Click here to open the Visual dBASE Help Topics dialog box (Contents/Index/Find).

What is *Visual* dBASE 7?

Topic group

Visual dBASE 7 is a 32-bit rapid application development (RAD) environment for the creation of powerful database applications. It features flexible interactive database administration tools, an advanced third-generation object-oriented programming model, and a high level of backward compatibility.

Your *Visual* dBASE 7 package includes the new Borland Database Engine (BDE) engine, which allows easy connectivity to dBASE tables—including the new DBF7 file format—and provides native support for Paradox, Microsoft Access 95, and Microsoft FoxPro formats, as well as any 32-bit ODBC-supported data source. Borland's SQL Links drivers (Client/Server edition only) extend support to the most popular enterprise database formats, including Oracle, Sybase, InterBase, MS SQL Server, IBM DB2, and Informix. *Visual* dBASE 7 also allows you to create links to other data sources through custom data objects.

This section of Help introduces you to the *Visual* dBASE 7 development environment and provides you with examples and tips that will help you get started quickly.

- What's new in *Visual* dBASE 7?
- What's changed in *Visual* dBASE?

Overview of new features

Topic group Related topics

Visual dBASE 7 offers dozens of new features and language elements to provide you with a more productive, efficient work environment. Among the new features and functionality:

- Report objects and the integrated Report designer
- Project Explorer
- Data objects
- ActiveX integration
- Enhanced visual designers
- Inspector improvements
- Full-featured Source editor
- New language elements
- SQL designer
- New BDE utility and expanded database support
- New DBF7 file format

Report objects and the integrated Report designer

Topic group Related topics

You can now create reports and labels using native Report objects and the new *Visual* dBASE Report designer (similar to the Form designer). The new classes use the full power of the object-oriented programming model, with objects that offer such sophisticated features as

- Complex expression support
- Conditional rendering
- Flexible grouping
- Inheritance
- Report viewing within a form

Project Explorer

Topic group Related topics

Visual dBASE 7 offers a new way to manage files and applications. The Project Explorer provides

- Automatic file viewers
- Instant switching between visual preview and source code views
- Project-based compiler directives
- The ability to compile, build, and deploy entire projects

Note that the Project Explorer replaces the Catalog functionality available in earlier versions. A conversion utility, CAT2PRJ.PRG, is available in your *Visual* dBASE/bin directory to let you easily convert Catalogs to Projects.

Data objects

Topic group Related topics

New data access classes merge the SQL and object-oriented paradigms. You can use queries within databases within sessions. Sessions provide independent connections to tables. Each database can then connect to a different data source. The queries connect to one or more tables and provide table navigation capability. The new objects let you

- Use Query, Rowset, Field, Database, Session, StoredProc, and other classes to access tables and stored procedures. (Data objects use only SQL to gather data.)
- Use DataModule and DataModRef objects to represent multiple data access objects and their relationships. These new objects take the place of *form.view* and old QBE files.
- Create custom data objects to access specialized, third party, and future data formats.

Enhanced visual designers

Topic group Related topics

- The visual designers feature numerous usability and productivity enchancements, including
- Win32 controls
- New Grid and Browse controls, which are faster and offer more functionality than the table browsing functionality in earlier versions
- Complete ActiveX control integration
- Live Two-Way-Tool™ editing: changes made in visual designers are immediately reflected in the source code and vice versa; to switch between the two, press F12
- File drag-and-drop capability lets you easily link tables and pull files onto a form or report from the Navigator, Project Explorer, Windows Explorer, or even the Windows Find results window
- Dockable toolbars
- A text-formatting palette, featuring industry-standard HTML tags
- In-place editing for Text components
- Automatic labeling for fields dragged from the Field palette
- Versatile form/report metrics (chars, twips, pixels, millimeters and more)
- Expanded image format support. The list now includes support for BMP, GIF (including animated GIF), ICO, JPEG, PNG, XBM, WMF, EMF, TIFF, PCX, and EPS formats

ActiveX integration

Topic group Related topics

You can now add ActiveX (OCX) controls directly into your forms and reports. You can either inspect ActiveX controls directly, or right-click a control to access its internal configuration dialog.

Inspector improvements

Topic group Related topics

The improved Inspector now offers

- Single-click list expansion
- Advancement or toggling of a selection with Ctrl-Enter (an alternative to double-clicking)
- A tool button on the Methods page to let you write method overrides
- Bold highlighting on changed and non-default values
- A property type chooser and history list
- Access to a codeblock builder and long string editor tool

Full-featured Source editor

Topic group Related topics

A new, fully-customizable ASCII Source editor is now available for writing programs and methods. The new editor replaces both the former Program editor and Method editor. It features

- Instant access (F12) from visual designers, with immediate updating between source and design modes
- A tree view of classes, objects, and methods
- Tabbed pages
- Improved syntax highlighting and a customizable color scheme
- Drag-and-drop editing, including the ability to drag code snippets onto the desktop or into another editor page, and drag them back into any page
- Multiple-level grouped undo
- Keystroke macro recording and playback
- An automatic file-open feature: If another file name appears in your source code, you can set your cursor on the name and press Ctrl-Enter to open the file
- Easy commenting and comment removal on selected blocks
- Enhanced configuration options

Additions to the *Visual* dBASE language

Topic group Related topics

- *Visual* dBASE 7 offers a number of new classes. In addition to the report and data classes noted earlier, new programming elements include
- Container and Notebook controls
- A Grid control
- Slider, Progress indicator, and TreeView controls
- Toolbars
- File handling classes
- New language elements include
- C operators: % ++ - - += -= *= /= %=
- C++-style comments: /* block comments */ and // end-of-line comments
- Logical constants and operators without the dots (case-insensitive): true, false, and, or, not
- An assignment-only operator := to prevent the creation of a variable or property when you mistype its name
- Structured exception handling with a new TRY...CATCH...FINALLY block, THROW statement, and Exception class
- WITH block for referencing multiple properties of the same object

SQL designer

Topic group Related topics

The new SQL designer lets you create, edit, and execute SQL queries. You can use the tool to test and apply the simplest SELECT statements to the most advanced queries on data in any supported data source. You can then view the results and save your query for inclusion in your programs. The new designer replaces the XBASE-QBE Query designer.

BDE Administrator and expanded database support

Topic group Related topics

- The new BDE Administrator utility, which replaces the BDE Configuration utility included with previous versions, helps you create aliases and test and configure your database connections and settings. Also, the enhanced BDE engine now offers a significant increase in the number of database objects that can be opened in each BDE session.
- The Client/Server edition of *Visual* dBASE 7 supports most popular enterprise database formats, including updated, high-speed native SQL Links drivers for DB2, Informix, Oracle, MS SQL Server, Sybase, and InterBase.
- All editions now include native (non-ODBC) Microsoft Access 95 and Microsoft FoxPro table support, along with improved Local SQL (for DBF and DB tables) and support for the new DBF7 table format.

New DBF7 file format features

Topic group Related topics

New features include

- Long field names
- New field types: TimeStamp, Double, AutoIncrement, Long
- Field constraints: minimum, maximum, required, and default
- Null character fields
- Distinct indexes; user gets a key violation when attempting to add a duplicate
- Primary distinct index
- Referential integrity
- Table constraints: an array of strings containing logical *Visual* dBASE expressions that act as row-level constraints when attempting to save a row
- Custom field attributes that comprise an active data dictionary that works at runtime as well as design time. These attributes are named properties with string values and are created in the Table designer.

New samples and sample viewer

Topic group Related topics

Sample forms, reports, menus and other files are located in the SAMPLES directory in your main *Visual* dBASE directory.

The directory features a form called SAMPLE GUIDE.WFM, which gives you a visual preview and description of the purpose of each sample form or applet.

Changes from earlier versions

Topic group Related topics

The following items and references found in earlier versions have been changed, retired or replaced in *Visual* dBASE 7.

- Query-by-example has been replaced by a new SQL query builder and the direct application of SQL. Also, the new SQL designer replaces the XBASE-QBE Query designer.
- The Catalog has been replaced by the Project Explorer. Catalogs may be converted with the CAT2PRJ.PRG program in your /BIN directory.
- Designer tool windows can no longer be minimized on the desktop.
- Records are now generally referred to as *rows* in the user interface and documentation. However, property and function names that used “rec” or “record,” such as RECNO(), RECCOUNT(), and abandonRecord(), remain unchanged.
- The BDE Configuration Utility has been redesigned and is now called the BDE Administrator.
- Crystal Reports has been replaced by a new, integrated Report designer. Your *Visual* dBASE 7 package includes a utility to convert your reports from the old format.
- The Expression Builder has been retired in the new streamlined coding package.

The following language elements have changed since *Visual* dBASE 5.x:

- Core executables and resources files now carry the VDB name, replacing DBASEWIN. Also, the preprocessor version identifier has changed from __dbasewin__ to __vdb__; likewise, the default _app.ddeServiceName property is now VDB, not DBASEWIN.
- Integers with leading zeroes are now interpreted as octal numbers. For example 031 is decimal 25. You may use a leading zero before a decimal point; for example 0.45. You may specify hexadecimal numbers with a leading 0x or 0X; for example 0x64 is decimal 100.
- *Visual* dBASE now performs automatic type conversion when concatenating or comparing values of different types.
- The internal algorithm for the MOD() function has changed, causing different results in ambiguous cases.
- Default PRECISION is now 10, with a maximum of 16 digits of real precision, although up to 18 digits may be displayed (the extra digits are "garbage").
- SESSIONS now defaults to OFF. The sessions created by CREATE SESSION are now referred to as worksets to differentiate them from Session objects. Issuing CREATE SESSION before opening a form is generally not required for forms that only use the new data objects.
- Unusual expression indexes, including those that use UDFs, are no longer supported. See INDEX for a list of supported index functions.
- The INTEGRITY option of SET RELATION is no longer supported. It will not cause a syntax error, but it has no effect. This functionality has been superseded by (1) the engine-level integrity in the new DBF7 format and (2) the built-in integrity features of the new data objects.
- The data type mappings for the Local SQL command CREATE TABLE have changed to support the new DBF7 format.
- The default calling convention for the EXTERN command is now STDCALL instead of PASCAL, so the function name you specify in the EXTERN command is case-sensitive. *Visual* dBASE is not case-sensitive, so once the function has been EXTERNed, it is not necessary to match case to call the function.
- *Visual* dBASE string operations now use Unicode. Among the implications of this feature are that, in addition to switching to Win32 API calls, you can no longer simply concatenate a string to be used as a structure. Instead you must use the getByte() and setByte() methods of the String object to manipulate the individual bytes of the Unicode string.
- The following command and functions (primarily dBASE IV UI commands) are no longer supported:

@...CLEAR	GETEXPR( )	READKEY( )
@...FILL	IMPORT	READMODAL( )
@...SAY...GET	INPUT	READVAL( )
@...SCROLL	LABEL FORM	RELEASE MENUS

@...TO	LASTKEY( )	RELEASE POPUPS
ACCEPT	MCOL( )	RELEASE SCREENS
ACTIVATE MENU	MDOWN( )	RELEASE WINDOWS
ACTIVATE POPUP	MOVE WINDOW	REPORT FORM
ACTIVATE SCREEN	MROW( )	RESIZE WINDOW
ACTIVATE WINDOW	ON BAR	RESTORE SCREEN
BAR( )	ON EXIT BAR	RESTORE WINDOW
BARCOUNT( )	ON EXIT MENU	ROW( )
BARPROMPT( )	ON EXIT PAD	SAVE SCREEN
CLEAR GETS	ON EXIT POPUP	SAVE WINDOW
CLEAR MENUS	ON MENU	SET BORDER
CLEAR POPUPS	ON MOUSE	SET COLOR OF
CLEAR SCREENS	ON PAD	SET COLOR TO
CLEAR WINDOWS	ON POPUP	SET DISPLAY
COL( )	ON SELECTION BAR	SET FORMAT
DEACTIVATE MENU	ON SELECTION FORM	SET INTENSITY
DEACTIVATE POPUP	ON SELECTION MENU	SET MOUSE
DEACTIVATE WINDOW	ON SELECTION PAD	SET WINDOW OF MEMO
DEFINE BAR	ON SELECTION POPUP	SHOW MENU
DEFINE BOX	PAD( )	SHOW OBJECT
DEFINE MENU	PADPROMPT( )	SHOW POPUP
DEFINE PAD	POPUP( )	VARREAD( )
DEFINE POPUP	PROMPT( )	UPDATED( )
DEFINE WINDOW	READ	WINDOW( )

Visual dBASE documentation

Topic group Related topics

Your *Visual* dBASE Help system offers full context sensitive help, examples, expanded and updated conceptual and training material, plus a full *Language Reference* with code samples you can cut and paste directly from the Help window.

Typographical conventions

The following typographical conventions used in this Help system will help you distinguish among various language and syntax elements.

Convention	Applies to	Examples
Italic/Camel cap	Property names, events, methods, arguments	length property, beginFilter() method, <start expN> argument
ALL CAPS	Commands and functions, files and directories	REPLACE command, INT() function, CUSTOMER.DBF
Initial caps	Class names, table names, field names, menu commands	StreamSource class, Members table, Price field
Monospaced font	Code examples	cTest = new String("Test");

Documentation updates and additional information resources

Topic group Related topics

The *Visual* dBASE home site on the World Wide Web, at http://www.borland.com/VdBASE, helps you find the most current information about *Visual* dBASE. Periodic upates to the *Visual* dBASE Help system, as well as technical notes, tips, and other materials that will further your understanding of the program, will be posted on the *Visual* dBASE documentation page at http://www.borland.com/techpubs/VdBASE.

The BDE Administrator and other included applications and controls, such as OCX controls, offer their own Help systems, which can be run from disk, from within the applications, or by pressing F1 while an application is open or control is selected.

For tips on using Windows Help, choose Help|How To Use Help from the main *Visual* dBASE menu.

Software registration

Topic group Related topics

To register your product with Borland and qualify for support, use the registration card included in your *Visual* dBASE package or register at our Web site at http://www.borland.com.

Borland developer support services

Topic group Related topics

Borland offers developers high-quality support options. These include free services on the Internet, where you can search our extensive information base and connect with other users of Borland products. In addition to this basic level of support, you can choose from several categories of telephone support, ranging from support on installation of the Borland product to fee-based consultant-level support and detailed assistance.

To obtain pricing information for Borland's developer support services, please see our Web site, at http://www.borland.com/devsupport, or call Borland Assist at (800) 523-7070.

What you need to run *Visual* dBASE

Topic group Related topics

To run *Visual* dBASE you need the following:

- A personal computer with a 486DX or faster CPU
- Microsoft Windows NT 4.0 or Windows 95 operating system
- A CD-ROM drive (needed for installation only)
- 12MB RAM
- 31MB free space on your hard disk drive for the Professional edition; 35MB for the Client/Server edition
- A VGA or higher resolution monitor and graphics adapter
- Mouse or other pointing device

Products and programs in your *Visual* dBASE package

Topic group Related topics

These are the products and programs that come with *Visual* dBASE:

- *Visual* dBASE, including integrated compiler/runtime system.
- The *Visual* dBASE debugger.
- The 32-bit Borland Database Engine (BDE) and configuration utility (BDE Administrator), with native drivers for dBASE, Paradox, Microsoft Access 95, and Microsoft FoxPro databases.
- Integrated Help system, including a full *Language Reference*.
- Sample tables, forms, reports, and other files that you can learn from, use or adapt.
- A selection of custom controls and graphics (backgrounds, cursors, and other images) for use in forms and reports.
- Two utilities:
- One for converting Crystal reports to *Visual* dBASE 7 reports.
- InstallShield Express for creating install programs for your applications.
- ODBC connectivity and Local InterBase.
- The enterprise-scale Client/Server edition also includes
- A full set of high-performance Borland SQL Links for connecting to InterBase, Oracle, Sybase, Informix, IBM DB2, and Microsoft SQL Server databases.
- Business Object Broker for distributed computing.
- Data Migration wizard for rapidly moving data from one type of source to another (for example from a .DBF database to an Oracle database).

Installing *Visual* dBASE

Topic group Related topics

To install *Visual* dBASE,

1 Insert your *Visual* dBASE CD into your CD-ROM drive.

2 Choose Run from the Start menu.

3 In the Run box, type the letter of your CD ROM drive, followed by a colon and the word setup, for example,

```
d:setup
```

4 Follow the directions that appear onscreen.

The README.TXT file appears near the beginning of the installation process. You can read it there, or you can open it later from your *Visual* dBASE root directory or program group.

What happens during installation

Topic group Related topics

In addition to installing the options you selected, the following occurs during setup:

- These ActiveX controls are installed and registered:
- BFX.OCX and PROJECT.OCX (Project Explorer controls installed with the dBASE program)
- Chart FX, Pinnacle-BPS Graph Control, VCI First Impression Chart, VCI Formula One Workbook, Visual Speller Control (sample controls installed with the dBASE samples)
- The RegSvr32 utility is copied into the windows system folder.
- The dBASE registry settings are written to HKEY_LOCAL_MACHINE\SOFTWARE\Borland*Visual* dBASE.
- In addition to the usual subdirectories, like BIN, a subdirectory named My Projects is created off the *Visual* dBASE home directory, by default C:\Program Files\Borland*Visual* dBASE\My Projects.

Uninstalling *Visual* dBASE

Topic group Related topics

To uninstall *Visual* dBASE, use the Add/Remove Programs dialog box in the Windows Control Panel.

Note: During uninstallation, you also have the option of keeping any shared program libraries on your disk that may be needed by other programs. Even if you choose to remove the shared files, other files and directories may remain on your disk after uninstallation. These remaining files are usually forms, applications, directories or other items you created while using *Visual* dBASE.

For other issues that may affect *Visual* dBASE removal, see README.TXT (normally stored in your *Visual* dBASE root directory or program group).

How to connect to an SQL database server

Topic group Related topics

If you are connecting your *Visual* dBASE application to an SQL database, you need to configure your SQL Links Driver and BDE to access your SQL database. In this procedure, you create an alias that BDE uses to locate the SQL database. You then add this alias to the Database object on your *Visual* dBASE form or report.

Note: The following instructions apply to purchasers of the Client/Server edition of *Visual* dBASE.

Install and configure the client software

Consult the documentation for your SQL database management system product for specific guidance on the initial steps of the following general procedure (specific product requirements may differ).

1. Make sure you have properly installed the client software for the database management system product to which you want to connect (Oracle, Sybase, Informix, InterBase, IBM DB2, or MS SQL Server).
2. Define server names or other connection strings in the product's required configuration files. For example, in Oracle, TNSNAMES.ORA, or in Sybase, SQL.INI, and so on.
3. Test the connection by using the database vendor's connection utility (such as Sybase's SYBPING.EXE). If you cannot "ping" the server with this utility, BDE and *Visual* dBASE will probably not be able to access it either.
4. Make sure that both BDE and the Borland SQL Links products are properly installed. These core products are included with the *Visual* dBASE Client/Server edition. If properly installed, the SQL Links drivers for Oracle, Sybase, MSSQL, IBM DB2, Informix, and InterBase appear on the Configuration page of the BDE Administrator, which is available from the *Visual* dBASE program group off the Start menu.

Configure the Borland Database Engine (BDE)

The Borland Database Engine (formerly called IDAPI) allows *Visual* dBASE to share data with supported SQL databases, Access 95, and FoxPro. If you'll be connecting to any of these databases, you must assign aliases to them and otherwise configure BDE with the parameters of the database.

To create an alias and configure the BDE,

1. Open the BDE Administrator (BDEADMIN.EXE), available from your *Visual* dBASE program group or from the Borland\Common Files\BDE directory.
2. Click the Databases tab.
3. Right-click and choose New to create a new alias.
4. Select the correct database driver name, type an alias name, and enter the path to the database.
5. After you have assigned an alias to a database, click the Configuration tab and set the appropriate parameters in the Definition panel. Parameters may vary according to vendor. (Parameters in bold cannot be changed.)

Note: If you're creating a new ODBC alias, you must define its DSN before you can connect to that database.

You'll find complete instructions in the BDE Administrator Help system. Press F1 with the cursor in any parameter for information on that parameter.

Listing SQL tables in the Navigator

Topic group Related topics

To see SQL tables listed in the Navigator,

1 Open the Navigator, and click the Tables tab.

2 Select the SQL server database alias from the Look In drop-down list (at the top of the Navigator).

3 At the prompt, enter your login name and password to connect to that SQL server database.

Once you're connected, you will see the tables in that database in the Navigator.

Customizing the development environment

You can set your preferences for the *Visual* dBASE working environment in most areas of the product. Dialog boxes in which you can change preferences, or properties, are generally available from the Properties menu, and many are available from the right-click menu. Many of the options you'll want to look at first are in the Desktop Properties dialog box (Properties|Desktop Properties).

In addition, you can set preferences for

- The built-in Source editor
- The Project Explorer
- The designer windows
- The Command window
- The Navigator
- The SQL designer
- ActiveX components
- The Image Viewer
- Table windows

Customizing tool windows

To customize tool windows, palettes, and the Inspector, use the Customize Tools dialog box, available from the View|Tool Windows|Customize Tools menu

Using menu toggle commands

In addition to setting your preferences in dialog boxes, the View menu and several context (right-click) menus have toggle commands for showing and hiding various tools.

The Inspector's right-click menu lets you categorize or alphabetize properties. If you have properties categorized, you can expand and collapse all categories at once using this menu.

Programming in *Visual* dBASE (introduction)

Topic group Related topics

Visual dBASE is an object-oriented, event-driven programming language that allows developers to create sophisticated, scalable applications using objects and classes.

Objects are a means of encapsulating collections of variables, some containing data, others referencing code. Classes are a mechanism for creating reusable groups of objects. With *Visual* dBASE, you can

- Create objects from standard classes or classes you declare
- Add custom properties to an object with a simple assignment statement
- Declare custom classes
- Declare classes that are based on other classes and inherit their properties and methods
- Write highly reusable code by building hierarchies of classes

“Hard coding” vs. visual programming

Topic group Related topics

Using a text editor, you can write programs from scratch by typing each command, line after line. That’s how most programmers used to write programs: the hard way. With *Visual* dBASE, you use design tools to generate the program code for you. The most painstaking requirement of traditional user-interface programming—guessing how fields and menus will appear after positioning them with coordinates—is obsolete. You place objects on a form exactly where you want them, and let *Visual* dBASE figure out the coordinates. That’s visual programming.

But there’s more to visual programming than just laying out forms. The objects you place on your forms have a built-in ability to respond to a user’s actions. A pushbutton automatically recognizes a mouse click. A form “knows” when the user moves or resizes it. You don’t need to figure out what the user does and how it happens. *Visual* dBASE handles that. You just tell the objects how to respond to these events by assigning procedures that will execute when the events occur.

The results of programming visually are applications that are easy to create and easy to use. They’re easy to use because they’re event-driven.

Advantages of event-driven programs

Topic group Related topics

The three major kinds of user interfaces are

- Command-line, where the user types commands at a prompt. The MS-DOS operating system and the dBASE Dot Prompt (in prior versions) and Command window (in *Visual* dBASE) are examples of command-line interfaces.
- Menu-driven, where the user selects choices from a hierarchy of menu items. Most applications written using prior versions of dBASE provide menu-driven interfaces.
- Event-driven, where the user interacts with visible objects, such as forms containing pushbuttons and list boxes, in any sequence. The user interface is event-driven, and you can create event-driven applications using the dBASE language.

Using traditional programming techniques, you can build menu-driven user interfaces. In these applications, the program dictates the sequence of events. If the user selects Order Entry from a menu, the program typically walks through a series of screens asking the user for information: enter the customer name, enter the date and purchase order number, enter the line items, enter the shipping charge.

These menu-driven techniques are not well-suited for programming in event-driven environments such as Windows. In an event-driven application, the user controls program flow. A user can click a button, activate a window, or select a menu choice at any time, and the program must respond to these events in whatever sequence they occur.

In a well-designed event-driven application,

- The user can focus on the task, not on the application. The user doesn't have to learn a complex hierarchy of menu choices. Rather, when choosing to enter an order, the user sees an order form similar to a familiar paper form.
- The user doesn't need to re-learn how to perform tasks. Because you create an application's interface using familiar objects such as pushbuttons and list boxes, common operations—opening a file, navigating a form, exiting the application—are more consistent across applications.

Most important, event-driven interfaces reflect the way people work in the real world. When clerks write up orders, they pick up forms and fill them out. When they receive checks for orders, they pick up the invoices and mark them as paid. This natural flow of work follows an object-action pattern. That is, a clerk selects an object (an order form, an invoice) and performs some action with it (fills out the order, posts the check).

Likewise, in an event-driven application, the user selects objects (forms, entry fields, pushbuttons) and performs actions with them.

How event-driven programs work

Topic group Related topics

In an application, the form is the primary user-interface component. Forms contain components, or controls, such as entry fields and pushbuttons, with which the user can interact. The controls recognize events, such as mouse clicks or key presses.

You attach code to event handlers of controls, such as *OnClick* or *OnLeftMouseDown* (most begin with *On*), that correspond to specific events. For instance, when a user clicks a pushbutton, the *OnClick* event handler executes.

Specifying event handlers for forms is similar to using the ON commands in dBASE DOS, such as ON KEY LABEL or ON ERROR. Like an event handler, the ON command designates some program code to execute when an event, such as a keypress or a run-time error, occurs. However, the events handled by the ON commands are limited and are not associated with user-interface objects.

In a typical event-driven application,

1 The application automatically displays a start-up form.

2 The form, or a control on the form, receives an event, such as a mouse click or keystroke.

3 An event handler associated with the event in step 2 executes.

4 The application waits for the next event.

Imagine a sample “Hello world!” form with one pushbutton on it that is labeled “Goodbye”. After displaying the form, *Visual* dBASE waits for an event. The user can move, resize, minimize, or maximize the form. When the user clicks the pushbutton, *Visual* dBASE executes the *OnClick* event.

The following code, a .WFM file generated by the Form designer, creates the form just described . This code follows the general structure of all forms generated by the Form designer. For now, don’t try to understand every line. Just look at the general structure to get a sense of how forms are created, properties are set, and event handlers are assigned to events.

```
parameter bModal
local f
f = new Hello()
if (bModal)
   f.mdi = .F. && ensure not MDI
   f.ReadModal()
else
   f.Open()
endif
CLASS Hello OF FORM
   with (this)
      Height = 16
      Left = 30
      Top = 0
      Width = 40
      Text = "My first dBASE form"
   EndWith
   this.TEXT1 = new TEXT(this)
   With (this.TEXT1)
      Height = 3
      Left = 11
      Top = 3
      Width = 33
      Metric = 0
      ColorNormal = "N/W"
      FontSize = 23
      Text = "Hello world!"
   EndWith
```

```
   this.BUTTON1 = new PUSHBUTTON(this)
   With (this.BUTTON1)
      onClick = class::BUTTON1_ONCLICK
      Height = 2
      Left = 19
      Top = 9
      Width = 13
      Text = "Goodbye"
      Metric = 0
      StatusMessage = "Click button to exit"
      Group = True
   EndWith
   // {Linked Method} Form.button1.onClick
   PROCEDURE Button1_OnClick
      DO WHILE (Form.Height > 0) .AND. (Form.Width > 0)
         Form.Text1.Text = "Goodbye"
         Form.Height = Form.Height - 1
         Form.Width  = Form.Width  - 1
         Form.Top    = Form.Top    + .5
         Form.Left   = Form.Left   + .5
      ENDDO
      Form.Close()
   RETURN
ENDCLASS
```

Developing event-driven programs

Topic group Related topics

All you really need to develop event-driven programs is the Form designer and Menu designer. Using the designers and their tools, you can build data-entry forms, dialog boxes, menus—all the visible components of an application. Then use the built-in Source editor to tie the components together by writing procedures to execute when events occur.

Projects that are more complex, however, require planning and a good design. That's where object-orientation helps. Using object-oriented techniques, you can group related information into your own objects, build classes of related objects, and create new objects by making easy modifications to existing ones.

Creating an application (introduction)

Topic group

Using *Visual* dBASE design tools, you can create the visual elements of an application quickly, in a manner that promotes reuse of design elements rather than repeated reinvention. Using the Component palette, you simply drag and drop both the visible user-interface components (also known as *controls* or *objects*) and the invisible data access objects onto forms. The Inspector gives you an easy way to set an object's attributes, or *properties*, and access its event handlers and methods directly, without hunting.

As you work with the design tools, *Visual* dBASE writes the corresponding dBASE code for you. If you prefer to do most of your developing in the Source editor, the code you write is reflected in the designer, and you can see immediately what your form looks like and how it runs. In either case, the entire source code for your form is available to you in the Source editor at all times. Press F12 to toggle between the source code and the visual designer.

This chapter discusses the basic steps of creating an application in *Visual* dBASE. It includes information on

- Creating projects and using the Project Explorer to manage them
- Planning and creating forms
- Code generated by the Form designer
- Types of form windows (MDI, SDI, modal, modeless)
- Using ActiveX controls, container components, and multi-page forms
- Creating custom classes, custom components, and data modules and using them in a form or report.

Menus are created separately with the Menu designer. You program a form to display a pull-down menu by referencing it in the form's *menuFile* property; a popup menu you reference manually in the Source editor.

Creating an application (basic steps)

Topic group

At the simplest level, designing an application in *Visual* dBASE consists of these steps:

1 Create a project that will hold all your application's files (and any other files you need to have handy while you're developing). Files you create while the project is open will be added to the project automatically. You may also add to the project any relevant files you've already created.

2 If you're creating tables from scratch, plan your tables so that you can link them to one another.

3 Plan your directory structure. For example, you may want to put tables in a DATA subdirectory and images in an IMAGES subdirectory.

4 Use the BDE Administrator to create Borland Database Engine (BDE) aliases for any SQL databases you may be using, so that you can access those databases through the BDE and through your application, which uses the BDE. (You may assign an alias to other databases, as well.)

5 If several forms (or reports) will be using the same data-source setup (table relationships, SQL statements, methods, and so on) create a data module so that you need to create the data-source setup only once.

6 Create the custom form and report classes you'll need, to give your application a unified look.

7 Create the forms (data entry forms, dialog boxes, and so on) that make up the user interface of your application.

8 Create any reports that your forms will link to or run, using the *Visual* dBASE Report wizard and integrated Report designer.

9 Compile and build your project (choose Build|Compile from the Project Explorer).

10 Test and debug, using the *Visual* dBASE debugger.

11 Create an installation program, using the InstallShield Express utility (choose Build|Create Install Program from the Project Explorer).

Project files (overview)

Topic group Related topics

Every application should have a project (.PRJ) file. The project file contains pointers to all your application files (tables, forms, queries, bitmaps, and so on). In addition to keeping things organized, having a project file lets you

- Compile and build a project.
- Set properties for the project as a whole; for example, you can set compile options, like preprocessor directives.
- Set properties for individual files; for example, you can specify which files you don't want to include in the build.
- Designate which file should be the first to open when your executable file is run.
- See instant previews of your files in the Project Explorer.
- Open several files at once.
- And if you create a file while a project is open, the file is automatically added to the project.

To create a project file

Topic group Related topics

1 Choose File|New Project.

2 In the New Project dialog box, type a name for the project.

This name will become the name of the project folder and the project file.

The Project Location text box updates to show your project name at the end of the path, in a subdirectory called My Projects (which is created during Setup). All of your projects will go in this directory, unless you specify otherwise. If you want to specify a different location, leave the Project Name text box blank, and add your new project name (directory) to the end of your specified Project Location path. A new directory is created at that location.

3 Choose OK.

The Project Explorer opens, displaying a tree view of several empty folders on the left and a viewing panel on the right. The left panel looks and acts much like the Windows Explorer. Files have context (right-click) menus that let you open, run, compile, create something new, and so on.

When you have files in your project, the right-hand pane displays read-only views of a file you select. A file may have more than one view, in which case more than one tabbed page may appear. For example, one tab may show source code for a custom control, another, the visual object.

To add files to a project

Topic group Related topics

You can add files to a project in three ways:

- Create a file while a project is open. The file is added to the project automatically.
- Drag files to the Project Explorer from the Navigator or Windows Explorer. You don't have to aim them at a particular folder; they will automatically drop into the correct folder. File types are assigned to folders in the Windows registry. If a file extension is not registered, *Visual* dBASE places it in the Other folder (at the bottom of the tree).
- Choose Project|Add Files To Project. You can select as many files as you want and choose Open to add them to the project. *Visual* dBASE places them in the correct folders.

Note: When you add a file, *Visual* dBASE scans for other file references, for example a #INCLUDE .h file, and those files are automatically added to the project.

Notes on the Project Explorer

Topic group Related topics

- To save a project, choose File|Save Project (Ctrl+V).
- You can create your own folders (Project|Folder, or use the context menu). In the dialog box that appears, give the folder a name and assign extensions to it. The folder and its associated extensions are added to the registry.
- Clicking on a folder in the left pane gives you a List view in the right pane. Right-click for a menu. You can multi-select files in the right pane and perform the same operation on them as a group: open, compile, delete, and so on.
- You can have only one project open at a time.
- The BIN directory contains a utility (CAT2PRJ) that converts your *Visual* dBASE 5.x Catalog files to Project files.
- When your project is ready to be deployed as an application, choose Build|Create Install Program to create an InstallShield Express set-up program for your users.

Building the user interface (overview)

Topic group

Visual dBASE forms (and the menus and toolbars you create for them) make up the user interface of an application. The forms you design become the windows and dialog boxes of your application. Some of the components you place on a form are the controls that let a user operate the application. Other components are data access objects that are invisible when the application runs but that link the application with data in tables.

Components contain three kinds of information:

- **State information**. Information about the present condition of a component is called a *property* of the component. Properties are named attributes of a component that a user or an application can read or set. Examples of properties are *Height* and *Color*.
- **Action information**. Components generally have certain actions they can perform on demand. These actions are defined by *methods*, which are procedures and functions you call in code to tell the component what to do. Examples of component methods are *Move* and *Refresh*.
- **Feedback information**. Components provide opportunities for application developers to attach code to certain occurrences, or *events*, making components fully interactive. By responding to events, you bring your application to life. Examples of component events are *OnClick* and *OnChange*.

Form design guidelines

Topic group

The process of designing forms involves clarifying the specific needs of your application, identifying the information you want to work with, and then devising a design that best meets your needs. This section briefly describes the process.

Goal of form design

The goal of form design is to display and obtain the information you need in an accessible, efficient manner. The form should encapsulate data so that it may be run without affecting other forms that use the same data. *Visual* dBASE makes this simple.

It's important for your design to provide users with the information they need and clearly tell them what they need to do to successfully complete a task. A well-designed form has visual appeal that motivates users to use your application. In addition, it should use limited screen space efficiently.

Purpose of a form

Each form in your application should serve a clear, specific purpose. Forms are commonly used for the following purposes:

- **Data entry forms** provide access to data in one or more tables. Users can retrieve, display, and change information stored in tables.
- **Dialog boxes** display status information or ask users to supply information or make a decision before continuing with a task. A typical feature of a dialog box is the OK button, which the user clicks to process the selected choices.
- **Application windows** contain an entire application that users can launch from an icon off the Windows Start menu.

You should be able to explain the purpose of a form in a single sentence. If a form serves multiple purposes, consider creating a separate form for each.

Some guidelines for data entry forms

When designing data entry forms, consider the following guidelines:

- If data resides in multiple tables, use a query or data module that defines the relationships among tables.
- If users need access to only some of the information in a table, use a query or data module that selects only the records and fields you want.
- Find out in what order users will want records to appear, for example, alphabetically, chronologically, or by customer number. Use a query with indexes that arrange records in the order the users will want.
- Identify the tasks that users need to perform to work with data on the form, and provide menus, pushbuttons, and toolbar buttons that users can choose to initiate tasks.
- When designing a form, you can provide validation criteria on a field-by-field basis. Use the following questions to help you decide the criteria you need.
- Do you require an entry for the field, or can users leave it blank?
- Are duplicate entries allowed?
- Must the data fall within a valid range?
- Must the data appear in a specific, fixed format, such as a phone number?
- Are valid entries limited to a list of values? If valid entries are *not* limited to a list of values, can you identify and suggest a list of frequently entered values to speed up data entry but allow users to enter companies not on the list?
- You can also provide form-level validation in a *canClose* event. This event returns True or False based on a condition you specify. If the condition has not been met, the form will not close. For example, you might want to use *canClose* if a user has not saved the last row entered. In the method you write for this event, you could ask if the user wants to save the data and if yes, allow the user to do so.
- You can associate some field types with particular controls. By default, each dBASE field type is associated with a specific control type. For example, a Numeric field type uses a spin box control by

default. You can change these associations if it will make entering data easier and more efficient in your particular application. Right-click the Field palette, and choose Associate Component Types.

- If your form needs to contain many fields or controls, consider using the Notebook component . Divide controls into related groups, with each group presented on a separate page of the notebook. Or use a multi-page form with buttons for page navigation. Or, instead of buttons, add a TabBox component, then set various TabBox properties to create page tabs and name each page.

Designing the form layout

You can put controls anywhere on a form. However, the layout you choose determines how successfully users can enter data using the form. Here are a few guidelines to consider:

- Put similar or related information together in a group, and use visual effects to emphasize the grouping. For example, put a company's billing and shipping address information in separate groups. To emphasize a group, enclose its controls in a distinct visual area using a rectangle, lines, alignment, and colors.
- On a form, the Tab key moves the focus from one control to another. Think about the order in which the user will be moving (tabbing) through controls on the form. The basic pattern is from left to right, top to bottom. However, you may want users to be able to jump from one group of controls to the beginning of another group, skipping over individual controls.
- If you have to fit in too much information for a single form screen, consider using a main form with optional smaller forms that users can display on demand, or using a form with multiple pages. Users are typically more productive when a screen is clean and uncluttered.

Guidelines for using the z-order

Topic group

All objects on a form exist in layers. When a form contains two or more controls, the plane in which a control exists always lies in front of or behind the plane in which another control exists. This affects two aspects of the form:

- **Visual layers, or the z-order, which indicates the z-axis (depth) of the layout. This determines what appears in front of (or on top of) what. Even when controls are laid out side-by-side, each control is in a unique plane of the form. That is, each control occupies a unique position in the z-order.**
- Tabbing order, which determines the order in which controls receive focus when a user presses Tab.

Each control is numbered to indicate its z-order position. The item in the back is number 1. The next item in front of the first item is number 2, and so on. By default, the z-order is the same as the order in which you added controls to the form. However, this is probably not the tab order you want. By choosing View|Order View, you can see the order of controls on a form and change the order by clicking on the numbers. Another way to change the order is to choose Layout|Set Component Order.

Another need for z-ordering is when you use a rectangle control, for example, to group a series of radio buttons. The radio buttons must appear on top of the rectangle, so you need to place the rectangle behind them in the z-order.

Creating a form

Topic group

You can create a form in two ways:

- **Use the Form wizard.** The Form wizard creates a data-entry form. It presents you with a series of options, and based on your selections, creates a form It saves time, and you can modify and further develop the form in the Form designer. See Using the Form wizard.
- **Use the Form designer.** Here you can create a form from scratch, by dragging components onto the form and specifying their properties. Since components have built-in functionality, you can actually create very simple applications with little or no coding. However, to create more complex and highly customized applications, you need to write your own event handlers and methods for various components.

  During form creation, press F12 to open the Source editor, where you can see and edit the dBASE code generated by *Visual* dBASE as you design your form. Pressing F12 toggles you between the visual design view and the integrated Source editor.

Using the Form wizard

Topic group

To use the Form wizard,

1. Choose File|New|Form. Or double-click the leftmost Untitled icon on the Forms page of the *Visual* dBASE Navigator. Then choose Wizard.
2. Go through the steps of the wizard, clicking the Next button when you're finished with each step. You can specify these things:

- The table or query that contains the data you want to use in the form
- The table fields you want to include in the form
- The layout for fields on the form
- Whether you want excess fields to spill over onto tabbed pages (using the TabBox component) or remain on the same page with a vertical scroll bar.
- The colors and font for the elements on the form, including the form itself, push buttons, editing and nonediting components. You can select a preset scheme of colors and patterns or define your own and save it, making it available for future use.

The Form wizard generates the form you specify. At the end of the wizard, you have the choice of running the form or opening the form in design mode to further customize it (adding components, changing properties, writing event handlers, and so on).

Using the Form designer

Topic group

To modify a wizard-created form or to design a form from scratch, use the Form designer (File|New| Form). These are the basic steps to follow in designing a form:

1 Place components on the form. To do so, drag files (including data modules, if you're using them) from the Navigator or Windows Explorer to automatically link a table or database to a form, and drag the objects you need from the Component and Field palettes onto the design surface.

Note: If you drag tables onto the form, the fields that are available on the Field palette are already linked to data. To link any other component to a field, set its *dataLink* property. See Linking a form or report to tables for more information.

2 Set component properties, using the Inspector (or the Source editor, if you prefer)

3 Attach code to component events and write the methods you need.

4 Create menus, as necessary, using the Menu designer (see Creating menus and toolbars**).**

5 Create toolbars and tool buttons, as necessary (see Creating menus and toolbars**).**

The Form designer creates a .WFM file.

The components available in *Visual* dBASE and the mechanics of using the Form designer, including the Inspector, are discussed in Using the Form and Report designers Also see the samples that come with *Visual* dBASE, installed by default in the *Visual* dBASE\Samples dirctory.

The following sections give you an orientation to the code generated by the Form designer.

.WFM file structure

Topic group Related topics

The following code was generated by

1 Dragging a table from the Navigator table's page onto the Form design surface

2 Adding a pushbutton from the Component palette

3 Selecting the *onClick* event in the Inspector and clicking its tool button

4 Writing simple code for an event handler that tells how many rows are in the table when the form is run and the button is clicked.

Here is the code:

```
** END HEADER -- do not remove this line
*
* Generated on 08/24/97
*
parameter bModal
local f
f = new UntitledForm()
if (bModal)
   f.mdi = .F. && ensure not MDI
   f.ReadModal()
else
   f.Open()
endif
CLASS AnatomyForm OF FORM
   this.Height = 12
   this.Left = 30
   this.Top = 0
   this.Width = 40
   this.Text = ""
   this.animals1 = new Query()
   this.animals1.parent = this
   with (this.animals1)
      Left = 10
      Top = 4
      SQL = 'SELECT * FROM "C:\PROGRAM FILES\BORLAND\VISUAL
DBASE\Samples\Animals.dbf"'
      Active = True
   endwith
   this.pushbutton1 = new pushbutton(this)
   with (this.pushbutton1)
      onClick = class::PUSHBUTTON1_ONCLICK
      Height = 1.1176
      Left = 20
      Top = 3
      Width = 15.875
      Text = "PUSHBUTTON1"
      Metric = 0
      FontBold = False
      Group = True
   endwith
   this.Rowset = this.animals1.Rowset
   // {Linked Method} Form.pushbutton1.onClick
   function PUSHBUTTON1_onClick
```

```
        this.text = form.rowset.count()
ENDCLASS
```

There are four major sections in a .WFM file:

- The first part is the optional Header section. This is any code above the ** END HEADER line. Comments that describe the file are usually put here.
- Between the header and the beginning of the CLASS definition is the standard bootstrap code. This code instantiates and opens a form when you run the form, similar to the way the boot sector of a disk starts the system when you turn on your computer. The standard bootstrap code allows you to open the form in two ways:
- If you DO the .WFM with no parameters, the form is opened with the *open*() method. The form is modeless.
- If you DO the .WFM with the parameter True, the form is opened with the *readModal*() method. The form is modal. A modal form cannot be MDI, so the form's *MDI* property is set to False first.
- The main CLASS definition constitutes the bulk of most .WFM files. This is the code representation of forms designed visually in the Form designer.
- Everything after the main class definition, if anything, makes up the General section. This is a place for other functions and classes.

Form class definition

Topic group Related topics

Like any other CLASS definition, the main one in the .WFM file can be further broken down into two parts:

- The constructor is the code that is run every time a NEW object of that class is instantiated. It creates, or constructs, an object of that class. Class constructors created by the Form designer are divided into four parts:
- Assignments to the stock properties of the Form object.
- Data access objects in the form, each with its own WITH block.
- All the controls in the form, each with its own WITH block.
- Housekeeping code; specifically to assign the rowset of one of the queries in the form to the form's *rowset* property as the form's primary rowset.
- Class methods, if any, follow. This is usually event handler code, but can also contain other methods that pertain to the form and which often are called by the event handlers.

How the contents are generated

The contents of the class constructor reflect the work you've done in the visual development environment. You can create and edit class methods in the Source editor. Both the Header and General sections are also editable in the Source editor. You have no control over the bootstrap code generated by the Form designer.

Editing a .WFM file

Topic group Related topics

As you become more proficient in *Visual* dBASE, you will find that it is sometimes more convenient to edit a form directly in source code without opening the form in the Form designer. To edit the form file directly, right-click the .WFM file in the Project Explorer or Navigator and choose Open In Source Editor. This will open the .WFM file in the built-in Source editor or another programmer's editor you specified in the Desktop Properties dialog box.

One advantage to using the built-in Source editor is that you can run the .WFM file directly by pressing Ctrl+D. No matter which editor you choose, you must save and close the .WFM file if you want to edit the form in the Form designer.

When editing the .WFM file directly, you want to preserve the two-way nature of the Form designer so that any changes you make manually will not be lost the next time you save the form from the Form designer.

Editing the header and bootstrap

Topic group Related topics

The first “safe .WFM” rule involves the line that says:

```
** END HEADER -- do not remove this line
```

Don’t remove or modify it! If you do, you might lose the contents of the header or prevent the Form designer from being able to read the form from the .WFM file.

The next rule is about the standard bootstrap code: don’t bother changing it. Every time the .WFM file is written the same standard bootstrap is rewritten anew, so any changes you make will be lost.

If you want to change the way the form is instantiated and opened when you run the form, instead of changing the bootstrap code, you need to add to it or replace it by placing your own bootstrap code in the header.

The key is to realize that a .WFM file is just a program file with a different extension. When you run the form, the code at the top is run just like when you run a program. To put it another way, there is nothing magical about the standard bootstrap code—it just happens to be the first code that is found at the top of a plain .WFM file. If there are some comments in the header they have no effect.

You can place any code you want in the header. The Form designer will ignore it.

Editing properties in the .WFM file

Topic group Related topics

Inside a WITH block, you may assign values to existing properties only. Therefore, you are free to edit the values assigned to any of the properties in the class constructor, or add assignments to the objects' stock properties.

Most properties must be of a particular data type. For example, *pageNo* is a number and *sql* is a string. If you change the property, you must maintain the correct type.

One notable exception is the *value* property. If a component is *dataLink*ed to a field, the type of that field determines the type of the *value*. But if the component is not *dataLink*ed, its type can be any of the simple data types. In the Inspector, you can use the Type button to select the type of the value you're assigning to the property if the property can accept multiple types.

The Form designer leans toward literals as opposed to expressions. For example, suppose you want a Text component to default to the current date. You could edit the .WFM file so that the assignment reads:

```
value = date()
```

That would work fine until the next time you edit the form in the Form designer. The expression gets evaluated when the form is loaded so that the *value* property has an actual date. Then that date gets saved to the .WFM file which causes the date that you last edited the form to be hard-coded into the form.

The simplest way to solve the problem is to set the *value* property programmatically, which puts it outside the reach of the Form designer. The most convenient place is the component's *onOpen* event. A simple codeblock like this will do it:

```
{;this.value = date()}
```

When the form is run, the form's *onOpen* event and each component's *onOpen* event, if any, is called in turn. This codeblock updates the *value* to the current date. The Form designer knows that a codeblock is attached to the *onOpen* event, and reads and writes it, but it doesn't bother with what's inside it, and doesn't change it.

Types of form windows

Topic group

Visual dBASE lets you create windows that are standard features of the Windows environment:

- MDI windows
- SDI windows
- Modal windows
- Modeless windows

The following sections briefly describe these form types.

MDI and SDI windows

You can create windows that conform to the Windows Multiple Document Interface (MDI). MDI is a Windows standard that allows an application to manage multiple windows or multiple views of the same document within the main application window. In *Visual* dBASE, for example, you can have multiple windows (Command window, Navigator, Table designer, and so on) open at the same time. You can also open the same document (form, table, report) multiple times.

You can also create Single Document Interface (SDI) windows with *Visual* dBASE. Unlike an MDI window, an SDI window does not contain any child windows.

MDI windows are the most appropriate for data entry forms. Forms that you create with the Form designer are MDI windows by default.

Modal and modeless windows

Visual dBASE lets you create both modal and modeless windows.

A modeless window does not take control of the user interface. A user can switch between modeless windows while an application is running. For example, the various windows that appear in the *Visual* dBASE Form designer, such as the Control palette, the Field palette, and the Inspector, are modeless windows.

A modal window takes control of the user interface. A user cannot switch to another window without exiting a modal window. A dialog box is an example of a modal window; when it's open, users cannot take any other actions outside the dialog box until it is closed. Modal forms are most appropriate as dialog boxes in applications.

Customizing the MDI form window

Following are some standard features of MDI windows:

- They are moveable and sizeable.
- They have a window title, a Control-menu box, Maximize and Minimize buttons.
- When active, their menus replace the menus in the application menu bar.
- They are bounded by the MDI parent window's frame.

If the MDI property is set to *true*, those features are automatically applied to the form. Accordingly, the following form properties are automatically set to *true*: *Minimize*, *Maximize*, *Sizeable*, *Moveable*, and *SysMenu*. Changing the MDI-required properties will have no effect until you change the *MDI* property itself to *false*. For more information about any of these properties, press F1 when the property in the Inspector is highlighted.

Using multi-page forms (overview)

Topic group Related topics

If your form needs to contain many fields or controls, you'll want to use a Notebook component or a multi-page form. Using either one, you can divide controls into related groups, with each group presented on a separate page.

It is easy to create forms with several pages and navigation buttons.

When you create a new form, the Form designer opens it on the first page. To create a multi-page form, choose the Next Form Page button on the toolbar. The Form designer appends a page each time you click the button.

To navigate between pages in the Form designer, use any of these techniques:

- Use the Next Form Page and Previous Form Page toolbar buttons.
- Choose View|Previous Form Page or View|Next Form Page.
- Use the PgUp and PgDn keys.
- In the Inspector, select the form object in the top selection box, and on the Properties page, change the numeric value of the *pageNo* property. Notice that as you change this value, the pages of the form change on the design surface.

Global page (forms)

Topic group Related topics

In a multi-page form, page 0 is a “global” page. Controls you place on page 0 are visible on every page of the form.

To open page 0,

1 Select the form object in the Inspector’s top selection box.

2 On the Properties page, change the numeric value of the *pageNo* property to 0.

Page 0 displays a composite view of all controls from all pages to help you position global controls so they will not interfere on the other pages. If you have several pages, naturally the various components of those pages may overlap in this composite view. To reposition the controls on other pages, you must navigate to the appropriate page.

Important: When you save a multi-page form, the page that is active becomes the default page at run time. Therefore, make sure you return to page 1 before clicking Run.

Navigation buttons (form pages)

Topic group Related topics

If you create a multi-page form, you will probably want to provide buttons to enable users to navigate between form pages. A simple solution is to create buttons at the top of the global page (*pageNo*=0) of the multi-page form.

To create one set of navigation buttons for a multi-page form,

1 Go to the global page, page 0 of the form (View|Go To Form Page Number).

2 Select the form itself in the Inspector's top selection box, and make sure the *pageNo* property is 0.

3 From the Component palette drag as many button components as you need to the visual design surface. Ensure that the buttons will not overlap controls appearing on other pages.

4 Select each button and set its *pageNo* property to 0 (the global page) so that it will appear on all pages. (Or multi-select the buttons and set the property once.)

5 Select each button's *text* property and change its value to whatever you want on the button, for example Next Page or Previous Page.

6 For each button, on its Events page, select *onClick* and click the tool button to display the Source editor. You'll see a comment for an *onClick* method. Write the code that will send the user to the appropriate page. Return to page 1 before running the form.

Creating a custom form, report, or data module class

Topic group Related topics

When you use the designers in *Visual* dBASE, by default the Form designer uses the Form class, the Report designer uses the Report class, and the Data Module Designer uses the DataModule class.

However, you can create *custom classes* and use them as templates (both for new forms, reports, and data modules and those already created). For example, if you want many forms in your application to have a similar look, you can specify all the common attributes for those forms, such as colors, size, controls, event handlers, and so forth, once. When you have established all the common attributes, save that form as a custom form class. Then you can specify that class to be a template for forms. Changes you subsequently make to the custom form class will be reflected in all its derived forms.

To create a custom form, report, or data module class,

1 Use the appropriate designer to create the form, report, or data module template you want.

2 Choose File|Save As Custom to display the Save As Custom dialog box.

3 Choose Save Form (or Report or Data Module) As Custom , then complete the rest of the dialog box.

   The new custom class file will be saved with the .CFM (custom form) extension if it's a form or .CRP (custom report) extension if it's a report or .CDM extension if it's a data module. Custom classes for forms, reports, and data modules are available from their respective pages in the Navigator. Their icons are yellow.

An alternate way to create a custom class is to double-click the yellow Untitled icon on the Forms, Reports, or Data Modules page of the Navigator. This opens the appropriate Custom Class designer, which is almost identical to the Form or Report designers. Then add the common features you want to appear on all derived forms, reports, or data modules.

Note: You can't run a file you've developed in this way; it is simply a template from which other forms, reports, or data modules can be derived.

Using a custom class

Topic group Related topics

To use a custom form, report, or data module class,

1 Open a new or existing form, report, or data module to which you want to apply a custom class.

2 From the designer, choose File|Set Custom Form (or Report or Data Module) Class.

3 Complete the Set Custom Class dialog box and choose OK.

Your custom class now applies to the current file in the designer. In addition, subsequent new files of that type will use the current setting in the Set Custom Class dialog box. To change this, choose File|Set Custom Class, and either enter a new form or report custom class, or choose the Clear Custom Class button to restore the default class as the setting.

Creating custom components (overview)

Topic group Related topics

You can create your own customized components and add them to the Component palette for easy reuse. A custom component is based on one or more of the components already on the Component palette. You arrange these components as you want them in the Form or Report designer, and set their properties, event handlers, and methods, as you desire.

Then you save your work into a custom component file (with the .CC extension) and optionally add it to the Component palette for convenient access.

To create custom components

Topic group Related topics

To create custom components that you can use again,

1. Drag a component or components to the Form or Report design surface, and arrange them the way you want them.
2. Set each component's properties, events, and methods.
3. Select the component or group of components.
4. Choose File|Save As Custom to display the Save As Custom dialog box, then complete the dialog box:

- Type a class name for the customized component.
- Specify an entire path name and the file (with the .CC extension) in which you want to store this component. Note that the components in a .CC file are treated as a group, and although you can add them to the palette individually in this dialog box (by checking the appropriate check box), you can remove them from the palette only as a group. So, if you want to be able to add and remove custom components from the palette separately, put each in its own file.
- Check the Place In Component Palette check box, if you want this component to appear on the Component palette. If you are putting the component in an existing .CC file whose components are already on the palette, and you don't check this box, then later, if you want to add the component to the palette, you'll have to remove the .CC file from the Set Up Custom Components dialog box, and then add it anew.

5. Click OK.

The custom component is now stored in the .CC file you specified. You can open the file in the Source editor.

To add custom components to the Component palette

Topic group Related topics

If you have designed a custom component yourself, the simplest way to add it to the Component palette is to check the Place In Component Palette check box in the Save As Custom dialog box (File|Save As Custom) at the time you are saving your custom component. If you didn't do this, or if you have a custom component from someone else, here's what to do:

1. Choose File|Set Up Custom Components (or right-click in the Component palette for access to the same command).

   The Set Up Custom Components dialog box appears. It lists paths to custom component files whose components already appear on the Component palette.
2. Choose Add to open the Choose Custom Component dialog box.
3. In the Choose Custom Component dialog box, locate the custom component file (with the .CC extension) that contains the component you want to put on the Component palette. Choose Open.
4. The path name to the selected custom component file now appears in the Set Up Custom Components dialog box.
5. With the desired .CC file selected, choose OK. The custom components you have saved in the .CC file appear on the Custom page of your Component palette (in both the Form and Report designers), ready to use just like any other component.

To remove custom components from the Component palette

Topic group Related topics

To remove a custom component from the Component palette,

1 Choose File|Set Up Custom Components.

2 In the dialog box that appears, select the file that contains the custom component, and choose Delete.

All the custom components in that file are removed from the Component palette. The .CC file is not deleted from disk.

Accessing and linking tables

Topic group

To link your forms and reports to the data in tables, *Visual* dBASE provides a set of data access objects. In the designers, these objects are available on the Data Access page of the Component palette. These components make specialized database access functionality available to your *Visual* dBASE applications.

This section discusses the following topics:

- The *Visual* dBASE data model
- Linking a form or report to tables
- Creating master-detail relationships
- Creating and using a data module

Before you use the data access objects, you should understand the *Visual* dBASE data model, described in the next section.

Note: Although the old dBASE Data Manipulation Language (DML) still exists for backward compatibility, those methods are no longer recommended. The new object classes cannot be combined with the old dBASE DML; you must choose one or the other. The new data object model is recommended because it realizes the full power of object-oriented programming.

The *Visual* dBASE data model (introduction)

Topic group

Visual dBASE's advanced, event-driven data model is implemented entirely in a handful of classes:

- Session
- Database
- Query
- StoredProc
- Rowset
- Field

This section gives you a sense of how these classes fit together. It introduces each object and explains how its primary properties relate to the other objects.

Query objects

Topic group

Query objects are the center of the data model. In most cases, if you want to access a table, you must use a Query object.

Note: Alternatively, you could use a StoredProc object that returns a rowset from an SQL database, or a DataModRef object that points to a data module containing the appropriate data access code, including at least a Query or StoredProc object.

The Query object's main job is to house two important properties: *SQL* and *rowset*.

SQL property

The *SQL* property's value is an SQL statement that describes the data to be obtained from the table. For example,

```
select * from BIOLIFE
```

The * means all the fields and BIOLIFE is the name of the table, so that statement would get all the fields from the BIOLIFE table.

The SQL statement specifies which tables to access, any tables to join, which fields to return, the sort order, and so on. This information is what many people think of when they hear the word query, but in *Visual* dBASE, SQL statements are only one of many properties of the Query object.

SQL is a standard, portable language designed to be used in other language products to access databases. When you use the Form and Report wizards or drag a table from the *Visual* dBASE Navigator, *Visual* dBASE builds the SQL statement for you. Once a table has been accessed by the SQL statement, you can do almost anything you want with *Visual* dBASE's data access objects, including navigating, searching, editing, adding, and deleting.

Although knowing SQL is useful for initially configuring data access objects for your databases, once these are complete and saved as custom components or in data modules, they can be reused without modification. Then others can create complete Windows database applications without knowing a word of SQL.

rowset property

A Query object is activated when its *active* property is set to true. When this happens, the SQL statement in the *sql* property is executed. The SQL statement generates a result: a set of rows, or rowset.

A rowset represents some or all the rows of a table or group of related tables.

Each Query object generates only one rowset, but you can add multiple Query objects to a form to use multiple rowsets from the same table, or for different tables. Using multiple Query objects also allows you to take advantage of *Visual* dBASE's built-in master-detail linking.

The Query object's *rowset* property refers to the Rowset object that represents the query's results.

Rowset objects

Topic group

While you must use a Query object to get access to data, you must use the Query object's resulting rowset to do anything with the data. All navigation methods for getting around in tables depend on the query's rowset.

The row cursor and navigation

The rowset maintains a *row cursor* that points to the current row in the rowset. When the Query object is first activated, the row cursor points to the first row in the rowset.

You can get and store the current position by calling the rowset's *bookmark*() method.

To move the row cursor, call the rowset's navigation methods:

- *next*() moves the cursor a specified number of rows relative to its current position.
- *first*() goes to the first row in the rowset.
- *last*() moves to the last row.
- *goto*() uses the value returned by *bookmark*() to move back to that specific row.

Because each rowset maintains its own row cursor, you can open multiple queries—each of which has its own rowset—to access the same table and point to different rows simultaneously.

Rowset modes

Once a Query object has been activated, its rowset is always in one of the following five modes (indicated by the rowset's *state* property):

- Browse mode, which allows navigation only.
- Edit mode, the default, which allows changes to the row.
- Append mode, in which the user can type new values for a row, and if the row is saved, a new row is created on disk.
- Filter mode, used to implement Filter-By-Form, in which the user types values into the form and *Visual* dBASE filters out all the rows that do not match.
- Locate mode, similar to Filter mode, except that it searches only for the first match, instead of setting a filter.

Rowset events

A rowset has many events used to control and augment its methods. These events fall into two categories:

- can- events, so named because they all start with the word can—which are fired before the desired action to see whether an action is allowed to occur; and
- on- events, which fire after the action has successfully occurred.

Row buffer

The rowset maintains a buffer for the current row. It contains all the values for all the fields in that row.

You access the buffer by using the rowset's *fields* property, which refers to an array of Field objects.

Field objects

Topic group

The rowset's *fields* array contains a Field object for each field in the row. In addition to static information, such as the field's name and size, the most important property of a Field object is its *value*.

value property

A Field object's *value* property reflects the value of that field for the current row. It is automatically updated as the rowset's row cursor is moved from row to row.

To change the value in the row buffer, assign a value to the *value* property. If the row is saved, those changes are written to disk.

Important: When referring to the contents of a field, don't forget to use the *value* property. For example,

```
this.form.rowset.fields[ "Species" ].value
```

If you leave out *value*,

```
this.form.rowset.fields[ "Species" ]
```

you are referring to the Field object itself, which is rarely intentional—except for *dataLink*s, explained next. Get in the habit of including *value* when referring to a field; if you don't, the code doesn't work.

Using *dataLink*s

Just as a Field object's *value* property is linked to the actual value in a table, a visual component on the form (such as a Select List or Radio Button) can be linked to a field object through the form component's *dataLink* property. This property is assigned a reference to the linked Field object. When connected in this way, the two objects are referred to as *dataLink*ed.

As the rowset navigates from row to row, the Field object's *value* is updated, which in turn updates the component on the form. If a value is changed in the form component, it is reflected in the *dataLink*ed Field object. From there, the change is saved to the table.

Database objects

Topic group

Database objects are one level up from Query objects in the object hierarchy. Database objects have three main functions:

- To access a database
- Database-level security
- Database-level methods

Accessing a database

A Database object is needed to access SQL databases, ODBC databases, and any other tables you are accessing through a BDE alias.

Before you can use a Database object, you must set up BDE to access the database by using the BDE Administrator (available from the *Visual* dBASE program group).

To connect a Database object to a database, set the Database object's *databaseName* property to the BDE alias for the database.

Database-level security

Many SQL and ODBC databases require the user to log in to the database. You can preset the Database object's *loginString* property with a valid user name and password to log in to the database automatically.

Because each Database object represents access to a database, you can have multiple Database objects that are logged in as different users to the same database.

Database-level methods

The Database object contains methods to perform database-level operations such as transaction logging and rollback, table copying, and re-indexing. Different database formats support each method to varying degrees.

Default Database object

To provide direct, built-in access to the BDE-standard table types (dBASE and Paradox), each session includes a default Database object that does not have a BDE alias. When you create a Query object, it is initially assigned to the default Database object. Thus, if you're accessing dBASE or Paradox tables without an alias, you don't need to use a Database object.

If you're accessing other table types, you need to use the Database object.

Session objects

Topic group

At the top of the object hierarchy is the Session object. Each session represents a separate user.

Each session contains one or more Database objects. A session always contains at least the default Database object, which supports direct access of dBASE and Paradox tables.

Session objects are important for dBASE and Paradox table security. Multiple users each have their own session, so that different users can be logged in with different levels of access, or they may share a single session, so that all users have the same level of access.

A default Session object always exists whenever you run *Visual* dBASE (either the environment or an application, sometimes referred to as a *Visual* dBASE executable). In most cases, the default Session is all you need. There is usually no need to add a Session component to your forms or reports. *Visual* dBASE's App object has a property that points to the default session object and the default database object. Thus, when you create a Query object, it is automatically assigned to both the default Session object and the default Database object.

The Session object has an event called *onProgress* that you can use to display progress information on database operations.

StoredProc objects

Topic group

The StoredProc object is used for calling a stored procedure in SQL databases. When you're calling a stored procedure, the StoredProc object takes the place of the Query object in the class hierarchy; it is attached to a Database object that gives access to the SQL database, and it can result in a Rowset object that contains Field objects.

The stored procedure can

- Return values, which are read from the *params* array
- Return a rowset, which is accessed through the *rowset* property, if the server supports this capability

DataModRef objects

Topic group Related topics

The DataModRef object points to preprogrammed data access components stored in a data module. If you maintain data access code in a data module, then you can use a DataModRef object to return rowsets in place of a Query or StoredProc component.

Data modules offer convenient reusability and easy maintenance of data access code. By storing custom or preset data access components in a data module, it is easy to maintain them (change links to changing databases, for example). Then, you can use just the DataModRef component (or custom class) to instantly implement the full set of current data access components.

To set a DataModRef object to point to a data module, set its *filename* property to the path name of the data module.

Linking a form or report to tables

Topic group

The Query object links a form or report to a table, making the table's fields available to the controls on the form or report. One Query object can refer to multiple tables in its SQL statement, or you can use multiple Query objects with an appropriate query statement in each.

If you need to link to table data in an SQL or ODBC database, you must first assign the database a BDE alias in the BDE Administrator. If you haven't done this yet, see How to connect to an SQL database server. Then, to see your tables listed in the Navigator,

1. Click the Navigator's Tables tab.
2. From the Look In drop-down list, select the alias of the database you want to access. Tables from the selected database appear listed on the Navigator Tables page.

If you are linking to BDE-standard tables, use the Navigator Look In drop-down list to select the directory that contains your tables. (Click the Tables tab to see the tables listed.)

From there, you can link to a table in two ways:

- Automatically, by dragging from the Navigator or using a wizard
- By dragging data access components from the Component palette to the design surface and setting linking properties

Linking to a table automatically

Topic group

The easiest way to use table data in a form or report is to drag the table from the Navigator onto the form or report design surface.

- For BDE-standard tables that you're accessing without a BDE alias, this creates a Query object.
- For SQL, ODBC, and other tables you're accessing through a BDE alias, this automatically creates both the Database object, which is required to connect to the database, and the Query object for the table.

The *SQL* and *rowset* properties of the Query object, and the *dataBaseName* property of the Database object are both set automatically, and the *active* property of both objects is set to *true*. The link is complete, and fields of the table are available from the Field palette.

The SQL statement in the *SQL* property selects all the fields of the table. You can modify this statement in the Inspector. Click the tool beside the *SQL* property.

Linking to a table manually

Topic group

Instead of dragging a table from the Navigator, you can use data access objects from the Component palette.

For SQL, ODBC, and other tables you're accessing through a BDE alias,

1. Drag a Database object from the Component palette to the form or report design surface. (One Query object is added along with it.)
   - Assign the BDE alias to the *databaseName* property.
   - Set its *active* property to *true*.
2. For databases that require a login, you must either log in or set the Database object's *loginString* property, so that the table will open without requiring a password or ID to be entered. (Your login name and password must be set up by your database administrator.)
3. Select the Query object.
   - Type the SQL query statement you want in the Query object's *SQL* property. Your SQL query can access any number of tables in the database. Some servers are case-sensitive for the table name; some may require quotation marks (Oracle, for example).
   - Assign the Database object to the Query object's *database* property. This must be done before activating the query.
   - Set the Query object's *active* property to *true*.
4. Add additional Query objects, if needed for other tables, and set their properties as in step 2. (If you want to drag a table from another database, be sure to first select the desired alias from the Navigator's Look In drop-down list, or in the case of BDE-standard tables without an alias, use the Navigator to locate the desired directory.)

For BDE-standard tables without a BDE alias, you do not need the Database object. Use only Query objects, and follow the instructions in steps 2 and 3.

To use tables accessed through a BDE alias, you must create new Database objects. Provided that you have created the BDE alias for your database, you need only activate the database object (and login if required) to have access to that database's tables. You may also log transactions or buffer updates to each database to allow you to rollback, abandon, or post changes.

Note: A table's fields do not appear on the Field palette until the Query object's *active* property is set to *true*.

Procedure for using a Session object

Topic group

All database applications are automatically provided with a Session object that encapsulates the default BDE session. You can create, and manipulate additional session components as needed.

If you intend to add another Session object, follow the sequence in this procedure for adding data access objects to the design surface:

1 Add the Session object.

2 Add a Database object to your form (if accessing tables through a BDE alias). It is automatically linked to the Session object already on the form.

3 Set the Database object's *databaseName* property to the name of the BDE alias, and set its *active* property to *true*.

4 Add a Query object. It is automatically linked to the Session and Database objects already on the form or report.

5 Set the Query object's *SQL* property, then set its *active* property to *true*.

Calling a stored procedure

Topic group

When you want to call a stored procedure, use the StoredProc object. When a stored procedure returns a rowset, it can take the place of a Query object.

To call a stored procedure,

1 Drag a StoredProc object from the Component palette onto the design surface.

2 Set its *procedureName* property to the name of the stored procedure.

3 Set any parameters that are passed to the stored procedure in the *params* array.

4 Set its *active* property to *true*.

Using local and remote tables together

Topic group

If you use both local dBASE or Paradox tables as well as client/server databases, it's a good idea to create a BDE alias for the local dBASE or Paradox table directories and any other directories containing tables as well. There are two reasons for this:

- All your table connections will be listed in the *Visual* dBASE Navigator Look In box when the Tables tab is selected.
- Using a BDE alias for BDE-standard tables makes it easier to move them to another directory; only the alias in the BDE configuration need be updated, and not the source code for all the forms and reports.

Creating master-detail relationships (overview)

Topic group

A master-detail form or report displays information selected from one or more related tables in a relational database. It groups the detail rows from the detail tables in relation to an associated row from the master table.

In a relational database, a master table can be linked to one or more related (detail) tables by key fields. A detail table may in turn act as a master table, with other key fields linked to other detail tables. Each detail table contains a *masterDetailRow* property pointing to its master table. You can implement a master-detail relationship between tables by setting this property in the detail tables.

A typical example is a CUSTOMER table with a key field called Orders. You could link it to an ORDERS table by setting the ORDER table's *masterDetailRow* property to the master CUSTOMER table. You could then generate a report on a selection of customers (from the master table CUSTOMER) that lists the rows of each customer's orders (from the detail table ORDERS). The result groups each customer's orders with each customer's name.

By creating a master-detail relationship and adding SQL statements to the Rowset or Query object properties, you can create forms and reports that group detail rows from detail tables with a selection of rows from the master table. For example, a report could include a filter on the ORDERS rowset to display a customer's orders only for the month of March. You can create complex filtered joins and perform virtually any programmatic operation on a database.

This section includes three different procedures to link master and detail tables:

- Use an SQL JOIN statement to generate a rowset from two or more tables. This procedure is often the fastest and easiest. It is illustrated in the AIRCRAFT.REP report in the SAMPLES directory.
- For local BDE-standard tables, use the Rowset object's *masterRowset* and *masterFields* properties.
- For client/server databases, use the Query object's *masterSource* property. (You can also use this in local tables.)

In general, for any procedure, you begin with these steps:

1. Make sure each pair of tables is indexed on a common field.
2. Drag the tables from the Navigator to the visual design surface of the designer you're working in. This creates a Query object for each table.

Using an SQL JOIN statement

Topic group

The sample report FLIGHT.REP (located in your *Visual* dBASE SAMPLES\FLEET directory) uses a single Query object whose *SQL* property contains an SQL JOIN statement linking the master table AIRCRAFT.DBF and the detail table FLIGHT.DBF. Both tables are indexed on a common field.

In the resulting report, each aircraft (stored in the master AIRCRAFT.DBF table) is displayed in the headerBand, followed by a list of flights for that aircraft (stored in the detail FLIGHT.DBF table) in the DetailBand.

This technique is usually faster and easier than adding and linking two Query objects. (However, in some cases, with BLOB fields, for example, it might be faster to use two Query objects.)

By using two joined tables, you gain several advantages:

- You can use the data as if it were all in one table.
- Separately the tables can be more easily maintained.
- If you have bitmaps, you need store them in only the master table, rather than duplicating the image in every row of the detail table.
- This method does not require an index (although with indexes it is much faster)

To create a master-detail relationship by using an SQL JOIN statement,

1. Add a Query object to the design surface.
2. Select the Query object. In the Inspector, click the wrench tool beside the *SQL* property to display the SQL Property Builder.
3. Do one of the following:

- Write an SQL JOIN query in the SQL Property Builder
- Locate a query you've already written

Note: Including image fields slows performance.

4. If you're designing a report, after the *SQL* property is set, choose Layout|Add Groups And Summaries. In the Groups And Summaries dialog box, all the fields from both tables appear in the Available Fields pane.
5. Select the field on which you want to group the detail rows.

Linking master-detail in local tables

Topic group

Creating a master-detail relationship by using the properties *masterRowset* and *masterFields* is the most efficient technique when working with local .DBF tables. It is similar to the older technique of using the SET RELATION and SET INDEX commands, but that technique is no longer recommended.

To link local master-detail tables,

1 Drag the two tables onto the design surface of the designer you're working in.

2 Select the Query object of the detail table and set its *masterRowset* property to the name of the master table's Query object. To do this, select the name of the Query object from the property's drop-down list (the down-arrow button, not the tool button).

3 With the Query object of the detail table still selected, click the rowset property's tool button to display the rowset properties.

4 Click the rowset's *masterFields* property and from the drop-down list select the fields you want to link from the master table.

5 Set the *indexName* property to the same field as the *masterFields* property. If the field names between the two tables are not identical, then in the *indexName* property select the index that corresponds to the *masterField* setting.

6 If you're designing a report, choose Layout|Add Groups And Summaries, and in the dialog box group the detail fields under the appropriate master-table field.

Using the masterSource property

Topic group

By using the *masterSource* property to create master-detail relationships you do not need an index, although it would improve performance. You might choose to use the *masterSource* property when

- You can improve performance, for example, in cases where large BLOB fields would be copied to temporary files
- You are working with client/server databases
- You are working with a one-to-many relation in a form, and you want the form to be updateable
- You want the order of the “many” table to be different from that of the linked fields.

To create a master-detail relationship by using the *masterSource* property,

1. Drag the two tables onto the design surface of the designer you’re working in.
2. Select the Query object of the detail table and set its *active* property to false.
3. Change the SQL statement in the Query object’s *SQL* property to use host variables. For example, in a master-detail report on CUSTOMERS and ORDERS, you might use this:

```
SELECT * FROM ORDERS
WHERE ORDERNO = :ORDERNO
```

   assuming that ORDERNO is the exact field name in the table.

4. Set the detail table’s Query object’s *masterSource* property to the name of the master table’s Query object. To do this, select the name of the Query object from the property’s drop-down list (the down-arrow button, not the tool button).
5. Set the detail table’s Query object’s *active* property back to true.

   This creates a parameter using the key fields from the master table.

What is a data module?

Topic group Related topics

A data module is a *Visual* dBASE class (DataModRef) for centralized handling of data access components (Query, Database, StoredProc, and Session). A data module enables you to

- Place all your data access components in a single container instead of duplicating them on each application form.
- Design queries once for use with many forms and reports instead of recreating them separately for each one.
- Create business rules—using component events, and additional methods you add to the source code for a data module—that can be shared across an entire application.
- Separate business logic and data access from user interface code for easier maintenance.

After you've set up data access components in a data module, it's easy to maintain them (change links to changing databases, for example).

To create a data module

Topic group Related topics

To create a data module,

1 Choose File|New|Data Module, and choose Designer.

   The Data Module Designer is similar to the Form designer, except that it has no grid and the Component palette contains only data access components.

2 Drag the components you need onto the design surface and set their properties (*SQL* and so on) and write their event handlers.

   Press F12 to toggle between the Source editor and the visual designer.

3 When everything is set up as you want it, save the data module (File|Save). It is saved with a .DMD extension.

Creating business rules in a data module

Besides writing event handlers for the components in a data module, you can code methods directly in the source file for a data module. These methods can be applied to the forms that use the data module as business rules. For example, you might write a procedure to perform month-, quarter-, or year-end bookkeeping. You might call the procedure from an event handler for a component in the data module.

To use a data module

Topic group Related topics

To use a data module in a form or report, do one of the following:

- Add a DataModRef object from the Component palette and link it to the desired data module file by setting the DataModRef's *filename* property to the path and filename of the data module.
- Drag the data module file from the Navigator or Project Explorer to a form or report design surface. This adds a DataModRef object with the *filename* property already set.

The properties, event handlers, and methods you set for components in a data module apply consistently to all forms and reports that use the module.

Using the Form and Report designers

Topic group Related topics

This section shows you the common elements you have to work with in the Form and Report designers. Other designers—for data modules, labels, and custom classes—are variations on the Form and Report designers. Their menus and tools vary, and they might look a little different, but otherwise they all work basically the same. All of them feature Two-Way tools: what you do in the designer is reflected in your code, and what you program in code is reflected in the designer as soon as you switch focus to it.

This section refers to the Form and Report designers, but the information applies to the other designers, as well. The section includes the following:

- A description of the Form and Report designer windows
- What's available on the Component palette for use in your forms and reports
- A discussion of the Field palette and how to populate it with components linked to fields in a table
- How to change component properties and create event handlers and other methods by using the Inspector
- How to manipulate components (change alignment, spacing, formatting, and so on)

You can open any of the designers from the File menu (File|New) or from the Navigator or Project Manager.

Note: The yellow untitled icon on several pages of the Navigator is for creating a custom class that you can use as a template.

The designer windows

Topic group Related topics

The form and report windows are visual design surfaces on which you position the components you need for your application. These can be invisible components, like data access objects (queries, stored procedures, databases, sessions, and data module references) and visible components, like text, graphics, list boxes, check boxes, and so on.

In both designers, the work you do with the visual design elements is reflected in the underlying code and vice versa. Press F12 to switch between the design surface and code.

You can change the size and position of a designer window either by dragging the edges of the window or, if you need to be precise, by changing the values of height, left, top, and width in the Inspector.

By default, a grid appears when you start the Form and Report designers, and objects are constrained to line up along the grids (Snap To Grid). In addition, vertical and horizontal rulers appear.

Both designers have the following tools:

- Component palette for dragging user-interface elements and data-access objects to the design surface
- Field palette for dragging linked fields to the design surface
- Inspector for setting properties and writing event handlers and other methods
- Format toolbar for formatting Text objects
- Alignment toolbar for aligning objects
- Layout, Format, and Method menus
- Status bar to show you your location on the design surface, show you what object is selected, and to give you instructions and other information

To display a tool window that’s not open, choose View|Tool Windows.

Design and Run modes

Topic group Related topics

You can view forms and reports (and other files) in Design mode and Run mode.

- Use Design mode to design the appearance and behavior of the form or report and the components you put on it.
- Use Run mode to see how a form or report looks when running. In Run mode, the components become active. For example, you can enter data into an entryField control and edit data that's already there.

Use the Design and Run toolbar buttons, or choose the appropriate command from the View menu, to switch between modes.

Component palette

Topic group Related topics

The Component palette displays the components and data access objects you can add to the form or report you're designing.

To open the Component palette, do one of the following:

- Choose View|Component Palette.
- Right-click anywhere on the form or report window and choose Tool Windows|Component Palette from the context menu.

Depending on which designer has focus, or whether you have installed the *Visual* dBASE samples (which include a number of custom components that appear automatically on the Component palette), you'll see a selection of the following pages on the Component palette:

Tab name	What's on the page
Standard	Common user interface controls, such as list components, buttons, text and image components, and so on.
Data Access	Database access objects required to connect to a table, group of tables, or to ensure record-locking.
Data Buttons	Buttons and toolbars (both image-style and text-labeled) for navigating through data. Installed with the *Visual* dBASE samples.
Report	The streamframe and group objects used to lay out reports.
Custom	Custom components that you create yourself (or obtain from a third party) or that appear in applications in the *Visual* dBASE samples.
ActiveX	ActiveX applications from third-party developers.

Standard page

Topic group Related topics

This table briefly describes the standard user-interface controls appearing on the Standard page of the Component palette. For more details, select the component and click the Question Mark button on the toolbar.

Table 7.1

Component	Use to...	Example/Explanation
Text	Display text that cannot be edited by users. The text can be any alphanumeric characters allowed in a character expression.	Use for a field label, heading, instruction, prompt, or any other non-editable display text. Format with the Format menu or Format toolbar.
EntryField	Let a user enter a single value, text or numbers, into a data-entry field.	Example: Data entry area for entering a value for a particular field of a table. Must be *DataLink*ed to the table field.
PushButton	Let a user perform a task with a single mouse-click.	A control that a user can click to execute code that you attach. (Sometimes called a command button.)
CheckBox	Let a user toggle between two choices of a logical value. Or choose a number of options that are not mutually exclusive.	Check boxes often are arranged in groups to present choices or options a user can turn on or off. Any number of check boxes in a group can be checked at a time.
RadioButton	Let a user select one choice among a group of mutually-exclusive possible values.	Example: A group of buttons labeled Credit, Cash, Check, Visa, and MC to choose among for entering only one of those values in a PAY_METHOD field of a table.
Line	Organize elements visually.	The line is a divider that may be extended vertically, horizontally, or diagonally to visually divide a form into sections. Users cannot edit or manipulate it.
Editor	Display the contents of a text file or memo field.	Text exceeding the size of the box causes a scrollbar to appear. You can choose to allow users to edit this text.
ListBox	Display values in a fixed-size, scrollable list box, from which a user can select one or more items.	The values in a list can be file names, records, array elements, table names, or field names.
ComboBox	Combine an entry field and a drop-down list box. A user clicks the down-arrow button to display the list.	A combo box accepts a value typed into the entry field or selected from the drop-down list box.
Image	Display an image.	Display area for a bitmap image stored in a binary field, resource file, or graphic file.
Shape	Visually divide a form into sections, for example, to place related radio buttons within a box.	A visual appearance element. By setting the component's *ShapeStyle* property you can create rounded rectangles, rectangles, ellipses, circles, rounded squares, and squares. You can also set the line style, weight, and interior color.
Container	Create moveable panels that can contain other components on a form.	Example: Moveable toolbars and palettes.
Browse	Display multiple records in row-and-column format.	The Browse component is maintained for compatibility and is suitable for viewing and editing tables open in work areas. For forms that use Data Access use a Grid object instead.
Grid	Display live table data in row/column format in a programmable component.	The Grid object is a multi-column grid control for displaying the contents of a rowset. The *dataLink* property is set to the rowset. Columns are automatically created for each field in the rowset.
Rectangle	Organize elements visually into	A graphic element for boxing objects. You can set

	boxes or create custom buttons.	the size, line weight, and fill of the box. It can respond to mouse clicks and other events.
Progress	Provide visual feedback to the user about the progress of long operations or background processes.	A rectangular bar that “fills” from left to right, like that shown when you copy files in the Windows Explorer. Use *position* to set a default position for the progress bar. At run time, *position* tracks the exact location as values increment. Use *max* and *min* to set the range of *position*. By default, the progress meter advances by a value of one.
PaintBox	Create custom form controls.	The PaintBox provides a window space in which you can call API functions in Windows. Users never interact with it directly. *Visual* dBASE does not paint the area.
Notebook	Make a multipage dialog box, with labeled tabs to display sections of information or groups of controls within the same window. See TabBox for full-size tabbed forms.	You might use the Notebook control to create a tabbed dialog box with different groups of controls on each tabbed page. The Desktop Properties dialog box is a good example of this. Use the DataSource Property Builder to name or add tabbed pages to the window. Then drag the components you want to each tabbed page.
TreeView	Display and control a set of objects as an indented outline based on their logical hierarchical relationships. The control includes buttons that allow the outline to be expanded and collapsed.	Use a tree view component to display the relationship between a set of containers or other hierarchical elements. You might use the TreeView as a way to select items from nested lists, much like the hierarchical view in the left pane of the Windows Explorer.
Slider	Define the extent or range of values. By moving the slider along the trackbar, the user can change the current value for the control.	You can set the trackbar orientation as vertical or horizontal, define the length and height of the slide indicator and the slide bar component, define the increments of the trackbar, and whether to display tick marks for the control. Examples: A volume control to play back sound files, or a color saturation adjuster for an image viewer.
Vertical scroll bar	Allow users to vertically scroll a grouping of controls, or a large control that has no integrated scroll bars.	Example: A custom dialog box containing an area filled with many file icons.
Horizontal scroll bar	Allow users to horizontally scroll a grouping of controls, or a large control that has no integrated scroll bars.	Example: A custom dialog box containing an area filled with many file icons.
TabBox	Group related data items on overlapping pages with labeled tabs.	Use a TabBox to display multiple pages the full size of the form. A user selects a tab to display the items on the TabBox. Similar to Notebook, except for the full form size.
SpinBox	Provide up and down arrows to assist changing a numeric value.	You can type a number into the numeric entry field or can increment or decrement the number by clicking the up and down arrows.
OLE	Create an object linking and embedding (OLE) client area in a form, in which you can embed, or link to, a document from another application.	Using an OLE control, a document from another application, for example, a sound file from a sound recorder application, can be opened from your *Visual* dBASE application.
ReportViewer	Displays a report in a sizeable frame.	The report is executed when the form is opened.

Data Access page

Topic group Related topics

Data access objects provide live connections and session control to tables and databases. A form or report that accesses a table must have at least one Query object on it, returning a rowset from the table. A StoredProc object that returns a rowset (as a query would) can be used in place of the Query object.

Note: Once you have set up a group of Data Access objects to return rowsets, you can save that group in a data module for easy reuse in other forms and reports or other applications.

This table describes the data access objects available from the Data Access page of the Component palette.

Table 7.2

Object	Lets you...	Explanation
Query	Run an SQL query on any table, including local .DBF and .DB tables. Query objects enable components to display data from tables on forms and reports.	You set a Query object's *SQL* property to the SQL statement that selects a rowset. In addition to linking a table to a form or report, this populates the Field palette. You must use a Query object containing an appropriate SQL statement to connect to a table or database (unless you are using a StoredProc object to return a rowset from an SQL database).
StoredProc	Run a stored procedure on an SQL server. This capability is available only when accessing tables on a server that supports stored procedures.	Place the StoredProc control on a form or report and link the control to a stored procedure by setting its *procedureName* property. If the stored procedure returns a rowset, it may be used in place of a Query object.
Database	Set up a persistent connection to a database, especially a remote client/server database requiring a user login and password.	Gives *Visual* dBASE forms and reports access to SQL databases (or another group of tables identified by an alias). To add connections to SQL databases or other multiple tables via a BDE alias, add a Database object to your form. You must have first created a BDE alias for the database by using the BDE Administrator.
Session	Session objects enable basic record-locking, so that multiple users do not modify the same record at the same time. Session objects also help to maintain security logins for local .DBF or .DB tables.	Use only if you are creating a multithreaded database application. When you open a form, a default session is created, linking the form to the BDE and connected tables. If you need separate threads for each user (to ensure record-locking), add a Session object to your form. A unique session number is assigned to track each user's connection to the table.
DataModRef	Use a preset data access setup stored in a data module.	Use to give a form or report access to a set of data access components you've programmed and stored in a data module.

Data Buttons page (forms)

Topic group Related topics

If you installed the *Visual* dBASE samples, the Component palette in the Form designer displays a page of buttons that let users navigate through records, locate and filter data, edit data, and so on.

Both standard and image-style buttons with identical functionality are available. The names of standard button components begin with button, and the names of image-style components begin with bitmap. In addition, you can choose a VCR-like control panel including a full set of navigational buttons, a report page-number object, and a rowstate object. This table describes the components available for working with data.

Table 7.3

Component	What it is	What it does
ButtonAppend BitmapAppend	An append-record control.	Lets users put the table that is linked to the form into Append mode to enter a new record. Clicking the Append button again adds the new record to the table and keeps the table in Append mode.
ButtonDelete BitmapDelete	A delete-record control.	Lets users delete the current row from the table that is linked to the form.
ButtonSave BitmapSave	A save-record control.	Lets users save the current row.
Buttonabandon Bitmapabandon	An abandon-changes control.	Lets users abandon any changes made to the current row and return to the last saved contents of the row.
ButtonLocate BitmapLocate	A search-records control.	Lets users go to the first row that matches the criteria. When the user clicks the Locate control, the form goes blank. The user then types in the criteria for the search and clicks the Locate control again.
ButtonFilter BitmapFilter	A filter-records control.	Lets users display records that meet a specific criteria. When the user clicks the Filter control, the form goes blank. The user then types in the criteria for the filter and clicks the Filter control again.
ButtonEdit BitmapEdit	An edit record control.	Lets users edit the current row. (Required only when *AutoEdit* is false.)
ButtonFirst BitmapFirst	A first-record control.	Displays the first record in the table that is linked to the form.
ButtonPrevious BitmapPrevious	A previous-record control.	Displays the previous record in the table that is linked to the form.
ButtonNext BitmapNext	A next-record control.	Displays the next record in the table that is linked to the form.
ButtonLast BitmapLast	A last-record control.	Displays the last record in the table that is linked to the form.
BarDataVCR	A set of navigational controls.	Contains the bitmap versons of the First, Previous, Next and Last buttons listed earlier in the table.
BarDataEdit	A set of edit controls.	Contains the bitmap versions of the Append, Delete, Save, Abandon, Locate, and Filter buttons listed earlier in the table.
Rowstate	Displays the state property of a given rowset, for example, whether it is Read-Only.	The other controls update this control.

Report page

Topic group Related topics

This page of the Component palette contains the data formatting components required for reports.

Table 7.4

Component	What it is	What it does
StreamFrame	The StreamFrame object receives and displays rowset data streamed from linked tables (specified in its *streamSource* property). One or more streamFrame objects may be contained within the pageTemplate object.	Dropping a component, such as a check box, into the streamFrame area of a report will cause that object to be printed as part of the report's row data.
Group	The Group object is descended from the streamFrame object that contains data from the query's rowset. By dropping a Group object on a report's streamframe, a Headerband and Footerband are created, with editable placeholder text for the group's heading. A streamFrame may contain several Group objects.	Groups the display of rowsets by the value of a selected field. For example, in a "Sales by District" report, you might have a Group object for each District to display sales rowsets for that district.

Custom page

Topic group Related topics

The Custom page of the Component palette contains custom-built components. If you didn't install the *Visual* dBASE samples, you won't see the Custom page until you create your first custom component and assign it to the palette. If you did install the samples, you'll see that the Custom page already contains custom components that are used in the sample applications.

You can build new components from scratch, and you can alter existing components and save them as custom components.

ActiveX page

Topic group Related topics

The components on the ActiveX page of the Component palette are sample ActiveX objects—complete, portable working applications created by third-party developers. To view the separate Help systems for these third-party components, place an ActiveX object on a form, select the component, and press F1.

Component	What it is
ChartFX	Lets you create highly customized charts. Choose Properties to display a tabbed control panel that lets you define the values, appearance, and end-user functionality of the chart component.
Pinnacle Graph	An implementation of a 2D graph designer.
Visual Speller	A customizable spelling checker.
VCI Formula One	A spreadsheet including a full-featured designer.
VCI First Impression Chart	Lets you create true 3D charts.

Using ActiveX (*.OCX) controls

Topic group Related topics

To use an ActiveX control in your forms and reports,

1 In the Form or Report designer, choose File|Set Up ActiveX Components.

   The dialog box that appears shows all available controls registered on your system.

2 Select the desired controls.

   Selected controls appear on the ActiveX page of the Component palette, ready for use. After placing a component on a form, the Inspector shows the properties of the ActiveX control. To use the control's own property dialog box, right-click the control and choose ActiveX Properties from the context menu.

Using the Field palette

Topic group

The Field palette displays fields for each Query object that's linked to an existing table, as long as the Query object's *active* property is set to *true*. Fields available on the Field palette are linked to a table through the *dataLink* property.

To open the Field palette, either

- Choose View|Tool Windows|Field Palette (it's a toggle).
- Right-click anywhere in the designer and choose Tool Windows|Field Palette from the context menu.

Dragging a field from the Field palette onto a form or report saves you the work of having to set its *dataLink* or *text* property manually for each component you want to link to a field in a table, although you can do it manually, if you want to.

If no active Query object exists on the form or report, the Field palette is empty, showing only the Pointer button. When you begin to design a data-aware form or a report, first add a Query object and set its *sql* property to the appropriate SQL statement and its *active* property to *true*. If you drag a table from the Navigator to the design surface, this automatically creates a Query object that selects all the records in that table and links the table to the form or report.

Once an active Query object exists on the form or report with its *active* property set to *true*, its fields appear on the Field palette as linked components. The type of the component depends on the data type of the field. For example, a Boolean field appears on the Field palette as a CheckBox control. To change the control type of a field, right-click the Field palette, and choose Associate Component Types from its context menu, or choose File|Associate Component Types.

If more than one Query object exists on the form or report, each table's fields are displayed on a separate page of the Field palette.

The Inspector (overview)

Topic group Related topics

You can change a component's properties in the Inspector. When you select a component in a form or report, the Inspector displays the component's properties. If the Inspector is not open, do one of the following:

- Press F11.
- Choose View|Inspector (this command is a toggle).
- Right-click the selected component and choose Tool Windows|Inspector from the context menu.

When you have selected multiple components, you can change their common properties simultaneously. When you change a property value or link code to an event for a multiple selection, the change affects all components in the selection.

Note: You cannot change methods for multiple selections.

The Inspector has three tabbed pages that show the properties, events, and methods of the selected object. The name of the currently selected object appears in the drop-down list box at the top of the Inspector. Click the Down arrow of this box to select a different object, or select the object on the form or report, itself.

Properties, methods and events set by you, or that have no default value, are shown in bold. (Bold properties are ones that will be streamed out.)

Properties page of the Inspector

Topic group Related topics

The Inspector's Properties page displays the properties of the current object. The right column shows the current value for each property.

You can set a property value in any of the following ways:

- Type the value into the column to the right of the property name.

Note: Yellow highlighting of an entry means that it's not yet committed or not yet evaluated. Press Enter to commit a change.

- Press Ctrl+Enter in the value column to rotate through a list of properties or to toggle logical values, or double-click the value column to do the same.
- Select a value from a history list or other drop-down list, when available.
- Click the wrench tool button that appears to the right of the property value. Tools are not available for every property.

The tool button may produce

- A property builder in which you can build or select a value. For example, you can display the *Color* property builder to set the color for an object.
- The String Builder dialog box, which makes it more convenient to type a long string.

Events page of the Inspector

Topic group Related topics

The Inspector's Events page displays the events to which the current object can respond. When you select an event, its value area becomes a text box with a tool button.

To specify what you want to happen when an event occurs, you can do one of the following:

- Type a code block into the text box for the event. Or, if you want to use the Code Block Builder,
- Click the Type drop-down list beside the text box, and select CodeBlock.
- Click the wrench tool beside the text box.

  This opens the Code Block Builder. Type parameters, if any, in the Parameters text box, and type the code block in the Commands Or Expression box. It's okay to put only one statement on each line, and end it with a semicolon, where appropriate. When you click OK, the code block becomes a one-line code block in the event's value text box and in your code.
- Write a method to link to the event. Click the tool button to display the Source editor with the cursor inside the skeleton of a new method, ready for you to type.

Methods page of the Inspector

Topic group Related topics

The Inspector's Methods page displays the current object's built-in methods, that is, the methods pre-defined for the component. You can call these methods in methods you create with the Source editor. Methods you create in the Source editor can be inspected on the Methods page.

To delete a method in code, you must be in the Source editor. Then, with the cursor in the method you want to delete, choose Method|Delete Method.

Note: A function inside a class is a "method." The keyword for method is "function."

The Method menu

Topic group Related topics

You can use commands on the Method menu when working with code. The last three commands open dialog boxes that can simplify writing methods.

Table 7.5

Command	What it does
New Method	Creates dBASE skeleton code for a new method in the Source editor: // {Linked Method} Form.OnOpen function Form_OnOpen You can do the same thing by clicking the tool beside an event in the Inspector.
Delete Method	Deletes the method that has the cursor in it and all references to the method from the code.
Verify Method	Attempts to compile the method, to make sure there are no syntax errors. This also happens when you switch focus from the Source editor to the designer.
Edit Event	Displays a dialog box that allows you to select objects in the left pane and, in the right pane, select one of the available events for editing. The selected event is then displayed in the Source editor for editing.
Link Event	Displays a dialog box similar to the Edit Events dialog box. You choose a control from the left pane and one of its events in the right pane. When you click OK, the new event is linked to that event.
Unlink	Displays a dialog box that allows you to view multiple events linked to a method and to remove any or all of them. When you click OK, the selected link is unlinked from that event.

Placing components on a form or report

Topic group Related topics

You can place a component on a form or report by selecting its icon from the Component palette or from the Field palette.

Note: To see fields on the Field palette, you must have first placed an active Query object on the form. Fields represented on the Field palette are already linked to the fields of the table(s) specified in the Query object.

To place a component,

1 Click the component on the palette to select it.

2 Drag on the design surface until the component is the size you want, or click on the design surface without dragging to add a component in its default size.

Note: If you're placing a field, simply click the form window; dragging will not size the field while you're adding it, although you can size it by dragging it after you've dropped it on the form or report.

Alternatively, you can add a component in these ways:

- Double-click the component in the palette; it appears at a default position on the design surface.
- Drag the component from the palette to the design surface.

By default, the mouse reverts to a pointer after you place a component on the design surface. If you want to place multiple instances of a component without having to return to the Component palette to select the component anew each time, uncheck the Revert Cursor To Pointer option in the Customize Tool Windows dialog box (View|Tool Windows|Customize Tool Windows). If you've unchecked this option, then before you select another component you have to first click the Pointer icon on the Component palette.

Special case: container components

Besides the form itself, *Visual* dBASE provides other components that themselves contain components. Examples are the Container and Notebook components. You can use these components to group other components so that they behave as a unit at design time. For instance, you might group pushbuttons and check boxes that provide related options to the user.

When you place components within container components, you create a new parent-child relationship between the container and the components it contains. Design-time operations you perform on these "container" (or parent) components, such as moving, copying, or deleting, also affect any components grouped within them.

Note: The form remains the owner for all components, regardless of whether they are parented within another component.

You generally want to add container components to the form before you add the components you intend to group, because it's easiest to add components that you want grouped directly from the Component palette into the container component. However, if a component is already in the form, you can add it to a container component by cutting and then pasting it. If you drag it in, it does not become a child to the container, and will not act as part of the container unit.

Selecting components

Topic group Related topics

To work with a component once you've placed it on the form, first select it. Once you select a component, you can resize it, move it, or delete it. You can also change its properties.

To select a component, do one of the following:

- Click the component.
- Press Tab or Shift+Tab until it's selected.
- Select it from the drop-down list at the top of the Inspector.

When a component has focus, its *handles*—small, black squares around the periphery—are visible.

Note: If it is a component that is part of a custom form or report class, the handles are white to remind you that you have selected such a component, because you may not want to change it.

Moving components

Topic group Related topics

To move a component, select it, and then do one of the following:

- Drag the component to the position you want. As soon as you move the mouse, the pointer becomes a hand. This indicates you're moving the component.
- Press any of the arrow keys to move the component in the direction of the arrow. If Snap To Grid is turned on, the object moves one gridline at a time.
- Change the object's position properties in the Inspector.

To move a multiple selection of components, put the mouse cursor within the borders of one of the components, and then either drag or press the appropriate arrow key to move your selection in the direction you want.

If Snap To Grid is checked in the Properties dialog box of the designer you're working in, then components align to the grid.

Cutting, copying, pasting, deleting components

Topic group Related topics

You can access the cut, copy, and paste commands from the Edit menu, the context (right-click) menu, or the toolbar buttons. Select the component or components, and then choose the appropriate command. To delete a selected component or multiple selection of components, choose Edit|Delete (or press Del).

Undoing and redoing in the designers

Topic group Related topics

You can undo operations on a form or report. Once you undo an operation, the previous action is available to Undo.

You can undo and redo values that you set in the Inspector. Once you undo a value, the Undo command on the Edit menu becomes Redo.

To undo an operation, choose Edit|Undo (or press Ctrl+Z). To redo an operation, Choose Edit|Redo (or press Ctrl+Z).

Aligning components

Topic group Related topics

You can align components by using the Layout|Align menu commands or the corresponding toolbar buttons (to display the Alignment toolbar, choose View|Tool Windows, and check Alignment Toolbar.) These commands adjust the position of objects in relation to each other or in relation to the form or report. To find out what each option does, highlight it and read the explanation in the status bar.

Resizing components

Topic group Related topics

To resize a component, select it and do one of the following:

- Place the mouse pointer on one of its handles. When the pointer turns into a double-headed arrow, drag the handle to size the component the way you want.
- Press Shift+any arrow key to resize it in the direction of the arrow.

You cannot resize a multiple selection of components with the mouse; however, you can press Shift+an arrow key to resize a multiple selection in the direction of the arrow.

To change the sizes of multiple objects to conform to one size, choose an option from the Layout|Size menu or the corresponding button in the Alignment toolbar. (To display the Alignment toolbar, choose View|Tool Windows, and check Alignment Toolbar.) To find out what each option does, highlight it and read the explanation in the status bar.

Spacing components

Topic group Related topics

To change the spacing of components in the Form designer, select the components, and choose an option from the Layout|Spacing menu.

Note: The Spacing menu is not available in the Report designer.

To find out what each command does, highlight it and read the explanation in the status bar.

Setting a scheme (Form designer)

Topic group Related topics

The Format|Set Scheme command displays the Set Scheme dialog box, which lets you set colors and background images and save them as a reusable scheme (you can do this in the Form wizard, as well—it uses the same dialog box). This is useful for maintaining a consistent look over several pages of a form or across related applications. You can either

- Choose a predefined scheme
- Set your own scheme

Editing a Text object

Topic group Related topics

You can change the words, font properties, and color of an entire Text object by selecting the object and setting the desired properties in the Inspector. Use the *text* property to specify the words. (Click the wrench tool beside the text property to open a string-builder dialog box.)

To edit directly on the design surface, or to format *parts* of a Text object individually, or to format in ways not available in the Inspector (for example, to specify a list format), select the Text object, and then select the text to get an insertion point. After you have an insertion point, you can drag over words to select them or double-click to select one word. Then you can edit the words in-place, or format, as desired, using either of the following:

- Format toolbar (View|Tool Windows|Format toolbar)
- Format menu

Note: Once you have used the Format toolbar or menu to change parts of a Text object, you cannot use the Inspector to override what you have done. Use the Format toolbar or menu, instead. However, the Inspector *will* make changes you specify to anything you haven't already changed by using the Format toolbar or Format menu.

Saving, running, and printing forms and reports

Topic group

To save a form or report design, either

- Click the Save toolbar button.
- Choose File|Save or File|Save As.

Enter a file name and specify a directory location. A form is given the extension .WFM; a report is given the extension .REP. A new file is placed into the current project, if a project is open.

Opening a form or report in Run mode

Topic group

To open a form or report in Run mode, do one of the following:

- Choose File|Open. If you're opening a form, in the Open File dialog box, choose the form you want to run, select the Run Form button at the bottom of the dialog box, and choose OK. If you're opening a report, running it is your only choice from this dialog box.
- In the Navigator, double-click the form or report you want to run. Or select it and press F2.
- Type DO Formname.wfm in the Command window, where Formname is the name of your form, or DO ReportName.rep, where ReportName is the name of your report.

Printing a form or report

Topic group

Print a form or report in Design or Run mode by doing one of the following:

- Click the Print toolbar button.
- Choose File|Print.

Creating menus and toolbars

Topic group Related topics

Most Windows applications offer menus of some kind—standard pulldown menus, popup menus, or both. Most also feature static or detachable toolbars.

This chapter describes how to create these objects and integrate them into your *Visual* dBASE applications.

Like all other objects in an object-oriented environment, menus and toolbars can be designed to be completely reusable by any number of forms. For that reason, we'll start with the task you'll eventually face most often—attaching your objects to forms.

Attaching pulldown menus to forms

Topic group Related topics

To attach a pulldown menu to a form, choose your form's MenuFile property, click the tool button, then locate the .MNU file you want on the form.

If you haven't already created a .MNU file or don't have a sample installed, you can create one using the Menu designer (described later in this section).

Note that at design time, menus don't appear on your forms. To see an attached menu in action, you have to run the form. If the menu you're attaching is also open in the Menu designer, you must close that as well before running the form.

Also note that if the the MDI property of your form is set to *true* (the default), your pulldown menu appears on the parent window or application frame, not on the form itself.

Attaching popup menus to forms

Topic group Related topics

Popup menus normally appear when a user right-clicks a form or control. Like dropdown menus, popup menu files (extension .POP) can be created using a special designer, also described later in this chapter.

However, popups are attached to forms in a different manner than pulldown menus.

To attach a popup menu, you must assign the popup object to your form's PopupMenu property. Unlike pulldown menus, however, you can't make the connection with the popup menu file name alone. To attach a popup, you need to add some code, either through a codeblock or within a form or control event handler.

The simplest and most common means of attaching a popup to a form is through a form's *onOpen* event. If, for example, you create a popup menu file called MYPOPUP.POP, you can make the menu available to any form by typing a codeblock like this into the form Inspector's *onOpen* event:

```
{;do mypopup.pop with this, "popup"; this.popupmenu = this.popup}
```

Alternatively, you can click the *onOpen* event's tool button and apply the same code as a linked method:

```
// {Linked Method} Form.onOpen
   function Form_onOpen
      do mypopup.pop with this, "popup"
      this.popupmenu = this.popup
```

Creating toolbars and attaching them to forms

Topic group Related topics

Note that this topic covers both object creation and attachment. That's because, like popup menus, you need to add some code to attach toolbars to your forms. However, unlike pulldown or popup menus—which you can create using special visual designers—you also have to define your toolbars programmatically, either in a reusable program or within your form's code.

Like any other object, toolbar and toolbutton classes have a number of properties that allow you to modify the behavior and appearance of a toolbar. These properties, some of which are illustrated in the following code examples, are described later in this series of Help topics and are covered in detail in the printed and online *Language Reference*.

Creating a reusable toolbar

Here's an example of an object definition program, MYTOOLBR.PRG, which defines a basic two-button toolbar for use in any form or application.

```
parameter FormObj
   if pcount() < 1
      msgbox("DO mytoolbr.prg WITH <form reference>")
      return
   endif
t = findinstance( "myTBar" )
if empty( t )
  ? "Creating toolbar"
  t = new myTBar()
endif
try
  t.attach( FormObj )
catch ( Exception e )
  // Ignore already attached error
  ? "Already attached"
endtry
class myTBar of toolbar
  this.imagewidth = 16
   this.flat = true
   this.floating = false
    this.b1 = new toolbutton(this)
   this.b1.bitmap = 'filename ..\artwork\button\dooropen.bmp'
    this.b1.onClick = {;msgbox("door is open")}
    this.b1.speedtip = 'button1'
    this.b2 = new toolbutton(this)
   this.b2.bitmap = 'filename ..\artwork\button\doorshut.bmp'
    this.b2.onClick = {;msgbox("door is shut")}
    this.b2.speedtip = 'button2'
endclass
```

Attaching a reusable toolbar

As with popup menus, you can attach a reusable toolbar definition file to your forms with a simple *DO* command. However, since forms don't have a toolbar property, the connection is defined in the toolbar's own *attach()* property. Thus, if you choose to connect the program described above through a form's *onOpen* event, the integration codeblock is simply this:

```
{;do mytoolbr.prg with this}
```

Or, if you prefer the linked method approach, click the *onOpen* event's tool button and add the integration code:

```
// {Linked Method} Form.onOpen
```

```
function Form_onOpen
   do mytoolbr.prg with this
```

Of course, you also need to provide a way to restore the toolbar if the user has closed it. You can do that by also adding the integration code (or codeblock) to the *onClick* event of another control, such as a menu item or button. Should the toolbar already be running when it is summoned, *findInstance()* will let you know and let you block the creation of a new instance.

As is the case with pulldown menus, keep in mind that if your form's MDI property is set to True, your toolbar is owned by (and may only be docked to) the form's parent window or application frame.

Creating a custom toolbar

Topic group Related topics

Defining a custom toolbar within a form uses much of the same basic code described above for defining and creating a reusable toolbar. The primary difference is that the toolbar is available only to the form in which it is defined.

Here's how the same toolbar described above could be adapted for use within a single form:

```
** END HEADER -- do not remove this line
*
* Generated on 08/20/97
*
parameter bModal
local f
f = new tooltestForm()
if (bModal)
   f.mdi = .F. // ensure not MDI
   f.ReadModal()
else
   f.Open()
endif
CLASS tooltestForm OF FORM
  with (this)
     onOpen = class::show_toolbar
     height = 8.6471
     left = 3.625
     top = 1.7059
     width = 23.75
     text = ""
  endwith
this PUSHBUTTON = new PUSHBUTTON1(this)
with (this.PUSHBUTTON1)
  onClick = class::show_toolbar
  height = 1.1176
  left = 4
  top = 2
  width = 15.875
  text = "PUSHBUTTON1"
  metric = 0
  fontBold = false
  group = true
endwith
// {Linked Method} Form.onOpen
  function Form_onOpen
  // {Linked Method} Form.pushbutton1.onClick
  function PUSHBUTTON1_onClick
  function show_toolbar
     t = findinstance( "myTBar" )

  if empty( t )
  ? "Creating toolbar"
     t = new myTBar()
  endif
  try
     t.attach( form )
  catch ( Exception e )
     // Ignore already attached error
```

```
    ? "Already attached"
  endtry
ENDCLASS
class myTBar of toolbar
  this.imagewidth = 16
  this.flat = true
  this.floating = false
  this.b1 = new toolbutton(this)
  this.b1.bitmap = 'filename ..\artwork\button\dooropen.bmp'
  this.b1.onClick = {;msgbox("door is open")}
  this.b1.speedtip = 'button1'
  this.b2 = new toolbutton(this)
  this.b2.bitmap = 'filename ..\artwork\button\doorshut.bmp'
  this.b2.onClick = {;msgbox("door is shut")}
  this.b2.speedtip = 'button2'
endclass
```

Note that the only change to the contents of the earlier program is the removal of the FormObj parameter definition (and related change to the referenced form object, to form, in the new method called *show_bar*)and the removal of the unneeded *pcount()* parameter check at the top of the file.

Otherwise, the code was simply partitioned and placed in the appropriate areas of the form source, and the new method, *show_bar*, was created to hold the instance-checking and toolbar creation/attachment code.

Creating menus with the designers

Topic group Related topics

Two designers are available for creating menus—one for pulldown menus and one for popup menus. To open them, do one of the following:

- From the main menu, choose File|New|Menu (Alt+FNM) for the pulldown Menu designer, File|New|Popup (Alt+FNP) for the Popup Menu designer.
- From the Navigator, select the Forms tab, then double-click the Untitled menu icon for the pulldown Menu designer or the Untitled popup icon for the Popup Menu designer.
- From the Command window: enter CREATE MENU or CREATE POPUP.

Note that the only difference in appearance between the two designers is that the pulldown Menu designer contains a horizontal rule. This rule is the top-level menu border.

The designer menu

Topic group Related topics

When you use either designer, a number of shortcuts are available through the main *Visual* dBASE menu. These options are available by choosing Menu when either designer has focus.

You can use these shortcuts to insert an item before the current item (Insert Menu Item, Alt+MN or Ctrl+N), start a new submenu (Insert Menu, Alt+MM or Ctrl +M) or insert a separator (Alt+MT or Ctrl+T) before the current item in a pulldown or submenu. You can also delete the current item with Alt+MD or Ctrl+U.

If you're designing a pulldown menu, two preset menus are available for insertion anywhere on your menu bar with the Insert "Edit" Menu (Alt+ME) and Insert "Window" Menu (Alt+MW) choices.

The last item on the Menu list—Toggle Type (Alt+MO)—is available for use on those occasions when you change your mind about the type of menu you want. It automatically switches the currently selected designer and converts its contents from pulldown style to popup style—or vice versa—any time.

Building blocks

Topic group Related topics

Building basic menus through the designers is a simple two-step process of adding items, then adding code to make the items do what you want them to do.

Like any other object, each menu item has its own set of properties available through the Inspector (F11 to view). The “action” code is applied through an item’s *onClick* event.

Not all items need to perform an action, however. Some, like top-level items, normally only serve as entry points to additional menu choices. Lower-level items, and any item in a popup menu, can also serve as entry points to additional menus. These types of menus are called submenus (also known as “cascading” or “flyout” menus). File|New on the main *Visual* dBASE menu is an example of this type of menu. And any submenu item can be specified as an entry point to another submenu.

Another type of “non-action” item is the separator bar, a horizontal line that lets you group items within menus. You specify a separator anywhere except in a top-level item. To make a separator, set an item’s Separator property to True.

To provide further visual cues and functionality, you can add graphics, mnemonics, check marks, shortcut keys, and conditionally enable or disable any item in any menu.

Adding, editing and navigating

Topic group Related topics

To create a new menu, open a new Menu designer or Popup Menu designer window, type the name of your first item, and press Enter.

The cursor automatically drops a level and opens an editing block for the next item. Use the same sequence for entering additional items.

To edit items above or below the current item, use your Up and Down arrow keys. Tab and Shift+Tab lets you navigate left and right through your structure.

To add a submenu, select the item that will be the entry point to your submenu and press Tab. A new editing block appears to the right of the current item.

To add a new top-level item in a pulldown menu, select the rightmost existing top-level item and press Tab.

Note that other pulldown and submenus are hidden while you create new ones. You can return to view or edit the others any time by selecting the root item for each.

To insert a top-level or submenu root item in front of an existing one, choose an item, then choose Menu|Insert Menu (Ctrl+M or Alt+MM) from the main *Visual* dBASE menu.

To delete an item, select the item and choose Menu|Delete Current (Ctrl+U or Alt+MU) from the main *Visual* dBASE menu. Be aware, however, that deleting a top-level or submenu root item also removes all items and submenus below the item you are deleting.

You can also perform structural changes by dragging items and entire root/submenu systems from one location to another within your menus. To move items, just click, hold, drag, and release onto another item. Note that if you drag a held item onto another top-level or submenu entry point, the pulldown or submenu open up to allow you to relocate your dragged item.

To see your menus in action, you have to attach your menus to a form (as instructed earlier in this chapter), and save and close the designer that contains the menu you want to test. You can reopen saved menus for editing or redesign from the Forms page in the Navigator. As noted earlier, pulldown menus carry the extension .MNU, and popups are saved as .POP files.

Features demonstration

Topic group Related topics

The following exercise demonstrates a number of menu creation principles and features, including preset menus.

1 Open a new pulldown Menu designer window.

2 Type &File (including the ampersand) at the cursor, then press Enter. Type &Form into the new item entry box, then press Tab. A new item entry box appears to the right of the current entry. Type &Close into this box.

3 If it isn't already open, press F11 to open the Inspector. Choose the Events tab, then type form.close() into your Close item's onClick event.

4 Back at the Menu designer, select the top-level "&File" item.

5 Press Tab. A new top-level item entry box appears. Press Alt+NE to insert a complete menu of basic editing commands. Now press the Tab key again for one more top-level item entry box.

6 Press Alt+NW. This time, a new top-level "&Window" item is created. This item has no subentries yet, but it will later.

7 Save the menu as MTEST.MNU, then close the Menu designer.

8 Open a new form in the Form designer. Add an entryfield control to the form.

9 Click on the form background. If it's not already in view, press F11 to view the Inspector. Click the tool button on the form's MenuFile property (Menu category), choose your MTEST.MNU file, and click OK. Keep other form properties at their default settings.

1**0** Press F2 to save (MTEST.FRM, for example) and run the form.

Because this is an MDI form (the default setting), the menu appears on the application frame, replacing the *Visual* dBASE menu while the form has focus.

Click the Windows menu item; you should see a selectable list of other active *Visual* dBASE windows. Now try the Edit menu commands. You should be able to use all of these standard Windows text editing commands on the text in your form's entryfield control.

The reason these two menus provide full functionality without any coding on your part is that the items use built-in menubar objects. You'll see how these objects work in the next topic when we examine the code behind the menu.

Note: Since the properties used to create these preset menus belong only to the menubar class and are not available to the popup class, you can't use the properties in a popup menu.

Finally, try your File|Form|Close item to test your first piece of menu action code by closing the form.

Now let's go to the Source editor to examine the code structure of this menu.

Examining menu file code

Topic group Related topics

The model for building menus is based on the hierarchy and containership of menu objects, not the kind of menu. You don't explicitly define menu bars, pulldown menus, or submenus. Instead, you build a hierarchy of menu objects, where each menu object contains another menu object or executes an action.

Just as a form contains controls, menus objects contain other menu objects. *Visual* dBASE automatically determines where menus appear based on their level in the hierarchy.

The code below is the source for the menu file described in the previous topic, and illustrates how *Visual* dBASE interprets and implements a menu structure.

(To view the source for any other menu file, choose a .MNU or .POP file on the Navigator's forms page, then choose Open In Source Editor from the file's context menu. Or you can type modi comm <filename.ext> in the Command window, where *filename.ext* is the .MNU or .POP file you want to examine.)

```
** END HEADER -- do not remove this line
//
// Generated on 10/24/97
//
parameter formObj
new mtestMENU(formObj, "root")
class mtestMENU(formObj, name) of MENUBAR(formObj, name)
   this.MENU2 = new MENU(this)
   with (this.MENU2)
      text = "&File"
   endwith
   this.MENU2.MENU3 = new MENU(this.MENU2)
   with (this.MENU2.MENU3)
      text = "&Form"
   endwith
   this.MENU2.MENU3.MENU7 = new MENU(this.MENU2.MENU3)
   with (this.MENU2.MENU3.MENU7)
      onClick = {;form.close()}
      text = "&Close"
   endwith
   this.MENU12 = new MENU(this)
   with (this.MENU12)
      text = "&Edit"
   endwith
   this.MENU12.UNDO = new MENU(this.MENU12)
   with (this.MENU12.UNDO)
      text = "&Undo"
      shortCut = "Ctrl+Z"
   endwith
   this.MENU12.CUT = new MENU(this.MENU12)
   with (this.MENU12.CUT)
      text = "Cu&t"
      shortCut = "Ctrl+X"
   endwith
   this.MENU12.COPY = new MENU(this.MENU12)
   with (this.MENU12.COPY)
      text = "&Copy"
      shortCut = "Ctrl+C"
   endwith
   this.MENU12.PASTE = new MENU(this.MENU12)
```

```
   with (this.MENU12.PASTE)
      text = "&Paste"
      shortCut = "Ctrl+V"
   endwith
   this.MENU17 = new MENU(this)
   with (this.MENU17)
      text = "&Window"
   endwith
   this.MENU11 = new MENU(this)
   with (this.MENU11)
      text = ""
   endwith
   this.windowMenu = this.menu17
   this.editCutMenu = this.menu12.cut
   this.editCopyMenu = this.menu12.copy
   this.editPasteMenu = this.menu12.paste
   this.editUndoMenu = this.menu12.undo
endclass
```

In the code above, after the menus are defined, certain key menus are assigned to menubar properties which automatically give the menus their required functionality. For example, when this.menu12.copy is assigned to the menubar's *editCopyMenu* property, the copy menu takes on the following characteristics:

- The Copy item remains dimmed unless there is highlighted text in an appropriate object on the form, such as an Entryfield or Editor object.
- When text is highlighted, the Copy item is enabled.
- When the Copy item is selected, the highlighted text is copied to the Windows clipboard.

The remaining Edit menu properties function in a similar fashion.

You can modify the preset Edit menu by adding, inserting, or changing item characteristics from the pulldown Menu designer properties sheet.

The *windowMenu* property is useful only with top-level menus on MDI forms. The menu assigned to *windowMenu* will automatically have a menu added to it for each open child window (such as all other active *Visual* dBASE windows). This feature provides a means for the user to easily switch windows.

Another important menubar feature is the *onInitMenu* event, which is fired when the menu system is opened. You can use this event to check for certain conditions and then modify your menus accordingly.

If, for example, you offer a Clear All item on your Edit menu, you can set an *onInitMenu()* event to disable the item if no tables are open when your form opens. To do that, you could add a pointer to the top of your menu file:

```
NEW MTESTMENU(FormObj,"Root")
CLASS MTESTMENU(FormObj,Name) OF MENUBAR(FormObj,Name)
this.onInitMenu = class::chkClearAll
```

And then create a method to handle the event:

```
function chkClearAll
  if alias() == ""
    this.edit.clear_all.enabled = false
  endif
return
```

Changing menu properties on the fly

Topic group Related topics

You'll often need to modify menu properties while a form is open and your application is running.

For example, you might want to change what menu items are offered based on the currently selected control. The following are two event handlers for the *OnGotFocus* and *OnLostFocus* properties of a grid object, respectively. When the grid gets focus, the previously defined Edit menu is enabled; when the grid loses focus, the menu is disabled.

```
function GridMenus                  // Assign to OnGotFocus of grid object
  form.Root.Edit.Enabled = true
return
PROCEDURE NoGridMenus                // Assign to OnLostFocus of grid object
  form.Root.Edit.Enabled = false
return
```

Menu and menu item properties, events and methods

Topic group Related topics

Each menu (choose form.root in the Inspector's drop-down object selector list) and menu item (form.root.*itemname*) has its own set of properties, events and methods, only a few of which were applied in the samples above. The following tables describe the primary elements you'll use to define your menus.

Note: Where an element is available to only one of the menu classes, the class is noted in the tables below. Otherwise, the element is available to both menubar and popup classes.

Table 8.1 Menubar and popup root properties

Property	Description
Alignment *(popup only)*	Lets you align items on your popup menus and submenus. Options are left-aligned, centered, and right-aligned. Default is left-aligned.
EditCopyMenu, EditCutMenu, EditPasteMenu, EditUndoMenu *(menubar only)*	These four built-in objects are available for assignment to items on a preset Edit menu on a pulldown menu (menubar class). To access properties for these objects, click the object's Tool button.
Left *(popup only)*	Sets the position of the left border of the popup. Default is 0.00.
Name	String used to reference the root menu object. Except for Edit and Window menu names (which use the defaults EDIT and WINDOW), default for custom menus is ROOT. A reference to a default item would thus be this.root..menuNN, where NN is a system-assigned item number.
Top *(popup only)*	Sets the position of the top border of the popup. Default is 0.00.
TrackRight *(popup only)*	Logical value (default true). Determines whether popup menu items can be selected with a right mouse click. If set to false, the popup menu is still opened with a right-click, but items must be selected with a left-click.
WindowMenu *(menubar only)*	This built-in object is available for assignment to items on a preset Window menu on a pulldown menu (menubar class). To access properties for the WindowMenu object, click the object's Tool button.

Table 8.2 Menubar and popup root events

Property	Description
onInitMenu	Codeblock or reference to code that executes when the menu is initialized (when its parent form is opened).

Table 8.3 Menubar and popup root methods

Property	Description
Open *(popup only)*	Opens the popup menu.
Release	Removes the menu object definition from memory.

Table 8.4 Item properties

Property	Description
Checked	Logical value (default false). Adds or removes a checkmark next to the item text.
CheckedBitmap	Graphic file (any supported format) or resource reference. When the menu is run, the graphic you specify appears next to an item to indicate that it is currently selected. Alternative to the Checked property. Works with UncheckedBitmap to offer visual cues to the current "on/off" state of an item.
COPY, CUT, PASTE, or UNDO *(dBASE variable properties; available only to menubar class if preset Edit menu is in place)*	If using a preset Edit menu, these references offer a Tool button to let you view or modify properties for the selected item.

Enabled	Logical value (default true) that dims or activates this item.
HelpFile	Specifies the Windows Help file that provides additional information about this item. If you choose to use a Help file, you must also specify a Help topic reference in the HelpId property.
HelpId	Specifies a Help topic that you want to appear when the user presses F1 while selecting this item. If you specify a Windows Help file in the HelpFile property, HelpId is a topic reference within that Help file. You can either specify a context ID number (prefaced by #) or a Help keyword.
Name	String used to reference the item object. Except for Edit and Window menu names, default is MENU*nn*, where *nn* is a system-assigned number.
Separator	Designates a menu item as a separator bar. A separator bar appears as a horizontal line with no text; a user can't choose or give focus to a separator bar. Use separator bars to begin a group of related menu items. You can also define a separator in the Menu or Popup Menu designers by choosing Menu|Insert Separator from the main *Visual* dBASE menu.
ShortCut	Specifies a keystroke or keystroke combination the user can press to choose the menu item. Shortcuts, also known as accelerators, provide quick keyboard access to a menu item. For example, you can set the ShortCut for an "Exit without saving" menu item to Ctrl+Q. To define a shortcut key for a menu item, enter it in the *Shortcut* property. For example, to specify the key combination Ctrl+X to exit a menu, enter CTRL-X. Thereafter, when the user presses Ctrl+X, the *OnClick* event occurs automatically. This key combination also appears in the menu title.
StatusMessage	Type text here to display a message in the status bar (if a status bar object is included) of your non-MDI form, or, if you are attaching the menu to an MDI form, in the status bar of your application frame.
Text	Item name, as it appears on the menu. You can also define item names directly in the Menu designer. To specify a letter as the mnemonic key that will be used to access the item, precede the letter in the text string with an ampersand (&). For example, Help menus are usually defined as *&Help*.
UncheckedBitmap	Graphic file (any supported format) or resource reference. When the menu is run, the graphic you specify appears next to the item to indicate that it is not currently selected. Works with CheckedBitmap to offer visual cues to the current "on/off" state of an item.

Table 8.5 Item events

Event	Description
onClick	"Action code" that executes when the item is clicked. If the item is an entry point to a pulldown or submenu, then no code is required for this event. Nor is code required for the items in the preset Edit or Window menus (described earlier in this chapter).
onHelp	Optional code that executes when the user presses F1. Use this to provide user information as an alternative to using the *HelpFile* and *HelpId* properties to define an online Help topic.

Table 8.6 Item methods

Method	Description
Release	Removes the object definition from memory.

Toolbar and toolbutton properties, events and methods

Topic group Related topics

Each toolbar and toolbutton has its own set of properties, events and methods, only a few of which were applied in the samples above. The tables on the next few pages describe the primary elements you'll use to define your toolbars.

Tip: To inspect all toolbar and toolbutton properties, methods and events, as well as the defaults for each, type four lines like this into the Command window:

```
t1 = new toolbar()
t2 = new toolbutton( t1 )
inspect( t1 ) // opens the Inspector with toolbar properties visible
inspect( t2 ) // opens the Inspector with toolbutton properties visible
```

Table 8.7 Toolbar properties

Property	Description
Flat	Logical value (default true) which toggles the appearance of buttons on the toolbar from always raised (false) to only raised when the pointer is over a button (true).
Floating	Logical value (default false) that lets you specify your toolbar as docked (false) or floating (true).
imageHeight	Adjusts the default height for all buttons on the toolbar. Since all buttons must have the same height, if ImageHeight is set to 0, all buttons will match the height of the tallest button. If *ImageHeight* is set to a non-zero positive number, images assigned to buttons are either padded (by adding to the button frame) or truncated (by removing pixels from the center of the image or by clipping the edge of the image).
imageWidth	Specifies the width, in pixels, for all buttons on the toolbar.
Left	Specifies the distance from the left side of the screen to the edge of a floating toolbar.
Text	String that appears in the title bar of a floating toolBar.
Top	Specifies the distance from the top of the screen to the top of a floating toolbar.
Visible	Logical property that lets you hide or reveal the toolbar. Default is *true*.

Table 8.8 Toolbar events

Event	Description
onUpdate	Fires when the application containing the toolbar is idle, intended for simple routines that enable, disable or otherwise update the toolbar. Because this event fires continuously when the application is idle, you should avoid coding elaborate, time-consuming routines in this event.

Table 8.9 Toolbar methods

Method	Description
Attach	Attach(<form object reference>) establishes communication between the toolbar and the specified form and sets the Form property of the toolbar. Note that a toolbar can be attached to multiple MDI forms or to a single SDI form.
Detach	Detach(<form object reference>) ends communication between the toolbar and the specified form, and closes the toolbar if it is not attached to any other open form.

Table 8.10 Toolbutton properties

Property	Description
Bitmap	Graphic file (any supported format) or resource reference that contains one or more images that are to appear on the button.

BitmapOffset	Specifies the distance, in pixels, from the left of the specified Bitmap to the point at which your button graphic begins. This property is only needed when you specify a Bitmap that contain a series of images arranged from left to right. Use with *BitmapWidth* to specify how many pixels to display from the multiple-image Bitmap. Default is 0 (first item in a multiple-image Bitmap).
BitmapWidth	Specifies the number of pixels from the specified Bitmap that you want to display on your button. This property is only needed when you specify a Bitmap that contain a series of images arranged from left to right. Use with *BitmapOffset*, which specifies the starting point of the image you want to display.
Checked	Returns true if the button has its *TwoState* property set to true. Otherwise returns false.
Enabled	Logical value (default true) that specifies whether or not the button responds when clicked. When set to false, the operating system attempts to visually change the button with hatching or a low-contrast version of the bitmap to indicate that the button is not available.
Separator	Logical value that lets you set a vertical line on the toolbar to visually group buttons. If you specify a separator button, only its Visible property has any meaning.
SpeedTip	Specifies the text that appears when the mouse rests over a button for more than one second.
TwoState	Logical value that determines whether the button displays differently when it has been depressed and consequently sets the *Checked* property to true. Default is true.
Visible	Logical value that lets you hide (*false*) or show (*true*) the button. Default is *true*.

Table 8.11 Toolbutton events

Event	Description
onClick	“Action code” that executes when the button is clicked.

Using the Source editor

Topic group

The Source editor contains the entire source code for the form, report, menu, query, or data module you're designing. If you're designing several files, the source for each one appears on a different tabbed page. Likewise for a .PRG file, which appears in the same editor.

Note: If you want, you can choose not to have tabbed pages in the editor but to open more than one instance of the Source editor, instead. Set this preference in the Editor Properties dialog box, Display page (Properties|Editor Properties).

To open the editor, do one of the following:

- Design a new or existing form, report, menu, query, or data module. Both the design view and the editor open, with the design view having focus. Press F12 to switch focus to the editor. (If in a prior session you closed the editor, it does not open automatically with the design view, but pressing F12 will open it.)
- Right-click a file in the Navigator, and choose Open In Source Editor. (Not all files have this choice.)
- Open a .PRG file or text file.
- Press F12 when you have a designer open (except the Table designer).

Thereafter, use F12 to toggle between design view and the code page for any given designer file. Changes made in either the Source editor or visual designer are reflected by the other when you move focus between them. Code is automatically compiled when you shift focus to the designer. If an error occurs during compilation, *Visual* dBASE displays an error message and points to the offending line in the file.

If an error occurs during runtime, *Visual* dBASE displays a dialog box, giving you the opportunity to fix the error. If you cancel the Fix dialog box, then the only copy of the work is in a temporary disk file which is placed on another page (or another instance) of the editor. You can do with this as you wish.

Two-pane window with tree view

The Source editor is a two-pane window:

- The left pane is a tree view showing the hierarchy of the current file (including the *this* object for classes with a constructor). You can enlarge the pane, or you can hide it. To do either one, move the split bar to the left or right, using the mouse. The tree view is dynamically updated during program editing, unless the tree view is closed.

  You can expand the nodes in the tree view pane by clicking the plus signs and collapse the nodes by clicking the minus signs, same as in the Windows Explorer. The expanded or collapsed state of nodes and the selected item are maintained in the tree-view pane when you take actions in the right-hand pane.

  The tree view displays object bitmaps for the standard controls. You can turn this off in the Editor Properties dialog box, Display page (Properties|Editor Properties).

- The right pane contains the code. Click an item in the tree view to highlight the first line of that object in code. Double-click an item in the tree view (or select it and press Tab) to jump to the start of that object in the code.

You cannot use the Source editor to select an object in the Inspector. You must do that in the design window or in the Inspector, itself.

Notes on the Source editor

Topic group

Here are additional comments on the Source editor.

- Compared to the former Method editor:

  During stream-out, procedures have a comment generated inline which identifies all methods linked to them. This plus the hierarchy visible in the tree view replaces the function of the "linktext" static text control that appeared in the former Method editor.

  The tree view points at the top and bottom of the source files, showing the equivalent of "header" and "general" in the former Method editor.

- When editing a .PRG file, the Method menu's New Method, Delete Method, and Verify Method commands are available. They work on whatever "method" is at the current cursor position. If no method can be identified, the menu commands are unavailable.

  When designing a form, report, menu, or data module file, three more commands are available on the Method menu: Edit Event, Link Event, and Unlink. Edit Event can generate wrappers for functions or procedures that are not yet part of the source, useful with the new tree view.

- If you attempt to edit a method in a base class, and you elect not to override that method in the derived class, *Visual* dBASE opens the source file for that base class in the designer. If it is already opened, it is given focus, and the cursor is positioned at the method.
- When you switch focus from the designer to the editor, it purges the editor's Undo buffers.
- Opening a file named in code:

  Choosing Edit|Open File At Cursor, opens the file at the cursor position. If you have a block of text selected, and you choose Edit|Open File At Cursor, *Visual* dBASE opens the file that appears within the block of selected text. Files with .WFM, .CFM, .REP, .CRP, .PRG, .CC, and .H extensions are opened in another instance of the editor. Other files are opened in their specific visual designer (for example, .DBF files are opened in the Table designer). File names with extensions unknown to *Visual* dBASE and not registered with Windows produce an error.

  If no matching file is found, the Open File dialog box appears, showing the text at the cursor as a DOS-type skeleton.

Creating a new method

Topic group

To create a new method, select an event in the Inspector, then click the tool button to the right of the text box. This creates the skeleton of a new method and links it to the event. The Source editor receives focus.

You can write a new method to link to the current event in the Inspector, or you can display the Edit Event dialog box to link the event to an existing method.

Note: A method is a function defined in a class. The Form and Report designers are object-oriented; forms and reports are classes. Therefore all methods are defined and appear in the Source editor with the reserved word function, and are sometimes (loosely) referred to as functions.

The Code Block Builder (overview)

Topic group

A code block is a data type that can be stored in a variable or property. Code blocks are used in forms and reports to define events or text properties.

Because code blocks cannot span multiple lines, using the Source editor to edit a long code block can be cumbersome. So, when you choose to, you can open the Code Block Builder, which temporarily lays out the code one command per line, with the parameters in a separate text box. Edit what you need to, and choose OK. The code block appears in your code as one line again.

You don’t have to open the Code Block Builder if you don’t want to. You can edit directly in the Inspector or the Source editor.

To create or edit a codeblock

Topic group

To create a new codeblock for an event,

1 Select CodeBlock from the event's drop-down Type list.

2 Click the wrench tool beside the event to open the Code Block Builder.

To create a new codeblock for a Text control,

1 Select its *text* property in the Inspector.

2 Select CodeBlock from the *text* property's drop-down Type list.

3 Click the wrench tool beside the property to open the Code Block Builder.

Editing an existing code block

If you have an existing code block you want to edit (it will be in an event or the *text* property of a Text control), you can open the Code Block Builder dialog box in these ways:

- For an event,
- Select the event in the Inspector, and then select the wrench tool beside it, or
- Choose Method|Edit Event, and if a code block is already associated with the event, the Code Block Builder opens (otherwise, the Source editor opens).
- For a Text control, select its *text* property in the Inspector, and then select the wrench tool beside it.

Make your changes in the Parameters text box and in the Commands Or Expression text box.

When you click OK, *Visual* dBASE checks the syntax of the code block. If an error exists, *Visual* dBASE attempts to repair the error. If it can't, a warning message box notifies you of the error, and the Code Block Builder stays open so you can fix the error. Focus is placed on the text box where the error occurs: Parameters or Commands Or Expression. If you don't know how to fix the error, you can choose Cancel and *Visual* dBASE keeps the previous code.

If the code block is error-free, then the Code Block Builder closes. The code block is condensed back into one line and displayed in the appropriate line in the Inspector. The indentations and carriage returns are removed.

The Command window

Topic group Related topics

The Command window is used to directly execute one-line *Visual* dBASE commands. It is handy for testing simple expressions and immediately seeing the results in the results pane. (It is the *Visual* dBASE counterpart to the dot prompt found in dBASE IV and earlier DOS versions of dBASE.)

Note: The Command window is for temporary work only; you cannot save your work. However, you can copy the contents of the window or drag and drop to a source file. You can also print the contents (select what you want to print, and choose File|Print).

To use your own functions in the Command window, you must first load them:

```
set procedure to <filename> additive
```

To open the Command window, choose View|Command Window.

The Command window has two panes:

- The input pane is where you enter interactive commands You might use the input pane in this way if you find typing commands easier or faster than using the mouse and menus.

  The input pane echoes your actions in the *Visual* dBASE interface, keeping a history of the commands you've executed. For example, when you create a new table by double-clicking the Untitled table icon, the Command window shows that you've executed a CREATE command.

- The results pane is where your command output appears, unless your commands create or call separate windows. It can be used with _sys.scriptOut.writeln to debug applications. The results pane is also the default destination for the output of many programs. The results pane retains the last 100 lines.

To change the relative size of the two panes, drag the center divider. To restore them to equal sizes, double-click the divider.

To clear the contents of the input pane, close the window and select View|Command Window. To clear the results pane, choose Edit|Clear All Results.

Typing and executing commands

Topic group Related topics

To execute a command, type it in the input pane and press Enter. You can also click the Execute Selection button on the toolbar or choose Edit|Execute Selection. You can delete commands like any other text. The commands you enter in the Command window remain there until you close the window or exit *Visual* dBASE.

Because pressing Enter executes the command line, you must press the down-arrow key to enter more than one line into the Command window. The maximum number of characters per line is configurable in the Editor Properties dialog box. The maximum number of lines the input pane can hold is limited by virtual memory.

The command line defaults to insert mode, as indicated in the status bar. To switch between insert and overwrite modes, press the Ins key.

Executing a block of commands

In addition to typing multiple command lines, you can paste lines of command text from another source. You can also execute a block of command lines, provided the block does not contain nested structures or methods.

To execute more than one line of text in the input pane, select the lines with the mouse or use Shift and the arrow keys. Press Enter, or click the Run button on the toolbar, or choose Edit|Execute Selection.

Reusing commands

To reuse commands you've already entered in the input pane,

1 Scroll the window, if necessary, to display the commands you want.

2 Click the command line you want, or select a block of commands.

3 Execute the command (or commands) by pressing Enter, clicking the Run button, or choosing Edit| Execute Selection.

Editing in the Command window

Topic group Related topics

Edit text in the input pane as you would in a text editor, using standard editing keys such as Backspace and Delete, and the Edit menu commands. Use the Edit|Search commands to search for and replace text in the input pane.

The command line is the line in the input pane containing the insertion point.

You can cut or paste code from Help or use commands from a program file by opening the file, copying the commands, and pasting them into the Command window. After the commands are in the Command window, you can test or modify them. The sample files provided with *Visual* dBASE are a good source of working commands.

Saving commands into programs

If the input pane contains dBASE code you want to use again, you can copy and paste it into a new program (.PRG) file or insert it into an existing program file.

You can also mark a block and choose Edit|Copy To File. *Visual* dBASE displays the Copy To File dialog box so you can name the new file for the selected text. By default, the file has a .PRG extension, but you can change it to another extension. If you don’t mark a block before you choose Edit|Copy To File, the entire contents of the Command window is selected.

Using the Debugger (introduction)

Topic group Related topics

Debugging is the process of locating and eliminating errors—bugs—from an application. Use the *Visual* dBASE Debugger to repair broken code and resolve problems in your forms, reports and programs.

With the Debugger you can

- Load and debug multiple files.
- Control program execution by stepping through an entire program line by line or skipping to defined breakpoints.
- Monitor the values of variables, fields, and objects. You can even make temporary changes for testing purposes, and then update your code using the *Visual* dBASE Source editor.
- View subroutines (methods, procedures, and functions) that the main program calls, and track the points at which each is called.
- Stop program execution at any point, or run full-speed to the cursor position.
- Run the Debugger as a standalone application to debug compiled programs.

Types of bugs

Topic group Related topics

The two most common types of bugs are syntactical and runtime errors.

Errors in syntax include such oversights as misplaced braces or *endif* statements, and are generally caught by the compiler before you even get to the debug stage. If you run uncompiled code through the Debugger, however, it will easily catch any syntactical errors.

Runtime errors, such as calls to non-existent tables, are also quickly exposed by the Debugger, which automatically halts at the offending reference.

When you are stopped by any error, you can either cancel or suspend further execution of the program, ignore the error and continue running the code through the Debugger, or note the problem, open your *Visual* dBASE Source editor, fix the code, and then return to the Debugger to check for additional errors.

The third, and least obvious type of bug is an error in program logic, and these are not detected so easily. If, for example, your program includes a method that is supposed to execute after a certain event, but the event is bypassed, you may need to use all the debugging power described in this chapter to track down and correct the problem.

Using the Debugger to monitor execution

Topic group Related topics

There are three ways you can use the Debugger to monitor how your program executes:

- Run the program locally from the *Visual* dBASE integrated development environment (IDE). Running from the IDE is convenient for checking code syntax or various parts of your program while you develop it.
- Compile your application, then debug it by typing debug <programname.exe> into the Command window. This method provides a “real world” test, showing how your program accesses tables, for example. After running your tests, you can use the *Visual* dBASE Source editor to make any needed adjustments.
- Run the Debugger as a standalone application, set breakpoints, then run your program from *Visual* dBASE. When the program reaches a breakpoint, control is handed over to the Debugger.

General debugging procedure

Topic group Related topics

This section gives you a quick overview of debugging procedures. The process is examined in greater depth in subsequent sections.

The Debugger is always available whenever you run into an error when in Run mode. To open the Debugger and deal with the error on the spot, you need only click the Debug button in the error dialog. When the Debugger opens, you can then proceed from step 2 in the instructions below.

Alternatively, you can run it before running your program, then choose a program to debug. Here's how:

1. Start the *Visual* dBASE Debugger by right clicking on a source file in the Navigator and choosing Debug. The program's code appears in the Debugger's Source window, under a tab with the file's name. If you open multiple programs, each appears under its own labeled tab.
2. You can then configure a number of options:

- If you intend to pause the execution of the program at certain points or isolate a section of the code for test-fix-test cycles, set breakpoints by double-clicking the Stop Hand pointer at the left of the line before which you want a breakpoint.
- Open any tool windows you intend to use, for example, to watch variables.

3. If you set breakpoints, or if any kind of error occurs

- The Error Message box displays the *Visual* dBASE error message. Click OK.
- The Debugger's Source window appears. The offending line immediately precedes the blue-highlighted line.
- Check for the more obvious and typical errors: a misspelling or missing punctuation or spaces.
- Inspect your variables and expressions by holding the cursor over a variable until a popup dialog box appears with the variable's current value. This can give you a clue about what went wrong. You can also view all variables in the Variable tool window or set watchpoints for particular expressions and monitor these in the Watch tool window.
- If the form does not appear quite the way you intended when you created it in the Designer, try adjusting some of the display parameters in one of the tool windows. If this works, make the same changes permanently in the code by editing the program in the *Visual* dBASE Source editor.
- For other types of errors, return to the main *Visual* dBASE Source editor, locate the offending line and make your corrections. Save the file, then restart your program to check the results.
- Restart the program to check the results of your correction.

4. If your application initially appears stable and displays properly, proceed by testing each of its features, entering or editing values, submitting changes to the server, or requesting updates. Click each button and interact with the program in every possible way. Errors generated from these interactions might require you to step into subroutines and again check variable values at each step.

Whenever you need to run the program again from the top, simply switch focus to the Debugger, then switch back to your main program window.

Debugging runtime applications

Topic group Related topics

To debug compiled programs, simply run the Debugger as a standalone application, set breakpoints, then run your program from *Visual* dBASE (not from the Debugger).

When the program reaches a breakpoint, control is handed over to the Debugger.

The Source window

Topic group Related topics

The Source window is the main Debugger window. The code is read-only. The left pane of the Source window shows a hierarchical view of the objects in your code.

You can use the Source window to step through code execution line by line, to highlight breakpoints and identify the location of errors.

However, you cannot edit or repair your code in the Debugger's Source window; to do that, you have to use the *Visual* dBASE Source editor.

As your program runs, source code scrolls to the line about to receive program control. You can scroll the source code without affecting program execution; the next command to be executed remains highlighted regardless of where the cursor is in the Source window.

Your program runs in the background while the Debugger retains focus. You can interact with your program by moving focus to it (use Alt+Tab to switch to it, or minimize the Debugger and click your program window). While you interact with your program, its code continues to scroll in the Source window. If you close the application, your program's code remains open in the Source window.

You also use the Source window to locate and set breakpoints. If an error occurs, the Source window automatically scrolls to the offending line, highlighting (in blue) the line immediately following the offending line.

To correct any detected errors, return to the *Visual* dBASE Source editor, load your file, locate the offending line (using the *Visual* dBASE Source editor's line-numbering feature) and fix the error.

To locate and move to a line number in the Source window

1 Choose Edit|Go To Line from the Debugger menu or right-click the Source window and choose Go To Line from the popup menu.

2 Specify the number in the Go To Line dialog box.

Using Go To Line to move to a line number in the Source window doesn't affect program execution, which remains paused at the last line you stepped or traced to, or at the last executed breakpoint.

To find a text string in the current program file

1 Choose Edit|Find from the Debugger menu or right-click the Source window and choose Find from the popup menu.

2 Specify the text to find in the Find dialog box.

The search begins from the current position of the cursor and is case-insensitive. If the text is found, the Source window scrolls to the line containing the text, and the cursor moves to the beginning of the text. To find additional occurrences of the same text, choose Edit|Find Next from the Debugger menu or Find Next from the Source window popup menu.

The Debugger tool windows

Topic group Related topics

The Debugger's View menu offers access to four tool windows, described below, that help you track program elements during a debugging session.

Variables

Lists variables found in the currently selected program. You can limit the extent of the variable search by deselecting options in the Debugger Options dialog box (File|Options).

Watches

The Watch tool window lets you specify particular variables, fields, and expressions that you would like to watch as the program code executes. The window shows the changing values for the watched items as you test the program (by clicking buttons, sending queries, and so on).

Call Stack

This tool window displays a list of subroutines called by the current program. Each call to a separate program file (or module) is displayed as it occurs, showing its line number, function name, and path name.

Trace

Displays the output that appears in the Output panel of the Command window.

Docking the Debugger tool windows

Topic group Related topics

To dock a tool window in the Debugger, click the frame of the window and drag to the side of the Source window where you want to fix the window's position. The small tool window enlarges to fit the side or bottom of the Source window.

To undock a tool window, click the frame of the tool window and drag to the center of the screen until the small outline appears, then release.

To disable docking, choose View|Tool Window Properties and uncheck the tool windows for which you want to disable docking.

Controlling program execution

Topic group Related topics

You can control program execution in the Debugger using the following commands and procedures, all of which are available from the Run and Debug menus.

Table 10.1

Method	Type of program execution control
Run	Runs the program, stopping at each error to display an error message. The line after the offending line is highlighted in blue.
Stop	Stops execution of the program.
Run To Cursor	Executes lines from the current position to the cursor location and stops there.
Step Over	Skips subroutines (any called functions, methods, or procedures).
Step Into	Shows line-by-line execution of subroutines, stopping at the end of each subroutine. You can step into another nested subroutine.
Step Out	Returns display of line-by-line execution to the preceding level of the program.
Break on next executable line	Causes program execution to stop at the next executable line, regardless of where execution starts.
Using breakpoints	Breakpoints are specific points in the program that you set to stop execution, letting you assess the situation. You can isolate a section of code for closer study by placing a breakpoint at the beginning and end of the section, then running that section repeatedly. You can further subdivide the section by adding more breakpoints.
Watching variables	You can see the current real-time value of any variable by holding the cursor over it. You can select particular variables (from the Variable tool window which shows all the variables in the program) and watch how their values change in the Watch tool window.

Stepping in the Debugger

Topic group Related topics

Stepping executes your program line by line, pausing after each line so you can evaluate the result.

If you are confident about a block of code, you don't have to step through it again and again to get to the uncertain areas. You can, for example, step over any lines that call subroutines (including methods and expressions).

For example, if you have already determined that no bugs exist in a particular subroutine, select the line that calls the subroutine, click the Step Over button in the toolbar, and run the program. The Debugger steps over the execution of the subroutine so you can focus on the rest of the program. The call to the subroutine still occurs, and the stepped-over subroutine still executes; you just don't see the line-by-line execution in the Source window. The Debugger then stops at the line following the stepped-over subroutine.

On the other hand, if you want to check out what a subroutine is doing, you can *step into* it, and further, step into any nested subroutines as well. Then you can *step out* from the subroutine and return to the main program level.

Commands for stepping over, stepping in, and stepping out of subroutines are available from the Run menu and toolbar.

Using breakpoints

Topic group Related topics

A breakpoint stops program execution so you can evaluate variables, fields, arrays, objects, and expressions; change the value of variables, arrays, and objects; and check what subroutine the program is in. Using breakpoints lets you run the program at full speed until it comes to a problem area; breakpoints give you an alternative to stepping through the entire program.

When you step or trace through a program, you're essentially breaking at each line. However, once you are certain that no bugs exist in certain parts of your program, there is no need to repeatedly step through each line; instead, set breakpoints at crucial places where the code is less certain, then run the program at full speed and evaluate program values at the breakpoints.

If, for example, you suspect a bug in occurs at one particular place, such as when a subroutine is called, you could set a breakpoint at the line that calls the suspect subroutine. You could then *step into* the called method or function.

Setting and removing breakpoints

To set a breakpoint, select a line of code in the Source window and either

- Move the pointer to the left of the command line where you want to enter a breakpoint. When the pointer changes to a Stop sign, double-click. The line is then highlighted in red.

  To remove the breakpoint, double-click the highlighted line again.
- Press Ctrl+B to add a breakpoint to the selected line of code or to remove a breakpoint from the selected line.
- Choose Debug|Toggle Breakpoint from the Debugger menu (or from the Source window's popup menu).

To remove all current breakpoints, choose Debug|Delete All Breakpoints.

Working with breakpoints

Topic group Related topics

To see a list of breakpoints in a program, choose Debug|Breakpoints.

You can use the Breakpoints list to keep track of existing breakpoints in all open modules. The line number of each breakpoint is listed next to the path name of the program in which it appears.

To delete a breakpoint, select it and click the Delete button.

To delete all breakpoints, click the Delete All button.

To go to any breakpoint, simply double-click the line number of the desired breakpoint (or select it and click Go To). The Breakpoint window closes and the the Source window opens to the selected breakpoint.

To conditionally set breakpoints, click Condition to open the Breakpoint Condition dialog box, and type in an expression—such as the value of a variable, a global condition, or any conditional expression that defines a condition in which the current breakpoints should be active. If the condition is not met, breakpoints are ignored.

- **Line.** Click the Line radio button to specify a condition for the line currently selected in the Breakpoint window. The conditional expression you enter applies only to the selected breakpoint line.
- **Global**. Click the Global radio button to enter a conditional expression for the entire program. For example, you might have noticed that when a global variable reaches a certain value, say 10, the program becomes unstable, but until then everything works fine. To test your observation, you could set the condition *x=10* to force all breakpoints to activate when the global variable *x* reaches 10.

Running a program at full speed from the Debugger

Topic group Related topics

The alternative to stepping and tracing, which examine your code line-by-line, is to debug at full speed. This lets you skip areas that you know are bug-free and concentrate on suspected problem areas.

If you set breakpoints in your program, you can debug at full speed and execute to the first breakpoint. You can then decide whether to continue running the program from the breakpoint or to proceed by stepping over or into subroutines.

To debug at full speed, either

- Click the Run toolbar button
- Choose Run|Run from the Debugger menu, or
- Press F9

Running to cursor position

You can also run at full speed until execution reaches the current cursor position in the Source window. To try this approach, choose Run|Run To Cursor.

Stopping program execution

In addition to using breakpoints and stepping techniques, you can halt execution of a running program any time by

- Clicking the Stop button on the toolbar
- Choosing Run|Stop from the Debugger menu

Debugging event handlers

Topic group Related topics

You can use the same basic techniques to debug event handlers as you do for any other code sections.

These are the general steps for approaching error handlers:

1 Open the Debugger and load the program containing the event handler code.

2 Set a breakpoint.

3 Run the program, either at full speed, or by stepping or tracing through it.

4 When the program opens a form, the form gets focus. Interact with the form to trigger the event associated with the event handler. For example, if the event handler is an *onClick* method for a pushbutton, click the pushbutton.

When the event handler reaches the line or condition specified by the breakpoint, execution stops and focus returns to the Debugger. You can then inspect, step, or perform other debugging tasks.

Viewing and using the Call Stack

Topic group Related topics

The Call Stack window tracks calls made to methods or functions, whether inside or outside of the running program. The list includes the line number, function name, and file name to which the calls were made.

The last line in the Call Stack list is always a reference to the main program level.

Note that if you step through or over nested subroutines, calls within the nested subroutines are removed when execution steps out again.

Otherwise, the Call Stack list is updated whenever program execution pauses.

You can also use the Call Stack list to quickly shift Source window focus to any subroutine call. To do that, select a subroutine in the Call Stack, right-click, and choose Go To Source Line from the popup menu. Note that though the Source window is refocused to the calling line, the current execution point remains where it was, and will continue from that point if you resume program execution.

Watching expressions

Topic group Related topics

The Debugger's Watch window lets you monitor expression execution and results. You can even use it to temporarily change and retest variables. It can help you detect such problems as the assignment of incorrect values to variables, or assignment of values at the wrong points.

Watchpoints are evaluated and their current values displayed in the Watch window whenever program execution is paused.

Adding watchpoints

To add a watchpoint, do one of the following:

- Choose Debug|Add Watch from the Debugger menu.
- Right-click the Watch window and choose either Add Watch or Watch Variable At Cursor from the popup menu.
- Press Ctrl+W.

The selected expression appears in the Watch window.

Note: If you haven't already run the program past a point where variables, fields, arrays, or objects in the selected expression are initialized, "unknown" is displayed to the right of the expression.

Editing watchpoints

To edit an existing watchpoint,

1. Select the watchpoint in the Watch window.
2. Choose Debug|Edit Watch Value or Debug|Edit Watch Name from the Debugger menu. Alternatively, right-click the Watch window and select one of the editing commands in the popup menu.

Changing watchpoint values

In addition to watching expressions, you can temporarily change the value of a variable. If, for example, a variable is receiving a correct value, but at the wrong point, you could

1. Add a watchpoint for the variable.
2. Pause program execution by setting up a breakpoint at the line where the correct value is supposed to be assigned to the variable.
3. Use the Watch window to directly assign the correct value to the variable.

It's important to remember that this sort of testing does not result in a permanent code change. It is only intended to let you examine how your program behaves when the correct variable value is assigned. If the test is successful, you can open the *Visual* dBASE Source editor to permanently correct the part of the program that was responsible for returning the wrong value.

Excluding variable types

Topic group Related topics

To exclude variable types from the tracking process, choose File|Options to open the Debugger Options dialog box, then deselect items from the variables type group.

The Options dialog box also permits you to hide exceptions during a debugging session.

SQL designer overview

Topic group

The *Visual* dBASE SQL designer lets you create, edit, and execute SQL queries on any supported data source.

You needn't be an SQL expert to use the SQL designer. In fact, you can use the tool to learn SQL by examining the results and structure of the queries you create. You can start with simple SELECT statements and progress to the most complex table joins and grouped queries—all of which can be easily constructed in the designer's table pane and notebook pages.

When your statements are structured to produce the results you want, you can save them to disk, edit them with the Source editor, or use them as templates in the SQL Property Builder.

You can also add your saved queries to a *Visual* dBASE program directly by assigning an .SQL file to the SQL property of a Query object, or by copying statements from your query files directly into your code.

Opening the SQL designer

Topic group

For new queries

You can open the SQL designer to create a new query by using any of the following methods.

- Menu: Choose File|Open (Alt+FNQ).
- Navigator: Queries tab, double-click the Untitled icon.
- Command window: Type

```
create query
```

To view or modify an existing query

You can open the SQL designer to load and review or modify an existing query by using any of the following methods.

- Menu: Choose File|Open (Alt+FO or Ctrl+O) for the Open File dialog, then choose Queries from the Files of Type list, and locate your saved .SQL file.
- Navigator: Queries tab, double-click the icon for an existing query file or select it and either press F2 or click the Design button on the toolbar.
- Command window: Type

```
modify query <queryfile.sql>
```

where <queryfile.sql> is a saved query file. Note that if the file is not in the current directory (as shown in the Look In box in the Navigator), you must also include the full path to the file.

SQL designer elements

Topic group

The SQL designer comprises two main sections:

- The **table pane**, the upper portion of the designer, where tables and fields are depicted. This area lets you select and deselect data for your queries. You can also use these table listings to quickly create joins.
- The **query notebook** is the tabbed lower portion of the designer. Each page of the notebook offers a grid layout for specifying query parameters and options.

The notebook pages are:

- Criteria. Where you specify which rows of data are to be included in the query results.
- Selection. This page enables you to create summary data. It also allows you to specify a customized output name for a field or summary data in the query results.
- Grouping. Use this page to create a grouped query. A grouped query groups the data from the source tables and produces a single summary row for each row group.
- Group Criteria. Enables you to specify group selection criteria used in the HAVING clause that SQL designer adds to the query. A HAVING clause selects and rejects row groups.
- Sorting. Where you specify a sort order for the query.
- Joins. This page lets you create multi-table SQL queries (joins).

Interacting with the Source editor

Topic group

Like other *Visual* dBASE designers, the SQL designer is a two-way tool. If you open a saved .SQL file in the designer, or save a new query, any change you make thereafter is immediately reflected in the source file (your .SQL file), and vice versa.

To view or edit your source file any time, press F12. The source code appears in the Source editor.

Entering data in the SQL designer

Topic group

As with data entry in the Inspector, it's important to remember to press Enter after completing a formula or entering data in an SQL designer grid. If you don't, the formula or data may not register.

Running a query from the SQL designer

Topic group

When you’re designing a query in the SQL designer, you can check the results of your query any time by pressing F2 or clicking the Run Query button on the toolbar. Results are displayed in a table (default is grid view).

When viewing your query results you have all of the standard table-editing and navigational tools at your disposal.

To return to the SQL designer from the results table, press Shift+F2 or click the Design Query button on the toolbar.

Putting your queries to work

Topic group

There are a number of ways to incorporate your .SQL files into your forms, reports and applications.

The quickest way is to add the name of your .SQL file to the SQL property of a Query object.

To do that,

1 Use the Form or Report designer to open a new form or report.

2 Choose the Data Access tab on the Component palette, and drag a Query object onto your form.

3 If it's not already in view, press F11 to display the Inspector.

4 In the Query object's SQL property, type:

```
@mysql.sql
```

where mysql.sql is the name of your query file.

Using your .SQL files with the SQL Property Builder

You can use your saved SQL statements as templates in the SQL Property Builder.

To do that, use steps 1-3 from the instructions above, but this time click the tool button next to the SQL property. This opens the SQL Property Builder.

Choose the second option in the builder, SQL Statement File, then click the tool button next to that field. A file search dialog opens to let you locate your saved .SQL file.

When you load the file, your SQL statement appears in the builder's edit window. You can then either edit the statement or click OK to attach it to the Query object.

Even if you edit the statement, your original .SQL file remains intact, available for modification or updating in the SQL designer or service as a template for another Query object.

Looking at the table pane

Topic group Related topics

The upper portion of the SQL designer, the table pane, is where tables and fields are depicted. This area lets you select and deselect data for your queries. You can also use these table listings to quickly create joins.

About the table boxes

Each table appears as a scrolling, sizable, collapsible window containing a header with the table name and a list box containing all of the table's fields.

Next to each field and table name is a check box. If a table name has a dark blue check mark, all fields from that table will be in the query. Otherwise, only fields that are checked will be in the query. If at least one, but not all, fields are checked, the table name will have a light gray check mark.

Dragging the mouse over a table window shows you the full name of the table. For example, the full name for a customer table might be ":mydb:Customer.dbf".

To view tables in a collapsed mode where only the table name appears, click on the minimize button next to the table name.

Tables can be joined by dragging a field from one table window to a field in another table window. When two tables are joined, a join line appears that links the joined tables. For more information on joins, see Creating joins.

Adding tables in the SQL designer

Topic group Related topics

Tables are added to a query in the SQL designer by simply adding them to the table pane. In the table pane you can select some or all fields of one or more tables to be included in the result set. You can also graphically join one table to another. A table may be added more than once.

To add a table, either click the Add Table icon on the toolbar, either press Ctrl+A, choose SQL|Add Table, or choose Add Table from the right-click popup menu. When the Add Table dialog appears, select a table from the list and press Add. You may also to use the Look In list and browse folders to locate additional tables.

When you're finished adding tables, press Close.

Renaming a table

1 Right-click on the table window and select Edit Table Alias.

2 Type an alias for the table name in the edit box.

Removing a table

1 Right-click on the table window and select Remove Table.

2 A table may also be removed by pressing the Delete button when the table window has focus.

Selecting fields in the SQL designer

Topic group Related topics

In the SQL designer, each table window in the table pane has a table and field name with a check box that allows you to select some or all fields to be included in the result set.

Selecting all fields in a table

In a table window, click on the table name's check box to add a blue check mark. A blue check mark indicates that all fields are selected. Uncheck this box to remove all fields from the query. If the check box has a gray check mark, only a portion of the fields have been selected to appear in the result set.

The F6 key and spacebar also enable you to toggle field selections.

Selecting all fields automatically adds them to the Selection page.

Selecting individual fields in a table

Check each field you wish to appear in the result set. When a field is checked and unchecked, it is automatically added to and removed from the Selection page.

Fields can also be selected by dragging them from the table window and dropping them on the Selection page grid.

Reordering selected fields

In the left gray column of the grid, drag the row and drop it at the new location.

Criteria page (SQL designer)

Topic group Related topics

In the SQL designer, the Criteria page allows you to specify selection criteria that the query will use to include only certain rows of data in the query results. Adding selection criteria to this page adds a WHERE clause to the query. The criteria can be either a simple expression, an SQL expression, or an EXISTS CLAUSE.

- The grid contains the selection criteria by which the query will exclude rows of data.
- The drop-down list box specifies whether ALL, ANY, NONE, OR NOT ALL OF THE CRITERIA APPLY.

Deleting a row

After selecting the row to delete, right-click and choose Delete Row from the context menu.

Adding selection criteria in the SQL designer

Topic group Related topics

Selection criteria in a query specifies which rows of data are included in the query results. In the SQL designer, you enter selection criteria into the Criteria page of the Query notebook.

Specifying selection criteria

1 In the Criteria page grid, choose the type of criteria you want by right-clicking in the grid and selecting the appropriate criteria from the grid's context menu. You may choose from Simple Equation, SQL Expression, and EXISTS. Each type is described below.

2 Enter criteria into the row according to the type of criteria you have chosen.

Simple Equation

A simple equation compares the values of two values for each row of data. For example,

```
CustNo >= 1000
```

The values can be either a field name, constant value or any valid SQL expression. String and date constant values must be surrounded by single quotes.

When defining a simple equation the grid has three columns: Field or Value, Compare, and Field or Value.

To enter a simple equation:

1 Enter the first field or value you wish to compare into the first Field or Value column. This can be done by either dragging a field from a table window in the table pane and dropping it onto the Field or Value column, selecting a field from the drop-down list box, or entering a constant value or valid SQL expression into the Field or Values column.

2 Select the appropriate comparison operator from the Compare column drop-down list box. You can choose from =, >, <, >=, <=, <>, LIKE, IN, BETWEEN, NOT BETWEEN, IS NULL, or IS NOT NULL.

3 Enter the field or value you wish to compare to the first into the second Field or Value column. This can be done by either dragging a field from a table window in the table pane and dropping it onto the Field or Value column, selecting a field from the drop-down list box, or entering a constant value or valid SQL expression into the Field or Values column.

Remember to press Enter after entering the last element of your equation.

SQL Expression

Enter an SQL expression directly into the SQL Expression column. For example,

```
((CustNo < 2000) OR (CustNo > 3000))
```

String and date constant values must be surrounded by single quotes.

EXISTS Clause

Adding an EXISTS clause returns True when the subquery produces at least one row of query results.

When a row to has this type of selection criteria, the row in the grid has two columns: Operator and SQL Expression. Select EXISTS from the Operator column. You can now enter an SQL expression to see if any rows are produced.

The following example returns all the companies who have placed orders:

```
SELECT Company FROM Customer.db WHERE EXISTS (SELECT * FROM Orders WHERE
Orders.CustNo = Customer.CustNo)
```

In the preceding example, you would enter the statement following the 'EXISTS' into the SQL Expression column.

String and date constant values must be surrounded by single quotes.

Combining selection criteria

Topic group Related topics

Row info

In the SQL designer, when Row Info is enabled, a NOT, OR, and AND are displayed to the left of the grid next to a row and indicates the rules for combining the criteria rows.

To enable row info, right-click on the grid and select Row Info from the grid's context menu.

Criteria combo box

To specify how selection criteria rows are combined to form more complex selection criteria, select from the drop-down list box above the criteria grid.

- ALL. Specifies that all selection criteria in the grid must be true for the combined criteria to be true. With row info enabled an AND will appear next to each additional row after the first row.
- ANY. Specifies that at least one of the selection criteria in the grid must be true for the combined criteria to be true. With row info enabled an OR will appear next to each additional row after the first row.
- NONE. Specifies that all of the selection criteria in the grid must be false for the combined criteria to be true. With row info enabled a NOT will appear next to the first row and an AND will appear next to each additional row after the first row.
- NOT ALL. Specifies that at least on of the selection criteria in the grid must be false for the combined criteria to be true. With row info enabled a NOT will appear next to the first row and an OR will appear next to each additional row after the first row.

Grouping selection criteria in the SQL designer

Topic group Related topics

In the SQL designer, individual selection criteria can be grouped together to form nested selection criteria.

To group selection criteria,

1 Select the rows to group by holding down the Ctrl key and clicking each row you want to select in the drill-down column. The drill-down column is located in the leftmost column of the grid and doesn't have a header description.

2 Right-click in the drill-down column and choose Drill-Down from the context menu.

Drill-down column

The drill-down column is the leftmost column of the grid and doesn't have a header description. If the query contains a nested selection criteria, a *drill-down* arrow appears next to the nested row. Clicking this arrow "drills down" into the expression. If a grouped expression has already been drilled down, a *drill-out* arrow appears in upper left cell of the grid. Clicking this arrow "drills out" the expression.

Ctrl+U and Ctrl+D also allow you to drill up and drill down respectively.

To ungroup selection criteria,

Change the operator in the grouped expression to its opposite. For example, if you have the previous grouped expression:

```
(City = 'Freeport') OR (Company = 'Unisco')
```

Change the OR to an AND:

```
(City = 'Freeport') AND (Company = 'Unisco')
```

Query operators

Topic group Related topics

The following are the operators available in the SQL designer's Criteria and Group Criteria pages. The Joins page uses only the standard boolean operators.

Operator	**Description**
>, <, >=, <=, <>	Standard boolean operators for a comparison test.
LIKE	Adds a LIKE clause to the query. Tests whether the data matches the specified pattern.
NOT LIKE	Adds a NOT LIKE clause to the query. Tests whether the data value does not match the specified pattern.
IN	Adds an IN clause to the query. Tests whether the data matches at least one value in the list of values. To create this list of values, enter fields and/or values separated by commas into the second Field or Value column.
NOT IN	Adds a NOT IN clause to the query. Tests whether the data does not match any value in the list of values. To create this list of values, enter fields and/or values separated by commas into the second Field or Value column.
BETWEEN	Adds a BETWEEN clause to the query. A BETWEEN clause tests whether the field or value falls within a specified range of values. For example, you can use this to return the salespeople whose sales are between $50,000 and $200,000.
NOT BETWEEN	Adds a NOT BETWEEN clause to the query. A NOT BETWEEN clause tests whether the field or value is outside a specified range of values.
IS NULL	Adds an IS NULL clause to the query. Tests whether the field or value contains a NULL value.
IS NOT NULL	Adds an IS NOT NULL clause to the query. Tests whether the field or value does not contain a NULL value.

Selection page of the SQL designer

Topic group Related topics

The Selection page in the SQL designer enables you to create summary data. It also allows you to specify a customized output name for a field or summary data in the query results.

Selecting a field

Select a field from the Field drop-down list box. Fields will be available for each table that appears in the table pane. A Field may also be dragged from a table window in the table pane and dropped onto the Field column.

Specifying an output name

In the Output Name column for a field or summary, you may enter a name you wish to appear as the title for that field or summary data rather than using the default.

Producing summary data

Right-click in the grid and select Summary from the context menu. The grid will have three columns: Output Name, Summary, and Field. Select the appropriate function from the Summary column's drop-down list box. You can also drag a field from a table window in the table pane and drop it onto the Field column.

When you add a summary, the SQL designer automatically groups on all of the non-summary fields to satisfy SQL syntax requirements.

Removing duplicate rows

When the Remove Duplicates box is checked every row in the query results will be unique. Checking this box adds the DISTINCT keyword to the SQL statement.

Deleting a row

After selecting the row to delete, right-click and choose Delete Row from the context menu.

Grouping page of the SQL designer

Topic group Related topics

The SQL designer Grouping page enables you to create a grouped query. A grouped query groups the data from the source tables and produces a single summary row for each row group.

Creating a grouped query

To create a grouped query,

1 Select the field or fields you wish to group by from the Output Fields list box.

2 Click the Add button to move the field to the Grouped On list box. The query will be grouped based on fields that appear in the Grouped On list box.

To have a field appear in the Output Fields list box, select the field in the Table Pane.

To remove a field from the Grouped On list box, select the field and click the Remove button.

Group criteria page of the SQL designer

Topic group

The SQL designer Group Criteria page enables you to specify group selection criteria used in the HAVING clause that the SQL designer adds to the query. A HAVING clause selects and rejects row groups.

The group criteria can be a simple expression, an SQL expression, or a two summary expression. Right-click in the grid and select the appropriate criteria type from the context menu.

Adding group selection criteria

To change the type of selection criteria, right-click in the grid on the Group Criteria page and select one of the following from the grid's context menu.

SQL Expression

Enter an SQL expression directly. For example,

```
SUM (Qty * Price) > 1000
```

Simple Having Summary Expression

A Simple Having Summary Expression summarizes the comparison of two fields for each row of data.

When defining a Simple Having Summary Expression the grid has four columns: Summary, Field, Operator, and Field.

A Field may be dragged from a table window in the table pane and dropped onto a Field column.

To enter a Simple Having Summary Expression,

1. Select the appropriate summary value from the Summary column.
2. Enter the first field you wish the summary to compare. This can be done by either dragging a field from a table window in the table pane and dropping it onto the Field column or selecting a field from the drop-down list box.
3. Select the appropriate operator from the Compare column drop-down list box.
4. Enter the second field you wish the summary to compare as described in step 2.

Two Summary Expression

A Two Summary Expression selects and rejects row groups based on the result of the comparison of two summaries.

When defining a Two Summary Expression, the grid has five columns: Summary, Field, Operator, Summary, and Field.

A Field may be dragged from a table window in the table pane and dropped onto a Field column.

To enter a Two Summary Expression grouping criteria:

1. Select the appropriate summary value from the Summary column for the first summary to compare.
2. Enter the first field you wish to summarize for the comparison. This can be done by either dragging a field from a table window in the table pane and dropping it onto the Field column or selecting a field from the drop-down list box.
3. Select the appropriate operator from the Operator column drop-down list box. This operator defines the type of comparison between the two summaries.
4. Select the appropriate summary value from the Summary column for the second summary to compare.
5. Enter the second field you wish to summarize for the comparison as described in step 2.

Combining group criteria

To specify how the selection criteria are combined to form more complex selection criteria, select from the drop-down list box above the criteria grid.

- ALL. Specifies that all selection criteria in the grid must be true for the combined criteria to be true.
- ANY. Specifies that at least one of the selection criteria in the grid must be true for the combined criteria to be true.
- NONE. Specifies that all of the selection criteria in the grid must be false for the combined criteria to be true.
- NOT ALL. Specifies that at least on of the selection criteria in the grid must be false for the combined criteria to be true.

Deleting a row

After selecting the row to delete, right-click and choose Delete Row from the context menu.

Sorting page of the SQL designer

Topic group

The Sorting page enables you to specify a sort order for the query.

To sort query results

1 Select the field you wish to sort by from the Output Fields list box.

2 Click the Add button to move the field to the Sorted By list box.

Toggling the sort order

Double click on the field in the Sorted by list box. To change sort order, you may also select the field and then to the left of the list box click on the A-Z for ascending order and Z-A for descending order.

Sorting on multiple fields

Simply add more fields to the Sorted By list box. The query will be sorted based on order of the fields that appear in the Sort By list box.

Adding a field to the Output Fields list box

Select the field in the Table Pane.

Removing a field from the Sorted By list box

Select the field and click the Remove button.

Reordering fields in the Sorted By list box

1 Select the field to move in the Sorted By list box.

2 Click on the gray up arrow to left of the list box to move the field up in the sort order. Click on the gray up/down arrow to the left of the list box to move the field down in the sort order.

Joins page of the SQL designer

Topic group Related topics

The SQL designer Joins page lets you create multi-table SQL queries (joins). See Creating joins for steps on how to create a join.

Including Unmatched Rows

These check boxes allow you to specify full, left, and right outer joins. If only the first check box is checked, a left outer join is added to the query. If only the second check box is checked, a right outer join is added to the query. If both check boxes are checked, a full outer join is added to the query. If neither box is checked (the default), an inner join is added to the query.

Note: : The SQL1 standard doesn't include an outer join in its specifications. Some SQL servers have restrictions on outer joins and some don't allow outer joins. Please see your server documentation for information on its support for outer joins.

Join list box

This box appears above the grid and allows you to specify a particular join. When you select a join in this box, both tables in the join appear. When a join is selected, the grid contains the field information for that particular join.

Joins grid

The Joins grid contains three columns: Field, Operator, and Field.

To have a field appear as a choice in the Fields column drop-down list boxes, select the field in the Table Pane.

The operator column allows you to specify a comparison operator for the join. You may choose from =, <, >, <=, >=, and <>.

Deleting a join

To delete a join, in the table pane, right-click on the join line be the two joined tables.

Deleting a row

After selecting the row to delete, right-click and choose Delete Row from the context menu.

Creating joins in the SQL designer

Topic group

In the SQL designer, fields can be linked by dragging one or more fields from one table to the fields on another table. Graphically, a join is indicated by a single line that connects the two table windows at their table name.

Each linked field pair in the join is added as a separate row to the Joins page grid. When a join line is selected in the table pane, the join list box (above the Join page grid) will contain the two joined tables.

To create a join

1 In the first Field column, select the field you want to match from the first table.

2 In the Op column, select the appropriate type of match. You may choose from =, <, >, <=, >=, and <>.

3 In the second Field column, select the field you want to match from the second table.

Creating reports (introduction)

Topic group Related topics

Reports provide non-editable views of data for formatted print or screen output. You can create reports to answer questions that may involve elaborate queries across a range of databases. A report can focus and manipulate data in many useful ways.

This group of topics shows you how to

- Use the Report wizard to automatically generate reports (using the wizard is the recommended way to begin creating a report)
- Understand the Report designer structure and objects
- Modify a report, changing its appearance and functionality
- Perform aggregate calculations
- Use multiple streamFrames that point to the same or different rowsets
- Create a variety of specialty labels by using the Label wizard

For information on linking a report to tables see Linking a form or report to tables. For information on creating master-detail relationships, see Creating master-detail relationships in forms and reports.

Before you can link a report to a client/server database, the database must be assigned an alias in the BDE. For details on linking *Visual* dBASE to a client/server database, see How to connect to an SQL database server.

Note: After you have created a report with the look and functionality you want, you can save that report as a custom report (.CRP) and use it as a template for subsequent reports. For instructions on how to create a custom report, see Creating a custom class.

Report wizard (overview and use)

Topic group Related topics

You can quickly create useful reports by using the Report wizard. You specify which table or query contains the data you want to display in the report, and the wizard links to it automatically. The rest of the wizard's options let you do the following:

- Display detail rows or just summary information.
- Specify fields to be included in the report.
- Group the report by specific fields. You can nest subgroups within groups.
- Choose aggregate operations that can be applied both to a group and to the entire report.
- Specify layout style, including a drill-down option, which displays summary information at the top of the page and details farther down.
- Specify a report title.
- Include the date
- Include page numbers, which causes the report to display one screenful at a time.

The Report wizard does so much that for many reports you won't need to go any further. You can, however, add complex query statements to your reports by writing code or using the SQL designer to generate SQL statements. And you can add advanced reporting capabilites, as needed, in the Report designer.

It's easiest to begin creating a report by using the Report wizard. You can then modify the design in the Report designer. By using code, you can add a great deal of analysis to your reports and provide more sophisticated and useful pictures of the data in one or more tables.

To use the Report wizard

1 Choose File|New|Report. Or, double-click the leftmost Untitled icon on the Reports page of the Navigator. The New Report dialog box appears.

2 Click the Wizard button.

For help on any wizard page, click the Help button on that page.

Report designer elements

Topic group Related topics

The Report designer provides a visual design surface where you can modify reports created with the Report wizard and build new reports from scratch.

The Report and Group panes

You can view the report in two panes:

- The Report pane, where you visually design the report
- The Group pane, which displays the hierarchy of the groups in the report.

When you first open the Report designer, the split bar between the panes appears at the far left edge of the Report designer window. To open the Group pane, drag the split bar to the right.

The Group pane shows the hierarchy of objects in the report.

- The dotted-line frame labeled Pagetemplate1 is the report object that determines the appearance of the page, such as the background color. Here is where you would place a report title. A report may include more than one pageTemplate object, so that different pages can have different layouts.

  When creating a report, you place data access components on the pageTemplate object.

- The inner dotted-line frame with the vertical label Streamframe1 is a streamFrame object. This object displays rowset data that is streamed from linked tables (specified in its *streamSource* property). One or more streamFrame objects may be contained within the pageTemplate object. Whatever is placed in the streamFrame area of a report will be displayed when the report is printed.

  If you're using standard user interface components, place them on the streamFrame.

- The Group1-Headerband displays the label of the grouped field. Groups are contained in a streamSource object and rendered in a streamFrame object.
- The detailBands are the streamFrame objects that contain the rowsets streamed from the linked table. Each detailBand contains data from an individual row in the table.

The Report pane shows the report appearance with the corresponding structures shown in the Group pane marked.

- The outer dotted area represents the margins of the actual report page (the pageTemplate object).
- The inner dotted line represents the data rows of the report (the streamFrame object).
- The individual fields of the row are columns in the report (the detailBand objects).

Deleting columns (fields) from a report

Topic group Related topics

To delete a column,

1 Click in the column beneath the column heading to select the column, and press Delete.

2 Click the column heading itself, and press Delete.

The remaining columns stay where they are.

If you make a mistake and delete the wrong object, choose Edit|Undo Delete.

Adding columns (fields) to a report

Topic group Related topics

Once you have created a live Query object on a report (usually by dragging the desired table icon to the designer surface), the Field palette is populated with live fields linked to the table data. When you drag a field from the palette to the design surface, a detailBand is created to display the field as a column in the report. The column is linked to the table's field by a codeblock in the *text* property of the detailBand's Text object.

To add a column,

1 Make sure the report has a Query object whose *active* property is set to *true* and that returns a rowset from the desired table.

2 Display the Field palette (View|Tool Windows, and check Field Palette-Report/Label Designer). The palette shows the active fields of the linked table as Text components.

3 Drag the desired Field component from the palette to the report.

When you drag a live Field component to a report, the field's name is automatically added as a column heading. To specify placement (or omission) of the automatic column label, choose Tool Windows| Customize Tool Windows and specify your preference on the Field Palettes page.

If you need to move the added column, remember to reposition its heading, as well.

Suppressing duplicate field values

Topic group Related topics

To suppress duplicate field values, set the *suppressIfDuplicate* property of a detailBand's Text object to *true*.

Displaying default values in a blank report field

Topic group Related topics

To display a default value in a report to substitute for blank values in a field,

1 Determine the field in which you want to display the default value, and select that field's Text object in the Inspector (streamSource1.detailBand.<text object>). This example uses the NAME field from the query object, query1.

2 Enter an appropriate codeblock into the *text* property of the Text object (click the tool button in the property box). For example, the following code displays No Value for every blank value in the field:

```
{||this.form.query1.rowset.fields["NAME"].value == "" ? "No Value":
this.form.query1.rowset.fields["NAME"].value}
```

Adding a floating dollar sign to field values in reports

Topic group Related topics

To add a floating dollar sign to the values in a field,

1 Select the field (represented on the report by a Text object).

2 In the Inspector, select the Text object's *picture* property under the Edit category.

3 Click the tool button to display the Template Property Builder.

4 Select the Numeric page.

5 Choose the @$ symbol from the Template Symbols box.

You can also do this by using the Code Block Builder to create the code.

Adding page numbers

Topic group Related topics

To include a page number on each page of a report, drag the PageNumber component (from the Component palette's Custom page) to the report page, positioning it where you want the number to appear. (This is a custom component installed with the *Visual* dBASE samples.)

To create a page number from scratch,

1 Place a Text component on the page.

2 Beside the *text* property, select Codeblock from the drop-down list, and then type

```
return this.parent.parent.reportPage
```

(You can do this in the Code Block Builder, available by clicking the wrench tool beside the *text* property.)

Drill-down reports

Topic group Related topics

Drill-down reports display summary information for a report at the beginning of the report. The details of the report appear toward the bottom. Hence the name *drill-down*—users can drill down from the summary at the top to the details at the bottom.

The Report wizard offers you the option to create a drill-down report. You can also create a drill-down report in the Report designer.

Controlling drill-down reports in the Report designer

In the Report designer (or if you print the report), the summary information of the report is in the headerBand and footerBand of the reportGroup class. The details of the report are in the detailBand.

In a non-drill-down report, the bands are rendered in this order (this example groups on STATE):

1 headerBand for report's reportGroup
2 headerBand for state of "CA"
3 detailBand 1 for state of "CA"
4 detailBand 2 for state of "CA"
5 detailBand n for state of "CA"
6 footerBand for state of "CA"
7 headerBand for state of "PA"
8 detailBand 1 for state of "PA"
9 detailBand n for state of "PA"
1**0** footerBand for state of "PA"
1**1** footerBand for report's reportGroup

However, in the drill-down report, the bands are rendered in this order:

1 headerBand for report's reportGroup
2 footerBand for report's reportGroup
3 headerBand for state of "CA"
4 footerBand for state of "CA"
5 headerBand for state of "PA"
6 footerBand for state of "PA"
7 detailBand 1 for state of "CA"
8 detailBand 2 for state of "CA"
9 detailBand n for state of "CA"
1**0** detailBand 1 for state of "PA"
1**1** detailBand n for state of "PA"

...and so on

The *drillDown* property

You can control the way the drill-down feature works by setting the *drillDown* property on the reportGroup class. This property is an enumerated type, with the following possible values:

Value		What happens
0	None (not a drill-down report)	
1	Drilldown (standard drill-down	All the headers and footers are rendered first, and

report)		then the details
2	Drilldown (repeat header)	The same as 1, but the headers are rendered again with the details
3	Drilldown (repeat footer)	The same as 1, but the footers are rendered again with the details
4	Drilldown (repeat header and footer)	The same as 1, but the footers and headers are rendered again with the details

Adding standard components to a report

Topic group Related topics

By adding components from the Report's component palette, you can extend a report's functionality so that it can do some of the same things a form can do.

Important: When working with components in Reports, keep these points in mind:

- Report components may be placed only on a pageTemplate, not on a band.
- When you copy and paste a component, its object hierarchy may vary in the following ways:
- Its parent will be the parent of the currently selected component; or,
- If the currently selected object can hold a component (a pageTemplate), then that object will be the parent; or,
- If nothing is selected, then the pageTemplate will be the parent.
- Mouse events of a component whose parent is a band are not available.
- All components available for use on reports have *canRender( )* and *onRender( )* events.
- Components on a pageTemplate can be referenced directly as well as through an elements array (as in forms).
- If you do not want a report component to be printed, set the component's *printable* property to *false*.

Changing the report's appearance

Topic group Related topics

You can place data from any source in streamFrames that can be sized and positioned anywhere on the report page. You can create a variety of borders around streamFrames, labels, or fields. You can control all aspects of the appearance of text. And you can specify colors for the entire report's background, for text, and for streamFrames.

Creating report borders

Topic group Related topics

Visual dBASE offers a choice of several different styles of borders. You can create borders around all report fields and columns and labels at once or around individual objects to set off things like grand totals. You can also place borders around streamframes (giving groups a boxed appearance).

To set borders around each column in the report, set the report's form.PageTemplate1 *gridLineWidth* property to a positive number. (*gridLineWidth* is in the Inspector's Miscellaneous category.)

To create a border around an individual object, including a streamframe, select the object and set its *borderStyle* property to one of the styles in the drop-down list beside the property. (*borderStyle* is in the Inspector's Visual category.)

For no border, set *borderStyle* to zero.

Setting background color in reports

Topic group Related topics

To set a report's background color,

1 Select the report's PageTemplate object in the Inspector (form.PageTemplate1).

2 Click the wrench tool beside the *colorNormal* property to display the Color Property Builder.

3 Select a color, or create your own, and choose OK.

Setting background image in reports

Topic group Related topics

To set a report's background image,

1 Select the report's PageTemplate object in the Inspector (form.PageTemplate1).

2 Click the wrench tool beside the *background* property to display the Image Property Builder.

3 Click the wrench tool beside the Image box of this dialog box to browse for an image file. As soon as you select it, you can see the background image in the Report designer.

Performing aggregate (summary) calculations

Topic group Related topics

You can perform aggregate calculations (sum, minimum, maximum, count, average, standard deviation, variance) on fields within groups in a report and for the report as a whole.

To do aggregate calculations you must first specify a group of fields on which to perform the summary operation (unless you are summarizing data for the entire report).

To perform an aggregate operation,

1. Choose Layout|Add Groups And Summaries
2. On the Group page of the dialog box, select the field or fields on which you want to group the data. If you are going to do only a grand summary over the entire report (such as a grand total), then skip this step.
3. Click the Summaries tab of the dialog box.
4. From the Group drop-down list, select the group on which you want to perform an aggregate operation. (Grand Summary is always available.)
5. From the Available Fields list, select the field on which you want to perform the operation.
6. From the Available Aggregates drop-down list, select an operation.
7. Click the arrow button to move the field and its operation to the Summary list.
8. Repeat for as many fields as you want.

If you want to change the aggregate summary operation for a field already in the Summary box, select that field in the Summary box and use the drop-down list below it to select a new operation.

If you need very sophisticated calculations beyond the operations offered in the Available Aggregates box, you could also create summary calculations in fields by writing methods for their events. Select the object linked to the field, and type your code into one of its report-specific events, such as

- *onDesignLoad*, activated on opening a report
- *preRender*, activated before a report runs
- *canRender*, activated before a component is rendered, to determine whether the component will be displayed.

Designing a report with multiple streamFrames

Topic group Related topics

The streamFrame object makes it possible to create a rectangular area of any size or position to display data rows from a linked rowset (which is set in the streamFrame's *streamSource's rowset* property).

For example, the Label wizard adds several streamFrames to a report, with their common *streamSource* pointing to the same rowset of customer addresses. By sizing each streamFrame to match sheets of adhesive labels, the wizard can create a report that prints a set of mailing labels.

To add a second streamFrame to an existing report,

1 From the Component palette, Report page, drag the streamFrame component to the design surface of the report.

2 The streamFrame object appears closed, as a box. You can drag this box diagonally to any desired size.

In addition, by using the Source editor, you can create additional streamFrames and set each streamFrame's *streamSource* property to point to different rowsets. For example, you could add two streamFrame objects side-by-side on a report, with one frame displaying sales representatives grouped by city and the adjacent frame displaying prospective customers grouped by city.

Creating printed labels

Topic group Related topics

The easiest way to create mailing labels and many other types of printed labels is by using the Label wizard. Choose File|New|Labels or double-click the Label icon on the Reports page of the Navigator, then choose Wizard. After you select the table or query file you want to use, the wizard does the following:

- Sets up a common address format for you, or you can create your own format
- Sorts the labels on a field you specify
- Sets up the page for the type of label sheets you have (many choices)
- Lets you create a calculated field

Labels are a type of report, given the extension .LAB. Label files you create are listed on the Reports page of the Navigator.

If you choose to modify labels after using the wizard, or if you design them from scratch, you'll be working in the Label designer. The Label designer is similar to the Report designer, except that you have additional choices on the menu.

Designing tables in *Visual* dBASE (introduction)

Topic group

The foundation of any application is the system of tables that store the data. *Visual* dBASE gives you powerful tools for creating and managing databases, whether your application needs a simple table or complete access to an enterprise client/server database system.

This section is a conceptual introduction to designing and creating tables:

- Table terms and concepts
- Table design guidelines
- Table structure concepts

Terms and concepts

Topic group

You should know these essential terms:

- An application is a complete system of tables and related forms, queries, reports and other components that handles a data management need.
- A *database* is a collection of one or more *tables* that store and classify information, plus related files such as index, graphic, and memo files. Each dBASE table in a database is a distinct file with a .DBF extension.
- A table consists of one or more horizontal rows (sometimes known as records) that contain information about a specific person, place, or thing.
- Each row contains one or more *fields*. A field contains one category of information, such as a person's name, a phone number, or an invoice date.
- A *field type* describes the kind of information stored in the field; for example, date, character, logical, numeric.

In a table, each row includes a *row number* field (or RECNO() in the dBASE language) that identifies that row uniquely in the table.

When you first create the table, you choose a *table type.* Your choices are standard tables (.DBF and .DB) and other supported databases for which you have configured a BDE alias. Then you define each field's name, field type, width, and decimal (if a numeric or float field). You can also create an index on the field, which lets you arrange rows in a useful order.

The *Visual* dBASE interface adjusts automatically to accommodate the type of table you are working with. For example, if the table you are working with supports data entry constraints, you can specify them in the Inspector while designing a Table. Otherwise, data entry constraints are unavailable in the Table designer.

Identifying the information to store

Topic group Related topics

To develop a system of tables for an application, begin by identifying all of the *relevant* information you need to manage—unnecessary data wastes disk space and distracts users from the task at hand.

You might start by looking at the order form you use day to day. Write down all the information you think you need, without attempting to organize it yet, as shown in the following example:

- Products ordered
- Customer name, address, phone number, credit standing
- Order number
- Shipping information, including when it was shipped
- Products purchased
- Purchase date and time
- Salesperson taking the order
- Customer signature
- Special notes about the customer

Next, review this list to see what's really relevant and what you can do without. For example, the name of the salesperson taking the order might not be important, or you might decide you don't need to track the exact time of purchase.

Classifying information

Topic group Related topics

After you identify the information you need, review the list and begin to classify the information into distinct groups. Identify the separate entities (such as persons, places, and things) and activities (such as events, transactions, and other occurrences). In general, each table should contain only one kind of entity or activity. The fields in each table identify the attributes of that entity or activity.

Reviewing the list in the previous topic reveals two separate entities (customers and products) and one separate activity (orders). Each of these components has unique attributes. When you reorganize the list according to these categories, you might come up with a new list similar to the following one:

- Customers, including customer name, address, city, state, postal code, phone number, credit standing, signature, notes, and so on
- Orders, including order date, order number, sales date, amount paid, and so on
- Products ordered, including product name, sales price, quantity ordered, and so on

Determining relationships among tables

Topic group Related topics

To better define your tables, you need to determine how they relate to each other.

Single versus multiple tables

Each table should have a specific purpose. It's often better to create several small tables and link them together, rather than try to store everything in one large table. Keeping everything in a single large table usually forces you to store redundant data.

For example, if you stored the complete customer information with each order, you would be entering the customer's name and address with every order. Not only does this procedure invite errors, but it makes it difficult to update information if something as simple as a customer's phone number should change. In addition, redundant data wastes disk space.

Use multiple tables to minimize the amount of data that appears more than once. By storing the name and address information once in a Customer table, you have only one location to update if that information changes. When a customer places an order, the order information goes in a separate table that can be linked to the name and address table.

In our sample case, three distinct tables have emerged to contain data: one for customers, another for orders, and one for the items ordered. We can call the tables Customer, Orders, and Lineitem.

One-to-one and one-to-many relationships

With multiple tables in an application, it's important to understand the relationships among entities and activities. In each relationship, is there a one-to-one correspondence, or does an entry in one correspond to many entries in another? Or is there no direct relationship?

For example, a customer can place several orders, and an order can contain one or more items. These are *one-to-many* relationships. Each order is associated with one customer, a *one-to-one* relationship.

For example, a query might relate three tables:

- From the Customer table comes the customer name, NAME
- From the Orders table comes the order number ORDER_NO
- From the Lineitem table comes the stock number STOCK_NO and selling price, SELL_PRICE.

The query results show each customer name followed by many orders, and under the orders, a list of the items and prices in the order.

Parent and child tables

When you relate two tables in a query, form, report, or data module, you establish one as the parent and the other as the child table. As you select a row from the parent table, you see the corresponding child row or rows.

Linking tables in a parent-child relationship lets you easily find rows in the child table. Fox example, you can set up the Customer table as the parent, and Orders as the child. Then, when you move to a new row in the Customer table, the row pointer in the Orders table moves to the orders for that customer automatically. Similarly, the Orders table becomes the parent to the Lineitem table, so that selecting an order also selects the items in the order.

The parent and child tables are linked on a common field, called the linking field. In our example, a query links the Customer and Orders tables on the CUSTOMER_N (customer number) field. In *Visual* dBASE, the linking field in the child table must have an index. As the example shows, a single table can be both parent and child in the same query.

Minimizing redundancy

Topic group Related topics

Using multiple tables reduces redundant information. In addition, don’t store information that you can easily calculate, unless the calculation requires excessive processing effort or you need an audit trail. For example, if you were creating tables for our hypothetical dive shop, you might want to store the total invoice amount, but not the total sales tax, which *Visual* dBASE can easily calculate.

In general, indexed fields that are used for linking should be the only fields that contain redundant information in related tables. Identical data in index fields is necessary for linking tables. In this example, it is the way to identify the same customer in both tables.

Choosing index fields

Topic group Related topics

Indexes make it easier and faster to process information in a table. With multiple tables, indexes are also necessary to link related tables together. Most tables should have at least one index, to organize rows and link to related tables, but too many indexes can slow performance.

To identify which fields to index, ask the following questions:

- What will users know when they search for information? For example, in the dive shop tables, users might want to search for a customer name, customer number, order number, or order date. Consider indexing on these fields.
- What are the common threads that tie the information together? For example, a customer number could be a common field between the Orders table and the Customer table, and the order number could be a common field between the Orders table and the Lineitem table.

Defining individual fields

Topic group Related topics

For each field, you define its name, type, size, decimals (if a numeric or float field), and index (optional). The specifics of field types are discussed in the following section. Here are some overall guidelines:

- Use one piece of information per field. For example, put city, state, zip code, and country data into separate fields, because you might want to process the information in each field separately. However, do not split certain information, such as street number and street name, unless you need to process rows by street name or street number separately.
- Keep field sizes to a minimum, without being excessively restrictive, to conserve disk space. If you intend to total a numeric field, you must define a field large enough to hold the total, not just individual values.
- For indexed fields, use abbreviated codes instead of long character fields wherever possible. For example, instead of duplicating the entire customer name in every order, use a short customer code to simplify data entry, indexing, and linking. This results in more efficient indexes and makes it easier to update information.
- Define fields in a logical order in the table. The order you define is the default way in which users will see the table. In general, put indexed fields toward the beginning of the table, and put similar information together in a sensible sequence.
- Use descriptive, unique field names. Be consistent when naming fields that contain similar data. Standardize field names shared across tables if possible (this is not permitted with some SQL databases).

Table names and types

Topic group Related topics

See your database software documentation to determine valid file names for its tables. For example, an Access table has no extension requirement because it is stored within an Access database with an .MDB extension. On the other hand, .DB is the required extension for Paradox tables and .DBF for dBASE tables.

The table name should indicate its purpose and be easy to remember. For example, if a table contains employee information, you might call it EMPLOYEE.DBF.

Table types

The *table type* determines the file format of a table.

The table type you define depends on the way you plan to use the table. If you expect to use the table only with *Visual* dBASE applications, the dBASE version 7 format is recommended for its flexibility and rich feature set. If the table is to be shared with other applications, consider the most useful format for all applications involved.

The *Visual* dBASE 7 format offers all the features of the previous dBASE file formats, including expression indexes and extensive table-, row-, and field-level security.

The *Visual* dBASE interface adjusts automatically to accommodate the type of table you are using. For example, if the table with which you are working supports it, you can specify data-entry constraints in the Inspector while working in the Table designer. Otherwise, data-entry constraints are unavailable in the Table designer.

Field types

Topic group Related topics

Each field has a defined *field type*, which determines the kind of information it can store. For example, a character field accepts all printable characters including spaces. You can define up to 1,024 fields in a table.

A *Visual* dBASE (.DBF) table can contain the following field types.

Field type	Default size	Maximum size	Index allowed?	Allowable values
Character	10 characters	254 characters	Yes	All keyboard characters
Numeric	10 digits, 0 decimal	20 digits	Yes	Positive or negative numbers
Float	10 digits, 0 decimal	20 digits	Yes	Positive or negative numbers
Long	4 digits	4 digits	Yes	Positive whole number. Optimized for speed.
Double	8 digits	8 digits	Yes	Positive whole number. Optimized for speed.
AutoIncrement	4 digits	4 digits	Yes	Contains long integer values in a read-only (non-editable) field, beginning with the number 1 and automatically incrementing. Deleting a row does not change the field values of other rows.
Date	8 characters	N/A	Yes	Dates in a valid date format, such as MM/DD/YY
TimeStamp	17 characters			Date/Time stamp, including the Date format plus hours, minutes, and seconds, such as HH:MM:SS
Logical	1 character	N/A	No	True (T, t), false (F, f), yes (Y, y), and no (N, n)
Memo	10 characters	N/A	No	Usually just text, but all keyboard characters; can contain binary data (but using binary field is preferred)
Binary	10 characters	N/A	No	Binary files (sound and image data, for example)
OLE	10 characters	N/A	No	OLE objects from other Windows applications

The field type determines what you can do with the information in the field. For example, you can perform mathematical calculations on values in a numeric field, but not on values in a logical field.

The field type also determines how the data appears in the field. For example, a date field, by default, displays dates in the MM/DD/YY format (such as 02/14/96). The display of field data is also affected by the settings of the Windows control panel and the settings defined by using the BDE Administrator.

Other table types, such as SQL tables, may have different field types. Refer to your server documentation for specific details.

Supported table types

Topic group

Visual dBASE provides a Table wizard and Table designer to quickly create tables in any supported table format. Although a particular database application may provide the fullest support for its native format, you can conveniently lay out the basic structure of its tables in the *Visual* dBASE Table designer and view any table in Run mode.

All table access is handled through the Borland Database Engine (BDE) which includes drivers to support the following table and database formats.

- BDE-standard (no other software or BDE alias required):
- *Visual* dBASE 7
- Paradox
- Other desktop database formats:
- FoxPro 2.5
- Microsoft Access 95

The software application must be installed and running, with aliases assigned in the BDE Administrator. Alternatively, BDE's ODBC socket supports any ODBC database. For example, if Microsoft Access is not installed, you can connect to an Access database via ODBC. For details, see BDE Help (BDEADMIN.HLP).

- SQL enterprise client/server database formats:
- Oracle
- Sybase
- Informix
- Microsoft SQL Server
- IBM DB/2
- InterBase

The database server system must be installed and running, with aliases assigned in the BDE Administrator.

A BDE alias is a short name used as a shortcut to a client/server database or to a directory containing database files. BDE aliases are required for Access, Foxpro, and all SQL client/server systems. You may also use BDE aliases for dBASE and Paradox tables for convenience or application portability, although it is not required.

To create SQL tables, you must first be able to access your SQL database.

Although you can create tables in any supported format, this section shows how to use the Table wizard and designer to quickly create tables in the *Visual* dBASE 7 table format, which is the most feature-rich and convenient. Some of the dialog boxes and capabilities might not apply to a particular database you are using. Please see the documentation for your database for guidance on implementing tables in its native format.

Note: The terms "database" and "table" are often confused. A database consists of a set of files, including indexes, memo, and graphics files, and one or more tables that may be related by key fields. A table consists of an ordered set of rows (records), each row containing a set of defined data fields. The larger, client/server database management systems are considered more database-oriented. The smaller "desktop" database applications are sometimes said to be table-oriented, although when related tables and index files are stored in a directory, that directory may be considered a database.

Using the Table wizard

Topic group

To use the Table Wizard to create a new table,

1. If you intend to create a table type other than dBASE or Paradox, click the Tables tab in the Navigator, and select an alias from the Look In drop-down list. Your new table will be of that alias's database type.
2. Choose File|New|Table (or double-click the Untitled icon on the Tables page of the Navigator). The New Table dialog box appears.
3. In the New Table dialog box, choose Wizard.
4. In step 1 of the wizard, select the fields you want from the available tables.
5. In step 2, select a table format type. If you have selected a database alias in the Navigator as described in step 1 of this procedure, that alias appears as the default table type and cannot be modified. To change it, you must exit the wizard and choose a new BDE alias from the Look In box on the Tables page of the Navigator.

Click the Help button on any step of the wizard for details about the options available with that step.

Using the Table designer

Topic group Related topics

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To create a new table by using the Table designer,

1 Choose File|New|Table.

2 In the New Table dialog box, click the Design button.

  The Table designer appears showing a default template for the first field.

3 Set the table type in the Inspector. You can select a BDE-standard table type or the table types of those databases for which you have created BDE aliases.

4 In the Table designer, type a name (no spaces for dBASE files) in the Name field. (You have to name a field before you can specify any of its other attributes.)

5 Specify values for the remaining attributes (Type, Width, Decimal, Index) by typing what you want, or by selecting a value from the drop-down list, or by clicking the spinbox arrows. You can tab through these to select the default values.

6 To create additional fields, press Return when you have finished specifying a field. Or press the Down arrow key. Or right-click and choose Add Field from the context menu.

  You can generate new fields in rapid succession by naming each, then pressing the Down arrow key. After naming all the fields in your table design, you can go back and set or reset the attributes for each field.

Warning!: Later on in your work, do not use functions such as CHR(), LTRIM(), RTRIM(), TRIM(), or IIF() that vary the field width in the key expression.

Table designer tips

- To add, insert, or delete fields, right-click in the Table designer window to display a context menu, and choose the appropriate command.
- To reorder the sequence of fields, place the insertion point in the field number box—it becomes a hand—and move the field to the desired position in the list.
- For information on .DBF field types, see Field types.

User-interface elements in the Table designer

Topic group Related topics

This section provides a detailed description of the user interface elements and common tasks of the Table designer.

To open the Table designer to modify an existing table, right-click the table on the Tables page of the Navigator, and choose Design Table from the context menu, or select the table and click the Table Design button in the toolbar.

The Table designer lists the fields defined in the table, along with the attributes for each field.

- **Field** contains a number that identifies the field in the table. Field numbers are consecutive, automatic, and read-only. They determine the default order in which fields appear in the Table window.
- **Name** is the name of the field (up to 31 characters for *Visual* dBASE). You can enter letters, numbers, and underscores, but no other characters. The first character must be a letter. Paradox and most SQL tables allow spaces; *Visual* dBASE tables do not.
- **Type** is the field type. Select the type you want from the list. The type you select determines what kind of data the field will contain. It also determines whether you can set the width, decimals, and index options for this field.
- **Width** is the field size. In the case of dBASE tables you can change field size for character, numeric, and float fields only (all others have fixed width). Never use functions that vary field widths.
- **Decimal** is the number of digits allowed to the right of the decimal point (for float and numeric fields only). In the case of dBASE tables, float and numeric fields, by default, have no decimals selected. You can set decimals to a maximum of 2 less than the width value you define. The total width must be 20 characters or less. This includes decimal settings, the decimal point, and an optional minus sign.
- **Index** determines whether to index rows using the values in this field (you can set an index on character, date, float, and numeric fields in dBASE tables). Select Ascend to index this field in ascending order (for character fields, this is ASCII order, or the order determined by your language driver). Selecting Descend indexes this field in descending order, and None (the default) omits this field from indexing (or removes an existing index associated with this field).

  If you select Ascend or Descend for a dBASE table, the Table designer creates an index for the field in the multiple index file (.MDX) associated with the table.

  To set a primary key on a dBASE 7 or Paradox table, choose Structure|Define Primary Key. Some SQL types also support this.

You can also set other field attributes or create custom field attributes by selecting the field and right-clicking the Inspector.

Resizing columns

Topic group Related topics

You can resize or move columns and move rows in the Table designer.

- To resize a column, point to the column border. When the pointer changes to a double-headed arrow, the column is outlined and you can drag the border until the column is the size you want.
- To move columns, point to the title of the column you want to move. When the pointer changes to a hand, the column is outlined and and you can drag it to its new location.
- To set multiuser locks or default table type and other properties, choose Properties|Desktop Properties|Table tab.

Note : If you want to see rows that have been marked for deletion when the table is in Run mode, the Deleted option must be unchecked in the Desktop Properties dialog box.

Getting around in the Table designer

Topic group Related topics

In the Table designer, each horizontal row of properties represents one field (or column) in the table you are designing or modifying. To add, change, or delete data, first select the field by clicking with the mouse or by using keyboard shortcuts. .

To go to a specific field number,

1 Choose Structure|Go To Field Number or press Ctrl+G.

2 Type the number of the field to go to and click OK.

Adding and inserting fields

Topic group Related topics

You can add a new field to the table by either adding a row at the end of the fields list or by inserting a row anywhere in the list.

To add a new field to the end of the fields list, choose Structure|Add Field (or right-click anywhere in the Table designer and choose Add Field from the menu).

To insert a new field between other fields, select a field, and choose Structure|Insert Field, or right-click and choose Insert Field from the context menu. The new field's row of properties appears above the one you selected.

Moving fields

Topic group Related topics

To move a field, changing its order in a table, point to the field number in the leftmost column. When the pointer changes to a hand, drag the row up or down to its new location.

Deleting fields

Topic group Related topics

To delete fields from a table,

1 Click anywhere in the property row of the field you want to delete.

2 Choose Structure|Delete Current Field (or right-click and choose Delete Current Field from the context menu).

The Table designer deletes the field definition. If the table contains rows, the data in this field is deleted as soon as you save the table structure.

Saving the table structure

Topic group Related topics

Save the table design to keep the structure you've created. If you haven't yet saved a new table design, doing so creates the table and any associated files (such as .DBT and .MDX files in the case of dBASE tables).

To save changes to a table design, do one of the following:

- If it's a new table, choose File|Save.
- To save an existing table under a new name, Choose File|Save As.

If you are saving for the first time, or if you choose Save As, the Save Table dialog box appears.

If you are saving an older dBASE .DBF file, it will be saved in the new *Visual* dBASE 7 file format with all the extended capabilites built in.

Type a valid file name. Choose a destination drive, directory, and database, if needed, and then choose OK. *Visual* dBASE creates or updates the table and any associated files.

Note : You may not use a file-name extension ending in a "T".

Abandoning changes

Topic group Related topics

Abandon changes to a table design if you want to cancel creating a new table or discard the changes you have made to an existing table.

To abandon changes,

1 Choose File|Close or press Esc to close the Table designer.

2 Choose No when asked to save changes.

Restructuring tables (overview)

Topic group Related topics

It’s easy to change the structure of a table, even if the table contains row data.

If the table is empty, you can make any valid changes you want to the table structure except change the table type. If the table contains rows, however, you need to be more careful about the changes you make—and you should make a backup copy of the table before attempting to change its structure.

When you change the structure of a table, the Table designer makes a backup copy of the old table, creates a new table with the revised design, and attempts to copy all the data from the backup table to the new table. However, each time you change the structure of this table, the backup copy that the Table designer created is overwritten. That is why you should make your own backup copy with a unique name or in another directory.

This section assumes you are using BDE-standard table types (dBASE or Paradox). You can also change the structure of the table types of other databases connected via BDE aliases. For information on restructuring these tables, see the documentation of the respective manufacturer.

Important guidelines for restructuring

Topic group Related topics

When you change the structure of a table, the Table designer uses the field name and field position to determine how to transfer information to the new structure.

Warning!: If it cannot find a corresponding field in the new table, the Table designer *does not copy the data from the fields in the backup table*; instead, the information is lost when the backup table is deleted.

To prevent losing data that you want to keep, save the table structure frequently as you make changes and confirm that they are completed successfully.

If you change the type of a field, the Table designer does its best to convert data to the new type. Some conversions are relatively straightforward, such as converting date, logical or numeric fields to character. However, radical conversions (such as a memo field to a date field) might produce results you don't want. In addition, the Table designer does not copy data that is invalid in the new field type. For example, attempting to copy the value "123ABC" from a character field to a numeric field fails because letters aren't valid entries in numeric fields.

In addition to these guidelines, remember that if you delete a field in a table that contains rows, you lose the information in that field permanently. You can recover the information only if you have made a backup of the table.

Changing the structure

Topic group Related topics

To change the structure of a table,

1 Open a table in Design mode.

(If you are working in a shared environment, you see a prompt to open the table exclusively. Choose Open Exclusive to open the Table designer.)

2 Make a working copy of the table (choose File|Save As and specify a new name for the table).

3 Change the field definitions you want. You cannot change the table type.

4 When you finish, choose File|Save. In addition to saving your changes, the Table designer also copies associated files (such as .MDX and .DBT files).

Note: Open the restructured table in Run mode to verify that your data is in the condition you want. If not, you can revert to your original table if you worked from a copy.

Printing the table structure

Topic group Related topics

To print the table structure for future reference,

1 Open the table in the Table designer.

2 Choose File|Print.

3 Choose the print options you want and click OK.

Creating custom field attributes

Topic group

Custom field attributes specify how a field will be displayed in a form or report, irrespective of the form's default control settings. You can create custom field attributes in the Table designer to control special properties and events on forms and reports. Whenever a field is *dataLink*ed to a control, all custom field attributes are copied to the control.

Custom field attributes are named field properties that contain a string value. These attributes form an active data dictionary that functions at both design and runtime. Attributes are listed under the Inspector's Custom category.

Properties assigned to fields by creating custom field attributes are not streamed. Therefore, you can change the attribute in the table without having to change your code. If you later change the field's attributes, the changes are automatically applied to the control *dataLink*ed to the field. No change to a report or form is necessary.

By using custom field attributes, you can cause a table's field to have its own special font, color, or format that will be reproduced on any form or report whose controls are *datalink*ed to it. For example, you can assign a picture attribute to a PHONE field. When you *dataLink* an entryfield control to the PHONE field, that entryfield control will automatically take on the *picture* property that was assigned as the field's picture attribute.

To create custom field attributes in the Table designer,

1 Select the field for which you want to create a custom attribute.

2 From the context menu, choose New Custom Field Attribute.

3 In the dialog box, enter a name for the new field attribute. For example, if your table contains a phone number field whose data you want to appear in forms in a particular phone number format, you would type picture to add the *picture* property (which provides data format templates, not images).

4 Now enter a value for the new field attribute. If you used the *picture* property, you might add a template value for the property, such as 999-999-9999 for a USA phone number template.

5 The new field attribute appears in the Inspector, listed under the Custom category.

To edit or delete custom field attributes,

1 In the Inspector, select the custom field attribute.

2 Right-click the inspector to display the context menu.

3 Choose Edit or Delete Custom Field Property from the context menu.

No checks are performed on the attribute name; be sure not to create attributes, such as "Name," that will cause undesired property name conflicts. Attributes with names not used by the component simply become custom properties of the component.

Specifying data-entry constraints

Topic group

If supported by the database type, you may be able to specify data-entry constraints—rules that govern the values you can enter in a field. If you want to make sure that the values users enter in a field meet certain conditions, specify a data-entry constraint for that field.

You can specify data-entry constraints for each field in the Inspector when you create or modify a table that supports them, such as a *Visual* dBASE 7 or a Paradox table.

The Inspector displays different data-entry constraints depending on the field type.

Table 14.1

Validity check	Meaning
Required	Every row in the table must have a value in this field.
Minimum	The values entered in this field must be equal to or greater than the minimum you specify here.
Maximum	The values entered in this field must be less than or equal to the maximum you specify here.
Default	The value you specify here is automatically entered in this field. You can replace it with another value.

Indexing and sorting *Visual* dBASE tables

Topic group

Rows in *Visual* dBASE tables can be organized either by indexing or by sorting. Both methods arrange rows in a specific order, but in completely different ways. Relational databases require index files; sorting creates a separate table with a different organization.

This section describes both indexing and sorting in a *Visual* dBASE table. It covers the following topics:

- Indexing versus sorting
- Simple indexes and complex indexes
- Design concepts and guidelines for indexes
- Adding, modifying, and deleting indexes
- Sorting data to a separate table
- Creating indexes for Paradox tables

Note: The material in this section applies to dBASE, Paradox, and SQL indexes. However, specific guidelines and procedures might differ. If you're using SQL tables, see your database documentation.

Indexing versus sorting

Topic group

Indexing and sorting are two approaches for establishing the order of data in a table. You use them to answer different needs in an application. In general, you index a table to establish a specific order of the rows, to help you locate and process information quickly. Indexing makes applications run more efficiently. Use sorting only when you want to create another table with a different natural order of rows.

Indexing orders rows in a specific sequence, usually in ascending or descending order on one field. Indexing creates a list of rows arranged in a logical order, such as by date or by name, and stores this list in a separate file called an *index file*. A dBASE index (.MDX) file can have up to 47 indexes, but only one controls the order of rows at any time. The index that is controlling the order is the current master index.

Note: *Visual* dBASE stores indexes in multiple index (.MDX) files, and recognizes older .MDX files. You can design and maintain multiple indexes using the Manage Indexes dialog box.

Sorting creates an entirely separate copy of the current table with the rows in a different order. You're likely to use sorting infrequently, only when you want to create a separate table with a different natural order.

Here is a summary of key differences between indexing and sorting:

- **Creating tables.** Indexing creates an index file that consists of a list of rows in a logical row order, along with their corresponding physical position in the table. Sorting a table creates a separate table and fills it with data from the original table, in sorted order.
- **Arranging rows.** Both indexing and sorting arrange rows in a specified order. However, indexing changes only the logical order and leaves the natural order intact, while sorting changes the natural order of the rows in the new table.
- **Processing operations.** Certain operations are much faster using indexes, such as searching for data, running queries, and so on. Some operations, such as linking tables, require indexes.
- **Using functions.** With indexes, you can order rows using fields and *Visual* dBASE methods. With sorting, you can use fields only, in ascending or descending order.
- **Adding rows.** If you add rows to an indexed table, the index is updated automatically so that the rows appear in the correct order. If you add or change rows in an already-sorted table, you might need to sort it again.
- **Mixing field types.** With indexing, you must convert field values to a common field type, for example, converting the sale date to a character type. With sorting, you can order rows on fields with different field types; for example, you can sort on customer number (a character field) and sale date (a date field), without converting them to a common field type.
- **Mixing orde**r. With indexes, the entire index is either ascending or descending. With sorting, you can mix fields sorted in ascending and descending order.

In general, use indexing to make processing more efficient in data entry forms, queries, and reports. The only significant costs are that index files require extra disk space, and processing time is required for ongoing automatic maintenance.

Sorting or exporting rows

Topic group

Sorting a table copies its contents to a separate table and arranges rows in the order you specify in the new table.

Tip: In general, use sorting only when you want to export data to another application or table type. Sorting is useful whenever you want to create a separate table for reporting or other purposes. Use indexing instead when you want to make data entry, querying, and reporting tasks faster and more efficient.

When you sort, the *source table* is the table containing the rows you want to copy, and the *target table* is the new table (and new table type, if you want) to contain the copied rows. Sorting does not change the data in the source file.

When you sort a table, all fields in the source table appear in the target table. You select the fields on which to sort rows.

Visual dBASE sorts data in case-sensitive alphabetic order, using the sort order specified by the language driver in the BDE Administrator. Sorting starts with the first character in the key and proceeds from left to right. Punctuation comes before numbers, numbers before letters, and uppercase letters before lowercase letters.

Note: Make sure you have enough available disk space to store the table on the target drive.

To created a sorted table or export table data to another table type,

1 Open the table you want to sort in Run mode.

2 Choose Table|Sort Rows. The Sort Rows dialog box appears.

3 Specify a target table. This is the path name of the new sorted file. Click the Target Table tool button to display a Save As dialog box. If you want to export the table data to another table type, choose the new table type in the box at the bottom of the Save As dialog box.

4 Select the field(s) on which to sort rows, and click the > button to move them to the Order By list.

   The order in which the selected fields appear in the Order By list determines the order of the sort. In the example, rows would be sorted first by zip code, then by name. The target table contains all fields from the source table.

5 Select each key field, then specify the sort order.

6 When you have finished, click OK. *Visual* dBASE creates a new table. If the target file exists, *Visual* dBASE asks whether to overwrite it. The rows you selected are copied to the target table and sorted as you specified, starting with the first Order By field.

Planning indexes

Topic group

When you design indexes for a table, consider how you will use and process data. Indexes affect and support features that an application provides: data entry, queries, and reports. Asking the right questions at the beginning can save you redesign efforts later.

Using indexes in data entry

Using indexes in queries

Using indexes in reports

Using indexes to link multiple tables

Using indexes in data entry

Topic group

Because indexes affect the order in which rows appear, they let users find and update information quickly. To make data entry more efficient, consider these questions:

- What is the order in which users expect to see the data? For example, they might expect to see a list of companies in alphabetical order, a list of purchase orders by purchase order number, or a list of invoices in chronological order. Indexes should reflect the *expected* order of information in a table. If users expect the same information in different sequences, you can create multiple indexes—one for each sequence. For example, in the Orders table, you might want separate indexes for the order number, order date, and customer number.
- To find rows in a table, what kind of information might users know already? For example, to locate an invoice, users might already have the invoice number, approximate date of the invoice, or the company that submitted the invoice. To speed up the search process, you might want to create indexes for the most common ways a user looks for information.
- What kinds of calculations are users going to perform on data in the table? For example, users might want to calculate the average sale per state or the total sales per month. The word “per” is a clue to an index you might want to create—in the first example, indexing the state field and, in the second example, indexing the sales date field. An index can put similar rows in consecutive order so that users can quickly search for the first row in the series and stop processing after the last row in the series. For example, if users want to calculate the total payments to a vendor, consider creating an index for the vendor number or name.

Using indexes in queries

Topic group

Indexes can increase the speed at which a query is processed. Indexes are also required for defining links among related tables. To make queries more efficient, consider the following issues:

- What kinds of questions are users going to ask? For example, will they want to know the number of items in stock for a particular product? If so, consider creating an index for the product name or identification number.
- What kind of information might a user know before attempting the query? For example, a user might know the name of the product, its identification number, or its type. Consider creating indexes for commonly known information.
- If the index is solely for occasional or ad hoc queries, consider generating an index at query time instead of maintaining an index separately on an ongoing basis. When the query is finished, you can delete the index to recover disk space.

Using indexes in reports

Topic group

Indexes affect the order in which rows appear in a report. In addition, they can trigger subtotals and totals in a report (when key values change). To make reports easy to design, consider the following issues:

- What is the order in which users expect to see information in the report? For example, do users want to see a chronological list of invoices billed? An index can ensure that rows appear in the expected order.
- What kinds of calculations will the report make? For example, a report might show the total number of sales by salesperson, or the average sale by customer. The word “by” is a clue to an index you might want to create—in the first example, indexing on the salesperson field and, in the second example, indexing on the customer number. Using an index makes it easier to calculate running totals. If a report includes subtotals within totals, consider using a complex index.
- If the index is solely for occasional or ad hoc reports, consider generating an index at report time instead of maintaining an index on an ongoing basis. When the report is finished, you can delete the index to recover disk space.

Using indexes to link multiple tables

Topic group

Indexes are required for linking related tables together in a multiple-table query. To link tables, consider the following issues:

- What are the relationships among the tables—one-to-one, one-to-many, many-to-many? For example, an Orders table and a LineItem table are in a one-to-many relationship. The Orders table is the parent table and the LineItem table is the child table.
- With related tables, which fields are common among them? To link tables together, you must have an index for the child table on a field that also appears in the parent table. For example, the Orders table and LineItem table both have an ORDER_NO field, and the LineItem table has an index on this field.
- Can you use codes instead of long character fields? For example, to link orders in the Orders table to customers in the Customer table, the application uses the customer number, a short character field that uniquely identifies each customer.

dBASE index concepts

Topic group

Before you create indexes on dBASE (.DBF) tables, you need to be familiar with a few general concepts.

- Multiple index (.MDX) files**.** When you create an index, it is stored in a file with the file-name extension .MDX. Each index has a name (sometimes called a *tag*) that defines the index uniquely in the .MDX file.

  A table's main .MDX file is called the *production index* file. The production index file opens automatically when you open a table, so its indexes are automatically available—though no index sets the row order until you select it as the master index. As you update rows in a table, the affected indexes in the production index file are also updated. If you use any non-production .MDX files, they must be opened explicitly by entering statements in the Command window.

  The production index file has the same name as the table plus the .MDX extension.

- Key expressions. A key expression is a field name, or a combination of field names, functions, or operators, that determines how an index orders rows in a table. It must be a character, numeric, date, or float field, or an expression that evaluates to one of these types. The key expression can be up to 220 characters in length.
- **Primary key**. The dBASE 7 table format supports primary keys, enabling you to create primary distinct indexes. Any field can be a primary key and you need not create the primary key before creating a secondary maintained index.
- Simple indexes. A simple index uses a single field name for the key expression.
- Complex indexes. A complex (or composite) index uses a combination of one or more fields, or a dBASE expression.
- Ascending and descending order. Rows can be ordered in ascending order, lowest to highest (the default), or descending order, highest to lowest. For character fields, the order is ASCII or the order established by the language driver installed by the BDE.

Note: Keeping a large number of indexes affects performance, because *Visual* dBASE must update each one as the table is revised. If you need to improve performance, consider removing rarely-used indexes from the production index file.

Creating a simple index

Topic group

A simple index consists of a single field.

The key of a simple index is just the name of a field. For example, in the Customer table, if you index on the CUSTOMER_N field, the key is the field name, CUSTOMER_N.

You can create a simple index using either the Table designer or the Manage Indexes dialog box, as shown in the next two sections.

Using the Table designer to create a simple index

To create a simple index in the Table designer, choose an index order for the field you want to use—ascending or descending.

Using the Manage Indexes dialog box to create a simple index

To open the Manage Indexes dialog box, in Table design mode, choose Structure|Manage Indexes. The Manage Indexes dialog box appears.

To create a simple index,

1 Choose New. The Define Index dialog box appears.

2 Choose fields from the Available Fields list and add them to the Fields Of Index Key list at the right.

3 Choose Ascending or Descending order.

4 Choose Specify From Field List for a simple index.

5 Enter a name for the new index.

You can use letters, numbers, and underscores, but the first character must be a letter. The name you use must be unique within the index file. For a simple index, use the field name.

Check your vendor documentation for other limitations.

By default, *Visual* dBASE indexes rows in ascending order. The exact sort order depends on the driver specified in BDE.

When you choose OK in the Manage Indexes dialog box, *Visual* dBASE builds any indexes you created or changed and removes any indexes you deleted.

Note: You might have to wait while the indexes are created, particularly if the table has many rows or if key expressions are long and complex.

To select an index for a rowset

Topic group

Depending on the table type, a rowset may be displayed in a form in different default orders. When you first open a dBASE table, it appears in natural order. When you first open a Paradox table, the natural order is the primary key order.

For dBASE tables, the production .MDX file opens automatically with the table, but the indexes it contains are not in effect until you select one.

To order rows that appear in a form in a specific way, select the index you want:

1 Open the form in Form designer.

2 Select the active Query object.

3 In the Inspector, select the rowset property.

4 Click the *rowset* property tool button. The Inspector displays the rowset object's properties.

5 Set the *indexName* property to one of the available indexes.

Modifying indexes

Topic group

You can modify an existing index to make it more useful or efficient. For example, if you create a simple index for a dBASE table in the Table designer, you might want to make it a complex index by adding fields or expressions. Or, you might learn after using the index for a while that a different key is more suitable.

To modify an index,

1 Open the table in the Table designer.

2 Choose Structure|Manage Indexes. The Manage Indexes dialog box appears.

3 Select the index you want to modify, and click the Modify button. The Define Index dialog box appears.

4 Make your changes, then choose OK.

Deleting indexes

Topic group

You can delete an index you no longer need to save space and improve performance. Deleting an index does not delete any rows in the table—it deletes only the separate index that arranges rows in a particular order.

To delete a simple index, open the table in the Table designer, and choose None as the index type for the field.

To delete any other index,

1 Open the table in the Table designer.

2 Choose Structure|Manage Indexes. The Manage Indexes dialog box appears.

3 Select the index you want to delete, and click the Delete button.

4 Choose OK.

5 Save the table.

The index you deleted is removed from the production index file. If you delete the only index in the file, the .MDX file is deleted as well.

Indexing on a subset of rows for dBASE tables

Topic group

In most cases, indexes include all rows in a table. For special circumstances, however, an index might contain only some of the rows in a table. Indexing on a subset of rows can make it easier to process information in that table. For example, you might want to work with budget information that applies to your sales department only. In this case, you could create an index that includes only those rows whose DEPT_ID is SALES.

To create an index that includes only the rows you want, first determine which rows you want to include, then state this in the form of a valid dBASE expression. For example, if you want to create an index of customers in your South sales region only, you could use a For *condition* expression such as SALES_REG = “SOUTH” to create the index. Thereafter, when you use this index, you see and process customers from the South region only.

Hiding duplicate values

Topic group

Indexes can contain multiple rows with the same value in an indexed field. For example, a Lineitem table can contain multiple entries with the same ORDER_NO or STOCK_NO.

In certain cases, however, you might want to have a unique index, which finds only the first occurrence of a value in the indexed field and ignores subsequent rows with the same value. This kind of index is useful when subsequent rows repeat information in the first row.

For example, in a Lineitem table, if all products with the same STOCK_NO were sold at the same price, you could use a unique index to hide duplicate index values, so that only the first row with the price would appear.

If you check Include Unique Key Values Only in the Define Index dialog box, only the first row with a duplicate value in the indexed field is included in the index. Subsequent rows with duplicate values in that field are excluded.

Note: In dBASE and Paradox indexes, if there is a primary or distinct index, rows may not have duplicate values in the indexed field. Duplicate values cause an error when trying to save. In SQL indexes, uniqueness is required if the index is defined as a unique index.

Creating complex indexes for dBASE tables

Topic group

Complex indexes on dBASE tables use a combination of one or more field names, plus valid dBASE expressions. Use a complex index when no single field uniquely identifies each row, or when you need the flexibility of an expression to define the index condition.

Indexes on .DB tables also can use multiple fields; such indexes are called *composite indexes*. However, unlike complex indexes in dBASE tables, you cannot use functions or operators in the .DB index expression.

Rules for dBASE complex indexes

Topic group

For complex dBASE indexes, the complexity of the index expression varies according to the way the index is used. The following rules apply when defining complex indexes:

- An index value can be up to 100 characters long. The text of the key expression can be up to 220 characters long.
- The complex index must be a valid dBASE expression. Note that a single field name is a valid expression.
- The expression must evaluate to a character, date, numeric, or float value.
- It usually, but not always, contains at least one field name.
- For multiple character fields, *concatenate*, or combine, fields using the plus sign (+), as shown in the following examples:

```
LAST_NAME + FIRST_NAME + M_INITIAL
CUSTOMER + ORDER_NO
```

- You can concatenate fields of different data types by converting them to a single type. In the following example, the key expression concatenates the CUSTOMER_N field, which is a character field, and ORDER_DATE, which is a date field. The DTOS() function converts the date value to a character string in the format YYYYMMDD. This order—year first, then month, then day—ensures accurate indexing.

```
CUSTOMER_N + DTOS(ORDER_DATE)
```

- For converting number fields, use the STR() function. Include the width and number of decimal places of the numeric field(s), to ensure accuracy of the index. For example, suppose you are creating an index that includes a character field LNAME, and a numeric field called AMOUNT that is 10 places wide with 2 decimal places. Use the following syntax:

```
LNAME+STR(AMOUNT,10,2)
```

Creating the dBASE complex index

Topic group

To create a complex index for a dBASE table,

1 With the table open in the Table designer, choose Structure|Manage Indexes. The Manage Indexes dialog box appears.

2 Choose New in the Manage Indexes dialog box. The Define Index dialog box appears.

3 Select the combination of fields on which you want to index from the Available Fields list and move them to the Fields Of Index Key list. Or type a key expression, such as STATE+CITY, to create a complex index on the STATE and CITY fields. The key expression can use multiple field names, functions, and operators.

4 Click OK to exit the dialog box and save the index.

Key expressions

The following table shows several examples of key expressions and the fields used.

Table 14.2

Key expression	Fields used	Notes
CUSTOMER_N	CUSTOMER_N	
CUSTOMER_N + ORDER_NO	CUSTOMER_N, ORDER_NO	
CUSTOMER_N + DTOS(SALE_DATE)	CUSTOMER_N, SALE_DATE	DTOS converts date field to character for indexing.
UPPER(LAST_NAME)+UPPER(FIRST_NAME)	LAST_NAME, FIRST_NAME	UPPER changes character field to all caps.

The first example is a single field as the key expression. Complex indexes, on the other hand, can use a combination of one or more fields, plus functions and operators.

- CUSTOMER_N + ORDER_NO is a complex key expression using multiple fields and the concatenation operator (+).
- CUSTOMER_N + DTOS(SALE_DATE) is a complex key expression consisting of multiple field names and a function.
- UPPER(LAST_NAME)+UPPER(FIRST_NAME) converts characters to all caps before concatenating them. The UPPER function prevents sorting problems when capitalized entries are mixed in with lowercase ones.

Primary and secondary indexes

Topic group

Visual dBASE lets you create primary and secondary indexes for any table type that supports them.

- A primary index is the main index in a table. It consists of one or more consecutive fields, starting with the first field in the table.
- A secondary index is supplemental to the primary index in a table.

Some table types let you specify whether or not a secondary index is case-sensitive. Case sensitivity affects the sort order and the uniqueness of values. In *Visual* dBASE, you can create case-sensitive indexes only, although *Visual* dBASE maintains case-insensitive indexes when you edit tables that use them.

Each table should have one primary index, although it is not required. In a Paradox table, the primary index is stored in a file with a .PX extension.

Unique keys

Primary indexes require unique values—they do not permit duplicate key values. For example, if a dBASE table has a primary index on ORDER_NO, you cannot add two orders with the same order number—only one can exist in the table. In a composite index, individual field values can be duplicates, but the combined value of all key fields must be unique. (Secondary indexes do permit duplicate values.)

When you create the primary index, use a field that will contain a unique value for each row, such as a customer number field.

A table can have only one blank (empty) value in the keyed field, because subsequent blank values are considered duplicates. Therefore, key fields usually require entries.

Note: Some field types, such as memo, OLE, binary, and logical, are unavailable as key fields.

Secondary indexes, maintained and non-maintained

The dBASE version 7 and Paradox table types permit two types of secondary indexes:

- *Maintained* secondary indexes are automatically maintained when data changes in the table. *Visual* dBASE lets you create maintained secondary indexes, and it updates maintained indexes automatically when you edit a table.
- *Non-maintained* secondary indexes are not automatically updated when the table is open. *Visual* dBASE does not let you create non-maintained secondary indexes, but it supports any existing non-maintained indexes.

The dBASE table format lets you create maintained secondary indexes regardless of whether the table has a primary index. You can create as many single-field (simple) indexes as there are fields in a table, and you can create up to 255 multiple-field (called *complex* or *composite*) indexes per table.

Creating primary indexes

Topic group

You can create a primary index in the Table designer or the Manage Indexes dialog box. If the table type you are creating does not support primary indexes, these options are not available. *Visual* dBASE 7 and Paradox table types both support primary indexes.

To create a primary index,

1 Open the table in the Table designer.

2 Choose Structure|Define Primary Key to display the Define Primary Key dialog box.

3 Choose the Primary Key fields from the Available Fields list. Click the arrow to add (or remove) fields from the Fields Of Primary Key list box.

Note : In the case of Paradox tables only, the first field in the table must be the primary key or part of a composite primary key. If the field you want to be the primary key is not currently the first one in the table, you have to move it up in the Table designer to be the first field. The dBASE format does not share this limitation.

Creating secondary indexes

Topic group

You can create one or more secondary indexes in the Manage Indexes dialog box.

1 Choose Structure|Manage Indexes to display the Manage Indexes dialog box.

2 Click the New button. The Define Index dialog box appears.

3 Select fields from the Additional Fields select box and click the arrow to add each one to the Fields Of Index Key box. The double-right arrow adds all the fields at once.

4 Choose Ascending or Descending order, and click OK.

Referential integrity (overview)

Topic group Related topics

Referential integrity validates and updates the data in the linked key fields of a relational database. In a relational database, a field or group of fields in one table (the child table) refers to the key of another table (the parent table). Referential integrity rules ensure that only values that exist in the parent table's key are valid values for the specified fields of the child table.

You can establish referential integrity only between like fields that contain matching values. For example, you can establish referential integrity between two tables that both have a field that holds the customer number. The field names do not matter as long as the field types and sizes are identical.

Visual dBASE lets you establish referential integrity for any file type that supports it, such as *Visual* dBASE 7 and Paradox table types. Some SQL-server tables also offer referential integrity. See your SQL-server database documentation to determine if your table type supports referential integrity.

The way referential integrity is used depends on the way you have set up indexing for the tables in a relational database. This section assumes you are familiar with the concepts of index creation and management.

Defining referential integrity

Topic group Related topics

You can establish referential integrity between tables in the current database. If no database is specified, you can establish referential integrity between tables in the current directory.

To define a referential integrity relationship,

1 In the Navigator, Tables page, use the Look In box to select a database alias or a directory containing tables (such as .DBF or .DB type) that support referential integrity.

2 Choose File|Database Administration. The Database Administration dialog box appears(To see SQL databases listed in this dialog box, you must first have given them a BDE alias.)

3 Specify a Table Type that supports referential integrity, such as dBASE or Paradox, then click Referential Integrity. The Referential Integrity Rules dialog box appears

4 Choose New.

The New Referential Integrity Rule dialog box appears. All tables in the current database or directory appear in the Parent Table and Child Table drop-down lists

5 Choose a parent table from the Parent Table list. The table's key fields appear in the Primary Key Fields area of the dialog box.

6 Choose the child table from the Child Table list. Fields available for referential integrity appear in the Available Child Fields list.

7 Specify whether the tables are in a one-to-one or one-to-many relationship in the Relationship panel. The relationship you choose changes the available child fields.

- One-to-one relationships can be defined between the primary key field in the parent and the primary key field in the child, or any field in the child that has a unique index.
- One-to-many relationships can be defined between an indexed field that is not the primary key in the child and the primary key field in the parent.

8 Choose the child table's field in the Available Child Fields list and click the Add Field arrow. The field name appears in the Related Child Fields area of the References panel.

You can establish referential integrity with a complex (or composite) key. If the parent table has a complex key, add fields from the Fields list to match all of the fields in the parent's key.

9 Select the update and delete behavior you want (see below).

10 Optionally change the rule name *Visual* dBASE provides in the topmost box.

11 Choose OK to save the referential integrity relationship.

Note: If you attempt to define referential integrity on a table that already contains data, some existing values may not match a value in the parent's key field. When this happens, the operation fails and you receive an error message.

Update and delete behavior

You can specify the following rules for updating and deleting data in a parent table that has dependent rows in a child table:

- **<SCb~Restrict:SC~> You cannot change or delete a value in the parent's key if there are rows that match the value in the child table.**

  For example, if the value 1356 exists in the Customer No field of Orders, you cannot change that value in the Customer No field of Customer. (You can change it in Customer only if you first delete or change all rows in Orders that contain it). If, however, the value doesn't exist in any rows of the child table, you can change the parent table.

- **<SCb~CascadeSC~>:** Any change you make to the value in the key of the parent table is automatically made in the child table. If you delete a value in the key of the parent table, dependent rows in the child table are also deleted.

The availability of cascading updates and deletes varies according to the table type:

- **<SCb~*Visual* dBASE 7SC~>: Cascading updates or deletes permitted**
- **<SCb~ParadoxSC~>: Cascading updates only**
- <SCb~OracleSC~>: Cascading deletes only
- <SCb~SybaseSC~>: No cascading updates or deletes permitted
- <SCb~InterBaseSC~>: No cascading updates or deletes permitted
- <SCb~Microsoft SQL ServerSC~>: No cascading updates or deletes permitted

Changing or deleting referential integrity

Topic group Related topics

You can choose any referential integrity name from the list of named referential integrity relationships in the Referential Integrity Rules dialog box to either modify or delete it.

- Choose Edit to open the Edit Referential Integrity Rule dialog box with the selected referential integrity relationship filled in. You must be able to obtain exclusive access to all tables involved in the referential integrity when you modify it.
- Choose Drop to delete the selected referential integrity relationship.

Editing table data

Topic group

To browse, change, or add to data in a table, open the table in Run mode. You can use any of three different layouts: grid, form, and columnar.

Though the various data sources supported by *Visual* dBASE have different capabilities, limitations and structures, the same basic procedures for running tables from within *Visual* dBASE apply to all.

This chapter section describes how to use *Visual* dBASE's built-in data-editing capabilities to

- Scan information
- Find or replace information
- Perform data entry (add information)
- Delete and undelete information
- Save or abandon changes
- Operate on a subset of information
- View and edit special field types

A few words of caution

Topic group

Like any file, tables and the information they contain can be corrupted or destroyed if used improperly.

If, for example, you design an application that prevents entry of a number greater than 10 in a field called NUMITEMS, and the existing data is contained in an older .DBF table, someone could circumvent your data constraint of “not greater than 10” by opening the table in Run mode, adding a new row with a value of 11 in the NUMITEMS field, and saving the table.

Most table types, including the new .DBF7 format, allow the table developer to enforce rules at the table level in order to prevent such problems from occurring. But even with such safeguards, developers should caution users who have access to tables that database integrity can be compromised by editing table data directly in *Visual* dBASE or in any other application—including spreadsheets and word processors.

Developers can also take other simple precautions, such as placing data in folders at levels casual users may not venture into, or naming data directories with numbers instead of with tempting titles like “databases.”

It also helps to understand exactly when and how your databases can be opened and modified from within *Visual* dBASE.

Running a table

Topic group

To view or edit a table, open a table in Run mode using any of the following methods.

- Menu: Choose File|Open (Alt+FO). The Open File dialog box appears. If it's not already selected, choose the Tables (*.dbf, *.db) item from the Files Of Type list and locate a table on your local drives, or select an alias from the Database list. Then choose the View Table Rows option at the bottom of the dialog box. Select your table, then click OK.
- Project Explorer: Select a table, right-click it, and choose Run Table from the context menu.
- Navigator: Choose the Tables tab, then use the Look In drop-down list to choose a local folder or alias (or use the Browse button to choose an unlisted folder). Then double-click a table icon. You can also open a selected table by clicking the Run button on the toolbar or by pressing F2.
- Command window: type

```
use <tablename>
```

  where <tablename> is a local table file name or aliased :database:table reference, for example, :MSSQL1:mytable. You may include the full path to the file name. Then type

  edit

The table appears in a grid of rows and columns. Each column is a field. You can browse or edit all the data in the table.

Viewing only selected table data

Topic group

To open a table with only specified rows available for viewing or editing, create and run a query—a SQL statement that requests specified information from one or more tables.

To view or edit data selected by a query, open the query in Run mode using any of the following methods.

- Menu: Choose File|Open (Alt+FO). The Open File dialog box appears. If it's not already selected, choose the Queries (*.sql) item from the Files Of Type list and locate a query on your local drives. Then choose the Run SQL option at the bottom of the dialog box. Select your query, then click OK.
- Project Explorer: Select the query you want to run, right-click it, and choose Run Query from the context menu.
- Navigator: Choose the SQL tab, then use the Look In drop-down list to choose a local folder (or use the Browse button to choose an unlisted folder). Then double-click a query icon. You can also open a selected query by clicking the Run button on the toolbar or by pressing F2.

The query results appear in a grid of rows and columns. What you edit here is reflected in the table or tables that contain the data.

For more information on creating, modifying and running queries, search for "SQL" or "queries" in the Help index.

Protected tables

Topic group

When you open a protected table, complete the Group, User, and Password fields in the Login dialog box, and choose OK. The database administrator assigns groups, users, and passwords for table protection.

Also note that some tables may have read-only protection or other access and editing restrictions.

Search the Help index for “security” for more information about protected tables, access rights, and encryption.

Table tools and views

Topic group

When you run a table or query, additional items appear on the View menu, and a Table menu becomes available.

Toolbar functionality changes as shown in the following figure.

The table-editing toolbar

These added items are described later in this chapter.

Table and query views

The default view when running tables or queries is a grid view. Other options are a columnar view, which displays a single row on each page with fields arranged vertically, and a form view.

Columnar view

You can choose your preferred view any time in two ways:

- Choose the desired view from the View menu.
- Click the appropriate button on the toolbar: Grid Layout, Columnar Layout, or Form Layout.

Visual dBASE remembers your last view choice and next time you open a table, it will be in the view you last chose.

Adjusting the view

In columnar view, fields remain at their default size and cannot be widened. You can, however, enlarge the view window vertically to see more fields at once.

In grid view, you have other options:

- You can resize columns and rows by pointing to a column or row border, then dragging when the pointer changes to a double-headed arrow.
- You can move columns by dragging field titles to new positions.

Table navigation

Topic group

Visual dBASE uses a row pointer to identify the current row. Use the following methods to move the row pointer in a table:

Table 15.1 Navigating rows using the menu, mouse or keyboard

Move to	Menu	Mouse	Keyboard
Next row	Table|Next Row	Click next row	¯ (grid) or PgDn (columnar)
Previous row	Table|Previous Row	Click previous row	‘‘ (grid) or PgUp (columnar)
First row	Table|First Row	Scroll to top of table, if necessary, and click first row	Ctrl+PgUp
Last row	Table|Last Row	Scroll to bottom of table, if necessary, and click last row	Ctrl+PgDn
Specific row	Table|Find Rows	Click row	Ctrl+F
Previous page	Table|Previous Page	Click in the scroll bar	PgUp (grid)
Next page	Table|Next Page	Click in the scroll bar	PgDn (grid)

In addition, you can use the navigation toolbar buttons.

Navigating rows using the toolbar

Note

Your Desktop Properties settings might cause the exclusion of certain rows in a table. For example, if Deleted is selected on the Table page in the Desktop Properties dialog box, the row pointer skips deleted rows. Similarly, if you’ve specified a scope in the Table Rows Properties dialog box, the row pointer ignores rows outside the scope. If you’ve specified a filter for the table, rows not meeting the filter condition are ignored. For details on these and other table property settings, search the Help index for “table properties.”

Data entry considerations

Topic group

When you're faced with day-to-day data entry tasks, consider the following:

Should I run a table or use a form? Running a table offers quick direct access to tables from within *Visual* dBASE. This is handy for occasional editing, data entry, and maintenance. However, forms offer more control over the data-entry process, including the ability to edit multiple linked tables in the same window and to programmatically enforce entry validation and data integrity. If a data-entry form doesn't already exist, you can use the Form wizard to quickly create one. For ongoing data entry and maintenance, consider designing a form.

Editing all rows or selecting only the information you need. You sometimes want to work with only a subset of rows in a table, especially if the table has a large number of rows. For example, you might want to change orders for the current month only. Consider the following approaches:

- Use queries to select the rows you need to change and ignore the rows that don't apply to the task at hand. One advantage to using queries is that they allow you to store the conditions you specify and use them with multiple tables.
- Use a conditional or unique index that includes only the rows you want.

Working with parent and child tables. Deleting rows or changing the values in linked fields or key fields can cause *Visual* dBASE to lose track of data. For example, if you delete an order in the Orders table but not in the associated rows in the LineItem table, you end up with orphaned rows that could skew calculations. Similarly, you might inadvertently change the order number in the Orders table but not in the LineItem table, which also results in orphaned rows.

If the table you are editing is part of a parent-child relation, consider using a query to link the parent and child table, rather than editing the single table. The query helps you see and preserve connections between related rows in the tables.

Ordering rows. During data entry, you can use the natural order of the table or you can use an index. When searching for rows to update, using an index could be the most efficient means, particularly in a table with many rows.

Selecting a view for entering data. When you run a table, two views are available: grid (default) and columnar. Choose the one that best suits your data entry task.

Repeated values. If you are entering the same value repeatedly, consider using the Replace option to update a number of rows with the same value quickly.

Note: The Data Entry page of the Desktop Properties dialog box offers a number of data entry configuration options, including Bell, Confirm, Delimiters, and Type-ahead. For details on these options, click the Help button on the Data Entry page.

Searching tables

Topic group

In addition to scrolling through rows, you can quickly find the row you want by searching for a value in a field you select. For example, you could quickly find a specific customer order by selecting the ORDER_NO field and typing the number of the order you want to find. You can search character, numeric, float, date, and memo fields.

To begin a search, click the Find Rows button, or choose Table|Find Rows.

The Find Rows dialog box provides options you can use to focus and speed up your search. The options you use depend on the search value you specify, the way information is organized in the table, how specific the search needs to be, and how much of the table you want to search.

Find Rows dialog box

- **Find What. In your search text, you can specify any printable character, including spaces. The search string can be as long as the width of the search field. In general, the longer the search string, the greater the precision required. If you can't find a match with the current search string, shorten it to increase your chances of finding a match.**
- Located in Field. You can search for text in any field, whether or not it has been indexed. Searching is fastest when you search on an indexed field. Before you start your search, select the index you want to use as the master index.

  You can also search non-indexed fields, such as memo fields. Doing so might be slower than an indexed search, particularly in tables with many rows.
- Partial Length. There is no requirement that the length of the search string be identical to the field value. This rule is checked by default.
- Exact Length. The search string must appear in the field just as you type it to be a match.
- Match Case. Match Case requires that the field value match the search string exactly, including uppercase and lowercase letters.

Once you have selected the options you want, click Find. If a match is found, the row pointer moves to the matching row and the row appears highlighted. If no match is found, a message appears.

If you don't find the match on the first try, shorten the search string or adjust other search options as needed and try again.

Replacing data in rows

Topic group

You can find text in a table and replace it with different text. For example, if you change the name of a product, you can search a table and replace the old name with the new one. The replacement can occur in a different field than the find string is in.

For example, suppose you assign a salesperson to a different sales territory and want to update the SALESPERSON field for all customers in that territory. Rather than update each customer row individually, you could simply select all the customer rows in that territory, then replace the SALESPERSON field in those rows only.

Important: Updating indexed fields in the master index can yield unpredictable results because changing the key value changes the row position—as well as the row pointer—in the index. Use a different master index instead. In addition, changing key values in related tables can result in orphaned rows in the child table. Therefore, carefully consider the implications of updating rows, and make a backup copy of your tables before proceeding.

To replace rows,

1 Select the table, then choose Table|Replace Rows. The Replace Rows dialog box appears.

Replace Rows dialog boxt

2 Complete the dialog box.

The replacement value you specify must match the data type of the selected replace field. Make sure that the value fits in the field.

- In character fields, if the text is too long for the field, it is truncated.
- In number fields, if the value exceeds the field size, the fields fill with asterisks.
- In memo fields, the existing memo text is overwritten with the replacement text. The replacement text must be in character format.

3 Once you've specified the replacement text, do one of the following:

- Choose Find to find the next occurrence of the search text. Then choose Replace to replace it, or choose Find to leave it alone and go to the next occurrence.
- Choose Replace All to replace all occurrences of the search text.

Adding rows to a table

Topic group

When you add rows to a table, they are appended to the end of the table. An empty row is added at the end of the table where you can enter data. If a table contains 100 rows before you append, the new row becomes row number 101 and the current row for editing.

To append a row, do one of the following:

- Choose Table|Add rows.
- Click the Add row button on the tool bar.
- In grid view, go to the last row, and then press the Down arrow.

An empty row appears. Now you can enter data. See “Data entry considerations” on page 15-37 and “Viewing and editing special field types” on page 15-48.

You can also add rows by importing them from another table or file. Use the IMPORT command in the Command window.

Note: If you’re adding rows to a table with an active index, each row appears at the end of the table. When you finish entering data in the row, *Visual* dBASE updates the index and moves the row to its correct position as indexed. The last row you added remains the current row for editing.

Deleting rows

Topic group

To delete a row in grid view, select the row by clicking the button at the left of the row, then press Ctrl+U. In columnar view, navigate to the row and press Ctrl+U.

You can also delete rows through the Delete Rows dialog box:

1 Find the row in the columnar view or select the row in the grid view.

2 Choose Table|Delete Rows, or click the Delete button in the toolbar. The Delete Rows dialog box appears.

The Delete Rows dialog boxr

3 Click OK to delete the currently selected row, or specify a particular row number, or choose all to delete all rows. Click OK.

Saving or abandoning changes

Topic group

Visual dBASE saves changes to a row automatically whenever you do one of the following:

- Move the row pointer to another row.
- Toggle the table view between grid and columnar view.

Note: If Autosave is selected in the Table page of the Desktop Properties dialog box, *Visual* dBASE writes changes to disk automatically. Otherwise, it accumulates changes and saves them to disk periodically.

To save a row manually, do one of the following,

- Close the Table window, or
- Click the Save Row button

To abandon changes to a row, click the Abandon Row button.

Performing operations on a subset of rows

Topic group

Sometimes you need to work with only a subset of the rows in a table. You can save time by selecting only the rows you want to work with, and avoid processing rows that don't apply.

Visual dBASE provides tools to make it easy to edit a set of rows. This group of topicssection explains how to

- Select sets of rows to process
- Count rows that meet a given set of criteria
- Perform calculations on multiple rows

All of these features are found in the Table menu.

Many of the operations described in this section—including aggregate operations for calculating data, finding rows, filtering conditions, and linking parent and child tables—can also be performed by creating queries. For information, search the Help index for "SQL" or "queries."

Selecting rows by setting criteria

Topic group

To select a subset of rows from your table, you have to identify the criteria by which rows qualify for selection.

For example, if you want to calculate the average sales volume of customers in Texas, your criteria might be that the STATE_PROV field in the Customer table contain the value “TX”. Rows that fail to meet this criteria are ignored.

Another row selection technique is to specify a condition by writing an expression in the Command window that defines which rows qualify for processing.

Setting For conditions

Use the For condition to select rows that appear throughout a table rather than in a contiguous group. For conditions, check all rows in the table when determining which rows qualify for processing. Processing starts at the top of the table and goes to the bottom (unless you limit it using one of the options discussed in the previous section).

Visual dBASE compares each row with the condition you specify to determine whether to process a row. For example, to count the number of customer orders that exceed $10,000, you might specify the following For condition: TOT_INV > 10000.

Setting While conditions

Use the While condition to select a series of rows that appear consecutively in a table. While conditions check only the current row and subsequent rows when determining which rows qualify for processing. Processing starts at the current row rather than at the top of the table. Therefore, the row pointer must be at the first qualified row before processing; otherwise, no rows can be selected.

This method works best when you use an index whose key matches fields in the condition. That way, you can quickly find the first row in the series, then process rows sequentially. Processing ends when the key no longer matches the condition.

For example, to do a calculation only on rows of customers in Texas, it would speed up processing to apply an index on STATE_PROV, which would group all the TX rows together. Search for the first TX row, and then enter STATE_PROV=“TX” in the While field to process from the current row through the last TX row.

You can also create or modify an index to include a subset of rows. In this case enter a For condition that specifies STATE_PROV=“TX”. When that index is active, only TX rows are selected.

Counting rows

Topic group

You can count rows to determine how many rows meet a given set of criteria. For example, you might want to know how many customers fall within a certain zip code range, or how many orders were taken on Tuesday.

To count rows,

1 Choose Table|Count Rows. The Count Rows dialog box appears.

Count Rows dialog box

2 Specify the rows to include in the count, then choose OK.
Visual dBASE counts the number of rows that meet the criteria, then displays that number in a message box.

Performing calculations on a selection of rows

Topic group

You can perform calculations on number fields to obtain useful information from a selection of rows. For example, you might calculate the total sales for a given month, the largest sale, the smallest sale, or the average sale amount.

You can perform the calculations shown here.

Table 15.2 Types of calculations

Calculation type	Result
Average	Average field value in selected rows
Minimum	Minimum field value in selected rows
Maximum	Maximum field value in selected rows
Sum	Sum total of field values in selected rows

Most calculations work on numeric and float fields only, but Maximum and Minimum can also be used with date and character fields.

To calculate values,

1 Select the table, then choose Table|Calculate Aggregates. The Calculate Aggregates dialog box appears.

Calculate Aggregates dialog box

2 Choose the type of calculation you want to perform, then select one or more of the listed fields. (Use **Shift+click to select several contiguous fields, or Ctrl+click to select several noncontiguous fields.)**

Optionally, you can type an expression in the Where box to select a group of rows on which to perform the calculation

3 Click OK. *Visual* dBASE performs the calculation and displays the results in the Calculation Results message box.

Calculation Results dialog box

Viewing and editing special field types

Topic group

Supported field types and field-editing rules can differ greatly from database to database. In many cases, entering and editing data is intuitive enough: select a field and type in characters or numbers, depending on the field type. If you enter a value that doesn't match the basic field type rules (like entering a character in a numeric field), you'll receive an error message.

Most databases also offer a number of non-character field types, however, and viewing and modifying data in these types is a bit different.

This section group of topics examines binary (image or sound), OLE, and memo field types, all of which are available in both the older .DBF and the new .DBF 7 table formats. Other table formats may offer other ways to edit similar field types.

Viewing the contents of special field types

Memo, image, sound, and OLE fields are represented in a table by icons. You can view the contents of these types of fields in three ways:

- Select the field and press F9.
- Double-click the field.
- Select the field and choose View|Field Contents.

To select a field with the keyboard, use the following keys:

Table 15.3 Field selection keyboard shortcuts

Go to	All views
Next field	Tab
Previous field	Shift+Tab
Beginning of field	Home
End of field	End

Memo fields

Topic group

Memo fields open in a text editor. When the text editor is open, the Format toolbar becomes available, and you can format text in the memo field.

Note: The Editor Properties dialog box offers a number of options that also relate to memo editing, including word wrap, auto indent, spacing, and font.

Binary fields

Topic group

Your tables can contain any supported sound and image data, and the data can be stored, viewed (or played, in the case of sound files), added, or replaced any time you run a table.

.DBF and .DBF 7 tables support most popular image formats (for a complete list, see the Image page in the Navigator). The supported sound format is .WAV.

Importing an image or sound into a binary field

To add an image or sound to a binary field,

1 Right-click the field and choose either Import Image or Import Sound from the popup menu.

2 A file import dialog box opens. Select your file, then click OK.

3 Save the row.

You can also use the right-click popup menu to save (export) an image or sound to disk.

OLE fields

Topic group

Object linking and embedding (OLE) lets you use objects from other Windows applications in your tables.

You can either link objects to or embed objects into OLE fields. Linking inserts a reference to the file from which the object originated, which means that in order to keep the object updated, both the source file and source application must remain available. If the linked object is updated, your OLE field is updated as well.

Embedding places an entire object into the OLE field. Embedding is a more portable solution, but still requires that the application that created the source be available. It can also cause significant enlargement of your table file sizes, which grow by the size of each object you embed plus some OLE reference code for each. And unlike links, embedded objects are not updated when the source object changes. Instead, they become separately editable (in the source application) objects of their own.

An OLE object can be a graphic image, a sound, a document created by a word processor, or any other object or document that can be created by an OLE-compliant server application. For example, Microsoft Word is an OLE server, and any document created in Word can be linked or embedded into an OLE field.

In any OLE exchange, *Visual* dBASE then becomes the client application.

Whether you choose to link or embed an object into your OLE field, you can launch the server application and load the object for editing by simply double-clicking the OLE field in your running table.

Adding an OLE object to an OLE field

Topic group

To add an object to an OLE field

1 Start the server application and open a file or create an object.

2 If you want only a portion of the object data, select it and copy it to the Clipboard using the application's Copy command or Ctrl+C.

3 Start or switch to *Visual* dBASE, and run the table containing an OLE field.

4 Click the Add Row button or choose Table|Add to open a new row. If the OLE field is represented by an icon, double-click the icon to open the OLE viewer.

5 Do one of the following:

- To link the object, right-click the OLE viewer and choose Paste Link from the popup menu.
- To embed the object, right-click the OLE viewer and choose Paste (Ctrl+V) from the popup menu.

The linked or embedded object appears in your OLE viewer. You may need the scroll bars to scan the entire object.

A linked object is automatically updated by default, so if the source object is edited, the OLE field will reflect the changes. You can modify link attributes, however—as well as view information on the link, open the source file, change the link (useful if the source file is moved) or even break the link—by right-clicking the OLE viewer and choosing Links from the popup menu.

To edit an embedded object, double-click the OLE viewer containing the object. The server application opens with the object loaded for editing. When you're finished with your edits, update the OLE field by choosing Update from the server application's Edit menu.

You can also link or embed OLE objects by right-clicking an OLE viewer window and choosing Insert Object from the popup menu. The Insert Object dialog box lets you choose from among the OLE object types registered on your system. You can then either create a new object in the server application (for embedding) or create an object from an existing file (for embedding or linking).

Removing an OLE object from an OLE field

Topic group

To remove an OLE object from a table,

1 Locate the OLE field that contains the data you want to remove.

2 Double-click to open the OLE viewer (if it's not already open).

3 Select the viewer window and choose Edit|Delete.

Setting up security

Topic group Related topics

Visual dBASE provides built-in levels of security against unauthorized access to encrypted databases and tables. This table-level security depends on data encryption.

Sensitive tables should always be encrypted by using the database vendor's administration software. *Visual* dBASE's password dialog is presented whenever a user tries to access a form linked to an encrypted table or database. The user's response to the password dialog is passed to the encrypted table or database for verification before *Visual* dBASE will display the form. See your database vendor's documentation about security administration for SQL, ODBC, or non-Standard systems.

The DBF and DB tables you create within *Visual* dBASE have built-in encryption. *Visual* dBASE provides direct database administration security access to set passwords for BDE-Standard DB and DBF tables, as well as the extensive user-access and privilege-level security features of DBF tables.

Setting up security strategies

Topic group Related topics

Visual dBASE offers two general strategies to handle access to encrypted tables of any type: individual login and preset access..

- **Individual login via automatic password dialogs**

In this approach, each user is required to login every time he or she tries to access a form linked to an encrypted table or database. *Visual* dBASE automatically displays a password dialog for the appropriate table type, requiring the user to enter a password or other information required by the table. Users might get different access levels, depending on their user name and password, and depending on the security features supported by the table type. The user must submit the correct information (which is passed to the encrypted database system for verification) before the user can access the *Visual* dBASE form.

- **Preset access via Session and Database objects**

Preset access involves hard-coding passwords or user names in *Visual* dBASE forms and reports. Preset access provides an automatic, pre-determined level of access without login procedures for certain groups of users. It can be used in conjunction with individual login to provide easy read-only access for the public and login-protected access for authorized company personnel.

- Preset access for Standard table types

Sessions objects provide unique connections between a user and a DBF or DB table. You can add methods to these objects to restrict access to certain features of a Standard table, or to make the table read-only for certain login-levels.

- Preset access for SQL and other table types

Database objects link *Visual* dBASE forms to SQL databases or table sets. You can set the Database object's *loginString* property for particular user names or passwords to limit users of a specific login-level to read but not write the data in a SQL database.

- **Table-level security for DBF tables**

Visual dBASE supports direct access to the extended security features of DBF tables, including administrator security, up to 8 user access levels, and three-level privilege security for DBF tables and individual fields. If you intend to create tables within *Visual* dBASE, DBF tables offer the most extensive and versatile security features.

- **Table-level security for DB tables**

Visual dBASE provides direct access to master password security for each DB table. However, you must use Borland's Paradox or Database Desktop to set auxiliary passwords.

Individual login via automatic password dialogs

Topic group Related topics

Visual dBASE's password dialogsare activated only by encrypted tables. Password protection alone is inadequate to protect a sensitive table unless the table is encrypted, because an intruder, having gained access to the machine or server on which the application is running, could use another application to read the data from the hard disk.

Once an authorized user gains access to your application by providing the correct password, the user might be offered a restricted choice of a variety of tables, with different access privileges, depending on the login level used to access the application. *Visual* dBASE supports the full range of table- and row-level security features for DBF tables, so you can create up to 8 user access levels and 3 privilege levels, precisely controlling access by different classes of users to specific tables and even to specific rowsets in those tables.

To link any encrypted table to a form (and thereby enable automatic password protection), you need only create a Query object for that table on your form. To do this, simply drag the table icon of the encrypted table from *Visual* dBASE Explorer's Tables page to your form surface in Form designer. (At this time, while in Design mode, you will have to supply access information to the encrypted table.) This is all you need to do to ensure that *Visual* dBASE will activate the automatic password dialog. See Form Designer for guidance on adding Query objects to forms.

After your form is run and the user activates some event (a button click, for example) to access a restricted table, the Borland Database Engine (BDE) attempts to open that table. Because the table is encrypted, *Visual* dBASE automatically displays the appropriate password dialog with fields for the input required by that table type. The type of security available varies according to table type.

The original *Visual* dBASE form is temporarily displaced and the user is presented with a password dialog. To gain access to your application (and its underlying encrypted table), the user must provide the particular security information required by that table or database.

Preset access via Database and Session objects

Topic group Related topics

Setting reset access levels is another approach to restricting access to your data.

To set levels, you have to hard-code passwords or user names in *Visual* dBASE forms and reports, thus restricting access only to individuals within specified groups.

Preset access can be useful in combination with the individual login approach to provide easy read-only access for general users, and login-protected access for authorized personnel. For example, you might have employee information managed through an application that allows updating by Human Resources personnel, but permits read-only access to other employees.

To implement this strategy, you would need a full-access (read/write) password that the HR staffers would have to enter manually every time they start the application. You would then code into the form a read-only password that would admit everyone else at a limited level.

How you encode preset access levels depends on the table type, as described in the next two topics.

Preset access for Standard table types

Topic group Related topics

For DBF and DB tables, security is session-based. The Session object has a *login*() method for DBF table security and a *addPassword*( ) method for DB table security. The appropriate method (or both if you're using both types of encrypted tables) must be called with the correct user name and password before attempting to activate a query that accesses the table.

Where this must occur depends on whether all users are sharing the same session. If everyone accessing *Visual* dBASE gets exactly the same access for every application by using the same user name and password, then they can share the default session. You would need only call the session's methods once through an administrative program or form.

All the forms would thus require a Query object to access the DBF or DB tables, but no Database object or Session object, because everyone uses the the default database in the default session.

On the other hand, if any two applications use different user names or passwords, then every form must have its own Session object, so that each form runs in its own session and the security is localized.

No Database object is needed because the form uses the default database of its own session. Then users must log into each session before the query is activated.

Use the Query object's *canOpen* event to call the session's security methods.

Preset access for SQL and other table types

Topic group Related topics

Table and database types other than DBF or DB tables accessed via the directory require modification of the Database object's loginString property. This applies to all non-Standard applications, including SQL servers such as Borland InterBase, Oracle, Sybase, Informix, IBM DB2, and MS SQL Server; and ODBC connections such as Access and Btrieve. It also applies to remote DBF and DB tables accessed through a Borland Database Engine (BDE) alias.

A BDE alias always identifies a database. Therefore all non-Standard table security is through the Database object that provides access to that database. In some cases, logins are required to access tables in a database.

The Database object's *loginString* property is a character string that contains the name and password in this form:

```
name/password
```

You can set this property in the Inspector in the Form designer. By setting the name and password in the form's Database object, all users attempting to open that form will get whatever level of access that name and password provides.

Although possible, it's more trouble than it's worth to share a Database object among multiple forms. Each form should have its own Database object, with whatever the appropriate *loginString* is for that particular form.

Table-level security for DBF tables

Topic group Related topics

The security features of DBF tables are extensive. If you intend to create private tables within *Visual* dBASE for which you want to set elaborate or varied access levels, the DBF table type is your best choice.

Table-level security relies on data encryption. Data encryption scrambles data so that it can't be read until it is unscrambled. An encrypted file contains data that has been translated from source data to another form that makes the content unreadable. If your database system is protected, *Visual* dBASE automatically encrypts and decrypts tables and their associated index and memo files when a user supplies the required passwords or other login information.

In addition, DBF tables allow you to define which fields within tables users can access, and the level of access, read, read/write, or full.

The first parts of this section describe how to plan your security scheme for DBF tables. Topics include

- The various levels of security
- An overview of the various aspects of the DBF security
- Planning group access for each table
- Planning each user's login and user access level
- Planning user access to tables and fields within tables

At the end of this section are procedures for setting up your DBF security scheme:

- Enter the database administrator's password
- Create user profiles
- Set user privileges for table access
- Set user privileges for fields within tables

About groups and user access

Topic group Related topics

You can control access to individual DBF tables (and to fields within those tables) by carefully defining groups of users according to

- Which tables each group can access
- Which privilege levels (read, update, extend, delete) each group has at the table-level
- Which fields within tables each group can access
- Which privilege levels (none, read-only, full) each group has at the field-level

Table access

Topic group Related topics

First, you'll need to define user groups and determine which group has access to which table. Try to organize users and tables into groups that reflect application use (for example, by department or sales area).

- A table can be assigned to only one group. If the user group and table group don't match, the user can't access the table.
- Typically, each group is associated with a set of tables. By associating each application with its own group, you can use the group to control data access.
- A user can belong to more than one group. However, each group that a user belongs to must be logged-in separately.
- If a user needs to access tables from two different groups in the same session, the user must log out of one group, then log in to the second. A user may have separate logins into different groups in separate sessions to access files in different groups.

User profiles and user access levels

Topic group Related topics

You'll need to develop a user profile for each user in each group. As part of each profile, you'll assign to the user an *access level.* Each user's access level is matched with the table's privilege scheme (see the next section) to determine what access the user has to the table and, within each table, to each field. For example, if you establish a read privilege of 5 for a table, users with a level from 1 to 5 can read that table. Users with a level of 6 or higher can't read the table.

By establishing access levels within a group, you can give different users different kinds of access to the table and to fields within the table.

- Access levels can range from 1 to 8 (the default is 1). Low numbers give the user greater access; high numbers limit the user's access. The access value is a relative one—it has no intrinsic meaning.
- The less restrictive levels (1, 2, 3) are typically assigned to the fewest people. To limit access to data, the more privileges a level has, the fewer users you should assign to that level.
- You can assign any number of users to each access level.
- If you don't need to vary the access level of the users within a group, there is no need to change each user's default level.

About privilege schemes

Topic group Related topics

Once you've established each users's access level, you set up a *privilege scheme* for each table. A DBF table's privilege scheme controls three things:

- Which group can access the table. (The user's group name is matched with the table's group name to allow table access.)
- Which user access levels can read, update, extend and/or delete the table (table privileges).
- Which user access levels can modify and/or view each field within the table (field privileges).

After a user logs in, *Visual* dBASE determines what access the user has to that DBF table and its fields by matching the user's access level with the rights you specified in the table's privilege scheme.

For example, if you assigned a user an access level of 2, that user's access to the table, and to various fields within the table, are determined by the privileges you assigned to Level 2 in the table privilege scheme.

In building a table privilege scheme, note the following:

- A user's ability to access a table is a function of both the access level of the group and the user's individual access level. However, only the user's access level determines what the user can do with a table once it is opened.
- If you do not create a privilege scheme for a table, all users of the group can read and write to all fields in the table.
- Access rights cannot override a read-only attribute established for the table at the operating system level.

Table privileges

Topic group Related topics

At the table level, you can control which operations each user access level (1-8) can do:

- View records in a table (read privilege)
- Change table record contents (update privilege)
- Append new records to a table (extend privilege)
- Delete records from a table (delete privilege)

When you create a table privilege scheme, all four table privileges are granted initially. That is, all table access levels are 1 by default (1 being the *least* restrictive level).

Field privileges

Topic group Related topics

At the field level, you can control which operations each user access level (1-8) can do:

- Read and write to the field in the table (FULL privilege). This is the initial default.
- Read but not write to the field (READ ONLY privilege).
- Neither read nor write the field (NONE privilege). NONE blocks a user from writing to fields and from seeing fields you do not want to display.

About data encryption

Topic group Related topics

A DBF table is not encrypted until you select it, edit the access levels, and save the privilege scheme.

When a DBF table's privilege scheme is saved, *Visual* dBASE encrypts the table, including the production index (MDX) file and the memo (DBT) file, if any. *Visual* dBASE also creates a backup copy of the original, unencrypted table. To ensure proper security, the backup files should be archived, then deleted from the system.

Even after a database system has been protected, the database administrator and application programmer maintain control over encryption of copied files.

Planning your security system

Topic group Related topics

This section describes how to plan out your security system for DBF table security. It's a good idea to think through user access and table/field rights before you start creating security profiles.

Follow these general steps to set up a protected database system for DBF tables:

1 Plan your user groups.

2 Plan each user's access level.

3 Plan each table's privilege scheme, including both table privileges and field privileges.

4 Implement your security scheme (see Setting up your DBF table security system**).**

Planning user groups

Topic group Related topics

Take time to think through the various groupings into which you can divide your users, based on who needs access to which tables. For example, an administrative staff might need to access tables that a sales staff does not, or vice versa. Other groups may overlap; for example a marketing group might need to see some of the administrative tables and some of the sales tables.

It helps to develop a worksheet, to map group access needs in advance. The following table shows one way of organizing this information; use whatever method works best for you.

Table 11.1 Worksheet for defining groups and group members

Table	Group	User name
CUSTOMER	SALES	AMORRIS
		BBISSING
		LJACUS
		FFINE
PRODUCT	ALL	AMORRIS
		BANDERS
		BBISSING
		CDORFFI
		LJACUS

Planning user access levels

Topic group Related topics

Next, think about how much access each user needs to the table.

Although there are 8 access levels, you might choose to standardize on just 3 levels; one for full access, one for typical use, and one for minimal access. The next table shows the sample worksheet, expanded to show user access levels.

Table 11.2 Worksheet expanded to show user access levels to DBF tables

Table	Group	User name	Level 1 (full access)	Level 4 (typical access)	Level 8 (minimal access)
CUSTOMER	SALES	AMORRIS	X		
		BBISSING		X	
		LJACUS	X		
		FFINE			X
PRODUCT	ALL	AMORRIS	X		
		BANDERS		X	
		BBISSING		X	
		CDORFFI		X	
		LJACUS	X		
		FFINE			X

Planning DBF table privileges

Topic group Related topics

Next, plan each DBF table's privilege scheme.

For each table operation, determine the most restricted access level that can perform the operation. All levels less restricted than the specified one can perform that operation; all levels more restricted than the specified level cannot.

The following worksheet illustrates one way to plan which user access levels grant which table rights.

Table 11.3 Worksheet for defining privileges for DBF table operations

Table	Read	Update	Extend	Delete
CUSTOMER	8	4	4	1
PRODUCT	8	4	4	1
ORDERS	8	4	4	1

Planning field privileges

Topic group Related topics

The last planning step is to determine which user access levels can read and/or write to fields. Consider developing a worksheet similar to the following one.

Table 11.4 Worksheet for defining field access privileges to DBF tables

Field name	Full access	Read only	No access
PAYRATE	Levels 1-2	Levels 3-6	Levels 7-8
FIRSTNAME	Levels 1-6	Levels 7-8	
LASTNAME	Levels 1-6	Levels 7-8	
SSN	Levels 1-2	Levels 3-6	Levels 7-8

Setting up your DBF table security system

Topic group Related topics

Once you've planned out your security scheme for DBF tables, you're ready to set it all up. Follow these steps to implement the security scheme:

1 In *Visual* dBASE, define the database administrator password.

2 Define the user profiles, including group membership and access level.

3 Define table privileges.

4 Define field privileges.

5 Set the login security scheme.

6 Save the security information.

This section describes how to set the database administrator password, how to enter and edit user profiles, and how to set up table privilege schemes.

Defining the database administrator password

Topic group Related topics

Before setting passwords, make sure any open tables have been closed. Follow these steps to enter the database administrator password:

1 Choose File|Database Administration. The Database Administration dialog box appears.

2 In the Database Administration dialog box, make sure that the Current Database field is set to <None> and the Table Type field is set for dBASE (DBF) tables.

3 Click the Security button. The Administrator Password dialog box appears.

4 In the Administrator Password dialog box, enter a password of up to 16 alphanumeric characters. You can enter characters in upper- or lowercase. The password does not appear onscreen.

   The first time you set the administrator password you are prompted to reenter the password to confirm. (Thereafter, the system gives you three chances to enter the password correctly before the login terminates.) The Security dialog box appears.

Warning!: Once established, the security system can be changed only if the administrator password is supplied. Keep a hard copy of this password in a secure place. There is no way to retrieve this password from the system.

Creating user profiles

Topic group Related topics

The Security Administrator dialog box is where you create user profiles and establish an access level for each user.

Follow these steps to add a user profile:

1 In the Security dialog box, select the Users page and click the New button.

2 Enter a user login name (1-8 alphanumeric characters) in the User field. The entry is converted to uppercase. Required.

3 Enter a group name (1-8 alphanumeric characters) in the Group field. The entry is converted to uppercase. Required.

4 Enter a password for this user (1-16 alphanumeric characters). Required.

5 Select an access level for this user (from 1 through 8; see About groups and user access). Lower numbers give the greatest access; higher numbers are the most restricted.

6 Enter the user's full name (1-24 alphanumeric characters). This entry is optional. Because this item is not used in validating a login, you can use it any way you want. Frequently, the full name is used to add a more complete user identification. Alphabetic characters you enter in the Full Name option are not converted to uppercase.

7 Click OK to save the user profile.

8 The Security dialog box reappears with your new user info added to the list on the Users page.

9 Repeat the preceding steps for each user.

Changing user profiles

Topic group Related topics

To change a user's profile,

1 Open the Users page of the Security dialog box.

2 Select the user name of the user you want to change, and click the Edit button.

3 Make the desired changes, then click OK.

Warning!: Be careful when editing the group name, deleting the group, or deleting all users from a group. If you edit the group name, there is no way for its users to access tables associated with the original group. And if you delete the group or all users from a group before all tables associated with the group are copied out in a decrypted form, no one can access the tables. In that case, you must create a new user for the group.

Deleting user profiles

Topic group Related topics

To delete a user profile,

1 Open the Users page of the Security dialog box.

2 Select the user name of the user you want to delete, then click the Delete button.

3 To confirm the deletion, click the Yes button.

Establishing DBF table privileges

Topic group Related topics

Follow these steps to define table and field privileges for a table:

1 Open the Tables page of the Security dialog box.

2 Select a table.

3 Assign the table to a group.

4 Establish the most restrictive access level for each table privilege.

5 Select field privileges for each user access level.

In general, for DBF tables you can use the Tables page of the Security dialog box to

- Assign a table to a specific group.
- Set table access privileges.
- Set field access privileges for each user access level.

The sections that follow describe these steps in detail.

Selecting a table

Topic group Related topics

To select a table,

1 Open the Tables page of the Security dialog box. You use the Tables page of the Security dialog box to create and modify DBF table privilege schemes. The DBF table privilege schemes are saved in the table structure.

2 In the Table field, type the name of the desired table. (Or click the Tools button and select the table.)

3 Click the Edit Table button. The Edit Table Privileges dialog box opens.

Assigning the table to a group

Topic group Related topics

A DBF table can be assigned to only one group. The group name is matched with a user group name to enable data access.

To select a group for the DBF table, click on the down arrow to display a list of the available groups from the Group list in the dialog box. (These groups were created when you created user profiles.)

Setting DBF table privileges

Topic group Related topics

For each type of table operation (see the table below), specify the most restricted access level that can perform that operation.

Table 11.5 Table operations

Privilege	Access granted
READ	View the table contents
UPDATE	Edit existing records in the table
EXTEND	Add records to the table
DELETE	Delete records from the table

To set table privileges, select a value (1-8) for each operation (Read, Update, Extend and Delete) in the dialog box. Remember that lower access numbers indicate the greatest access; higher numbers indicate the greatest restriction.

Note: You cannot specify access levels that are logically incompatible. For example, you cannot prohibit Level 6 from having read access, and also permit Level 6 to have update access. To have update access, Level 6 also needs read access.

Setting field privileges

Topic group Related topics

With DBF tables you can establish access for each field by user access level. Table 11.6 describes the available field privileges.

Table 11.6 Field privileges

Privilege	Access granted
FULL	View and modify the field. This is the default.
READ-ONLY	View the field only (no update capability).
NONE	No access. The user can neither read nor update the field, and the field does not appear.

Note: Table privileges take precedence over field privileges. For example, if a table privilege is set for Read but not Update, the only meaningful field privileges are Read-Only or None. You must restrict *table* privileges to protect your data against table-oriented commands like DELETE and ZAP. Restricting field privileges to Read-Only or None without restricting table privileges doesn't protect data against these commands.

The Fields list in the dialog box lists all of the fields in the current table. The Rights buttons display the field privileges for the selected field for access levels 1 through 8. Initially, all field privileges are set to Full.

Follow this procedure to change a field privilege:

1 Select the field.

2 Click the Rights buttons that correspond to the privileges you want to grant for the field *for each access level*.

3 Repeat the process for each of the other fields in the table.

4 Click OK to save the field access privileges.

Warning!: Never change the access rights of the _DBASELOCK field of any table. The rights to this field must remain Full for all access levels.

Setting the security enforcement scheme

Topic group Related topics

You can choose one of two enforcement schemes:

- Force a login when a user attempts to load *Visual* dBASE itself.
- Force a login when a user tries to view a form linked to an encrypted DBF table. In this scheme, anyone may use unencrypted tables, but unauthorized users are prevented from accessing protected tables.

To change the security enforcement scheme, follow these steps:

1. Open the Enforcement page of the Security dialog box. The two radio buttons on the Enforcement page indicate the security enforcement scheme currently in effect.
2. Select the enforcement scheme you want: whether to display a password dialog **when loading** *Visual* dBASE **or only when accessing an encrypted table.**
3. Click Close.

Table-level security for DB tables

Topic group Related topics

Although DB tables do not offer the extensive user the access-level and privilege- level security system available to DBF tables, DB tables (unlike DBF tables) support passwords.

You can use *Visual* dBASE to assign master passwords to DB (Paradox) tables. Once you have assigned a master password assigned to a DB table, it cannot be opened without supplying the password, either by you locally or by users over the Internet.

You may choose to create a single master password that opens all DB tables. A user with this password need see only one password dialog to gain access to all DB tables. Or you may set unique passwords for particularly sensitive DB tables.

Note: In addition, auxiliary passwords are supported by DB tables, but you cannot access this feature from *Visual* dBASE. Auxiliary passwords allow you to create multiple individual passwords for each DB table, so that you can restrict access to certain tables and certain fields. Different users can be given different passwords that will open only a specific set of DB tables or allow read/write access to only certain fields within those tables. However, to set auxiliary passwords for field rights to a DB table you must use Paradox.

The process of assigning passwords is initially very similar to that described previously for DBF tables. To assign a master password to a DB table, follow these steps:

1 Make sure the DB table you want to secure is closed.

2 From the File menu, select Database Administration. The Database Administration dialog box appears.

3 Make sure that the Current Database field is set to <None> and the Table Type field is set for Paradox (DB) tables.

4 Click the Security button to open the Security dialog box.

5 Select the name of the table in the Table list. If the table is not in the current directory, use the Folder button to select the directory.

6 Click the Edit Table button to open the Master Password dialog box.

7 Enter the new password for the table in the Master Password field. The password can be up to 31 characters long and can contain spaces. Paradox passwords are case-sensitive.

8 Enter the password again in the Confirm password field.

9 Click the Set button to save the password.

Removing passwords from DB tables

Topic group Related topics

To remove an existing password from a DB table, follow Steps 1 through 6 in the previous section. When prompted, enter the existing master password for the table. Then click the Delete button to remove the password from the table.

Character sets and language drivers

Topic group Related topics

Visual dBASE is an international software tool and can accommodate many languages. Each language or language category uses its own character set, and each has its own way of sorting and relating its characters. *Visual* dBASE provides comprehensive language and character set support with multiple language drivers and automatic OEM-ANSI conversion as needed.

Users new to the Windows environment need to understand the difference between the OEM and ANSI character sets. Users who exchange data across national or linguistic boundaries need to understand how *Visual* dBASE uses language drivers to handle data in different languages.

This section of the Help system explains how *Visual* dBASE uses the OEM and ANSI character sets and discusses techniques for working with language drivers.

About character sets

Topic group Related topics

In the early 1980s, the developers of the IBM PC created an ordered list of symbols known as the *IBM extended character set*. This list contained all the classic ASCII 7-bit characters, together with various mathematical symbols, line and box drawing characters, and some accented characters.

While this was adequate for certain English-speaking countries, it was insufficient for most other countries. For example, there are accented characters in various European languages that are not included in the IBM extended character set. Therefore, a number of other character sets were developed. Each character set, including the original IBM extended character set, is contained in a *code page*. Each code page is designed for a particular country or group of countries, and each is identified by a three-digit number.

Some examples of the code pages supported by MS-DOS are:

- 437 English and some Western European languages
- 850 Most Western European languages
- 852 Many Eastern European languages
- 860 Portuguese
- 863 Canadian French
- 865 Nordic languages

These are known as *OEM code pages* (for Original Equipment Manufacturer). The classic IBM extended character set is contained in OEM code page 437 and is the default code page for the United States. DOS considers code page 850 to be the default for most European countries. Code page 850 contains all the letters (but not all the symbols) of code pages 437, 860, 863, and 865; consequently, many of the box-drawing and line-drawing characters contained in these code pages are omitted to make room for accented characters in code page 850.

Each character in a code page is identified with a number; this number (which can be decimal or hexadecimal) is known as a *code point*. For example, the code point of the numeric character “4” is 52 (decimal) or 34 (hexadecimal) in code pages 437 and 850.

The Windows environment uses its own character set, which is generally known as the *ANSI character set*. Although this character set shares many characters in common with the OEM code pages, it omits most of the line-drawing characters and mathematical symbols that these code pages offer. Furthermore, even characters shared in common between an OEM code page and the ANSI character set often have different code point numbers.

The global language driver determines the character set used by *Visual* dBASE. If you have another product already installed on your system that uses the Borland Database Engine (BDE), your current language driver is unchanged when you install *Visual* dBASE 7. If no BDE language driver setting is detected, however, *Visual* dBASE 7 installs the ANSI language driver by default.

About language drivers

Topic group Related topics

Visual dBASE uses language drivers to specify which character set to use and which language rules apply to that character set. For example, the Canadian French language driver uses a character set that is identical to code page 863, while the default driver for the United States uses a character set that is identical to code page 437. It is important to understand that *Visual* dBASE uses these internal code pages instead of the code pages supplied by the operating system.

Visual dBASE language drivers contain tables that define or control the following for a particular character set:

- Alphabetic characters
- Rules for upper- and lowercase
- Collation (sort order) used in sorting or indexing
- String comparisons (=, <, >, <=, >=)
- Soundex values (values that represent phonetic matches when exact spellings are not known)
- Rules for translation between OEM and ANSI character sets

Visual dBASE identifies each driver with a character string known as an *internal name*. For example, the internal name of the German driver for code page 850 is DB850DE0, and the internal name of the Finnish language driver is DB437FI0. The following table lists some of the European language drivers available in *Visual* dBASE.

Table 27.3 European language drivers

Language or country	Code page	Internal name
Portuguese/Brazil	850	DB850PT0
Portuguese/Portugal	860	DB860PT0
Danish	865	DB865DA0
Finnish	437	DB437FI0
French/Canada	850	DB850CF0
French/Canada	863	DB863CF1
German	437	DB437DE0
Italian	437	DB437IT0
Netherlands	437	DB437NL0
Norway	865	DB865NO0
Spanish	437	DB437ES1
Spanish	ANSI	DBWINES0
Swedish	437	DB437SV0
English/UK	437	DB437UK0
English/UK	850	DB850UK0
English/USA	437	DB437US0
English/USA	ANSI	DBWINUS0
W. European	ANSI	DBWINWE0

When *Visual* dBASE converts data from OEM to ANSI, and vice versa, most alphabetic characters exist in both an OEM code page and the ANSI character set and are converted without problem. Most of the extended graphic symbols in an OEM code page cannot be represented in the ANSI character set at all. When such a discrepancy exists, *Visual* dBASE, like other standard Windows applications, makes a guess at the nearest character, but data loss can occur.

Performing exact and inexact matches

Topic group Related topics

When *Visual* dBASE compares two characters, an exact match (also known as a *primary match*) or an inexact match (also known as a *secondary match*) can be performed. An exact match is performed if the EXACT condition is set ON, and in inexact match is performed if EXACT is set OFF.

An exact match requires that the characters be exactly the same. For example, although the characters A and Ä are similar, they don't satisfy the requirement for an exact match, and a SEEK or a FIND expression treats them as different characters. In contrast, an inexact match requires only that the characters belong in the same general category. For example, since the characters A and Ä are similar in several languages, they satisfy the requirement for an inexact match with many language drivers; a SEEK or a FIND expression treats them as identical characters.

Exact and inexact matches are performed using *primary weights* and *secondary weights*, which are assigned by a language driver to each character. Exact matches use primary and secondary weights, while inexact matches use only the primary weights and ignore the secondary weights. For example, the SET EXACT command controls whether characters with umlauts match their respective characters without umlauts. The following commands open a table named VOLK.DBF and search for a record with a key value that satisfies an exact match criterion:

```
set exact on
use VOLK order NAMEN
seek "KONIG"              // Will NOT find "KÖNIG".
```

EXACT is ON and the secondary weights of O and Ö are different, so they are evaluated as different characters. The following commands open VOLK.DBF and search for a record with a key value that satisfies an inexact match criterion:

```
set exact off
use VOLK order NAMEN
seek "KONIG"              // Can find "KÖNIG".
```

EXACT is OFF and the primary weights of O and Ö are the same, so they are evaluated as identical characters.

Using global language drivers

Topic group Related topics

Each time you start *Visual* dBASE, a language driver is activated automatically. This is known as the *global language driver*. This setting applies to reading and writing of files, table creation, table-independent character operations and the output of commands and functions. For example, the global language driver governs FOR and WHILE expression evaluations.

Visual dBASE normally chooses the global language driver from the dBASE Language Driver setting in the BDEADMIN.EXE Utility. Optionally, you can also specify a global driver in your VDB.INI file with an *ldriver* key.When there is no VDB.INI entry for a language driver, the setting in the BDEADMIN Utility determines the global language driver. When you place a valid driver entry in VDB.INI it overrides the setting in the BDEADMIN Utility except when creating tables. *Visual* dBASE will always set the new table's language according to the global language driver specified in the BDE Administrator Utility.

To set the ldriver option in VDB.INI:

1 Close *Visual* dBASE if it is running.

2 Open the VDB.INI file (normally located in your *Visual* dBASE\BIN directory) and enter one of the following in the [CommandSettings] section:

```
ldriver = WINDOWS
```

or

```
ldriver = <internal driver name>
```

For example, the internal name of a European Spanish language driver for code page 437 is DB437ES1; to install this driver, insert the following setting:

```
ldriver = DB437ES1
```

3 Save your changes and restart *Visual* dBASE.

Use ldriver = WINDOWS to maximize compatibility with the operating system locale.

Use ldriver = <internal driver name> to specify a Borland language driver and maximize compatibility with legacy applications. For legacy applications matching the global language driver to the one previously in effect will help ensure compatible character handling and processing of data in the legacy tables.

Using table language drivers

Topic group Related topics

Visual dBASE assigns a language driver to a table automatically when you create it. This assignment is recorded in the LDID, a 1-byte identifier in the file header region. When you create a table from scratch, *Visual* dBASE always assigns the current global language driver to the LDID. When you create a table file from another table file, either the global language driver or the language driver of the original table is assigned to the LDID of the new table. Which language driver is assigned depends on the command you use to create the file, as shown in the following table:.

Table 27.4 Commands that use table or global language drivers

Assigns global driver to the LDID of new table	Assigns original table driver to LDID of new table
CREATE	COPY FILE
CREATE...FROM	COPY STRUCTURE
CREATE...STRUCTURE EXTENDED	COPY...STRUCTURE EXTENDED
	COPY TABLE
	COPY TO
	JOIN
	MODIFY STRUCTURE
	RENAME TABLE
	SORT
	TOTAL

For example, the following commands open a table file and create a new one with the LDID set to the current global language driver:

```
use CLIENTS     // LDID specifies a language driver other than global
language driver
copy to CLIENTS2 structure extended  // LDID of CLIENTS2.DBF matches the
language
                                     // driver of CLIENTS.DBF
use CLIENTS2 exclusive
create NEWCLIENT from CLIENTS2       // Create a new table with the global
LDID
```

The following commands open a table file and create a sorted table file with an LDID set to the original table language driver:

```
use CLIENTS                   // LDID specifies a nonglobal language driver
sort on LASTNAME to CUSTOMER  // LDID of CUSTOMER the same driver as with
CLIENTS
```

Identifying a table language driver and code page

Topic group Related topics

Because some commands behave differently than others when a table language driver differs from the current global language driver, it is often necessary to detect which language driver is assigned to the LDID region of the table file or determine which code page the language driver uses. For example, file and field names may be valid in one language but not in another, or a key field may have characters that are not shared in common between the code pages of the language drivers.

When you use a command to open a table, and that table has a language driver that differs from the global language driver *Visual* dBASE displays a warning dialog box only if LDCHECK is set to ON (installation default is OFF).

To determine which language driver is recorded in a table LDID region and which code page the driver uses, use the LDRIVER() and CHARSET() functions:

```
set ldcheck off      // Turns off automatic language driver compatibility
checking.
use CLIENTS exclusive
index on COMPANY tag COMPANY
if ldriver() == "DB437DE0"    // If this is the German language driver...
  seek "ShÖnberg Systems"   // Searches are OK
else
  if charset() == "DOS:437"  // If the driver uses Code Page 437...
    warn1.open()           // Opens a custom warning dialog box.
  else                      // If the driver doesn't use Code Page 437...
    warn2.open()           // Opens a different warning dialog box.
  endif
endif
```

Using table language drivers versus global language drivers

Topic group Related topics

When the language driver of a table differs from the current global language driver, the table language driver is loaded into memory automatically when you open the table. Thereafter, the table language driver is respected by some commands, while the global language driver is respected by others.

All commands that have nothing to do with a table use the global language drivers. Table 27.5 shows the general rules when operations are performed on table data where the table language driver differs from the global language driver.

Table 27.5 Contexts for table language drivers and global language drivers

Table driver	Global driver
INDEX ON command expressions	SET FILTER command expression
FOR scope expression of INDEX ON command	FOR and WHILE expressions for every command except INDEX ON
SET KEY range checking expression	SET RELATION TO expression
SORT command expressions	
Secondary matches for expressions in LOOKUP(), FIND, SEEK, and SEEK() with EXACT set OFF	
Secondary matches for SET RELATION TO expression with EXACT set OFF (uses the driver of the child table)	

For example, when you create a table file with the German language driver, an LDID identifier is written to the header region of the file. When you open the files in a *Visual* dBASE that has the global language driver set to English, *Visual* dBASE notes the discrepancy between the table's and system's language rules. If you create an index with INDEX ON, the logical order of the index obeys the language driver of the table:

```
use VOLK                      // Created with the German language driver
index on NAMEN tag DIENAMEN   // Orders records in the German way
```

By contrast, if you create a filter with SET FILTER, the filtering condition obeys the global language driver:

```
use VOLK
set filter to NAMEN = "KONIG"  // Excludes records with "KÖNIG" in NAMEN
```

Handling character incompatibilities in field names

Topic group Related topics

When you use a table file that was created with a different language driver from the current global language driver, some characters in the table file might not be recognized. This can lead to problems.

For example, the German language driver DB437DE0 has the same code page and character set as the US language driver DB437US0. However, the German language driver recognizes extended characters like **Ö** and **Ü** as alphabetic characters, while the U.S. language driver doesn't. Consequently, when a field name contains such characters (as with ÜNAMEN in the example below) problems arise when you try to reference the field in when using the U.S. language driver.

When such conditions exist, the following command generates an error condition:

```
replace ÜNAMEN with "Schiller"
```

You can solve this problem by surrounding the field name with the : delimiter, which treats the field name as an identifier regardless of the rules contained in the current language driver:

```
replace :ÜNAMEN: with "Schiller"
```

When you use this command, each element in the field name ÜNAMEN, including Ü, is treated as an identifier and the command executes successfully.

Language definition

Topic group Related topics

Visual dBASE is a dynamic object-oriented programming language. It features dozens of built-in classes that represent forms, visual components, reports, and databases in an advanced integrated development environment with Two-Way Tool designers.

These topics define the language elements in *Visual* dBASE. After a brief overview of basic language attributes, which is geared toward those with previous programming experience, the language is described from its most fundamental elements, data types, to the most general.

Basic attributes

Topic group Related topics

If you're familiar with another programming language, knowing the following attributes will help orient you to *Visual* dBASE. If *Visual* dBASE is your first programming language, you may not recognize some of the terminology below. Keep the rules in mind; the terminology will be explained later in this series of topics.

- *Visual* dBASE is not case-sensitive.

Although language elements are capitalized using certain conventions in the *Language Reference*, you are not required to follow these conventions.
Rules of thumb for how things are capitalized are listed in Syntax conventions. You are encouraged to follow these rules when you create your own names for variables and properties.

- *Visual* dBASE is line-oriented.

By default, there is one line per statement, and one statement per line. You may use the semicolon (;) to continue a statement on the next line, or to combine multiple statements on the same line.

- Most structural language elements use keyword pairs.

Most structual language elements start with a specific keyword, and end with a paired keyword. The ending keyword is usually the word starting keyword preceded by the word END; for example IF/ENDIF, CLASS/ENDCLASS, and TRY/ENDTRY.

- Literal strings are delimited by single quotes, double quotes, or square brackets.
- *Visual* dBASE is weakly typed with automatic type conversion.

  You don't have to declare a variable before you use it. You can change the type of a variable at any time.
- *Visual* dBASE's object model supports dynamic subclassing.

  Dynamic subclassing allows you to add new properties on-the-fly, properties that were not declared in the class structure.

Data types

Topic group Related topics

Data is both the means and the end for both programming and databases. Because *Visual* dBASE is designed to manipulate databases, there are three categories of data types:

- Simple data types common to both the language and databases
- Database-specific data types
- Data types used in programming

Simple data types

Topic group Related topics

There are five simple data types common to both *Visual* dBASE and databases:

- String
- Numeric
- Logical or boolean
- Date
- Null

Keep in mind that different table formats support different data types to varying degrees.

For each of these data types, there is a way to designate a value of that type in *Visual* dBASE code. This is known as the literal representation.

String data

Topic group Related topics

A string is composed of zero or more characters: letters, digits, spaces, or special symbols. A string with no characters is called an empty string or a null string (not to be confused with the null data type).

The maximum number of characters allowed in a string depends on where that string is stored. In *Visual* dBASE, the maximum is approximately 1 billion characters, if you have enough virtual memory. For DBF (dBASE¨) tables, you may store 254 characters in a character field and an unlimited number in a memo field. For DB (Paradox) tables, the limit is 255 characters in an alpha field, and no limit with memo fields. Different database servers on different platforms each have their own limits.

Literal character strings must be enclosed in matching single or double quotation marks, or square brackets, as shown in the following examples:

```
'text'
"text"
[text]
```

A literal null string, or empty string, is indicated by two matching quotation marks or a set of square brackets with nothing in between.

Numeric data

Topic group Related topics

Visual dBASE supports a single numeric data type. It does not distinguish between integers and non-integers, which are also referred to as floating-point numbers. Table formats vary in the types of numbers they store. Some support short (16-bit) and long (32-bit) integers or currency in addition to a numeric format. When these numbers are read into *Visual* dBASE, they are all treated as plain numbers. When numbers are stored into tables, they are automatically truncated to fit the table format.

In *Visual* dBASE, a numeric literal may contain a fractional portion, or be multiplied by a power of 10. The following are all valid numeric literals:

- 42
- 5e7
- .315
- 19e+4
- 4.6
- 8.306E-2

As the examples show, the “E” to designate a power of 10 may be uppercase or lowercase, and you may include a plus sign to indicate a positive power of 10 even though it is unnecessary.

In addition to decimal literals, you may use octal (base 8) or hexadecimal (base 16) literal integers. If an integer starts with a zero (0), it is assumed to be octal, with digits from 0 to 7. If it starts with 0x or 0X, it is hexadecimal, with the digits from 0 to 9 and the letters A to F, uppercase or lowercase. For example,

Literal	Base	Decimal value
031	Octal	25
0x64	Hexadecimal	100

Logical data

Topic group Related topics

A logical, or boolean, value can be only one of two things: true or false. These two logical values are expressed literally in *Visual* dBASE by the keywords true and false.

For compatibility with earlier versions of *Visual* dBASE, you may also express true as .T. or .Y., and false as .F. or .N.

Date data

Topic group Related topics

Visual dBASE features native support for dates, including date arithmetic. To specify a literal date, enclose the date in curly braces. The order of the day, month, and year depends on the current setting of SET DATE, which derives its default setting from the Regional Settings in the Windows Control Panel. For example, if SET DATE is MDY (month/day/year), then the literal date:

```
{10/02/97}
```

is October 2nd, 1997. The way *Visual* dBASE handles two-digit years depends on the setting of SET EPOCH. The default is to interpret two-digit years as a year in the 1900s. Curly braces with nothing between them represent a special date value, known as a blank date.

Null values

Topic group Related topics

Visual dBASE supports a special value represented by the keyword null. It is its own data type, and is used to indicate a nonexistent or undefined value. A null value is different from a blank or zero value; null is the absence of a value.

The new DBF7 (dBASE) table type support nulls, as do most other tables, including DB (Paradox). Older DBF formats do not. A null value in a field would indicate that no data has been entered into the field, like in a new row, or that the field has been emptied on purpose. In certain summary operations, null fields are ignored. For example, if you are averaging a numeric field, rows with a null value in the field are ignored. If instead a null value was considered to be zero or some other value, it would affect the average.

null is also used in *Visual* dBASE to indicate an empty function pointer, a property or variable that is supposed to refer to a function, but doesn't contain anything.

Database-specific data types

Topic group Related topics

There are a number of data types supported by different databases that do not have a direct equivalent in *Visual* dBASE. The following list is not exhaustive; a new or upgraded table format may introduce new types. In any case, the type is represented by the closest matching *Visual* dBASE data type, with the string type being the catchall, since all data can be represented as a bunch of bytes.

The common database-specific types are:

- Memo
- Binary and OLE

Memo data

Topic group Related topics

As far as *Visual* dBASE is concerned, a memo is just a character string; potentially a very long one. For tables, it is important to distinguish between a character field, which is of fixed and usually small size, and a memo field, which is unlimited in size. For example, a character field might contain the title of a court decision, and the memo field contain the actual text of that court decision.

Binary and OLE data

Topic group Related topics

Binary and OLE data are similar to memos, except that they are usually meant to be modified by external programs, not *Visual* dBASE. For example, a binary field might contain a graphic bitmap, which *Visual* dBASE can display, but you cannot edit the bitmap with *Visual* dBASE.

Programming data types

Topic group Related topics

There are three data types used specifically for programming:

- Object reference
- Function pointer
- Codeblock

These types are explained later, in the context in which they are used.

Operators and symbols

Topic group Related topics

An operator is a symbol, set of symbols, or keyword that performs an operation on data. *Visual* dBASE provides many types of operators, used throughout the language, in the following categories:

Operator category	Operator symbols
Assignment	= := += -= *= /= %=
Comparison	= == <> # > < >= <= $
String concatenation	+ -
Numeric	+ - * / % ^ ** ++ --
Logical	AND OR NOT
Object	. [] NEW ::
Call, Indirection	()
Alias	->
Macro	&

All operators require either one or two arguments, called *operands*. Those that require a single operand are called *unary operators*; those requiring two operands are called *binary operators*. For example, the logical NOT operator is a unary operator:

```
not endOfSet
```

The (*) is the binary operator for multiplication, for example,

```
59 * 436
```

If you see a symbol in *Visual* dBASE code, it's probably an operator, but not all symbols are operators. For example, quote marks are used to denote literal strings, but are not operators, since they do not act upon data—they are part of the representation of a data type.

Another common symbol is the end-of-line comment symbol, a double slash. It and everything on the line after it are ignored by *Visual* dBASE. For example,

```
calcAverages()              // Call the function named calcAverages
```

All operators and symbols are described in full in the Operators and Symbols section of this Help file.

Names

Topic group Related topics

Names are given to variables, fields in work areas, properties, events, methods, functions, and classes. The following rules are the naming conventions in *Visual* dBASE:

- A name begins with an underscore or letter, and contains any combination of underscores, letters, spaces, or digits.
- If the name contains spaces, it must be enclosed in colons.
- The letters may be uppercase or lowercase. *Visual* dBASE is not case-sensitive.
- With *Visual* dBASE, only the first 32 characters in a name are significant. There can be more than 32, but the extra characters are ignored. For example, the following two names are considered to be the same:

```
   theFirst_32_CharactersAreTheSameButTheRestArent
  theFirst_32_CharactersAreTheSameAndTheRestDontMatter
```

The following are some examples of valid names:

```
x
:First name:
DbException
Form
messages1_onOpen
```

Expressions

Topic group Related topics

An expression is anything that results in a value. Expressions are built from literal data, names, and operators.

Basic expressions

Topic group Related topics

The simplest expression is a single literal data value; for example,

```
6                               // The number 6
"eloign"                        // The string "eloign"
```

You can use operators to join multiple literals; for example,

```
6 + 456 * 3                     // The number 1374
"sep" + "a" + "rat" + "e"       // The string "separate"
```

To see the value of an expression in the Command window, precede the expression with the ? symbol:

```
? 6 + 456 * 3                   // Displays 1374
```

Variables

Topic group Related topics

Variables are named locations in memory where you store data values: strings, numbers, logical values, dates, nulls, object references, function pointers, and codeblocks. You assign each of these values a name so that you can later retrieve them or change them.

You can use these values to store user input, perform calculations, do comparisons, define values that are used as parameters for other statements, and much more.

Assigning variables

Topic group Related topics

Before a variable can be used, a value must be assigned to it. Use a single equal sign to assign an expression to a variable; for example,

```
alpha = 6 + 456 * 3    // alpha now contains 1374
```

If the variable does not exist, it is created. There are other assignment operators that will assign to existing variables only, and others that combine an arithmetic operatation and an assignment. See

Using variables in expressions

Topic group Related topics

When a variable is not the target (on the left side) of an assignment operator, its value is retrieved. For example, type the following lines in the Command window, without the comments:

```
alpha = 6           // Assigns 6 to alpha
beta = alpha * 4    // Assigns values of alpha (6) times 4 to beta
? beta              // Displays 24
```

In the same way, when the name of a field in a work area is used in an expression, its value for the current record is retrieved. (Note that assignment operators do not work on fields in work areas; you must use the REPLACE command.) Continuing the previous example:

```
use FISH              // Open Fish table in current work area
? Name                // Display value of Name field in first record
? :Length CM:         // Display value of Length CM field in first record
                      // Colons required around field name because it
contains spaces
? :Length CM: * beta  // Display value of field multiplied by variable
```

For information on referencing fields in different work areas and resolving name conflicts between variables and field names, see Alias operator.

Type conversion

Topic group Related topics

When combining data of two different types with operators, they must be converted to a common type. If the type conversion does not occur automatically, it must be done explicitly.

Automatic type conversion

Topic group Related topics

Visual dBASE features automatic type conversion between its simple data types. When a particular type is expected, either as part of an operation or because a property is of a particular type, automatic conversion may occur. In particular, both numbers and logical values are converted into strings, as shown in the following examples:

```
"There are " + 6 * 2 + " in a dozen"    // The string "There are 12 in a
dozen"
"" + 4                                  // The string "4"
"2 + 2 equals 5 is " + ( 2 + 2 == 5 )   // The string "2 + 2 equals 5 is
false"
```

As shown above, to convert a number into a string, simply add the number to an empty string. Be careful, though; the following expression doesn't work as you might expect:

```
"The answer is " + 12 + 1       // The string "The answer is 121"
```

The number 12 is converted to a string and concatenated, then the number 1 is converted and concatenated, yielding "121". To concatenate the sum of 12 plus 1, use parentheses to force the addition to be performed first:

```
"The answer is " + (12 + 1)     // The string "The answer is 13"
```

Explicit type conversion

Topic group Related topics

In addition to automatic type conversion, there are a number of functions to convert from one type to another:

- String to number: use the VAL() function
- Number to formatted string: use the STR() function
- Date to string: use the DTOC() function
- String to date: use the CTOD() function

Arrays

Topic group Related topics

Visual dBASE supports a rich set of array classes. An array is an n-dimensional list of values stored in memory. Each entry in the array is called an element, and each element in an array can be treated like a variable.

To create an array, you can use the object syntax detailed in Array objects, but for a one-dimensional array, you can also use the literal array syntax.

Literal arrays

Topic group Related topics

A literal array declares and populates an array in a single expression. For example,

```
aTest = { 4, "yclept", true }
```

creates an array with three elements:

- The number 4
- The string “yclept”
- The logical value *true*

and assigns it to the variable aTest. The three elements are enclosed in curly braces (the same curly braces used for dates) and separated by commas.

Array elements are referenced with the index operator, the square brackets ([ ]). Elements are numbered from one. For example, the third element is element number 3:

```
? aTest[ 3 ]         // Displays true
```

You can assign a new value directly to an element, just like a variable:

```
aTest[ 3 ] = false  // Element now contains false
```

Complex expressions

Topic group Related topics

The following is an example of a complex expression that uses multiple names, operators, and literal data. It is preceded by a question mark so that when it's typed into the Command window, it displays the resulting value:

```
? {"1st","2nd","3rd","4th"}[ ceiling( month( date()) / 3 ) ] + " quarter"
```

Except for the question mark, the entire line is a single complex expression, made up of many smaller basic expressions. The expression is evaluated as follows:

- A literal array of literal strings is enclosed in braces, separated by commas. The strings are enclosed in double quotation marks.
- The resulting array is referenced using the square brackets as the index operator. Inside the square brackets is a numeric expression.
- The numeric expression uses nested functions, which are evaluated from the inside out. First, the DATE() function returns the current date. The MONTH() function returns the month of the current date.
- The month is divided by the number 3, then the CEILING() function rounds the number up to the nearest integer.
- The string containing the ordinal number for the calendar quarter that corresponds to the month of the current date is extracted from the array, which is then added to the literal string "quarter".

The value of this complex expression is a string like "4th quarter".

Statements

Topic group Related topics

A statement is an instruction that directs *Visual* dBASE to perfom a single action. This action may be simple or it may be complex, causing other actions to occur. You may type and execute individual statements in the Command window.

Basic statements

Topic group Related topics

There are four types of basic statements:

- *Visual* dBASE commands

  These commands make up a significant portion of the entries in the *Language Reference*. For example:

```
clear                  // Clears the Command window
erase TEMP.TXT         // Erases a file on the disk
build from FISHBASE    // Creates an executable
? time()               // Displays the current time
```

- Assignment statements

  A statement may include only one assignment operator, although the value assigned may be a very complex expression. For example:

```
clear = 14          // Assign 14 to variable named clear
f = new Form()      // NEW and call operator on class name Form, assigned to
variable f
```

  Note that the first example uses the word “clear”, but because the syntax of the statement a variable is created instead of executing the command. While creating variables with the same name as a command keyword is allowed, it is strongly discouraged.

- *Visual* dBASE expressions

  An expression is a valid statement. If the expression evaluates to a number, it is equivalent to a GO command. For example:

```
6           // Goto record 6
3 + 4       // Goto record 7
date()      // Get today's date and throw it away
f.open()    // Call object f's open() method
```

- Embedded SQL statements

  Visual dBASE features native support for SQL statements. You may type an SQL statement in the Command window, or include them in programs. If the command results in an answer table, that table is opened in the current work area. For example:

```
select * from FISH    // Open FISH table in current work area
```

Control statements

Topic group Related topics

Visual dBASE supports a number of control statements that can affect the execution of other statements. Control statements fall into the following categories:

- Conditional execution
- IF
- DO CASE
- Looping
- FOR
- DO WHILE
- DO...UNTIL
- Object manipulation
- WITH
- Exception handling
- TRY

These control statements are fully documented in the <~Core language~idh_intro_corelangJMP~> topic series.

Functions and codeblocks

Topic group Related topics

In addition to the built-in functions, you may create your own. A function is a code module—a set of statements—to which a name is assigned. The statements can be called by the function name as often as needed. Functions also provide a mechanism whereby the function can take one or more parameters that are acted upon by the function.

A function is called by following the function name with a set of parentheses, which act as the call operator. When discussing a function, the parentheses are included to help distinguish functions from other language elements like variables.

For example, the function LDoM() takes a date parameter dArg and returns the last day of the month of that date.

```
function LDoM( dArg )
  local dNextMOnth
  dNextMonth = dArg - date( dArg ) + 45   // Day in the middle of next month
  return dNextMonth - day( dNextMonth )
```

Functions are identified by the keyword FUNCTION in a program file; they cannot be typed into the Command window. While many functions use RETURN to return a value, they are not required to do so.

Function pointers

Topic group Related topics

The name of a function that you create is actually a pointer to that function. Applying the call operator to a function pointer calls that function. (Built-in functions work differently; there is no function pointer.)

Function pointers are a distinct data type, and can be assigned to other variables or passed as parameters. The function can then be called through that function pointer variable.

Function pointers enable you to assign a particular function to a variable or property. The decision can be made up front and changed as needed. Then that function can be called as needed, without having to decide which function to call every time.

Codeblocks

Topic group Related topics

While a function pointer points to a function defined in a program, a codeblock is compiled code that can be stored in a variable or property. Codeblocks do not require a separate program; they actually contain code. Codeblocks are another distinct data type that can be stored in variables or properties and passed as parameters, just like function pointers.

Codeblocks are called with the same call operator that functions use, and may receive parameters.

There are two types of codeblocks:

- Expression codeblocks
- Statement codeblocks

Expression codeblocks return the value of a single expression. Statement codeblocks act like functions; they contain one or more statements, and may return a value.

In terms of syntax, both kinds of codeblocks are enclosed in curly braces ({ }) and

- Cannot span multiple lines.
- Must start with either two pipe characters (||) or a semicolon (;)
- If ; it must be a statement codeblock with no parameters
- If || it may be either an expression or statement codeblock
- The || are used for parameters to the codeblock, which are placed between the two pipe characters. They may also have nothing in-between, meaning no parameters for either an expression or statement codeblock.
- Parameters inside the ||, if any, are separated by commas.
- For an expression codeblock, the || must be followed by one and only one expression, with no ;

These are valid expression codeblocks:

```
{|| false}
{|| date()}
{|x| x * x}
```

- Otherwise, it is a statement codeblock. A statement codeblock may begin with || (again, with or without parameters in-between).
- Each statement in a statement codeblock must be preceded by a ; symbol. These are valid statement codeblocks (the first two are functionally the same):

```
{; clear}
{||; clear}
{|x|; ? x}
{|x|; clear; ? x}
```

- You may use a RETURN inside a statement codeblock, just like with any other function. (A RETURN is implied with an expression codeblock.) For example,

```
{|n|; for i=2 to sqrt(n); if n % i == 0; return false; endif; endfor;
return true}
```

```
Because codeblocks don't rely on functions in programs, you can create them
in the Command window. For example,
square = {|x| x * x}  // Expression codeblock
? square( 4 )         // Displays 16
// A statement codeblock that returns true if a number is prime
p = {|n|; for i=2 to sqrt(n); if n % i == 0; return false; endif; endfor;
return true}
? p( 23 )  // Displays true
? p( 25 )  // Displays false
As mentioned previously, curly braces are also used for literal dates and
literal arrays. Compare the following:
{10}       // A literal array containing one element with the value 10
{10/5}     // A literal array containing one element with the value 2
{10/5/97}  // A literal date
{||10/5}   // An expression codeblock that returns 2
```

Codeblocks vs. functions

Topic group Related topics

A codeblock is a convenient way to create a small anonymous function and assign it directly to a variable or property. The code is physically close to its usage and easy to see. In contrast, a function pointer refers to a function defined elsewhere, perhaps much later in the same program file, or in a different program file.

Functions are easier to maintain. Their syntax is not cramped like codeblocks, and it's easier to include readable comments in the code. In a class definition, all FUNCTION definitions are all together at the bottom. Codeblocks are scattered throughout the constructor. If you want to run the same code from multiple locations, using function pointers that point to the same function means that changing the code requires changing the function once; multiple codeblocks would require changing each codeblock individually.

You can create a codeblock at runtime by constructing a string that looks like a codeblock and using the macro operator to evaluate it.

Objects and classes

Topic group Related topics

An object is a collection of properties. Each of these properties has a name. These properties may be simple data values, such as numbers or strings, or references to code, such as function pointers and codeblocks. A property that references code is called a method. A method that is called by *Visual* dBASE in response to a user action is called an event.

Objects are used to represent abstract programming constructs, like arrays and files, and visual components, like buttons and forms. All objects are initially based on a class, which acts as a template for the object. For example, the PushButton class contains properties that describe the position of the button, the text that appears on the button, and what the button should do when it is clicked. All these properties have default values. Individual button objects are instances of the PushButton class that have different values for the properties of the button.

Visual dBASE contains many built-in, or stock, classes, which are documented throughout the *Language Reference*. You can extend these stock classes or build your own from scratch with a new CLASS definition.

While the class acts as a formal definition of an object, you can always add properties as needed. This is called dynamic subclassing.

Dynamic subclassing

Topic group Related topics

To demonstrate dynamic subclassing, start with the simplest object: an instance of the Object class. The Object class has no properties. To create an object, use the NEW operator, along with the class name and the call operator, which would include any parameters for the class (none are used for the Object class).

```
obj = new Object()
```

This statement creates a new instance of the Object class and assigns an object reference to the variable obj. Unlike variables that contain simple data types, which actually contain the value, an object reference variable contains only a reference to the object, not the object itself. This also means that making a copy of the variable:

```
copy = obj
```

does not duplicate the object. Instead, you now have two variables that refer to the same object.

To assign values to properties, use the dot operator. For example,

```
obj.name = "triangle"
obj.sides = 3
obj.length = 4
```

If the property does not exist, it is added; otherwise, the value of the property is simply reassigned. This behavior can cause simple bugs in your programs. If you mistype a property name during an assignment, for example,

```
obj.wides = 4   // should be s, not w
```

a new property is created instead of changing the value of the existing property you intended. To catch these kinds of problems, use the assignment-only := operator when you know you are not initializing a property or variable. If you attempt to assign a value to a property or variable that does not exist, an error occurs instead of creating the property or variable. For example:

```
obj.wides := 4  // Error if wides property does not already exist
```

Methods

Topic group Related topics

A method is a function or codeblock assigned to a property. The method is then called through the object via the dot and call operators. Continuing the example above:

```
obj.perimeter = {|| this.sides * this.length}
? obj.perimeter()   // Displays 12
```

As you may have deduced by now, the object referred to by the variable obj represents a regular polygon. The perimeter of such a polygon is the product of the length of each side and the number of sides.

The reference *this* is used to access these values. In the method of an object, the reference *this* always refers to the object that called the method. By using *this*, you can write code that can be shared by different objects, and even different classes, as long as the property names are the same.

A simple class

Topic group Related topics

Here is a class representing the polygon:

```
class RegPolygon
  this.sides  = 3   // Default number of sides
  this.length = 1   // and default length
  function perimeter()
    return this.sides * this.length
endclass
```

The top of the CLASS definition, up to the first FUNCTION, is called the class constructor, which is executed when an instance of the class is created. In the constructor, the reference *this* refers to the object being created. The sides and length properties are added, just as they were before.

The function in the class definition is considered a method, and the object automatically has a property with the same name as the method that points to the method. The code is the same, but now instead of a codeblock, the method is a function in the class. Methods have the advantage of being easier to maintain and subclass.

Programs

Topic group Related topics

A program contains any combination of the following items:

- Statements to be executed
- Functions and classes that may be called
- Comments

The *Visual* dBASE compiler also supports a standard language preprocessor, so a program that is run by *Visual* dBASE may contain preprocessor directives. These directives are not part of the *Visual* dBASE language; instead they form a separate simple language that can affect the code compilation process, and are explained later.

Program files

Topic group Related topics

A program file may have any file-name extension, although there are a number of defaults:

- A program containing a form is .WFM
- A program containing a report is .REP
- Any other program is .PRG

These file-name extensions are assumed by the Navigator, the Source Editor.

When a program is compiled into byte code by *Visual* dBASE, it stores the byte code in a file with the same name and extension, but it changes the last character of the extension to the letter “O”: .PRG becomes .PRO, .WFM becomes .WFO, and .REP becomes .REO.

Program execution

Topic group Related topics

Use the DO command to run a program file, or double-click the file in the Navigator. If you run the program through the Navigator, the equivalent DO command will be streamed out to the Command window and executed. You can also call a .JS program by name with the call operator, the parentheses, in the Command window; for example,

```
sales_report()
```

will attempt to execute the file SALES_REPORTS.JS. Since the operating system is not case-sensitive about file names when searching for files, neither is *Visual* dBASE.

A basic program simply contains a number of *Visual* dBASE statements, which are executed once in the order that they appear in the program file, from the top down. For example, the following four statements remember the current directory, switch to another directory, execute a report, and switch back to the previous directory:

```
cDir = set( "DIRECTORY" )
cd C:\SALES
do DAILY.REP
cd &cDir
```

```
Control statements, discussed earlier, are acted upon as they occur; they may
affect the execution of the code that they contain. Some statements may be
executed only when a certain condition is true and other statements may be
executed more than once in a loop. But even within these control statements,
the execution is still basically the same, from the top down.
```

When and if there are no more statement to execute, the program ends, and control returns to where the program was called. For example, if the program was executed from the Command window, then control returns to the Command window and you can do something else.

Functions and classes

Topic group Related topics

Functions and classes affect execution in two ways. First, when a function or class definition is encountered in the straight top-down execution of a program, execution in that program is terminated.

The second effect is that when a function, class constructor, or method is called, execution jumps into that function or class, executes that code in the usual top-down fashion, then goes back to where the call was made and continues where it left off.

Comments

Topic group Related topics

Use comments to include notes to yourself or others. The contents of a comment do not follow any *Visual* dBASE rules; include anything you want. Comments are stripped out at the beginning of the program compilation process.

A program will typically contain a group of comments at the beginning of the file, containing information like the name of the program, who wrote it and when, version information, and instructions for using it. But the most important use for comments is in the code itself, to explain the code—not obvious things like this:

```
n++    // Add one to the variable n
```

(unless you're writing example code to explain a language) but rather things like what you're doing in the overall scheme of the program, or why you decided to do something in a particular way. Decisions that are obvious to you when you write a statement will often completely bewilder you a few months later. Write comments so that they can be read by others, and put them in as you code, since there's rarely time to add them in after you're done, and you may have forgotten what you did by then anyway.

Preprocessor directives

Topic group Related topics

A preprocessor directive must be on its own line, and starts with the number sign (#).

Because preprocessor directives are not part of the *Visual* dBASE language, you cannot execute them in the Command window.

For more information about using preprocessor directives, see Preprocessor.

A simple program

Topic group Related topics

Here is a simple program that creates an instance of the RegPolygon class, changes the length of a side, and displays the perimeter:

```
// Polygon.prg
// A simple program example
//
local poly
poly = new RegPolygon()
poly.length = 4
? poly.perimeter()  // Displays 12
class RegPolygon
  this.sides  = 3   // Default number of sides
  this.length = 1   // and default length
  function perimeter()
    return this.sides * this.length
endclass
```

Syntax conventions

Topic group Related topics

The *Language Reference* uses specific symbols and conventions in presenting the syntax of *Visual* dBASE language elements.

This section explains *Visual* dBASE syntax notation and provides an example of the various elements of the language syntax.

Syntax notation

Topic group Related topics

Statements, methods, and functions are described with syntax diagrams. These syntax diagrams consist of a least one fixed language element—the one being documented—and may include arguments, which are enclosed in angle brackets (< >).

The *Visual* dBASE language is not case-sensitive.

The following table describes the symbols used in syntax:

Symbol	Description
< >	Indicates an argument that you must supply
[ ]	Indicates an optional item
|	Indicates two or more mutually exclusive options
...	Indicates an item that may be repeated any number of times

Arguments are often expressions of a particular type. The description of an expression argument will indicate the type of argument expected, as listed in the following table:

Descriptor	Type
expC	A character expression
expN	A numeric expression
expL	A logical or boolean expression; that is, one that evaluates to *true* or *false*
expD	A date expression
exp	An expression of any type
oRef	An object reference

All the arguments and optional elements are described in the syntax description.

Unlike legacy dBASE command and function keywords, which are shown in uppercase letters, property names are capitalized differently. Property names are camel-capped, that is, they contain both uppercase and lowercase letters if the name consists of more than one word. If the property is a method, the name is followed by parentheses. Examples of properties include *onAppend*, *onRightMouseDown*, *checked*, and *close*().

These conventions help you differentiate the language elements; for example,

- DELETE is a command
- *delete* is a property
- DELETED() is a function
- *delete*() is a method

These typographical conventions are for readability only. When writing code, you can use any combination of uppercase and lowercase letters.

Note: In *Visual* dBASE 7, you must refer to classes and properties by their full names. However, you can still abbreviate some keywords in the dBASE language to the first four characters, though for reasons of readability and clarity such abbreviation is not recommended.

Syntax example

Topic group Related topics

The syntax entries for the EXTERN statement illustrate all of the syntax symbols:

EXTERN [CDECL | PASCAL | STDCALL] <return type> <function name>
([<parameter type> [, <parameter type> ...]])
<filename>

- The square brackets enclosing the calling convention, [CDECL | PASCAL | STDCALL], means the item is optional. The pipe character between the three calling conventions is an "or" indicator. In other words, if you want to use a calling convention, you must choose one of the three.
- <return type> and <function name> are both required arguments.
- The parentheses are fixed language elements, and thus also required. Inside the parentheses are optional <parameter type> arguments, as indicated by the square brackets.
- The location of the comma inside the second square bracket indicates that the comma is needed only if more than one <parameter type> is specified.
- The ellipsis (...) at the end means that any number of parameter type arguments may be specified (with a comma delimiter, if more than one is used).
- <filename> is a required argument.

A simple EXTERN statement with neither of the two optional elements would look like this:

```
extern CINT angelsOnAPin() ANSWER.DLL
The <return type> argument is CINT, and the <function name> is angelsOnAPin.
```

A more complicated EXTERN statement with a calling convention and parameters would look like this:

```
extern PASCAL CLONG wordCount( CPTR, CLOGICAL ) ANSWER.DLL
```

Capitalization guidelines

Topic group Related topics

The following guidelines describe the standard capitalization of various language elements. Although *Visual* dBASE is not a case-sensitive language, you are encouraged to follow these guidelines in your own scripts.

- Commands and built-in functions are shown in uppercase in descriptions so that they stand out, but are all lowercase in code examples.
- Class names start with a capital letter. Multiple-word class names are joined together without any separators between the words, and each word starts with a capital letter. For example,

  Form
  PageTemplate
- Property, event, and method names start with a lowercase letter. If they are multiple-word names, the words are joined together without any separators between the words, and each word (except the first) starts with a capital letter. They also appear italicized in the *Language Reference*. For example,

  color
  dataLink
  showMemoEditor()
- Variable and function names are capitalized like property names.
- Manifest constants created with the #define preprocessor directive are all uppercase, with underscores between words. For example,

  ARRAY_DIR_NAME
  NUM_REPS
- Field names and table names from DBF tables are in all uppercase in code so that they stand out.

Operators and symbols

Topic group Related topics

An operator is a symbol, set of symbols, or keyword that specifies an operation to be performed on data. Data is supplied in the form of arguments, or *operands*.

For example, in the expression “total = 0”, the equal sign is the operator and “total” and “0” are the operands. In this expression, the numeric operator “=” takes two operands, which makes it a *binary* operator. Operators that require just one operand (such as the numeric increment operator “++”) are known as *unary* operators.

Operators are categorized by type. *Visual* dBASE’s operators are classified as follows:

Operator symbols	Operator category
= := += -= *= /= %=	Assignment
= == <> # > < >= <= $	Comparison
+ -	String concatenation
+ - * / % ^ ** ++ --	Numeric
AND OR NOT	Logical
. [] NEW ::	Object
()	Call, Indirection
->	Alias
&	Macro

Most symbols you see in *Visual* dBASE code are operators, but not all. Quotation marks, for example, are used to denote literal strings and thus are part of the representation of a data type. Since they don’t act upon data, they’re a “non-operational” symbol.

You can use the following non-operational symbols in *Visual* dBASE code:

Symbols	Name/meaning
;	Statement separator, line continuation
// &&	End-of-line comment
*	Full-line comment
/* */	Block comment
{} {;} {||}	Literal date/literal array/codeblock markers
"" " []	Literal strings
::	Name/database delimiters
#	Preprocessor directive

Finally, the following symbols are used as *Visual* dBASE commands when they are used to begin a statement:

Symbols	Name/meaning
? ??	Displays streaming output
!	Runs program or operating system command

Operator precedence

Topic group Related topics

Visual dBASE applies strict rules of precedence to compound expressions. In expressions that contain multiple operations, parenthetical groupings are evaluated first, with nested groupings evaluated from the "innermost" grouping outward. After all parenthetical groupings are evaluated, the rest of the expression is evaluated according to the following operator precedence:

Order of precedence (highest to lowest)	Operator description or category
&	Macro
(*expression*)	Parenthetical grouping, all expressions
->	Alias
() [] . NEW ::	Object operators: call; member (square bracket or dot); *new*; scope resolution
+ - ++ - -	Unary plus/minus, increment/decrement
^ **	Exponentiation
* / %	Multiply, divide, modulus
+ -	Addition, subtraction
= == <> # < <= > >= $	Comparison
NOT	Logical Not
AND	Logical And
OR	Logical Or
= := += -= *= /= %=	Assignment

In compound expressions that contain operators from the same precedence level, evaluation is conducted on a literal left-to-right basis. For example, no operator precedence is applied in the expressions 21/7*3 and 3*21/7 (both return 9).

Here's another example:

```
4+5*(6+2*(8-4)-9)%19>=11
```

This example is evaluated in the following order:

```
8-4=4
2*4=8
6+8=14
14-9=5
5*5=25
25%19=6
4+6=10
```

The result is the logical value *false*.

Assignment operators

Topic group Related topics

Assign/create operator: =

Assignment-only operator: :=

Arithmetic assignment operators: += -= *= /= %=

Syntax

x = n

y = x

x += y

Description

Assignment operators are binary operators that assign the value of the operand on the right to the operand on the left.

The standard assignment operator is the equal sign. For example, *x* = 4 assigns the value 4 to the variable *x*, and *y* = *x* assigns the value of the variable *x* (which must already have an assigned value) to the variable *y*. If the variable or property on the left of the equal sign does not exist, it is created.

To prevent the creation of a variable or property if it does not exist, use the assignment-only := operator. This operator is particularly useful when assigning values to properties. If you inadvertently misspell the name of the property with the = operator, a new property is created; your code will run without error, but it will not behave as you intended. By using the := operator, if the property (or variable) does not exist, an error occurs.

The arithmetic assignment operators are shortcuts to self-updating arithmetic operations. For example, the expression *x* += *y* means that *x* is assigned its own value plus that of *y* (*x* = *x* + *y*). Both operands must already have assigned values, or an error results. Thus, if the operand *x* has already been assigned the value 4 and *y* has been assigned the value *6*, the expression *x* += *y* returns 10.

+ operator

Topic group | Related topics | Example

Addition, concatenation, unary positive operator.

Syntax

n + m

date + n

"str1" + "str2"

"str" + x

x+ "str"

+n

Description

The “plus” operator performs a variety of additive operations:

- It adds two numeric values together.
- You may add a number to a date (or vice-versa). The result is the day that many days in the future (or the past if the number is negative). Adding any number to a blank date always results in a blank date.
- It concatenates two strings.
- You may concatenate any other data type to a string (or vice versa). The other data type is converted into its display representation:
- Numbers become strings with no leading spaces. Integer values eight digits or less have no decimal point or decimal portion. Integer values larger than eight digits and non-integer values have as many decimals places as indicated by SET DECIMALS.
- The logical values *true* and *false* become the strings “true” and “false”.
- Dates (primitive dates and Date objects) are converted using DTOC().
- Object references to arrays are converted to the word “Array”.
- References to objects of all other classes are converted to the word “Object”.
- Function pointers take on the form “Function: “ followed by the function name.

Note: Adding the value *null* to anything results in the value *null*.

The plus sign may also be used as a unary operator to indicate no change in sign, as opposed to the unary minus operator, which changes sign. Of course, it is generally superfluous to indicate no change in sign; the unary plus is rarely used.

+ operator examples

These examples demonstrate addition and concatenation.

```
"this &" + " that"       // = the string "this & that"
5 + 5                    // = the number 10
"this & " + 5 + " more"  // = the string "this & 5 more"
5 + "-5"                 // = the string "5-5"
date() + 7               // = same day next week
"" + Form::open          // = the string "Function: FORM::OPEN"
? 3 + 4 + "abc" + false  // = the string "7abcfalse"
? false + 3 + 4 + "abc"  // Error: unexpected type
```

The last two examples demonstrate the standard left-to-right precedence of the + operator. In the first example, 4 is added to 3, which yields 7. The string “abc” is added, so the number is converted to its display representation, resulting in the string “7abc”. Then the value *false* is added, which is also converted to string, yielding “7abcfalse”. But in the second example, the first addition attempts to add 3 to the value *false*, which is not allowed; an error occurs.

- operator

Topic group | Related topics | Example

Subtraction, concatenation, unary negative operator.

Syntax

n - m

date + n

date - date

"str1" + "str2"

"str" + x

x+ "str"

-n

Description

The “minus” operator is similar to the “plus” operator. It subtracts two numbers, and subtracts days from a date. You may also subtract one date from another date; the result is the number of days between the two dates. If you subtract a blank date from another date, the result is always zero.

The minus symbol is also used as the unary negation operator, to change the sign of a numeric value.

You may concatenate two strings, or a string with any other data type, just like with the plus operator. The difference is that with the minus operator, the trailing blanks from the first operand are removed before the concatenation, and placed at the end of the result. This means that the concatenation with either the plus or minus results in a string with the same length, but with the minus operator, the trailing blanks are combined at the end of the result.

If you want to trim field values when creating an expression index for a DBF table, use the minus operator.

- operator example

Suppose you have a DBF table with last name and first name fields, both 16 characters wide. Compare the result of the plus and minus operators:

```
"Bailey-Richter  " + "Gwendolyn       " ==> "Bailey-Richter  Gwendolyn
"
"Bailey-Richter  " - "Gwendolyn       " ==> "Bailey-RichterGwendolyn
"
```

It may be more useful to include a comma between the last name and first name:

```
"Bailey-Richter  " - "," - "Gwendolyn       " ==> "Bailey-Richter,Gwendolyn
"
```

The last name and comma are concatenated, moving the trailing blanks after the comma, then that is concatenated to the first name, moving the trailing blanks after the last name. By separating the last name and first name, the comma ensures that the names are sorted correctly, and it makes searching—particularly interactive incremental searching—easier. The command to create such an index tag would look like:

```
index on upper( LAST_NAME - "," - FIRST_NAME ) tag FULL_NAME
```

The minus operator results in index keys that are all the same length, something that you wouldn't get by using the TRIM() function.

Numeric operators

Topic group Related topics

Binary numeric operators: + - * / % ^ **

Unary numeric operators: ++ - -

Syntax

n + m

n++

n - -

++n

Description

Perform standard arithmetic operations on two operands, or increment or decrement a single operand.

All of these operators take numeric values as operands. The + (plus) and - (minus) symbols can also be used to concatenate strings.

As binary numeric operators, the +, -, *, and / symbols perform the standard arithmetic operations addition, subtraction, multiplication and division.

The modulus operator returns the remainder of an integral division operation on its two operands. For example, 50%8 returns 2, which is the remainder after dividing 50 by 8.

You may use either ^ or ** for exponentiation. For example, 2^5 is 32.

The increment/decrement operators ++ and - - take a variable or property and increase or decrease its value by one. The operator may be used before the variable or property as a prefix operator, or afterward as postfix operator. For example,

```
n = 5     // Start with 5
? n++     // Get value (5), then increment
? n       // Now 6
? ++n     // Increment first, then get value (7)
? n       // Still 7
```

If the value is not used immediately, it doesn't matter whether the ++/- - operator is prefix or postfix, but the convention is postfix.

Logical operators

Topic group Related topics

Binary logical operators: AND OR

Unary logical operator: NOT

Syntax

a AND b

a OR b

NOT b

Description

The AND and OR logical operators return a logical value (*true* or *false*) based on the result of a comparison of two operands. In a logical AND, both expressions must be *true* for the result to be *true*. In a logical OR, if either expression is *true*, or both are *true*, the result is *true*; if both expressions are *false*, the result is *false*.

When *Visual* dBASE evaluates an expression involving AND or OR, it uses short-circuit evaluation:

- *false* AND <any expL> is always *false*
- *true* OR <any expL> is always *true*

Because the result of the comparison is already known, there is no need to evaluate <any expL>. If <any expL> contains a function or method call, it is not called; therefore any side effects of calling that function or method do not occur.

The unary NOT operator returns the opposite of its operand expression. If the expression evaluates to *true*, then NOT *exp* returns *false*. If the expression evaluates to *false*, NOT *exp* returns *true*.

You may enclose the logical operators in dots, that is: .AND., .OR., and .NOT. The dots are required in earlier versions of dBASE.

Comparison operators

Topic group Related topics Example

Comparison operators compare two expressions. The comparison returns a logical *true* or *false* value. Comparing logical expressions is allowed, but redundant; use logical operators instead.

Visual dBASE automatically converts data types in a comparison, using the following rules:

1 If the two operands are the same type, they are compared as-is.

2 If either operand is a numeric expression, the other operand is converted to a number:

- If a string contains a number only (leading spaces are OK), that number is used, otherwise it is interpreted as an invalid number.
- The logical value *true* becomes one; *false* becomes zero.
- All other data types are invalid numbers.

All comparisons between a number and an invalid number result in *false*.

3 If either operand is a string, the other operand is converted to its display representation:

- Numbers become strings with no leading spaces. Integer values eight digits or less have no decimal point or decimal portion. Integer values larger than eight digits and non-integer values have as many decimals places as indicated by SET DECIMALS.
- The logical values *true* and *false* become the strings “true” and “false”.
- Dates (primitive dates and Date objects) are converted using DTOC().
- Object references to arrays are converted to the word “Array”.
- References to objects of all other classes are converted to the word “Object”.
- Function pointers take on the form “Function: “ followed by the function name.

4 All other comparisons between mismatched data types return *false*.

These are the comparison operators:

Operator	Description
==	Exactly equal to
=	Equal to or Begins with
<> or #	Not equal to or Doesn’t begin with
<	Less than
>	Greater than
<=	Less than or equal to
>=	Greater than or equal to
$	Contained in

When comparing dates, a blank date comes after (is greater than) a non-blank date.

When comparing Date objects, the date/time they represent are compared; they may be earlier, later, or exactly the same. For all other objects, only the equality tests makes sense. It tests whether two object references refer to the same object.

String equality comparisons are case-sensitive and follow the rules of SET EXACT. The == operator always compares two strings as if SET EXACT is ON. The other equality operators (=, <>, #) use the current setting of SET EXACT. When SET EXACT is ON, trailing blanks in either string are ignored in the comparison. When SET EXACT is OFF (the default), the = operator act like a “begins with” operator: the string on the left must begin with the string on the right. The <> and # operators act like “does not begin with” operators. Note that there is no single genuinely exactly equal comparison for strings in *Visual* dBASE.

It is recommended that you leave SET EXACT OFF so that you have the flexibility of doing an “exact” comparison or a “begins with” comparison as needed. By definition, all strings “begin with” an empty string, so when checking if a string is empty, always put the empty string on the left of the equality operator.

Warning: For compatibility with earlier versions of dBASE, if the string on the right of the = operator is

(or begins with) CHR(0) and SET EXACT is OFF, then the comparison always returns *true*. When checking for CHR(0), always use the == operator.

The $ operator determines if one string is contained in, or is a substring of, another string. By definition, an empty string is not contained in another string.

Comparison operators, examples

To see these examples in action, type them into the Command window.

```
// The usual numeric and string comparisons
? 3 < 4                  // true
? "cat" > "dog"          // false
// String comparisons demonstrate SET EXACT rules
set exact off
? "abc" == "abc"         // Obviously true
? "abc" == "abc "        // Trailing space in second operand is ignored: true
? "abc" = "ab"           // 1st operand begins with the characters in the
2nd: true
? "abc" = ""             // true by definition
? "" = "abc"             // false
? "abc" # ""             // false
? "" # "abc"             // true
// Logical comparisons are redundant
valid = true
? valid == true          // true, but so is
? valid                  //   this
? valid == false         // false, but it's simpler to
? not valid              //   use the logical NOT operator
// Date objects compare the date/time they represent
x = new Date()
y = new Date()           // Should be a few seconds later
? x < y                  // true, date/time in x is before y
x = new Date( "25 Sep 1996" )
y = new Date( "25 Sep 1996" )
? x == y                 // true: objects are different, but date/time is the
same
// Other objects test for equality only
a = new Form()
b = new Form()
c = b
? a == b                 // false, different objects
? b == c                 // true, references to same object
```

Object operators

Topic group Related topics

Object operators are used to create and reference objects, properties, and methods. Here are the Object operators:

Operator	Description
NEW	Creates a new instance of an object
[ ]	Index operator, which accesses the contents of an object through a numeric or string value
. (period)	Dot operator, which accesses the contents of an object through an identifier name
::	Scope resolution operator, to reference a method in a class or call a method from a class.

NEW operator

The NEW operator creates an object or instance of a specified class.

The following is the syntax for the NEW operator:

```
[<object reference> =] new <class name>([<parameters>])
```

The <object reference> is a variable or property in which you want to store a reference to the newly created object.

Note that the reference is optional syntactically; you may create an object without storing a reference to it. For most classes, this results in the object being destroyed after the statement that created it is finished, since there are no references to it.

The following example shows how to use the NEW operator to create a Form object from the Form class. A reference to the object is assigned to the variable customerForm:

```
customerForm = new Form()
```

This example creates and immediately uses a Date object. The object is discarded after the statement is complete:

```
? new Date().toGMTString()
```

Index operator

The index operator, [ ], accesses an object's properties or methods through a value, which is either a number or a character string. The following shows the syntax for using the index operator (often called the array index operator):

```
<object reference>[<exp>]
```

You typically use the index operator to reference elements of array objects, as shown in the following example:

```
aScores = new Array(20)  // Create a new array object with 20 elements
aScores[1] = 10          // Change the value of the 1st element to 10
? aScores[1]             // Displays 10 in results pane of Command window
```

Dot operator

The dot operator, (“.”), accesses an object's properties, events, or methods through a name. The following shows the syntax for using the dot operator:

```
<object reference>[.<object reference> ...].<property name>
```

Objects may be nested: the property of an object may contain a reference to another object, and so on. Therefore, a single property reference may include many dots.

The following statements demonstrate how you use the dot operator to assign values:

```
custForm = new Form()          // Create a new form object
custForm.title = "Customers"   // Set the title property of custForm
```

```
custForm.height = 14          // Set the height property of custForm
```

If an object contains another object, you can access the child object's properties by building a path of object references leading to the property, as the following statements illustrate:

```
custForm.addButton = new Button(custForm)  // Create a button in the custForm
form
custForm.addButton.text = "Add"            // Set the text property of
addButton
```

Scope resolution operator

The scope resolution operator (::, two colons, no space between them) lets you reference methods directly from a class or call a method from a class.

The scope resolution operator uses the following syntax:

```
<class name>|class|super::<method name>
```

The operator must be preceded by either an explicit class name, the keyword CLASS or the keyword SUPER. CLASS and SUPER may be used only inside a class definition. CLASS refers to the class being defined and SUPER refers to the base class of the current class, if any.

<*method name*> is the method to be referenced or called.

Scope resolution searches for the named method, starting at the specified class and back through the class's ancestry. Because SUPER starts searching in a class's base class, it is used primarily when overriding methods.

Call, indirection, grouping operator

Topic group Related topics

Parentheses are used to call functions and methods, and to execute codeblocks. For example:

```
MyClass::MyMethod
```

is a function pointer to a method in the class, while

```
MyClass::MyMethod()
```

actually calls that method. Any parameters to include in the call are placed inside the parentheses. Multiple parameters are separated by commas. Here is an example using a codeblock:

```
rootn = {|x,n| x^(1/n)}     // Create expression codeblock with two
parameters
? rootn( 27, 3 )            // Displays cube root of 27: 3
```

Some commands expect the names of files, indexes, aliases, and so forth to specified directly in command—”bare”—not in a character expression. Therefore, you cannot use a variable directly. For example, the ERASE command erases a file from disk. The following code will not work:

```
cFile = getfile( "*.*", "Erase file" )  // Store filename to variable
erase cFile                             // Tries to erase file named "cFile"
```

because the ERASE command tries to erase the file with the name of the variable, not the contents of the variable. To use the variable name in the file, enclose the variable in parentheses. In these commands, the parentheses evaluate the indirect file reference, and when used in this way, they are referred to as indirection operators:

```
erase ( cFile )    // Spaces inside parentheses optional
```

Macro substitution also works in these cases, but macro substitution can be ambiguous. Indirection operators are recommended in commands where they are allowed.

Finally, parentheses are also used for grouping in expressions to override or emphasize operator precedence. Emphasizing precedence simply means making the code more readable by explicitly grouping expressions in the normal order they are evaluated, so that you don’t need to remember all the precedence rules to understand an expression. Overriding precedence uses the parentheses to change the order of evaluation. For example:

```
? 3 + 4 * 5      // Multiplication first, result is 23
? ( 3 + 4 ) * 5  // Do addition first, result is 35
```

Alias operator

Topic group Related topics Example

Designates a field name in a specific work area, or a private or public variable.

Syntax

alias->name

Description

When using a name that may be a variable or the name of a field in the current work area, the name is matched in the following order:

1 Local or static variable

2 Field name

3 Private or public variable

To resolve the ambiguity, or to refer to a field in another work area, use the alias operator. Aliases are not case-sensitive.

Private and public variables are referenced by the alias M. Use the alias of the specific work area to identify a particular field. Local and static variables cannot use the alias operator; you must use the variable alone.

Alias operator example

The following program opens two tables that both have a field named City and creates both private and local variables named City:

```
use CUSTOMER                          // Open in current work area
use CUSTOMER                          // Open in current work area
use VENDOR2 in select() alias VENDOR  // Open in another work area with alias
private city                          // Names are not case-sensitive
city = "Peoria"  // Alias not required because assignment does not assign to
fields
? "No alias:", city                   // Field from current table
exerciseAliasOp()
use in VENDOR                         // Close tables
use
function exerciseAliasOp()
  local city
  city = "Louisville"
  ? "Local defined, no alias:", city  // Local variable
  ? "M alias:", m->city               // Private variable hidden by local
  ? "Customer:", customer->city       // Field from table
  ? "Vendor:", vendor->city           // Field from other table
```

Macro operator

Topic group Related topics Example

Substitutes the contents of a private or public string variable during the evaluation of a statement.

Syntax

&<character variable>[.]

Description

Macro substitution with the & operator allows you to change the actual text of a program statement at runtime. This capabilities allows you to overcome certain syntactic and architectural limitations in *Visual* dBASE.

The mechanics of macro substitution are as follows. When compiling a statement, in a program or for immediate execution in the Command window, *Visual* dBASE looks for any single & symbols in the statement. (Double ampersands [&&] denote end-of-line comments.) If something that looks like it could be a variable name—that is, a word made up of letters, numbers, and underscores—immediately follows the & symbol, its location is noted during compilation. If a period (.) happens to immediately follow the word, that period is considered to be a macro terminator.

When the statement is executed, *Visual* dBASE searches for a private or public variable with that name. If that variable exists, and that variable is a character variable, the contents of that variable are substituted in the statement in the place of the & symbol, the variable name, and the terminating period, if any. This is referred to as macro substitution. If no private or public variable with that name can be found, or if the variable is not a character variable, nothing happens; the statement is executed as-is.

Note: The & character is also used as the pick character in the *text* property of some form and menu components. For example, if you use the string “&Close” to designate the letter C as the pick character, if you happen to have a private or public variable named close, it will be substituted.

If macro substitution occurs, one of two things can happen:

- Some commands expect certain kinds macro substitution. If the substitution is one of those cases, the command can immediately use the substituted value. For example, SET commands which expect either ON or OFF as the final word in the statement are optimized in this way.
- If the substituted value is not an expected case, or if the command or statement does not expect macro substitution, the entire statement in its new form is recompiled on-the-fly and executed.

Recompiling the statement takes a small amount of time that is negligible unless you are constantly recompiling in a loop. Also, local and static variables may be out-of-scope when a recompiled statement is executed.

You cannot use the & operator immediately after a dot operator. You also cannot have the & and dot operators on the left side of an assignment operator; that is, you cannot assign to a property that is partially resolved with macro substitution. If you do either of these, a compile-time error occurs. You can assign to a property that is completely resolved with macro substitution, or use the STORE command instead of an assignment operator.

The macro terminator (a period, the same character as the dot operator) is required if you want to abut the macro variable name with a letter, number, underscore or dot operator. Compare the following examples:

```
&ftext     // The macro variable ftext
&f.text    // The macro variable f followed by the word text
&f..text   // The macro variable f followed by the dot operator and the word
text
```

Macro operator example

The first example stores the value of a setting at the beginning of a function, and restores it at the end.

```
function findMatch( xArg )
  local lRet
  private cExact               // Can't be local for macro substitution
  cExact = set( "EXACT" )      // Store "ON" or "OFF" to character variable
  set exact on
  lRet = seek( xArg )          // Does exact match exist?
  set exact &cExact            // Either "set exact ON" or "set exact OFF"
  return lRet
```

The second example converts the value of a control in a form into a literal value to be used in a filter. The filter cannot refer to the control directly, because the value of the form reference varies depending on what form has focus at any given moment.

```
function setFilter_onClick()
  private cFltr
  cFltr = form.cityCombobox.value    // Store string in private variable
  set filter to CITY == "&cFltr"
```

Note the use of macro substitution inside a quoted string. For example, if the value of the combobox is “Dover”, then the variable is assigned the value “Dover”. The result of the macro substitution would then be the statement:

```
set filter to CITY == "Dover"
```

The third example uses macro substitution to refer to a control by name through a variable.

```
local f
private c, g
f = new Form()
g = f                          // g and f both point to same form
f.button1 = new PushButton(f)
c = "1"
? g.button&c..className        // Displays "PUSHBUTTON"
? f.button&c..className        // Error: Variable undefined: F
```

This creates a form with a single button. Two variables refer to this form, one private variable, and one local variable. In the first macro substitution statement, the value of the variable c is substituted. There are two periods following the variable. The first is to terminate the macro, and the second is the actual dot operator. This results in:

```
? g.button1.className
```

The second macro substitution works the same, but the statement fails because the local variable f is not in scope when the statement is executed. However, this approach is actually unnecessary because you can refer to controls by name with a variable through the form’s *elements* array:

```
? f.elements[ "button" + c ].className
```

Without macro substitution, you avoid potential problems with local variables.

Finally, continuing the previous example, compare these statements that attempt to assign to a property using macro substitution:

```
local cText
cText = "OK"
g.button&c..text := cText   // Has both & and . to left of assignment; won't
compile
private cVar
cVar = "g.button" + c + ".text"
&cVar := cText   // Compiles, but fails at runtime; local variable out-of-
scope
private cStmt
```

```
cStmt = cVar + " := cText"                // Try macro substituting entire
statement
&cStmt                                    // Fails; local variable out-of-
scope
cStmt = cVar + [ := "] + cText + ["]      // Build entire statement with no
locals
&cStmt                                    // This works
g.elements[ "button" + c ].text = cText   // But this is still easier to use
```

Non-operational symbols

Topic group Related topics

Though they don't act upon data or hold values in themselves, non-operational symbols have their own purpose in *Visual* dBASE code and in the interpretation of programs.The symbols are:

Symbols	Name/meaning
;	Statement separator, line continuation
// &&	End-of-line comment
*	Full-line comment
/* */	Block comment
{} {;} {||}	Literal date/literal array/codeblock markers
"" '' []	Literal strings
::	Name/database delimiters
#	Preprocessor directive

String delimiters

Topic group Related topics

Enclose literal strings in either:

- A set of single quote marks,
- A set of double quote marks, or
- A set of square brackets

The following example simply assigns the string “literal text” to the variable *xString*:

```
xString = "literal text"
```

To use a string delimiter in a literal string, use a different set of delimiters to delimit the string. For example:

```
? [There are three string delimiters: the ', the ",] + " and the []"
```

Note that the literal string had to be broken up into two separate strings, because all three kinds of delimiters were used.

Name/database delimiters

Topic group Related topics

If the name of a variable or a field in a work area contains a space, you may enclose the name in colons, for example:

```
local :a var:
:a var: = 4
? :a var:       // Displays 4
```

Creating variables with spaces in them is strongly discouraged, but for some table types, it is not unlikely to get field names with spaces. If you create automem variables for that table, those variables will also have spaces.

However, if you're using the data access objects instead of the Xbase DML, the fields are contained in a *fields* array and are referenced by name. The field name is a character expression, so you don't have to do anything different if the field name contains a space. The colons are not used.

You may also use colons when designating a table in a database. The name of the database is enclosed in colons before the name of the table, in the form:

```
:database:table
```

For example:

```
use :IBLOCAL:EMPLOYEE   // IBLOCAL is sample Interbase database
```

Comment symbols

Topic group Related topics

Two forward slashes (//, no space between them) indicate that all text following the slashes (until the next carriage return) is a comment. Comments let you provide reference information and notes describing your code:

```
x = 4 * y      // multiply the value of y by four and assign the result to
variable x
```

Two ampersands (&&) can also be used for an end-of-line comment, but they are usually seen in older code.

If an asterisk (*) is the first character in a statement, the entire line is considered a comment.

A pair of single forward slashes with “inside” asterisks (/* */) encloses a block comment that can be used for a multi-line comment block:

```
/* this is the first line of a comment block
this is more of the comment
this is the last line of the comment block */
```

You can also use the pair for a comment in the middle of a statement:

```
x = 1000000 /* a million! */ * y
```

Comment blocks cannot be nested. This example shows improper usage:

```
/* this is the first line of a comment block
this is more of the the same /* this nested comment will cause problems*/
this is the last line of the comment block */
```

After the opening block marker, *Visual* dBASE ends the comment at the next closing block marker it finds, which means that only the section of the comment from “this is the first line” to the word “problems” will be interpreted as a comment. The unenclosed remainder of the block will generate an error.

Statement separator, line continuation

Topic group Related topics

There is normally one statement per line in a program file. Use the semicolon to either:

- Combine multiple statements on a single line, or
- Create a multi-line statement

For example, a DO...UNTIL loop usually takes more than two lines: one for the DO, one for the UNTIL condition, and one or more lines in the loop body. But suppose all you want to do is loop until the condition is *true*; you can combine them using the semicolon as the statement separator:

```
do ; until rlock()    // Wait for record lock
```

Long statements are easier to read if break them up into multiple lines. Use the semicolon as the last non-comment character on the line to indicate that the statement continues on the next line. When the program is compiled, the comments are stripped; then any line that ends with a semicolon is tacked onto the beginning of the next line. For example, the program:

```
? "abc" + ;  // A comment
  "def" + ;
  ghi
```

is compiled as

```
? "abc" +   "def" +   ghi
```

on line 3 of the program file. Note that the spaces before the semicolons and the spaces used to indent the code are not stripped. If an error occurs because there is no variable named ghi, the error will be reported on line 3.

Codeblock, literal date, literal array symbol

Topic group Related topics

Braces ({ }) enclose codeblocks, literal dates, and literal array elements. They must always be paired. The following examples show how braces may be used in *Visual* dBASE code.

Literal dates are interpreted according to the current settings of SET DATE and SET EPOCH:

```
dMoon = {07/20/69}   // July 20, 1969 if SET DATE is MDY and SET EPOCH is
1900
```

To enclose arrays

```
a = {1,2,3}
? a[2]          // displays 2
```

To assign a statement codeblock to an object's event handling property

```
form.onOpen = {;msgbox("Warning: You are about to enter a restricted area.")}
```

To assign an expression codeblock to a variable, and pass parameters to it

```
c = {|x| x*9}
? c(4)              // returns 36
// or
q = {|n| {"1st","2nd","3rd"}[n]}
? q(2)                                      // displays "2nd"
```

To assign an expression codeblock to a variable, without passing parameters

```
c = {|| 4*9}      // pipes (||) must be included in an expression codeblock,
                  // even if a parameter is not being passed
? c()             // returns 36
```

Preprocessor directive symbol

Topic group Related topics

The number sign (#) marks preprocessor directives, which provide instructions to the *Visual* dBASE compiler. Preprocessor directives may be used in programs only.

Use directives in your *Visual* dBASE code to perform such compile-time actions as replacing text throughout your program, perform conditional compilations, include other source files, or specify compiler options.

The symbol must be the non-blank first character on a line, followed by the directive (with no space), followed by any conditions or parameters for the directive.

For example, you might use this statement:

```
#include "IDENT.H"
```

to include a source file named IDENT.H (the “H” extension us generally used to identify the file as a “header” file) in the compilation. The included file might contain its own directives, such as constant definitions:

```
//file IDENT.H: constant definitions for MYPROG
#define COMPANY_NAME  "Nobody's Business"
#define NUM_EMPLOYEES 1
#define COUNTRY       "Liechtenstein"
```

For a complete listing of all *Visual* dBASE preprocessor directives, along with syntax and examples for each, see Preprocessor.

Core language overview

Topic group

This section of the Help file describes the core features of the *Visual* dBASE programming language, primarily:

- Structural elements
- Function linking/loading
- Program flow
- Variable scoping
- Global properties and methods

Basic understanding of programming concepts such as loops and variables is assumed.

class Exception

Topic group Related topics Example

An object that describes an exception condition.

Syntax

[<oRef> =] new Exception()

<oRef>

A variable or property in which to store a reference to the newly created Exception object.

Properties

The following table lists the properties of the Exception class. (No events or methods are associated with this class.)

Property	Default	Description
className	Exception	Identifies the object as an instance of the Exception class
code		A numeric code to identify the type of exception
message	Empty string	Text to describe the exception

Event	Parameters	Description
none		

Method	Parameters	Description
none		

Description

An Exception object is automatically generated by *Visual* dBASE whenever an error occurs. The object's properties contain information about the error.

You can also create an Exception object manually, which you can fill with information and THROW to manage execution or to jump out of deeply nested statements.

You may subclass the Exception class to create your own custom exception objects. A TRY block may be followed by multiple CATCH blocks, each one looking for a different exception class.

class Exception example

Suppose you are using exceptions to manage execution in a deeply nested set of conditional statements and loops. You create your own exception class:

```
class JumpException of Exception
endclass
```

Then in the code, you create the JumpException object and THROW it if needed:

```
try
  local j
  j = new JumpException()
  // Lots of nested code
  ...
                       if lItsNoGood
                           throw j // Deep in the code, you want out
                       endif
  ...
catch ( JumpException e )
  // Do nothing; JumpException is OK
catch ( Exception e )
  // Normal error
  logError( new Date(), e.message ) // Record error message
  // and continue
endtry
```

If there is a normal error, the second CATCH block saves it to a log file, using a function you wrote, and execution continues.

class Object

Topic group Related topics Example

An empty object.

Syntax

[<oRef> =] new Object()

<oRef>

A variable or property in which to store a reference to the newly created object.

Properties

An object of the Object class has no initial properties, events, or methods.

Description

Use the Object class to create your own simple objects. Once the new object is created, you may add properties and methods through assignment. You cannot add events.

This technique of adding properties and methods on-the-fly is known as dynamic subclassing. In *Visual* dBASE, dynamic subclassing supplements formal subclassing, which is achieved through CLASS definitions.

The Object class is the only class in *Visual* dBASE that does not have the read-only *className* property.

class Object example

The following statements create a simple object with a few properties—some referenced by name and some referenced by number—and a codeblock as a method.

```
o = new Object()
o.title = "Summer"
o[ 2000 ] = "Sydney"
o[ 1996 ] = "Atlanta"
o.cityInYear = {|y| this[ y ]}
? o.cityInYear( 2000 ) // Displays "Sydney"
```

ARGCOUNT()

Topic group Related topics Example

Returns the number of parameters passed to a routine.

Syntax

ARGCOUNT()

Description

Use ARGCOUNT() to determine how many parameters, or arguments, have been passed to a routine. You may alter the behavior of the routine based on the number of parameters. If there are fewer parameters than expected, you may provide default values.

ARGCOUNT() returns 0 if no parameters are passed.

The function PCOUNT() is identical to ARGCOUNT(). Neither function recognizes parameters passed to codeblocks. If called within a codeblock, the function will return the parameter information for the currently executing FUNCTION or PROCEDURE.

ARGCOUNT() example

The following function returns someone's age. The first required parameter is the birthdate. The second optional parameter is the date to calculate the age. If the second parameter is not specified, the current date is used.

```
function age( dBirth, dCheck )
  if argcount() < 2
    dCheck = date()
  endif
  return floor( ( val( dtos( dCheck )) - val( dtos( dBirth )) ) / 10000 )
```

ARGVECTOR()

Topic group Related topics Example

Returns the specified parameter passed to a routine.

Syntax

ARGVECTOR(<parameter expN>)

<parameter expN>

The number of the parameter to return. 1 returns the first parameter, 2 returns the second parameter, etc.

Description

Use ARGVECTOR() to get a copy of the value of a parameter passed to a routine. Because it is a copy, there is no danger of modifying the parameter, even if it was a variable that was passed by reference. For more information on parameter passing, see PARAMETERS.

ARGVECTOR() can be used in a routine that receives a variable number of parameters, where declaring the parameters would be difficult.

ARGVECTOR() example

The following function returns the mean average of all the parameters passed to it, skipping any with a *null* value:

```
function mean()
  local nRet, nArg, nCnt
  nTot = 0
  nCnt = 0
  for nArg = 1 to argcount()
    if argvector( nArg ) # null
      nTot += argvector( nArg )
      nCnt++
    endif
  endfor
  return nTot / nCnt
```

CASE

Topic group Related topics

Designates a block of code in a DO CASE block.

Description

See DO CASE for details.

CATCH

Topic group Related topics

Designates a block of code to execute if an exception occurs inside a TRY block.

Description

See TRY...ENDTRY for details.

CLASS

Topic group

A class declaration including constructor code, which typically creates member properties, and class methods.

Syntax

```
CLASS <class name>[(<parameters>)]
   [OF <superclass name>[(<parameters>)]
      [CUSTOM]
      [FROM <filename expC>] ]{
   [PROTECT <propertyList>]
   [<constructor code>]
   [<methods>]
ENDCLASS
```

<class name>

The name of the class.

OF <superclass name>

Indicates that the class is a derived class that inherits the properties defined in the superclass. The superclass constructor is called before the <constructor code> in the current CLASS is called, which means that any properties created in the superclass are inherited by the class.

<parameters>

Optional parameters to pass to the class, and through to the superclass.

CUSTOM

Identifies the class as a custom component class, so that its predefined properties are not streamed out by the visual design tools.

FROM <filename>

<filename> specifies the file containing the definition code for the <superclass>, if the <superclass> is not defined in the same file as the class.

PROTECT <propertyList>

<propertyList> is a list of properties and/or methods of the class which are to be accessible only by other members of the class, and by classes derived from the class.

<constructor code>

The code that is called when a new instance of the class is created with the NEW operator or a DEFINE statement. The constructor consists of all the code at the top of the class declaration up to the first method.

<methods>

Any number of functions designed for the class.

ENDCLASS

A required keyword that marks the end of the CLASS structure.

Description

Use CLASS to create a new class.

A class is a specification, or template, for a type of object. *Visual* dBASE provides many stock classes, such as Form and Query; for example, when you create a form, you are creating a new Form object that has the standard properties and methods from the Form class. However, when you declare a class with CLASS, you specify the properties and methods that objects derived from the new class will have.

A CLASS declaration formalizes the creation of an object and its methods. Although you can always add properties to an object and assign methods dynamically, a CLASS simplifies the task and allows you to build a clear class hierarchy.

Another benefit is polymorphism. Every FUNCTION (or PROCEDURE) defined in the CLASS becomes a method of the class. An object of that class automatically has a property with the same name as each FUNCTION that contains a reference to that FUNCTION. Because a method is part of the CLASS, different functions may use the same name as long as they are methods of different classes. For example, you can have multiple copy() functions in different classes, with each one applying to objects of that class. Without classes, you would have to name the functions differently even if they performed the same task conceptually.

Before the first statement in the constructor is executed, if the CLASS extends another class, the constructor for that superclass has already been executed, so the object contains all the superclass properties. Any properties that refer to methods, as described in the previous paragraph, are assigned. This means that if the CLASS contains a method with the same name as a method in a superclass, the method in the CLASS overrides the method in the superclass. The CLASS constructor, if any, then executes.

In the constructor, the variable *this* refers to the object being created. Typically, the constructor creates properties by assigning them to *this* with dot notation. However, the constructor may contain any code at all, except another CLASS—you can't nest classes—or a FUNCTION, since that FUNCTION would become a method of the class and indicate the end of the constructor.

Properties and methods can be protected to prevent the user of the class from reading or changing the protected property values, or calling the protected methods from outside of the class.

className

Topic group Related topics

Identifies of which class the object is a member.

Property of

All classes except Object.

Description

The *className* property identifies the class constructor that originally created the object. Although you may dynamically subclass the object by adding new properties, the *className* property does not change.

The *className* property is read-only.

CLEAR MEMORY

Topic group

Clears all user-defined memory variables.

Syntax

CLEAR MEMORY

Description

Use CLEAR MEMORY to release all memory variables (except system memory variables), including those declared PUBLIC and STATIC and those initialized in higher-level routines. CLEAR MEMORY has no effect on system memory variables.

Note: CLEAR MEMORY does not explicitly release objects. However, if the only reference to an object is in a memory variable, releasing the variable with CLEAR MEMORY will in turn release the object.

Issuing RELEASE ALL in the Command window has the same effect as CLEAR MEMORY. However, issuing RELEASE ALL in a program clears only memory variables created at the same program level as the RELEASE ALL statement, and has no effect on higher-level, public, or static variables. CLEAR MEMORY, whether issued in a program or in the Command window, always has the same effect, releasing all variables.

To clear only selected memory variables, use RELEASE.

CLEAR PROGRAM

Topic group Related topics

Clears from memory all program files that aren't currently executing and aren't currently open with SET PROCEDURE or SET LIBRARY.

Syntax

CLEAR PROGRAM

Description

Program files are loaded into memory when they are executed with DO, and when they are loaded as library or procedure files with SET LIBRARY and SET PROCEDURE. When *Visual* dBASE is done with the program—the execution is complete, or the file is unloaded—the program file is not automatically cleared from memory. This allows these files to be quickly reloaded without having to reread them from disk. *Visual* dBASE's internal dynamic memory management will clear these files if it needs more memory; for example, when you create a very large array.

You may use CLEAR PROGRAM to force the clearing of all inactive program (object code) files from memory. The command doesn't clear files that are currently executing or files that are currently open with SET PROCEDURE or SET LIBRARY. However, if you close a file (for example, with CLOSE PROCEDURE), a subsequent CLEAR PROGRAM clears the closed file from memory.

CLEAR PROGRAM is rarely used in a deployed application. Because of the event-driven nature of *Visual* dBASE, program files must remain open to handle events; these files are not affected by CLEAR PROGRAM anyway. Also, the amount of memory used by dormant program files is small compared to the total amount of memory available. You are more likely to use CLEAR PROGRAM during development, for example to ensure that you are running the latest version of a program file, and not one that is stuck in memory.

CLOSE PROCEDURE

Topic group Related topics

Closes a procedure file, preventing further access and execution of its functions, classes, and methods.

Syntax

CLOSE PROCEDURE <filename>

<filename>

The procedure file you want to close. If you specify a file without including its extension, *Visual* dBASE assumes PRG

Description

CLOSE PROCEDURE reduces the load count of the specified program file by one. If that reduces its load count to zero, then that program file is closed, and its memory is marked as available for reuse.

Closing a program file does not automatically remove the file from memory. If a request is made to open that program file, and the file is still in memory and its source code has not been updated, it will be reopened without having to reread the file from disk. Use CLEAR MEMORY to release a closed program file from memory.

In a deployed application, it is not unusual to open program files as procedure files and never close them. Because of the event-driven nature of *Visual* dBASE, program files must remain open to respond to events. The memory used by a procedure file is small in comparison to the amount of system memory.

See SET PROCEDURE for a description of the reference count system used to manage procedure files. You may issue SET PROCEDURE TO to close all open procedure files, regardless of their load count.

DEFINE

Topic group Related topics

Creates an object from a class.

Syntax

DEFINE <class name> <object name>
[OF <container object>]
[FROM <row, col> TO <row, col> > | <AT <row, col>]
[PROPERTY <stock property list>]
[CUSTOM <custom property list>]

<class name>

The class of the object to create.

<object name>

The identifier for the object you create. <object name> will become an object reference variable, or a named property of the container if a <containter object> is specified.

OF <container object>

Identifies the object that contains the object you define.

FROM <row>, <col> TO <row>, <col> | AT <row>, <col>

Specifies the initial location and size of the object within its container. FROM and TO specify the upper left and lower right coordinates of the object, respectively. AT specifies the position of the upper left corner.

PROPERTY <stock property list>

Specifies values you assign to the built-in properties of the object.

CUSTOM <custom property list>

Specifies new properties you create for the object and the values you assign to them.

Description

Use DEFINE to create an object in memory. DEFINE provides an alternate, shorthand syntax for creating objects that directly maps to using the NEW operator. The equivalence depends on whether the object created with DEFINE is created inside a container object. With no container,

```
define <class name> <object name>
```

is equivalent to:

```
<object name> = new <class name>()
```

With a container,

```
define <class name> <object name> of <container object>
```

is equivalent to:

```
new <class name>( <container object>, "<object name>" )
```

where <object name> becomes an all-uppercase string containing the specified name. These two parameters, the container object reference and the object name, are the two properties expected by the class constructors for all stock control classes such as PushButton and Entryfield. For example, these two sets of statements are functionally identical (and you can use the first statement in one set with the second statement of the other set):

```
define Form myForm
define PushButton cancelButton of myForm
```

```
myForm = new Form()
new PushButton( myForm, "CANCELBUTTON" )
```

The FROM or AT clause of the DEFINE command provide a way to specify the *top* and *left* properties of an object, and the TO coordinates are used to calculate the object's *height* and *width*.

The PROPERTY clause allows assignment to existing properties only. Attempting to assign a value to a

non-existent property generates an error at runtime. This will catch spelling errors in property names, when you want to assign to an existing property; it prevents the creation of a new property with the misspelled name. Using the assignment-only (:=) operator has the same effect when assigning directly to a property in a separate assignment statement. In contrast, the CUSTOM clause will create the named property if it doesn't already exist.

While the DEFINE syntax offers some amenities, it is not as flexible as using the NEW operator and a WITH block. In particular, with DEFINE you cannot pass any parameters to the class constructor other than the two properties used for control containership, and you cannot assign values to the elements of properties that are arrays.

DO

Topic group Related topics

Runs a program or function.

Syntax

DO <filename> | ? | <filename skeleton> |
    <function name>
[WITH <parameter list>]

<filename> | ? | <filename skeleton>

The program file to execute. The ? and <filename skeleton> options display a dialog box from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the search path in search order. See "Search path and order" later in this section for more information.

If you specify a file without including its extension, *Visual* dBASE assumes a .PRO extension (a compiled object file). If *Visual* dBASE can't find a .PRO file, it looks for a .PRG file (a source file), which, if found, it compiles. By default, *Visual* dBASE creates the .PRO in the same directory as the .PRG, which might not be the current directory.

<function name>

The function name in an open program file to execute. The function must be in the program file containing the DO command that calls it, or in a separate open file on the search path. The search path is described later in this section.

WITH <parameter list>

Specifies memory variable values, field values, or any other valid expressions to pass as parameters to the program or function. See the description of PARAMETERS for information on parameter passing.

Description

Use DO to run program files from the Command window or to run other programs from a program. If you enter DO in the Command window, control returns to the Command window when the program or function ends. If you use DO in a program to execute another program, control returns to the program line following the DO statement when the program ends.

Although you may use DO to execute functions, common style dictates the use of the call operator (the parentheses) when calling functions, and the DO command when running a program file. The DO command supports the use of a file path and extension, and the ? and <filename skeleton> options. The call operator supports calling a function by name only. In the not-recommended situation where you have a program file that has the same name as a function loaded into memory, the DO command will execute the program file, and the call operator will executed the loaded function. Other than these differences, the two calling methods behave the same, and follow the same search rules described later in this section.

You may nest routines; that is, one routine may call another routine, which may call another routine, and so on. This series of routines, in the order in which they are called, is referred to as the call chain.

When *Visual* dBASE executes or loads a program file, it will automatically compile the program file into object code when either:

- There is no object code file, or
- SET DEVELOPMENT is ON, and program file is newer than the object code file (the source code file's last update date and time is later than the object code file's)

When *Visual* dBASE encounters a function call in a program file, it looks in that file for a FUNCTION or PROCEDURE of the specified name. If the current program file contains a FUNCTION and a PROCEDURE with the same name, *Visual* dBASE executes the first one declared. If *Visual* dBASE doesn't find a FUNCTION or PROCEDURE definition of the specified name in the same program file, it looks for a program file, FUNCTION, or PROCEDURE of the specified name on the search path in search order.

Search path and order

If the name you specify with DO doesn't include a path or a file-name extension, it can be a file, FUNCTION, or PROCEDURE name. To resolve the ambiguity, *Visual* dBASE searches for the name in specific places (the search path) in a specific order (the search order) and runs the first program or function of the specified name that it finds. The search path and order *Visual* dBASE uses is as follows:

1 The executing program's object file (.PRO)

2 Other open object files (.PRO) in the call chain, in most recently opened order

3 The file specified by SYSPROC = <filename> in VDB.INI

4 Any files opened with SET PROCEDURE, SET PROCEDURE...ADDITIVE, or SET LIBRARY statements, in the order in which they were opened

5 The object file (.PRO) with the specified name in the search path

6 The program file (.PRG) with the specified name in the search path, which *Visual* dBASE automatically compiles

The search path is controlled with the SET PATH command. It is not used when you are running a compiled EXE (a deployed application)—all program files must be linked into the executable. All path information is lost during linking and ignored during execution, which means that you cannot have more than one file with the same name, even if they originally came from different directories.

Because program files must be compiled into object code to be linked into a compiled EXE, the last search step, #6, does not apply when running a compiled EXE.

DO CASE

Topic group Related topics Example

Conditionally processes statements by evaluating one or more conditions and executing the statements following the first condition that evaluates to true.

Syntax

```
DO CASE
CASE <condition expL 1>
    <statements>
[CASE <condition expL 2>
    <statements>...]
[OTHERWISE
    <statements>]
ENDCASE
```

CASE <condition expL>

If the condition is true, executes the set of commands between CASE and the next CASE, OTHERWISE, or ENDCASE command, and then transfers control to the line following ENDCASE. If the condition is false, control transfers to the next CASE, OTHERWISE, or ENDCASE command.

<statements>

Zero or more statements to execute if the preceding CASE statement evaluates to *true*.

OTHERWISE

Executes a set of statements if all the CASE statements evaluate to *false*.

ENDCASE

A required keyword that marks the end of the DO CASE structure.

Description

DO CASE is similar to IF...ELSE...ENDIF. As with IF conditions, *Visual* dBASE evaluates DO CASE conditions in the order they're listed in the structure. DO CASE acts on the first true condition in the structure, even if several apply. In situations where you want only the first true instance to be processed, use DO CASE instead of a series of IF commands.

Also, use DO CASE when you want to program a number of exceptions to a condition. The CASE <condition> statements can represent the exceptions, and the OTHERWISE statement the remaining situation.

Starting with the first CASE condition, *Visual* dBASE does the following.

- Evaluates each CASE condition until it encounters one that's *true*
- Executes the statements between the first true CASE statement and the next CASE, OTHERWISE, or ENDCASE (if any)
- Exits the DO CASE structure without evaluating subsequent CASE conditions
- Moves program control to the first line after the ENDCASE command

If none of the conditions are true, *Visual* dBASE executes the statements under OTHERWISE if it's included. If no OTHERWISE statement exists, *Visual* dBASE exits the structure without executing any statements and transfers program control to the first line after the ENDCASE command.

DO CASE is functionally identical to an IF...ELSEIF...ENDIF structure. Both specify a series of conditions and an optional fallback (OTHERWISE and ELSE) if none of the conditions are *true*. Common style dictates the use of DO CASE when the conditions are dependent on the same variable, for example what key was pressed, while IF...ELSEIF...ENDIF is used when the conditions are not directly related. In addition, DO CASE usually involves more indenting of code.

DO CASE example

The following is a key event handler for a custom entryfield that handles dates. It recognizes special keystrokes to move the date forward or backward one day, to the first and last day of the month, and so forth:

```
function key( nChar, nPosition )
  local c1
  c1 = upper( chr( nChar ))
  do case
    case c1 == "T"                  // Today
      this.value := date()
    case c1 == "-" or c1 == "_"     // Next day
      this.value--
    case c1 == "+" or c1 == "="     // Previous day
      this.value++
    case c1 == "M"                  // First day of the month
      this.value := FDoM( iif( this.lastKey == "M", --this.value,
this.value ) )
    case c1 == "H"                  // Last day of the month
      this.value := LDoM( iif( this.lastKey == "H", ++this.value,
this.value ) )
    case c1 == "Y"                  // First day of the year
      this.value := FDoY( iif( this.lastKey == "Y", --this.value,
this.value ) )
    case c1 == "R"                  // Last day of the year
      this.value := LDoY( iif( this.lastKey == "R", ++this.value,
this.value ) )
    otherwise
      this.lastKey := null          // Clear stored keystroke
      return true                   // Handle key normally
  endcase
  this.lastKey := c1                // Store as property for comparison next
time
  return false                      // Ignore key
```

The functions FDoM(), LDoM(), FDoY(), and LDoY() are defined elsewhere.

DO WHILE

Topic group Related topics Example

Executes the statements between DO WHILE and ENDDO while a specified condition is *true*.

Syntax

```
DO WHILE <condition expL>
   [ <statements> ]
ENDDO
```

<condition expL>

A logical expression that is evaluated before each iteration of the loop to determine whether the iteration should occur. If it evaluates to *true*, the statements are executed. Once it evaluates to *false*, the loop is terminated and execution continues with the statement following the ENDDO.

<statements>

Zero or more statements executed in each iteration of the loop.

ENDDO

A required keyword that marks the end of the DO WHILE loop.

Description

Use a DO WHILE loop to repeat a statement or block of statements while a condition is *true*. If the condition is initially *false*, the statements are never executed.

You may also exit the loop with EXIT, or restart the loop with LOOP.

DO WHILE example

The following loop deletes all the orders for a particular customer, using the customer ID number to find their orders in the Order table:

```
function deleteAllOrders
  do while form.orders1.rowset.findKey( form.custID.value )
    form.orders1.rowset.delete()
  enddo
```

Note that if there are no orders in the table initally, the DO WHILE condition will fail, and nothing will happen.

DO...UNTIL

Topic group Related topics Example

Executes the statements between DO and UNTIL at least once while a specified condition is false.

Syntax

DO
  [<statements>]
UNTIL <condition expL>

<statements>

Zero or more statements executed in each iteration of the loop.

UNTIL <condition expL>

The statement that marks the end of the DO...UNTIL loop. <condition expL> is a logical expression that is evaluated after each iteration of the loop to determine whether the iteration should occur again. If it evaluates to *false*, the statements are executed. Once it evaluates to *true*, the loop is terminated and execution continues with the statement following the UNTIL.

Description

Use a DO...UNTIL loop to repeat a block of statements until a condition is *true* (in other words, while the condition is *false*). Because the condition is evaluated at the end of the loop, a DO...UNTIL loop always executes at least once, even when the condition is initially *true*.

You may also exit the loop with EXIT, or restart the loop with LOOP.

DO...UNTIL is rarely used. In most condition-based loops, you don't want to execute the loop at all if the condition is initially invalid. DO WHILE loops are much more common, because they check the condition before they begin.

In a DO WHILE loop, the condition fails—that is, the loop should not be executed—when it evaluates to *false*; in a DO...UNTIL loop, the condition fails when it evaluates to *true*. This is simply the result of the wording of the looping commands. You can easily reverse any logical condition by using the logical NOT operator or the opposite comparison operator (for example, less than instead of greater than or equal, or not equal instead of equal).

DO...UNTIL example

The first example shows a loop that goes through all the checkboxes on a form and sets their *value* to *false*. An object reference to the form's first control is assigned to a variable, and the reference is updated at the end of the loop to point to the next control in the tab order.

```
local oCtrl
oCtrl = form.first
do
  if oCtrl.className == "CHECKBOX"
    oCtrl.value := false
  endif
  oCtrl := oCtrl.before
until oCtrl == form.first
```

Because the DO...UNTIL checks the condition at the end of the loop, after the object reference has been updated, you can simply test if the reference has looped back to the beginning. To use the same test with a DO WHILE loop, you would have to maintain an extra flag to allow the loop to proceed the first time through.

The next example shows a basic loop that traverses all the rows in a rowset, referenced by the variable r:

```
if r.first()
  do
    // Something to do to each row
  until not r.next()
endif
```

To traverse the rowset, you must start at the first row. The first() method attempts to reposition the row cursor to the first row in the rowset, returning *true* to indicate success. It would return *false* if there are no rows in the rowset—no rows at all, or no rows that match any active filter conditions—in which case the IF fails and the DO...UNTIL loop is not executed at all. If it returns *true*, then there must be at least one row, and the DO...UNTIL loop body is executed.

After the loop body is executed, the rowset's next() method is called. It returns *true* unless it reaches the end-of-set. As long as it returns *true*, the logical NOT operator reverses the logical condition so that the UNTIL condition evaluates to *false*, and the loop continues. When it reaches the end-of-set, next() returns *false*, which gets reversed to *true*, satisfying the UNTIL condition and terminating the loop.

Compare the DO...UNTIL loop with the equivalent structure using DO WHILE:

```
r.first()
do while not r.endOfSet
  // Something to do to each row
  r.next
enddo
```

The rowset's endOfSet property is *true* if the rowset is at the end-of-set. The return value from the first() method is not checked, because the endOfSet property is checked at the beginning of the DO WHILE loop. If first() fails, it leaves the rowset cursor at the end-of-set. The return value of next() is also not checked, for the same reason. However, this loop is slightly less efficient because it goes through the extra step of checking the endOfSet property instead of simply using the return value of next(), which must be called to move to the next row.

This next example may look a bit odd:

```
do
until form.rowset.rlock()
```

but it simply retries the rlock() until it is successful. Note that the loop body is empty. You may want put a comment in the loop so you won't have to think about it in the future:

```
do
  // Wait for lock
```

```
until form.rowset.rlock()
```
or you can use the semicolon to put two statements on the same line:
```
do; until form.rowset.rlock()
```

ELSE

Topic group

Designates an alternate statement to execute if the condition in an IF statement is *false*.

Description

See IF for details.

ELSEIF

Topic group

Designates an alternate condition to test if the condition in an IF statement is *false*.

Description

See IF for details.

EMPTY()

Topic group Related topics

Returns *true* if a specified expression is empty.

Syntax

EMPTY(<exp>)

<exp>

An expression of any type.

Description

Use EMPTY() to determine if an expression is empty. The definition of empty depends on the type of the expression:

Expression type	Empty if value is
Numeric	0 (zero)
String	empty string (“”) or a string of just spaces (“ “)
Date	blank date ({ / / })
Logical	*false*
Null	*null* is always considered empty
Object reference	Reference points to object that has been released

Note that event properties that have not been assigned handlers have a value of *null*, and are therefore considered empty. In contrast, an object reference pointing to an object that has been released is not *null*; you must use EMPTY().

EMPTY() is similar to ISBLANK(). However, ISBLANK() is intended to test field values; it differentiates between zero and blank values in numeric fields, while EMPTY() does not. EMPTY() understands null values and object references, while ISBLANK() does not. For more information, see ISBLANK().

EXIT

Topic group Related topics Example

Immediately terminates the current loop. Execution continues with the statement after the loop.

Syntax

EXIT

Description

Normally, all of the statements in the loop are executed in each iteration of the loop; in other words, the loop always exits after the last statement in the loop. Use EXIT to exit a loop from the middle of a loop, due to some extra or abnormal condition.

In most cases, you don’t have to resort to using EXIT; you can code the condition that controls the loop to handle the extra condition. The condition is tested between loop iterations, after the last statement, but that usually means that there are some statements that should not be executed because of this condition. Those statements would have to be conditionalized out with an IF statement. Therefore, often it’s simpler to EXIT out of a loop immediately once the condition occurs.

EXIT example

The following function counts the number of words in a string by counting spaces between words. Multiple spaces between two words are counted as a single space and therefore a single word:

```
function wordCount( cArg )
  local nRet, cRemain, nPos
  nRet    = 0
  cRemain = ltrim( trim( cArg ))
  do while "" # cRemain
    nRet++
    nPos = at( " ", cRemain )
    if nPos == 0
      exit
    else
      cRemain := ltrim( substr( cRemain, nPos ))
    endif
  enddo
  return nRet
```

The condition in the DO WHILE loop is really needed only once, the first time the loop is entered. It makes sure that there is some text to search through. If the argument is an empty string or all spaces, the loop is not executed and the word count is zero. After the first loop, it is used simply to keep the loop going, since there would always be text to check.

The loop is terminated when there are no more spaces in the string. This is determined by the return value of the AT() function. Because the position returned is out of range for the SUBSTR() function, it should be called if there are no more spaces in the string. By using EXIT, the loop is immediately terminated once no more spaces are found. Execution continues with the RETURN statement following the DO WHILE loop.

FINALLY

Topic group

Designates a block of code that always executes after a TRY block, even if an exception occurs.

Description

See TRY...ENDTRY for details.

FINDINSTANCE()

Topic group Example

Returns an object of the specified class from the object heap.

Syntax

FINDINSTANCE(<classname expC> [, <previous oRef>])

<classname expC>

The name of the class you want to find an instance of. <classname expC> is not case-sensitive.

<previous oRef>

When omitted, FINDINSTANCE() returns the first instance of the specified class. Otherwise, it returns the instance following <previous oRef> in the object heap.

Description

Use FINDINSTANCE() to find any instance of a particular class, or to find all instances of a class in the object heap.

Objects are stored in the object heap in no predefined order. Creating a new instance of a class or destroying an instance may reorder all other instances of that class. A newly created object is not necessarily last in the heap.

Sometimes you will want to make sure there is only one instance of a class, and reuse that instance; a particular toolbar is the prime example. To see if there is an instance of that class, call FINDINSTANCE() with the class name only. If the return value is *null*, there is no instance of that class in memory.

Other times, you may want to iterate through all instances of a class to perform an action. For example, you may want to close all data entry forms, which are all instances of the same class. Call FINDINSTANCE() with the class name only to find the first instance of the class. Then call FINDINSTANCE() in a loop with the class name and the object reference to get the next instance in the object heap. When FINDINSTANCE() returns *null*, there are no more instances.

FINDINSTANCE() example

The first example checks if there is already an instance of the the EditToolbar class. If not, one is created.

```
function attachEditToolbar( formObj )
  local t
  t = findinstance( "EditToolbar" )
  if empty( t )                              // If null, no instance exists,
so
    t = new EditToolbar()                    // Create one (defined in this
file)
    set procedure to program(1) additive     // Load this file as procedure
file
  endif
  t.attach( formObj )
```

The second example finds all instances of the OrderForm class and closes them.

```
function closeAllOrders()
  local f
  f = findinstance( "OrderForm" )
  do while not empty( f )
    f.close()
    f := findinstance( "OrderForm", f )
  enddo
```

FOR...ENDFOR

Topic group Related topics Example

Executes the statements between FOR and ENDFOR the number of times indicated by the FOR statement.

Syntax

FOR <memvar> = <start expN> TO <end expN> [STEP <step expN>]
  [<statements>]
ENDFOR | NEXT

<memvar>

The loop counter, a memory variable that's incremented or decremented and then tested each time through the loop.

<start expN>

The initial value of <memvar>.

<end expN>

The final allowed value of <memvar>.

STEP <step expN>

Defines a step size (<step expN>) by which *Visual* dBASE increments or decrements <memvar> each time the loop executes. The default step size is 1.

When <step expN> is positive, *Visual* dBASE increments <memvar> until it is greater than <end expN>. When <step expN> is negative, *Visual* dBASE decrements <memvar> until it is less than <end expN>.

<statements>

Zero or more statements executed in each iteration of the loop.

ENDFOR | NEXT

A required keyword that marks the end of the FOR loop. You may use either ENDFOR (more dBASE-ish) or NEXT.

Description

Use FOR...ENDFOR to execute a block of statements a specified number of times. When *Visual* dBASE first encounters a FOR loop, it sets <memvar> to <start expN>, and reads the values for <end expN> and <step expN>. (If <end expN> or <step expN> are variables and are changed inside the loop, the loop will not see the change and the original values will still be used to control the loop.)

The loop counter is checked at the beginning of each iteration of the loop, including the first iteration. If <memvar> evaluates to a number greater than <end expN> (or less than <end expN> if <step expN> is negative), *Visual* dBASE exits the FOR loop and executes the line following ENDFOR (or NEXT). Therefore, it’s possible that the loop body is not executed at all.

If <memvar> is in the range from <start expN> through <end expN>, the loop body is executed. After executing the statements in the loop, <step expN> is added to <memvar>, and the loop counter is checked again. The process repeats until the loop counter goes out of range.

You may also exit the loop with EXIT, or restart the loop with LOOP.

The <memvar> is usually used inside the loop to refer to numbered items, and continues to exist after the loop is done, just like a normal variable. If you do not want the variable to be the default private scope, you should declare the scope of the variable before the FOR loop.

FOR...ENDFOR loop example

The following event handler creates a new row, carrying over the values in the current row. The values in the current row are copied to a temporary array, a new row is created, and the values are copied fromthe array.

```
function newButton_onClick
  local a, n
  a = new Array()
  for n = 1 to form.rowset.fields.size
    a.add( form.rowset.fields[ n ].value )
  endfor
  form.rowset.beginAppend()
  for n = 1 to form.rowset.fields.size
    form.rowset.fields[ n ].value := a[ n ]
  endfor
```

FUNCTION

Topic group Related topics

Defines a function in a program file including variables to represent parameters passed to the function.

Syntax

FUNCTION <function name>[([<parameter list>])]
  [<statements>]

<function name>

The name of the function. Although *Visual* dBASE imposes no limit to the length of fucnction names, it recognizes only the first 32 characters.

(<parameter list>)

Variable names to assign to data items (or parameters) passed to the function by the statement that called it. The variables in <parameter list> are local in scope, protecting them from modification in lower-level subroutines. For more information about the local scope, see LOCAL.

<statements>

Any statements that you want the function to execute. You can call functions recursively.

Description

Use functions to create code modules. By putting commonly used code in a function, you can easily call it whenever needed, pass parameters to the function, and optionally return a value. You also create more modular code, which is easier to debug and maintain.

When a FUNCTION is defined inside a CLASS definition, the FUNCTION is considered a method of that CLASS. You cannot nest functions.

The keywords FUNCTION and PROCEDURE are interchangable in *Visual* dBASE.

A single program file can contain a total of 184 functions and methods. Each class also counts as one function (for the class constructor). To access more functions simultaneously, use SET PROCEDURE...ADDITIVE. The maximum size of a function is limited to the maximum size of a program file.

When a function is called via an object, usually as a method or event handler, the variable *this* refers to the object that called the function.

Function naming restrictions

Do not give a function the same name as the file in which it's contained. Statements at the beginning of the file, before any FUNCTION, PROCEDURE, or CLASS statement, are considered to be a function (not counted against the total limit) with the same name as the file. (This function is sometimes referred to as the "main" procedure in the program file.) Multiple functions with the same name do not cause an error, but the first function with that name is the only one that is ever called.

Don't give the function the same name as a built-in *Visual* dBASE function. You cannot call such a function with the DO command, and if you call the function with the call operator (parentheses), *Visual* dBASE always executes its built-in function instead.

Also do not give the function a name that matches a *Visual* dBASE command keyword. For example, you should not name a function OTHER() because that matches the beginning of the keyword OTHERWISE. When you call the OTHER() function, the compiler will think it's the OTHERWISE keyword and will generate an error, unless you happen to be in a DO CASE block, in which case it will be treated like the OTHERWISE keyword, instead of calling the function.

These function naming restrictions do not apply to methods, because calling a method through the dot or scope resolution operator clearly indicates what is being called. However, you may run into problems calling methods inside a WITH block. See WITH for details.

Making procedures available

You can include a procedure in the program file that uses it, or place it in a separate program file you access with SET PROCEDURE or SET LIBRARY. If you include a procedure in the program file that

uses it, you should place it at the end of the file and group it with other procedures.

When you call a procedure, *Visual* dBASE searches for it in the search path in search order. If there is more than one procedure available with the same name, *Visual* dBASE runs the first one it finds. For this reason, avoid using the same name for more than one procedure. See the description of DO for an explanation of the search path and order *Visual* dBASE uses.

IF

Topic group

Conditionally executes statements by evaluating one or more conditions and executing the statements following the first condition that evaluates to *true*.

Syntax

```
IF <condition expL 1>
   [ <statements> ]
[ELSEIF <condition expL 2>
   <statements>
[ELSEIF      <condition expL 3>
   <statements>...]]
[ELSE
   [ <statements> ]]
ENDIF
```

<condition expL>

A logical expression that determines if the set of statements between IF and the next ELSE, ELSEIF, or ENDIF command execute. If the condition is *true*, the statements execute. If the condition is false, control passes to the next ELSE, ELSEIF, or ENDIF.

<statements**>**

One or more statements that execute depending on the value of <condition expL>.

ELSEIF <condition expL> <statements>

Specifies that when the previous IF or ELSEIF condition is false, control passes to this ELSEIF <condition expL>. As with IF, if the condition is true, only the set of statements between this ELSEIF and the next ELSEIF, ELSE, or ENDIF execute. If the condition is false, control passes to the next ELSEIF, ELSE, or ENDIF.

You can enter this option as either ELSEIF or ELSE IF. The ellipsis (...) in the syntax statement indicates that you can have multiple ELSEIF statements.

ELSE <statements**>**

Specifies statements to execute if all previous conditions are *false*.

ENDIF

A required keyword that marks the end of the IF structure.

Description

Use IF to evaluate one or more conditions and execute only the set of statements following the first condition that evaluates to *true*. For the first true condition, *Visual* dBASE executes the statements between that program line and the next ELSEIF, ELSE, or ENDIF, then skips everything else in the IF structure and executes the program line following ENDIF. If no condition is true and an associated ELSE command exists, *Visual* dBASE executes the set of statements after ELSE and then executes the program line following ENDIF.

Use IF...ENDIF to test one condition and IF...ELSEIF...ENDIF to test two or more conditions. If you have more than three conditions to test, consider using DO CASE instead of IF. Compare the example in this section with the example for DO CASE.

If you’re evaluating a condition to decide which value you want to assign to a variable or property, you may be able to use the IIF() function, which involves less duplication (you don’t have to type the target of the assignment twice).

You can nest IF statements to test multiple conditions; however, the ELSEIF option is an efficient alternative. When you use ELSEIF, you don't need to keep track of which ELSE applies to which IF, nor do you have to put in an ending ENDIF.

You can put many statements for each condition. If the number of statements in a set makes the code

hard to read, consider putting them in a function and calling the function from the IF statement instead.

IIF()

Topic group Related topics

Returns one of two values depending on the result of a specified logical expression.

Syntax

IIF(<expL>, <exp1>, <exp2>)

<expL>

The logical expression to evaluate to determine whether to return <exp1> or <exp2>.

<exp1>

The expression to return if <expL> evaluates to *true*.

<exp2>

The expression to return if <expL> evaluates to *false*. The data type of <exp2> doesn't have to be the same as that of <exp 1>.

Description

IIF() stands for "immediate IF" and is a shortcut to the IF...ELSE...ENDIF programming construct. Use IIF() as an expression or part of an expression where using IF would be cumbersome or not allowed. In particular, if you’re evaluating a condition to decide which value you want to assign to a variable or property, using IIF() involves less duplication (you don’t have to type the target of the assignment twice).

If <exp1> and <exp2> are *true* and *false*, in either order, using IIF() is redundant because <expL> must evaluate to either *true* or *false* anyway.

LOCAL

Topic group Related topics

Declares memory variables that are visible only in the routine where they're declared.

Syntax

LOCAL <memvar list>

<memvar list>

The list of memory variables to declare local.

Description

Use LOCAL to declare a list of memory variables available only to the routine in which the command is issued. Local variables differ from those declared PRIVATE in the following ways:

- Private variables are available to lower-level subroutines, while local variables are not. Local variables are accessible only to the routine—the program or function—in which they are declared.
- TYPE() does not “see” local variables. If you want to determine the TYPE() of a local variable, you must copy it to a private (or public) variable and call TYPE() with that variable name in a string.
- You cannot use a local variable for macro substitution with the & operator. Again, you must copy it to a private (or public) variable first.

Despite these limitations, local variables are generally preferred over private variables because of their limited visibilty. You cannot accidentally overwrite them in a lower-level routine, which would happen if you forget to hide a public variable; nor can you inadvertently use a variable created in a higher-level routine, thinking that it’s one declared in the current routine, which would happen if you misspell the variable name in the current routine.

Note: The special variables *this* and *form* are local.

You must declare a variable LOCAL before initializing it to a particular value. Declaring a variable LOCAL doesn't create it, but it does hide any higher-level variable with the same name. After declaring a variable LOCAL, you can create and initialize it to a value with STORE or =. (The := operator will not work at this point because the variable hasn’t been created yet.) Local variables are erased from memory when the routine that creates them finishes executing.

For more information, see PUBLIC for a table that compares the scope of public, private, local, and static variables.

LOOP

Topic group Related topics

Skips the remaining statements in the current loop, causing another loop iteration to be attempted.

Syntax

LOOP

Description

Conditional statements are often used inside a loop to control which statements are executed in each loop iteration. For example, in a loop that processes the rows in an employee table, you might want to increase the monthly salary of non-managers and the annual bonus for managers, all in the same loop.

There can be many different sets of statements in the loop, each with a different combination of conditions dictating whether they should be executed. Sometimes you can be in the middle of a loop, and none of the remaining statements apply. The condition that determines this may be nested a few levels deep. While it would be possible to code the rest of the loop with conditional statements to take this condition into account, often it's simpler to use a LOOP statement when this condition is encountered. This causes the remaining statements in the loop to be skipped, and the next iteration of the loop to be attempted.

OTHERWISE

Topic group

Designates a block of code in a DO CASE block to execute if there are no matching CASE blocks.

Description

See DO CASE for details.

PARAMETERS

Topic group Related topics Example

Assigns data passed from a calling routine to private variables.

Syntax

PARAMETERS <parameter list>

<parameter list>

The memory variable names to assign, separated by commas.

Description

There are three ways to access values passed to program or function:

- Variable names may be declared on the FUNCTION (or PROCEDURE) line in parentheses. These variables are local to that routine.
- Variable names may be declared in a PARAMETERS statement. These variables are private in scope.
- The values may be retrieved through the ARGVECTOR() function.

Passed values may be assigned to variables only once in a routine. You may either create local variables on the FUNCTION line or use the PARAMETERS statement, and you may only use the PARAMETERS statement once.

The ARGVECTOR() function returns copies of the passed values, and has no effect nor is affected by the other two techniques.

In general, local variables are preferred because they cannot be accidentally overwritten by a lower-level routine. Reasons to use PARAMETERS instead include:

- Using values passed to a program file: a program file may contain statements that are not part of a function or class, like the statements in the Header of a WFM file. Because there is no FUNCTION or PROCEDURE line, there is no place to declare local parameters. A PARAMETERS statement must be used instead.
- You specifically want the parameters to be private, so they can for example be modified by a lower-level routine, or be used in a macro substitution.

For more information on the difference between local and private variable scope, see LOCAL.

If you specify more variables in the <parameter list> than values passed to the routine, the extra variables assume a value of *false*. If you specify fewer variables, the extra values do not get assigned.

The PARAMETERS statement should be at or near the top of the routine. This is good programming style; there is no rule requiring this.

Passing mechanisms

There are two ways to pass parameters, by reference or by value. This section uses the term "variable" to refer to both memory variables and properties.

- If you pass variables by reference, the called function has direct access to the variable. Its actions can change (overwrite) the value in that variable. Pass variables by reference if you want the called function to manipulate the values stored in the variables it receives as parameters.
- If you pass variables by value, the called function gets a copy of the value contained in the variable. Its actions can't change the contents of the variable itself. Pass variables by value if you want the called function to use the values in the variables without changing their values—on purpose or by accident—in the calling subroutine.

The following rules apply to parameter passing mechanisms:

- Literal values (like 7) and calculated expression values (like xVar + 3) must be passed by value—there is no reference for the called function to manipulate, nor is there any way to tell that the parameter has been changed.
- Memory variables and properties may be passed by reference or by value. The default is pass-by-reference.
- The scope declaration of a variable (local, private, etc.) does not have any effect on whether the

variable is passed by reference or by value. The scope declaration protects the name of the variable. That name is used inside the calling routine; the called function assigns its own name (which is often different but sometimes happens to be the same) to the parameter, making the scope declaration irrelevant.

- To pass a variable or property by value, enclose it in parentheses when you pass it.

Passing objects

Because an object reference is itself a reference, passing one as a parameter is a bit more complicated:

- Passing a variable (or property) that contains an object reference by reference means that you can change the contents of that variable, so that it points to another object, or contains any other value.
- Even if you pass an object reference by value, you can access that object, and change any of its properties. This is because the value of a object reference is still a reference to that object.

Passing fields in XBase DML

With the XBase DML, fields are accessed directly by name (instead of a Field object's *value* property). When used as parameters, they are always passed by value, so the called function can't change their contents.

There are two ways to alter the contents of an XBase field with a function:

- Store its contents to a memory variable and call the function with that variable. When control returns to the calling routine, REPLACE the field contents with the memory variable contents.
- Design the function to accept a field name. Pass the name of the field, and have the function REPLACE the contents of the named field, using macro substitution to convert the field name to a field reference.

Protecting parameters from change

Because the decision whether to pass by reference or by value is made by the caller, the called function doesn't know whether it's safe to modify the parameter. It's a good idea to copy parameters to work variables and to use those variables instead if their values are going to be changed, unless the intent of the function is specifically to modify the parameters.

PARAMETERS example

The following contrived examples demonstrate the various aspects of the parameter passing mechanism. With the following program file, DOUBLE.PRG:

```
parameters arg
arg *= 2        // Double passed parameter
```

from the Command window, typing the following statements results in the values shown in the comments:

```
x = 7
double( x )         // Call as variable
? x                 // Displays 14, pass by reference
double( x + 0 )     // Call as an expression
? x                 // Displays 14, pass by value
double( (x) )       // Call with parentheses around variable name
? x                 // Displays 14, pass by value
o = new Object()
o.x = 5
double( o.x )       // Call as property
? o.x               // Displays 10, pass by reference
double( (o.x) )     // Call with parentheses around property name
? o.x               // Displays 10, pass by value
```

With the following program DOUBLEX.PRG, designed specifically to modify the property x of the passed object:

```
parameters oArg
oArg.x *= 2
```

typing the following statements in the Command window results in the values shown in the comments:

```
doublex( o )        // Pass by reference
? o.x               // Displays 10, property modified
doublex( (o) )      // Pass by value
? o.x               // Displays 20, property still modified
```

With the following program ILIKEAPP.PRG:

```
parameter oArg
oArg := _app
```

passing by value will prevent the object reference itself from being changed:

```
f = new Form()
ilikeapp( (f) )     // Pass by value
? f.className       // Displays FORM
ilikeapp( f )       // Pass by reference
? f.className       // Displays APPLICATION, object reference changed
g = "test"          // Another variable, this one with a string
ilikeapp( g )       // Pass by reference
? g.className       // Displays APPLICATION, variable changed to an object
reference
```

Note that you when assigning to a variable that was passed by reference, you are free to change the type of the variable.

parent

Topic group

The immediate container of an object.

Property of

Most data access, form, and report objects

Description

Many objects are related in a containership hierarchy. If the container object— referred to as the parent —is destroyed, all the objects it contains—referred to as child objects—are also destroyed. Child objects may be parents themselves and contain other objects. Destroying the highest-level parent destroys all the descendant child objects.

An object's *parent* property refers to its parent object.

For example, a form contains both data access objects and visual components. A Query object in a form has the form as its parent. The Query object contains a rowset, which contains an array of fields, which in turn contains Field objects. Each object in the hierarchy has a *parent* property that refers back up the chain, up to the form, which has no parent. A button on the form also has a *parent* property that refers to the form. If the form is destroyed, all of the objects it contains are destroyed.

The *parent* property is often used to refer to sibling objects—other objects that are contained by the parent. For example, one Field object can refer to another by using the *parent* reference to go one level up in the hierarchy, then use the name of the other field to go back down one level to the sibling object.

The *parent* property is read-only.

PCOUNT()

Topic group

Returns the number of parameters passed to a routine.

Syntax

PCOUNT()

Description

PCOUNT() is identical to ARGCOUNT().

PRIVATE

Topic group Related topics

Declares variables that you can use in the routine where they're declared and in all lower-level subroutines.

Syntax

PRIVATE <memvar list> |
ALL
    [LIKE <memvar skeleton 1>]
    [EXCEPT <memvar skeleton 2>]

<memvar list>

The list of memory variables you want to declare private, separated by commas.

ALL

Makes private all memory variables declared in the subroutine.

LIKE <memvar skeleton 1>

Makes private the memory variables whose names are like the memory variable skeleton you specify for <memvar skeleton 1>. Use characters of the variable names and the wildcards * and ? to create <memvar skeleton 1>.

EXCEPT <memvar skeleton 2>

Makes private all memory variables except those whose names are like the memory variable skeleton you specify for <memvar skeleton 2>. Use characters of the variable names and the wildcards * and ? to create <memvar skeleton 2>. You can use LIKE and EXCEPT in the same statement, for example, PRIVATE ALL LIKE ?_* EXCEPT c_*.

Description

Use PRIVATE in a function to avoid accidentally overwriting a variable with the same name that was declared in a higher-level routine. Normally, variables are visible and changeable in lower-level routines. In effect, PRIVATE hides any existing variable with the same name that was not created in the current routine.It’s a good practice to always use LOCAL or PRIVATE. For example, if you write a function that someone else might use, you probably won’t know what variables they’re using. If you don’t use LOCAL or PRIVATE, you might accidentally change the value of one of their variables when they call your function.

Although they have some limitations, local variables are generally preferred over private variables because of their more limited visibilty. You cannot accidentally overwrite them in a lower-level routine, which would happen if you forget to hide a public variable; nor can you inadvertently use a variable created in a higher-level routine, thinking that it’s one declared in the current routine, which would happen if you misspell the variable name in the current routine. Also, private variables may be macro-substituted inadvertently with the & operator. For example, if you specify the *text* of a menu item as “&Close” to designate the letter C as the pick character and you happen to have a private variable named close, the variable with be macro-substituted when the menu is created. If the variable was declared local, this wouldn’t happen.

You must declare a variable PRIVATE before initializing it to a particular value. Declaring a variable PRIVATE doesn't create it, but it does hide any higher-level variable with the same name. After declaring a variable PRIVATE, you can create and initialize it to a value with STORE or =. (The := operator will not work at this point because the variable hasn’t been created yet.) Private variables are erased from memory when the routine that creates them finishes executing.

Unless declared otherwise, variables you initialize in programs are private. If you initialize a variable that has the same name as a variable created in the Command window or declared PUBLIC or PRIVATE in an earlier routine—in other words, a variable that is visible to the current routine—and don't declare the variable PRIVATE first, it is not created as a private variable. Instead, the routine uses and alters the value of the existing variable. Therefore, you should always declare your private variables, even though that is the default.

For more information, see PUBLIC for a table that compares the scope of public, private, local, and static variables.

PROCEDURE

Topic group

Defines a function in a program file including variables to represent parameters passed to the function.

Description

PROCEDURE is identical to FUNCTION. While earlier versions of dBASE differentiated between the two, these differences have been removed. The descriptive terms “function” and “procedure” are used interchangably in *Visual* dBASE. (The term “procedure file” refers to a program file opened with the SET PROCEDURE command, which is not restricted to a file that contains PROCEDUREs only.)

See FUNCTION for details.

PUBLIC

Topic group Related topics

Declares global memory variables.

Syntax

PUBLIC <memvar list>

<memvar list>

The memory variables to make public.

Description

A variable's scope is determined by two factors: its duration and its visibility. A variable's duration determines when the variable will be destroyed, and its visibility determines in which routines the variable can be seen.

Use PUBLIC to declare a memory variable that has an indefinite duration and is available to all routines and to the Command window.

You must declare a variable PUBLIC before initializing it to a particular value. Declaring a variable PUBLIC creates it and initializes it to *false*. Once declared, a public variable will remain in memory until it is explicitly released.

By default, variables you initialize in the Command window are public, and those you initialize in programs without a scope declaration are private. (Variables initialized in the Command window when a program is suspended are private to that program.) The following table compares the characteristics of variables declared PUBLIC, PRIVATE, LOCAL and STATIC in a routine called CreateVar.

	PUBLIC	PRIVATE	LOCAL	STATIC
Created when it is declared and initialized to a value of *false*	Y	N	N	Y
Can be used and changed in CreateVar	Y	Y	Y	Y
Can be used and changed in lower-level routines called by CreateVar	Y	Y	N	N
Can be used and changed in higher-level routines that call CreateVar	Y	N	N	N
Automatically released when CreateVar ends	N	Y	Y	N

Public variables are rarely used in programs. To maintain global values, it's better to create properties of the *_app* object. As properties, they will not conflict with variables that you might have with the same name, and they can communicate with each other more easily.

QUIT

Topic group Example

Closes all open files and terminates *Visual* dBASE.

Syntax

QUIT [WITH <expN>]

WITH <expN>

Passes a return code, <expN>, to the operating system when you exit *Visual* dBASE.

Description

Use QUIT to end your *Visual* dBASE work. It has the same effect as closing the *Visual* dBASE application.

If you include QUIT in a program file, *Visual* dBASE halts the program's execution and exits *Visual* dBASE. To end a program's execution without leaving *Visual* dBASE, use CANCEL or RETURN.

Use QUIT WITH <expN> to pass a return code to Windows or to another application.

QUIT example

At the end of a long day, suppose you want to exit *Visual* dBASE and run the latest 3-D shoot-em-up game, which requires 128 MB of RAM. Your hands are already on the home keys of the keyboard, so instead of reaching to press Alt-F4 or using the mouse to click the close button, you type the following in the Command window.

```
quit
```

REDEFINE

Topic group Related topics

Assigns new values to an object's properties.

Syntax

REDEFINE <class name> <*object name*>
[OF <container object>]
[FROM <row, col> TO <row, col> > | <AT <row, col>]
[PROPERTY <changed property list>]
[CUSTOM <new property list>]

<class name>

The class of the object you want to redefine.

<object name>

The identifier for the object you want to modify. <object name> is either an object reference variable, or a named property of the container if a <containter object> is specified.

OF <container object>

Identifies the object that contains the object you want to redefine.

FROM <row>, <col> TO <row>, <col> | AT <row>, <col>

Specifies the new location and size of the object within its container. FROM and TO specify the upper left and lower right coordinates of the object, respectively. AT specifies the position of the upper left corner.

PROPERTY <changed property list>

Specifies new values you assign to the existing properties of the object.

CUSTOM <new property list>

Specifies new properties you create for the object and the values you assign to them.

Description

Use REDEFINE to assign new values to the properties of an existing object.

While the REDEFINE syntax offers some amenities (like DEFINE), it is not as flexible as assigning values in a WITH block. In particular, with REDEFINE you cannot assign values to the elements of properties that are arrays.

RELEASE

Topic group Related topics

Deletes specified memory variables.

Syntax

RELEASE <memvar list> |
ALL
    [LIKE <memvar skeleton 1>]
    [EXCEPT <memvar skeleton 2>]

<memvar list>

The specific memory variables to release from memory, separated by commas.

ALL

Removes all variables in memory (except system memory variables).

LIKE <memvar skeleton 1>

Removes from memory all memory variables whose names are like the memory variable skeleton you specify for <memvar skeleton 1>. Use characters of the variable names and the wildcards * and ? to create <memvar skeleton 1>.

EXCEPT <memvar skeleton 2>

Removes from memory all memory variables except those whose names are like the memory variable skeleton you specify for <memvar skeleton 2>. Use characters of the variable names and the wildcards * and ? to create <memvar skeleton 2>. You can use LIKE and EXCEPT in the same statement, for example, RELEASE ALL LIKE ?_* EXCEPT c_*.

Description

Use RELEASE to clear memory variables. To remove large groups of variables, use the option ALL [LIKE <memvar skeleton 1>] [EXCEPT <memvar skeleton 2>].

If you issue RELEASE ALL [LIKE <memvar skeleton 1>] [EXCEPT <memvar skeleton 2>] in a programor function, *Visual* dBASE releases only the local and private variables declared in that routine. It doesn't release public or static variables, or variables declared in higher-level routines.

To release a variable by name, that variable must be in scope. For example, you may release a private variable declared in a higher-level routine by name, because the private variable is still visible; but you cannot release a local variable the same way because the local variable is not visible outside its routine.

Note: RELEASE does not explicitly release objects. However, if the only reference to an object is in a memory variable, releasing the variable with RELEASE will in turn release the object. In contrast, RELEASE OBJECT will explicitly release an object, but it does not release any variables that used to point to that object.

When control returns from a subroutine to its calling routine, *Visual* dBASE clears from memory all variables initialized in the subroutine that weren't declared PUBLIC or STATIC. Thus, you don't have to release a routine's local or private variables explicitly with RELEASE before the routine terminates.

release()

Topic group Related topics

Explicitly releases an object from memory.

Syntax

<oRef>.*release*()

<oRef>

An object reference to the object you want to release.

Property of

All form objects; all report objects except Band and StreamFrame.

Description

Visual dBASE manages memory and resources used by objects automatically. When there are no more variables or properties that reference an object and that object is not visible onscreen, the object is destroyed. Any components that are contained in the object, such as the components of a form, are also destroyed when the container is destroyed. Because of this automatic object management, there is usually no reason to call *release*().

release() explicitly releases an object from memory, returning *true* if successful. Any references that point to that object become invalid; attempting to use such a reference results in an error. If these references are tested with EMPTY(), it returns *true*.

For example, you might want to get rid of a single component in a form. You could *release*() that component, but in most cases you could just as easily hide the component by setting its *visible* property to *false*.

RELEASE OBJECT

Topic group Related topics

Explicitly releases an object from memory.

Syntax

RELEASE OBJECT <oRef>

<oRef>

An object reference to the object you want to release.

Description

RELEASE OBJECT functions identically to the *release*() method. See *release*() for details.

Because *release*() is a method, its use is preferred, especially when called from a method. But *release*() is not a method in all classes. Use RELEASE OBJECT when the object does not have a *release*() method, or to release an object regardless of its class.

If <oRef> is a variable, RELEASE OBJECT does not release that variable, or any other variables that point to the just-released object. Testing these variables with EMPTY() will return *true* once the object has been released.

RESTORE

Topic group Related topics

Copies the memory variables stored in the specified disk file to active memory.

Syntax

RESTORE FROM <filename> | ? | <filename skeleton>
[ADDITIVE]

<filename> | ? | <filename skeleton>

The file of memory variables to restore. RESTORE FROM ? and RESTORE FROM <filename skeleton> display a dialog box, from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the path you specify with SET PATH. If you specify a file without including its extension, *Visual* dBASE assumes MEM.

ADDITIVE

Preserves existing memory variables when RESTORE is executed.

Description

Use RESTORE with SAVE to retrieve and store important memory variables. All local and private variables are cleared at the end of execution of the routine that created them, while all public and static variables are cleared when you exit *Visual* dBASE. To preserve these values for future use, store them in a memory file by using SAVE. You can then retrieve these values later by using RESTORE.

SAVE saves simple variables only—those containing numeric, string, logical, or null values—and objects of class Array. It ignores all other object reference variables. Therefore you can neither SAVE nor RESTORE objects (other than arrays).

Without the ADDITIVE option, RESTORE clears all existing user memory variables before returning to active memory the variables stored in a memory file. Use ADDITIVE when you want to restore a set of variables while retaining those already in memory.

Note: If you use ADDITIVE and a restored variable has the same name as an existing variable, the restored variable will replace the existing one.

If you issue RESTORE in the Command window, *Visual* dBASE makes all restored variables public. When *Visual* dBASE encounters RESTORE in a program file, it makes all restored variables private to the currently executing function.

RETURN

Topic group Related topics

Ends execution of a program or function, returning control to the calling routine—program or function—or to the Command window.

Syntax

RETURN [<return exp>]

<return exp>

The value a function returns to the calling routine or the Command window.

Description

Programs and functions return to their callers when there are no more statements to execute. When ended this way, they do not return a value.

Use RETURN in a program or function to return a value, or to return before the end of the program or function.

If the RETURN is inside a TRY block, the corresponding FINALLY block, if any, is executed before returning. If there is a RETURN inside that FINALLY block, whatever it returns is returned instead.

SAVE

Topic group Related topics

Stores memory variables to a file on disk.

Syntax

SAVE TO <filename> | ? | <filename skeleton>
[ALL]
[LIKE <memvar skeleton 1>]
[EXCEPT <memvar skeleton 2>]

TO <filename> | ? | <filename skeleton>

Directs the memory variable output to be saved to the target file <filename>. By default, *Visual* dBASE assigns a MEM extension to <filename> and saves the file in the current directory. The ? and <filename skeleton> options display a dialog box in which you specify the name of the target file and the directory to save it in.

ALL

Stores all memory variables to the memory file. If you issue SAVE TO <filename> with no options, *Visual* dBASE also saves all memory variables to the memory file.

LIKE <memvar skeleton 1>

Stores in the target file the memory variables whose names are like the memory variable skeleton you specify for <memvar skeleton 1>. Use characters of the variable names and the wildcards * and ? to create <memvar skeleton 1>.

EXCEPT <memvar skeleton 2>]

Stores in the target file all memory variables except those whose names are like the memory variable skeleton you specify for <memvar skeleton 2>. Use characters of the variable names and the wildcards * and ? to create <memvar skeleton 2>.

Description

Use SAVE with RESTORE to store and retrieve important memory variables. Local and private variables are cleared at the end of the routine that created them, while public and static variables are cleared when you exit *Visual* dBASE. To preserve these values for future use, store them in a memory file with SAVE. Use RESTORE to retrieve them.

If SET SAFETY is ON and a file exists with the same name as the target file, *Visual* dBASE displays a dialog box asking if you want to overwrite the file. If SET SAFETY is OFF, any existing file with the same name is overwritten without warning.

Note: SAVE saves simple variables only—those containing numeric, string, logical, or null values—and objects of class Array. It ignores all other object reference variables. Therefore you can neither SAVE nor RESTORE objects (other than arrays). SAVE also does not save function pointer, bookmark, or system memory variables.

SET LIBRARY

Topic group Related topics

Opens a *Visual* dBASE program file as the library file, making its functions, classes, and methods available for execution.

Syntax

SET LIBRARY TO [<filename> | ? | <filename skeleton>]

<*filename*> | ? | <*filename skeleton*>

The program file to open. The ? and <filename skeleton> options display a dialog box from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the path you specify with SET PATH. If you specify a file without including its extension, *Visual* dBASE assumes .PRO (a compiled object file). If *Visual* dBASE can't find a .PRO file, it looks for a .PRG file (a source file). If *Visual* dBASE finds a .PRG file, it compiles it.

Description

SET LIBRARY is similar to SET PROCEDURE. Both commands open a program file, allowing access to the functions, classes, and methods the file contains. The difference is that while SET PROCEDURE can add a program file to a list of procedure files, there can be only one library file open at any time. The library file cannot be closed with the SET PROCEDURE command.

Otherwise, the library file is treated like a procedure file. The library and procedure files are searched in the order they were opened. You may want to designate a stable program file with core functionality as the library file, and all other program files as procedure files.

Issue SET LIBRARY TO without a file name to close the open library file.

SET PROCEDURE

Topic group Related topics

Opens a *Visual* dBASE program file as a procedure file, making its functions, classes, and methods available for execution.

Syntax

SET PROCEDURE TO
[<filename> | ? | <filename skeleton>] [ADDITIVE]

<filename> | ? | <filename skeleton>

The procedure file to open. The ? and <filename skeleton> options display a dialog box, from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the path you specify with SET PATH. If you specify a file without including its extension, *Visual* dBASE assumes .PRO (a compiled object file). If *Visual* dBASE can't find a .PRO file, it looks for a .PRG file (a source file). If *Visual* dBASE finds a .PRG file, it compiles it.

ADDITIVE

Opens the procedure file(s) without closing any you've opened with previous SET PROCEDURE statements. SET PROCEDURE TO < filename> (without the ADDITIVE option) closes all procedure files you've opened with previous SET PROCEDURE statements.

Description

To execute a function or method, that function must be loaded in memory. To be more precise, a simple pointer to that function must be in memory. The contents of the function itself are not necessarily in memory at any given time; if not, the contents get loaded into memory automatically when the function is executed. But if that function's pointer is in memory, it is considered to be loaded.

Whenever you execute a program file with DO (or with the call operator), it is loaded implicitly; pointers to all of the functions, classes, and methods in that file are loaded into memory. Therefore, code in a program file may always call any other functions or methods in the same file.

To access functions, classes, and methods in other program files, load the program file with SET PROCEDURE first. Its function pointers stay in memory until the program file is unloaded with CLOSE PROCEDURE or SET PROCEDURE TO (with no options).

Visual dBASE uses a reference count system to manage program files in memory. Each loaded program file has a counter for the number of times it has been loaded, either explicitly with SET PROCEDURE or implicitly. As long as the count is more than zero, the file stays loaded. Calling CLOSE PROCEDURE reduces the count by one. Therefore, if you issue SET PROCEDURE twice, you need to issue CLOSE PROCEDURE twice to close the program file.

A program file's load count has no impact on memory; it is simply a counter. Loading a program file 10 times uses the same amount of memory as loading it once.

Whenever a function is called, *Visual* dBASE looks for the routine in specific places in a specific order. After searching the program files in the call chain, *Visual* dBASE looks in files opened with SET PROCEDURE. See the DO command for an explanation of the search path and order.

To make the file containing the currently executing routine a procedure file—for example, after creating an object, to make the object's methods which are defined in the same file available to it—execute the following statement:

```
set procedure to program(1) additive
```

Some operations, such as assigning a menuFile to a form or opening a form defined in a WFM file, automatically open the associated file as a procedure file, and that statement is not necessary.

If you issue SET PROCEDURE TO with no options, *Visual* dBASE closes all procedure files you've opened with SET PROCEDURE. If you want to close only specific procedure files, use CLOSE PROCEDURE. The maximum number of open procedure files depends on available memory.

Note: A common mistake is to forget the ADDITIVE clause when opening a procedure file. This will

close all other open procedure files.

When *Visual* dBASE executes or loads a program file, it will automatically compile the program file into object code when either:

- There is no object code file, or
- SET DEVELOPMENT is ON, and program file is newer than the object code file (the source code file's last update date and time is later than the object code file's)

If a file is opened as a procedure file and the file is changed in the Source editor, the file is automatically recompiled so that the changed code takes effect immediately.

Use TYPE() to detect whether a function, class, or method is loaded into memory. If so, TYPE() will return "FP" (for function pointer), as shown in the following IF statements:

```
if type( "myfunc" ) # "FP"              // Function name
if type( "myclass::myclass" ) # "FP"    // Class constructor name
if type( "myclass::mymethod" ) # "FP"   // Method name
```

SET()

Topic group Related topics Example

Returns the current setting of a SET command or function key.

Syntax

SET(<expC> [,<expN>])

<expC>

A character expression that is the SET command or function key whose setting value to return.

<expN>

The nth such setting to return.

Description

Use SET() to get a SET or function key setting so that you can change it or save it. For example, you can issue SET() at the beginning of a routine to get current settings. You can then save these settings in memory variables, change the settings, and restore the original settings from the memory variables at the end of the routine.

When *Visual* dBASE supports a SET and a SET...TO command that use the same keyword, SET() returns the ON|OFF setting and SETTO() returns the SET...TO setting. For example, you can issue SET FIELDS ON, SET FIELDS OFF, or SET FIELDS TO <field list>. SET("FIELDS") returns "ON" or "OFF" and SETTO("FEILDS") returns the field list as a character expression.

If *Visual* dBASE supports a SET...TO command but not a corresponding SET command, SET() and SETTO() both return the SET...TO value. For example, SET("BLOCKSIZE") and SETTO("BLOCKSIZE") both return the same value.

When <expC> is a function key name, such as "F4", SET() returns the function key setting. To return the value of a Ctrl+function key setting, add 10 to the function key number; to return the value of a Shift+function key setting, add 20 to the function key number. That is, to return the value of Ctrl+F4, use SET("F14"), and to return the value of Shift+F4, use SET("F24").

If a procedure file is open, SET("PROCEDURE") returns the name of the procedure file. If more than one procedure file is open, SET("PROCEDURE") returns the name of the first one loaded. To return the name of another open procedure file, enter a number as the second argument; for example, SET("PROCEDURE",2) returns the name of the second procedure file that was loaded. If no procedure files are open, SET("PROCEDURE") returns an empty string ("").

The command you specify for <expC> can be abbreviated to four letters in most cases, following the same rules as those for abbreviating keywords. For example, SET("DECI") and SET("DECIMALS") have the same meaning. The <expC> argument is not case-sensitive.

SET() example

The following example stores the value of a setting at the beginning of a function, and restores it at the end.

```
function findMatch( xArg )
  local lRet
  private cExact               // Can't be local for macro substitution
  cExact = set( "EXACT" )      // Store "ON" or "OFF" to character variable
  set exact on
  lRet = seek( xArg )          // Does exact match exist?
  set exact &cExact            // Either "set exact ON" or "set exact OFF"
  return lRet
```

SETTO()

Topic group Related topics

Returns the current setting of a SET...TO command or function key.

Syntax

SETTO(<expC> [,<expN>])

<expC>

A character expression that is the SET...TO command whose setting value to return.

<expN>

The nth such setting to return.

Description

Use SETTO() to get a SET or function key setting so that you can change it or save it. For example, you can issue SETTO() at the beginning of a routine to get current settings. You can then save these settings in memory variables, change the settings, and restore the original settings from the memory variables at the end of the routine.

When *Visual* dBASE supports a SET and a SET...TO command that use the same keyword, SET() returns the SET setting and SETTO() returns the SET...TO setting. For example, you can issue SET FIELDS ON, SET FIELDS OFF, or SET FIELDS TO <field list>. SET("FIELDS") returns the ON or OFF setting and SETTO("FIELDS") returns the field list as a character expression.

SETTO() is almost identical to SET(). For more information, see SET().

STATIC

Topic group Related topics Example

Declares memory variables that are local in visibility but public in duration.

Syntax

STATIC <variable 1> [= <value 1>] [,<variable 2> [= <value>] ...]

<variable>

The variable to declare static.

<value>

The value to assign to the variable.

Description

Use STATIC to declare memory variables that are visible only to the routine where they're declared but are not automatically cleared when the routine ends. Static variables are different from other scopes of memory variables in two important ways:

- You can declare and assign a value to a static variable in a single statement, referred to as an in-line assignment.
- Static variables initialized in a single statement are assigned the initialization value whenever the variable is undefined, including the first time the routine is executed and after the variable is cleared.

You must declare a variable STATIC before initializing it to a particular value. Declaring a variable STATIC without an in-line assignment creates it and initializes it to *false*. Once declared, a static variable will remain in memory until it is explicitly released (usually with CLEAR MEMORY).

Because static variables are not released when the routine in which they are created ends, you can use them to retain values for subsequent times that routine runs. To do this, use an in-line assignment. The first time *Visual* dBASE encounters the STATIC declaration, the variable is initialized to the in-line value. If the subroutine is run again, the variable is not reinitialized; instead, it retains whatever value it had when the routine last ended.

Because *Visual* dBASE is a dynamic object-oriented language, you usually assign new properties to an object to retain values between method calls. For example, if you're calculating a running total in a report, you can create a property of the Report or Group object to store that number.

Static variables are only useful for truly generic functions that are not associated with objects, functions that might be called from different objects that need to share a persistent value, or for values that are maintained by a class—not each object. In this last case, the variables are referred to as static class variables.

For more information, see PUBLIC for a table that compares the scope of public, private, local, and static variables.

STATIC example

The following is a stopwatch function that returns the number of seconds since the last time it was called.

```
function stopwatch()
  local thisTime, nSecs
  thisTime = new Date().getTime()
  static lastTime = thisTime
  nSecs = ( thisTime - lastTime ) / 1000
  lastTime := thisTime
  return nSecs
```

The function uses a Date object's getTime() method, which keeps time in milliseconds. Whenever the function is called, the variable firstTime is set to the current time in milliseconds. The first time through the function, the lastTime variable is set to that same time. The difference is calculated, and then the value of thisTime is saved in the static variable lastTime for the next function call.

To reset the timer, call the function; you may ignore the return value. Then the next time you call the function, you will get the elapsed time. If you're measuring a series of intervals, call the function once between intervals. For example:

```
stopwatch()           // Reset timer
// Process 1
time1 = stopwatch()   // Time for first process
// Process 2
time2 = stopwatch()   // Time for second process
// etc.
```

The static variable lastTime maintains its value between function calls. The in-line assignment makes sure it has a value the first time the function is called (the function will return zero the first time), and is ignored from then on, unless the variable is explicitly released. The static variable is hidden to all other functions, so you can't accidentally overwrite it.

STORE

Topic group Related topics

Stores an expression to specified memory variables or properties.

Syntax

STORE <exp> TO <memvar list>

<exp>

The expression to store.

TO <memvar list>

The list of memory variables and/or properties to store <exp>, separated by commas.

Description

Use STORE to store any valid expression to a one or more variables or properties.

Common style dictates the use of STORE only when storing a single value to multiple locations. When storing to a single variable or property, an assignment operator, either = or :=, is preferred.

To specify the scope of a variable, use LOCAL, PRIVATE, PUBLIC, or STATIC before assigning a value to the variable.

THROW

Topic group Related topics Example

Generates an exception.

Syntax

THROW <exception oRef>

<exception oRef>

A reference to the Exception object you want to pass to the CATCH handler.

Description

Use THROW to manually generate an exception. THROW must pass a reference to an existing Exception object that describes the exception.

THROW example

Suppose you are using exceptions to manage execution in a deeply nested set of conditional statements and loops. You create your own exception class:

If there is a normal error, the second CATCH block saves it to a log file, using a function you wrote, and execution continues.

TRY

Topic group Related topics Example

A control statement used to handle exceptions and other deviations of program flow.

Syntax

```
TRY
   <statement block 1>
[ CATCH( <exception type1> <exception oRef1> )
   <statement block 2> ]
[ CATCH( <exception type2> <exception oRef2> )
   <statement block 3> ]
[ CATCH ... ]
[ FINALLY
   <statement block 4> ]
ENDTRY
```

TRY <statement block 1>

A statement block for which the following CATCH or FINALLY block—or both—will be used if an exception occurs during execution. A TRY block must be followed by either a CATCH block, a FINALLY block, or both.

CATCH <statement block 2>

A statement block that is executed when an exception occurs.

<exception type>

The class name of the exception to look for—usually, Exception.

<exception oRef>

A formal parameter to receive the Exception object passed to the CATCH block.

CATCH...

Catch blocks for other types of exceptions.

FINALLY <statement block 4>

A statement block that is always executed after the TRY block, even if an exception or other deviation of program flow occurs. If there is both a CATCH and a FINALLY, the FINALLY block executes after the CATCH block.

ENDTRY

A required keyword that marks the end of the TRY structure.

Description

An exception is a condition that is either generated by *Visual* dBASE, usually in response to an error, or by the programmer. By default, *Visual* dBASE handles an exception by displaying an error dialog and terminating the currently executing program. You can use FINALLY to make sure some code gets executed even if there is an exception, and CATCH to handle the exception yourself, in the following combinations:

- For a block of code that may generate an exception, place the code inside a TRY block. To prevent the exception from generating a standard error dialog and terminating execution, place exception handling code in a CATCH block after the TRY. If an exception occurs, execution immediately jumps to the CATCH block; no more statements in the TRY block are executed. If no exception occurs, the CATCH block is not executed.
- If there's some code that should always be executed at the end of a process, whether or not the process completes successfully, place that code in a FINALLY block. With TRY and FINALLY but no CATCH, if an exception occurs during the TRY block, execution immediately jumps to the FINALLY block; no more statements in the TRY block are executed. Since there was no CATCH, you would still have an exception, which if not handled by a higher-level CATCH as described later, *Visual* dBASE would handle as usual, after executing the FINALLY block. If no exception occurs, the FINALLY block is executed after

the TRY.

- If you have all three—TRY, CATCH, and FINALLY—if an exception occurs, execution immediately jumps to the CATCH block; after the CATCH block executes, the FINALLY block is executed. If there is no exception during the TRY, then the CATCH block is skipped, and the FINALLY block is executed.

The code that is covered by TRY doesn't have to be inside the statement block physically; the coverage exists until that entire block of code is executed. For example, you may have a function call inside a TRY block, and if an exception occurs while that function is executing—even if that function is defined in another programfile—execution jumps back to the corresponding CATCH or FINALLY.

A TRY block may be followed by multiple CATCH blocks, each with its own <exception type>. When an exception occurs, *Visual* dBASE compares the <exception type> with the *className* property of the Exception object. If they match, that CATCH block is executed and all others are skipped. If the *className* does not match, *Visual* dBASE searches the class hierarchy of that object to find a match. If no match is found, the next CATCH block is tested. Class name matches are not case-sensitive. For example, the DbException class is a subclass of the Exception class. If the blocks are arranged like this:

```
try
  // Statements
catch ( DbException e )
  // Block 1
catch ( Exception e )
  // Block 2
endtry
```

and a DbException occurs, execution goes to Block 1, because that's a match. If an Exception occurs, execution goes to Block 2, because Block 1 doesn't match, but Block 2 does. If the blocks are arranged the other way around, like this:

```
try
  // Statements
catch ( Exception e )
  // Block 1
catch ( DbException e )
  // Block 2
endtry
```

then all exceptions always go to Block 1, because all Exceptions are derived from the Exception class. Therefore, when using multiple CATCH blocks, list the most specific exception classes first.

You can generate exceptions on purpose with the THROW statement to control program flow. For example, if you enter deeply nested control structures or subroutines from a TRY block, you can THROW an exception from anywhere in the nested code. This would cause execution to jump back to the corresponding CATCH or FINALLY, instead of having to exit each control structure or subroutine one-by-one.

You may also nest TRY structures. An exception inside the TRY block causes execution to jump to the corresponding CATCH or FINALLY, but an exception in a CATCH or FINALLY is simply treated as an exception. Also, if you have a TRY and FINALLY but no CATCH, that leaves you with an unhandled exception. If the TRY/CATCH/FINALLY is itself inside a TRY block, then that exception would be handled at that next higher level, as illustrated in the following code skeleton:

```
try
  // exception level 1
  try
    // exception level 2
  catch ( Exception e )
    // handler for level 2
    // but exception level 1
  finally
    // level 2
  endtry
```

```
catch ( Exception e )
  // handler for level 1
endtry
```

Note that if an exception occurs in the level 2 CATCH, the level 2 FINALLY is still executed before going to the level 1 CATCH, because a FINALLY block is always executed after a TRY block.

In addition to exceptions, other program flow deviations—specifically EXIT, LOOP, and RETURN—are also caught by TRY. If there is a corresponding FINALLY block, it's executed before control is transferred to the expected destination. (CATCH catches only exceptions.)

TRY example

The following example illustrates how to code a transaction, which is an all-or-nothing attempt at multiple database changes. If any of the changes should fail—for example, attempting to write a new record to disk, which would fail if there was no more disk space—the entire transaction must be rolled back:

```
try
  form.rowset.parent.database.beginTrans() // Begin the transaction
  //
  // make changes
  //
  form.rowset.parent.database.commit()     // If you got this far, there were
no
                                           // errors, so commit the changes
catch ( Exception e )   // The parameter receives the Exception object that
describes
                        // the error (not used in this example, but required)
  form.rowset.parent.database.rollback()   // Undo any changes that did take
  // display an error message
endtry
```

This example runs a process in a subdirectory, the name of which is passed as the parameter cDir. It uses two TRY blocks to create the subdirectory if necessary, and return to the previous directory even if there is an error in the process:

```
try
  // Instead of bothering to see if the directory already exists
  md &cDir    // Go ahead and try to create the directory
catch ( Exception e )   // If there's an error creating the directory,
                        //   execution goes here.
  // Do nothing -- this assumes the error is because the directory already
exists.
  // By using a CATCH, the error is ignored.
finally
  cd &cDir    // Now try and go to that directory
  // At this point, if you can't go to the directory, then that's a real
error.
  // That would be handled normally, since the error occurred in the FINALLY
and
  // is not nested inside another TRY.
endtry
try
  //
  // Run the process
  //
// No CATCH, so if there's an error, there will be a dialog
finally
  // But because of this FINALLY, the previous directory will be restored
regardless.
  // This makes the code easier to re-test, since you don’t have to switch
back to
  // your main directory manually after an error.
  cd ..
endtry
```

Note that in the first TRY block, the statement to switch to the subdirectory doesn’t have to be in a FINALLY block. Unlike the second TRY block, where the FINALLY will switch back to the parent directory even if there is an error, the switch to the subdirectory would work just as well between the two

TRY blocks. It’s shown in the FINALLY as an example of what would happen if there is an exception in a FINALLY block.

TYPE()

Topic group Related topics Example

Returns a character string that indicates a specified expression's data type.

Syntax

TYPE(<expC>)

<expC>

A character string containing the expression whose type to evaluate and return.

Description

Use TYPE() to determine the data type of an expression, including whether a variable is undefined.

TYPE() expects a character string containing the expression. This allows you to specify a variable name that may not exist. (If you were to use an actual expression with an undefined variable instead of putting the expression in a string, the expression would cause an error.) The <expC> may be any valid character expression, including a variable or a literal string representing the expression to evaluate.

TYPE() returns a character string containing a one- or two- letter code indicating the data type. The following table lists the values TYPE() returns.

Expression type	TYPE() code
Array object	A
DBF or Paradox binary field (BLOB)	B
Bookmark	BM
Character field or string value, Paradox alphanumeric field	C
Codeblock	CB
Date field or value, Paradox date field	D
Float field, Paradox numeric or currency field	F
Function pointer	FP
OLE (general) field	G
Logical field or value	L
DBF or Paradox memo field	M
DBF numeric field or value	N
Object reference (other than Array)	O
Undefined variable, field, invalid expression, or *null*	U

Note that an object of class Array is a special case. Unlike other objects, its code is “A” (this is for backward compatibility with earlier versions of dBASE).

TYPE() cannot “see” variables declared as local or static. If there is a public or private variable hidden by a local or static variable of the same name, then TYPE() will return the code for that hidden variable. Otherwise, that variable and any expression using that variable is considered undefined.

Use TYPE() to detect whether a function, class, or method is loaded into memory. If so, TYPE() will return “FP” (for function pointer), as shown in the following IF statements, which detect if the named function is not loaded (this is done to determine if the specified function needs to be loaded):

```
if type( "myfunc" ) # "FP"              // Function name
if type( "myclass::myclass" ) # "FP"    // Class constructor name
if type( "myclass::mymethod" ) # "FP"   // Method name
```

TYPE() example

The following statements demonstrate that TYPE() expects a character string containing an expression:

```
dVar = date()           // Create a date variable
? type( dVar )          // Error: Data type mismatch. Expecting: Character
? type( "dVar" )        // Displays "D" for Date, as do the next two
statements
? type( "D" + "var" )   // Any expression containing the variable name works
                        // (and variable names are not case-sensitive)
? type( "date()" )      // String can contain any expression, not just single
variable
```

The following routine is used to read the data in a generated text file into the corresponding fields of a table. Character fields in the text file are the same length as in the table. Dates are formatted in six characters as MMDDYY (which matches the current SET DATE format). Numbers are always twelve characters and represent currency stored in cents, so it needs to be divided by 100.

```
function decodeLine( cLine, aDest )
  #define YEAR_LEN 2
  #define NUM_LEN  12
  local nPtr, nFld, cFld, nLen
  nPtr = 1                    // Pointer into string
  for nFld = 1 to fldcount()
    cFld = field( nFld )      // Store name of field in string variable for
reuse
    do case
      case type( cFld ) == "C"
        aDest[ nFld ] = substr( cLine, nPtr, flength( nFld ))
        nPtr += flength( nFld )
      case type( cFld ) == "D"
        aDest[ nFld ] = ctod( substr( cLine, nPtr, 2 ) + "/" + ;
                              substr( cLine, nPtr + 2, 2 ) + "/" + ;
                              substr( cLine, nPtr + 4, YEAR_LEN ) )
        nPtr += 2 + 2 + YEAR_LEN
      case type( cFld ) == "N"
        aDest[ nFld ] = val( substr( cLine, nPtr, NUM_LEN )) / 100
        nPtr += NUM_LEN
    endcase
  endfor
```

An array is passed to the routine along with the line to read. The field values are stored in the array, which is appended to the table with APPEND FROM ARRAY in the calling routine (not shown here). The function defines some manifest constants for the size of a numeric field and whether the year is two or four digits in case this changes in the future. A FOR loop goes through each field in the table. The name of each field is stored in a variable for convenience; it's used repeatedly in the DO CASE structure. The variable is string containing the name of the field, which TYPE() expects. In contrast, TYPE("cFLD") would always return "C".

The following function is a slight variation on the TYPE() function. It returns the type of a value, but it expects the expression itself as a parameter instead of a string containing the expression. It therefore cannot handle undefined or invalid expressions, but it can handle local and static variables. It also returns the character "0" (zero) when the expression contains the value *null*, to differentiate it from expressions that have no value. For example, if you have a function that does not RETURN a value, that function call has an undefined value.

```
function valType
  parameter x
  return iif( x == null, "0", type( "x" ) )
```

The function works by taking the parameter as a private variable named x. Then if it's not *null*, the

TYPE() function is used with the string “x” to return the type of the parameter.

WITH

Topic group Example

A control statement that causes all the variable and property references within it to first assume that they are properties of the specified object.

Syntax

WITH <oRef>
  <statement block>
ENDWITH

<oRef>

A reference to the default object.

<statement block>

A statement block that assumes that the specified object is the default.

ENDWITH

A required keyword that marks the end of the WITH structure.

Description

Use WITH when working with multiple properties of the same object. Instead of using the object reference and the dot operator every time you refer to a property of that object, you specify the object reference once. Then every time a variable or property name is used, it is first checked to see if that name is a property of the specified object. If it is, then that property is used. If not, then the variable or property name is used as-is.

You cannot take advantage of the WITH syntax to create properties. For example:

```
with someObject
  existingProperty = 2
  newProperty = existingProperty
endwith
```

Suppose that existingProperty is an existing property of the object, and newProperty is not. In the first statement in the WITH block, the value 2 is assigned to the existing property. Then in the second statement, newProperty is treated like a variable, because it does not exist in the object. The statement creates a variable named newProperty, assigning to it the value of the existingProperty property.

Method name conflicts

You may encounter naming conflicts when calling methods inside a WITH block in two ways:

The name of the method matches the name of a built-in function. The built-in function takes precedence. For example, you create a class with a method center() and try to call it within a WITH block:

```
with x
  center()
  // other code
endwith
```

The CENTER() function would be called. It expects parameters, so you'll get a runtime error. You might check your center() method, which has no parameters, and wonder what's going on.

It may be possible to call your method by using the explicit object reference, which is normally redundant in a WITH block, and will not work if the object happens to have a property with the same name as the object reference. For example, you could call your center() method like this:

```
with x
  x.center()
  // other code
endwith
```

If the object x happens to have a property named x, then you would have to create a temporary duplicate reference that does not have the same name as the any other property of x outside the WITH block first:

```
y = x
with x
  y.center()
  // other code
endwith
```

The name of the method matches the first word of a command. For example, if the object f has a method named open(), the method call with the dot operator would look like:

```
f.open()
```

Using WITH, it would be:

```
with f
  open()
endwith
```

but that code will not work because the name of the method matches the first word in a *Visual* dBASE command; there are some commands that start with the word OPEN. When the compiler sees the word OPEN, it considers that statement to be a command starting with that keyword, and looks for the rest of the command; for example, OPEN DATABASE. When it doesn't find the rest of the command, it considers the statement to be incorrect and generates a compile-time error.

To call such a method inside a WITH block, you may use an explicit object reference as shown above, or change the statement from a direct method call to an indirect method call—an assignment or through the EMPTY() function. Many methods return values. By assigning the return value of the method call to variable, even a dummy variable, you bypass the naming conflict. For example, with another object that has a copy() method (there are several commands that begin with the word COPY):

```
with x
  dummy = copy()  // As long as x does not have property named dummy!
endwith
```

For methods that don't return values, you may use the EMPTY() function, which will safely "absorb" the undefined value:

```
with x
  empty( copy() )
endwith
```

WITH example

The following code from a WFM file assigns values to the properties of a newly created Query object inside a WITH block. In this excerpted code, *this* refers to the form:

```
this.messages1 = new Query()
with this.messages1
   left = 55.25
   top = 4.9
   sql = "select * from MESSAGES.DB"
   active = true
endwith
```

Without the WITH block, the code would have looked like this:

```
this.messages1 = new Query()
this.messages1.left = 55.25
this.messages1.top = 4.9
this.messages1.sql = "select * from MESSAGES.DB"
this.messages1.active = true
```

String object

Topic group

Visual dBASE supports two types of strings:

- A primitive string that is compatible with earlier versions of dBASE
- A JavaScript-compatible String object.

Visual dBASE will convert one type of string to the other on-the-fly as needed. For example, you may use a String class method on a primitive string value or a literal string:

```
? version().toUpperCase()
? "peter piper pickles".toProperCase()
```

This creates a temporary String object from which the method or property is called. You may also use a string function on a String object.

Many string object methods have built-in string functions that are practically identical, while others are merely similar with subtle differences.

Note: JavaScript is zero-based; dBASE is one-based. For example, to extract a substring starting with the third character, you would use the parameter 2 with the *substring*() method, and the parameter 3 with the SUBSTR() function.

The maximum length of a string in *Visual* dBASE is approximately 1 billion characters, or the amount of virtual memory, whichever is less.

class String

Topic group Example

A string of characters.

Syntax

[<oRef> =] new String([<expC>])

<oRef>

A variable or property in which you want to store a reference to the newly created String object.

<expC>

The string you want to create. If omitted or *null*, the resulting string is empty.

Properties

The following tables list the properties and methods of the String class. (No events are associated with this class.)

Property	Default	Description
className	STRING	Identifies the object as an instance of the String class
length		The number of characters in the string
string		The value of the String object

Method	Parameters	Description
anchor()	<expC>	Tags the string as an anchor <A NAME>
asc()	<expC>	Returns the ASCII value of the first character in the designated string
big()		Tags the string as big <BIG>
blink()		Tags the string as blinking <BLINK>
bold()		Tags the string as bold <BOLD>
charAt()	<index expN>	Returns the character in the string at the designated position
chr()	<expN>	Returns the character equivalent of the specified ASCII value
fixed()		Tags the string as fixed font <TT>
fontcolor()	<expC>	Tags the string as the designated color
fontsize()	<expN>	Tags the string as the designated font size
getByte()	<*index* expN>	Returns the value of the byte at the specified index in the string
indexOf()	<expC> [, <start index expN>]	Returns the position of the search string inside the string
isAlpha()		Returns *true* if the first character of the string is alphabetic
isLower()		Returns *true* if the first character of the string is lowercase
isUpper()		Returns *true* if the first character of the string is uppercase
italics()		Tags the string as in italics <I>
lastIndexOf()	<expC> [, <start index expN>]	Returns the position of the search string inside the string, searching backwards
left()	<expN>	Returns the specified number of characters from the beginning of the string
leftTrim()		Returns the string with all leading spaces removed
link()	<expC>	Tags the string as a link <A HREF>

replicate()	<expC> [, <expN>]	Returns the specified string repeated a number of times
right()	<expN>	Returns the specified number of characters from the end of the string
rightTrim()		Returns the string with all trailing spaces removed
setByte()	<*index* expN>, <*value* expN>	Assigns a new value to the byte at the specified index in the string
small()		Tags the string as small <SMALL>
space()	<expN>	Returns a string comprising the specified number of spaces
strike()		Tags the string as strikethrough <STRIKE>
stuff()	<start expN> , <quantity expN> [, <replacement expC>]	Returns the string with specified characters removed and others inserted in their place
sub()		Tags the string as subscript <SUB>
substring()	<start index expN> , <end index expN>	Returns a substring derived from the string
sup()		Tags the string as superscript <SUP>
toLowerCase()		Returns the string in all lowercase
toProperCase()		Returns the string in proper case
toUpperCase()		Returns the string in all uppercase

Description

A String object contains the actual string value, stored in the property *string*, and methods that act upon that value. The methods do not modify the value of *string*; they use it as a base and return another string, number, or *true* or *false*.

The methods are divided into three categories: those that simply wrap the string in HTML tags, those that act upon the contents of the string, and static class methods that do not operate on the string at all.

Because the return values for most string methods are also strings, you can call more than one method for a particular string by chaining the method calls together. For example,

```
cSomething.substring( 4, 7 ).toUpperCase()
```

class String example

When you concatenate a *null* to a string, the result is *null*. By passing a value that may be *null* through the String class constructor, you can safely concatenate two values without using cumbersome conditional constructs. For example, suppose you are combining, first name, middle initial, and last name. The middle initial field may be *null*. You can safely combine the three like this:

```
fullName = firstName + " " + new String( middleInitial + " " ) + lastName
```

If the middle initial is *null*, adding a space to it results in *null*, and the String object will be an empty string. If the middle initial is not *null*, adding a space will result in a space between the middle initial and the last name.

ASC()

Topic group Related topics Example

Returns the numeric ASCII value of a specified character.

Syntax

ASC(<expC>)

<expC>

The character whose ASCII value you want to return. You can specify a string with more than one character, but *Visual* dBASE uses only the first one.

Description

ASC() is the inverse of CHR(). ASC() accepts a character and returns its ASCII value—a number from 0 to 255, inclusive. CHR() accepts an ASCII value and returns its character.

Other than the syntactic difference of being a method instead of a function, the *asc*() method behaves identically to the ASC() function.

ASC() example

Executing the following statements in the Command window demonstrates the relation between ASC() and CHR():

```
? asc( "A" )                      // 65
? chr( asc( "A" ) + 32 )          // "a"
? asc( chr( asc( "A" ) + 32 ) )   // 97
```

In the following example, if the variable cDrive contains a drive letter, ASC() is used to convert the drive letter to a number suitable for the DISKSPACE() function.

```
nDiskSpace = diskspace( asc( cDrive ) - asc( "A" ) + 1 )
```

ASC()

Topic group Related topics

Returns the numeric ASCII value of a specified character.

Syntax

<oRef>.*asc*(<expC>)

<oRef>

A reference to a String object.

<expC>

The character whose ASCII value you want to return. You can specify a string with more than one character, but *Visual* dBASE uses only the first one.

Property of

String

Description

Other than the syntactic difference of being a method instead of a function, this method behaves identically to the ASC() function.

AT()

Topic group Related topics Example

Returns a number that represents the position of a string within another string.

Syntax

AT(<search expC>, <target expC> [, <nth occurrence expN>])

<search expC>

The string you want to search for in <target expC>.

<target expC>

The string in which to search for <search expC>.

<nth occurrence expN>

Which occurrence of the string to find. By default, *Visual* dBASE searches for the first occurrence. You can search for other occurrences by specifying the number, which must be greater than zero.

Description

AT() returns the numeric position where a search string begins in a target string. AT() searches one character at a time from left to right, beginning to end, from the first character to the last character. The search is case-sensitive. Use UPPER() or LOWER() to make the search case-insensitive.

You can specify which occurrence of the search string to find by specifying a number for <nth occurrence expN>. If you omit this argument, AT() returns the starting position of the first occurrence of the search string.

AT() returns 0 when

- The search string isn't found.
- The search string or target string is empty.
- The search string is longer than the target string.
- The <nth occurrence expN> occurrence doesn't exist.

When AT() counts characters in a memo field, it counts two characters for each carriage-return and linefeed combination (CR/LF) in the memo field.

Use RAT() to find the starting position of <search expC>, searching from right to left, end to beginning. Use the substring operator ($) to learn if one string exists within another.

The *indexOf*() method is similar to the AT() function, but in addition to the syntactic difference of being a method instead of a function and the fact that the position is zero-based, the method's optional parameter specifies where to start searching instead of the nth occurrence to find.

AT() example

The following function removes characters from a string by looking for the search string with the $ operator and replacing it with nothing.

```
? strip( "banana", "an" )      // Displays "ba"
function strip( cArg, cStrip )
  local cRet, nLen
  cRet = cArg
  nLen = len( cStrip )
  do while cStrip $ cRet
    cRet := stuff( cRet, at( cStrip, cArg ), nLen, "" )
  enddo
  return cRet
```

All the loop needs know is whether the substring is in the main string, not where it is, so the $ operator is slightly more convenient that using the AT() funciton. If the substring is in the main string, then STUFF() is used to remove it, using the position returned by AT(). The length of the substring is stored in a variable before the loop; it never changes so there's no need to get it repeatedly in the loop.

CENTER()

Topic group Related topics

Returns a character string that contains a string centered in a line of specified length.

Syntax

CENTER(<expC> [, <length expN> [, <pad expC>]])

<expC>

The text to center.

<length expN>

The length of the resulting line of text. The default is 80 characters.

<pad expC>

The single character to pad the string with if <length expN> is greater than the number of characters in <expC>. If <length expN> is equal to or less than the number of characters in <expC>, <pad expC> is ignored.

If <pad expC> is more than one character, CENTER() uses only the first character. If <pad expC> isn't specified, CENTER() pads with spaces.

Description

CENTER() returns a character expression with the requisite number of leading and trailing spaces to center it in a line that is a specified number of characters wide.

To create the resulting string, CENTER() performs the following steps.

- Subtracts the length of <expC> or <memo field> from <length expN>
- Divides the result in half and rounds up if necessary
- Pads <expC> on either side with that number of spaces or the first character in <pad expC>

If the length of <expC> or <memo field> is greater than <length expN>, CENTER() does the following:

- Subtracts <length expN> from the length of <expC>
- Divides the result in half and rounds up if necessary
- Truncates both sides of <expC> by that many characters

When the result of subtracting the length of <expC> from <length expN> is an odd number, CENTER() pads one less space on the left if the difference is positive, or truncates one less character on the left if the difference is negative.

charAt()

Topic group Related topics

Returns the character at the specified position in the string.

Syntax

<expC>.*charAt*(<expN>)

<expC>

A string.

<expN>

Index into the string, which is indexed from left to right. The first character of the string is at index 0 and the last character is at index <expC>.length - 1.

Property of

String

Description

charAt() returns the character in a String object at the specified index position. If the index position is after the last character in the string, *charAt*() returns an empty string.

CHR()

Topic group Related topics Example

Returns the character equivalent of a specified ASCII value.

Syntax

CHR(<expN>)

<expN>

The numeric ASCII value, from 0 to 255, inclusive, whose character equivalent you want to return.

Description

CHR() is the inverse of ASC(). CHR() accepts an ASCII value and returns its character, while ASC() accepts a character and returns its ASCII value.

Other than the syntactic difference of being a method instead of a function, the *chr*() method behaves identically to the CHR() function.

CHR() example

Executing the following statements in the Command window demonstrates the relation between ASC() and CHR():

```
? asc( "A" )                      // 65
? chr( asc( "A" ) + 32 )          // "a"
? asc( chr( asc( "A" ) + 32 ) )   // 97
```

CHR()

Topic group Related topics

Returns the character equivalent of a specified ASCII value.

Syntax

<oRef>.*chr*(<expN>)

<oRef>

A reference to a String object.

<expN>

The numeric ASCII value, from 0 to 255, inclusive, whose character equivalent you want to return.

Property of

String

Description

Other than the syntactic difference of being a method instead of a function, this method behaves identically to the CHR() function.

DIFFERENCE()

Topic group Related topics Example

Returns a number that represents the phonetic difference between two strings.

Syntax

DIFFERENCE(<expC1>, <expC2>)

<expC1>

The first character expression to evaluate the SOUNDEX() of and compare to the second value.

<expC2>

The second character expression to evaluate the SOUNDEX() of and compare to the first value.

Description

SOUNDEX() returns a four-character code that represents the phonetic value of a character expression. DIFFERENCE() compares the SOUNDEX() codes of two character expressions, and returns an integer from 0 to 4 that expresses the difference between the codes.

A returned value of 0 indicates the greatest difference in SOUNDEX() codes—the two expressions have no SOUNDEX() characters in common. A returned value of 4 indicates the least difference—the two expressions have all four SOUNDEX() characters in common. However, using DIFFERENCE() on short strings can produce unexpected results, as shown in the following example.

```
? soundex( "Mom" )          // Displays M500
? soundex( "Dad" )          // Displays D300
? soundex( "Mom", "Dad" )   // Displays 2
```

To compare the character-by-character similarity between two strings rather than the phonetic similarity, use LIKE().

DIFFERENCE() example

The following example sets a filter in the current work area to show those records whose Title field sounds like the word typed in the entryfield soundsLike:

```
function showTitlesLike_onClick()
  private cArg
  cArg = form.soundsLike.value
  set filter to difference( TITLE, "&cArg" ) == 4   // Best matches only
```

Macro substitution is used to convert the value in the entryfield into a literal string for the filter expression.

getByte()

Topic group Related topics Example

Returns the value of the byte at the specified index in the string.

Syntax

<oRef>.*getByte*(<index expN>)

<oRef>

A reference to the String object that you're using as a structure.

<index expN>

The index number of the desired byte. The first byte is at index number zero.

Property of

String

Description

Strings in *Visual* dBASE are Unicode strings, which use double-byte characters. Use *getByte*() when using a string as a structure that is passed to a DLL function that you have prototyped with EXTERN, to get the values of the bytes in the structure.

getByte() example

The GetClientRect() API function returns the coordinates of a window's client rectangle (the area inside the window borders) in a structure made up of four long integers: left, top, right, and bottom. A long integer is 32 bits, or 4 bytes. Therefore the rectangle structure is 16 bytes long. In a *Visual* dBASE string, each character is two bytes, so a string must be 8 characters long to store the rectangle structure.

The client rectangle coordinates are relative to the window's client area, so the left and top are always zero; the right and bottom coordinates contain the width and height of the client area. The following example displays the width of the client area of a default form in pixels:

```
if type( "GetClienRect" ) # "FP"
  extern CLOGICAL GetClientRect( CHANDLE, CPTR ) USER32
endif
c = space( 8 )         // 16-byte structure
f = new Form()
f.open()               // Form must be open to have valid hWnd
if GetClientRect( f.hWnd, c )
  ? c.getByte( 8 ) + bitlshift( c.getByte( 9 ), 8 )
endif
f.close()
```

The SPACE() function is used to create a string of the desired length. The entire structure will be overwritten by the function, so it doesn't matter that the string initially contains spaces.

After the function call, *getByte*() is used to extract the coordinate, byte-by-byte. The right coordinate starts at offset 8 (the left starts at offset 0, the top at offset 4, and the bottom at offset 12) with the low byte first. The second byte is shifted 8 bits to the left and added to the first byte. Only the first two bytes are used, because the width will always be well under 64 K pixels, the maximum number that can be represented by two bytes (16 bits).

indexOf()

Topic group Related topics

Returns a number that represents the position of a string within another string.

Syntax

<target expC>.*indexOf*(<search expC> [, <from index expN>])

<target expC>

The string in which you want to search for <search expC>.

<search expC>

The string you want to search for in <target expC>.

<from index expN>

Where you want to start searching for the string. By default, *Visual* dBASE starts searching at the beginning of the string, index 0.

Property of

String

Description

This method is similar to the AT() function, but in addition to the syntactic difference of being a method instead of a function and the fact that the position is zero-based, the optional parameter specifies where to start searching instead of the nth occurrence to find.

indexOf() returns an index representing where a search string begins in a target string. The first character of the string is at index 0 and the last character is at index <target expC>.length - 1. *indexOf*() searches one character at a time from left to right, beginning to end, from the character at <from index expN> to the last character. The search is case-sensitive. Use *toUpperCase*() or *toLowerCase*() to make the search case-insensitive.

indexOf() returns -1 when

- The search string isn't found.
- The search string or target string is empty.
- The search string is longer than the target string.

Use *lastIndexOf*() to find the starting position of <search expC>, searching from right to left, end to beginning.

ISALPHA()

Topic group Related topics

Returns *true* if the first character of a string is alphabetic.

Syntax

ISALPHA(<expC>)

<expC>

The string you want to test.

Description

ISALPHA() tests the first character of the string and returns *true* if it's an alphabetic character. ISALPHA() returns *false* if the character isn't alphabetic or if the character expression is empty.

The current language driver defines the character values that are lowercase and uppercase alphabetic. In a U.S. language driver, a lowercase alphabetic character is from a to z, and an uppercase alphabetic character is from A to Z.

Other than the syntactic difference of being a method instead of a function, the *isAlpha*() method behaves identically to the ISAPLHA() function.

isAlpha()

Topic group Related topics

Returns *true* if the first character of a string is alphabetic.

Syntax

<expC>.*isAlpha*()

<expC**>**

The string you want to test.

Property of

String

Description

Other than the syntactic difference of being a method instead of a function, this method behaves identically to the ISAPLHA() function.

ISLOWER()

Topic group Related topics

Returns *true* if the first character of a string is alphabetic and lowercase.

Syntax

ISLOWER(<expC>)

<expC>

The string you want to test.

Description

ISLOWER() tests the first character of the string and returns *true* if it's a lowercase alphabetic character. ISLOWER() returns *false* if the character isn't lowercase or if the character expression is empty.

The current language driver defines the character values that are lowercase and uppercase alphabetic. In a U.S. language driver, a lowercase alphabetic character is from a to z, and an uppercase alphabetic character is from A to Z.

Other than the syntactic difference of being a method instead of a function, the *isLower*() method behaves identically to the ISLOWER() function.

isLower()

Topic group Related topics

Returns *true* if the first character of a string is alphabetic and lowercase.

Syntax

<oRef>.*isLower*()

<expC**>**

The string you want to test.

Property of

String

Description

Other than the syntactic difference of being a method instead of a function, this method behaves identically to the ISLOWER() function.

ISUPPER()

Topic group Related topics

Returns *true* if the first character of a string is alphabetic and uppercase.

Syntax

ISUPPER(<expC>)

<expC>

The string you want to test.

Description

ISUPPER() tests the first character of the string and returns *true* if it's an uppercase alphabetic character. ISUPPER() returns *false* if the character isn't uppercase or if the character expression is empty.

The current language driver defines the character values that are lowercase and uppercase alphabetic. In a U.S. language driver, a lowercase alphabetic character is from a to z, and an uppercase alphabetic character is from A to Z.

Other than the syntactic difference of being a method instead of a function, the *isUpper*() method behaves identically to the ISUPER() function.

isUpper()

Topic group Related topics

Returns *true* if the first character of a string is alphabetic and uppercase.

Syntax

<expC>.*isUpper*()

expCThe string you want to test.

Property of

String

Description

Other than the syntactic difference of being a method instead of a function, this method behaves identically to the ISUPPER() function.

lastIndexOf()

Topic group Related topics

Returns a number that represents the starting position of a string within another string. *lastIndexOf*() searches backward from the right end of the target string, and returns a value counting from the beginning of the target.

Syntax

<target expC>.*lastIndexOf*(<search expC> [, <from index expN>])

<target expC>

The string in which you want to search for <search expC>.

<search expC>

The string you want to search for in <target expC>.

<from index expN>

Where you want to start searching for the string. By default, *Visual* dBASE starts searching at the end of the string, index <target expC>.length - 1.

Property of

String

Description

This method is similar to the RAT() function, but in addition to the syntactic difference of being a method instead of a function and the fact that the position is zero-based, the optional parameter specifies where to start searching instead of the nth occurrence to find.

Use *lastIndexOf*() to search for the <search expC> in a target string, searching right to left, end to beginning, from the character at <from index expN> to the first character. The search is case-sensitive. Use *toUpperCase*() or *toLowerCase*() to make the search case-insensitive.

Even though the search starts from the end of the target string, *lastIndexOf*() returns an index representing where a search string begins in a target string, counting from the beginning of the target. The first character of the string is at index 0 and the last character is at index <target expC>.length - 1. If <search expC> occurs only once in the target, *lastIndexOf*() and *indexOf*() return the same value. For example, “abcdef”.*lastIndexOf*(“abc”) and “abcdef”.*indexOf*(“abc”) both return 0.

lastIndexOf() returns -1 when:

- The search string isn’t found
- The search string or target string is empty
- The search string is longer than the target string

To find the starting position of <search expC>, searching from left to right, beginning to end, use *indexOf*().

LEFT()

Topic group Related topics Example

Returns a specified number of characters from the beginning of a string.

Syntax

LEFT(<expC>, <expN>)

<expC>

The string from which you want to extract characters.

<expN>

The number of characters to extract from the beginning of the string.

Description

Starting with the first character of a character expression, LEFT() returns <expN> characters. If <expN> is greater than the number of characters in the specified string, LEFT() returns the string as it is, without adding spaces to achieve the specified length. You can use LEN() to determine the actual length of the returned string.

If <expN> is less than or equal to zero, LEFT() returns an empty string. If <expN> is greater than or equal to zero, LEFT(<expC>, <expN>) achieves the same results as SUBSTR(<expC>, 1, <expN>).

When LEFT() returns characters from a memo field, it counts two characters for each carriage-return and linefeed combination (CR/LF).

Other than the syntactic difference of being a method instead of a function, the *left*() method behaves identically to the LEFT() function.

left()

Topic group Related topics

Returns a specified number of characters from the beginning of a character string.

Syntax

<expC>.*left*(<expN>)

<expC**>**

The string from which you want to extract characters.

<expN>

The number of characters to extract from the beginning of the string.

Property of

String

Description

Other than the syntactic difference of being a method instead of a function, this method behaves identically to the LEFT() function.

leftTrim()

Topic group Related topics

Returns a string with no leading space characters.

Syntax

<expC>.*leftTrim*()

<*expC*>

The string from which you want to remove the leading space characters.

Property of

String

Description

Other than the syntactic difference of being a method instead of a function, this method behaves identically to the LTRIM() function.

LEN()

Topic group Related topics

Returns the number of characters in a specified character string.

Syntax

LEN(<expC>)

<expC>

The character string whose length you want to find.

Description

LEN() returns the number of characters (the length) of a character string or memo field. The length of an empty character string or empty memo field is zero. When LEN() calculates the length of a memo field, it counts two characters for each carriage-return and linefeed combination (CR/LF).

Other than the syntactic difference of reading a property instead of calling a function, *length* contains the same value that LEN() returns.

length

Topic group Related topics

The number of characters in a specified character string.

Syntax

<expC>.*length*

<expC>

The character string whose length you want to find.

Property of

String

Description

A string's *length* property reflects the number of characters (the length) of a character string. The length of an empty character string is zero.

length is a read-only property.

Other than the syntactic difference of reading a property instead of calling a function, *length* contains the same value that LEN() returns.

LIKE()

Topic group Related topics

Returns *true* if a specified string matches a specified skeleton string.

Syntax

LIKE(<skeleton expC>, <expC>)

<skeleton expC>

A string containing a combination of characters and wildcards. The wildcards are ? and *.

<expC>

The string to compare to the skeleton string.

Description

Use LIKE() to compare one string to another. The <skeleton expC> argument contains wildcard characters and represents a pattern; the <expC> argument is compared to this pattern. LIKE() returns *true* if <expC> is a string that matches <skeleton expC>. To compare the phonetic similarity between two strings rather than the character-by-character similarity, use DIFFERENCE().

Use the wildcard characters ? and * to form the pattern for <skeleton expC>. An asterisk (*) stands for any number of characters, including zero characters. The question mark (?) stands for any single character. Both wildcards can appear anywhere and more than once in <skeleton expC>. Wildcard characters in <skeleton expC> can stand for uppercase or lowercase letters.

If * or ? appears in <expC>, they are interpreted as literal, not wildcard, characters, as shown in the following example.

```
? LIKE( "a*d", "abcd" )  // Displays true
? LIKE( "a*d", "aBCd" )  // Displays true
? LIKE( "abcd", "a*d" )  // Displays false
```

LIKE() is case-sensitive. Use UPPER() or LOWER() for case-insensitive comparisons with LIKE(). LIKE() returns *true* if both arguments are empty strings. LIKE() returns *false* if one argument is empty and the other isn't.

LOWER()

Topic group Related topics

Converts all uppercase characters in a string to lowercase and returns the resulting string.

Syntax

LOWER(<expC>)

<expC>

The string you want to convert to lowercase.

Description

LOWER() converts the uppercase alphabetic characters in a character expression or memo field to lowercase. LOWER() ignores digits and other characters.

The current language driver defines the character values that are lowercase and uppercase alphabetic. In a U.S. language driver, a lowercase alphabetic character is from a to z, and an uppercase alphabetic character is from A to Z.

Other than the syntactic difference of being a method instead of a function, the *toLowerCase*() method behaves identically to the LOWER() function.

LTRIM()

Topic group Related topics

Returns a string with no leading space characters.

Syntax

LTRIM(<expC>)

<expC>

The string from which you want to remove the leading space characters.

Description

LTRIM() returns <expC> with no leading space characters.

To remove trailing space characters from a string or memo field, use RTRIM() or TRIM().

Other than the syntactic difference of being a method instead of a function, the *leftTrim*() method behaves identically to the LTRIM() function.

PROPER()

Topic group Related topics

Converts a character string to proper-noun format and returns the resulting string.

Syntax

PROPER(<expC>)

<expC>

The character string to convert to proper-noun format.

Description

PROPER() returns <expC> with the first character in each word capitalized and the remaining letters set to lowercase. PROPER() changes the first character of a word only if it is a lowercase alphabetic character.

The current language driver defines the character values that are lowercase and uppercase alphabetic. In a U.S. language driver, a lowercase alphabetic character is from a to z, and an uppercase alphabetic character is from A to Z.

Other than the syntactic difference of being a method instead of a function, the *toProperCase*() method behaves identically to the PROPER() function.

RAT()

Topic group Related topics Example

Returns a number that represents the starting position of a string within another string. RAT() searches backward from the right end of the target string, and returns a value counting from the beginning of the target.

Syntax

RAT(<search expC>, <target expC> [, <nth occurrence expN>])

<search expC>

The string you want to search for in <target expC>.

<target expC>

The string in which to search for <search expC>.

<nth occurrence expN>

Which occurrence of the string to find. By default, *Visual* dBASE searches for the first occurrence from the end. You can search for other occurrences by specifying the number (based on starting from the end), which must be greater than zero.

Description

Use RAT() to search for the first or <nth occurrence expN> occurrence of <search expC> in a target string, searching right to left, end to beginning, from the last character to the first character. The search is case-sensitive. Use UPPER() or LOWER() to make the search case-insensitive.

Even though the search starts from the end of the target string or memo field, RAT() returns the numeric position where a search string begins in a target string, counting from the beginning of the target. If <search expC> occurs only once in the target, RAT() and AT() return the same value. For example, RAT("abc","abcdef") and AT("abc","abcdef") both return 1.

RAT() returns 0 when:

- The search string isn't found
- The search string or target string is empty
- The search string is longer than the target string
- The nth occurrence you specify with <nth occurrence expN> doesn't exist

To find the starting position of <search expC>, searching from left to right, beginning to end, use AT(). To learn if one string exists within another, use the substring operator ($).

The *lastIndexOf*() method is similar to the RAT() function, but in addition to the syntactic difference of being a method instead of a function and the fact that the position is zero-based, the optional parameter specifies where to start searching instead of the nth occurrence to find.

RAT() example

Here is a simple file name extraction function that extracts a file name for a path by looking for the last backslash character with RAT(). Everything that follows in the string is extracted with SUBSTR(). If there is no backslash, the entire string is returned.

```
? getFileName( "C:\\WINDOWS\\SOL.EXE" )
function getFileName( cArg )
  local nPos
  nPos = rat( "\", cArg )
  return iif( n >= 0, substr( cArg, ++nPos ), cArg )
```

Note that the position returned by RAT() is incremented before it is passed to SUBSTR(). Otherwise, the last backslash would be returned as well.

REPLICATE()

Topic group Related topics Example

Returns a string repeated a specified number of times.

Syntax

REPLICATE(<expC>, <expN>)

<expC>

The string you want to repeat.

<expN>

The number of times to repeat the string.

Description

REPLICATE() returns a character string composed of a character expression repeated a specified number of times.

If the character expression is an empty string, REPLICATE() returns an empty string. If the number of repeats you specify for <expN> is 0 or less, REPLICATE() returns an empty string.

To repeat space characters, use SPACE().

The *replicate*() method is almost identical to the REPLICATE() function, but in addition to the syntactic difference of being a method instead of a function, the repeat count is optional and defaults to 1.

REPLICATE() example

The following function pads the left side of a string with a specified character to make the result at least as long as needed.

```
? padl( "Test", 7, "*" )   // Displays ***Test
function padl( cArg, nLen, cPad )
  if argcount() < 3
    cPad = ""
  endif
  return replicate( left( cPad + " ", 1 ), nLen - len( cArg ) ) + cArg
```

To make sure only one character is repeated, a space is added to the parameter (in case the parameter is an empty string or was omitted), and the LEFT() function is used to extract the first character (in case the parameter was more than one character).

replicate()

Topic group Related topics

Returns a string repeated a specified number of times.

Syntax

<oRef>.*replicate*(<expC> [, <expN>])

<*oRef***>**

A reference to a String object.

<expC>

The string you want to repeat.

<expN>

The number of times to repeat the string; by default, 1.

Property of

String

Description

This method is almost identical to the REPLICATE() function, but in addition to the syntactic difference of being a method instead of a function, the repeat count is optional and defaults to 1.

RIGHT()

Topic group Related topics

Returns characters from the end of a character string.

Syntax

RIGHT(<expC>, <expN>)

<expC>

The string from which you want to extract characters.

<expN>

The number of characters to extract from the string.

Description

Starting with the last character of a character expression, RIGHT() returns a specified number of characters. If the number of characters you specify for <expN> is greater than the number of characters in the specified string or memo field, RIGHT() returns the string as is, without adding spaces to achieve the specified length. If <expN> is less than or equal to zero, RIGHT() returns an empty string.

Strings often have trailing blanks. You may want to remove them with TRIM() before using RIGHT().

When RIGHT() returns characters from a memo field, it counts two characters for each carriage-return and linefeed combination (CR/LF).

Other than the syntactic difference of being a method instead of a function, the *right*() method behaves identically to the RIGHT() function.

right()

Topic group Related topics

Returns characters from the end of a character string.

Syntax

<expC>.*right*(<expN>)

<expC**>**

The string from which you want to extract characters.

<expN>

The number of characters to extract from the string.

Property of

String

Description

Other than the syntactic difference of being a method instead of a function, this method behaves identically to the RIGHT() function.

rightTrim()

Topic group Related topics

Returns a string with no trailing space characters.

Syntax

<expC>.*rightTrim*()

<expC**>**

The string from which you want to remove the trailing space characters.

Property of

String

Description

Other than the syntactic difference of being a method instead of a function, this method behaves identically to the TRIM() function.

RTRIM()

Topic group Related topics

Returns a string with no trailing space characters.

Syntax

RTRIM(<expC>)

<expC>

The string from which you want to remove the trailing space characters.

Description

RTRIM() is identical to TRIM(). See TRIM() for details.

setByte()

Topic group | Related topics | Example

Assigns a new value to the byte at the specified index in the string.

Syntax

<oRef>.*setByte*(<index expN>, <value expN>)

<oRef>

A reference to the String object that you're using as a structure.

<index expN>

The index number of the byte to set. The first byte is at index number zero.

<value expN>

The new byte value, from 0 to 255.

Property of

String

Description

Strings in *Visual* dBASE are Unicode strings, which use double-byte characters. Use *setByte*() when using a string as a structure that is passed to a DLL function that you have prototyped with EXTERN, to set the values of the bytes in the structure.

The *length* of the structure string should be one-half the number of bytes in the structure, rounded up. Setting the individual bytes of a Unicode string will most likely cause the string to become unprintable.

setByte() example

Suppose you need to copy a string into a structure that is used by a function. The function expects the string to be composed of single-byte characters. *Visual* dBASE strings are double-byte, so you will need to use *setByte*() to copy each character of the string into the structure string, byte-by-byte.

The following function copies a string into a structure string at the specified offset, and pads the rest of the length in the structure will null characters.

```
function setStructString( cStruct, nIndex, cValue, nChars )
  if argcount() < 4
    nChars = len( cValue )  // Default length is length of string
  endif
  local n
  for n = 0 to min( len( cValue ), nChars ) - 1
    cStruct.setByte( nIndex + n, asc( cValue.charAt( n )) )
  endfor
  do while n < nChars       // Pad length with null characters
    cStruct.setByte( nIndex + n++, 0 )
  enddo
```

In the FOR loop, the MIN() function is used to copy all the characters in the string, or the specified number of characters, whichever is less. This means that you can safely pass a string of any length to the function, and as long as you specify the correct length, you don't have to worry about the string being too long. Each character is extracted with the *charAt*() method and converted to its ASCII value (a number from 0 to 255) with the ASC() function.

SOUNDEX()

Topic group Related topics Example

Returns a four-character string that represents the SOUNDEX (sound-alike) code of another string.

Syntax

SOUNDEX(<expC>)

<expC>

The string for which to calculate the soundex code.

Description

SOUNDEX() returns a four-character code that represents the phonetic value of a character expression. The code is in the form "letter digit digit digit," where "letter" is the first alphabetic character in the expression being evaluated. The more phonetically similar two strings are, the more similar their SOUNDEX codes.

Use SOUNDEX() to find words that sound similar, or are spelled similarly, such as names like "Smith," "Smyth," and "Smythe." Using the U.S. language driver, these all evaluate to S531.

SOUNDEX() returns "0000" if the character expression is an empty string or if the first nonblank character isn't a letter. SOUNDEX() returns 0's for the first digit encountered and for all following characters, regardless of whether they're digits or alphabetic characters.

To compare the SOUNDEX values of two character expressions or memo fields, use DIFFERENCE(). If you want to compare the character-by-character similarity between two strings rather than the phonetic similarity, use LIKE().

SOUNDEX() is language driver-specific. If the current language driver is U.S., SOUNDEX() does the following to calculate the phonetic value of a string:

- Ignores leading spaces.
- Ignores the letters A, E, I, O, U, Y, H, and W.
- Ignores case.
- Converts the first nonblank character to uppercase and makes it the first character in the SOUNDEX code.
- Converts B, F, P, and V to 1.
- Converts C, G, J, K, Q, S, X, and Z to 2.
- Converts D and T to 3.
- Converts L to 4.
- Converts M and N to 5.
- Converts R to 6.
- Removes the second occurrence of any adjacent letters that receive the same digits as phonetic values.
- Pads the end of the resulting string with zeros if fewer than three digits remain.
- Truncates the resulting string to three digits if more than three digits remain.
- Concatenates the first character of the code to the remaining three digits to create the "letter digit digit digit" soundex code.

SOUNDEX() example

To perform a sound-alike match for the Last_name field of a table, first create an index using SOUNDEX():

```
index on soundex( LAST_NAME ) tag LAST_SNDX
```

Then to perform the search, use SOUNDEX() on the search value entered, like this:

```
function searchButton_onClick()
  set order to LAST_SNDX
  if not seek( soundex( form.soundsLike.value ) )
    msgbox( "No names similar", "Search failed" )
  endif
```

SPACE()

Topic group Related topics

Returns a specified number of space characters.

Syntax

SPACE(<expN>)

<expN>

The number of spaces you want to return.

Description

SPACE() returns a character string composed of a specified number of space characters. The space character is ASCII code 32.

If <expN> is 0 or less, SPACE() returns an empty string.

To create a string using a character other than the space character, use REPLICATE().

Other than the syntactic difference of being a method instead of a function, the *space*() method behaves identically to the SPACE() function.

space()

Topic group Related topics

Returns a specified number of space characters.

Syntax

<*oRef*>.*space*(<expN>)

<oRef>

A reference to a String object.

<expN>

The number of spaces you want to return.

Property of

String

Description

Other than the syntactic difference of being a method instead of a function, this method behaves identically to the SPACE() function.

STR()

Topic group Related topics

Returns the character string equivalent of a specified numeric expression.

Syntax

STR(<expN> [, <length expN> [, <decimals expN> [, <expC>]]])

<expN>

The numeric expression to return as a character string.

<length expN>

The length of the character string to return. The valid range is 1 to 20, inclusive, and includes a decimal point, decimal digits, and minus sign characters. The default is 10. If <length expN> is smaller than the number of integer digits in <expN>, STR() returns asterisks (*).

<decimals expN>

The number of characters to reserve for decimal digits. The default and lowest allowable value is 0. If you do not specify a value for <decimals expN>, STR() rounds <expN> to the nearest whole number. If you want to specify a value for <decimals expN>, you must also specify a value for <length expN>.

<expC>

The character to pad the beginning of the returned character string with when the length of the returned string is less than <length expN> digits long. The default pad character is a space. If you want to specify a value for <expC>, you must also specify values for <length expN> and <decimals expN>. You can specify more than one character for <expC>, but STR() uses only the first one.

Description

Use STR() to convert a number to a string, so you can manipulate it as characters. For example, you can index on a numeric field in combination with a character field by converting the numeric field to character with STR().

Visual dBASE rounds and pads numbers to fit within parameters you set with <length expN> and <decimals expN>, following these rules:

- If <decimals expN> is smaller than the number of decimals in <expN>, STR() rounds to the most accurate number that will fit in <length expN>. For example, STR(10.765,5,1) returns " 10.8" (with a single leading space), and STR(10.765,5,2) returns "10.77".
- If <length expN> isn't large enough for <decimals expN> number of decimal places, STR() rounds <expN> to the most accurate number that will fit in <length expN>. For example, STR(10.765,4,3) returns "10.8".
- If <decimals expN> is larger than the number of decimals in <expN>, and <length expN> is larger than the returned string, STR() adds zeros (0) to the end of the returned string. *Visual* dBASE only adds enough zero to bring the number of decimal digits to a maximum of <decimals expN>.
- If the returned string is still shorter than <length expN>, dBASE pads the left to fill to the length of <length expN>. For example, STR(10.765,8,6) returns "10.76500" for a returned length of 8; STR(10.765,7,6) returns "10.7650" for a returned length of 7; and STR(10.765,12,6) returns " 10.765000" (with three leading spaces) for a returned length of 12.

To remove the leading spaces created by STR(), use LTRIM(). If you concatenate a number to a string with the + or - operators, *Visual* dBASE automatically converts the number to a string, using the number of decimal places specified by SET DECIMALS, and removes the leading spaces.

STUFF()

Topic group Related topics

Returns a string with specified characters removed and others inserted in their place.

Syntax

STUFF(<target expC>, <start expN>, <quantity expN>, <replacement expC>)

<target expC>

The string you want to remove characters from and replace with new characters.

<start expN>

The character position in the string at which you want to start removing characters.

<quantity expN>

The number of characters you want to remove from the string.

<replacement expC>

The characters you want to insert in the string.

Description

STUFF() returns a target character expression with a replacement character string inserted at a specified position. Starting at the position you specify, <start expN>, STUFF() removes a specified number, <quantity expN>, of characters from the original string.

If the target character expression is an empty string, STUFF() returns the replacement string.

If <start expN> is less than or equal to 0, STUFF() treats <start expN> as 1. If <quantity expN> is less than or equal to 0, STUFF() inserts the replacement string at position <start expN> without removing any characters from the target.

If <start expN> is greater than the length of the target, STUFF() doesn't remove any characters and appends the replacement string to the end of the target.

If the replacement string is empty, STUFF() removes the characters specified by <quantity expN> from the target, starting at <start expN>, without adding characters.

The *stuff*() method is almost identical to the STUFF() function, but in addition to the syntactic difference of being a method instead of a function and the fact that the position is zero-based, the replacement string is optional, and defaults to an empty string.

stuff()

Topic group Related topics

Returns a string with specified characters removed and others inserted in their place.

Syntax

<expC>.*stuff*(<start expN>, <quantity expN> [, <replacement expC>])

<expC**>**

The string in which you want to remove and replace characters.

<start expN>

The character position in the string at which you want to start removing characters.

<quantity expN>

The number of characters you want to remove from the string.

<replacement expC>

The characters you want to insert in the string. By default, this is an empty string.

Property of

String

Description

This method is almost identical to the STUFF() function. However, the *stuff*() method is zero-based (the function is one-based), a replacement string is optionsl, and the method defaults to an empty string.

SUBSTR()

Topic group Related topics Example

Returns a substring derived from a specified character string.

Syntax

SUBSTR(<expC>, <start expN> [, <length expN>])

<expC>

The string you want to extract characters from.

<start expN>

The character position in the string to start extracting characters.

<length expN>

The number of characters to extract from the string.

Description

Starting in a character expression at the position you specify for <start expN>, SUBSTR() returns the number of characters you specify for <length expN>. If <start expN> is greater than the length of <expC>, or <length expN> is zero or a negative number, SUBSTR() returns an empty string.

If you don't specify <length expN>, SUBSTR() returns all characters starting from position <start expN> to the end of the string. If <length expN> is greater than the number of characters from <start expN> to the end of the string, SUBSTR() returns only as many characters as are left in the string, without adding space characters to achieve the specified length. You can use LEN() to determine the actual length of the returned string.

When SUBSTR() returns characters from a memo field, it counts two characters for each carriage-return and linefeed combination (CR/LF) in the memo field.

The *substring*() method is similar to the SUBSTR() function, but in addition to the syntactic difference of being a method instead of a function and the fact that the position is zero-based, the method takes a starting and ending position, while the function takes a start position and the number of character to extract.

substring()

Topic group Related topics

Returns a substring derived from a specified character string.

Syntax

<expC>.*substring*(<index1 expN>, <index2 expN>)

<expC>

The string you want to extract characters from.

<index1 expN>, <index2 expnN>

Indexes into the string, which is indexed from left to right. The first character of the string is at index 0 and the last character is at index <expC>.length - 1.

Property of

String

Description

This method is similar to the SUBSTR() function, but in addition to the syntactic difference of being a method instead of a function and the fact that the position is zero-based, the method takes a starting and ending position, while the function takes a start position and the number of character to extract.

<index1 expN> and <index2 expN> determine the position of the substring to extract. *substring*() begins at the lesser of the two indexes and extracts up to the character before the other index. If the two indexes are the same, *substring*() returns an empty string.

If the starting index is after the last character in the string, *substring*() returns an empty string.

toLowerCase()

Topic group Related topics

Converts all uppercase characters in a string to lowercase and returns the resulting string.

Syntax

<expC>.*toLowerCase*()

<expC>

The string you want to convert to lowercase.

Property of

String

Description

Other than the syntactic difference of being a method instead of a function, this method behaves identically to the LOWER() function.

toProperCase()

Topic group Related topics

Converts a character string to proper-noun format and returns the resulting string.

Syntax

<expC>.*toProperCase*()

<*expC*>

The string you want to convert to proper-noun format.

Property of

String

Description

Other than the syntactic difference of being a method instead of a function, this method behaves identically to the PROPER() function.

toUpperCase()

Topic group Related topics

Converts all lowercase characters in a string to uppercase and returns the resulting string.

Syntax

<expC>.*toUpperCase*()

<expC>

The string you want to convert to uppercase.

Property of

String

Description

Other than the syntactic difference of being a method instead of a function, this method behaves identically to the UPPER() function.

TRANSFORM()

Topic group Related topics Example

Applies a formatting template to an expression, returning a formatted string.

Syntax

TRANSFORM(<exp>, <picture expC>)

<exp>

The expression to be formatted.

<picture expC>

The string containing the template characters necessary to format <exp>. The template characters are the same characters used in the *picture* property of an entryfield.

Description

TRANSFORM() returns an expression in the template format you indicate with <picture expC>.

TRANSFORM() example

Suppose you store phone numbers as ten digits only to save storage space. You can display the number with the usual characters using a formatting template:

```
? transform( "8005551234", "@R (999) 999-9999" )  // Displays "(800) 555-1234"
```

Negative numbers can be displayed enclosed in parentheses:

```
? transform( -45, "@( 9999" )  // Displays "( -45)"
? transform( 123, "@( 9999" )  // Displays "  123 "
```

TRIM()

Topic group Related topics

Returns a string with no trailing space characters.

Syntax

TRIM(<expC>)

<expC>

The string from which you want to remove the trailing space characters.

Description

TRIM() returns a character expression with no trailing space characters. TRIM() is identical to RTRIM().

To remove trailing blanks before concatenating a string to another string, use the - operator instead of the + operator.

Warning: Do not create index expression with TRIM() that result in key values that vary in length from record to record. This results in unbalanced indexes that may become corrupted. Use the - operator, which relocates trailing blanks without changing the resulting length of the concatenated string.

To remove leading space characters from a string, use LTRIM().

Other than the syntactic difference of being a method instead of a function, the *rightTrim*() method behaves identically to the TRIM() function.

UPPER()

Topic group Related topics Example

Converts all lowercase characters in a string to uppercase and returns the resulting string.

Syntax

UPPER(<expC>)

<expC>

The character string you want to convert to uppercase.

Description

UPPER() converts the lowercase alphabetic characters in a character expressionor memo field to uppercase. UPPER() ignores digits and other characters.

The current language driver defines the character values that are lowercase and uppercase alphabetic. In a U.S. language driver, a lowercase alphabetic character is from a to z, and an uppercase alphabetic character is from A to Z.

Other than the syntactic difference of being a method instead of a function, the *toUpperCase*() method behaves identically to the UPPER() function.

UPPER() example

UPPER() is frequently used to make searches case-insensitive. First you create an index using UPPER(), for example:

```
index on upper( LAST_NAME - "," - FIRST_NAME ) tag FULL_NAME
```

Then when searching, convert the search value to uppercase to match:

```
seek upper( form.search.value )
```

VAL()

Topic group Related topics

Returns the number at the beginning of a character string.

Syntax

VAL(<expC>)

<expC>

The character expression that contains the number.

Description

Use VAL() to convert a string that contains a number into an actual number. Once you convert a string to a number, you can perform arithmetic operations with it.

If the character string you specify contains both letters and numbers, VAL() returns the value of the entire number to the left of the first nonnumeric character. If the string contains a nonnumeric character other than a blank space in the first position, VAL() returns 0. For example, VAL("ABC123ABC456") returns 0, VAL("123ABC456ABC") returns 123, and VAL(" 123") also returns 123.

Math / Money

Topic group

Visual dBASE supports a wide range of mathematic, trigonometric, and financial functions.

ABS()

Topic group Related topics

Returns the absolute value of a specified number.

Syntax

ABS(<expN>)

<expN>

The number whose absolute value you want to return.

Description

ABS() returns the absolute value of a number. The absolute value of a number represents its magnitude. Magnitude is always expressed as a positive value, so the absolute value of a negative number is its positive equivalent.

ACOS()

Topic group Related topics

Returns the inverse cosine (arccosine) of a number.

Syntax

ACOS(<expN>)

<expN>

The cosine of an angle, from -1 to +1.

Description

ACOS() returns the radian value of the angle whose cosine is <expN>. ACOS() returns a number from 0 to pi radians. ACOS() returns zero when <expN> is 1. For values of x from 0 to pi, ACOS(y) returns x if COS(x) returns y.

To convert the returned radian value to degrees, use RTOD(). For example, if the default number of decimal places is 2, ACOS(.5) returns 1.05 radians while RTOD(ACOS(.5)) returns 60.00 degrees.

Use SET DECIMALS to set the number of decimal places ACOS() displays.

To find the arcsecant of a value, use the arccosine of 1 divided by the value. For example, the arcsecant of 2 is ACOS(1/2), or 1.05 radians.

ASIN()

Topic group Related topics

Returns the inverse sine (arcsine) of a number.

Syntax

ASIN(<expN>)

<expN>

The sine of an angle, from -1 to +1.

Description

ASIN() returns the radian value of the angle whose sine is <expN>. ASIN() returns a number from -pi/2 to pi/2 radians. ASIN() returns zero when <expN> is 0. For values of x from -pi/2 to pi/2, ASIN(y) returns x if SIN(x) returns y.

To convert the returned radian value to degrees, use RTOD(). For example, if the default number of decimal places is 2, ASIN(.5) returns .52 radians while RTOD(ASIN(.5)) returns 30.00 degrees.

Use SET DECIMALS to set the number of decimal places ASIN() displays.

To find the arccosecant of a value, use the arcsine of 1 divided by the value. For example, the arccosecant of 1.54 is ASIN(1/1.54), or .71 radians.

ATAN()

Topic group Related topics

Returns the inverse tangent (arctangent) of a number.

Syntax

ATAN(<expN>)

<expN>

Any positive or negative number representing the tangent of an angle.

Description

ATAN() returns the radian value of the angle whose tangent is <expN>. ATAN() returns a number from -pi/2 to pi/2 radians. ATAN() returns 0 when <expN> is 0. For values of x from -pi/2 to pi/2, ATAN(y) returns x if TAN(x) returns y.

To convert the returned radian value to degrees, use RTOD(). For example, if the default number of decimal places is 2, ATAN(1) returns 0.79 radians, while RTOD(ATAN(1)) returns 45.00 degrees.

Use SET DECIMALS to set the number of decimal places ATAN() displays.

ATAN() differs from ATN2() in that ATAN() takes the tangent as the argument, but ATN2() takes the sine and cosine as the arguments.

To find the arccotangent of a value, subtract the arctangent of the value from pi/2. For example, the arccotangent of 1.73 is PI/2 - ATAN(1.73), or .52.

ATN2()

Topic group Related topics

Returns the inverse tangent (arctangent) of a given point.

Syntax

ATN2(<sine expN>, <cosine expN>)

<sine expN>

The sine of an angle. If <sine expN> is 0, <cosine expN> can't also be 0.

<cosine expN>

The cosine of an angle. If <cosine expN> is 0, <sine expN> can't also be 0. When <cosine expN> is 0 and <sine expN> is a positive or negative (nonzero) number, ATN2() returns +pi/2 or -pi/2, respectively.

Description

ATN2() returns the angle size in radians when you specify the sine and cosine of the angle. ATN2() returns a number from -pi to +pi radians. ATN2() returns 0 when <sine expN> is 0. When you specify 0 for both arguments, *Visual* dBASE returns an error.

To convert the returned radian value to degrees, use RTOD(). For example, if the default number of decimal places is 2, ATN2(1,0) returns 1.57 radians while RTOD(ATN2(1,0)) returns 90.00 degrees.

Use SET DECIMALS to set the number of decimal places ATN2() displays.

ATN2() differs from ATAN() in that ATN2() takes the sine and cosine as the arguments, but ATAN() takes the tangent as the argument. See ATAN() for instructions on finding the arccotangent.

CEILING()

Topic group Related topics

Returns the nearest integer that is greater than or equal to a specified number.

Syntax

CEILING(<expN>)

<expN>

A number, from which to determine and return the integer that is greater than or equal to it.

Description

CEILING() returns the nearest integer that is greater than or equal to <expN>; in effect, rounding positive numbers up and negative numbers down towards zero. If you pass a number with any digits other than 0 as decimal digits, CEILING() returns the nearest integer that is greater than the number. If you pass an integer to CEILING(), or a number with only 0s for decimal digits, it returns that number.

For example, if the default number of decimal places is 2,

- CEILING(2.10) returns 3.00
- CEILING(-2.10) returns -2.00
- CEILING(2.00) returns 2.00
- CEILING(2) returns 2
- CEILING(-2.00) returns -2.00

Use SET DECIMALS to set the number of decimal places CEILING() displays.

See the table in the description of INT() that compares INT(), FLOOR(), CEILING(), and ROUND().

COS()

Topic group Related topics

Returns the trigonometric cosine of an angle.

Syntax

COS(<expN>)

<expN>

The size of the angle in radians. To convert an angle's degree value to radians, use DTOR(). For example, to find the cosine of a 30-degree angle, use COS(DTOR(30)).

Description

COS() calculates the ratio between the side adjacent to an angle and the hypotenuse in a right triangle. COS() returns a number from -1 to +1. COS() returns 0 when <expN> is pi/2 or 3*pi/2 radians.

Use SET DECIMALS to set the number of decimal places COS() displays.

The secant of an angle is the reciprocal of the cosine of the angle. To return the secant of an angle, use 1/COS().

DTOR()

Topic group Related topics

Returns the radian value of an angle whose measurement is given in degrees.

Syntax

DTOR(<expN>)

<expN>

A negative or positive number that is the size of the angle in degrees.

Description

DTOR() converts the measurement of an angle from degrees to radians. To convert degrees to radians, *Visual* dBASE

- Multiplies the number of degrees by pi
- Divides the result by 180
- Returns the quotient

A 180-degree angle is equivalent to pi radians.

Use DTOR() in the trigonometric functions SIN(), COS(), and TAN() because these functions require the angle value in radians. For example, to find the sine of a 45-degree angle, use SIN(DTOR(45)), which returns .71 if the default number of decimal places is 2.

Use SET DECIMALS to set the number of decimal places DTOR() displays.

EXP()

Topic group Related topics

Returns e raised to a specified power.

Syntax

EXP(<expN>)

<expN>

The positive, negative, or zero power (exponent) to raise the number e to.

Description

EXP() returns a number equal to e (the base of the natural logarithm) raised to the <expN> power. For example, EXP(2) returns 7.39 because e^2 = 7.39.

EXP() is the inverse of LOG(). In other words, if y = EXP(x), then LOG(y) = x.

Use SET DECIMALS to set the number of decimal places EXP() displays.

FLOOR()

Topic group Related topics

Returns the nearest integer that is less than or equal to a specified number.

Syntax

FLOOR(<expN>)

<expN>

A number from which to determine and return the integer that is less than or equal to it.

Description

FLOOR() returns the nearest integer that is less than or equal to <expN>; in effect, rounding positive numbers down and negative numbers up away from zero. If you pass a number with any digits other than zero (0) as decimal digits, FLOOR() returns the nearest integer that is less than the number. If you pass an integer to FLOOR(), or a number with only zeros for decimal digits, it returns that number.

For example, if the default number of decimal places is 2,

- FLOOR(2.10) returns 2.00
- FLOOR(-2.10) returns -3.00
- FLOOR(2.00) returns 2.00
- FLOOR(2) returns 2
- FLOOR(-2.00) returns -2.00

Use SET DECIMALS to set the number of decimal places FLOOR() displays.

When you pass a positive number to it, FLOOR() operates exactly like INT(). See the table in the description of INT() that compares INT(), FLOOR(), CEILING(), and ROUND().

FV()

Topic group Related topics

Returns the future value of an investment.

Syntax

FV(<payment expN>, <interest expN>, <term expN>)

<payment expN>

The amount of the periodic payment. Specify the payment in the same time increment as the interest and term. The payment can be negative or positive.

<interest expN>

The interest rate per period expressed as a positive decimal number. Specify the interest rate in the same time increment as the payment and term.

<term expN>

The number of payments. Specify the term in the same time increment as the payment and interest.

Description

Use FV() to calculate the amount realized (future value) after equal periodic payments (deposits) at a fixed interest rate. FV() returns a float representing the total of the payments plus the interest generated and compounded.

Express the interest rate as a decimal. For example, if the annual interest rate is 9.5%, <interest expN> is .095 (9.5/100) for payments made annually.

Express <payment expN>, <interest expN>, and <term expN> in the same time increment. For example, if the payment is monthly, express the interest rate per month, and the number of payments in months. You would express an annual interest rate of 9.5%, for example, as .095/12, which is 9.5/100 divided by 12 months.

The formula *Visual* dBASE uses to calculate FV() is as follows:

$$fv = pmt * \frac{1 + int^{term} - 1}{int}$$

where int = rate / 100

For the future value an investment of $350 made monthly for five years, earning 9% interest, the formula expressed as a *Visual* dBASE expression looks like this:

```
? FV(350,.09/12,60)                    // Returns 26398.45
? 350*((1+.09/12)^60-1)/(.09/12)        // Returns 26398.45
```

In other words, if you invest $350/month for the next five years into an account that pays an annual interest rate of 9%, at the end of five years you will have $26398.45.

Use SET DECIMALS to set the number of decimal places FV() displays.

INT()

Topic group Related topics

Returns the integer portion of a specified number.

Syntax

INT(<expN>)

<expN>

A number whose integer value you want to determine and return.

Description

Use INT() to remove the decimal digits of a number and retain only the integer portion, the whole number.

If you pass a number with decimal places to a function, command, or method that uses an integer as an argument, such as SET EPOCH, *Visual* dBASE automatically truncates that number, in which case you don't need to use INT().

The following table compares INT(), FLOOR(), CEILING(), and ROUND(). (In these examples, the value of the second ROUND() argument is 0.)

<expN>	**INT()**	**FLOOR()**	**CEILING()**	**ROUND()**
2.56	2	2	3	3
-2.56	-2	-3	-2	-3
2.45	2	2	3	2
-2.45	-2	-3	-2	-2

LOG()

Topic group Related topics

Returns the logarithm to the base e (natural logarithm) of a specified number.

Syntax

LOG(<expN>)

<expN>

A positive nonzero number that equals e raised to the log. If you specify 0 or a negative number for <expN>, *Visual* dBASE generates an error.

Description

LOG() returns the natural logarithm of <expN>. The natural logarithm is the power (exponent) to which you raise the mathematical constant e to get <expN>. For example, LOG(5) returns 1.61 because e^1.61= 5.

LOG() is the inverse of EXP(). In other words, if LOG(y) = x, then y = EXP(x).

Use SET DECIMALS to set the number of decimal places LOG() displays.

LOG10()

Topic group Related topics

Returns the logarithm to the base 10 of a specified number.

Syntax

LOG10(<expN>)

<expN>

A positive nonzero number which equals 10 raised to the log. If you specify 0 or a negative number for <expN>, *Visual* dBASE returns an error.

Description

LOG10() returns the common logarithm of <expN>. The common logarithm is the power (exponent) to which you raise 10 to get <expN>. For example, LOG10(100) returns 2 because 10^2=100.

Use SET DECIMALS to set the number of decimal places LOG10() displays.

MAX()

Topic group Related topics

Compares two numbers (or two date, character, or logical expressions) and returns the greater value.

Syntax

MAX(<exp1>, <exp2>)

<exp1>

A numeric, date, character, or logical expression to compare to a second expression of the same type.

<exp2>

The second expression to compare to <exp1>.

Description

Use MAX() to compare two numbers to determine the greater of the two values. You can use MAX() to ensure that a number is not less than a particular limit.

MAX() may also be used to compare two dates, character strings, or logical values, in which case MAX() returns:

- The later of the two dates. In *Visual* dBASE, a blank date is considered later than a non-blank date.
- The character string with the higher collation value. Collation values are determined by the language driver in use, and are case-sensitive. For example, with the DB437US driver, the letter “B” is higher than the letter “A”, but “a” is higher than “B” (all lowercase letters are collated higher than uppercase letters).
- *true* if one or both logical expressions evaluate to *true*. (The logical OR operator has the same effect.)

If <exp1> and <exp2> are equal, MAX() returns their value.

MIN()

Topic group Related topics

Compares two numbers (or two date, character, or logical expressions) and returns the lesser value.

Syntax

MIN(<exp1>, <exp2>)

<exp1>

A numeric, date, character, or logical expression to compare to a second expression of the same type.

<exp2>

The second expression to compare to <exp1>.

Description

Use MIN() to compare two numbers to determine the lesser of the two values. You can use MIN() to ensure that a number is not greater than a particular limit.

MIN() may also be used to compare two dates, character strings, or logical values, in which case MIN() returns:

- The earlier of the two dates. In *Visual* dBASE, a non-blank date is considered earlier than a blank date.
- The character string with the lower collation value. Collation values are determined by the language driver in use, and are case-sensitive. For example, with the DB437US driver, the letter “a” is lower than the letter “b”, but “B” is lower than “a” (all uppercase letters are collated lower than lowercase letters).
- *false* if one or both logical expressions evaluate to *false*. (The logical AND operator has the same effect.)

If <exp1> and <exp2> are equal, MIN() returns their value.

MOD()

Topic group Related topics

Returns the modulus (remainder) of one number divided by another.

Syntax

MOD(<dividend expN>, <divisor expN>)

<dividend expN>

The number to be divided.

<divisor expN>

The number to divide by.

Description

MOD() divides <dividend expN> by <divisor expN> and returns the remainder. In other words, MOD(X,Y) returns the remainder of x/y.

The modulus formula is

```
<dividend>-INT(<dividend>/<divisor>)*<divisor>
```

where INT() truncates a number to its integer portion.

Note: Earlier versions of dBASE used FLOOR() instead of INT() in the modulus calculation. This change only affects the result if <dividend expN> and <divisor expN> are not the same sign, which in itself is an ambiguous case.

The % symbol is also used as the modulus operator. It performs the same function as MOD(). For example, the following two expressions are identical:

```
mod( x, 2 )
x % 2
```

PAYMENT()

Topic group Related topics

Returns the periodic amount required to repay a debt.

Syntax

PAYMENT(<principal expN>, <interest expN>, <term expN>)

<principal expN>

The original amount to be repaid over time.

<interest expN>

The interest rate per period expressed as a positive decimal number. Specify the interest rate in the same time increment as the term.

<term expN>

The number of payments. Specify the term in the same time increment as the interest.

Description

Use PAYMENT() to calculate the periodic amount (payment) required to repay a loan or investment of <principal expN> amount in <term expN> payments. PAYMENT() returns a number based on a fixed interest rate compounding over a fixed length of time.

If <principal expN> is positive, PAYMENT() returns a positive number.
If <principal expN> is negative, PAYMENT() returns a negative number.

Express the interest rate as a decimal. For example, if the annual interest rate is 9.5%, <interest expN> is .095 (9.5/100) for payments made annually.

Express <interest expN> and <term expN> in the same time increment. For example, if the payments are monthly, express the interest rate per month, and the number of payments in months. You would express an annual interest rate of 9.5%, for example, as .095/12, which is 9.5/100 divided by 12 months.

The formula *Visual* dBASE uses to calculate PAYMENT() is as follows:

$$pmt = princ * \frac{int * (1 + int)^{term}}{(1 + int)^{term} - 1}$$

where int = rate/100
For the monthly payment required to repay a principal amount of $16860.68 in five years, at 9% interest, the formula expressed as a *Visual* dBASE expression looks like this:

```
? PAYMENT(16860.68,.09/12,60)        // Returns 350.00
nTemp = (1 + .09/12)^60
? 16860.68*(.09/12*nTemp)/(nTemp-1) // Returns 350.00
```

Use SET DECIMALS to set the number of decimal places PAYMENT() displays.

PI()

Topic group Related topics

Returns the approximate value of pi, the ratio of a circle's circumference to its diameter.

Syntax

PI()

Description

PI() returns a number that is approximately 3.141592653589793. pi is a constant that can be used in mathematical calculations. For example, use it to calculate the area and circumference of a circle or the volume of a cone or cylinder.

Use SET DECIMALS to set the number of decimal places PI() displays.

PV()

Topic group Related topics

Returns the present value of an investment.

Syntax

PV(<payment expN>, <interest expN>, <term expN>)

<payment expN>

The amount of the periodic payment. Specify the payment in the same time increment as the interest and term. The payment can be negative or positive.

<interest expN>

The interest rate per period expressed as a positive decimal number. Specify the interest rate in the same time increment as the payment and term.

<term expN>

The number of payments. Specify the term in the same time increment as the payment and interest.

Description

PV() is a financial function that calculates the original principal balance (present value) of an investment. PV() returns a float that is the amount to be repaid with equal periodic payments at a fixed interest rate compounding over a fixed length of time. For example, use PV() if you want to know how much you need to invest now to receive regular payments for a specified length of time.

Express the interest rate as a decimal. For example, if the annual interest rate is 9.5%, <interest expN> is .095 (9.5 / 100) for payments made annually.

Express <payment expN>, <interest expN>, and <term expN> in the same time increment. For example, if the payment is monthly, express the interest rate per month, and the number of payments in months. Express an annual interest rate of 9.5%, for example, as .095/12, which is 9.5/100 divided by 12 months.

The formula *Visual* dBASE uses to calculate PV() is as follows:

$$pv = pmt * \frac{(1 + int)^{term} - 1}{int * (1 + int)^{term}}$$

where int = rate 100

For the present value of an investment earning 9% interest, to be paid at $350 monthly for five years, the formula expressed as a *Visual* dBASE expression looks like this:

```
? PV(350,.09/12,60)                // Returns 16860.68
nTemp = (1 + .09/12)^60
? 350*(nTemp-1)/(.09/12*nTemp)     // Returns 16860.68
```

In other words, you have to invest $16,860.68 now into an account paying an interest rate of 9% annually to receive $350/month for the next five years.

Use SET DECIMALS to set the number of decimal places PV() displays.

RANDOM()

Topic group Related topics

Returns a pseudo-random number between 0 and 1 exclusive (never 0 and never 1).

Syntax

RANDOM([<expN>])

<expN>

The number with which you want to seed RANDOM().

Description

Computers cannot generate truly random numbers, but you can use RANDOM() to generate a series of numbers that appear to have a random distribution. A series of pseudo-random numbers relies on a seed value, which determines the exact numbers that appear in the series. If you use the same seed value, you get the same series of numbers.

Pseudo-random numbers, when considered as a whole series, appear to be random; that is, you cannot tell from one number what the next will be. But the first number in the series is related to the seed value. Therefore, you should seed RANDOM() only once at the beginning of each series, like before simulating a card shuffle or randomly assigning work shifts. Seeding during a series defeats the design of the random number generator.

If you specify a positive <expN> value, RANDOM() uses that <expN> as the seed value, so a positive value should be used for testing, since the numbers will be the same each time. If <expN> is negative, RANDOM() uses a seed value based on the number of seconds past midnight on your computer system clock. As a result, a negative <expN> value most likely will give you a different series of random numbers each time.

If you don't specify <expN>, or use zero, RANDOM() returns the next number in the series.

When *Visual* dBASE first starts up, the random number generator is seeded with a fixed internal seed value of 179757.

Use SET DECIMALS to set the number of decimal places RANDOM() displays.

ROUND()

Topic group Related topics

Returns a specified number rounded to the nearest integer or a specified number of decimal places.

Syntax

ROUND(<expN 1> [, <expN 2>])

<expN 1**>**

The number you want to round.

<expN 2>

If <expN 2> is positive, the number of decimal places to round <expN 1> to. If <expN 2> is negative, whether to round <expN 1> to the nearest tens, hundreds, thousands, and so on.

Description

Use ROUND() to round a number to a specified number of decimal places or to a specified tens, hundreds, thousands value, and so forth. Use ROUND() with SET DECIMALS to round a number and remove trailing zeros.

If the digit in position <expN 2> + 1 is between 0 and 4 inclusive, <expN 1> (with <expN 2> decimal places) remains the same; if the digit in position <expN 2> + 1 is between 5 and 9 inclusive, the digit in position <expN 2> is increased by 1.

Use 0 as <expN 2>to round a number to the nearest whole number. Using -1 rounds a number to the nearest multiple of ten; rounding to a -2 rounds a number to the nearest multiple of one hundred; and so on. For example, ROUND(14932,-2) returns 14900 and ROUND(14932,-3) returns 15000.

For example, if the default number of decimal places is 2,

- ROUND(2.50) returns 3.00
- ROUND(-2.50) returns -2.00
- ROUND(2.00) returns 2.00

See the table in the description of INT() that compares INT(), FLOOR(), CEILING(), and ROUND().

RTOD()

Topic group Related topics

Returns the degree value of an angle measured in radians.

Syntax

RTOD(<expN>)

<expN>

A negative or positive number that is the size of the angle in radians.

Description

RTOD() converts the measurement of an angle from radians to degrees.

To convert radians to degrees, *Visual* dBASE

- Multiplies the number of radians by 180
- Divides the result by pi
- Returns the quotient

An angle of pi radians is equivalent to 180 degrees.

Use RTOD() with the trigonometric functions ACOS(), ASIN(), ATAN(), and ATN2() to convert the radian return values of these functions to degrees. For example, if the default number of decimal places is 2, ATAN(1) returns the value of the angle in radians, 0.79, while RTOD(ATAN(1)) returns the value of the angle in degrees, 45.00.

Use SET DECIMALS to set the number of decimal places RTOD() displays.

SET CURRENCY

Topic group Related topics

SET CURRENCY determines the character(s) used as the currency symbol, and the position of that symbol when displaying monetary values

Syntax

SET CURRENCY left | right

SET CURRENCY TO [<expC>]

LEFT

Places currency symbol(s) to the left of currency numbers.

RIGHT

Places currency symbol(s) to the right of currency numbers.

<expC>

The characters that appear as a currency symbol. Although *Visual* dBASE imposes no limit to the length of <expC>, it recognizes only the first nine characters. You can't include numbers in <expC>.

Description

Currency symbols are displayed for numbers when you use the "$" template symbol in a formatting template or the TRANSFORM() function. The defaults for SET CURRENCY are set by the Regional settings of the Windows Control Panel.

Use SET CURRENCY left | right to specify the position of currency symbol(s) in monetary numeric values. Use SET CURRENCY TO to establish a currency symbol other than the default.

When SET CURRENCY is LEFT, dBASE displays only as many currency symbols as fit, together with the digits to the left of any decimal point, within ten character spaces.

SET CURRENCY TO without the <expC> option resets the currency symbol to the default set with the Regional settings of the Windows Control Panel.

SET DECIMALS

Topic group Related topics

Determines the number of decimal places of numbers to display.

Syntax

SET DECIMALS TO [<expN>]

<expN>

The number of decimals places, from 0 to 18. The default is 2.

Description

Use SET DECIMALS to specify the number of decimal places of numbers you want *Visual* dBASE to display. SET DECIMALS affects the display of most mathematical calculations, but not the way numbers are stored on disk or maintained internally.

Excess digits are rounded when a number is displayed. For example, with the default setting of two decimal places, the number 1.995 is displayed as 2.00.

Use SET PRECISION to set the number of decimal places used in comparisons. SET DECIMALS and SET PRECISION are independent settings.

SET DECIMALS TO without <expN> resets the number of decimal places back to the default of 2.

SET POINT

Topic group Related topics

Specifies the character that separates decimal digits from integer digits in numeric display.

Syntax

SET POINT TO [<expC>]

<expC>

The character representing the decimal point. You can specify more than one character, but *Visual* dBASE uses only the first one. If you specify a number as a character for <expC> (for example, "3"), dBASE returns an error.

The default is set by theRegional Settings of the Windows Control Panel.

Description

SET POINT affects both numeric input and display with commands such as EDIT. SET POINT also affects numeric display with commands such as DISPLAY MEMORY, STORE, =, and the PICTURE "." template character. You must use the period in the PICTURE option, regardless of the setting of SET POINT.

SET POINT has no effect on the representation of numbers in *Visual* dBASE expressions and statements. Only a period is valid as a decimal point. For example, if you SET POINT TO "," (comma) and issue the following command:

```
? MAX(123,4, 123,5)
```

Visual dBASE returns an error. The correct syntax is:

```
? MAX(123.4, 123.5)
```

SET POINT TO without the <expC> option resets the decimal character to the default set with theRegional settings of the Windows Control Panel.

SET PRECISION

Topic group Related topics Example

Determines the number of digits used when comparing numbers.

Syntax

SET PRECISION TO [<expN>]

<expN>

The number of digits, from 10 to 16. The default is 10.

Description

Use SET PRECISION to change the accuracy, or precision, of numeric comparisons. You can set precision from 10 to 16 digits.

SET PRECISION affects data comparisons, but not mathematical computations or data display. Math computations always use full precision internally. To change the number of decimal places dBASE displays, use SET DECIMALS.

In general, you should use as little precision as possible for comparisons. Like many programs, *Visual* dBASE handles numbers as base-2 floating point numbers. This format precisely represents fractional values such as 0.5 (1/2) or 0.375 (3/8), but only approximates other values such as 0.4 and 1/9. In addition, precision is also used to represent the integer portion of a number; the larger the integer portion, the less precision is available for the fractional portion. Therefore, comparing values with too much precision results in erroneous mismatches.

SET PRECISION example

The following examples demonstrate how numbers are represented and how the precision setting affects data comparisons:

```
set decimals to 18         // to see as many digits as possible
set precision to 16        // maximum
? 0.5                      //         0.500000000000000000 exact
? 0.375                    //         0.375000000000000000 exact
? 0.4                      //         0.400000000000000022 16 digits precision
? 1/9                      //         0.111111111111111105 16 digits precision
? 12345.4                  //     12345.399999999999640000 11 digits precision
? 123456789.4              // 123456789.400000006000000000  7 digits precision
? 12345.4 - 12345          //         0.399999999999636202 11 digits precision
? 12345.4 - 12345 == 0.4   // False, too much precision attempted
set precision to 10
? 12345.4 - 12345 == 0.4   // True
set decimals to 0          // Has no effect on comparisons
? 12345.4 - 12345 == 0.4   // Still True
set precision to 16
? 12345.4 - 12345 == 0.4   // Still False
set precision to 11
? 12345.4 - 12345 == 0.4   // True
set precision to 12
? 12345.4 - 12345 == 0.4   // True
```

Note that the final comparion to 12 digits returns *true* because the first 12 digits just happen to be the same for both the calculated and literal value of 0.4. In fact, there are only 11 digits of precision in the calculated value. The 12th digit is the first rounding digit.

SET SEPARATOR

Topic group Related topics

Specifies the character that separates each group of three digits (whole numbers) to the left of the decimal point in the display of numbers greater than or equal to 1000.

Syntax

SET SEPARATOR TO [<expC>]

<expC>

The whole-number separator, which is the character that separates each group of three digits to the left of the decimal point in the display of numbers greater than or equal to 1000. You can specify more than one character, but *Visual* dBASE uses only the first one. If you specify a number as a character for <expC> (for example, "3"), dBASE returns an error.

The default is set by theRegional Settings of the Windows Control Panel.

Description

SET SEPARATOR affects only the PICTURE "," template character and the numeric display of byte totals for the commands such as DIR, DISPLAY FILES, and LIST FILES. For example, if you SET SEPARATOR TO "."(period) and issue the following, *Visual* dBASE returns 123456 displayed as 123.456:

```
? 123456 PICTURE "999,999"
```

You must use the comma in the PICTURE function, regardless of the setting of SET SEPARATOR.

SET SEPARATOR TO without the <expC> option resets the separator to the default set with theRegional Settings of the Windows Control Panel.

Setting a whole-number separator with SET SEPARATOR doesn't affect the values of numbers, only their display.

SIGN()

Topic group Related topics Example

Returns an integer that indicates if a specified number is positive, negative, or zero (0).

Syntax

SIGN(<expN>)

<expN>

The number whose sign (positive, negative, or zero) to determine.

Description

Use SIGN() to reduce an arbitrary numeric value into one three numbers: 1, -1, or zero. SIGN() returns 1 if a specified number is positive, -1 if that number is negative, and 0 if that number is 0.

SIGN() is used when the numbers 1, -1, and/or 0 are appropriate for an action, based on the sign—but not the magnitude—of another number. When interested in the sign alone, it's more straightforward to compare the number with zero using a comparison operator.

SIGN() always returns an integer, regardless of the value of SET DECIMALS.

SIGN() example

The following example is a custom next() method for a detail rowset that automatically navigates in the master rowset:

```
function next( nArg )
  if not rowset::next( nArg )               // Navigate as far as specified,
but
                                            //   if end of detail rowset
    this.masterRowset.next( sign( nArg ) )  // Move forward or backward in
master
    if nArg < 0                             // If navigating backwards
      this.last()                           // Go to last matching detail row
    endif
  endif
```

No matter how many records are skipped in the detail rowset, the master rowset is navigated forward one or backward one row only, by using the SIGN() function to convert the row count to 1 or -1 (or zero). Without the SIGN() function, you would have to use a more cumbersome IIF() function or IF block.

When checking to see if the navigation was backwards, it would be redundant to use the SIGN() function again, since you would have to compare the result to zero or -1 anyway. Simply using the less than logical operator is all that is needed.

SIN()

Topic group Related topics

Returns the trigonometric sine of an angle.

Syntax

SIN(<expN>)

<expN>

The size of the angle in radians. To convert an angle's degree value to radians, use DTOR(). For example, to find the sine of a 30-degree angle, use SIN(DTOR(30)).

Description

SIN() calculates the ratio between the side opposite an angle and the hypotenuse in a right triangle. SIN() returns a number from -1 to +1. SIN() returns zero when <expN> is zero, pi, or 2pi radians.

Use SET DECIMALS to set the number of decimal places SIN() displays.

The cosecant of an angle is the reciprocal of the sine of the angle. To return the cosecant of an angle, use 1/SIN().

SQRT()

Topic group Related topics

Returns the square root of a number.

Syntax

SQRT(<expN>)

<expN>

A positive number whose square root you want to return. If <expN> is a negative number, *Visual* dBASE generates an error.

Description

SQRT() returns the positive square root of a non-negative number. For example SQRT(36) returns 6 because 6^2 = 36. The square root of 0 is 0.

An alternate way to find the square root is to raise the value to the power of 0.5. For example, the following two statements display the same value:

```
? sqrt(36) )     // displays 6.00
? 36^.5          // displays 6.00
```

Use SET DECIMALS to set the number of decimal places SQRT() displays.

TAN()

Topic group Related topics

Returns the trigonometric tangent of an angle.

Syntax

TAN(<expN>)

<expN>

The size of the angle in radians. To convert an angle's degree value to radians, use DTOR(). For example, to find the tangent of a 30-degree angle, use TAN(DTOR(30)).

Description

TAN() calculates the ratio between the side opposite an angle and the side adjacent to the angle in a right triangle. TAN() returns a number that increases from zero to plus or minus infinity. TAN() returns zero when <expN> is 0, pi, or 2*pi radians. TAN() is undefined (returns infinity) when <expN> is pi/2 or 3*pi/2 radians.

Use SET DECIMALS to set the number of decimal places TAN() displays.

The cotangent of an angle is the reciprocal of the tangent of the angle. To return the cotangent of an angle, use 1/TAN().

Date and time

Topic group

Visual dBASE supports two types of dates:

- A primitive date that is compatible with earlier versions of dBASE
- A JavaScript-compatible Date object.

A Date object represents a moment in time. It is stored as the number of milliseconds since January 1, 1970 00:00:00 GMT (Greenwich Mean Time). Although GMT and UTC (a compromise between the English and French acronyms for Universal Coordinated Time) are derived differently, they are considered to represent the same time.

Modern operating systems have their own current time zone setting, which is used when handling Date objects. For example, two computers with different time zone settings—whether or not they are physically in different time zones—will display the same time differently.

Primitive dates represent the date only, not the time. (They are considered to be the first millisecond—midnight—of that date.) Literal dates are delimited by curly braces and are evaluated according to the rules used by the CTOD() function. An invalid literal date is always converted to the next valid one; for example, if the current date format is month/day/year, {02/29/1997} is considered March 1, 1997. An empty date is valid and is represented by empty braces: { }.

Visual dBASE will convert one type of date to the other on-the-fly as needed. For example, you may use a Date class method on a primitive date variable or a literal date:

```
? date().toGMTString()
? {8/21/97}.toString()
```

This creates a temporary Date object from which the method or property is called. Because the object is a temporary copy, calling the set methods or assigning to the properties is allowed, but has no apparent effect. You may also use a date function on a Date object, in which case the time portion of the Date object will be truncated.

Note: While the JavaScript-compatible methods are zero-based, *Visual* dBASE functions are one-based. For example, the *getMonth*() method returns 0 for January, while MONTH() returns 1.

Visual dBASE also features a Timer object that can cause actions to occur at timed intervals.

class Date

Topic group

An object that represents a moment in time.

Syntax

[<oRef> =] new Date()

or

[<oRef> =] new Date(<date expC>)

or

[<oRef> =] new Date(<msec expN>)

or

[<oRef> =] new Date(<year expN>, <month expN>, <day expN>
[, <hours expN> , <minutes expN> , <seconds expN>])

<oRef>

A variable or property in which you want to store a reference to the newly created Date object.

<date expC>

A string representing a date and time.

<msec expN>

The number of milliseconds since January 1, 1970 00:00:00 GMT. Negative values can be used for dates before 1970.

<year expN>

The year.

<month expN>

A number representing the month, between 0 and 11: zero for January, one for February, and so on, up to 11 for December.

<day expN>

The day of the month, from 1 to 31.

<hours expN>

The hours portion of the time, from 0 to 23.

<minutes expN>

The minutes portion of the time, from 0 to 59.

<seconds expN>

The seconds portion of the time, from 0 to 59.

Properties

The following tables list the properties and methods of the Date class. (No events are associated with this class.).

Property	Default	Description
className	DATE	Identifies the object as an instance of the Date class
date		The day of the month
day		The day of the week, from 0 to 6: 0 is Sunday, 1 is Monday, and so on
hour		The hour of the time
minute		The minute of the time
month		The month of the year, from 0 to 11: 0 is January, 1 is February, and so on

second	The second of the time
year	The year of the date

Method	Parameters	Description
getDate()		Returns day of month
getDay()		Returns day of week
getHours()		Returns hours portion of time
getMinutes()		Returns minutes portion of time
getMonth()		Returns month of year
getSeconds()		Returns seconds portion of time
getTime()		Returns date/time equivalent
getTimezoneOffset()		Returns time zone offset for current locale
getYear()		Returns year of date
parse()	<date expC>	Calculates time equivalent for date string
setDate()	<expN>	Sets day of month
setHours()	<expN>	Sets hours portion of time
setMinutes()	<expN>	Sets minutes portion of time
setMonth()	<expN>	Sets month of year
setSeconds()	<expN>	Sets seconds portion of time
setTime()	<expN>	Sets date/time
setYear()	<expN>	Sets year of date
toGMTString()		Converts date to string, using Internet (GMT) conventions
toLocaleString()		Converts date to string, using locale conventions
toString()		Converts date to string, using standard JavaScript conventions
UTC()	<year expN> , <month expN> , <day expN> [, <hours expN> , <minutes expN> , <seconds expN>]	Calculates time equivalent of date parameters

Description

A Date object represents both a date and time.

There are four ways to create a new Date object:

- When called with no parameters, the Date object contains the current system date and time.
- You can pass a string containing a date and optionally a time.
- You can pass a number representing the number of milliseconds since January 1, 1970, 00:00:00 GMT. Use a negative number for dates before 1970.
- You can pass numeric parameters for each component of the date, and optionally each component of the time.

When you specify a date/time in a string or with the component numbers, the time zone defaults to the current locale.

If you specify a date but don't specify hours, minutes, or seconds, they are set to zero. When passing a string, the *<date expC>* can be in a variety of formats, with or without the time, as shown in the following examples:

```
d1 = new Date( "Jan 5 1996" )          // month, day, year
d2 = new Date( "18 Dec 1994 15:34" )   // day, month, year, and time
```

```
d3 = new Date( "1987 Nov 4 9:18:34" )  // year, month, day, and time with
seconds
```

You may spell out the month or abbreviate it, down to the first three letters; for example, “April”, “Apri”, or “Apr”. For consistency and because of the three-letter month of May, you should either always spell it out completely or use the first three letters.

Date objects have an inherent value. The format of the date is platform-dependent; in *Visual* dBASE, the format is same as using the *toLocaleString*() method. Use the *toGMTString*(), *toLocaleString*(), and *toString*() methods to format the Date objects, or create your own. Date objects will automatically type-convert into strings, using the inherent format.

In *Visual* dBASE, every Date object has a separate property for each date and time component. You may read or write to these properties directly (except for the *day* property, which is read-only), or use the equivalent method. For example, assigning a value to the *minute* property has the same effect as calling the *setMinutes*() method with the value as the parameter. Standard JavaScript does not have these properties, so if you want your code to be portable, avoid direct access to the properties and use the methods.

class Timer

Topic group Example

An object that initiates a recurring action at preset intervals.

Syntax

[<oRef> =] new Timer()

<oRef>

A variable or property in which you want to store a reference to the newly created Timer object.

Properties

The following tables list the properties and events of the Timer class. (No methods are associated with this class.)For details on each property, click on the property below.

Property	Default	Description
className	Timer	Identifies the object as an instance of the Timer class
enabled	false	Whether the Timer is active
interval	10	The interval between actions, in seconds

Event	Parameters	Description
onTimer		Action to take when *interval* expires

Description

To use a Timer object:

1 Assign an event handler to the *onTimer* event.

2 Set the *interval* property to the desired number of seconds.

3 Set the *enabled* property to *true* when you want to activate the timer.

The Timer object will start counting down time whenever *Visual* dBASE is idle. When the number of seconds assigned to *interval* has passed, the Timer object's *onTimer* event fires. After the event fires, the Timer object's internal timer is reset back to the *interval*, and the countdown repeats.

To disable the timer, set the *enabled* property to *false*.

A Timer object counts idle time; that is when *Visual* dBASE is not doing anything. This includes waiting for input in the Command window or Navigator. If a process, such as an event handler or program, is running, the counter in all active Timer objects is suspended. When the process is complete and *Visual* dBASE is idle again, the count resumes.

class Timer example

Suppose you want to display the date and time in a form. The following is an *onOpen* event handler that creates a Timer object and attaches it to the form. A reference to the form is added to the Timer object so that the timer's *onTimer* event handler can update the form. Another method in the form is assigned as the Timer object's *onTimer* event handler. The time is updated every two seconds instead of every second, so that *Visual* dBASE is not too bogged down constantly updating the time.

```
function Form_onOpen()
  this.timer = new Timer()                 // Make timer a property of the
form
  this.timer.parent   = this               // Assign form as timer's parent
  this.timer.onTimer  = this.updateClock   // Assign method in form to timer
  this.timer.interval = 2                  // Fire timer every 2 seconds
  this.timer.enabled  = true               // Activate timer
```

The following is the updateClock() method of the form, assigned as the *onTimer* event handler. Because the Timer object calls this method, the *this* reference refers to the Timer object, not the form, even though the method is a method of the form. A reference to the form has been stored in the parent property of the timer; an Text component of the form named clock is updated through that reference.

```
function updateClock()
  this.parent.clock.text = new Date()
```

The timer should be deactivated when the form is closed. Use the form's *onClose* event:

```
function Form_onClose()
  this.timer.enabled = false;
```

CDOW()

Topic group Related topics Example

Returns the name of the day of the week of a specified date.

Syntax

CDOW(<expD>)

<expD>

The date whose corresponding weekday name to return.

Description

CDOW() returns a character string containing the name of the day of the week on which a date falls. To return the day of the week as a number from 1 to 7, use DOW().

If you pass an blank or invalid date to CDOW(), it returns "Unknown".

CDOW() example

The following is a *beforeGetValue* event handler for a date field. It displays recent posting dates as days of the week. Anything older than a week it displays as the date.

```
function postdate_beforeGetValue
  local nDays
  nDays = date() - this.value
  do case
    case this.value == {}        // Blank date
      return "Not posted"
    case nDays < 0               // Date should never be after current date
      return "Error"
    case nDays == 0              // Same date as today
      return "Today"
    case nDays < 7               // Date within the past week
      return cdow( this.value )
    otherwise                    // Older date
      return dtoc( this.value )
  endcase
```

CMONTH()

Topic group | Related topics | Example

Returns the name of the month of a specified date.

Syntax

CMONTH(<expD>)

<expD>

The date whose corresponding month name to return.

Description

CMONTH() returns a character string containing the name of the month in which a date falls. To return the month as a number from 1 to 12, use MONTH().

If you pass an blank or invalid date to CMONTH(), it returns "Unknown".

CMONTH() example

The following funtion uses CMONTH(), DAY(), and YEAR() to return the month, day, and year in a character string—like the MDY() function, but with no leading zero in the day and always with the full year.

```
function mdcy( dArg )
  return cmonth( dArg ) + " " + day( dArg ) + ", " + year( dArg )
```

CTOD()

Topic group Related topics Example

Interprets a specified character expression as a literal date.

Syntax

CTOD(<expC>)

<expC>

The character expression, in the current date format, to return as a date.

Description

Use CTOD() to convert a character expression containing a literal date to a date value. Once you convert the string to a date, you can manipulate it with date functions and date arithmetic.

A literal date must be in format:

```
<number><separator><number><separator><number>[BC]
```

where <separator> should be a slash (/), hyphen (-), or period (.). The two <separator> characters should match. You may specify a BC date by including the letters “BC” (not case-sensitve) at the end of the literal date.

To specify a literal date in code, use curly braces ({ }) as literal date delimiters; there is no need to use CTOD(). For example, there two are equivalent:

```
{04/05/06}
ctod( "04/05/06" )
```

The interpretation of the literal date—that is, which numbers are the day, month, and year, and how two-digit years are handled—is controlled by the current settings for SET DATE and SET EPOCH. For example, if SET DATE is MDY and SET EPOCH is 1930, the literal date above is April 5, 2006.

SET DATE also controls the display of dates, while SET EPOCH does not. SET CENTURY controls the display of dates, but has no effect on how dates are interpreted. Two-digit years are always treated as years in the current epoch.

If you pass an invalid date to CTOD(), it attempts to convert the date to a valid one. For example, it interprets June 31 (June only has 30 days) as July 1. If you pass an empty or non-literal-date string to CTOD(), it returns an blank date, which is a valid date value.

CTOD() example

Suppose a form allows the input of the month and year only. You want to store this as the first day of that month. First create a literal date string from the month and year numbers, then use CTOD() to convert that string into a date, as follows:

```
function saveButton_onClick
  local cDate
  cDate = "" + form.month.value + "/01/" + form.year.value   // Create string
  form.rowset.fields[ "Start date" ].value = ctod( cDate )   // Store in date
field
  form.rowset.save()
```

This function assumes that the current SET DATE format is MDY, or something similar, like AMERICAN.

DATE()

Topic group | Related topics | Example

Returns the system date.

Syntax

DATE()

Description

DATE() returns your computer system's current date.

To change the system date, use SET DATE TO.

DATE() example

The following statement counts how many records in a table of payments are more than 30 days overdue.

```
count for date() - LAST_PAY > 30 to nOver30
```

DAY()

Topic group Related topics Example

Returns the numeric value of the day of the month for a specified date.

Syntax

DAY(<expD>)

<expD>

The date whose corresponding day-of-the-month number you want to return.

Description

DAY() returns a date's day of the month number—a value from 1 to 31.

DAY() returns zero for a blank date.

DAY() example

The following is an *onOpen* event handler for a form that makes the “Ship” button invisible on the first day of the month, when inventory is being reconciled:

```
function Form_onOpen()
  if day( date() ) == 1              // Get today's day of month, if first of
month
    this.shipButton.visible = false  // Prevent shipping
  endif
```

DMY()

Topic group Related topics

Returns a specified date as a character string in DD MONTH YY or DD MONTH YYYY format.

Syntax

DMY(<expD>)

<expD>

The date to format.

Description

DMY() returns a date in DD MONTH YY or DD MONTH YYYY format, where DD is the day number, MONTH is the full month name, and YY is the year number. If SET CENTURY is OFF (the default), DMY() returns the year as 2 digits. If SET CENTURY is ON, DMY() returns the year as 4 digits. If the day is only one digit, it is preceded by a space.

If you pass an blank date to DMY(), it returns "0 Unknown 00" or "0 Unknown 0000".

DOW()

Topic group Related topics Example

Returns the day of the week corresponding to a specified date as a number from 1 to 7.

Syntax

DOW(<expD>)

<expD>

The date whose corresponding weekday number you want to return.

Description

DOW() returns the number of the day of the week on which a date falls:

Day	Number
Sunday	1
Monday	2
Tuesday	3
Wednesday	4
Thursday	5
Friday	6
Saturday	7

To return the name of the day of the week instead of the number, use CDOW().

DOW() returns zero for a blank date.

DOW() example

The following function calculates the date for the Monday that follows the specified date:

```
function nextMonday( dArg )
  if dow( dArg ) == 1              // If it's Sunday
    return dArg + 1                // Monday is the next day
  else                             // Otherwise, subtract DOW()
    return dArg - dow( dArg ) + 9  // to get last week Saturday
  endif                            // then add 9 for next week Monday
```

DTOC()

Topic group | Related topics | Example

Converts a date into a literal date string.

Syntax

DTOC(<expD>)

<expD>

The date to return as a string.

Description

There are many different ways to represent a date as a string. Use DTOC() to convert a date into a literal date string, one that is suitable for conversion back into a date by CTOD().

The order of the day, month, and year is controlled by the current SET DATE setting. Whether the year is expressed as two or four digits is controlled by SET CENTURY. The separator character is controlled by SET MARK.

Note: To convert a date expression to a character string suitable for indexing or sorting, always use DTOS(), which converts the date into a consistent and sortable format.

If you pass a blank date to DTOC(), it returns a string with spaces instead of digits. For example, if the SET DATE format is AMERICAN and SET CENTURY is OFF, DTOC({ }) returns " / / ".

When concatenating a date to a string, *Visual* dBASE automatically converts the date using DTOC() for you.

DTOC() example

The following statement writes the current date to the text file opened in the File object fLog:

```
fLog.puts( dtoc( date()) )
```

The *puts*() method expects a string.

DTOS()

Topic group Related topics Example

Returns a specified date as a character string in YYYYMMDD format.

Syntax

DTOS(<expD>)

<expD>

The date expression to return as a character string in YYYYMMDD format.

Description

Use DTOS() to convert a date expression to a character string suitable for indexing or sorting. For example, you can use DTOS() when indexing on a date field in combination with another field of a different type. DTOS() always returns a character string in YYYYMMDD format, even if SET CENTURY is OFF.

If you pass a blank date to DTOS(), it returns a string with eight spaces, which matches the length of the normal result.

DTOS() example

The following statement indexes a table of orders by customer ID and order date. The customer ID field is a character field.

```
index on CUST_ID + dtos( ORDER_DATE ) tag CUST_DATE
```

ELAPSED()

Topic group Related topics Example

Returns the number of seconds elapsed between two specified times.

Syntax

ELAPSED(<stop time expC>, <start time expC>)

<stop time expC>

The time expression, in the format HH:MM:SS, at which to stop timing seconds elapsed. The <stop time expC> argument should be a later time than <start time expC>; if it is not, *Visual* dBASE returns a negative value.

<start time expC>

The time expression, in the format HH:MM:SS, at which to start timing seconds elapsed. The <start time expC> argument should be an earlier time than <stop time expC>; if it is not, *Visual* dBASE returns a negative value.

Description

Use ELAPSED() with TIME() to time a process. Call TIME() at the start of the process and store the resulting time string to a variable. Then call TIME() again at the end of the process. Call ELAPSED() with the start and stop times to calculate the number of seconds between.

ELAPSED() subtracts the value of <start time expC> from <stop time expC>. If <start time expC> is the later time, ELAPSED() returns a negative integer. Both <stop time expC> and <start time expC> must be in HH:MM:SS format, where HH is the hour, MM the minutes, and SS the seconds.

ELAPSED example

The following example shows a top-level routine that calls processes records. A subroutine does the processing, and returns the number of records processed. The elapsed time is used to calculate the throughput of a process.

```
local cTimeStart, nRecs, nRecSec, cMsg
cTimeStart = time()
nRecs = processRecords()
nRecSec = nRecs / elapsed( time(), cTimeStart )
cMsg = ltrim( str( nRecs )) + " records processed, " + ;
       ltrim( str( nRecSec )) + " records/sec"
msgbox( cMsg, "Process complete" )
```

enabled

Topic group Related topics Example

Specifies whether a Timer object is active and counting down time.

Property of

Timer

Description

Set the *enabled* property to *true* to activate the Timer object. When the number of seconds of idle time specified in the *interval* property has passed, the timer's *onTimer* event fires.

When the *enabled* property is set to *false*, the Timer stops counting time and the internal counter is reset. For example, suppose that

1 The *interval* is 10, and *enabled* is set to *true*.

2 Then 9 seconds of idle time go by, and

3 *enabled* is set to *false*.

If *enabled* is set to *true* again, the *onTimer* will fire after another 10 seconds has gone by, even though there was only 1 second left before the timer was disabled.

If a Timer is intended to go off only once instead of repeatedly, set the *enabled* property to *false* in the *onTimer* event handler.

enabled example

Running the following statements in the Command window will cause a message to be displayed once, 5 seconds after timer the is enabled:

```
t = new Timer()
t.onTimer = {; ? "Ding!"; this.enabled = false}
t.interval = 5
t.enabled = true
```

getDate()

Topic group Related topics Example

Returns the numeric value of the day of the month.

Syntax

<oRef>.*getDate*()

<oRef>

The Date object whose corresponding day-of-the-month number you want to return.

Property of

Date

Description

getDate() returns a date's day of the month number—a value from 1 to 31.

If the Date object contains a blank date, *getDate*() returns 0.

getDate() example

The following is an *onOpen* event handler for a form that makes the “Ship” button invisible on the first day of the month, when inventory is being reconciled:

```
function Form_onOpen()
  if day( date() ) == 1              // Get today's day of month, if first of
month
    this.shipButton.visible = false  // Prevent shipping
  endif
```

getDay()

Topic group Related topics Example

Returns the day of the week corresponding to a specified date as a number from 0 to 6.

Syntax

<oRef>.*getDay*()

<oRef>

The Date object whose corresponding weekday number you want to return.

Property of

Date

Description

getDay() returns the number of the day of the week on which a date falls. The number is zero-based:

Day	Number
Sunday	0
Monday	1
Tuesday	2
Wednesday	3
Thursday	4
Friday	5
Saturday	6

Note: The equivalent date function DAY() is one-based, not zero-based.

The day of the week is the only date/time component you cannot set directly; there is no corresponding **set- method. It is always based on the date itself.:**

getDay() example

The following is an *onOpen* event handler for a form that makes the “Game center” button visible on the weekends:

```
function Form_onOpen()
  if new Date().getDay() % 6 == 0          // If today is a weekend day
    this.gameCenterButton.visible = true   // Enable access to game center
page
  endif
```

The day number modulo 6 is zero for both day numbers 0 and 6, the days on the weekend.

getHours()

Topic group Related topics Example

Returns the hours portion of a date object.

Syntax

<oRef>.*getHours*()

<oRef>

The date object whose hours you want to return.

Property of

Date

Description

getHours() returns the hours portion of the time (using a 24-hour clock) in a Date object: an integer from 0 to 23.

getHours() example

The following function returns *true* if the date/time passed to it is during the graveyard shift, between 10 p.m. and 6 a.m.:

```
function isGraveyard( dArg )
  return ( dArg.getHours() >= 22 or dArg.getHours() < 6 )
```

getMinutes()

Topic group Related topics

Returns the minutes portion of a date object.

Syntax

<oRef>.getMinutes()

<oRef>

The date object whose minutes you want to return.

Property of

Date

Description

getMinutes() returns the minutes portion of the time in a Date object: an integer from 0 to 59.

getMonth()

Topic group Related topics

Returns the number of the month for a specified date.

Syntax

<oRef>.*getMonth*()

<oRef>

The Date object whose corresponding month number you want to return.

Property of

Date

Description

getMonth() returns a date's month number. The number is zero-based:

Month	Number
January	0
February	1
March	2
April	3
May	4
June	5
July	6
August	7
September	8
October	9
November	10
December	11

Note: The equivalent date function MONTH() is one-based, not zero-based.

getSeconds()

Topic group Related topics

Returns the seconds portion of a date object.

Syntax

<oRef>.*getSeconds*()

<oRef>

The date object whose seconds you want to return.

Property of

Date

Description

getSeconds() returns the seconds portion of the time in a Date object: an integer from 0 to 59.

getTime()

Topic group | Related topics | Example

Returns time equivalent of date/time, in milliseconds.

Syntax

<oRef>.*getTime*()

<oRef>

The Date object whose time equivalent you want to return.

Property of

Date

Description

getTime() returns the number of milliseconds since January 1, 1970 00:00:00 GMT for the date/time stored in the Date object. All date/times are represented internally by this millisecond number.

getTime() example

The following is a stopwatch function that returns the number of seconds since the last time it was called.

```
function stopwatch()
  local thisTime, nSecs
  thisTime = new Date().getTime()
  static lastTime = thisTime
  nSecs = ( thisTime - lastTime ) / 1000
  lastTime := thisTime
  return nSecs
```

The function uses a Date object's getTime() method, which keeps time in milliseconds. Whenever the function is called, the variable firstTime is set to the current time in milliseconds. The first time through the function, the lastTime variable is set to that same time. The difference is calculated, and then the value of thisTime is saved in the static variable lastTime for the next function call.

To reset the timer, call the function; you may ignore the return value. Then the next time you call the function, you will get the elapsed time. If you're measuring a series of intervals, call the function once between intervals. For example:

```
stopwatch()           // Reset timer
// Process 1
time1 = stopwatch()   // Time for first process
// Process 2
time2 = stopwatch()   // Time for second process
// etc.
```

getTimezoneOffset()

Topic group Related topics

Returns the time zone offset for a date object in the current locale, in minutes.

Syntax

<oRef>.*getTimezoneOffset*()

<oRef>

A date object created in the locale in question.

Property of

Date

Description

All time zones have an offset from GMT (Greenwich Mean Time), from twelve hours behind to twelve hours ahead. *getTimezoneOffset*() returns this offset, in minutes, for the locale in which the Date object was created, taking Daylight Savings Time into account.

For example, the United States and Canada Pacific time zone is eight hours behind GMT. A date in January, when Daylight Savings Time is not in effect, created in the Pacific time zone would have a time zone offset of -480. A date in July, when Daylight Savings Time is in effect, would have a time zone offset of
-420, or seven hours, since Daylight Savings Time moves clocks one hour forward, closer to GMT.

In Windows, the locale is determined by the Time Zone setting in each system's Date/Time properties, which is found in the Control Panel, or by double-clicking the clock in the Taskbar.

All Date objects default to the time zone setting of the current locale.

getYear()

Topic group Related topics

Returns the year of a specified date.

Syntax

<oRef>.*getYear*()

<oRef><expD>

The Date object whose corresponding year number you want to return.

Property of

Date

Description

getYear() returns a date's year number. For dates in the 1900s, the 2-digit year is returned. The SET CENTURY setting has no effect on *getYear*().

interval

Topic group Related topics Example

The amount of idle time, in seconds, between the firings of the timer.

Property of

Timer

Description

Set the *enabled* property to *true* to activate the Timer object. When the number of seconds of idle time specified in the *interval* property has passed, the timer's *onTimer* event fires.

When the *enabled* property is set to *false*, the Timer stops counting time and the internal counter is reset. For example, suppose that

1 The *interval* is 10, and *enabled* is set to *true*.

2 Then 9 seconds of idle time go by, and

3 *enabled* is set to *false*.

If *enabled* is set to *true* again, the *onTimer* will fire after another 10 seconds has gone by, even though there was only 1 second left before the timer was disabled.

interval must be zero or greater. The *interval* may be a fraction of a second; the resolution of the timer is one system clock tick, approximately 0.055 seconds. When *interval* is zero, the timer fires once per clock tick.

Setting the *interval* always resets the internal counter to the newly specified time.

interval example

Running the following statements in the Command window will cause a message to be displayed once, 5 seconds after timer is enabled:

```
t = new Timer()
t.onTimer = {; ? "Ding!"; this.enabled = false}
t.interval = 5
t.enabled = true
```

MDY()

Topic group Related topics

Returns a specified date as a character string in MONTH DD, YY format.

Syntax

MDY(<expD>)

<expD>

The date to return as a character string in MONTH DD, YY format.

Description

MDY() returns a date in MONTH DD, YY or MONTH DD, YYYY format, where MONTH is the full month name, DD is the day number, and YY is the year number. If SET CENTURY is OFF (the default), MDY() returns the year as 2 digits. If SET CENTURY is ON, MDY() returns the year as 4 digits. MDY() always returns the day portion as 2 digits, with a leading zero for the first nine days of the month.

If you pass an invalid date to MDY(), it returns "Unknown 00, 00" or "Unknown 00, 0000".

MONTH()

Topic group Related topics Example

Returns the number of the month for a specified date.

Syntax

MONTH(<expD>)

<expD>

The date whose corresponding month number you want to return.

Description

MONTH() returns a date's month number:

Month	Number
January	1
February	2
March	3
April	4
May	5
June	6
July	7
August	8
September	9
October	10
November	11
December	12

To return the name of the month instead of the number, use CMONTH().

MONTH() returns zero for a blank date.

MONTH() example

The following function returns the date of the last day of the year of the specified date, using date math only. This makes the calculation independent of the current SET DATE setting. The function relies on another function that returns the last day of the month of a specified date.

```
function LDoY( dArg )
  local dDec
  dDec = dArg - day( dArg ) + 28 * ( 13 - month( dArg ))
return LDoM( dDec )
function LDoM( dArg )
  local dNxtMonth
  dNxtMonth = dArg - day( dArg ) + 45
return dNxtMonth - day( dNxtMonth )
```

onTimer

Topic group | Related topics | Example

When the timer's interval has elapsed.

Parameters

none

Property of

Timer

Description

A Timer object's *onTimer* event is fired every time the amount of idle time specified by the timer's *interval* property has elapsed.

Like all event handlers, inside the *onTimer* event handler, the reference *this* refers to the Timer object itself. To refer to other objects, add references to those objects as properties to the Timer object before activating the timer.

While processing the *onTimer* event, all active timers are suspended, since *Visual* dBASE is busy processing code. Once the *onTimer* event handler has completed, its internal counter is reset to the *interval*, and all active timers resume counting.

If a Timer is intended to go off only once instead of repeatedly, set the *enabled* property to *false* in the *onTimer* event handler.

onTimer example

Running the following statements in the Command window will cause a message to be displayed once, 5 seconds after timer is enabled:

```
t = new Timer()
t.onTimer = {; ? "Ding!"; this.enabled = false}
t.interval = 5
t.enabled = true
```

parse()

Topic group Related topics Example

Returns time equivalent of a date/time string, in milliseconds.

Syntax

Date.*parse*(<date expC>)

<date expC>

The date/time string you want to convert.

Property of

Date

Description

parse() returns the number of milliseconds since January 1, 1970 00:00:00 GMT for the specified date/time string, defaulting to the operating system's current time zone setting. For example, if the time zone is currently set to United States Eastern Standard Time, which is five hours behind GMT, then Date.*parse*("Sep 14 1995 11:20") yields a time which is equivalent to 16:20 GMT.

The string may be in any of the forms acceptable to the Date class constructor, as described under class Date at the beginning of this chapter. In contrast, the *UTC*() method uses numeric parameters for each of the date and time components and assumes GMT as the time zone.

Because *parse*() is a static class method, you call it via the Date class, not a Date object.

parse() example

The following code fragment resets an existing date object d1 to a date typed into a text control:

```
d1.setTime( Date.parse( this.form.dateText.value ))
```

SECONDS()

Topic group Related topics

Returns the number of seconds that have elapsed on your computer's system clock since midnight.

Syntax

SECONDS()

Description

SECONDS() returns the number of seconds to the hundredth of a second that have elapsed on your system clock since midnight (12 am). There are 86,400 seconds in a day, so the maximum value SECONDS() can return is 86,399.99, just before midnight.

Use SECONDS() to calculate the amount of time that portions of your program take to run. SECONDS() is more convenient for this purpose than TIME() because SECONDS() returns a number rather than a character string.

You can also use SECONDS() instead of ELAPSED() to determine elapsed time for the current day to within hundredths of a second.

SET CENTURY

Topic group Related topics

Controls the format in which *Visual* dBASE displays the year portion of dates.

Syntax

SET CENTURY on | off

Description

When SET CENTURY is ON, *Visual* dBASE displays dates in the current format with 4-digit years; when SET CENTURY is OFF, *Visual* dBASE displays dates in the current format with 2-digit years.

You can enter a date with a 2-, 3-, or 4-digit year whether SET CENTURY is ON or OFF. *Visual* dBASE assumes that 2-digit years are in the epoch designated by SET EPOCH, by default the 1900s. If SET CENTURY is OFF, *Visual* dBASE truncates any digits to the left of the last two when displaying the date. However, *Visual* dBASE stores the correct value of the date internally.

The following table shows the how *Visual* dBASE displays and stores dates depending on the setting of SET CENTURY. (The table assumes SET DATE is AMERICAN and SET EPOCH is 1900.)
As the table shows, SET CENTURY doesn't affect the relationship between how you enter a date and how *Visual* dBASE evaluates and stores it. SET CENTURY affects only how *Visual* dBASE displays the year portion of the date.

You enter date as	*Visual* dBASE stores date as	With SET CENTURY ON, *Visual* dBASE displays	With SET CENTURY OFF, *Visual* dBASE displays
{10/13/94}	10/13/1994	10/13/1994	10/13/94
{10/13/994}	10/13/0994	10/13/0994	10/13/94
{10/13/1994}	10/13/1994	10/13/1994	10/13/94
{10/13/2094}	10/13/2094	10/13/2094	10/13/94

SET DATE

Topic group Related topics

Specifies the format *Visual* dBASE uses for the display and entry of dates.

Syntax

SET DATE [TO]
AMERICAN | ANSI | BRITISH | FRENCH | GERMAN | ITALIAN | JAPAN | USA | MDY | DMY | YMD

TO

Include for readability only; TO has no affect on the operation of the command.

AMERICAN | ANSI | BRITISH | FRENCH | GERMAN | ITALIAN | JAPAN | USA | MDY | DMY | YMD

The options correspond to the following formats:

Option	Format
AMERICAN	MM/DD/YY
ANSI	YY.MM.DD
BRITISH	DD/MM/YY
FRENCH	DD/MM/YY
GERMAN	DD.MM.YY
ITALIAN	DD-MM-YY
JAPAN	YY/MM/DD
USA	MM-DD-YY
MDY	MM/DD/YY
DMY	DD/MM/YY
YMD	YY/MM/DD

Description

SET DATE determines how *Visual* dBASE displays dates; and how literal date strings, like those in curly braces ({ }), are interpreted. If SET CENTURY is ON, *Visual* dBASE displays all formats with a 4-digit year.

The default for SET DATE is set by theRegional Settings in the Windows Control Panel. To change the default, set the DATE parameter in VDB.INI. To do so, either use the SET command to specify the setting interactively, or enter the DATE parameter directly in VDB.INI.

SET DATE overrides any prior SET MARK setting. However, you can use SET MARK after SET DATE to change the date separator character.

SET DATE TO

Topic group Related topics

Sets the system date.

Syntax

SET DATE TO <expC>

<expC>

The character expression, in the current date format, to set as the current system date.

Description

Use SET DATE TO to reset the date on your system clock. The date string in <expC> must match the current setting of SET DATE.

The date must be in the range from January 1, 1980, to December 31, 2099.

SET EPOCH

Topic group Related topics

Sets the base year for interpreting two-digit years in dates.

Syntax

SET EPOCH TO <expN>

Default

The default base year is 1900, yielding years from 1900 to 1999.

Description

Use SET EPOCH to change how two-digit years are interpreted. This allows you to keep SET CENTURY OFF, while enabling entry of dates that cross a century boundary. The following table shows how dates are interpreted using three different SET EPOCH settings:

Date	1900	1930	2000
{5/5/00}	05/05/1900	05/05/2000	05/05/2000
{5/5/30}	05/05/1930	05/05/1930	05/05/2030
{5/5/99)	05/05/1999	05/05/1999	05/05/2099

For example, if you SET EPOCH TO 1930, you can continue to use most applications with two-digit years unchanged well into the 21st century, (although you would no longer be able to enter dates before 1930, which would not be a problem with many applications). If your applications use dates that span more than one hundred years, then SET EPOCH alone will not help; you must SET CENTURY ON.

The base year setting takes effect whenever dates are interpreted. In programs, two-digit years in literal dates are evaluated at compile-time. If you use SET EPOCH, be sure it is set correctly when you compile code or run new or changed programs.

SET EPOCH is session-based. You may get the value of SET EPOCH with the SET() and SETTO() functions.

SET MARK

Topic group Related topics

Determines the character *Visual* dBASE uses to separate the month, day, and year when it displays dates.

Syntax

SET MARK TO [<expC>]

<expC>

The single date separator character. You can specify more than one character for <expC>, but *Visual* dBASE uses only the first one.

Description

Use SET MARK to change the date separator from the default character. For example, if you issue SET DATE AMERICAN, the date separator character is a forward slash (/), and *Visual* dBASE displays dates in MM/DD/YY format. However, if you specify SET MARK TO "." after issuing SET DATE AMERICAN, *Visual* dBASE displays dates in the format MM.DD.YY. If you issue SET DATE AMERICAN again, the format returns to MM/DD/YY.

Issuing SET MARK TO without <expC> resets the date separator character to that of the current date format.

SET MARK controls the separator used for display only. You may use any valid separator character when designating a literal date.

SET TIME

Topic group Related topics

Sets the system time.

Syntax

SET TIME TO <expC>

<expC>

The time, which you must specify in one of the following formats:

- HH
- HH:MM or HH.MM
- HH:MM:SS or HH.MM.SS

Description

Use SET TIME to reset your system's clock.

setDate()

Topic group Related topics

Sets day of month.

Syntax

<oRef>.*setDate*(<expN>)

<oRef>

The Date object whose day you want to change.

<expN>

The day of month number, normally between 1 and 31.

Property of

Date

Description

setDate() sets the day of month for the Date object.

setHours()

Topic group Related topics

Sets hours portion of time.

Syntax

<oRef>.*setHours*(<expN>)

<oRef>

The Date object whose hours you want to change.

<expN>

The hour number, normally between 0 and 23.

Property of

Date

Description

setHours() sets the hours portion of the time for the Date object.

setMinutes()

Topic group Related topics

Sets minutes portion of time.

Syntax

<oRef>.*setMinutes*(<expN>)

<oRef>

The Date object whose minutes you want to change.

<expN>

The minute number, normally between 0 and 59.

Property of

Date

Description

setMinutes() sets the minutes portion of the time for the Date object.

setMonth()

Topic group Related topics

Sets month of year.

Syntax

<oRef>.*setMonth*(<expN>)

<oRef>

The Date object whose month you want to change.

<expN>

The month number, normally between 0 and 11: 0 for January, 1 for February, and so on, up to 11 for December.

Property of

Date

Description

setMonth() sets the month of year for the Date object.

setSeconds()

Topic group Related topics

Sets seconds portion of time.

Syntax

<oRef>.*setSeconds*(<expN>)

<oRef>

The Date object whose seconds you want to change.

<expN>

The number of seconds, normally between 0 and 59.

Property of

Date

Description

setSeconds() sets the seconds portion of the time for the Date object.

setTime()

Topic group Related topics

Sets date/time of Date object.

Syntax

<oRef>.setTime(<expN>)

<oRef>

The Date object whose time you want to set.

<expN>

The number of milliseconds since January 1, 1970 00:00:00 GMT for the desired date/time.

Property of

Date

Description

While you may use standard date/time nomenclature when creating a new Date object, *setTime*() requires a number of milliseconds. Therefore *setTime*() is used primarily to copy the date/time from one Date object to another. If you tried copying dates like this:

```
d1 = new Date( "Aug 24 1996" )
d2 = new Date()
d2 = d1            // Copy date
```

what you're actually doing is copying an object reference for the first Date object into another variable. Both variables now point to the same object, so changing the date/time in one would appear to change the date/time in the other.

To actually copy the date/time, use *setTime*() and *getTime*():

```
d1 = new Date( "Aug 24 1996" )
d2 = new Date()
d2.setTime( d1.getTime() )  // Copy date
```

If you're copying the date/time when you're creating the second Date object, you can use the millisecond value in the Date class constructor:

```
d1 = new Date( "Aug 24 1996" )
d2 = new Date( d1.getTime() )  // Create copy of date
```

You may also perform date math by adding or subtracting milliseconds from the value.

setYear()

Topic group Related topics

Sets year of date.

Syntax

<oRef>.*setYear*(<expN>)

<oRef>

The Date object whose year you want to change.

<expN>

The year. For years in the 1900s, you can specify the year as either a 2-digit or 4-digit year.

Property of

Date

Description

setYear() sets the year for the Date object.

toGMTString()

Topic group Related topics Example

Converts the date into a string, using Internet (GMT) conventions.

Syntax

<oRef>.*toGMTString*()

<oRef>

The Date object you want to convert.

Property of

Date

Description

toGMTString() converts the date, which was created using the operating system's time zone setting, to GMT and returns a string in a format like, "Tue, 07 May 1996 02:55:27 GMT".

toGMTString() example

When the following statement is executed in the Command window, the current date and time is displayed in the results pane in GMT format:

```
? new Date().toGMTString()
```

toLocaleString()

Topic group Related topics Example

Converts the date into a string, using locale conventions.

Syntax

<oRef>.*toLocaleString*()

<oRef>

The Date object you want to convert.

Property of

Date

Description

toLocaleString() converts the date to a string, using the standards for the current locale, like “05/06/96 19:55:27”.

Visual dBASE uses Windows’ Regional settings from the Control Panel.

toLocaleString() example

When the following statement is executed in the Command window, the current date and time is displayed in the results pane in locale format:

```
? new Date().toLocaleString()
```

toString()

Topic group | Related topics | Example

Converts the date into a string, using standard JavaScript conventions.

Syntax

<oRef>.*toString*()

<oRef>

The Date object you want to convert.

Property of

Date

Description

toString() converts the date to a string, in standard JavaScript format, which includes the complete time zone description, for example,

"Mon May 06 19:55:27 Pacific Daylight Time 1996"

toString() example

When the following statement is executed in the Command window, the current date and time is displayed in the results pane in standard format:

```
? new Date().toString()
```

UTC()

Topic group | Related topics | Example

Returns time equivalent of the specified date/time parameters using GMT, in milliseconds.

Syntax

Date.*UTC*(<year expN>, <month expN>, <day expN>
[, <hours expN> [, <minutes expN> [, <seconds expN>]]])

<year expN>

The year.

<month expN>

A number representing the month, between 0 and 11: zero for January, one for February, and so on, up to 11 for December.

<day expN>

The day of the month, from 1 to 31.

<hours expN>

The hours portion of the time, from 0 to 23.

<minutes expN>

The minutes portion of the time, from 0 to 59.

<seconds expN>

The seconds portion of the time, from 0 to 59.

Property of

Date

Description

UTC() returns the number of milliseconds since January 1, 1970 00:00:00 GMT for the date/time parameters specified, using GMT as the time zone. In contrast, the *parse*() method takes a string as a parameter, and uses the operating system's current time zone setting as the default.

Because *UTC*() is a static class method, you call it via the Date class, not a Date object.

UTC() example

You cannot specify a time zone when creating a Date object with separate date and time components, but you can use *UTC*() for GMT:

```
dLocale = new Date( nYear, nMonth, nDay )              // Time zone of locale
dGMT    = new Date( Date.UTC( nYear, nMonth, nDay ) )  // GMT
```

YEAR()

Topic group Related topics

Returns the year of a specified date.

Syntax

YEAR(<expD>)

<expD>

The date whose corresponding year number you want to return.

Property of

Date

Description

YEAR() returns a date's 4-digit year number. The SET CENTURY setting has no effect on YEAR().

YEAR() returns zero for a blank date.

Bitwise

Topic group

The functions in this chapter are used for bit manipulation and base conversion for unsigned 32-bit values. These values are often passed to and returned by Windows API and other DLL functions. Interpreting such values often requires analysis and manipulation of individual bits.

For all parameters designated as 32-bit integers, non-integers will be truncated to integers. For integers larger than 32 bits, only the least significant (right-most) 32 bits are used.

BITAND()

Topic group Related topics Example

Performs a bitwise AND.

Syntax

BITAND(<expN1>, <expN2>)

<expN1>
<expN2>

Two 32-bit integers

Description

BITAND() compares bits in the numeric value <expN1> with corresponding bits in the numeric value <expN2>. When both bits in the same position are on (set to 1), the corresponding bit in the returned value is on. In any other case, the bit is off (set to 0).

AND	0	1
0	0	0
1	0	1

Use BITAND() to force individual bits to zero. Create a bit mask: a 32-bit integer with zeroes in the bits you want to force to zero and ones in the bits you want to leave alone. Use this bit mask as either one of the parameters to BITAND(), and the other parameter as the number that is modified.

BITAND() example

The following program displays Windows version information extracted from the return value of the Windows API function GetVersion(), which returns a 32-bit integer. The major version number is in the low byte of the low word, and the minor version number is in the high byte of the low word. For example, if the version is 4.10, the major version number is 4 and the minor version number is 10.

As is common practice, macro-functions are created with the #define preprocessor directive to simplify common bit manipulations. There are functions to extract the high word and low word of 32-bit value, and the high byte and low byte of a 16-bit value. The HIBYTE() macro-function has some defensive programming in case the parameter is larger than 16 bits. The functions BITAND() and BITZRSHIFT() are used to extract the values.

```
#define HIWORD(n) (bitzrshift((n),16))
#define LOWORD(n) (bitand((n),0xFFFF))
#define HIBYTE(n) (bitand(bitzrshift((n),8),0xFF))
#define LOBYTE(n) (bitand((n),0xFF))
if type( "GetVersion" ) # "FP"
  extern clong GetVersion() kernel32
endif
local v, vMajor, vMinor, vBuild, isNT
v = GetVersion()
vMajor = LOBYTE( LOWORD( v ))
vMinor = HIBYTE( LOWORD( v ))
isNT   = not bitset( v, 31 )          // High bit clear if NT
vBuild = iif( isNT, HIWORD( v ), 0 ) // Ignores Win32s
? iif( isNT, "Windows NT", "Windows 9x" ), ;
  "version " + ltrim( str( vMajor )) + "." + str( vMinor, 2, 0, "0" )
if isNT
  ?? " build", ltrim( str( vBuild ))
endif
```

To get the low word of a 32-bit integer, a bit mask is created with ones in all 16 low bits. The hexadecimal value of this number is FFFF, as shown in the LOWORD() macro-function. Similarly, to get the low byte of a 16-bit integer, the bit mask has ones in the low 8 bits: FF. All the other bits are set to zero when the bitwise AND is performed.

The major version number uses both LOBYTE() and LOWORD(). While this is redundant—LOBYTE() alone would work—it's left in to make the code more symmetical and self-documenting.

BITLSHIFT()

Topic group Related topics Example

Shifts a number's bits to the left.

Syntax

BITLSHIFT(<int expN>, <shift expN>)

<int expN>

A 32-bit integer.

<shift expN>

The number of places to shift, from 0 to 32.

Description

BITLSHIFT() moves each bit in the numeric value <int expN> to the left the number of times you specify in <shift expN>. Each time the bits are shifted, the least significant bit (bit 0, the bit farthest to the right) is set to 0, and the most significant bit (bit 31, the bit farthest to the left) is lost.

Shifting a number’s bits to the left once has the effect of multiplying the number by two, except that if the number gets too large—equal to or greater than 2^32 (roughly 4 billion)—the high bit is lost.

BITLSHIFT() example

The following macro-function takes three separate values for red, green, and blue and combines them into a single 24-bit value.

```
#define RGB(r,g,b) ;
(bitlshift(bitand((r),0xff),16)+bitlshift(bitand((g),0xff),8)+bitand((b),0xff
))
```

Each value is 8 bits—BITAND() makes sure of that. The red value is shifted 16 bits to the left to make room for the green and blue values. The green value is shifted 8 bits to the left to make room for the blue value. All three numbers are added together to form a single 24-bit number. For example, suppose you pass the following values, shown here in binary to the macro-function:

```
Red    11000011
Green  10101010
Blue   11111111
```

Shifting the red and green results in the following values:

```
Red    11000011 00000000 00000000
Green  00000000 10101010 00000000
Blue   00000000 00000000 11111111
```

The 8-bit values are shifted so their bits do not overlap. Now, adding the values together combines them into a single 24-bit value:

```
RGB    11000011 10101010 11111111
```

BITNOT()

Topic group Related topics

Inverts the bits in a number

Syntax

BITNOT(<expN>)

<expN>

A 32-bit integer.

Description

BITNOT() inverts all 32 bits in <expN>. All zeroes become ones, and all ones become zeroes.

To invert specific bits, use BITXOR().

BITOR()

Topic group Related topics

Performs a bitwise OR.

Syntax

BITOR(<expN1>, <expN2>)

<expN1>
<expN2>

Two 32-bit integers

Description

BITOR() compares bits in the numeric value <expN1> with corresponding bits in the numeric value <expN2>. When either or both bits in the same position are on (set to 1), the corresponding bit in the returned value is on. When neither element is on, the bit is off (set to 0).

OR	0	1
0	0	1
1	1	1

Use BITOR() to force individual bits to one. Create a bit mask: a 32-bit integer with ones in the bits you want to force to one and zeroes in the bits you want to leave alone. Use this bit mask as either one of the parameters to BITOR(), and the other parameter as the number that is modified.

BITRSHIFT()

Topic group Related topics

Shifts a number's bits to the right, maintaining sign.

Syntax

BITRSHIFT(<int expN>, <shift expN>)

<int expN>

A signed 32-bit integer.

<shift expN>

The number of places to shift, from 0 to 32.

Description

Unlike the other bitwise functions, BITRSHIFT() treats its 32-bit integer as a signed 32-bit integer. The sign of a 32-bit integer is stored in the most significant bit (bit 31), which is also referred to as the high bit. If the high bit is 1, the number is negative if it is treated as a signed integer. Otherwise, it is simply a very large unsigned integer.

BITRSHIFT() moves each bit in the numeric value <int expN> to the right the number of times you specify in <shift expN>. Each time the bits are shifted, the previous value of the high bit is restored, and the least significant bit (bit 0, the bit farthest to the right) is lost. This is called a sign-extended shift, because the sign is maintained.

A similar function, BITZRSHIFT(), performs a zero-fill right shift, which always sets the high bit to zero. If <int expN> is a positive integer less than 2^31, BITZRSHIFT() and BITRSHIFT() have the same effect, because the high bit for such an integer is zero.

Use BITRSHIFT() when you’re treating the integer as a signed integer. Use BITZRSHIFT() when the integer is unsigned.

Shifting a number’s bits to the right once has the effect of dividing the number by two, dropping any fractions.

BITSET()

Topic group Related topics Example

Checks if a specified bit in a numeric value is on.

Syntax

BITSET(<int expN>, <bit expN>)

<int expN>

A 32-bit integer.

<bit expN>

The bit number, from 0 (the least significant bit) to 31 (the most significant bit).

Description

BITSET() evaluates the number <int expN> and returns *true* if the bit in position <bit expN> is on (set to 1), or *false* if it is off (set to 0). For example, the binary representation of 3 is

00000000 00000000 00000000 00000011

bit number 0 is on, bit number 2 is off.

BITSET() example

The following statement from the example for BITAND()

```
isNT   = not bitset( v, 31 )          // High bit clear if NT
```

uses BITSET() to check the high bit of the value returned by the GetVersion() Windows API function. If the bit is not set, the operating system is Windows NT.

BITXOR()

Topic group Related topics

Performs a bitwise exclusive OR.

Syntax

BITXOR(<expN1>, <expN2>)

<expN1>
<expN2>

Two 32-bit integers

Description

BITXOR() compares bits in a numeric value <expN1> with corresponding bits in the numeric value <expN2>. When one (and only one) of two bits in the same position are on (set to 1), the corresponding bit in the returned value is on. In any other case, the bit is off (set to 0).

XOR	0	1
0	0	1
1	1	0

This operation is known as exclusive OR, since one bit (and only one bit) must be set on for the corresponding bit in the returned value to be set on.

Use BITXOR() to flip individual bits. Create a bit mask: a 32-bit integer with ones in the bits you want to flip and zeroes in the bits you want to leave alone. Use this bit mask as either one of the parameters to BITXOR(), and the other parameter as the number that is modified.

HTOI()

Topic group Related topics Example

Shifts a number's bits to the right.

Syntax

BITZRSHIFT(<int expN>, <shift expN>)

<int expN>

A 32-bit integer.

<shift expN>

The number of places to shift, from 0 to 32.

Description

BITZRSHIFT() moves each bit in the numeric value <int expN> to the right the number of times you specify in <shift expN>. Each time the bits are shifted, the most significant bit (bit 31, the bit farthest to the left) is set to 0, and the least significant bit (bit 0, the bit farthest to the right) is lost.

Shifting a number’s bits to the right once has the effect of dividing the number by two, dropping any fractions.

Like most other bitwise functions, BITZRSHIFT() treats <int expN> as an unsigned integer. To shift a signed integer, use BITRSHIFT() instead.

BITZRSHIFT() example

The following macro-function, defined with the #define preprocessor directive:

```
#define HIWORD(n) (bitzrshift((n),16))
```

extracts the high word (16 bits) of a 32-bit integer. Shifting the bits 16 places to the right with BITZRSHIFT() moves the high word into the low word, filling the now-vacated high bits with zeros, resulting in a 32-bit integer with the same value as the original high word.

HTOI()

Topic group Related topics Example

Returns the numeric value of a specified hexadecimal number.

Syntax

HTOI(<expC>)

<expC>

The hexadecimal number whose numeric value to return.

Description

Use HTOI() to convert a string containing a hexadecimal number to its numeric value (in decimal). For example, you might allow the input of a hexadecimal number. This input would have to go into a string because the hexadecimal digits A through F are considered characters. To use the hexadecimal number, you would have to convert the hexadecimal string into its numeric value.

HTOI() will attempt to convert a hexadecimal number of any magnitude; it is not limited to 32 bits (8 hexadecimal digits).

You may specify literal hexadecimal numbers by preceding them with 0x; HTOI() is not necessary. For example, 0x64 and HTOI("64") result in the same number: 100 decimal.

HTOI() example

The following example converts a hexadecimal string typed into an Entryfield into the corresponding numeric value and stores it in a custom property called numValue.

```
function address_onChange
  this.numValue = htoi( this.value )
```

ITOH()

Topic group Related topics

Returns the hexadecimal equivalent of a specified number, as a character string.

Syntax

ITOH(<int expN> [, <chars expN>])

<int expN>

The 32-bit integer whose hexadecimal equivalent to return.

<chars expN>

The minimum number of characters to include in the returned hexadecimal character string.

Description

Use ITOH() to convert a number to a character string representing its hexadecimal equivalent. The hexadecimal number may be used for display and editing/input purposes. To use the hexadecimal number as a number, it must be converted back into a numeric value with HTOI().

By default, ITOH() uses only as many characters as necessary to represent <int expN> in hexadecimal. If <chars expN> is greater than the number of characters required, ITOH() pads the returned string with leading 0's to make it <chars expN> characters long. If <chars expN> is less than the number of characters required, it is ignored. For example, ITOH(21) returns the string "15", while ITOH(21,4) returns "0015".

Because ITOH() treats the integer as a 32-bit integer, negative integers are always converted into 8 hexadecimal digits. For example, ITOH(-1) returns "FFFFFFFF".

Array objects

Topic group

Visual dBASE supports a wide variety of array types:

- Arrays of contiguously numbered elements, in one or more dimensions. Elements are numbered from one. There are methods specifically for one- and two-dimensional arrays, which mimic a row of fields and a table of rows.
- Associative arrays, in which the elements are addressed by a key string instead of a number.
- Sparse arrays, which use non-contiguous numbers to refer to elements.

All arrays are objects, and use square brackets ([ ]) as indexing operators.

Array elements may contain any data type, including object references to other arrays. Therefore you can create nested arrays (multi-dimensional arrays of arrays with fixed length in each dimension), ragged arrays (nested arrays with variable lengths), arrays of associative arrays, and so on.

There are two array classes: Array and AssocArray. Sparse arrays can be created with any other object. In addition to creating properties by name, you can create numeric properties using the indexing operators. For example,

```
o = new Object()
o.title = "Summer"
o[ 2000 ] = "Sydney"
o[ 1996 ] = "Atlanta"
? o[ 1996 + 4 ]  // Displays "Sydney"
```

Array functions

Topic group

Visual dBASE supports a number of array functions, most of which have equivalent methods in the Array class. These functions are:

Function	Array class method
ACOPY()	No equivalent
ADEL()	*delete*()
ADIR()	*dir*()
ADIREXT()	*dirExt*()
AELEMENT()	*element*()
AFIELDS()	*fields*()
AFILL()	*fill*()
AGROW()	*grow*()
AINS()	*insert*()
ALEN()	For number of elements, check array's *size* property
ARESIZE()	*resize*()
ASCAN()	*scan*()
ASORT()	*sort*()
ASUBSCRIPT()	*subscript*()

Like the equivalent methods, these functions operate on one- and two-dimensional arrays only. ACOPY() and ALEN(), which have no direct equivalents, are described separately. The other functions are not described in detail.

The use of those functions, although not recommended, is similar to the equivalent method. For a given method like:

```
aExample.fill( 0 )   // Fill array with zeros
```

the equivalent function uses the reference to the array as its first parameter and all other parameters (if any) following it:

```
afill( aExample, 0 )
```

The parameters following the array name in the function are identical to the parameters to the equivalent method, and the functions return the same values as the methods.

class Array

Topic group Related topics Example

An array of elements, in one or more dimensions.

Syntax

[<oRef> =] new Array([<dim1 expN> [,<dim2 expN>...]])

<oRef>

A variable or property in which to store a reference to the newly created Array object.

<dim1 expN> [,<dim2 expN> ...]

The size of the array in each specified dimension. If no dimensions are specified, the array is a one-dimensional array with zero elements.

Properties

The following tables list the properties and methods of the Array class. (No events are associated with this class.)

Property	Default	Description
className	ARRAY	Identifies the object as an instance of the Array class
dimensions		The number of dimensions in the array
size	0	The number of elements in the array

Method	Parameters	Description
add()	<exp>	Increases the size of a one-dimensional array by one and assigns the passed value to the new element.
delete()	<position expN> [,1 | 2]	Deletes an element from a one-dimensional array, or deletes a row (1) or column (2) of elements from a two-dimensional array, without changing the size of the array.
dir()	[<filespec expC>]	Stores in the array five characteristics of specified files: name, size, modified date, modified time, and file attribute(s). Returns the number of files whose characteristics are stored.
dirExt()	[<filespec expC>]	Same as *dir*() method, but adds short (8.3) file name, create date, create time, and access date.
element()	<row expN> [,<col expN>]	Returns the element number for the element at the specified row and column.
fields()		Stores table structure information for the current table in the array
fill()	<exp> , <start expN> [, <count expN>]	Stores a specified value into one or more elements of the array.
grow()	1 | 2	When passed 1, adds a single element to a one-dimensional array or a row to a two-dimensional array; when passed 2, adds a column to the array.
insert()	<element expN> [,1 | 2]	Inserts an element, row (1), or column (2) into an array without changing the size of the array (the last element, row, or column is lost).
resize()	<rows expN> [, <cols expN> [, <retain values>]]	Increases or decreases the size of an array. First passed parameter indicates the new number of rows, the second parameter indicates the new number of columns. If the third parameter is zero, current values are relocated; if nonzero, they are retained in their old positions.
scan()	<exp> , <start expN> [, <count expN>]	Searches an array for the specified expression; returns the element number of the first element that matches the expression, or zero if the search is unsuccessful.
sort()	<start expN>	Sorts the elements in a one-dimensional array or the rows in

	[, <count expN> [, 0 | 1]]	a two-dimensional array in ascending (0) or descending (1) order.
subscript()	<element expN> 1 | 2	Returns the row (1) or column (2) subscript for the specified element number.

Description

An Array object is a standard array of elements, addressed by a contiguous range of numbers in one or more dimensions. The array can hold as many elements as memory allows. You can create arrays that contain more than two dimensions, but most *Visual* dBASE Array methods work only on one- or two-dimensional arrays. For a two-dimensional array, the first dimension is considered the row and the second dimension is the column. For example, the following statement creates an array with 3 rows and 4 columns:

```
a = new Array( 3, 4 )
```

There are two ways to refer to individual elements in an array; you can use either element subscripts or the element number. Element subscripts, one for each dimension, are values that represent the element's position in that dimension. For a two-dimensional array, they indicate the row and column in which an element is located. Element numbers indicate the sequential position of the element in the array, starting with the first element in the array and increasing in each dimension, with the last dimension first. For a two-dimensional array, the first element is in the first column of the first row, the second element is in the second column of the first row, and so on.

To determine the number of dimensions in an array, check its *dimensions* property (it's read-only). The array's *size* property reflects the number of elements in the array. To determine the number of rows or columns in a two-dimensional array, use the ALEN() function. There is no built-in way to determine the size of dimensions above two.

In an Array object, element numbering starts with one. You cannot create elements outside the defined range of elements or subscripts (although you could change the dimensions of the array if desired). For example, a 3-row,
4-column array has 12 elements, numbered 1 to 12. The first element's subscripts are [1,1] and the last element is [3,4].

Certain *Visual* dBASE methods require the element number, and others require the subscripts. If you are using one- or two-dimensional arrays, you can use *element*() to determine the element number if you know the subscripts, and *subscript*() to determine the subscripts if you know the element number.

Array elements may contain any data type, including object references to other arrays. Therefore you can create nested arrays (multi-dimensional arrays of arrays with fixed length in each dimension), ragged arrays (nested arrays with variable lengths), arrays of associative arrays, and so on.

With both nested and multi-dimensional arrays, you end up with multiple dimensions or levels of elements, but when you nest arrays, you create separate array objects, and the methods that are designed to work on the multiple dimensions of a single Array object will not work on the separate dimensions of the nested arrays.

In addition to creating an array with the NEW operator, you can create a populated one-dimensional array using the literal array syntax. For example, this statement

```
a1 = {"A", "B", "C"}
```

creates an Array object with three elements: “A”, “B”, and “C”. You can nest literal arrays. For example, if this statement:

```
a2 = { {1, 2, 3}, a1 }
```

followed the first, you would then have a nested array.

To access a value in a nested array, use the index operators in series. Continuing the example, the third element in the first array would be accessed with:

```
x = a2[1][3]  // 3
```

One-dimensional arrays are the only Array objects that are allowed to have zero elements. This is particularly useful for building arrays dynamically. To create a zero-element array, create a NEW Array

with no parameters:

```
a0 = new Array()
```

Then use the *add*() method to add elements to the array.

class Array example

The following statements create a 3 row, 4 column array with the letters “A” through “L” with two different techniques and use a function to display each array.

```
aAlpha = new Array( 3, 4 )
aAlpha[0,0] = "A"; aAlpha[0,1] = "B"; aAlpha[0,2] = "C"; aAlpha[0,3] = "D"
aAlpha[1,0] = "E"; aAlpha[1,1] = "F"; aAlpha[1,2] = "G"; aAlpha[1,3] = "H"
aAlpha[2,0] = "I"; aAlpha[2,1] = "J"; aAlpha[2,2] = "K"; aAlpha[2,3] = "L"
displayArray( aAlpha )
aAlpha = {"A", "B", "C", "D", "E", "F", "G", "H", "I", "J", "K", "L" }
aAlpha.resize( 3, 4 )
displayArray( aAlpha )
```

The second array takes advantage of the literal array syntax, but *resize*() only creates a one- or two-dimensional array.

The displayArray() function is used to display the contents of the array in the results pane of the Command window. It is shown in the example for *dimensions*.

class AssocArray

Topic group Related topics Example

A one-dimensional associative array, in which the elements can be referenced by string.

Syntax

[<oRef> =] new AssocArray()

<oRef>

A variable or property in which to store a reference to the newly created AssocArray object.

Properties

The following tables list the properties and methods of the AssocArray class. (No events are associated with this class.)

Property	Default	Description
className	ASSOCARRAY	Identifies the object as an instance of the AssocArray class
firstKey		Character string assigned as the subscript of the first element of an associative array

Method	Parameters	Description
count()		Returns the number of elements in the associative array
isKey()	<key expC>	Returns *true* or *false* to indicate whether the character string is a key of the associative array
nextKey()	<key expC>	Returns the associative array key following the passed key
removeAll()		Deletes all elements from the associative array
removeKey()	<key expC>	Deletes the specified element from the associative array

Description

In an associative array, elements are associated with arbitrary character strings, which act as key values. The keys may be of any length, and are case-sensitive. An AssocArray is a one-dimensional array.

New elements are created simply by assigning a value to a key. If the key does not exist, a new element is created. If the key already exists, then the old value is replaced. For example,

```
aTest = new AssocArray()
aTest[ "alpha" ] = 1  // Create element with key "alpha" value 1
aTest[ "beta"  ] = 2  // Create element with key "beta" value 2
aTest[ "alpha" ] = 3  // Change value of element "alpha" to 3
aTest[ "Beta"  ] = 4  // Create element with key "Beta" value 4
```

The *isKey*() method will check if a given string is a key value in the associative array, and *removeKey*() will remove the element for a given key value from the array. *removeAll*() removes all the elements from the array.

The order of elements in an associative array is undefined. They are not necessarily sorted in the order they were added or sorted by their key values. You can think of an associative array as a bag of elements, and depending on what's in the bag, the order is different. But no matter what's in the associative array, you can use its *firstKey* property to get a key value, and use the *nextKey*() method to get all the other key values. The *count*() method will return the number of elements in the array so that you can call *nextKey*() as many times as needed.

class AssocArray example

Suppose you want to create an associative array that associates country codes with the name of the country. You could use a table for the lookup, but because the lookups don't change, reading the table into an array once at the beginning of the application makes the application run faster.

```
use COUNTRY order CODE
aCountry = new AssocArray()
scan
  aCountry[ CODE ] = NAME
endscan
```

If you had to create the array manually, the code would look like this:

```
aCountry = new AssocArray()
aCountry[ "AFG" ] = "Afghanistan"
aCountry[ "ALB" ] = "Albania"
aCountry[ "ALG" ] = "Algeria"
aCountry[ "ASA" ] = "American Samoa"
// ...
aCountry[ "ZAM" ] = "Zambia"
aCountry[ "ZIM" ] = "Zimbabwe"
```

ACOPY()

Topic group Related topics

Copies elements from one array to another. Returns the number of elements copied.

Syntax

ACOPY(<source array>, <target array>
[, <starting element expN> [, <elements expN> [, <target element expN>]]])

<source array>

A reference to the array from which to copy elements.

<target array>

A reference to the array that elements are copied to.

<starting element expN>

The position of the element in <source array> from which ACOPY() starts copying. Without <starting element expN>, ACOPY() copies all the elements in <source array> to <target array>.

<elements expN>

The number of elements in <source array> to copy. Without <elements expN>, ACOPY() copies all the elements in <source array> from <starting element expN> to the end of the array. If you want to specify a value for <elements expN>, you must also specify a value for <starting element expN>.

<target element expN>

The position in <target array> to which ACOPY() starts copying. Without <target element expN>, ACOPY() copies elements to <target array> starting at the first position. If you want to specify a value for <target element expN>, you must also specify values for <starting element expN> and <elements expN>.

Description

ACOPY() copies elements from one array to another. The dimensions of the two array do not have to match; the elements are handled according to element number.

The target array must be big enough to contain all the elements being copied from the source array; otherwise no elements are copied and an error occurs.

add()

Topic group Related topics Example

Adds an element to a one-dimensional array.

Syntax

<oRef>.*add*(<exp>)

<oRef>

A reference to the one-dimensional array to which you want to add the element.

<exp>

An expression of any type you want to assign to the new element.

Property of

Array

Description

Use *add*() to dynamically build a one-dimensional array.

add() adds a new element to a one-dimensional array and assigns <exp> to the new element.

You can create an empty one-dimensional array in a statement like:

```
a = new Array()  // No parameters to Array class creates empty 1-D array
```

and add elements as needed.

add() example

The following function is an *onOpen* event handler for a ComboBox component. It creates a one-dimensional array from values in a field in a table and assigns that array as the *dataSource* property of the Select component. The table is already opened in the query sections1.

```
function sectionCombo_onOpen()
  this.aSections = new Array()
  if form.sections1.rowset.first()
    do
      this.aSections.add( form.sections1.rowset.fields[ "Name" ].value )
    until not form.sections1.rowset.next()
  endif
  this.dataSource = "array this.aSections"
```

ALEN()

Topic group | Related topics | Example

Returns the number of elements, rows, or columns of an array.

Syntax

ALEN(<array> [, <expN>])

<array>

A reference to a one- or two-dimensional array.

<expN>

The number 0, 1, or 2, indicating which array information to return: elements, rows, or columns. The following table describes what ALEN() returns for different <expN> values:

If <expN> is...	ALEN() returns...
not supplied	Number of elements in the array
0	Number of elements in the array
1	For a one-dimensional array, the number of elements
	For a two-dimensional array, the number of rows (the first subscript of the array)
2	For a one-dimensional array, 0 (zero)
	For a two-dimensional array, the number of columns (the second subscript of the array)
any other value	0 (zero)

Property of

Array

Description

Use ALEN() to determine the dimensions of an array—either the number of elements it contains, or the number of rows or columns it contains.

The number of elements in an array (with any number of dimensions) is also reflected in the array's *size* property.

If you need to determine both the number of rows and the number of columns a two-dimensional array contains, call ALEN() twice, once with a value of 1 for <expN> and once with a value of 2 for <expN>. For example, the following determines the number of rows and columns contained in aExample:

```
nRows = alen( aExample, 1 )
nCols = alen( aExample, 2 )
```

ALEN() example

ALEN() is used in the displayArray() function, shown in the example for *dimensions*, to determine the number of rows and columns in a two-dimensional array.

count()

Topic group | Related topics | Example

Returns the number of elements in an associative array.

Property of

AssocArray

Description

Use *count*() to determine the number of elements in an associative array.

Because associative arrays use arbitrary strings as keys and change size dynamically, you need to get the number of elements in an associative array if you want to loop through its elements.

count() example

The following statements loop through an associative array and display all its elements:

```
aTest = new AssocArray()
aTest[ "USA" ] = "United States of America"
aTest[ "RUS" ] = "Russian Federation"
aTest[ "GER" ] = "Germany"
aTest[ "CHN" ] = "People's Republic of China"
cKey = aTest.firstKey               // Get first key in AssocArray
// Get number of elements in AssocArray and loop through them
for nElements = 1 to aTest.count()
  ? cKey                            // Display key value
  ? aTest[ cKey ]                   // Display element value
  cKey := aTest.nextKey( cKey )     // Get next key value
endfor
```

delete()

Topic group Related topics Example

Deletes an element from a one-dimensional array, or deletes a row or column of elements from a two-dimensional array. Returns 1 if successful; generates an error if unsuccessful. The remaining elements move forward to replace the deleted element(s); the dimensions of the array do not change.

Syntax

<oRef>.*delete*(<position expN> [, <row/column expN>])

<oRef>

A reference to the one- or two-dimensional array from which you want to delete data.

<position expN>

When the array is a one-dimensional array, <position expN> specifies the number of the element to delete.

When the array is a two-dimensional array, <position expN> specifies the number of the row or column whose elements you want to delete. The second argument (discussed in the next paragraph) specifies whether <position expN> is a row or a column.

<row/column expN>

Either 1 or 2. If you omit this argument or specify 1, a row is deleted from a two-dimensional array. If you specify 2, a column is deleted. *Visual* dBASE generates an error if you use <row/column expN> with a one-dimensional array.

Property of

Array

Description

Use *delete*() to delete selected elements from an array without changing the size of the array. *delete*() does the following:

- Deletes an element from a one-dimensional array, or deletes a row or column from a two-dimensional array
- Moves all remaining elements toward the beginning of the array (up if a row is deleted, to the left if an element or column is deleted)
- Inserts *false* values in the last position(s)

Adjust the array's *size* property or use *resize*() to make the array smaller after you *delete*() if you want the net effect of removing elements.

One-dimensional arrays

When you issue *delete*() for a one-dimensional array, the element in the specified position is deleted, and the remaining elements move one position toward the beginning of the array. The logical value *false* is stored to the element in the last position.

For example, if you define a one-dimensional array with

```
aAlpha = {"A", "B", "C"}
```

the resulting array has one row and can be illustrated as follows:

```
A   B   C
```

Issuing aAlpha.*delete*(2) deletes element number 2 whose value is "B," moves the value in aAlpha[3] to aAlpha[2], and stores *false* to aAlpha[3] so that the array now contains these values:

```
A   C   false
```

Two-dimensional arrays

When you issue *delete*() for a two-dimensional array, the elements in the specified row or column are deleted, and the elements in the remaining rows or columns move one position toward the beginning of the array. The logical value *false* is stored to the elements in the last row or column.

For example, suppose you define a two-dimensional array and store letters to the array. The following

illustration shows how the array is changed by aAlpha.*delete*(2,2).

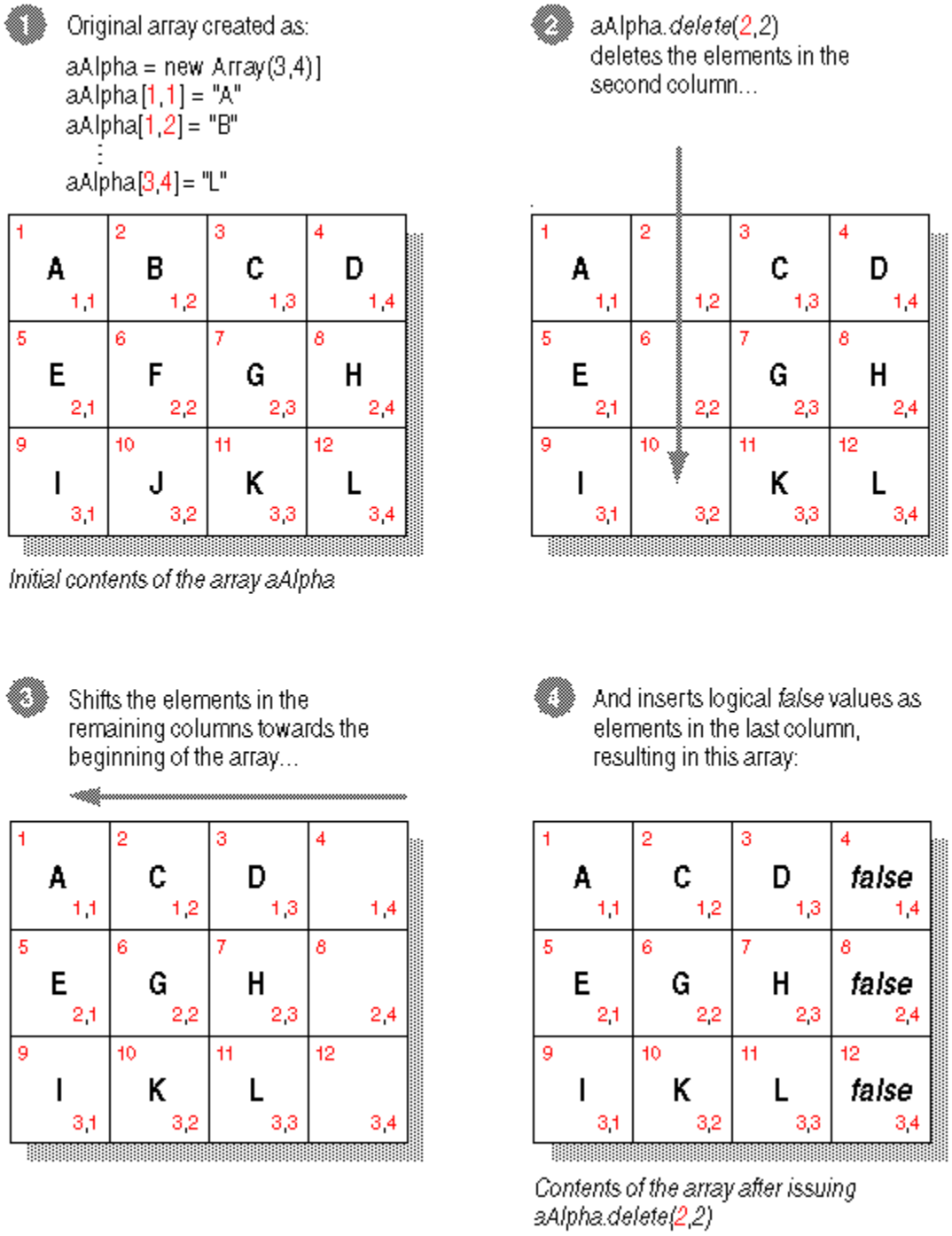


Figure 10.1 Using delete() with a two-dimensional array

delete() example

The following code removes elements from the array aTest that have the letter “e” in them.

```
aTest = {"alpha", "beta", "gamma", "delta"}
nDeleted = 0                              // Count deleted elements
// Loop through array backwards
for nElement = aTest.size to 1 step -1
  if "e" $ aTest[ nElement ]              // If element contains "e"
    aTest.delete( nElement )              //   Delete element
    nDeleted++                            //   Increment delete count
  endif
endfor
if nDeleted > 0
  aTest.size := aTest.size - nDeleted     // Discard false elements
endif
// Display elements (looping forward)
for nElement = 1 to aTest.size
  ? aTest[ nElement ]
endfor
```

The loop to delete the elements runs through the array backwards because *delete*() moves all remaining elements forward. You would then have to recheck the same element number and juggle the element counter. It’s simpler to just loop through the array backwards.

dimensions

Topic group Related topics Example

The number of dimensions in an Array object.

Property of

Array

Description

dimensions indicates the number of dimensions in an Array object. It is a read-only property.

You can use the *resize*() method to change the number of dimensions to one or two, but for more than two you would have to create a new array.

If the array has one or two dimensions, you can use the ALEN() function to determine the size of each dimension. There is no built-in way to determine dimension sizes for arrays with more than two dimensions.

dimensions example

The following function displays the contents of an array, but only if the array has one or two dimensions:

```
function displayArray( aArg, nColWidth )
local nElement, nCols, nRows, nCol, nRow
  #define DEFAULT_WIDTH 2
  if argcount() < 2
    nColWidth = DEFAULT_WIDTH
  endif
  do case
    case aArg.dimensions == 1
      ? replicate( "-", nColWidth * aArg.size )
      ?
      for nElement = 1 to aArg.size             // Display elements
        ?? aArg[ nElement ] at nColWidth * ( nElement - 1 )
      endfor                                    //   in a single line
    case aArg.dimensions == 2
      nRows = alen( aArg, 1 )                   // Determine # of rows
      nCols = alen( aArg, 2 )                   // Determine # of columns
      ? replicate( "-", nColWidth * nCols )
      for nRow = 1 to nRows
        ?                                       // Each row on its own line
        for nCol = 1 to nCols                   // Display each row as before
          ?? aArg[ nRow, nCol ] at nColWidth * ( nCol - 1 )
        endfor
      endfor
    otherwise
      msgbox( "Error: only 1 or 2 dimensions allowed", "Alert" )
  endcase
```

dir()

Topic group | Related topics | Example

Fills the array with five characteristics of specified files: name, size, modified date, modified time, and file attribute(s). Returns the number of files whose characteristics are stored.

Syntax

<oRef>.*dir*([<filename skeleton expC> [, <DOS file attribute list expC>]])

<oRef>

A reference to the array in which you want to store the file information. *dir*() will automatically redimension or increase the size of the array to accommodate the file information, if necessary.

<filename skeleton expC>

The file-name pattern (using wildcards) describing the files whose information you want to store to <oRef>.

<file attribute list expC>

The letter or letters D, H, S, and/or V representing one or more file file attributes.

If you want to specify a value for <file attribute expC>, you must also specify a value or "*.*" for <filename skeleton expC>.

The meaning of each attribute is as follows:

Character	Meaning
D	Directories
H	Hidden files
S	System files
V	Volume label

If you supply more than one letter for <file attribute expC>, include all the letters between one set of quotation marks, for example, aFiles.*dir*("*.*", "HS").

Property of

Array

Description

Use *dir*() to store information about files to an array, which is dynamically resized so all returned information fits in the array. The resulting array is always a two-dimensional array, unless there are no files, in which case the array is not modified.

Without <filename skeleton expC>, *dir*() stores information about all files in the current directory, unless they are hidden or system files. For example, if you want to return information only on DBF tables, use "*.DBF" as <filename skeleton expC>.

If you want to include directories, hidden files, or system files in the array, use <file attribute expC>. When D, H, or S is included in <file attribute expC>, all directories, hidden files, and/or system files (respectively) that match <filename skeleton expC> are added to the array.

When V is included in <file attribute expC>, *dir*() ignores <filename skeleton expC> as well as other characters in the attribute list, and stores the volume label to the first element of the array.

dir() stores the following information for each file in each row of the array. The data type for each is shown in parentheses:

Column 1	Column 2	Column 3	Column 4	Column 5
File name (character)	Size (numeric)	Modified date (date)	Modified time (character)	File attribute(s) (character)

The last column (file attribute) can contain one or more of the following file attributes, in the order shown:

Attribute	Meaning
R	Read-only file
A	Archive file (modified since it was last backed up)
S	System file
H	Hidden file
D	Directory

If the file has the attribute, the letter code is in the column. Otherwise, there is a period. For example, a file with none of the attributes would have the following string in column 5:

```
.....
```

A read-only, hidden file would have the following string in column 5:

```
R..H.
```

Use *dirExt*() to get extended Windows 95/NT file information.

dir() example

The following example uses *dir*() to store the file information for all the files in the root directory of the current drive to the array aFiles. The file name and attributes string is displayed for all the files in the results pane of the Command window. Manifest constants to represent the columns are created with the #define preprocessor directive to make the code more readable.

```
#define ARRAY_DIR_NAME 1  // Manifest constants for columns returned by dir()
#define ARRAY_DIR_SIZE 2
#define ARRAY_DIR_DATE 3
#define ARRAY_DIR_TIME 4
#define ARRAY_DIR_ATTR 5
aFiles = new Array()                 // Array will be resized as needed
nFiles = aFiles.dir( "\*.*", "HS" )  // Include Hidden and System files
for nFile = 1 to nFiles
  ?  aFiles[ nFile, ARRAY_DIR_NAME ]
  ?? aFiles[ nFile, ARRAY_DIR_ATTR ] at 25
endfor
```

dirExt()

Topic group | Related topics | Example

dirExt() is an extended version of the *dir*() method. It fills the array with nine characteristics of specified files: name, size, modified date, modified time, file attribute(s), short (8.3) file name, create date, create time, and access date. Returns the number of files whose characteristics are stored.

Syntax

<oRef>.*dirExt*([<filename skeleton expC> [, <file attribute list expC>]])

<oRef>

A reference to the array in which you want to store the file information. *dirExt*() will automatically redimension or increase the size of the array to accommodate the file information, if necessary.

<filename skeleton expC>

The file-name pattern (using wildcards) describing the files whose information you want to store to <oRef>.

<file attribute list expC>

The letter or letters D, H, S, and/or V representing one or more file attributes.

If you want to specify a value for <file attribute expC>, you must also specify a value or "*.*" for <filename skeleton expC>.

The meaning of each attribute is as follows:

Character	Meaning
D	Directories
H	Hidden files
S	System files
V	Volume label

If you supply more than one letter for <file attribute expC>, include all the letters between one set of quotation marks, for example, aFiles.*dirExt*("*.*", "HS").

Property of

Array

Description

Use *dirExt*() to store information about files to an array, which is dynamically resized so all returned information fits in the array. The resulting array is always a two-dimensional array, unless there are no files, in which case the array is not modified.

Without <filename skeleton expC>, *dirExt*() stores information about all files in the current directory, unless they are hidden or system files. For example, if you want to return information only on DBF tables, use "*.DBF" as <filename skeleton expC>.

If you want to include directories, hidden files, or system files in the array, use <file attribute expC>. When D, H, or S is included in <file attribute expC>, all directories, hidden files, and/or system files (respectively) that match <filename skeleton expC> are added to the array.

When V is included in <file attribute expC>, *dirExt*() ignores <filename skeleton expC> as well as other characters in the attribute list, and stores the volume label to the first element of the array.

dirExt() stores the following information for each file in each row of the array. The data type for each is shown in parentheses:

Column 1	Column 2	Column 3	Column 4	Column 5
File name (character)	Size (numeric)	Modified date (date)	Modified time (character)	File attribute(s) (character)

Column 6	Column 7	Column 8	Column 9

Short (8.3) file name (character)	Create date (date)	Create time (character)	Access date (date)

Column 5 (file attribute) can contain one or more of the following file attributes, in the order shown:

Attribute	Meaning
R	Read-only file
A	Archive file (modified since it was last backed up)
S	System file
H	Hidden file
D	Directory

If the file has the attribute, the letter code is in the column. Otherwise, there is a period. For example, a file with none of the attributes would have the following string in column 5:

```
.....
```

A read-only, hidden file would have the following string in column 5:

```
R..H.
```

Use *dir*() to get basic file information only.

dirExt() example

The following example uses *dirExt*() to store the file information for all the files in the root directory of the current drive to the array aFiles. The file name and access date is displayed for all the files in the results pane of the Command window. Manifest constants to represent the columns are created with the #define preprocessor directive to make the code more readable.

```
#define ARRAY_DIR_NAME        1 // Manifest constants for columns returned by
dirExt()
#define ARRAY_DIR_SIZE        2
#define ARRAY_DIR_DATE        3
#define ARRAY_DIR_TIME        4
#define ARRAY_DIR_ATTR        5
#define ARRAY_DIR_SHORT_NAME  6
#define ARRAY_DIR_CREATE_DATE 7
#define ARRAY_DIR_CREATE_TIME 8
#define ARRAY_DIR_ACCESS_DATE 9
aFiles = new Array()                    // Array will be resized as needed
nFiles = aFiles.dirExt( "\*.*", "HS" )  // Include Hidden and System files
for nFile = 1 to nFiles
  ?  aFiles[ nFile, ARRAY_DIR_NAME ]
  ?? aFiles[ nFile, ARRAY_DIR_ACCESS_DATE ] at 25
endfor
```

element()

Topic group | Related topics | Example

Returns the number of a specified element in a one- or two-dimensional array.

Syntax

<oRef>.*element*(<subscript1 expN> [, <subscript2 expN>])

<oRef>

A reference to a one- or two-dimensional array.

<subscript1 expN>

The first subscript of the element. In a one-dimensional array, this is the same as the element number. In a two-dimensional array, this is the row.

<subscript2 expN>

When <oRef> is a two-dimensional array, <subscript2 expN> specifies the second subscript, or column, of the element.

If <oRef> is a two-dimensional array and you do not specify a value for <subscript2 expN>, *Visual* dBASE assumes the value 1, the first column in the row. *Visual* dBASE generates an error if you use <subscript2 expN> with a one-dimensional array.

Property of

Array

Description

Use *element*() when you know the subscripts of an element in a two-dimensional array and need the element number for use with another method, such as *fill*() or *scan*().

In one-dimensional arrays, the number of an element is the same as its subscript, so there is no need to use *element*(). For example, if aOne is a one-dimensional array, aOne.*element*(3) returns 3, aOne.*element*(5) returns 5, and so on.

element() is the inverse of *subscript*(), which returns an element's row or column subscript number when you specify the element number.

element() example

The following statement returns the element number of the third column of the fourth row of the array aTwo. The result depends on the number of columns in aTwo.

```
nElement = aTwo.element( 3, 2 ) // Fourth row, third column
```

fields()

Topic group Related topics

Fills the array with the current table's structural information. Returns the number of fields whose characteristics are stored.

Syntax

<oRef>.*fields*()

<oRef>

A reference to the array in which you want to store the field information. *fields*() will automatically redimension or increase the size of the array to accommodate the field information, if necessary.

Property of

Array

Description

Use *fields*() to store information about the structure of the current table to an array, which is dynamically resized so all returned information fits in the array. The resulting array is always a two-dimensional array, unless there are is no table open in the current work area, in which case the array is not modified.

fields() stores the following information for each field in each row of the array. The data type for each is shown in parentheses:

Column 1	Column 2	Column 3	Column 4
Field name (character)	Field type (character)	Field length (numeric)	Decimal places (numeric)

Visual dBASE uses the following codes for field types (some codes are used for more than one field type):

Code	Field type
B	Binary
C	Character, Alphanumeric
D	Date, Timestamp
F	Float, Double
G	General, OLE
L	Logical, Boolean
M	Memo
N	Numeric

fields() stores the same information into an array that COPY STRUCTURE EXTENDED stores into a table, except *fields*() doesn't create a column+ containing FIELD_IDX information.

fill()

Topic group Related topics Example

Stores a specified value into one or more locations in an array, and returns the number of elements stored.

Syntax

<oRef>.*fill*(<exp> [, <start expN> [, <count expN>]])

<oRef>

A reference to a one- or two-dimensional array you want to fill with the specified value <exp>.

<exp>

An expression you want to store in the specified array.

<start expN>

The element number at which you want to begin storing <exp>.
If you do not specify <start expN>, *Visual* dBASE begins at the first element in the array.

<count expN>

The number of elements in which you want to store <exp>, starting at element <start expN>. If you do not specify <count expN>, *Visual* dBASE stores <exp> from <start expN> to the last element in the array.
If you want to specify a value for <count expN>, you must also specify a value for <start expN>.

If you do not specify <start expN> or <count expN>, *Visual* dBASE fills all elements in the array with <exp>.

Property of

Array

Description

Use *fill*() to store a value into all or some elements of an array. For example, if you are going to use elements of an array to calculate totals, you can use *fill*() to initialize all values in the array to 0.

fill() stores values into the array sequentially. Starting at the first element in the array or at the element specified by <start expN>, *fill*() stores the value in each element in a row, then moves to the first element in the next row, continuing to store values until the array is filled or until it has inserted <count expN> elements. *fill*() overwrites any existing data in the array.

If you know an element's subscripts, you can use *element*() to determine its element number for use as <start expN>.

fill() example

Suppose you're measuring the performance of a process, keeping track of six different variables, some of which may not used for any given request. In addition to keeping an average, you want to always display the last three measurements. You can use an array with 3 rows and 6 columns, and *insert*() a new row at the beginning of the array for each request. You *fill*() the new row with zeros to initialize the variables in case they're not used. The code, with simulated input, would look like this:

```
#define SHOW_LAST        3  // Manifest constants for number of measurements
#define NUM_MEASUREMENTS 6  // to maintain
aMeasure = new Array( SHOW_LAST, NUM_MEASUREMENTS )
aMeasure.fill( "" )         // Start with all blanks
// Simulated input
newRequest()
aMeasure[ 1, 1 ] = 34
aMeasure[ 1, 4 ] = 16
displayArray( aMeasure, 10 )
newRequest()
aMeasure[ 1, 3 ] = 67
displayArray( aMeasure, 10 )
newRequest()
aMeasure[ 1, 1 ] = 27
aMeasure[ 1, 2 ] = 29
displayArray( aMeasure, 10 )
newRequest()
aMeasure[ 1, 2 ] = 31
aMeasure[ 1, 6 ] = 40
displayArray( aMeasure, 10 )
// End simulated input
function newRequest()
  aMeasure.insert( 1 )                    // Insert row at top, losing last
row
  aMeasure.fill( 0, 1, NUM_MEASUREMENTS )  // Fill first row with zeros
```

The displayArray() function is used to display the contents of the array in the results pane of the Command window. It is shown in the example for *dimensions*.

firstKey

Topic group Related topics Example

Returns the character string key for the first element of an associative array.

Property of

AssocArray

Description

Use *firstKey* when you want to loop through the elements in an associative array. Once you have gotten the key value for the first element with *firstKey*, use *nextKey*() to get the key values for the rest of the elements.

Note: The order of elements in an associative array is undefined. They are not necessarily stored in the order in which you add them, or sorted by their key values. You can't assume that the value returned by *firstKey* will be consistent, or that it will return the first item you added.

For an empty associative array, *firstKey* is the logical value *false*. Because *false* is a different data type than valid key values (which are character strings), it requires extra code to look for *false* to see if the array is empty. It's easier to get the number of elements in the array with *count*() and see if it's greater than zero.

firstKey example

The following statements loop through an associative array and display all its elements:

```
aTest = new AssocArray()
aTest[ "USA" ] = "United States of America"
aTest[ "RUS" ] = "Russian Federation"
aTest[ "GER" ] = "Germany"
aTest[ "CHN" ] = "People's Republic of China"
cKey = aTest.firstKey               // Get first key in AssocArray
// Get number of elements in AssocArray and loop through them
for nElements = 1 to aTest.count()
  ? cKey                            // Display key value
  ? aTest[ cKey ]                   // Display element value
  cKey := aTest.nextKey( cKey )     // Get next key value
endfor
```

grow()

Topic group Related topics Example

Adds an element, row, or column to an array and returns the number of added elements.

Syntax

<oRef>.*grow*(<expN>)

<oRef>

A reference to a one- or two-dimensional array you want to add elements to.

<expN>

Either 1 or 2. When you specify 1, *grow*() adds a single element to a one-dimensional array or a row to a two-dimensional array. When you specify 2, *grow*() adds a column to the array.

Property of

Array

Description

Use *grow*() to insert an element, row, or column into an array and change the size of the array to reflect the added elements. *grow*() can make a one-dimensional array two-dimensional. All added elements are initialized to *false* values.

One-dimensional arrays

When you specify 1 for <expN>, *grow*() adds a single element to the array. When you specify 2, *grow*() makes the array two-dimensional, and existing elements are moved into the first column. This is shown in the following figure:

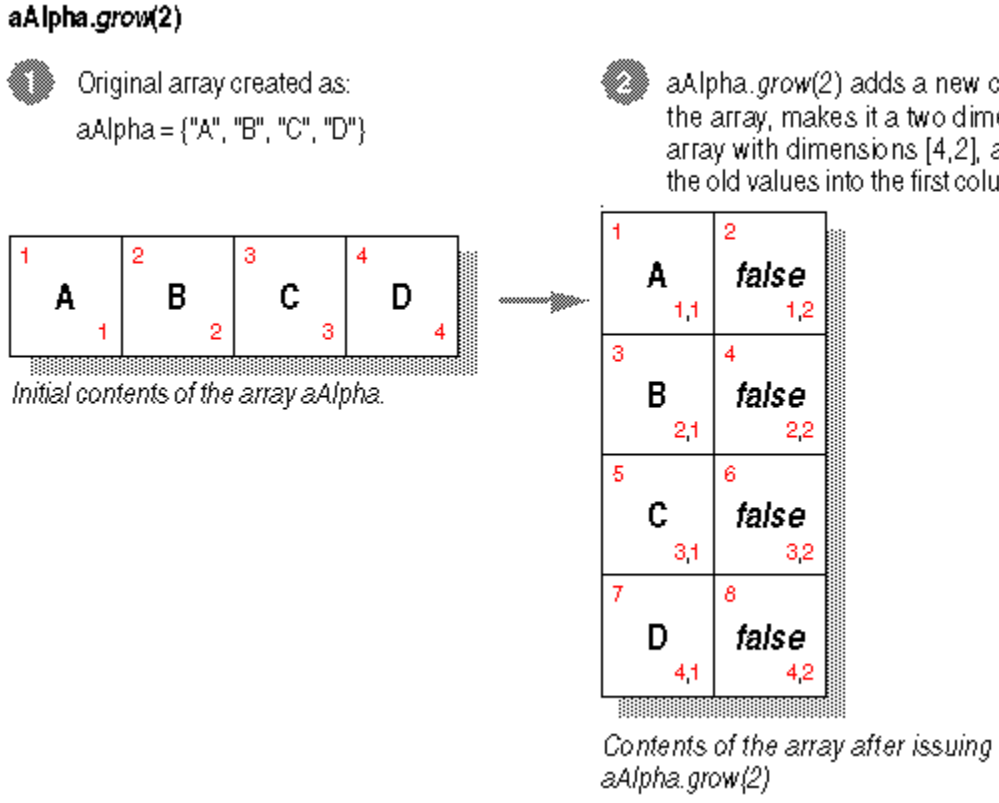


Figure 10.2 Adding a column to a one-dimensional array using aAlpha.*grow*(2)

Use *add*() to add a new element to a one-dimensional array and assign its value in one step.

Note: You may also assign a new value to the array's *size* property to make a one-dimensional array any arbitrary size.

Two-dimensional arrays

When you specify 1 for <expN>, *grow*() adds a row to the array at the end of the array. This is shown in the following figure:

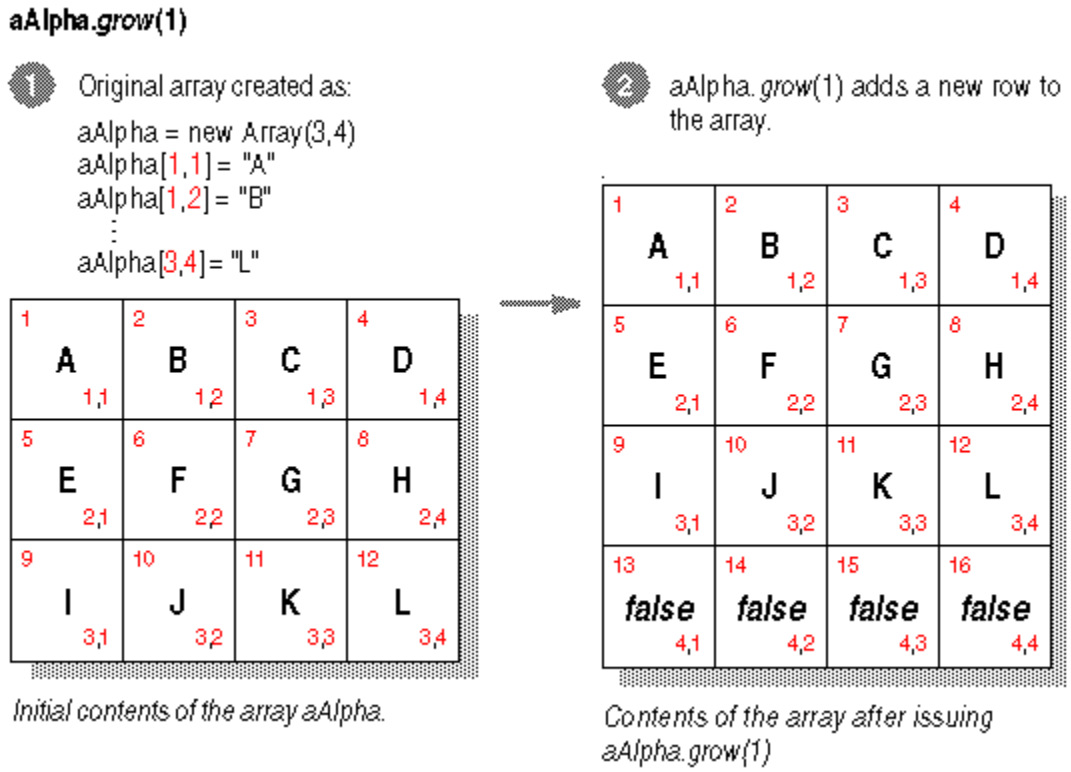


Figure 10.3 Adding a row to a two-dimensional array using aAlpha.*grow*(1)

When you specify 2 for <expN>, *grow*() adds a column to the array and places *false* into each element in the column.

grow() example

The following example initially declares a one-dimensional array with a single element, and then uses *grow*() to add a second element, convert the array to two dimensions, add a third row, and finally add a third column. The end result is the first nine letters in order:

```
a = {"A"}          // 1-D, 1 element
displayArray( a )
a.grow(1)          // 1-D, 2 elements
a[ 2 ] = "D"
displayArray( a )
a.grow(2)          // 2-D, 2 rows, 2 columns
a[ 1, 2 ] = "B"; a[ 2, 2 ] = "E"
displayArray( a )
a.grow(1)          // 2-D, 3 rows, 2 columns
a[ 3, 1 ] = "G"; a[ 3, 2 ] = "H"
displayArray( a )
a.grow(2)          // 2-D, 3 rows, 3 columns
a[ 1, 3 ] = "C"; a[ 2, 3 ] = "F"; a[ 3, 3 ] = "I"
displayArray( a )
```

The displayArray() function is used to display the contents of the array in the results pane of the Command window. It is shown in the example for dimensionsidh_array_dimensions_ex>ex_win.

insert()

Topic group Related topics Example

Inserts an element with the value *false* into a one-dimensional array, or inserts a row or column of elements with the value *false* into a two-dimensional array. Returns 1 if successful; generates an error if unsuccessful. The dimensions of the array do not change, so the element(s) at the end of the array will be lost.

Syntax

<oRef>.*insert*(<position expN> [, <row/column expN>])

<oRef>

A reference to a one- or two-dimensional array in which you want to insert data.

<position expN>

When <oRef> is a one-dimensional array, <position expN> specifies the number of the element in which you want to insert a *false* value.

When <oRef> is a two-dimensional array, <position expN> specifies the number of a row or column in which you want to insert *false* values. The second argument (discussed in the next paragraph) specifies whether <position expN> is a row or a column.

<row/column expN>

Either 1 or 2. If you omit this argument or specify 1, a row is inserted into a two-dimensional array. If you specify 2, a column is inserted. *Visual* dBASE generates an error if you use <row/column expN> with a one-dimensional array.

Property of

Array

Description

Use *insert*() to insert elements in an array. *insert*() does the following:

- Inserts an element in a one-dimensional array, or inserts a row or column in a two-dimensional array
- Moves all remaining elements toward the end of the array (down if a row is inserted, to the right if an element or column is inserted)
- Stores *false* values in the newly created position(s)

Because the dimensions of the array are not changed, the element(s) at the end of the array—the last element for a one-dimensional array or the last row or column for a two-dimensional array—are lost. If you don't want to lose the data, use *grow*() to increase the size of the array before using *insert*().

One-dimensional arrays

When you call *insert*() for a one-dimensional array, the logical value *false* is inserted into the position of the specified element. The remaining element(s) are moved one place toward the end of the array. The element that had been in the last position is lost.

For example, if you define a one-dimensional array with:

```
aAlpha = {"A", "B", "C"}
```

the resulting array has one row and can be illustrated as follows:

```
A   B   C
```

Issuing aAlpha.*insert*(2) inserts *false* into element number 2, moves the "B" that was in aAlpha[2] to aAlpha[3], and loses the "C" that was in aAlpha[3] so that the array now contains these values:

```
A  false  B
```

Two-dimensional arrays

When you call *insert*() for a two-dimensional array, a logical value *false* is inserted into the position of each element in the specified row or column. The elements in the remaining columns or rows are moved one place toward the end of the array. The elements that had been in the last row or column are lost.

For example, suppose you define a two-dimensional array and store letters to the array. The following illustration shows how the array is changed by aAlpha.*insert*(2,2).

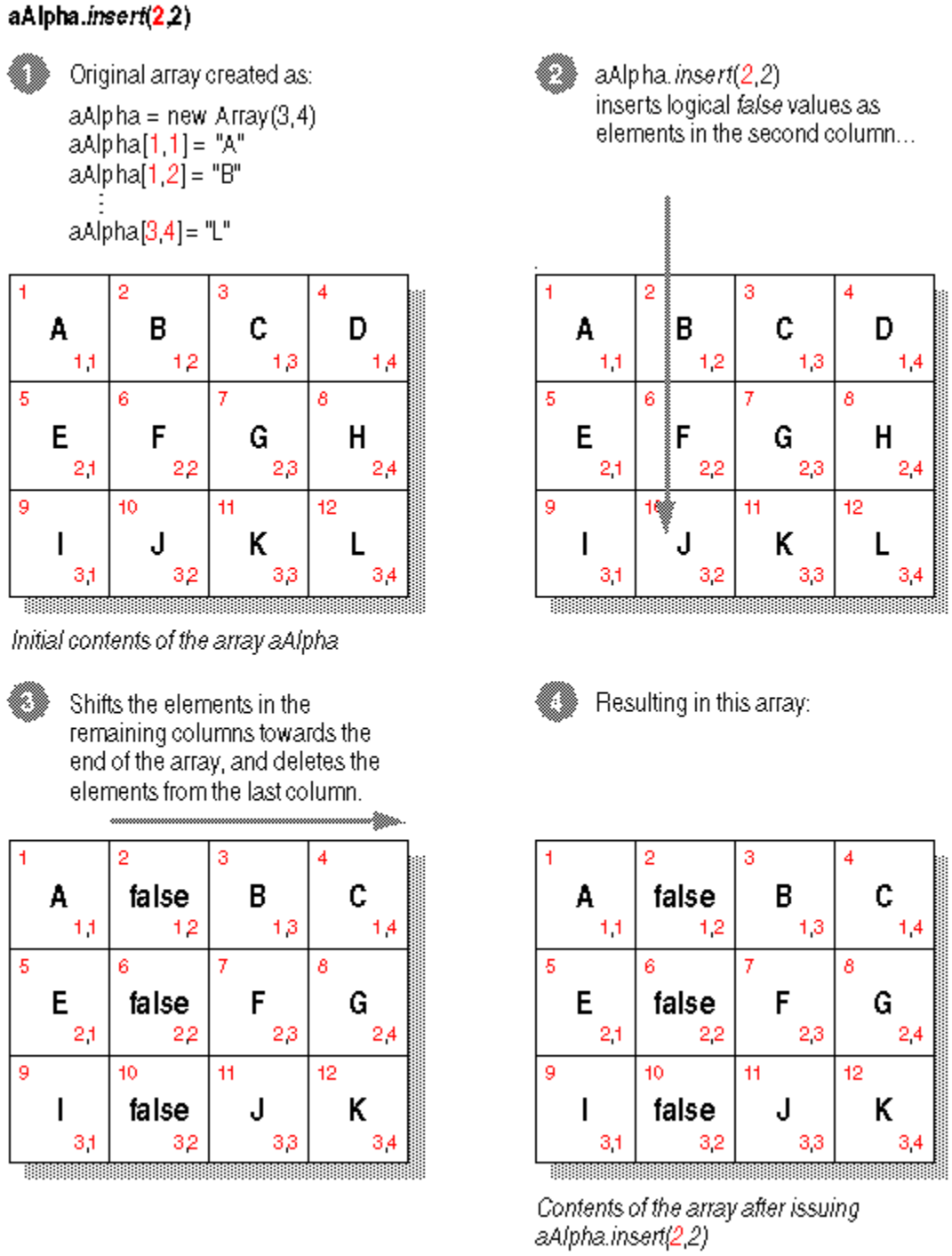


Figure 10.4 Using insert() with a two-dimensional array

insert() example

Suppose you're measuring the performance of a process, keeping track of six different variables, some of which may not used for any given request. In addition to keeping an average, you want to always display the last three measurements. You can use an array with 3 rows and 6 columns, and *insert*() a new row at the beginning of the array for each request. You *fill*() the new row with zeros to initialize the variables in case they're not used. The code, with simulated input, would look like:

```
#define SHOW_LAST        3  // Manifest constants for number of measurements
#define NUM_MEASUREMENTS 6  // to maintain
aMeasure = new Array( SHOW_LAST, NUM_MEASUREMENTS )
aMeasure.fill( "" )         // Start with all blanks
// Simulated input
newRequest()
aMeasure[ 1, 1 ] = 34
aMeasure[ 1, 4 ] = 16
displayArray( aMeasure, 10 )
newRequest()
aMeasure[ 1, 3 ] = 67
displayArray( aMeasure, 10 )
newRequest()
aMeasure[ 1, 1 ] = 27
aMeasure[ 1, 2 ] = 29
displayArray( aMeasure, 10 )
newRequest()
aMeasure[ 1, 2 ] = 31
aMeasure[ 1, 6 ] = 40
displayArray( aMeasure, 10 )
// End simulated input
function newRequest()
  aMeasure.insert( 1 )                    // Insert row at top, losing last
row
  aMeasure.fill( 0, 1, NUM_MEASUREMENTS )  // Fill first row with zeros
```

The displayArray() function is used to display the contents of the array in the results pane of the Command window. It is shown in the example for *dimensions*.

isKey()

Topic group Related topics Example

Returns a logical value that indicates if the specified character expression is the key of an element in an associative array.

Syntax

<oRef>.*isKey*(<expC>)

<oRef>

A reference to the associative array you want to search.

<expC>

The character string you want to find.

Property of

AssocArray

Description

Use *isKey*(<expC>) to determine if an associative array contains an element with a key value of <expC>. Key values in associative arrays are case-sensitive.

Attempting to access a non-existent key value in an associative array generates an error.

isKey() example

The following example uses some test data for the associative array aCountry, which associates country codes with their names. The function countryName() returns the corresponding country name for a particular code, but if the code is not defined, it returns “Unknown country” instead.

```
aCountry = new AssocArray()
aCountry[ "USA" ] = "United States of America"  // Test data
aCountry[ "RUS" ] = "Russian Federation"
aCountry[ "GER" ] = "Germany"
aCountry[ "CHN" ] = "People's Republic of China"
? countryName( "GER" )  // "Germany"
? countryName( "XYZ" )  // "Unknown country"
function countryName( cArg )
  // Make sure code is defined before trying to reference it
  return iif( aCountry.isKey( cArg ), aCountry[ cArg ], "Unknown country" )
```

nextKey()

Topic group Related topics Example

Returns the key value of the element following the specified key in an associative array.

Syntax

<oRef>.*nextKey*(<key expC>)

<oRef>

A reference to the associative array that contains the key.

<key expC>

An existing key value.

Property of

AssocArray

Description

Use *nextKey*() to loop through the elements in an associative array. Once you have gotten the key value for the first element with *firstKey*, use *nextKey*() to get the key values for the rest of the elements.

nextKey() returns the key value for the key following <key expC>. Key values in associative arrays are case-sensitive. For the last key in the associative array and for a <key expC> that is not an existing key value, *nextKey*() returns the logical value *false*. Because *false* is a different data type than valid key values (which are character strings), it's difficult to look for *false* to terminate a loop. It's easier to get the number of elements in the array first with *count*(); then loop through that many iterations.

Note: The order of elements in an associative array is undefined. They are not necessarily stored in the order in which you add them, or sorted by their key values. You can't assume that the sequence of keys will be consistent.

To determine if a given character string is a key value in an associative array, use *isKey*().

nextKey() example

The following statements loop through an associative array and display all its elements:

```
aTest = new AssocArray()
aTest[ "USA" ] = "United States of America"
aTest[ "RUS" ] = "Russian Federation"
aTest[ "GER" ] = "Germany"
aTest[ "CHN" ] = "People's Republic of China"
cKey = aTest.firstKey               // Get first key in AssocArray
// Get number of elements in AssocArray and loop through them
for nElements = 1 to aTest.count()
  ? cKey                            // Display key value
  ? aTest[ cKey ]                   // Display element value
  cKey := aTest.nextKey( cKey )     // Get next key value
endfor
```

removeAll()

Topic group | Related topics | Example

Deletes all elements from an associative array.

Syntax

<oRef>.*removeAll*()

<oRef>

A reference to the associative array you want to empty.

Property of

AssocArray

Description

Use *removeAll*() to remove all the elements from an associative array.

To remove elements for particular key values, use *removeKey*().

removeAll() example

The following example removes all elements from an associative array.

```
var aTest = new AssocArray()
aTest[ "USA" ] = "United States of America"
aTest[ "RUS" ] = "Russian Federation"
aTest[ "GER" ] = "Germany"
aTest[ "CHN" ] = "People's Republic of China"
// Array contains four elements
aTest.removeAll() // Array now contains no elements
```

removeKey()

Topic group | Related topics | Example

Deletes an element from an associative array.

Syntax

<oRef>.*removeKey*(<key expC>)

<oRef>

A reference to the associative array that contains the key.

<key expC>

The key value of the element you want to delete.

Property of

AssocArray

Description

Use *removeKey*() to remove an element from an associative array. Key values in associative arrays are case-sensitive.

If you specify a key value that does not exist in the array, nothing happens; no error occurs and no elements are removed.

To remove all the elements from an associative array, use *removeAll*().

removeKey() example

The following example loops through an associative array of country names and deletes those whose names are longer than 15 characters.

```
aTest = new AssocArray()
aTest[ "USA" ] = "United States of America"
aTest[ "RUS" ] = "Russian Federation"
aTest[ "GER" ] = "Germany"
aTest[ "CHN" ] = "People's Republic of China"
cKey = aTest.firstKey                // Get first key in AssocArray
// Get number of elements in AssocArray and loop through them
for  nElements = 1 to aTest.count()
  cNextKey = aTest.nextKey( cKey )   // Get next key value before deleting
element
  if len( aTest[ cKey ] ) > 15
    aTest.removeKey( cKey )          // Remove element
  endif
  cKey := cNextKey                   // Use next key value
endfor
```

Note that you must get the next key value before deleting the element, and you repeat the loop based on the number of elements there were before you started deleting.

resize()

Topic group | Related topics | Example

Sets the size of an array to the specified dimensions and returns a numeric value representing the number of elements in the modified array.

Syntax

<oRef>.*resize*(<rows expN> [,<cols expN> [, <retain values expN>]])

<oRef>

A reference to the array whose size you want to change.

<rows expN>

The number of rows the resized array should have. <rows expN> must always be a positive, nonzero value.

<cols expN>

The number of columns the resized array should have. <cols expN> must always be 0 or a positive value. If you omit this option, *resize*() changes the number of rows in the array and leaves the number of columns the same.

<retain values expN>

Determines what happens to the values of the array when rows are added or removed. If it is nonzero, values are retained. If you want to specify a value for <retain values expN>, you must also specify a value for <new cols expN>.

Property of

Array

Description

Use *resize*() to change the dimensions of an array, making it larger or smaller, or change the number of dimensions. To determine the number of dimensions, check the array's *dimensions* property. The *size* property of the array reflects the number of elements; for a one-dimensional array, that's all you need to know. For a two-dimensional array, you can't determine the number of rows or columns from the *size* property alone (unless the *size* is one—a one-by-one array). To determine the number of columns or rows in a two-dimensional array, use the ALEN() function.

For a one-dimensional array, you can change the number of elements by calling *resize*() and specifying the number of elements as <rows expN> parameter. You can also set the *size* property of the array directly, which is a bit less typing.

You can also change a one-dimensional array into a two-dimensional array by specifying both a <rows expN> and a nonzero <cols expN> parameter. This makes the array the designated size.

For a two-dimensional array, you can specify a new number of rows or both row and column dimensions for the array. If you omit <cols expN>, the <rows expN> parameter sets the number of rows only. With both a <rows expN> and a nonzero <cols expN>, the array is changed to the designated size.

You can change a two-dimensional array to a one-dimensional array by specifying <cols expN> as zero and <rows expN> as the number of elements.

To change the number of columns only for a two-dimensional array, you will need to specify both the <rows expN> and <cols expN> parameters, which means that you have to determine the number of rows in the array, if not known, and specify it unchanged as the <rows expN> parameter.

To add a single row or column to an array, use the *grow*() method.

If you add or remove columns from the array, you can use <retain values expN> to specify how you want existing elements to be placed in the new array. If <retain values *expN*> is zero or isn't specified, resize() rearranges the elements, filling in the new rows or columns or adjusting for deleted elements, and adding or removing elements at the end of the array, as needed. This is shown in the following two figures. You are most likely to want to do this if you don't need to refer to existing items in the array; that is, you plan to update the array with new values.

Figure 10.5 Adding a row and a column to a 3x4 array, rearranging elements

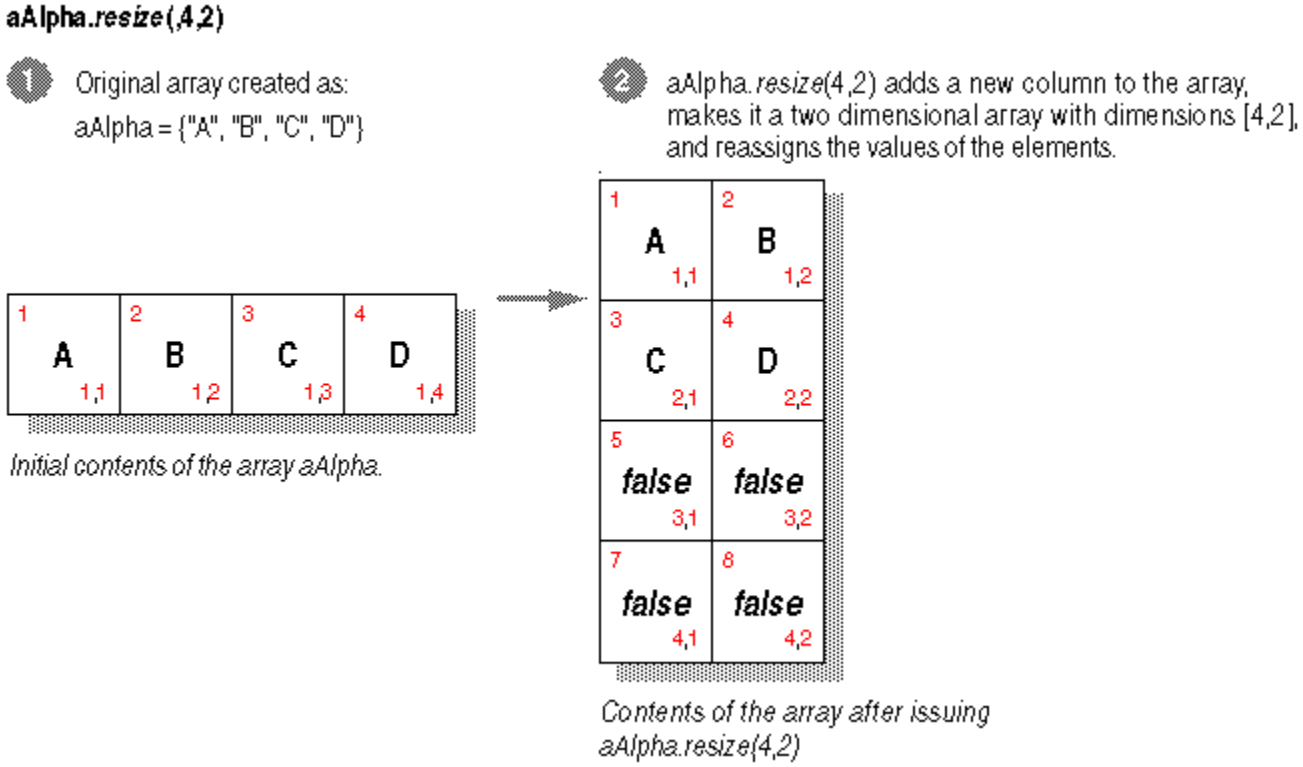


Figure 10.6 Adding a column to a one-dimensional array, rearranging elements

When you use *resize*() on a one-dimensional array, you might want the original row to become the first column of the new array. Similarly, when you use *resize*() on a two-dimensional array, you might want existing two-dimensional array elements to remain in their original positions. You are most likely to want to do this if you need to refer to existing items in the array by their subscripts; that is, you plan to add new values to the array while continuing to work with existing values.

If <retain values expN> is a nonzero value, *resize*() ensures that elements retain their original values. The following two figures repeat the statements shown in the previous two figures, with the addition of a value of 1 for <retain values expN>.

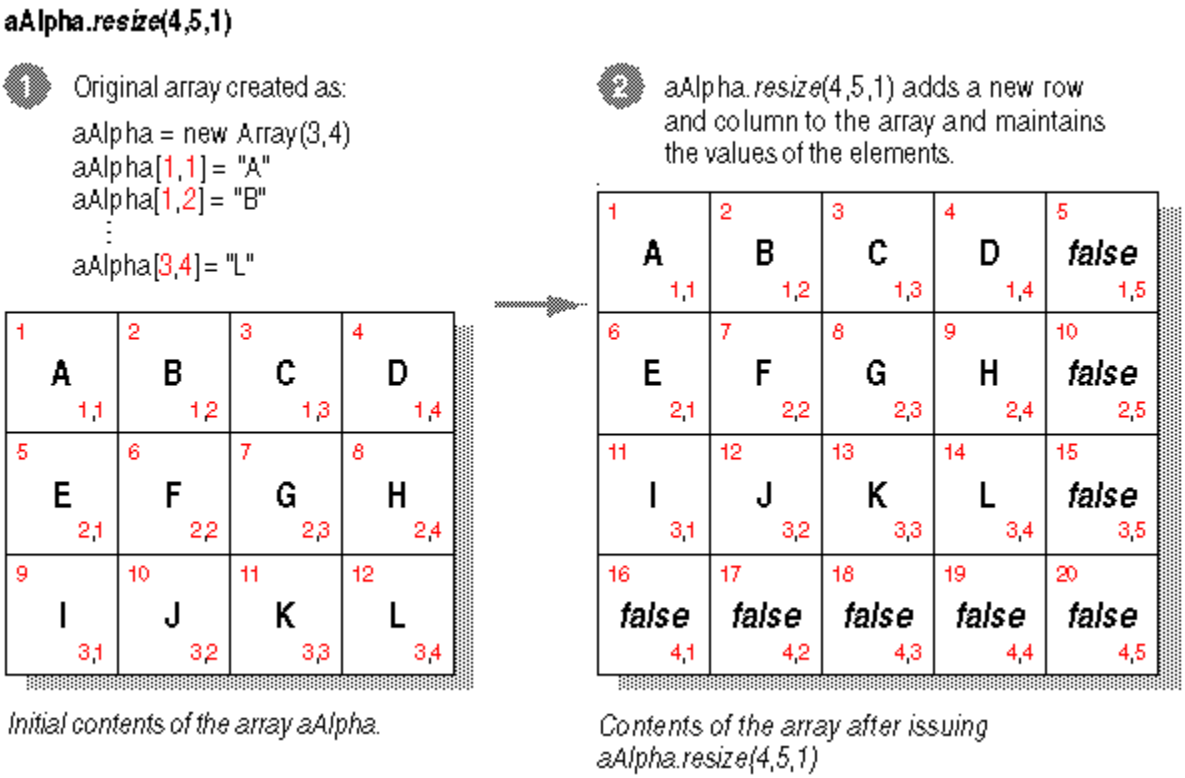


Figure 10.7 Adding a row and a column to a 3x4 array, "preserving elements"

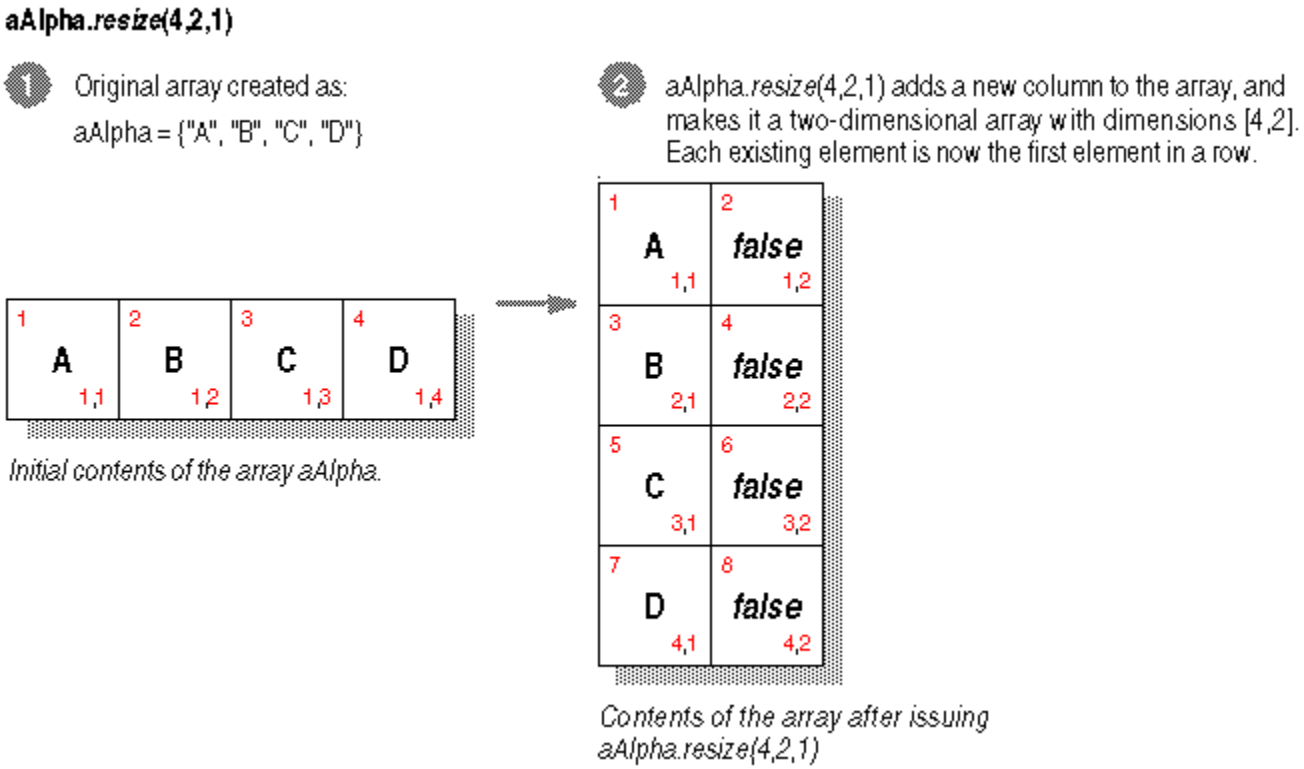


Figure 10.8 Adding a column to a one-dimensional array, "preserving elements"

resize() example

The following example resizes a one-dimensional array with 12 elements into a two-dimensional array with 3 rows and four columns.

```
aAlpha = {"A", "B", "C", "D", "E", "F", "G", "H", "I", "J", "K", "L" }
aAlpha.resize( 3, 4 )
displayArray( aAlpha )
```

The displayArray() function is used to display the contents of the array in the results pane of the Command window. It is shown in the example for ***dimensions***.

scan()

Topic group Related topics Example

Searches an array for an expression. Returns the number of the first element that matches the expression if the search is successful, or 0 if the search is unsuccessful.

Syntax

<oRef>.*scan*(<exp> [, <starting element expN> [, <elements expN>]])

<oRef>

A reference to the array you want to search.

<exp>

The expression you want to search for in <oRef>.

<starting element expN>

The element number in <oRef> at which you want to start searching. Without <starting element expN>, *scan*() starts searching at the first element.

<elements expN>

The number of elements in <oRef> that *scan*() searches. Without <elements expN>, *scan*() searches <oRef> from <starting element expN> to the end of the array. If you want to specify a value for <elements expN>, you must also specify a value for <starting element expN>.

Property of

Array

Description

Use *scan*() to search an array for the value of <exp>. For example, if an array contains customer names, you can use *scan*() to find the location in which a particular name appears.

scan() returns the element number of the first element in the array that matches <exp>. If you want to determine the subscripts of this element, use *subscript*().

When <exp> is a string, *scan*() is case-sensitive; you may want to use methodsUPPER(), LOWER(), or PROPER() to match the case of <exp> with the case of the data stored in the array. *scan*() also follows the rules established by SET EXACT to determine if <exp> and the array element are equal. For more information, see SET EXACT.

scan() example

The following example uses *dir*() to store the file information for all the files and directories in the root directory of the current drive to the array aFiles. Then the array is searched to display only the directories in the array. Manifest constants to represent the columns are created with the #define preprocessor directive to make the code more readable.

```
#define ARRAY_DIR_NAME 1  // Manifest constants for columns returned by dir()
#define ARRAY_DIR_SIZE 2
#define ARRAY_DIR_DATE 3
#define ARRAY_DIR_TIME 4
#define ARRAY_DIR_ATTR 5
aFiles   = new Array()
nFiles   = aFiles.dir( "\*.*", "D" )           // Read all files and
directories
nElement = 1                                   // Start looking at first
element
do
  nElement = aFiles.scan( "....D", nElement )  // Look for next directory
  if nElement > 0                              // Display a match
    ? aFiles[ nElement - ARRAY_DIR_ATTR + ARRAY_DIR_NAME ]
    if nElement++ >= aFiles.size               // Continue looking with next
element
      exit                                     // Unless that was the last
element
    endif
  endif
until nElement == 0                            // Until there's no match
```

To find all the matches in the array, you need to keep track of the last match. Here it's kept in the variable nElement. It starts at one, the first element, and is used in the *scan*() call as the starting element parameter. The result of each search is stored back in nElement. If there's a match, the directory name is displayed. Then nElement is incremented—otherwise *scan*() would match the same element again—and the loop continues.

A few subtleties are present in the example code. First, when incrementing nElement, it is compared with the *size* of the array. If the element number is equal to (or greater than, which it should never be, but it's good defensive programming to test for it anyway) the *size* of the array, that means the last match was in the last element of the array. This is possible only because the file attribute is in the last column of the array. In this case, you don't want to call *scan*() again, since the starting element number is higher than the highest element number and would cause an error. So you EXIT out of the loop instead.

The variable nElement is incremented after the comparison to the *size* of the array by using the postfix + + operator. If nElement was pre-incremented, the comparison would be off, although the rest of the loop would work.

To display the directory name, the column number of the file attribute column is subtracted from the matching element number, and the column number for the file name column is added. This yields the element number of the file name in the same row as the matching file attribute. This would work for any combination of search or display columns.

size

Topic group | Related topics | Example

The number of elements in an Array object.

Property of

Array

Description

size indicates the number of elements in an Array object.

For a one-dimensional array, you can assign a value to *size* to change its size.

For a array with more than one dimension, *size* is read-only.

You can use the ALEN() function to determine the size of each dimension for a two-dimensional array. There is no built-in way to determine dimension sizes for arrays with more than two dimensions.

size example

The following classes implement a simple stack based on the Array class. When items are pushed onto the stack, the *size* of the array is checked to see if the item will fit. If not, the *add* method() is used. When items are popped from the stack, the array does not shrink. If another item is pushed onto the stack, the item can be stored in an existing array element.

```
class Stack of Array
  this.ptr = 0
  function push( xArg )
    if this.ptr == this.size
      this.add( xArg )
      this.ptr++
    else
      this[ ++this.ptr ] = xArg
    endif
  function pop()
    if this.ptr > 0
      return this[ this.ptr-- ]
    else
      throw new StackException()
    endif
  function top()
    if this.ptr > 0
      return this[ this.ptr ]
    else
      throw new StackException()
    endif
  function empty()
    return this.ptr == 0
endclass
class StackException of Exception
  this.message = "Stack fault"
endclass
```

sort()

Topic group Related topics Example

Sorts the elements in a one-dimensional array or the rows in a two-dimensional array. Returns 1 if successful; generates an error if unsuccessful.

Syntax

<oRef>.*sort*([<starting element expN> [,<elements to sort expN> [, <sort order expN>]]])

<oRef>

A reference to the array you want to sort.

<starting element expN>

In a one-dimensional array, the number of the element in <oRef> at which you want to start sorting. In a two-dimensional array, the number (subscript) of the column on which you want to sort. Without <starting element expN>, *sort*() starts sorting at the first element or column in the array.

<elements to sort expN>

In a one-dimensional array, the number of elements you want to sort. In a two-dimensional array, the number of rows to sort. Without <elements to sort expN>, *sort*() sorts the rows starting at the row containing element <starting element expN> to the last row. If you want to specify a value for <elements to sort expN>, you must also specify a value for <starting element expN>.

<sort order expN>

The sort order:

- 0 specifies ascending order (the default)
- 1 specifies descending order

If you want to specify a value for <sort order expN>, you must also specify values for <elements to sort expN> and <starting element expN>.

Property of

Array

Description

sort() requires that all the elements on which you're sorting be of the same data type. The elements to sort in a one-dimensional array must be of the same data type, and the elements of the column by which rows are to be sorted in a two-dimensional array must be of the same data type.

sort() arranges elements in alphabetical, numerical, chronological, or logical order, depending on the data type of <starting element expN>. (For strings, the current language driver determines the sort order.)

One-dimensional arrays

Suppose you create an array with the following statement:

```
aNums = {5, 7, 3, 9, 4, 1, 2, 8}
```

That creates an array with the elements in this order:

```
5    7    3    9    4    1    2    8
```

If you call aNums.*sort*(1, 5), *Visual* dBASE sorts the first five elements so that the array elements are in this order:

```
3    4    5    7    9    1    2    8
```

If you then call aNums.*sort*(5, 2), *Visual* dBASE sorts two elements starting at the fifth element so that the array elements are now in this order:

```
3    4    5    7    1    9    2    8
```

Two-dimensional arrays

Using *sort*() with a two-dimensional array is similar to using the SORT command with a table. Array rows correspond to records, and array columns correspond to fields.

When you sort a two-dimensional array, whole rows are sorted, not just the elements in the column

where <starting element expN>) is located.

For example, suppose you create the array aInfo and fill it with the following data:

Sep 15 1965 7 A

Dec 31 1965 4 D

Jan 19 1945 8 C

May 2 1972 2 B

If you call aInfo.*sort*(1), *Visual* dBASE sorts all rows in the array beginning with element number 1. The rows are sorted by the dates in the first column because element 1 is a date. The following figure shows the results.

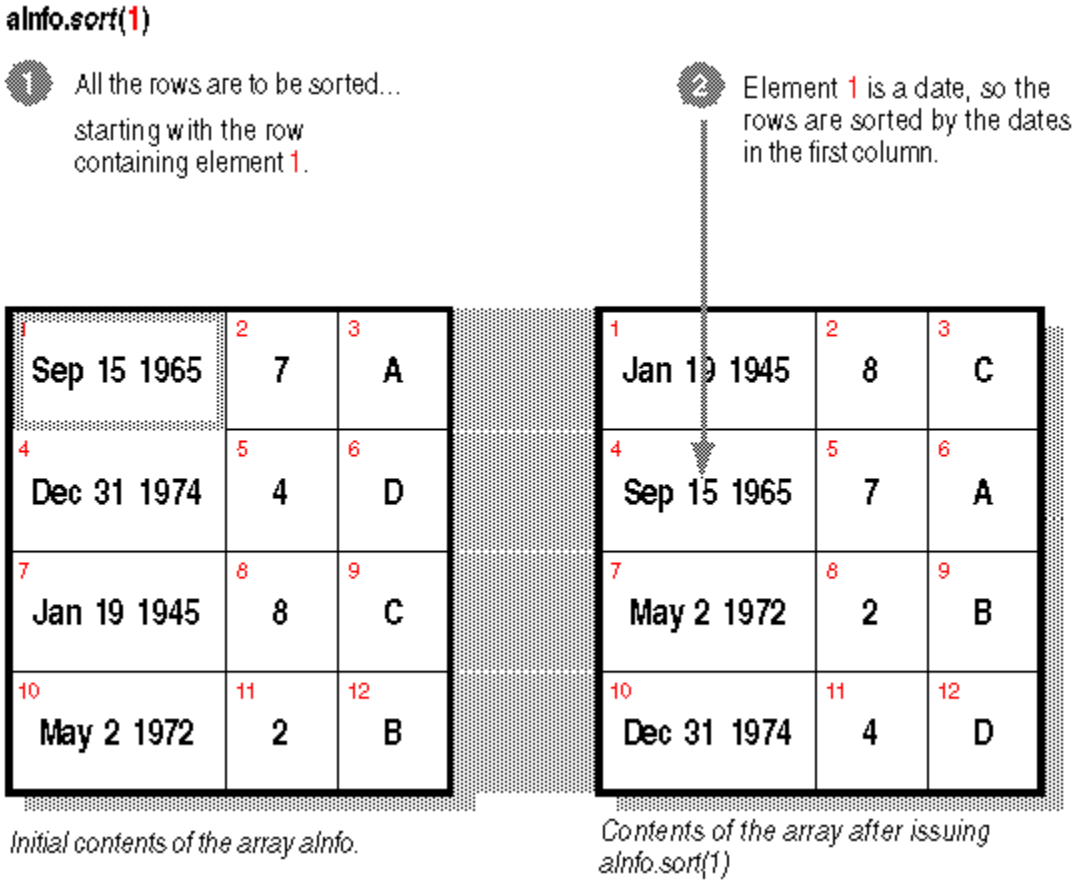


Figure 10.9 **aInfo.***sort* (1)

If you then call aInfo.*sort*(5, 2), *Visual* dBASE sorts two rows in the array starting with element number 5, whose value is 7. *sort*() sorts the second and the third rows based on the numbers in the second column. The following figure shows the results.

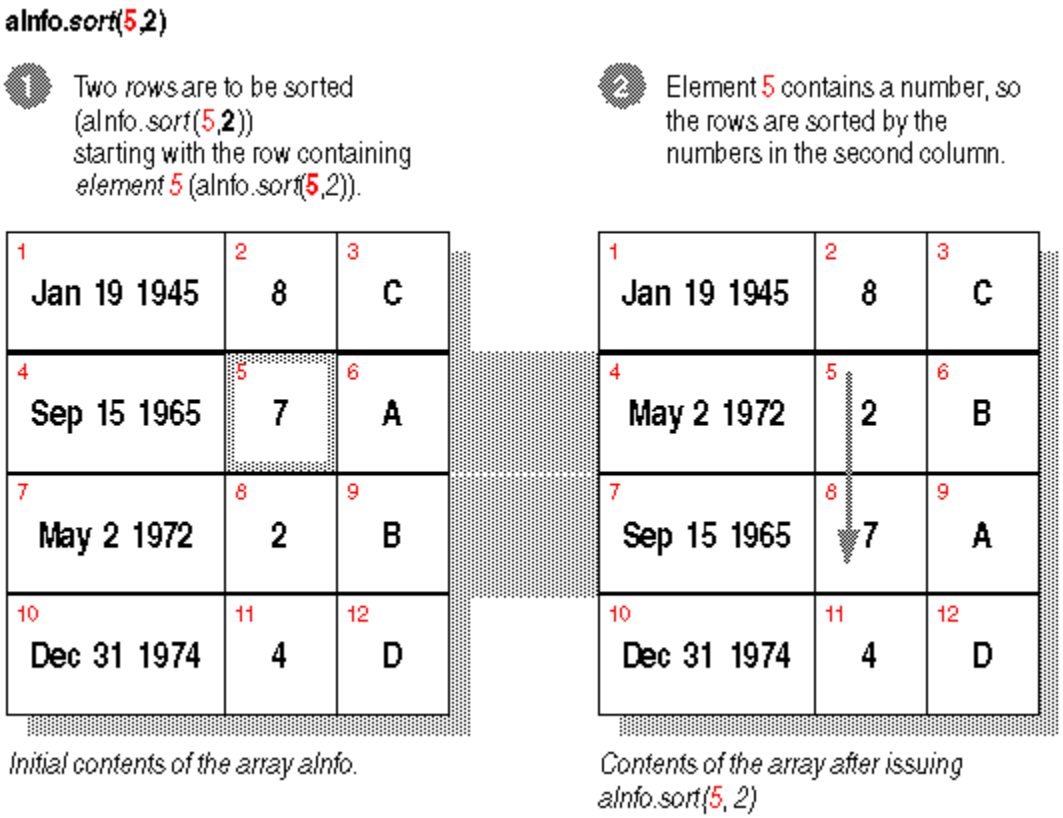


Figure 10.10 **Using** sort() with a two-dimensional array

sort() example

The following example uses *dir*() to store the file information for all the files in the current directory to the array aFiles. Then the array is sorted on the file size. Manifest constants to represent the columns are created with the #define preprocessor directive to make the code more readable.

```
#define ARRAY_DIR_NAME 1  // Manifest constants for columns returned by dir()
#define ARRAY_DIR_SIZE 2
#define ARRAY_DIR_DATE 3
#define ARRAY_DIR_TIME 4
#define ARRAY_DIR_ATTR 5
aFiles = new Array()
nFiles = aFiles.dir()
aFiles.sort( ARRAY_DIR_SIZE )  // Sort by size
for nFile = 1 to nFiles
  ?  aFiles[ nFile, ARRAY_DIR_NAME ]
  ?? aFiles[ nFile, ARRAY_DIR_SIZE ] at 25
endfor
```

subscript()

Topic group Related topics Example

Returns the row number or the column number of a specified element in an array.

Syntax

<oRef>.*subscript*(<element expN>, <row/column expN>)

<oRef>

A reference to the array.

<element expN>

The element number.

<row/column expN>

A number, either 1 or 2, that determines whether you want to return the row or column subscript of an array. If <row/column expN> is 1, subscript() returns the number of the row subscript. If <row/column expN> is 2, subscript() returns the number of the column subscript.

If <oRef> is a one-dimensional array, *Visual* dBASE returns an error if <row/column expN> is a value other than 1.

Property of

Array

Description

Use *subscript*() when you know the number of an element in a two-dimensional array and want to reference the element by using its subscripts.

If you need to determine both the row and column number of an element in a two-dimensional array, call *subscript*() twice, once with a value of 1 for <row/column expN> and once with a value of 2 for <row/column expN>. For example, if the element number is in the variable nElement, execute the following statements to get its subscripts:

```
nRow = aExample.subscript( nElement, 1 )
nCol = aExample.subscript( nElement, 2 )
```

In one-dimensional arrays, the number of an element is the same as its subscript, so there is no need to use *subscript*(). For example, if aOne is a one-dimensional array, aOne.*subscript*(3) returns 3, aOne.*subscript*(5) returns 5, and so on.

subscript() is the inverse of *element*(), which returns an element number when you specify the element subscripts.

subscript() example

The following example displays all the nonzero-size files in your Windows Temp directory. First it tries to find the directory where your temporary files are stored by looking for the operating system environment variable TMP. Then it uses *dir*() to store the file information for all the files in that directory (or the current directory if the TMP directory is not found) to the array aFiles. All the rows that have a file size of zero are deleted using a combination of *scan*(), *subscript*(), and *delete*().

scan() can simply search for zeros because there are no other numeric columns in the array created by *dir*(). If it finds one, *subscript*() is called to return the corresponding row number for the matching element. Then the row number is used in the *delete*() call.

Manifest constants to represent the columns are created with the #define preprocessor directive to make the code more readable.

```
#define ARRAY_DIR_NAME 1  // Manifest constants for columns returned by dir()
#define ARRAY_DIR_SIZE 2
#define ARRAY_DIR_DATE 3
#define ARRAY_DIR_TIME 4
#define ARRAY_DIR_ATTR 5
// Look for OS environment variable TMP
cTempDir = getenv( "TMP" )
// If defined, make sure it has trailing backslash
if "" # cTempDir
  if right( cTempDir, 1 ) # "\"  // No trailing backslash
    cTempDir += "\"              //   so add one
  endif
endif
aFiles   = new Array()
nFiles   = aFiles.dir( cTempDir + "*.*" )              // Read all files in
TMP dir
nElement = aFiles.scan( 0 )
do while nElement > 0                                  // Find zero-byte
files and
  aFiles.delete( aFiles.subscript( nElement, 1 ), 1 )  // delete by row
  nFiles--                                             // Decrement file
count
  nElement := aFiles.scan( 0 )
enddo
for nFile = 1 to nFiles                                // Display results
  ?  aFiles[ nFile, ARRAY_DIR_NAME ]
  ?? aFiles[ nFile, ARRAY_DIR_SIZE ] at 25
endfor
```

File commands and functions

Topic group

Visual dBASE supports equivalent file commands and functions for all the methods in the File class, which can be organized into the following categories:

- File utility commands
- File information functions
- Functions that provide byte-level access to files, sometimes referred to as low-level file functions

The low-level file functions are maintained for compatibility. To read and write to files, you should use a File object, which better encapsulates direct file access. In contrast, the file utility commands and file information functions are easier to use, because they do not require the existence of a File object.

File utility commands

Topic group

The following commands have equivalent methods in the File class:

Command	File class method
COPY FILE	*copy*()
DELETE FILE	*delete*()
ERASE	*delete*()
RENAME	*rename*()

These commands are described separately to document their syntax. Otherwise, they perform identically to their equivalent method.

File information functions

Topic group

The following file information functions are usually used instead of their equivalent methods in the File class:

Function	File class method
FACCESSDATE()	*accessDate*()
FCREATEDATE()	*createDate*()
FCREATETIME()	*createTime*()
FDATE()	*date*()
FILE()	*exists*()
FSHORTNAME()	*shortName*()
FSIZE()	*size*()
FTIME()	*time*()

These functions are not described separately (except for FILE(), because its name is not based on the name of its equivalent method). The syntax of a file information function is identical to the syntax of the equivalent method, except that as a function, no reference to a File object is needed, which makes the function more convenient to use. For example, these two statements are equivalent

```
nSize = fsize( cFile )             // Get size of file named in variable
cFile
nSize = new File().size( cFile )   // Get size of file named in variable
cFile
```

Low-level file functions

Topic group

The following low-level file functions are equivalent to the following methods in the File class:

Function	File class method
FCLOSE()	*close*()
FCREATE()	*create*()
FEOF()	*eof*()
FERROR()	*error*()
FFLUSH()	*flush*()
FGETS()	*gets*() and *readln*()
FOPEN()	*open*()
FPUTS()	*puts*() and *writeln*()
FREAD()	*read*()
FSEEK()	*seek*()
FWRITE()	*write*()

These functions are not described separately. While a File object automatically maintains its file handle in its *handle* property, low-level file functions must explicitly specify a file handle, with the exception of FERROR(), which does not act on a specific file. The FCREATE() and FOPEN() functions take the same parameters as the *create*() and *open*() methods, and return the file handle.

The other functions use the file handle as their first parameter and all other parameters (if any) following it The parameters following the file handle in the function are identical to the parameters to the equivalent method, and the functions return the same values as the methods.

Compare the examples for *exists*() and FILE() to see the difference between using a File object and low-level file functions.

class File

Topic group Example

An object that provides byte-level access to files and contains various file directory methods.

Syntax

[<oRef> =] new File()

<oRef>

A variable or property in which to store a reference to the newly created File object.

Properties

The following tables list the properties and methods of the File class. (No events are associated with this class.)

Property	Default	Description
className	FILE	Identifies the object as an instance of the File class
handle	-1	Operating system file handle
path		Full path and file name for open file
position	0	Current position of file pointer, relative to the start of the file

Method	Parameters	Description
accessDate()	<filename expC>	Returns the last date a file was opened
close()		Closes the currently open file
copy()	<filename expC> , <new name expC>	Makes a copy of the specified file
create()	<filename expC> [,<access rights>]	Creates a new file with optional access attributes
createDate()	<filename expC>	Returns the date when the file was created
createTime()	<filename expC>	Returns the time a file was created as a string
date()	<filename expC>	Returns the date the file was last modified
delete()	<filename expC>	Deletes the specified file
eof()		Returns true or false indicating if the file pointer is positioned past the end of the currently open file
error()		Returns a number indicating the last error encountered
exists()	<filename expC>	Returns true or false to indicate whether the specified disk file exists
flush()		Writes current data in the file buffer to disk and keeps file open
gets()	[<chars read expN>] [, <eol expC>]	Reads and returns a line from a file, leaving the file pointer at the beginning of the next line. Same as readln()
open()	<filename expC> [,<access rights>]	Opens an existing file with optional access attributes
puts()	<input string expC> [, <max chars expN> [, <eol expC>]	Writes a character string and end-of-line character(s) to a file. Same as writeln()
read()	<characters expN>	Reads and returns the specified number of characters from the file starting from the current file pointer position; leaving the file pointer at the character after the last one read
readln()	[<chars read expN>] [, <eol expC>]	Reads and returns a line from a file, leaving the file pointer at the beginning of the next line. Same as gets().
rename()	<filename expC>	Changes the name of the specified file to a new name

	, <new name expC>	
seek()	<offset expN> [, 0 | 1 | 2]	Moves the file pointer the specified number of bytes within a file, optionally allowing the movement to be from the beginning (0), end (2), or current file position (1)
shortName()	<filename expC>	Returns the short (8.3) name for a file
size()	<filename expC>	Returns the number of bytes in the specified file
time()	<filename expC>	Returns the time the file was last modified as a string
write()	<expC> [, <max chars expN>]	Writes the specified string into the file at the current file position, overwriting any existing data and leaving the file pointer at the character after the last character written
writeln()	<input string expC> [, <max chars expN> [, <eol expC>]	Writes a character string and end-of-line character(s) to a file. Same as puts().

Description

Use a File object for direct byte-level access to files. Once you create a new File object, you can *open*() an existing file or *create*() a new one. Be sure to *close*() the file when you are done. A File object may access only one file at a time, but after closing a file, you may open or create another.

File objects also contain information and utility methods for file directories, such as returning the size of a file or changing a file name. If you intend to call multiple methods, you can create and reuse a File object. For example,

```
ff = new File()
? ff.size( "VDB.HLP" )
? ff.accessDate( "VDB.HLP" )
```

Or you can create a File object for a WITH block. For example,

```
with new File()
  ? size( "VDB.HLP" )
  ? accessDate( "VDB.HLP" )
endwith
```

For a single call, you can create and use the File object in the same statement:

```
? new File().size( "VDB.HLP" )
```

However, unless you happen to have a File object handy, it's easier to use the equivalent built-in function or command to get the file information or perform the file operation:

```
? fsize( "VDB.HLP" )
? faccessdate( "VDB.HLP" )
```

class File example

Suppose you have a data file generated by a mainframe computer that has fixed length records with no record breaks. You want to convert this file so that you have one record on each line. Use two File objects to read and write the file, adding line breaks as you write:

```
#define REC_LENGTH 80
#define IN_FILE    "STUFF.REC"
#define OUT_FILE   "STUFF.TXT"
fIn  = new File()
fOut = new File()
fIn.open( IN_FILE );
fOut.create( OUT_FILE );
do while not fIn.eof()
  fOut.puts( fIn.read( REC_LENGTH ))  // Read fixed length; write with line
break
enddo
fIn.close()
fOut.close()
```

!

Topic group Related topics

Executes a program or operating system command from within *Visual* dBASE.

Syntax

! <command>

<command>

A command recognized by your operating system.

Description

! is identical to RUN, except that a space is not required after the ! symbol, while a space is required after the word RUN. See RUN for details.

accessDate()

Topic group | Related topics | Example

Returns the last date a file was opened.

Syntax

<oRef>.*accessDate*(<filename expC>)

<oRef>

A reference to a File object.

<filename expC>

The name of the file to check. Wildcard characters are not allowed; you must specify the actual file name.

If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the search path(s) you specified with SET PATH, if any. If you specify a file without including its extension, *Visual* dBASE assumes no extension. If the named file cannot be found, an exception occurs.

Property of

File

Description

accessDate() checks the file specified by <filename expC> and returns the date that the file was last opened by the operating system for reading or writing.

To get the date the file was last modified, use *date*(). For the date the file was created, use *createDate*().

accessDate() example

The following example uses *accessDate*() to display the last date the Help file was used:

```
? new File().accessDate( "C:/Program Files/Borland/Visual dBASE/Help/VDB.HLP"
)
```

CD

Topic group Related topics

Changes the current drive or directory.

Syntax

CD [<path>]

<path>

The new drive and/or path. Quotes (single or double) are required if the path contains spaces or other special characters; optional otherwise.

Description

Use CD to change the current working directory in *Visual* dBASE to any valid drive and path. If you're unsure whether a drive is valid, use VALIDDRIVE() before issuing CD. The current directory appears in the Navigator.

CD supports the Universal Naming Convention (UNC), which starts with double backslashes for the resource name, for example:

```
\\MyServer\MyVolume\MyDir\MySubdir
```

CD without the option <path> displays the current drive and directory path in the result pane of the Command window. To get the current directory, use SET("DIRECTORY").

Another way to access files on different directories is with the command SET PATH. You can specify one or more search paths, and *Visual* dBASE uses these paths to locate files not on the current directory. Use SET PATH when an application's files are in several directories.

CD works like SET DIRECTORY, except SET DIRECTORY TO (with no argument) returns you to the HOME() directory, instead of displaying the current directory.

close()

Topic group | Related topics | Example

Closes a file previously opened with *create*() or *open*().

Syntax

<oRef>.*close*()

<oRef>

A reference to the File object that created or opened the file.

Property of

File

Description

close() closes a file you've opened with *create*() or *open*(). *close*() returns *true* if it's able to close the file. If the file is no longer available (for example, the file was on a floppy disk that has been removed) and there is data in the buffer that has not yet been written to disk, *close*() returns *false*.

Always close the file when you're done with it.

To save the file to disk without closing it, use *flush*().

close() example

The following example writes the current date and time to a text file, which you might do for a simple access log. The file is archived and deleted at the end of the week, so you need to test for its existence to determine whether it should be created or opened. The name of the file, which is used in three different places, is set in a manifest constant created by the #define preprocessor directive for ease of maintenance.

```
#define LOG_FILE "ACCESS.TXT"
f = new File()
if f.exists( LOG_FILE )
  f.open( LOG_FILE, "A" )
else
  f.create( LOG_FILE, "A" )
endif
f.puts( new Date().toLocaleString() )
f.close()
```

copy()

Topic group Related topics Example

Duplicates a specified file.

Syntax

<oRef>.*copy*(<filename expC>, <new name expC>)

<oRef>

A reference to a File object.

<filename expC>

Identifies the file to duplicate (also known as the source file). <filename expC> may be a file name skeleton with wildcard characters. In that case, *Visual* dBASE displays a dialog box in which you select the file to duplicate.

If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the search path(s) you specified with SET PATH, if any. If you specify a file without including its extension, *Visual* dBASE assumes no extension. If the named file cannot be found, an exception occurs.

<new name expC>

Identifies the target file that will be created or overwritten by *copy*(). <new name expC> may be a filename skeleton with wildcard characters. In that case, *Visual* dBASE displays a dialog box in which you specify the name of the target file and its directory.

Property of

File

Description

copy() lets you duplicate an existing file at the operating system level. *copy*() duplicates a single file of any type.

When running a *Visual* dBASE .EXE, *copy*() first looks for <filename expC> in the internal file system of the .EXE file. Any path in <filename expC> is ignored. If the named file is found in the .EXE, that file is copied. If the file is not found, then *Visual* dBASE searches for the file on disk. This lets you package static files, like empty tables, inside the .EXE during the build process and extract them when needed. You cannot copy files into the .EXE

If SET SAFETY is ON and a file exists with the same name as the target file, *Visual* dBASE displays a dialog box asking if you want to overwrite the file. If SET SAFETY is OFF, any existing file with the same name is overwritten without warning.

copy() does not automatically copy the auxiliary files associated with table files, such as indexes and memo files. For example, it does not copy the MDX or DBT file associated with a DBF file. When copying tables, use the Database object's *copyTable*() method.

You cannot *copy*() a file that has been opened for writing with the *open*() or *create*() methods; it must be closed first.

copy() example

The following example makes a copy of a file in the current directory:

```
new File().copy( "AFILE", "ACOPY" )
```

Visual dBASE also offers the same functionality in the COPY FILE command. To perform the same operation as above, you could enter

```
copy file AFILE to ACOPY
```

COPY FILE

Topic group Related topics Example

Duplicates a specified file.

Syntax

COPY FILE <filename> TO <new name>

Description

COPY FILE is identical to the File object's *copy*() method, except that as a command, the file name arguments are treated as names, not character expressions. They do not require quotes unless they contain spaces or other special characters. If the name is in a variable, you must use the indirection or macro operators.

See *copy*() for details on the operation of the command.

create()

Topic group | Related topics | Example

Creates and opens a specified file.

Syntax

<oRef>.*create*(<filename expC>[, <access expC>])

<oRef>

A reference to a File object.

<filename expC>

The name of the file to create and open. By default, *create*() creates the file in the current directory. To create the file in another directory, specify a full path name for <filename expC>.

<access expC>

The access level of the file to create, as shown in the following table. The access level string is not case-sensitive. If omitted, the default is read and write. Append is a more restrictive version of write; the data is always added to the end of the file.

<access expC>	Access level
"R"	Read-only
"W"	Write-only
"A"	Append-only
"RW" or "WR"	Read and write
"RA" or "AR"	Read and append

Property of

File

Description

Use *create*() to create a file with a name you specify, assign the file the level of access you specify, and open the file. If *Visual* dBASE can't create the file (for example, if the file is already open), an exception occurs.

SET SAFETY has no effect on *create*(). If <filename expC> already exists, it is overwritten without warning. To see if a file with the same name already exists, use *exists*() before issuing *create*().

To use other File methods, such as *read*() and *write*(), first open a file with *create*() or *open*().

When you open a file with *create*(), the file is empty, so the file pointer is positioned at the first character in the file. Use *seek*() to position the file pointer before reading from or writing to a file.

create() example

The following example writes the current date and time to a text file, which you might do for a simple access log. The file is archived and deleted at the end of the week, so you need to test for its existence to determine whether it should be created or opened. The name of the file, which is used in three different places, is set in a manifest constant created by the #define preprocessor directive for ease of maintenance.

```
#define LOG_FILE "ACCESS.TXT"
f = new File()
if f.exists( LOG_FILE )
  f.open( LOG_FILE, "A" )
else
  f.create( LOG_FILE, "A" )
endif
f.puts( new Date().toLocaleString() )
f.close()
```

createDate()

Topic group | Related topics | Example

Returns the date a file was created.

Syntax

<oRef>.*createDate*(<filename expC>)

<oRef>

A reference to a File object.

<filename expC>

The name of the file to check. Wildcard characters are not allowed; you must specify the actual file name.

If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the search path(s) you specified with SET PATH, if any. If you specify a file without including its extension, *Visual* dBASE assumes no extension. If the named file cannot be found, an exception occurs.

Property of

File

Description

createDate() checks the file specified by <filename expC> and returns the date that the file was created.

To get the date the file was last modified, use *date*(). For the date the file was last accessed, use *accessDate*(). To get the time the file was created, use *createTime*().

createDate() example

The following example uses *createDate*() to display the date the Help file was created:

```
? new File().createDate( "C:/Program Files/Borland/Visual dBASE/Help/VDB.HLP"
)
```

createTime()

Topic group | Related topics | Example

Returns the time a file was created.

Syntax

<oRef>.*createTime*(<filename expC>)

<oRef>

A reference to a File object.

<filename expC>

The name of the file to check. Wildcard characters are not allowed; you must specify the actual file name.

If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the search path(s) you specified with SET PATH, if any. If you specify a file without including its extension, *Visual* dBASE assumes no extension. If the named file cannot be found, an exception occurs.

Property of

File

Description

createTime() checks the file specified by <filename expC> and returns the time, as a character string, that the file was created.

To get the date the file was created, use *createDate*().

createTime() example

The following example uses *createTime*() to display the time the Help file was created:

```
? new File().createTime( "C:/Program Files/Borland/Visual dBASE/Help/VDB.HLP"
)
```

date()

Topic group Related topics Example

Returns the date stamp for a file, the date the file was last modified.

Syntax

<oRef>.*date*(<filename expC>)

<oRef>

A reference to a File object.

<filename expC>

The name of the file to check. Wildcard characters are not allowed; you must specify the actual file name.

If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the search path(s) you specified with SET PATH, if any. If you specify a file without including its extension, *Visual* dBASE assumes no extension. If the named file cannot be found, an exception occurs.

Property of

File

Description

Use *date*() to determine the date on which the last change was made to a file on disk.

When you update a file, *Visual* dBASE changes the file's date stamp to the current operating system date when the file is written to disk. For example, when the user edits a DB table, *Visual* dBASE changes the date stamp on the table file when the file is closed. *date*() reads the date stamp and returns its current value.

To get the date the file was created, use *createDate*(). For the date the file was last accessed, use *accessDate*(). To get the time the file was last changed, use *time*().

createTime() example

The following example uses *date*() to display the date *Visual* dBASE's INI file was last modified:

```
? new File().date( "C:/Program Files/Borland/Visual dBASE/Bin/VDB.INI" )
```

delete()

Topic group Related topics Example

Removes a file from a disk.

Syntax

<oRef>.*delete*(<filename expC>)

<oRef>

A reference to a File object.

<filename expC>

Identifies the file to remove. <filename expC> may be a filename skeleton with wildcard characters. In that case, *Visual* dBASE displays a dialog box in which you select the file to duplicate.

If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the search path(s) you specified with SET PATH, if any. If you specify a file without including its extension, *Visual* dBASE assumes no extension. If the named file cannot be found, an exception occurs.

Property of

File

Description

delete() deletes a file from a disk.

SET SAFETY has no effect on *delete*( ); the file is deleted without warning.

delete() does not automatically remove the auxiliary files associated with table files, such as indexes and memo files. For example, it does not delete the MDX or DBT files associated with a DBF file. When deleting tables, use the Database object's *dropTable*() method.

You cannot *delete*() a file that is open, including one opened with the *open*() or *create*() methods; it must be closed first.

delete() example

The following examples deletes a file in the current directory:

```
new File().delete( "AFILE" )
```

DELETE FILE

Topic group Related topics Example

Removes a file from a disk.

Syntax

DELETE FILE <filename>

Description

DELETE FILE is identical to the File object's *delete*() method, except that as a command, the file name argument is treated as a name, not a character expression. It does not require quotes unless it contain spaces or other special characters. If the name is in a variable, you must use the indirection or macro operators.

See *delete*() for details on the operation of the command.

The ERASE command is identical to DELETE FILE.

DELETE FILE example

Compare this example with the equivalent example for *delete*():

```
delete file AFILE
```

DIR

Topic group | Related topics | Example

Performs a directory or table listing.

Syntax

DIR | DIRECTORY
[[LIKE] <drive/path/filename skeleton>]

[LIKE] <drive/path/filename skeleton>

Specifies a path and/or file specification to be used by DIR. The LIKE keyword is included for readability only; it has no effect on the command.

If omitted, the tables in the current directory or database are listed.

Description

DIR (or DIRECTORY) is a utility command that lets you perform a directory listing. The information provided on each file includes its short (8.3) name, its size in bytes, the date of its last update, and its long file name. DIR also shows the total number of bytes used by the listed files, the number of bytes left on that drive, and the total disk space.

DIR with no arguments displays information on the tables in the current directory or database. When accessing tables in the current directory, SET DBTYPE controls the files that are displayed. If SET DBTYPE is DBASE, files with .DBF extensions in the current directory are shown; if SET DBTYPE is PARADOX, .DB files are shown instead. In addition to the information normally displayed, DIR displays the number of records in each table.

The same DBF or DB tables are listed if the database chosen by SET DATABASE is a Standard table alias (one that looks at DBF and DB tables in a specific directory). If the database chosen by SET DATABASE is any other kind of alias, only the table names and the total number of tables are shown.

DIR pauses when the results pane is full and displays a dialog box prompting you to display another screenful of information.

If you have not used ON KEY or SET FUNCTION to reassign the F4 key, pressing F4 is a quick way to execute DIR.

DIR example

The following examples use DIR:

```
set database to           // Access tables by directory, not database
set dbtype to dbase
dir                       // Displays all DBF tables in current directory
set dbtype to paradox
dir                       // Displays all DB tables in current directory
open database iblocal     // Open Interbase database
set database to iblocal   // Set active database
dir                       // Displays all tables in database
dir *.DBF                 // Displays all DBF files, without # of records
dir c:\autoexec.*         // Displays all AUTOEXEC files in root directory of
C:
```

DISKSPACE()

Topic group Related topics

Returns the number of bytes available on the current or specified drive's disk.

Syntax

DISKSPACE([<drive expN>])

<drive expN>

A drive number from 1 to 26. For example, the numbers 1 and 2 correspond to drives A and B, respectively.

Without <drive expN> or if <drive expN> is 0, DISKSPACE() returns the number of bytes available on the current drive.

If <drive expN> is less than 0 or greater than 26, DISKSPACE() returns the number of bytes available on the drive that contains the home directory.

Description

Use DISKSPACE() to determine how much space is left on a disk.

DISPLAY FILES

Topic group Related topics

Displays information about files on disk in the results pane of the Command window.

Syntax

DISPLAY FILES
[[LIKE] <drive/path/filename skeleton>]
[TO FILE <filename> | ? | <filename skeleton>]
[TO PRINTER]

TO FILE <filename> | ? | <*filename skeleton*>

Directs output to a text file as well as to the results pane of the Command window. By default, *Visual* dBASE assigns a .TXT extension. The ? and <*filename skeleton*> options display a dialog box in which you specify the name of the target file and the directory to save it in.

TO PRINTER

Directs output to the printer as well as to the results pane of the Command window.

Description

DISPLAY FILES is identical to DIR, and adds the option of directing the output to a file or a printer (or both) in addition to the Command window. See DIR for details.

DISPLAY FILES is the same as LIST FILES, except that LIST FILES doesn't pause for each screenful of information but rather lists the information continuously. This makes LIST FILES more appropriate when directing output to a file or printer.

DOS

Topic group Related topics

Open an MS-DOS or Windows NT command prompt.

Syntax

DOS

Description

Use the DOS command to open an operating system command prompt. This has the same effect as choosing MS-DOS Prompt or Command Prompt from the Windows Start menu. The command prompt runs as a separate process.

To execute single operating system commands use RUN. To execute applications, use RUN().

eof()

Topic group Related topics Example

Returns *true* if the file pointer is at the end of a file previously opened with *create*() or *open*()

Syntax

<oRef>.*eof*()

<oRef>

A reference to the File object that created or opened the file.

Property of

File

Description

eof() determines if the file pointer of the file you specify is at the end of the file (EOF), and returns *true* if it is and *false* if it is not. The file pointer is considered to be at EOF if it is positioned at the byte after the last character in the file.

You can move the file pointer to the end of the file with *seek*(). If a file is empty, as it is when you first create a new file with *create*(), *eof*() returns *true*.

eof() example

Suppose you have a data file generated by a mainframe computer that has fixed-length records with no record breaks. You want to convert this file so that you have one record on each line. Use two File objects to read and write the file, adding line breaks as you write:

```
#define REC_LENGTH 80
#define IN_FILE    "STUFF.REC"
#define OUT_FILE   "STUFF.TXT"
fIn  = new File()
fOut = new File()
fIn.open( IN_FILE );
fOut.create( OUT_FILE );
do while not fIn.eof()
  fOut.puts( fIn.read( REC_LENGTH ))  // Read fixed length; write with line
break
enddo
fIn.close()
fOut.close()
```

ERASE

Topic group Related topics Example

Removes a file from a disk.

Syntax

ERASE <filename>

Description

ERASE is identical to the File object's *delete*() method, except that as a command, the file name argument is treated as a name, not a character expression. It does not require quotes unless it contains spaces or other special characters. If the name is in a variable, you must use the indirection or macro operators.

See *delete*() for details on the operation of the command.

The DELETE FILE command is identical to ERASE.

ERASE example

Compare this example with the equivalent example for *delete*():

```
erase AFILE
```

This example lets the user pick a text file to delete:

```
cFile = getfile( "*.txt", "Delete text file from current directory" )
if upper( cFile ) = set( "DIRECTORY" ) and right( upper( cFile ), 4 ) ==
".TXT"
  erase ( cFile )
else
  msgbox( "Not a text file in the current directory", "Can't delete", 48 )
endif
```

The beginning of the returned file name is compared with the current directory returned by SET("DIRECTORY") using the equals operator (with SET EXACT OFF). The end of the file name is checked to see if it is a text file.

If the file is a text file in the current directory, the indirection operators convert the file name stored into a name the command can use. Without the indirection operators (or the macro operator, which would have the same effect), the command would attempt to erase the file named “cFile”.

error()

Topic group Related topics

Returns the error number of the most recent byte-level input or output error, or 0 if the most recent byte-level method was successful.

Syntax

<oRef>.*error*()

<oRef>

A reference to the File object that attempted the operation.

Property of

File

Description

To trap errors, call the File object method in a TRY block. Use the number that *error*() returns in a CATCH block to respond to errors in the byte-level methods of the File object. The following table lists the byte-level method errors that *error*() returns.

Error number	Cause of error
2	File or directory not found
3	Bad path name
4	No more file handles available
5	Can't access file
6	Bad file handle
8	No more directory entries available
9	Error trying to set the file pointer
13	No more disk space
14	End of file

exists()

Topic group Related topics Example

Tests for the existence of a file. Returns *true* if the file exists and *false* if it doesn't.

Syntax

<oRef>.*exists*(<filename expC>)

<oRef>

A reference to a File object.

<filename expC>

The name of the file to search for. Wildcard characters are not allowed; you must specify the actual file name.

If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the search path(s) you specified with SET PATH, if any. If you specify a file without including its extension, *Visual* dBASE assumes no extension.

Property of

File

Description

Use *exists*() to determine whether a file exists. You can use either the long file name or the short file name.

exists() example

The following example writes the current date and time to a text file, which you might do for a simple access log. The file is archived and deleted at the end of the week, so you need to test for its existence to determine whether it should be created or opened. The name of the file, which is used in three different places, is set in a manifest constant created by the #define preprocessor directive for ease of maintenance.

```
#define LOG_FILE "ACCESS.TXT"
f = new File()
if f.exists( LOG_FILE )
  f.open( LOG_FILE, "A" )
else
  f.create( LOG_FILE, "A" )
endif
f.puts( new Date().toLocaleString() )
f.close()
```

FILE()

Topic group Related topics Example

Tests for the existence of a file. Returns *true* if the file exists and *false* if it doesn't.

Syntax

FILE(<filename expC>)

Description

FILE() is identical to the File object's *exists*() method, except that as a built-in function, it does not require a File object to work.

FILE() example

Compare this example with the equivalent example for *exists*():

```
#define LOG_FILE "ACCESS.TXT"
if file( LOG_FILE )
  h = fopen( LOG_FILE, "A" )
else
  h = fcreate( LOG_FILE, "A" )
endif
fputs( h, new Date().toLocaleString() )
fclose( h )
```

flush()

Topic group Related topics

Writes to disk a file previously opened with *create*() or *open*() without closing the file. Returns *true* if successful and *false* if unsuccessful.

Syntax

<oRef>.*flush*()

<oRef>

A reference to the File object that created or opened the file.

Property of

File

Description

Use *flush*() to save a file in the file buffer to disk, flush the file buffer, and keep the file open. If *flush*() is successful, it returns *true*.

Flushing a buffer to disk is similar to saving the file and continuing to work on it. Until you flush an open file buffer to disk, any data in the buffer is stored only in RAM (random-access memory). If the power to the computer fails or *Visual* dBASE ends abnormally, data in RAM is lost. However, if you have used *flush*() to write the file buffer to disk, you lose only data that was added between the time you issued *flush*() and the time the system failed.

To save the file to disk and close the file, use *close*().

FNAMEMAX( )

Topic group Related topics

Returns the maximum allowable file-name length on a given drive or volume.

Syntax

FNAMEMAX([<*expC*>])

<*expC***>**

The drive letter (with a colon), or name of the volume, to check. If <expC> is not provided, the current drive/volume is assumed. If the drive/volume does not exist, an error occurs.

Description

FNAMEMAX( ) checks the drive or volume specified by <expC> and returns the maximum file-name length (including the dot and three-letter extension) allowed for files on that drive/volume. Typical values are:

FNAMEMAX()	Drive type
255	Windows long file name
12	MS-DOS-compatible 8.3 name
240	Novell Netware long file name

FUNIQUE()

Topic group Related topics Example

Creates a unique file name.

Syntax

FUNIQUE([<expC>])

<expC>

A file-name skeleton, using ? as the wildcard character (the * character is not allowed).

Description

Use FUNIQUE() when creating temporary files to generate a file name that is not being used by an existing file. The generated file name follows the file name skeleton you specify, with random numbers substituted for each ? character.

FUNIQUE() generates the new file name by replacing each wildcard character with a random number, then looking in the current or specified directory for a file name that matches the new file name. If no match is found, FUNIQUE() returns that name—but it does not create the file. If a match is found, FUNIQUE() tries again until a unique file name is found. If no combination of random numbers is successful, FUNIQUE() returns an empty string.

If you omit <expC>, FUNIQUE() returns an 8-character file name with no extension, composed entirely of random numbers, in the Windows temp directory.

FUNIQUE() example

The following example shows the top-level routine used to process a generated text file. An intermediate file is created during the process. The final result is stored in a subdiretory. Because the application is used by many people on a network, a fixed file name cannot be used. Instead it uses a temporary file whose name is generated by FUNIQUE().

```
parameter cFile                         // Name of file to process
local cTmpFile
cTmpFile = funique( "T???????.TMP" )    // Letter T followed by seven digits
preProcess( cFile, cTmpFile )           // Create intermediate temp file
mainProcess( cTmpFile, cFile )          // Create result file in subdirectory
erase ( cTmpFile )                      // Erase temp file when done
```

GETDIRECTORY()

Topic group Related topics

Displays a dialog box from which you can select a directory for use with subsequent commands.

Syntax

GETDIRECTORY([<directory expC>])

<directory expC>

The initial directory to appear in the dialog box. If <directory expC> is omitted, the current directory appears as the initial directory.

Description

Use GETDIRECTORY() to return a directory name for use in subsequent commands.

GETDIRECTORY() does not return a final backslash at the end of the directory name it returns. GETDIRECTORY() returns an empty string if the user clicks Cancel or presses Esc.

GETENV()

Topic group Related topics

Returns the value of an operating system environment variable.

Syntax

GETENV(<expC>)

<expC>

The name of the environment variable to return.

Description

Use GETENV() to return the current value of an operating system environment variable.

If *Visual* dBASE can't find the environment variable specified by <expC>, it returns an emptry string.

GETFILE()

Topic group Related topics

Displays a dialog box, from which the user can choose or enter an existing file name, and returns the file name.

Syntax

GETFILE([<filename skeleton expC>
[, <title expC>
[, <suppress database expL>]]])

<filename skeleton expC>

A character string that matches selected file names with the wildcard characters ? and *. The GETFILE() dialog box initially lists only those file names in the current directory that match the file name skeleton. Without <filename skeleton expC>, the dialog box lists all file names.

<title expC>

A title displayed in the top of the dialog box. Without <title expC>, the GETFILE() dialog box displays the default title. If you want to specify a value for <title expC>, you must also specify a value or empty string ("") for <filename skeleton expC>.

<suppress database expL>

Whether to suppress the combobox from which you can choose a database. The default is *true*; the Database combobox is not displayed. If you want to specify a value for <suppress database expL>, you must also specify a value or empty string ("") for <filename skeleton expC> and <title expC>.

Description

Use GETFILE() to present the user with a dialog box from which they can choose an existing file or table. GETFILE() does not open any files.

The GETFILE() dialog box includes names of files whether they are currently open or closed. *Visual* dBASE returns the full path name of the file whether SET FULLPATH is ON or OFF.

By default, the dialog box opened with GETFILE() displays file names from the current directory the first time you issue GETFILE(). After the first time you use GETFILE() and exit successfully, the subdirectory you choose becomes the default the next time you use GETFILE().

If <suppress database expL> is *false*, you can also choose from a list of databases. When a database is selected, the dialog box displays a list of tables in that database instead of files in the current directory.

The dialog box is a standard Windows dialog box. The user can perform many Windows Explorer-like activities in this dialog box, including renaming files, deleting files, and creating new folders. They can also right-click on a file to get its context menu. These features are disabled when the dialog is displaying tables in a database instead of files in a directory.

GETFILE() returns an empty string if the user chooses the Cancel button or presses Esc.

gets()

Topic group | Related topics | Example

Returns a line of text from a file previously opened with *create*() or *open*().

Syntax

<oRef>.*gets*([<characters expN> [, <end-of-line expC>]])

<oRef>

A reference to the File object that created or opened the file.

<characters expN>

The number of characters to read and return before a carriage return is reached.

<end-of-line expC>

The end-of-line indicator, which can be a string of one or two characters. If omitted, the default is a hard carriage return and line feed. The following table lists standard codes used as end-of-line indicators.

Character code (decimal)	(hexadecimal)	Represents
CHR(141)	0x8D	Soft carriage return (U.S.)
CHR(255)	0xFF	Soft carriage return (Europe)
CHR(138)	0x8A	Soft linefeed (U.S.)
CHR(0)	0x00	Soft linefeed (Europe)
CHR(13)	0x0D	Hard carriage return
CHR(10)	0x0A	Hard linefeed

Use the CHR() function to create the <end-of-line expC> if needed. To designate the <end-of-line expC>, you must also specify the <characters expN>. If you don't want a line length limit, use an arbitrarily high number. For example:

```
cLine = f.gets( 10000, chr( 0x8d ) )  // Soft carriage return (U.S.)
```

Property of

File

Description

Use *gets*() to read lines from a text file. *gets*() reads and returns a character string from the file opened by the File object, starting at the file pointer position, and reading past but not returning the first end-of-line character(s) it encounters.

gets() will read characters until it encounters the end-of-line character(s) or it reads the number of characters you specify with <characters expN>, whichever comes first. If a file does not have end-of-line character(s) and you do not specify <characters expN>, *gets*() will read and return everything from the current file pointer position to the end of the file.

If the file pointer position is at an end-of-line character(s), *gets*() returns an empty string (""); the line is empty.

If *gets*() encounters an end-of-line character(s), it positions the file pointer at the character after the end-of-line character(s); that is, at the beginning of the next line. Otherwise, *gets*() positions the file pointer at the character after the last character it returns. Use *seek*() to move the file pointer before or after using *gets*().

If the file being read is not a text file, use *read*() instead. *read*() requires <characters expN> to be specified, and does not treat end-of-line characters specially.

To write a text file, use *puts*(). *readln*() is identical to *gets*().

gets() example

The following statements display the contents of a text file in an Text component, replacing the line breaks in the text file with the HTML
 tag. The name of the file is typed into a Entryfield component named entryfield1, and the Text component is named text1.

```
f = new File()                                  // Create File object
if f.exists( form.entryfield1.value )           // Make sure file exists
  f.open( form.entryfield1.value )
  form.text1.text = ""                          // Clear HTML component
  do while not f.eof()
    form.text1.text += f.gets() + "<BR>"        // Write lines to HTML component
  enddo
  f.close()                                     // Close file
else
  form.text1.text = form.entryfield1.value + " not found"
endif
```

handle

Topic group Related topics

The operating system file handle for a file previously opened with *create*() or *open*().

Property of

File

Description

When a file is opened by the operating system, it is assigned a file handle, an arbitrary number that identifies that open file. Applications then use that file handle to refer to that file.

A File object's *handle* property reflects the file handle used by *Visual* dBASE to access a file opened with *create*() or *open*(). It is a read-only property and is generally informational only. By calling methods of the File object, *Visual* dBASE internally uses the file handle to perform its operations.

HOME()

Topic group Related topics

Returns the directory where the VDB.EXE in use is located.

Syntax

HOME()

Description

There are two “home” directories:

- The directory where *Visual* dBASE is installed, by default:

```
C:\Program Files\Borland\Visual dBASE\
```

- The directory where the actual executable file, VDB.EXE is installed. This is in the \Bin subdirectory of the installation diretory, so by default, it’s:

```
C:\Program Files\Borland\Visual dBASE\Bin\
```

HOME() identifies the directory in which the currently running copy of VDB.EXE is located. HOME() returns the full path name whether SET FULLPATH is ON or OFF, and always includes the trailing backslash, as shown.

To identify the *Visual* dBASE installation home directory, use _dbwinhome.

LIST FILES

Topic group Related topics

Displays information about files on disk in the results pane of the Command window.

Syntax

LIST FILES
[[LIKE] <drive/path/filename skeleton>]
[TO FILE <filename> | ? | <filename skeleton>]
[TO PRINTER]

TO FILE <filename> | ? | <*filename skeleton*>

Directs output to a text file as well as to the results pane of the Command window. By default, *Visual* dBASE assigns a .TXT extension. The ? and <*filename skeleton*> options display a dialog box in which you specify the name of the target file and the directory to save it in.

TO PRINTER

Directs output to the printer as well as to the results pane of the Command window.

Description

LIST FILES is the same as DISPLAY FILES, except that LIST FILES doesn't pause for each screenful of information but rather lists the information continuously. This makes LIST FILES more appropriate when directing output to a file or printer.

MD

Topic group Related topics

Creates a new directory.

Syntax

MD <directory>

Description

MD is identical to MKDIR. See MKDIR for details.

MKDIR

Topic group Related topics

Creates a new directory.

Syntax

MKDIR <directory>

<directory>

The directory you want to create.

Description

Use MKDIR to create a new directory. The MD command is identical to MKDIR.

The new directory name must follow the standard naming conventions for the operating system.

If you try to make a directory that already exists or is on a path that does not exist, an error occurs.

After you create the new directory, you can use CD or SET DIRECTORY to make the new directory the current directory.

open()

Topic group | Related topics | Example

Opens a specified file.

Syntax

<oRef>.*open*(<filename expC>[, <access expC>])

<oRef>

A reference to a File object.

<filename expC>

The name of the file to open. Wildcard characters are not allowed; you must specify the actual file name.

If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the search path(s) you specified with SET PATH, if any. If you specify a file without including its extension, *Visual* dBASE assumes no extension. If the named file cannot be found, an exception occurs.

<access expC>

The access level of the file being opened, as shown in the following table. The access level string is not case-sensitive. If omitted, the default is read-only. Append is a more restrictive version of write; the data is always added to the end of the file

<access expC>	Access level
“R”	Read-only
“W”	Write-only
“A”	Append-only
“RW” or “WR”	Read and write
“RA” or “AR”	Read and append

Property of

File

Description

Use *open*() to open a file with a name you specify and assign the file the level of access you specify. If *Visual* dBASE can’t open the file (for example, if the file is already open), an exception occurs.

To use other File methods, such as *read*() and *write*(), first open a file with *open*() or *create*().

If you open the file with append-only or read and append access, the file pointer is positioned at the end-of-file, after the last character. For other access levels, the file pointer is positioned at the first character in the file. Use *seek*() to position the file pointer before reading from or writing to a file.

open() example

The following example writes the current date and time to a text file, which you might do for a simple access log. The file is archived and deleted at the end of the week, so you need to test for its existence to determine whether it should be created or opened. The name of the file, which is used in three different places, is set in a manifest constant created by the #define preprocessor directive for ease of maintenance.

```
#define LOG_FILE "ACCESS.TXT"
f = new File()
if f.exists( LOG_FILE )
  f.open( LOG_FILE, "A" )
else
  f.create( LOG_FILE, "A" )
endif
f.puts( new Date().toLocaleString() )
f.close()
```

OS()

Topic group Related topics

Returns the name and version number of the current operating system.

Syntax

OS()

Description

Use OS() to determine the version of Windows in which *Visual* dBASE is running. To determine which version of *Visual* dBASE is running, use VERSION(). OS() returns a character string like:

```
Windows NT version 4.00
```

with the name of the operating system, the word “version” and the version number.

path

Topic group Related topics

The full path and file name for a file previously opened with *create*() or *open*().

Property of

File

Description

When you open a file with *create*() or *open*(), the path is optional. If you use *create*() without a path, the file is created in the current directory. If you use *open*() without a path, *Visual* dBASE looks for the file in the current directory, then in the search path(s) you specified with SET PATH, if any.

A File object's *path* property reflects the full path and file name for the open file. It is a read-only property.

position

Topic group Related topics

The position of the file pointer in a file previously opened with *create*() or *open*().

Property of

File

Description

A File object's *position* property reflects the current position of the file pointer.
It is a read-only property. To move the file pointer, use *seek*(). Reading and writing to a file also moves the file pointer.

The position is zero-based. The first character in the file is at position zero.

PUTFILE()

Topic group Related topics

Displays a dialog box within which the user can choose an exisiting file to overwrite or a new file name, and returns the file name.

Syntax

PUTFILE([<title expC>
[, <filename expC>
[, <extension expC>
[, <suppress database expL>]]]])

<title expC >

A title that is displayed at the top of the dialog box.

<filename expC >

The default file name that is displayed in the dialog box's entryfield. Without <filename expC >, PUTFILE() displays an empty entryfield.

<extension expC >

A default extension for the file name that PUTFILE() returns.

<suppress database expL>

Whether to suppress the combobox from which you can choose a database. The default is *true*; the Database combobox is not displayed. If you want to specify a value for <suppress database expL>, you must also specify a value or empty string ("") for <filename skeleton>, <title expC>, and <extension expC>.

Description

Use PUTFILE() to present the user with a dialog box from which they can choose an existing file or table or specify a new file or table name. If they choose an existing file, the user then gets the standard “Replace existing file?” dialog box. If they choose no, their choice is ignored and they are left in the PUTFILE() dialog box. PUTFILE() does not actually create or write anything to the specified file.

The PUTFILE() dialog box includes names of files whether they are currently open or closed. *Visual* dBASE returns the full path name of the file whether SET FULLPATH is ON or OFF.

By default, the dialog box opened with PUTFILE() displays file names from the current directory the first time you issue PUTFILE(). After the first time you use PUTFILE() and exit successfully, the subdirectory you choose becomes the default the next time you use PUTFILE().

If <suppress database expL> is *false*, you can also choose from a list of databases. When a database is selected, the dialog box displays a list of tables in that database instead of files in the current directory.

The dialog box is a standard Windows dialog box. The user can perform many Windows Explorer-like activities in this dialog box, including renaming files, deleting files, and creating new folders. They can also right-click on a file to get its context menu. These features are disabled when the dialog is displaying tables in a database instead of files in a directory.

PUTFILE() returns an empty string if the user chooses the Cancel button or presses Esc.

puts()

Topic group Related topics

Writes a character string and one or two end-of-line characters to a file previously opened with *create*() or *open*(). Returns the number of characters written.

Syntax

<oRef>.*puts*(<string expC> [, <characters expN> [, <end-of-line expC>]])

<oRef>

A reference to the File object that created or opened the file.

<string expC>

The character expression to write to the specified file. If you want to write only a portion of <string expC> to the file, use the <characters expN> argument.

<characters expN>

The number of characters of the specified character expression <string expC> to write to the specified file, starting at the first character in <string expC>. If omitted, the entire string is written.

<end-of-line expC>

The end-of-line indicator, which can be a string of one or two characters. If omitted, the default is a hard carriage return and line feed. The following table lists standard codes used as end-of-line indicators.

Character code (decimal)	(hexadecimal)	Represents
CHR(141)	0x8D	Soft carriage return (U.S.)
CHR(255)	0xFF	Soft carriage return (Europe)
CHR(138)	0x8A	Soft linefeed (U.S.)
CHR(0)	0x00	Soft linefeed (Europe)
CHR(13)	0x0D	Hard carriage return
CHR(10)	0x0A	Hard linefeed

Use the CHR() function to create the <end-of-line expC> if needed. To designate the <end-of-line expC>, you must also specify the <characters expN>. If you don't want a line length limit, use an arbitrarily high number. For example:

```
f.puts( cLine, 10000, chr( 0x8d ) )  // Soft carriage return (U.S.)
```

Property of

File

Description

Use *puts*() to write text files. *puts*() writes a character string and one or two end-of-line characters to a file. If the file was opened in append-only or read and append mode, the string is always added to the end of the file. Otherwise, the string is written starting at the current file pointer position, overwriting any existing characters. You must have either write or append access to use *puts*().

puts() returns the number of bytes written to the file, including the end-of-line character(s). If *puts*() returns 0, no characters were written. Either <string expC> is an empty string, or the write was unsuccessful.

Use *error*() to determine if an error occurred.

When *puts*() finishes executing, the file pointer is located at the character immediately after the last character written, which is the end-of-line character. Successive *puts*() calls writes one line after another. Use *seek*() to move the file pointer before or after you use *puts*().

To write to a file that is not a text file, use *write*(). *write*() does not add the end-of-line character(s). To read from a text file, use *gets*(). *writeln*() is identical to *puts*().

puts() example

The following example writes the current date and time to a text file, which you might do for a simple access log. The file is archived and deleted at the end of week, so you need to test for its existence to determine whether it should be created or opened. The name of the file, which is used in three different places, is set in a manifest constant created by the #define preprocessor directive for ease of maintenance.

```
#define LOG_FILE "ACCESS.TXT"
f = new File()
if f.exists( LOG_FILE )
  f.open( LOG_FILE, "A" )
else
  f.create( LOG_FILE, "A" )
endif
f.puts( new Date().toLocaleString() )
f.close()
```

read()

Topic group Related topics Example

Returns a specified number of characters from a file previously opened with *create*() or *open*().

Syntax

<oRef>.*read*(<characters expN>)

<oRef>

A reference to the File object that created or opened the file.

<characters expN>

The number of characters to return from the specified file.

Property of

File

Description

read() returns the number of characters you specify from the file opened by the File object. *read*() starts reading characters from the current file pointer position, leaving the file pointer at the character immediately after the last character read. Use *seek*() to move the file pointer before or after you use *read*().

If the file to be read is a text file, use *gets*() instead. *gets*() looks for end-of-line characters, and returns the contents of the line, without the end-of-line character(s).

To write to a file, use *write*().

read() example

Suppose you have a data file generated by a mainframe computer that has fixed-length records with no record breaks. You want to convert this file so that you have one record on each line. Use two File objects to read and write the file, adding line breaks as you write:

```
#define REC_LENGTH 80
#define IN_FILE    "STUFF.REC"
#define OUT_FILE   "STUFF.TXT"
fIn  = new File()
fOut = new File()
fIn.open( IN_FILE );
fOut.create( OUT_FILE );
do while not fIn.eof()
  fOut.puts( fIn.read( REC_LENGTH ))  // Read fixed length; write with line
break
enddo
fIn.close()
fOut.close()
```

readln()

Topic group Related topics

Returns a line of text from a file previously opened with *create*() or *open*().

Syntax

<oRef>.*readln*([<characters expN> [, <end-of-line expC>]])

Property of

File

Description

readln() is identical to *gets*(). See *gets*() for details.

RENAME

Topic group Related topics Example

Renames a file on disk.

Syntax

RENAME <filename> TO <new name>

Description

RENAME is identical to the File object's *rename*() method, except that as a command, the file name arguments are treated as names, not a character expressions. They do not require quotes unless they contain spaces or other special characters. If the name is in a variable, you must use the indirection or macro operators.

See *rename*() for details on the operation of the command.

RENAME example

Compare this example with the equivalent example for *rename*():

```
rename AFILE to SOMETHING
```

rename()

Topic group Related topics Example

Renames a file on disk.

Syntax

<oRef>.*rename*(<filename expC>, <new name expC>)

<oRef>

A reference to a File object.

<filename expC>

Identifies the file to rename (also known as the source file). <filename expC> may be a file name skeleton with wildcard characters. In that case, *Visual* dBASE displays a dialog box in which you select the file to rename.

If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the search path(s) you specified with SET PATH, if any. If you specify a file without including its extension, *Visual* dBASE assumes no extension. If the named file cannot be found, an exception occurs.

<new name expC>

Identifies the new name for the source file (also known as the target file). <new name expC> may be a file name skeleton with wildcard characters. In that case, *Visual* dBASE displays a dialog box in which you specify the name of the target file and its directory.

Property of

File

Description

rename() lets you change the name of a file at the operating system level.

If SET SAFETY is ON and a file exists with the same name as the target file, *Visual* dBASE displays a dialog box asking if you want to overwrite the existing file. If SET SAFETY is OFF and a file exists with the same name as the target file, an exception occurs, and the target file is not overwritten.

If you specify a different drive or directory for the target file, *Visual* dBASE moves the source file to that location.

rename() does not automatically rename the auxiliary files associated with table files, such as indexes and memo files. For example, it does not rename the MDX or DBT files associated with a DBF file. When renaming tables, use the Database object's *renameTable*() method.

rename() example

The following example changes the name of a file in the current directory to something else:

```
new File().rename( "AFILE", "SOMETHING" )
```

RUN

Topic group Related topics Example

Executes a program or operating system command from within *Visual* dBASE.

Syntax

RUN <command>

<command>

A command recognized by your operating system.

Description

Use RUN to execute a single operating system command or program from within *Visual* dBASE. Enter commands and file names exactly as you would when working in the command prompt; do not enclose them in quotes. ! is equivalent to RUN.

RUN opens a command prompt in the current directory and executes <command>. The command prompt automatically closes when the program or command is finished. Commands and programs launched by RUN execute as a separate task, as if you had started that task from the Start menu. *Visual* dBASE continues to run on its own.

To open a command prompt so you can enter multiple commands yourself, use the DOS command. To execute a Windows application, use RUN() instead; it does not open a command prompt window.

RUN example

In the following example, clicking a button on a form runs a command line compression utility through a batch file:

```
function backupButton_onClick
  run ZIPEM.BAT
```

RUN()

Topic group Related topics

Executes a program or operating system command from within *Visual* dBASE, returning the instance handle of the program.

Syntax

RUN([<direct expL>,] <command expC>)

<direct expL>

Determines whether RUN() runs a Windows program directly (*true*) or through a command prompt (*false*). If <command expC> is not a Windows program, <direct expL> must be *false*, or RUN() has no effect. If you omit <direct expL>, *Visual* dBASE assumes a value of *false*.

<command expC>

A Windows program name or a command recognized by your operating system.

Description

Use RUN() to execute another Windows program or an operating system command from within *Visual* dBASE.

To run another Windows program, <direct expL> should be *true*; otherwise, a seperate command prompt is opened first, and you cannot get the returned instance handle.

seek()

Topic group | Related topics | Example

Moves the file pointer in a file previously opened with *create*() or *open*(), and returns the new position of the file pointer.

Syntax

<oRef>.*seek*(<offset expN> [, <position expN>])

<oRef>

A reference to the File object that created or opened the file.

<offset expN>

The number of bytes to move the file pointer in the specified file. If <offset expN> is negative, the file pointer moves toward the beginning of the file. If <offset expN> is 0, the file pointer moves to the position you specify with <position expN>. If <offset expN> is positive, the file pointer moves toward the end of the file or beyond the end of the file.

<position expN>

The number 0, 1, or 2, indicating a position relative to the beginning of the file (0), to the file pointer's current position (1), or to the end of the file (2). The default is 0.

Property of

File

Description

seek() moves the file pointer in the file you specify relative to the position specified by <position_expN>, and returns the resulting position of the file pointer as an offset from the beginning of the file. The File object's *position* property is also updated with this new position. If an error occurs, seek() returns -1.

The movement of the file pointer is relative to the beginning of the file unless you specify otherwise with <position expN>. For example, *seek*(5) moves the file pointer five characters from the beginning of the file (the 6th character) while *seek*(5,1) moves it five characters forward from its current position. You can move the file pointer beyond the end of the file, but you can't move it before the beginning of the file.

To move the file pointer to the beginning of a file, use *seek*(0). To move it to the end of a file, use *seek*(0, 2). To move to the last character in a file, use *seek*(-1,2).

gets(), *puts*(), *read*(), and *write*() also move the file pointer as they read from or write to the file.

seek() example

Suppose you're exporting data from a table in a special format for another program. The export file must have the number of rows of data written in the file, starting at the 9th character. You extend the File class, adding methods to create the export file, write the data in the special format, and record the number of rows written. The following is the method that records the number of rows.

```
function recordRowsWritten()
  this.seek( 8 )                          // 9th character == offset 8
  this.write( "" + this.rowsExported )  // Convert number to string to write
```

SET DIRECTORY

Topic group Related topics

Changes the current drive or directory.

Syntax

SET DIRECTORY TO [<path>]

<path>

The new drive and/or path. Quotes (single or double) are required if the path contains spaces or other special characters; optional otherwise.

Description

SET DIRECTORY works like CD, except SET DIRECTORY TO (with no argument) returns you to the HOME() directory, while CD with no argument displays the current directory.

To get the current directory, use SET("DIRECTORY").

SET FULLPATH

Topic group Related topics

Specifies whether functions that return file names return the full path with the file name.

Syntax

SET FULLPATH on | OFF

Description

Use SET FULLPATH ON when you need to have functions or methods such as *shortName*(), return a file name with its full path. When SET FULLPATH is OFF, these functions include the drive letter (and colon) with the file name only.

Some functions, such as GETFILE(), always return the full path, regardless of SET FULLPATH.

SET PATH

Topic group Related topics

Specifies the directory search route that *Visual* dBASE follows to find files that are not in the current directory.

Syntax

SET PATH TO [<path list>]

<path list>

A list of (optional) drives and directories indicating the search path—one or more drives and directories you want *Visual* dBASE to search for files. Separate each directory path name with commas, semicolons, or spaces. If the path name contains spaces or other special characters, the path name should be enclosed in quotes.

Description

Use SET PATH to establish a search path to access files located on directories other than the current directory. When no SET PATH setting exists and you don't provide the full path name when you specify a file name, dBASE searches for that file only in the current directory.

The order in which you list drives and directories with SET PATH TO <path list> is the order *Visual* dBASE searches for a file in that search path. Use SET PATH when an application's files are in several directories.

SET PATH TO without the option <path list> resets the search path to the default value (no path).

shortName()

Topic group Related topics

Returns the short (8.3) name of a file.

Syntax

<oRef>.*shortName*(<filename expC>)

<oRef>

A reference to a File object.

<*filename expC*>

The name of the file to check. Wildcard characters are not allowed; you must specify the actual file name.

If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the search path(s) you specified with SET PATH, if any. If you specify a file without including its extension, *Visual* dBASE assumes no extension. If the named file cannot be found, an exception occurs.

Property of

File

Description

shortName() checks the file specified by <filename expC> and returns a name for the file following the DOS file-naming convention (eight-character file name, three-character extension). If SET FULLPATH is ON, the path is also returned.

size()

Topic group | Related topics | Example

Returns the size of a file in bytes.

Syntax

<oRef>.*size*(<filename expC>)

<oRef>

A reference to a File object.

<filename expC>

The name of the file to check. Wildcard characters are not allowed; you must specify the actual file name.

If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the search path(s) you specified with SET PATH, if any. If you specify a file without including its extension, *Visual* dBASE assumes no extension. If the named file cannot be found, an exception occurs.

Property of

File

Description

Use *size*() to determine the size of a file on disk.

With the byte-level access methods of the File object, *Visual* dBASE doesn't update the size on the file recorded on the disk until you *close*() the file.

size() example

The following example uses *size*() to display the size of the Help file:

```
? new File().size( "C:/Program Files/Borland/Visual dBASE/Help/VDB.HLP" )
```

time()

Topic group Related topics Example

Returns the time stamp for a file, the time the file was last modified.

Syntax

<oRef>.*time*(<filename expC>)

<oRef>

A reference to a File object.

<filename expC>

The name of the file to check. Wildcard characters are not allowed; you must specify the actual file name.

If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the search path(s) you specified with SET PATH, if any. If you specify a file without including its extension, *Visual* dBASE assumes no extension. If the named file cannot be found, an exception occurs.

Property of

File

Description

Use *time*() to determine the time of day when the last change was made to a file on disk. *time*() returns the time as a character string.

When you update a file, *Visual* dBASE changes the file's time stamp to the current operating system time when the file is written to disk. For example, when the user edits a DB table, *Visual* dBASE changes the time stamp on the table file when the file is closed. *time*() reads the time stamp and returns its current value.

To get the time the file was created, use *createTime*(). For the date the file was last modified, use *date*().

time() example

The following example uses *time*() to display the time *Visual* dBASE's INI file was last modified:

```
? new File().time( "C:/Program Files/Borland/Visual dBASE/Bin/VDB.INI" )
```

TYPE

Topic group Related topics

Display the contents of a text file.

Syntax

TYPE <filename 1> | ? | <filename skeleton 1>
[MORE]
[NUMBER]
[TO FILE <filename 2> | ? | <filename skeleton 2>] | [TO PRINTER]

<filename> | ? | <filename skeleton>

The file whose contents to display. TYPE ? and TYPE <filename skeleton> display a dialog box from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the path you specify with SET PATH. You must specify a file-name extension.

MORE

Pauses output when it fills the Command window; otherwise, the output scrolls through the Command window to the end of the file.

NUMBER

Precedes each line of output with its line number.

TO FILE <filename 2> | ? | <filename skeleton>

Directs output to the text file <filename 2>, as well as to the results pane of the Command window. By default, *Visual* dBASE assigns a .TXT extension to <filename 2> and saves the file in the current directory. The ? and <filename skeleton> options display a dialog box in which you specify the name of the target file and the directory to save it in.

TO PRINTER

Directs output to the printer, as well as to the results pane of the Command window.

Description

Use TYPE to display the contents of text files. All program files in *Visual* dBASE are text files that you can display with TYPE.

If you TYPE a file TO FILE or TO PRINTER, *Visual* dBASE adds two lines of output at the beginning of the saved or printed output if SET HEADINGS is ON. The first line is a blank line, and the second line contains the full path name and date stamp of the source file. If you specify NUMBER, these two lines are not numbered; numbering begins with 1 at the first actual line of the source file.

If you specify MORE and cancel output before completion, *** INTERRUPTED *** appears in the results pane of the Command window, but does not appear in the incomplete saved or printed output.

If SET SAFETY is ON and a file exists with the same name as the target file, dBASE displays a dialog box asking if you want to overwrite the file. If SET SAFETY is OFF, any existing file with the same name is overwritten without warning.

VALIDDRIVE()

Topic group Related topics Example

Returns *true* if the specified drive exists and can be read. Returns *false* if the specified drive does not exist or cannot be read.

Syntax

VALIDDRIVE(<drive expC>)

<drive expC>

The drive to be tested, which can be either:

- A drive letter, optionally followed by a colon, or
- The UNC name for a drive

Description

Use VALIDDRIVE() to determine if a specified drive exists and is ready before using CD, SET DEFAULT, SET DIRECTORY or SET PATH. VALIDDRIVE() is also useful if your program copies files to or from a drive, or includes drive letters in any file names.

VALIDDRIVE() can verify any drive specified, including drives created by partitioning a hard disk and mapped network drives. Checking for a floppy disk or network drive takes a few seconds, so you should display a message before you check.

VALIDDRIVE() example

The following example checks if a disk is inserted in drive A:

```
if not validdrive( "a:" )
  // No disk (or no floppy drive installed)
endif
```

The following example use a UNC name to check if the user is connected to a particular network drive:

```
if validdrive( "\\finance\vol2" )
  // Not connected to Finance server, or has no access to Vol2 volume
endif
```

write()

Topic group Related topics Example

Writes a character string to a file previously opened with *create*() or *open*(). Returns the number of characters written.

Syntax

<oRef>.*write*(<expC> [, <characters expN>])

<oRef>

A reference to the File object that created or opened the file.

<expC>

The character expression to write to the specified file. If you want to write only a portion of <string expC> to the file, use the <characters expN> argument.

<characters expN>

The number of characters of the specified character expression <string expC> to write to the specified file, starting at the first character in <string expC>. If omitted, the entire string is written.

Property of

File

Description

write() writes a character string to a file. If the file was opened in append-only or read and append mode, the string is always added to the end of the file. Otherwise, the string is written starting at the current file pointer position, overwriting any existing characters. You must have either write or append access to use *write*().

write() returns the number of bytes written to the file. If *write*() returns 0, no characters were written. Either <expC> is an empty string, or the write was unsuccessful.

Use *error*() to determine if an error occurred.

When *write*() finishes executing, the file pointer is located at the character immediately after the last character written. Use *seek*() to move the file pointer before or after you use *write*().

To write to a text file, use *puts*(). *puts*() automatically adds the end-of-line character(s).

To read from a file, use *read*().

write() example

Suppose you're exporting data from a table in a special format for another program. The export file must have the number of rows of data written in the file, starting at the 9th character. You extend the File class, adding methods to create the export file, write the data in the special format, and record the number of rows written. The following is the method that records the number of rows.

```
function recordRowsWritten()
  this.seek( 8 )                          // 9th character == offset 8
  this.write( "" + this.rowsExported )  // Convert number to string to write
```

writeln()

Topic group Related topics

Writes a character string and one or two end-of-line characters to a file previously opened with *create*() or *open*(). Returns the number of characters written.

Syntax

<oRef>.*writeln*(<string expC> [, <characters expN> [, <end-of-line expC>]])

Property of

File

Description

writeln() is identical to *puts*(). See *puts*() for details.

_dbwinhome

Topic group Related topics Example

Contains the home directory of the currently running instance of *Visual* dBASE.

Description

There are two “home” directories:

- The directory where *Visual* dBASE is installed, by default:

```
C:\Program Files\Borland\Visual dBASE\
```

- The directory where the actual executable file, VDB.EXE is installed. This is in the \Bin subdirectory of the installation diretory, so by default, it’s:

```
C:\Program Files\Borland\Visual dBASE\Bin\
```

_dbwinhome contains the installation home directory, from which you can access all subdirectories. _dbwinhome contains the full path name whether SET FULLPATH is ON or OFF, and always includes the trailing backslash, as shown.

_dbwinhome is read-only.

To identify where the currently running instance of VDB.EXE is located, use HOME().

_dbwinhome example

The following statement changes the directory to *Visual* dBASE's \Custom subdirectory:

```
cd "&_dbwinhome.Custom"
```

The macro operator is used to expand the path name contained in _dbwinhome. The period acts as the macro terminator. The resulting command looks like:

```
cd "C:\PROGRAM FILES\BORLAND\VISUAL DBASE\Custom"
```

(The path name in _dbwinhome is all-uppercase.) The quotes are required because the path name contains spaces.

Xbase introduction

Topic group

Every Xbase command and function includes an OODML section that lists the object-oriented DML equivalent, if there is one.

The examples in this section of the Help file are mostly data processing and utility code. Data entry in *Visual* dBASE is done at another level, either using the form-based events that are melded into the Xbase worksets, or the new *Visual* dBASE 7 data objects, which replace most Xbase functionality and provide powerful new object-oriented capabilities.

The examples also do not use any new *Visual* dBASE 7 syntax, and thus are compatible with older versions of *Visual* dBASE.

Common command elements

Topic group

The following sections detail command elements that are common to many Xbase commands and functions.

- Filenames
- Aliases
- Command scope

Filenames

Topic group

Filenames are required for many Xbase commands. The filename may refer to a file on disk or a table in a database. A filename is indicated by <filename> in the syntax diagram and may be any one of the following forms:

- A filename, without the extension. When the filename refers to a table, *Visual* dBASE will assume the extension specified by the SET DBTYPE command (.DBF for dBASE and .DB for Paradox), which can be overridden in most commands with the command's TYPE clause. If the SET DATABASE command has been used to set a server database as the default, then the table name will be used as-is, without an extension. When the filename is not a table, there is always a default extension, which is listed in each command description.
- A filename, with the extension.
- A table in a database. Use the BDE Administrator to create database aliases. Specify the database alias in colons before the table name as follows:

  ```
  :databaseAlias:tableName
  ```

  If the database is not already open, *Visual* dBASE displays a dialog box in which you specify the parameters, such as a login name and password, necessary to establish a connection to that database.
- A filename skeleton. Use the ? and * as wildcard characters. A single ? is the same as *, meaning any filename. A dialog box is displayed from which you can choose a table, either a file on disk or a table from a database.

In all cases, the <filename> may be enclosed in string delimiters (single quotes, double quotes, or square brackets). Delimiters are required if <table name> contains spaces or other special characters. If the <filename> is contained in a variable and is not defined as an expression—functions expect filenames that are character expressions, commands do not—use the parentheses as indirection operators on the variable containing the <filename>.

If the <filename> refers to a file and does not contain a path and the file is not found in the current directory, then the path specified by SET PATH is also searched.

In many commands, the <filename> does not have to be specified in the statement. If it is omitted, *Visual* dBASE will display a dialog box from which you can choose a file to execute the command.

For commands that specifically create files and not tables, the database options are not allowed. If a dialog box is displayed, it will not include the controls to choose a database.

If you are about to overwrite a file, you will get a confirmation dialog box if SET SAFETY is ON. If SET SAFETY is OFF, the file will be overwritten without a warning.

Aliases

Topic group

While some commands work only in the current work area, others allow you to specify the work area in which they perform their function. Work areas are referenced by their alias, which may take one of the following forms:

- The work area number, from 1 to 225
- A character string that contains a single letter from A through J, which correspond to work area 1 through 10. This is supported for compatibility.
- A character string containing the name of the work area: the name of the table, or the alias assigned to the work area when the table was opened. See the USE command for information on assigning aliases.

When using a letter or work area name as the alias in a function, the alias must be a character expression, usually the string enclosed in string delimiters. In a command, the delimiters are optional and usually not used, unless the alias contains spaces or other special characters. In addition to the normal string delimiters (single quotes, double quotes, and square brackets), colons may be used to delimit aliases in commands.

The alias option is indicated by <alias> in the syntax tables. When you do not specify an alias, the command or function works on the current work area.

Command scope

Topic group

Many Xbase commands have a scope option (not to be confused with the scope resolution operator) that dictates which records to process. The scope honors the current index order, filter, and key constraints. Three clauses comprise a command's scope:

- <scope>
- FOR <for condition>
- WHILE <while condition>

There are four different options for <scope>:

ALL

All records, starting with the first.

REST

Starting with the current record, processes all subsequent records in the table

NEXT <expN>

Starting with the current record, processes the next <expN> records. NEXT 1 processes the current record only.

RECORD <bookmark>

The individual record referenced by the bookmark <bookmark>. You may also specify a record number for DBF tables.

Different commands have different default scopes. In conjunction with <scope>, many commands have one or both of the following conditional clauses:

FOR <for condition>

Specifies a condition that must evaluate to *true* for each record to be processed. If the <for condition> fails, that record is skipped and the next record is tested.

WHILE <while condition>

Specifies a condition that must evaluate to *true* for processing to continue. The test is performed before processing each record. If the <while condition> fails, processing stops.

If you specify a FOR clause, the default scope of the command becomes ALL. If you specify a WHILE clause, with or without a FOR clause, the default scope of the command becomes REST.

ALIAS()

Topic group Related topics Example

Returns the alias name of the current or a specified work area.

Syntax

ALIAS([<alias>])

<alias>

The work area you want to check. (If <alias> is a work area alias name, there is no reason to use this function because that alias name is what the function will return.)

Description

ALIAS() returns the alias name of any work area within the current workset, in all uppercase. If no table is opened in the specified work area, ALIAS() returns an empty string ("").

Routines that do work in other work areas usually save the current work area before switching, and then switch back when done. Use ALIAS() to get the name of the current work area, then switch back using the SELECT command.

OODML

There is no concept of the "current" Query object. You may refer to any Query object at any time through its object reference.

ALIAS() example

In this example, a function changes the index order of table of classes at a school:

```
PROCEDURE ClassesByRoom
  local cAlias
  cAlias = alias()
  select CLASSES
  set order to ROOM
  select ( cAlias )
```

This function saves the alias name of the currently selected table—which might be the table of teachers, students, or even the classes table—in the variable cAlias. When the function is done, that alias is reselected with the SELECT command, using the parentheses as indirection operators.

APPEND

Topic group | Related topics | Example

Adds a new record to a table.

Syntax

APPEND [BLANK]

BLANK

Adds a blank record to the end of the table and makes the blank record the current record.

Description

APPEND displays the currently selected table in an auto-generated data entry form and puts the form in Append mode. This has the same effect as using the EDIT command to display the data entry form and manually choosing Add Row from the menu or toolbar. This interactive APPEND is rarely used in applications because you have no control over the appearance of the data entry form.

The APPEND BLANK command adds a blank record to the current table and positions the record pointer on the new record, but it doesn't display a window to edit the data. This is often done in an older style of dBASE programming, and is typically followed by REPLACE statements to store values into the newly-created record.

When accessing SQL tables, some database servers do not allow you to enter blank records. Also, constraints on tables created with non-null fields, including DBF7 tables, prevent entering records with fields left blank. In these cases, APPEND BLANK will fail and cause an error.

OODML

Use the Rowset object's *beginAppend*() method. While APPEND BLANK creates a blank record first that you must delete if you decide to discard the new record, *beginAppend*() blanks the row buffer and creates a new row only if the row is modified and saved.

APPEND example

The following function is used when adding data to a table. It attempts to recycle records by looking for a blank deleted record. If one is not found the APPEND BLANK command is used to create a new record.

```
PROCEDURE NewRec
  set deleted off
  if seek( " " ) .and. deleted() .and. rlock()
    recall
  else
    append blank
  endif
  set deleted on
```

First, DELETED is turned OFF so that deleted records can be found. (The normal operation of the application has DELETED ON.) The SEEK() function looks for a record with a character key that starts with a blank space, which indicates a blank record; a valid index key cannot be blank. The table must be ordered on a character field when the function is called. If a blank record is found, the DELETED() function makes sure it's deleted, and an RLOCK() is attempted to prevent anyone else from grabbing the same record at the same time.

If all of these things are successful, the record is RECALLed and made available for use. Otherwise, a new blank record is created with APPEND BLANK. Either way, DELETED is turned back ON and the function is completed, leaving the record pointer at the new or recycled record.

To see the function that deletes records for recycling, see the example for BLANK.

APPEND AUTOMEM

Topic group Related topics Example

Adds a new record to a table using the values stored in automem variables.

Syntax

APPEND AUTOMEM

Description

APPEND AUTOMEM adds a new record to the currently selected table and then replaces the value of fields in the table with the contents of corresponding automem variables. Automem variables are variables that have the same names and data types as the fields in the current table. Automem variables must be private or public; they cannot be local or static. If a field does not have a matching variable, that field is left blank.

APPEND AUTOMEM is used as part of data entry in an older style of dBASE programming. In *Visual* dBASE, controls in data entry forms are *dataLink*ed to fields; there is no need for a set of corresponding variables. APPEND AUTOMEM is also used for programatically adding records to table. It is more convenient than using APPEND BLANK and REPLACE.

To use APPEND AUTOMEM to add records to a table, first create a set of automem variables. The USE...AUTOMEM command opens a table and creates the corresponding empty automem variables for that table. CLEAR AUTOMEM creates a set of empty automem variables for the current table or reinitializes existing automem variables to empty values. STORE AUTOMEM copies the values in the current record to automem variables. You may also create the individual variables manually.

When referring to the value of automem variables you need to prefix the name of an automem variable with M-> to distinguish the variable from the corresponding fields, which have the same name. The M-> prefix is not needed during variable assignment; the STORE command and the = and := operators do not work on Xbase fields.

OODML

The Rowset object's contains an array of Field objects, accessed through its *fields* property. These Field objects have *value* properties that may be programmed like variables.

APPEND AUTOMEM example

The following function is used to record access to an application as part of its startup process:

```
PROCEDURE LogRec
  private user, date, time
  use LOGREC in select()
  select LOGREC
  user = user()
  date = date()
  time = time()
  append automem
  use
```

The variables that will be used as automem variables are first declared private, to hide any variables of the same name that might exist. Then the table is opened in an unused work area and selected. The automem variables are created manually, using built-in functions. Finally, the values are appended to the table, and the table is closed.

APPEND FROM

Topic group Related topics

Copies records from an existing table to the end of the current table.

Syntax

APPEND FROM <filename>
[FOR <condition>]
[[TYPE] DBASE | PARADOX | SDF |
  DELIMITED [WITH
    <char> | BLANK]]
[REINDEX]

<filename>

The name of the file whose records you want to append to the current table.

FOR <condition>

Restricts APPEND FROM to records in <filename> that meet <condition>. You can specify a FOR <condition> only for fields that exist in the current table. *Visual* dBASE pretends that the record is appended, then evalulates the <condition>. If it fails, the records is not actually appended.

[TYPE] DBASE | PARADOX | SDF |
DELIMITED [WITH <char> | BLANK]

Specifies the default file extension, and for text files, the text file format. For example, if you specify a .DBF file as the <filename> and TYPE PARADOX, the TYPE is ignored because the file is really a dBASE file. The TYPE keyword is included for readability only; it has no effect on the operation of the command. The following table provides a description of the different file formats that are supported:

Type	**Description**
DBASE	A dBASE table. If you don't include an extension for <filename>, *Visual* dBASE assumes a .DBF extension.
PARADOX	A Paradox table. If you don't include an extension for <filename>, *Visual* dBASE assumes a .DB extension.
SDF	A System Data Format text file. Records in an SDF file are fixed-length, and the end of a record is marked with a carriage return and a linefeed. If you don't specify an extension, *Visual* dBASE assumes .TXT.
DELIMITED	A text file with fields separated by commas. These files are also referred to as CSV (Comma Separated Value) files. Character fields may be delimited with double quotation marks; the quotes are required if the field itself contains a comma. Each carriage return and linefeed indicates a new record. If you don't specify an extension, *Visual* dBASE assumes .TXT.
DELIMITED WITH <char>	Indicates that character data is delimited with the character <char> instead of with double quotes. For example, if delimited with a single quote instead of a double quote, the clause would be: DELIMITED WITH '
DELIMITED WITH BLANK	Indicates that data is separated with spaces instead of commas, with no delimiters.

REINDEX

Rebuilds all open index files after APPEND FROM finishes executing. Without REINDEX, *Visual* dBASE updates all open indexes after appending each record from <filename>. When the current table has multiple open indexes or contains many records, APPEND FROM executes faster with the REINDEX option.

Description

Use the APPEND FROM command to add data from another file or table to the end of the current table. You can append data from dBASE tables or files in other formats. Data is appended to the current table

in the order in which it is stored in the file you specify.

When you specify a table as the source of data, fields are copied by name. If a field in the current table does not have a matching field in the source table, those fields will be blank in the appended records. If the field types do not match, type conversion is attempted. For example, if a field named ID in the current table is character field, but the ID field in the source table is numeric, the number will be converted into a string when it is appended.

When appending text files, SDF or DELIMITED, there is no data type in the source file; everything is a string. For non-character fields, the strings should be in the following format to match the data type in the table:

- For logical or boolean fields, the letters T, t, Y, and Y indicate *true*. All other letters and blanks are considered *false*.
- Dates must be in the format YYYYMMDD.

If the field of the current table is shorter than the matching field of the source table, *Visual* dBASE truncates the data.

If SET DELETED is OFF, dBASE adds records from a source dBASE table that are marked for deletion and doesn't mark them for deletion in the current table. If SET DELETED is ON, dBASE doesn't add records from a source dBASE table that are marked for deletion.

When importing data from other files, remove column headings and leading blank rows and columns; otherwise, this data is also appended.

OODML

Use the UpdateSet object's *append*() or *appendUpdate*() method to append data from other tables.

APPEND FROM ARRAY

Topic group Related topics

Adds to the current table one or more records containing data stored in a specified array.

Syntax

APPEND FROM ARRAY <array>
[FIELDS <field list>]
[FOR <condition>]
[REINDEX]

<array>

A reference to the array containing the data to store in the current table as records.

FIELDS <field list>

Appends <array> data only to the fields in <field list>. Without FIELDS <field list>, APPEND FROM ARRAY appends to all the fields in the table, starting with the first field.

FOR <condition>

Restricts APPEND FROM ARRAY to array rows in <array> that meet <condition>. The FOR <condition> should reference the fields in the current table. *Visual* dBASE pretends that the record is appended, then evalulates the <condition>. If it fails, the records is not actually appended.

REINDEX

Rebuilds open indexes after all records have been changed. Without REINDEX, *Visual* dBASE updates all open indexes after appending each record from <array>. When the current table has multiple open indexes or contains many records, APPEND FROM ARRAY executes faster with the REINDEX option.

Description

APPEND FROM ARRAY treats one- and two-dimensional arrays as tables, with columns corresponding to fields and rows corresponding to records. A one-dimensional array works as a table with only one row; therefore, you can append only one record from a one-dimensional array. A two-dimensional array works as a table with multiple rows; therefore, you can append as many records from a two-dimensional array as it has rows.

When you append data from an array to the current table, *Visual* dBASE appends each array row as a single record. If the table has more fields than the array has columns, the excess fields are left empty. If the array has more columns than the table has fields, the excess columns are ignored. The data in the first column is added to the first field's contents, the data in the second column to the second field's contents, and so on.

The data types of the array must match those of corresponding fields in the table you are appending. If the data type of an array element and a corresponding field don't match, *Visual* dBASE returns an error.

If the current table has a memo field, *Visual* dBASE ignores this field. For example, if the second field is a memo field, *Visual* dBASE adds the data in the array's first column to the first field's contents, and the data in the array's second column to the third field's contents.

Use APPEND FROM ARRAY as an alternative to automem variables when you need to transfer data between tables where the structures are similar but the field names are different.

OODML

Use two nested loops to first call the Rowset object's *beginAppend*() method to create the new rows, and then to copy the elements of the array into the *value* properties of the Field objects in the rowset's *fields* array.

APPEND MEMO

Topic group Related topics Example

Appends a text file to a memo field.

Syntax

APPEND MEMO <memo field> FROM <filename>
[OVERWRITE]

<memo field>

The memo field to append to.

FROM <filename>

The text file to append. The default extension is .TXT.

OVERWRITE

Erases the contents of the current record memo field before copying the contents of <filename>.

Description

Use the APPEND MEMO command to insert the contents of a text file into a memo field. You may use an alias name and the alias operator (that is, alias->memofield) to specify a memo field in the current record of any open table.

APPEND MEMO is identical to REPLACE MEMO, except that APPEND MEMO defaults to appending the file to the current contents of the memo field and has the option of overwriting, while REPLACE MEMO is the opposite.

While memo fields may contain types of information other than text, binary fields are recommended for storing images, sound, and other user-defined binary type information. Use OLE fields for linking to OLE documents from other Windows applications.

OODML

Use the Field object's *replaceFromFile*() method.

APPEND MEMO example

The following event handler displays a dialog to pick a text file, then adds the contents of that file to a memo field. The date and time are written to the memo field before the added file.

```
PROCEDURE addTextButton_onClick
  local cFile, cCRLF
  cCRLF = chr( 13 ) + chr( 10 )
  cFile = getfile( "*.txt", "Text file to import" )
  if "" # cFile
    replace MEMO_FIELD with cCRLF + dtoc( date()) + " " + time() + cCRLF
additive
    append memo MEMO_FIELD from ( cFile )
  endif
```

The date and time, with a line break before and after, is written to the memo field using the REPLACE command with the ADDITIVE option for memo fields.

GETFILE() will return an empty string if no file is selected. In the IF statement, the order of the empty string and the variable cFile is important. If they were the other way around and SET EXACT is OFF, then the IF statement would always be *false*.

The parentheses are used as indirection operators to get the name of the file from the variable. Without them, *Visual* dBASE would attempt to append a file named cFile.

AVERAGE

Topic group Related topics Example

Computes the arithmetic mean (average) of specified numeric fields in the current table.

Syntax

AVERAGE [<exp list>]
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]
[TO <memvar list> | TO ARRAY <array>]

<exp list>

The numeric fields, or expressions involving numeric fields, to average.

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is ALL.

TO <memvar list> | TO ARRAY <array>

Initializes and stores averages to the variables (or properties) of <memvar list> or stores averages to the existing array <array>. If you specify an array, each field average is stored to elements in the order in which you specify the fields in <exp list>. If you don't specify <exp list>, each field average is stored in field order. <array> can be a single- or multidimensional array; the array elements are accessed via their element numbers, not their subscripts.

Description

The AVERAGE command computes the arithmetic means (averages) of numeric expressions and stores the results in specified variables or array elements. If you store the values in variables, the number of variables must be exactly the same as the number of fields or expressions averaged. If you store the values in an array, the array must already exist, and the array must contain at least as many elements as the number of averaged expressions.

If SET TALK is ON, AVERAGE also displays its results in the results pane of the Command window. The SET DECIMALS setting determines the number of decimal places that AVERAGE displays. Numeric fields in blank records are evaluated as zero. To exclude blank records, use the ISBLANK() function in defining a FOR condition. EMPTY() excludes records in which a specified expression is either 0 or blank.

OODML

Loop through the rowset to calculate the average.

AVERAGE example

The following example uses AVERAGE to calculate the average year to date sales for all companies in the Company table and displays it in Text control on a form:

```
select COMPANY
average YTD_SALES to form.ytdSalesText.text
```

BEGINTRANS()

Topic group Related topics

Begins transaction logging.

Syntax

BEGINTRANS([<database name expC> [,<isolation level expN>]])

<database name expC>

The BDE alias of the SQL database in which to begin the transaction.

- If <database name expC> is omitted but a SET DATABASE statement has been issued, BEGINTRANS() refers to the database in the SET DATABASE statement.
- If <database name expC> is omitted and no SET DATABASE statement has been issued, the default database, which supports DBF and DB tables is used.

<isolation level expN>

Specifies a pre-defined server-level transaction isolation scheme.

- Valid values for <isolation level> are:

Value	Description
0	Server's default isolation level
1	Uncommitted changes read (dirty read)
2	Committed changes read (read committed)
3	Full read repeatability (repeatable read)

- <isolation level> is not supported for DBF and DB tables.
- If an invalid value is given for <isolation level>, a "Value out of range" error is generated.
- The <isolation level> is server-specific; a "Not supported" error will result from the database engine if an unsupported level is specified.

Note: If you include <database name expC> when you issue BEGINTRANS(), you must also include it in subsequent COMMIT() or ROLLBACK() statements within that transaction. If you don't, dBASE ignores the COMMIT() or ROLLBACK() statement.

Description

Separate changes that must be applied together are considered to be a transaction. For example, transferring money from one account to another means debiting one account and crediting another. If for whatever reason one of those two changes cannot be done, the whole transaction is considered a failure and any change that was made must be undone.

Transaction logging records all the changes made to all the tables in a database. If no errors are encountered while making the individual changes in the transaction, the transaction log is cleared with COMMIT() and the transaction is done. If an error is encountered, all changes made so far are undone by calling ROLLBACK().

All locks made during a transaction are maintained until the transaction is completed. This ensures that no one else can make any changes until the transaction is committed or abandoned.

You can't nest transactions with BEGINTRANS(). If you issue BEGINTRANS() against an SQL database that does not support transactions, or if a server error occurs, BEGINTRANS() returns *false*. Otherwise, it returns *true*. If BEGINTRANS() returns *false*, use SQLERROR() or SQLMESSAGE() to determine the nature of the server error that might have occurred.

OODML

Call the *beginTrans*() method of the Database object.

BINTYPE()

Topic group Related topics

Returns the predefined type number of a specified binary field.

Syntax

BINTYPE([<field name>])

<field name>

The name of a field in the current table.

Description

BINTYPE() returns the predefined binary type number of a binary field in the current table. Using this command, you can determine the type of data stored in the field. The values returned by BINTYPE() are the following:

Predefined binary type numbers	Description
1 to 32K - 1 (1 to 32,767)	User-defined file types
32K (32,768)	.WAV files
32K + 1 (32,769)	.BMP and .PCX files

BINTYPE() returns an error if a non-binary field is specified. It returns a value of 0 if the binary field is empty.

OODML

No direct equivalent. You may be able to ascertain the data type by examining the data in the *value* of the Field object.

BLANK

Topic group Related topics Example

Fills fields in records with blanks.

Syntax

BLANK
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]
[FIELDS
  <field list> | [LIKE <skeleton 1>] [EXCEPT <skeleton 2>]]
[REINDEX]

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is NEXT 1, the current record only.

FIELDS <field list> | LIKE <skeleton 1> | EXCEPT <skeleton 2>

The fields to blank. Without FIELDS, BLANK replaces all fields. If you specify FIELDS LIKE <skeleton 1>, the BLANK command restricts the fields that are blanked to the fields that match <skeleton 1>. Conversely, if you specify FIELDS EXCEPT <skeleton 2>, the BLANK command makes all fields blank except those whose names match <skeleton 2>.

REINDEX

Rebuilds all open indexes after BLANK finishes executing. Without REINDEX, *Visual* dBASE updates all open indexes after each record is made blank. When the current table has multiple open indexes or contains many records, BLANK executes faster with the REINDEX option.

Description

Use BLANK to blank-out fields or records in the current table. BLANK has the same effect as using REPLACE on each field with a *null* value. For DBF7, DB, and SQL tables, the fields are replaced with *null* values. For earlier versions of DBF tables, the fields are replaced with blanks (spaces). EMPTY() and ISBLANK() return *true* for a field whose value has been replaced using BLANK. BLANK fills an existing record with the same values as APPEND BLANK. Updates to open indexes are performed after each record or a set of records is blanked.

The distinction between blank and zero values in numeric fields can be significant when you use commands such as AVERAGE and CALCULATE.

For earlier DBF tables, blank numeric fields evaluate to zero and blank logical or boolean fields evaluate to *false*. In DBF7 tables, which support true null values, the value of the field is *null*, although some commands may display the null value as zero or *false*.

OODML

Use a loop to assign *null* values to the *value* properties of the Field objects.

BLANK example

The followin function blanks records before deleting them, making them available for recycling:

```
PROCEDURE DelRec
  blank
  delete
```

To see the function that reclaims recycled records, see the example for APPEND.

BOF()

Topic group Related topics

Indicates if the record pointer in a table is at the beginning of the file.

Syntax

BOF([<alias>])

<alias>

The work area you want to check.

Description

BOF() returns *true* when the record pointer has just moved before the first logical record of the table in the specified work area; otherwise, it returns *false*. For example, if you issue SKIP -1 when the record pointer is on the first record, BOF() returns *true*. If you attempt to navigate backwards when BOF() is *true*, an error occurs.

However, unlike EOF(), the record pointer can never stay before the first record. After the record pointer has moved past the first record, it is automatically moved back to the first record, even though BOF() remains *true*. Subsequent navigation will cause BOF() to return *false* unless the navigation moves the record pointer before the first record again.

When you first USE a table, BOF() can never be *true*, but EOF() can if the table is empty, or you are using a conditional index with no matching records.

If no table is open in the specified work area, BOF() also returns *false*.

OODML

The Rowset object's *endOfSet* property is *true* when the row pointer is past either end of the rowset. Unlike BOF() and EOF(), there is symmetry with the *endOfSet* property. You can determine which end you're on based on the direction of the last navigation.

There is also an *atFirst*() method that determines whether you are on the first row in the rowset.

BOF() example

The following is an event handler for a button that navigates backward through a table:

```
PROCEDURE prevButton_onClick
  if .not. bof()
    skip -1
  endif
  if bof()
    msgbox( "First record", "Navigation", 64 )
  endif
```

This example demonstrates an atypical programming construct: instead of using IF and ELSE, there is an IF statement for a condition, followed by a separate IF statement for the opposite condition. In this case, it works like this: if you are already at BOF() you do not want to attempt to navigate backwards, because that will cause an error. But if you end up at BOF(), or if you're already at BOF(), then you will get a message.

BOOKMARK()

Topic group Related topics

Returns a bookmark for the current record.

Syntax

BOOKMARK([<alias>])

<alias>

The work area you want to check.

Description

BOOKMARK() returns a value for the current record. The value returned by BOOKMARK() is of a special unprintable data type called bookmark. BOOKMARK() returns an empty bookmark if no table is open in the current work area.

When used with the GO command, bookmarks let you navigate to particular records.

Unlike record numbers, which work only with DBF tables, bookmarks work with all tables, including DBFs. Bookmarks are only guaranteed to be valid for the table from which they are created.

Bookmark values can be used in all commands and functions that can otherwise use a record number, and with relational operators to check for equality and relative position in a table.

OODML

Use the Rowset object's *bookmark*() method.

BROWSE

Topic group Related topics

Provides display and editing of records in a table format.

Syntax

BROWSE
[COLOR <color>]
[FIELDS <field 1> [<field option list 1>] |
  <calculated field 1> = <exp 1> [<calculated field option list 1>]
  [, <field 2> [<field option list 2>] |
  <calculated field 2> = <exp 2> [<calculated field option list 2>]...]]
[FREEZE <field 3>]
[LOCK <expN 1>]
[NOAPPEND]
[NOEDIT | NOMODIFY]
[TITLE <expC 1>]
[WIDTH <expN 2>]

COLOR <color>

Specifies the color of the cells in the BROWSE. The current highlighted cell has its own, fixed color. The <color> is made up of a foreground color and a background color, separated by a forward slash (/). You may use a Windows-named color, one of the basic 16-color color codes, or a user-defined color name. For more information on colors, see *colorNormal*.

FIELDS <field 1> [<field option list 1>] |
<calculated field 1> = <exp 1> [<calculated field option list 1>]
[, <field 2> [<field option list 2>] |
<calculated field 2> = <exp 2> [<calculated field option list 2>] ...]]

Displays the specified fields, in the order they're listed, in the Table window. Options for <field option list 1>, <field option list 2>, which apply to <field 1>, <field 2>, and so on, affect the way these fields are displayed. These options are as follows:

Option	Description
\<column width>	The width of the column within which <field 1> appears when <field 1> is character type
\B = <exp 1>, <exp 2> [\F]	RANGE option; forces any value entered in <field 1> to fall within <exp 1> and <exp 2>, inclusive.
	RANGE REQUIRED option; the \F option prevents the cursor from leaving <*field 1*> and the editing session from ending until the value falls between <exp 1> and <exp 2>, inclusive
\C=<color>	COLOR option; sets the foreground and/or background colors of the column according to the values specified in <color>
\H = <expC>	HEADER option; causes <expC> to appear above the field column in the Table window, replacing the field name
\P = <expC>	PICTURE option; displays <field 1> according to the PICTURE or FUNCTION clause <expC>
\R	READ-ONLY option; specifies that <field 1> is read-only and can't be edited
\V = <condition> [\F] [\E = <expC>]	VALID option; allows a new <field 1> value to be entered only when <condition> evaluates to *true*
	VALID REQUIRED option; the \F option prevents the cursor from leaving <field 1> and the editing session from ending until <condition> evaluates to *true*
	ERROR MESSAGE option; \E = <expC> causes <expC> to appear when <condition> evaluates to *false*
\W = <condition>	WHEN option; allows <field 1> to be edited only when <condition> evaluates to *true*

Note: You may also use the forward slash (/) instead of the backslash (\) when specifying only a single option in a field option list.

Read-only calculated fields are composed of an assigned field name and an expression that results in the calculated field value, for example:

```
browse fields commission = RATE * SALEPRICE
```

Options for calculated fields affect the way these fields are displayed. These options are as follows:

Option	Description
\<column width>	The width of the column within which <calculated field 1> is displayed
\H = <expC>	Causes <expC> to appear above the calculated field column in the Table window, replacing the calculated field name

FREEZE <field 3>

Restricts editing to <field 3>, although other fields are visible.

LOCK <expN 2>

Keeps the first <expN 2> fields in place onscreen as you move the cursor to fields on the right.

NOAPPEND

Prevents records from being added when you cursor down past the last record in the Table window.

NOEDIT | NOMODIFY

Prevents you from modifying records from the Table window.

TITLE <expC 1>

Causes <expC 1> to appear as the title of the Table window.

WIDTH <expN 3>

The default column width. If a field is wider than the specified width, you can scroll the field within the specified width.

Description

The BROWSE command opens a table grid in a window, displaying the fields in the currently selected work area. It is intended more for interactive use; in an application, you have more control over a Browse or Grid object in a form.

The BROWSE command is modeless. After the window is opened, the next statement is executed.

OODML

Use a Grid control on a form.

CALCULATE

Topic group Related topics

Performs financial and statistical operations for values of records in the current table.

Syntax

CALCULATE <function list>
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]
[TO <memvar list> | TO ARRAY <array>]

<function list>

You can use one or more of the following functions:

Function	Purpose
AVG(<expN>)	Calculates the average of the specified numeric expression.
CNT()	Counts the number of records in the current table.
MAX(<expC> | <expN> | <expD>)	Calculates the maximum value of the specified numeric, character, or date expression.
MIN(<expC> | <expN> | <expD>)	Calculates the minimum value of the specified numeric, character, or date expression.
NPV(<expN 1>, <expN 2> [, <expN 3>])	Calculates the net present value of the numeric values in <expN 2>; <expN 1> is the periodic interest rate, expressed as a decimal; <expN 3> is the initial investment and is generally a negative number.
STD(<expN>)	Calculates the standard deviation of the specified numeric expression.
SUM(<expN>)	Calculates the sum of the specified numeric expression.
VAR(<expN>)	Calculates the variance of the specified numeric expression.

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is ALL.

TO <memvar list> | TO ARRAY <array>

Initializes and stores the results to the variables (or properties) of <memvar list> or stores results to the existing array <array>. <array> can be a single- or multidimensional array; the array elements are accessed via their element numbers, not their subscripts.

Description

CALCULATE uses one or more of the eight associated functions listed in the previous table to calculate and store sums, maximums, minimums, averages, variances, standard deviations, or net present values of specified expressions. The expressions are usually, but not required to be, based on fields in the current table. You can calculate values in a work area other than the current work area if you set a relation between the work areas.

CALCULATE can also return the count or number of records in the current table. These special functions, with the exception of MAX() and MIN(), can be used only with CALCULATE.

CALCULATE can use the same function on different expressions or different functions on the same expression. For instance, if your table contains a Salary field and a Bonus field, you can issue the command:

```
calculate sum(SALARY), sum(BONUS), avg(SALARY), avg(12 * (SALARY + BONUS))
```

CALCULATE stores results to variables or to an existing array in the order of the specified functions. If you store the results to memory variables, specify the same number of variables as the number of functions in the CALCULATE command line. If you store the values in an array, the array must already exist, and the array must contain at least as many elements as the number calculations.

If SET TALK is ON, CALCULATE displays the results in the result pane of the Command window. The

SET DECIMALS setting determines the number of decimal places that CALCULATE displays.

CALCULATE treats a blank numeric field as containing 0 and includes the field in its calculations. For example, if you calculate the average of a numeric field in a table containing ten records, five of which are blank, CALCULATE divides the sum by 10 to find the average. Furthermore, if you calculate the minimum of the same table field and five records contain positive non-zero numbers and the five others are blank in the same fields, CALCULATE returns 0 as the minimum. If you want to exclude blank fields when using CALCULATE, be sure to specify a condition such as FOR .NOT. ISBLANK(numfield).

Although you can use the SUM or AVERAGE commands to find sums and averages, if you are mixing sums and averages, CALCULATE is faster because it runs through the table just once while making all specified calculations.

OODML

Loop through the rowset to calculate the values.

CHANGE()

Topic group Related topics

Returns *true* if another user has changed a record since it was read from disk.

Syntax

CHANGE([<alias>])

<alias>

The work area you want to check.

Description

Use CHANGE() to determine if another user has made changes to a record since it was read from disk. If the record has been changed, you might want to display a message to the user before allowing the user to continue.

Note: CHANGE() only works with DBF tables.

For CHANGE() to return information, the table being checked must have a _DBASELOCK field. Use CONVERT to add a _DBASELOCK field to a table. If the table doesn't contain a _DBASELOCK field, CHANGE() returns *false*

CHANGE() compares the counter in the workstation's memory image of _DBASELOCK to the counter stored on disk. If they are different, the record has changed, and CHANGE() returns *true*.

You can reset the value of CHANGE() to *false* by moving the record pointer. GOTO BOOKMARK() rereads the current record's _DBASELOCK field, and a subsequent CHANGE() returns *false*, unless another user has changed the record in the interim between moving to it and issuing CHANGE().

OODML

Call rowset.fields["_DBASELOCK"].changed()

CLEAR AUTOMEM

Topic group Related topics

Initializes automem variables with empty values for the current table.

Syntax

CLEAR AUTOMEM

Description

Use CLEAR AUTOMEM to initialize a set of automem variables containing empty values for the current table. CLEAR AUTOMEM creates any automem variables that don't exist already. If the variables exist, CLEAR AUTOMEM reinitializes them. If no table is in use, CLEAR AUTOMEM doesn't create any variables.

CLEAR AUTOMEM creates normal variables. They default to private scope when CLEAR AUTOMEM is executed in a program or function. If there is a danger of overwriting previously created public or private variables with the same name, you must declare the new automem variables PRIVATE individually by name before issuing CLEAR AUTOMEM, just as you would if you created the variables manually.

Automem variables have the same names and data types as the fields in an active table. You can create empty automem variables automatically for the current table by using CLEAR AUTOMEM or USE...AUTOMEM, or manually by using STORE or the assignment operators.

OODML

The Rowset object’s contains an array of Field objects, accessed through its *fields* property. These Field objects have *value* properties that may be programmed like variables.

CLEAR FIELDS

Topic group Related topics

Removes the fields list defined with the SET FIELDS TO command.

Syntax

CLEAR FIELDS

Description

Use CLEAR FIELDS to remove the SET FIELDS TO <field list> setting in all work areas and automatically turn SET FIELDS to OFF, thus making all fields in all open tables accessible. You can use CLEAR FIELDS prior to specifying a new fields list with SET FIELDS TO. You might also want to use CLEAR FIELDS at the end of a program. CLEAR FIELDS has the same effect as SET FIELDS TO with no options.

OODML

No direct equivalent. When accessing the *fields* array, you may include program logic to include or exclude specific fields.

CLOSE DATABASES

Topic group Related topics

Closes databases, including their tables and indexes.

Syntax

CLOSE DATABASES [<database name list>]

<database name list>

The list of database names, separated by commas. If no list is specified, all open databases are closed.

Description

Closing a database closes all the open tables in the database, including all the index, memo, and other associated files. For the default database, which gives access to DBF and DB tables, this means all open tables in all work areas.

CLOSE DATABASES only closes those tables opened in the current workset. For more information on worksets, see CREATE SESSION.

OODML

Set the *active* property of the Database object (or all its Query objects) to *false*.

CLOSE INDEXES

Topic group Related topics

Closes DBF index files in the current work area.

Syntax

CLOSE INDEXES

Description

Closes index (.MDX and .NDX) files open in the current work area. This option does not close the production .MDX file.

OODML

Clear the *indexName* property of the Rowset object.

CLOSE TABLES

Topic group Related topics

Closes all tables.

Syntax

CLOSE TABLES

Description

Closes all tables in all work areas or all tables in the current database, if one is selected.

CLOSE TABLES only closes those tables opened in the current workset. For more information on worksets, see CREATE SESSION.

OODML

Set the *active* property of all the Query objects to *false*.

COMMIT()

Topic group Related topics

Clears the transaction log, committing all logged changes.

Syntax

COMMIT([<database name expC>])

<database name expC>

The name of the database in which to complete the transaction.

- If you began the transaction with BEGINTRANS(<database name expC>), you must issue COMMIT(<database name expC>). If instead you issue COMMIT(), *Visual* dBASE ignores the COMMIT() statement.
- If you began the transaction with BEGINTRANS(), <database name expC> is an optional COMMIT() argument. If you include it, it must refer to the same database as the SET DATABASE TO statement that preceded BEGINTRANS().

Description

A transaction works by logging all changes. If an error occurs while attempting one of the changes, or the changes need to be undone for some other reason, the transaction is canceled by calling ROLLBACK(). Otherwise, COMMIT() is called to clear the transaction log, thereby indicating that all the changes in the transaction were committed and that the transaction as a whole was posted.

For more information on transactions, see BEGINTRANS().

OODML

Call the *commit*() method of the Database object.

CONTINUE

Topic group Related topics

Continues a search for the next record that meets the conditions specified in a previously issued LOCATE command.

Syntax

CONTINUE

Description

CONTINUE continues the search of the last LOCATE issued in the selected work area. When you issue the LOCATE command, the current table is searched sequentially for the first record that matches the search criteria.

If a record is found, the record pointer is left at the matching record. To continue the search, issue the CONTINUE command. Whenever a match is found, FOUND() returns *true*. If match is not found, the record pointer is left after the last record checked, which usually leaves it at the end-of-file. Also, FOUND() returns *false*.

If SET TALK is ON, CONTINUE will display the record number of the matching record in the result pane of the Command window if you are searching a DBF table. If no match is found, CONTINUE will display "End of Locate scope".

If you issue CONTINUE without first issuing a LOCATE command for the current table, an error occurs..

OODML

Use the Rowset object's *locateNext*() method. This method also allows going backwards or to the nth match.

COPY

Topic group Related topics

Copies records from the current table to another table or text file.

Syntax

COPY TO <filename>
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]
[FIELDS <field list>]
[[TYPE] DBASE | DBMEMO3 | PARADOX | SDF |
    DELIMITED [WITH
        <char> | BLANK]] |
[[WITH] PRODUCTION]

TO <filename>

Specifies the name of the table or file you want to create.

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is ALL.

FIELDS <field list>

Specifies which fields to copy to the new table.

[TYPE] DBASE | DBMEMO3 | PARADOX | SDF |
DELIMITED [WITH <char> | BLANK]

Specifies the format of the file to which you want to copy data. The TYPE keyword is included for readability only; it has no effect on the operation of the command. The following table provides a description of the different file formats that are supported:

Type	Description
DBASE	A dBASE table. If you don't include an extension for <filename>, *Visual* dBASE assumes a .DBF extension.
DBMEMO3	A table (.DBF) and memo (.DBT) files in dBASE III PLUS format.
PARADOX	A Paradox table. If you don't include an extension for <filename>, *Visual* dBASE assumes a .DB extension.
SDF	A System Data Format text file. Records in an SDF file are fixed-length, and the end of a record is marked with a carriage return and a linefeed. If you don't specify an extension, *Visual* dBASE assumes .TXT.
DELIMITED	A text file with fields separated by commas. These files are also referred to as CSV (Comma Separated Value) files. Character fields are delimited with double quotation marks. Each carriage return and linefeed indicates a new record. If you don't specify an extension, *Visual* dBASE assumes .TXT.
DELIMITED WITH <char>	Indicates that character data is delimited with the character <char> instead of with double quotes. For example, if delimited with a single quote instead of a double quote, the clause would be: DELIMITED WITH '
DELIMITED WITH BLANK	Indicates that data is separated with spaces instead of commas, with no delimiters.

[WITH] PRODUCTION

Specifies copying the production .MDX file along with the associated table. This option can be used only when copying to another dBASE table.

Description

Use COPY to copy all or part of a table to a file of the same or a different type. If an index is active, COPY arranges the records of the new table or file according to the indexed order. The COPY command does not copy a _DBASELOCK field in a table that you've created with CONVERT.

When COPYing to text files, SDF or DELIMITED, non-character fields are written as follows:

- Numbers are written as-is.
- Logical or boolean fields use the letter T for *true* and F for *false*.
- Dates are written in the format YYYYMMDD.

If you COPY a table containing a memo field to another dBASE table, *Visual* dBASE creates another file with the same name as the table but having a .DBT extension, and copies the contents of the memo field to it. If, however, you use the SDF or DELIMITED options and COPY to a text file, *Visual* dBASE doesn't copy the memo fields.

Deleted records are copied to the target file (if it's a dBASE table) unless a FOR or WHILE condition excludes them or unless SET DELETED is ON. Deleted records remain marked for deletion in the target dBASE table.

You can use COPY to create a file containing fields from more than one table. To do that, open the source tables in different work areas and define a relation between the tables. Use SET FIELDS TO to select the fields from each table that you want to copy to a new file. Before you issue the COPY command, SET FIELDS must be ON and you must be in the work area in which the parent table resides.

The COPY command does not verify that the files you build are compatible with other software programs. You may specify field lengths, record lengths, number of fields, or number of records that are incompatible with other software. Check the file limitations of your other software program before exporting tables using COPY.

OODML

Use the UpdateSet object's *copy*() method. Set filter options in the *source* rowset.

COPY BINARY

Topic group Related topics

Copies the contents of the specified binary field to a file.

Syntax

COPY BINARY <field name> TO <filename>
[ADDITIVE]

<field name>

The binary field to copy.

TO <filename>

The name of the file where the contents of the binary field are copied. For predefined binary file types, *Visual* dBASE assigns the appropriate extension, for example, .BMP, .WAV, and so on. For user-defined binary type fields, dBASE assigns a .TXT extension by default.

ADDITIVE

Appends the contents of the binary field to the end of an existing file. Without the ADDITIVE option, *Visual* dBASE overwrites the previous contents of the file.

Description

Use COPY BINARY to export data from a binary field in the current record to a file. You can use binary fields to store text, images, sound, video, and other user-defined binary data.

If you specify the ADDITIVE option, *Visual* dBASE appends the contents of the binary field to the end of the named file, which lets you combine the contents of binary fields from more than one record. When you don't use ADDITIVE, *Visual* dBASE displays a warning message before overwriting an existing file if SET SAFETY is ON. Note that you can't combine the data from more than one field for many of the predefined binary data types. For example, you can store only a single image in a binary field or file, so do not use the ADDITIVE option of COPY BINARY when copying an image to a file.

OODML

Use the Field object's *copyToFile*() method.

COPY MEMO

Topic group Related topics

Copies the contents of the specified memo field to a file.

Syntax

COPY MEMO <memo field> TO <filename>
[ADDITIVE]

<memo field>

The memo field to copy.

TO <filename> | ?

The name of the text file where text will be copied. The default extension is .TXT.

ADDITIVE

Appends the contents of the memo field to the end of an existing text file. Without the ADDITIVE option, *Visual* dBASE overwrites any previous text in the text file.

Description

Use COPY MEMO to export memo file text in the current record to a text file. You can also use COPY MEMO to copy images or other binary-type data to a file; however, binary fields are recommended for storing images, sound, and other user-defined binary information.

If you specify the ADDITIVE option, *Visual* dBASE appends the contents of the memo field to the end of the named file, which lets you combine the contents of memo fields from more than one record. When you don't use ADDITIVE, dBASE displays a warning message before overwriting an existing file if SET SAFETY is ON. You can store only a single image in either a memo field or in a file, so do not use the ADDITIVE option of COPY MEMO when copying an image to a file. (RESTORE IMAGE can display an image stored in either a memo field or a text file.)

OODML

Use the Field object's *copyToFile*() method.

COPY STRUCTURE

Topic group Related topics

Creates an empty table with the same structure as the current table.

Syntax

COPY STRUCTURE TO <filename>
[[TYPE] PARADOX | DBASE]
[FIELDS <field list>]
[[WITH] PRODUCTION]

<filename>

The name of the table you want to create.

[TYPE] PARADOX | DBASE

Specifies the type of table you want to create, if <filename> does not include an extension. This option overrides the current SET DBTYPE setting. The TYPE keyword is included for readability only; it has no effect on the operation of the command.

FIELDS <field list>

Determines which fields *Visual* dBASE includes in the structure of the new table. The fields appear in the order specified by <field list>.

[WITH] PRODUCTION

Creates a production .MDX file for the new table. The new index file has the same index tags as the production index file associated with the original table.

Description

The COPY STRUCTURE command copies the structure of the current table but does not copy any records. If SET SAFETY is OFF, *Visual* dBASE overwrites any existing tables of the same name without issuing a warning message.

The COPY STRUCTURE command copies the entire table structure unless limited by the FIELDS option or the SET FIELDS command. When you issue COPY STRUCTURE without the FIELDS <field list> option, *Visual* dBASE copies the fields in the SET FIELDS TO list to the new table. The _DBASELOCK field created with the CONVERT command is not copied to new tables.

You can use COPY STRUCTURE to create an empty table structure with fields from more than one table. To do so,

1. Open the source tables in different work areas.
2. Use the FIELDS <field list> option, including the table alias for each field name not in the current table.

OODML

No equivalent.

COPY STRUCTURE EXTENDED

Topic group Related topics

Creates a new table whose records contain the structure of the current table.

Syntax

COPY STRUCTURE EXTENDED TO <filename>
[[TYPE] PARADOX | DBASE]

or

COPY TO <filename>
STRUCTURE EXTENDED
[[TYPE] PARADOX | DBASE]

<filename>

The name of the table that you want to create to contain the structure of the current table.

[TYPE] PARADOX | DBASE

Specifies the type of table you want to create, if <filename> does not include an extension. This option overrides the current SET DBTYPE setting. The TYPE keyword is included for readability only; it has no effect on the operation of the command.

Description

COPY STRUCTURE EXTENDED copies the structure of the current table to records in a new table.

COPY STRUCTURE EXTENDED first defines a table, called a structure-extended table, containing five fields of fixed names, types, and lengths. Once the structure-extended table is defined, COPY STRUCTURE EXTENDED appends records that provide information about each field in the current table. The fields in the structure-extended table store the following information about fields in the current table:

Field	Contents
FIELD_NAME	Character field that contains the name of the field.
FIELD_TYPE	Character field that contains the field's data type.
FIELD_LEN	Numeric field that contains the field length.
FIELD_DEC	Numeric field that contains the number of decimal places for numeric fields.
FIELD_IDX	Character field that indicates if index tags were created on individual fields in the table.

When the process is complete, the structure-extended table contains as many records as there are fields in the current table. You can then use CREATE...FROM to create a new table from the information provided by the structure-extended table.

No record is created in the structured-extended table for the _dbaselock field created with the CONVERT command.

OODML

Use the Database object's *executeSQL*() method to call the SQL command CREATE TABLE (see CREATE STUCTURE EXTENDED) to create the structure-extended table. Then use a loop to populate the table with information from the array of Field objects.

COPY TABLE

Topic group Related topics

Makes a copy of a table.

Syntax

COPY TABLE <source tablename> TO <target tablename>
[[TYPE] PARADOX | DBASE]

<source table name>

The name of the table that you want to copy. You can also copy a table in a database (defined using the BDE Administrator) by specifying the database as a prefix (enclosed in colons) to the name of the table, that is, :database name:table name. If the database is not already open, *Visual* dBASE displays a dialog box in which you specify the parameters, such as a login name and password, necessary to establish a connection to that database.

<target table name>

The name of the table you want to create. The table type is the same as the source table. If you copy a table in a database, you must specify the same database as the destination of the target table.

[TYPE] PARADOX | DBASE

Specifies the default extension for the both the source table and target table: .DB for Paradox and .DBF for dBASE. This overrides the current setting of DBTYPE. You cannot change the table type during the copy; this clause is useful only when using filenames that do not have extensions.

Description

Use the COPY TABLE command to make a copy of a table, including all its index, memo, and other associated files, if any. Unlike the COPY command, the table does not have to be open, and an exact copy of all the records is always made.

OODML

Use the Database object's *copyTable*() method.

COPY TO ARRAY

Topic group Related topics Example

Copies data from non-memo fields of the current table, overwrites elements of an existing array, and moves the record pointer to the last record copied.

Syntax

COPY TO ARRAY <array>
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]
[FIELDS <field list>]

<array>

A reference to the target array

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is ALL, until <array> is filled.

FIELDS <field list>

Copies data from the fields in <field list> in the order of <field list>. Without FIELDS, dBASE copies all the fields the array can hold in the order they occur in the current table.

Description

Use COPY TO ARRAY to copy records from the current table to an existing array. COPY TO ARRAY treats the columns in a one-dimensional array like a single record of fields; and treats a two-dimensional array like a table, with the rows (the first dimension) of the array like records, and the columns (the second dimension) like fields.

To copy the fields from a single record, create a one-dimensional array the same size as the number of fields to copy. To copy all the fields in the record, use FLDCOUNT() to get the number of fields; for example

```
a = new Array( fldcount() )
```

To copy multiple records, create a two-dimensional array. The first dimension will indicate the number of records. The second dimension indicates the maximum number of fields. To copy all the records, use RECCOUNT() to get the number of records; for example

```
a = new Array( reccount(), fldcount() )
```

If the array has more columns than the table has fields, the additional elements will be left untouched. Similarly, if a two-dimensional array has more rows than the table, the additional rows are left untouched.

COPY TO ARRAY does not copy memo (or binary) fields; these fields should not be counted when sizing the target array.

COPY TO ARRAY copies records in their current order and, within each record, in field order unless you use the FIELDS option to specify the order of the fields to copy.

After copying, the record pointer is left at the last record copied, unless the array has more rows than the table has records. In this case, the record pointer is left at the end-of-file.

OODML

Use two nested loops, the first to traverse the rowset, and the second to copy the *value* properties of the Field objects in the rowset's *fields* array to the target array's elements.

COPY TO ARRAY example

The following example uses COPY TO ARRAY and APPEND FROM ARRAY to copy records between tables where the fields are the same data type, but may not have the same field names. (If the field names were the same, the APPEND FROM command would be easier.) To minimize disk access, records are read in blocks of 100.

```
PROCEDURE AppendByPosition( cSource )
  #define BLOCK_SIZE 100
  local cTarget, aRec, nRecs, nCopied
  *-- Get alias for current table
  cTarget = alias()
  use ( cSource ) in select() alias SOURCE
  if reccount( "SOURCE" ) == 0
    *-- If source table is empty, do nothing
    return 0
  endif
  *-- Create array with default block size
  aRec = new Array( BLOCK_SIZE, FLDCOUNT( "SOURCE" ) )
  nCopied = 0
  do while .not. eof( "SOURCE" )
    *-- Calculate number of records to copy, the smaller of
    *-- the block size and the number of records left
    nRecs = min( BLOCK_SIZE, reccount( "SOURCE" ) - nCopied )
    if nRecs < BLOCK_SIZE
      *-- Resize array for last block to copy
      aRec.resize( nRecs, FLDCOUNT( "SOURCE" ) )
    endif
    select SOURCE
    *-- Copy next block
    copy to array aRec rest
    *-- Move from last record copied to first record in next block
    skip
    select ( cTarget )
    append from array aRec
    nCopied = nCopied + nRecs
  enddo
  use in SOURCE
  return nCopied
```

The COPY TO ARRAY command uses the REST scope to copy the next block of records. Because the number of records to copy is known (it's calculated for the nRec variable), NEXT nRec would also work, but it's redundant, because the array has been sized to copy the right number of records. The array sizing is important because that determines the number of records that get appended with APPEND FROM ARRAY.

COUNT

Topic group Related topics

Counts the number of records that match specified conditions.

Syntax

COUNT
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]
[TO <memvar>]

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is ALL.

TO <memvar>

Stores the result of COUNT, a number, to the specified variable (or property).

Description

Use COUNT to total the number of visible records. The current index, filter, key constraints, DELETED setting, and other factors control which records are visible at any time. You may specify further criteria with the <scope> and FOR and WHILE conditons.

If the COUNT is not stored to a memvar, the result is displayed in a dialog box. If the COUNT is stored to a memvar and SET TALK is ON, the result is also displayed in the status bar.

COUNT automatically locks the table during its operation if SET LOCK is ON (the default), and unlocks it after the count is finished. If SET LOCK is OFF, you can still perform a count; however the result may change if another user changes the table.

You can also count the total number of records in a table using the RECCOUNT() function. However, unlike COUNT, RECCOUNT() does not let you specify conditions to qualify the records it counts.

OODML

Use the Rowset object's *count*() method.

CREATE SESSION

Topic group Related topics Example

Creates a new session—now referred to as a workset—and immediately selects it.

Syntax

CREATE SESSION

Description

Use CREATE SESSION in an application that uses form-based data handling and the Xbase DML. Applications that only use the data access objects generally do not need CREATE SESSION.

A workset is the more precise term for what was called a session in earlier versions of *Visual* dBASE and is used to encapsulate separate user tasks. It consists of the set of all 225 work areas and the current settings of most of the SET commands. There is always an active workset. When *Visual* dBASE starts, the settings are read from the VDB.INI file and all work areas are empty. This is sometimes referred to as the startup workset.

Whenever you open or close a table or change a setting, that occurs in the current workset. Commands that affect all work areas, like CLOSE DATABASES, affect all work areas in the current workset only. Record locks are workset-based. If a record is locked in one workset, you cannot lock that same record from another workset; but you could lock that record if the same table is open in another work area in the same workset.

When you issue CREATE SESSION, a new workset is created and made active. A new unused set of work areas is created and all settings are reread from the .INI file. Any previously existing worksets are unaffected, except that they are no longer active. In fact, you cannot change anything about a dormant workset; you must make it active first.

Whenever a form is created, it is bound to the currently active workset. Any number of forms may be bound to a single workset. Each workset has a reference count that indicates the number of forms bound to it. The Command window and Navigator are both bound to the startup workset.

Whenever a form receives focus or any of its methods are called, its workset is activated. This means that all commands, functions, and methods take place in the context of a specific workset and have no effect on the tables or settings in other worksets.

Note: Worksets have no effect on variables.

When a form is released (either explicitly or when there are no more references to the form) its workset's reference count is reduced by one. If that reduces the reference count to zero, the workset is also released.

Whenever a workset is released, any tables that are open in it are closed automatically.

The active workset's reference count is also checked:

- Just before another workset is activated (usually by giving focus to a form in another workset)
- Whenever CREATE SESSION is executed (before the new workset is created)
- When a form method has finished executing.

If the count is zero, the active workset is released. When a form method is finished, it also selects the workset that was active when the method started. So if you click a button button on a form that currently does not have focus, and that button's *onClick* event handler (all event handlers are methods) has a CREATE SESSION command then the sequence of events is as follows:

1. Clicking the form causes a focus change. The active workset is checked; if its reference count is zero, it is released.
2. The form's workset is activated.
3. The *onClick* executes, creating and activating a new workset.
4. The *onClick* ends. If the reference count of the just-created workset is zero, which it would be if the method didn't create any forms after the CREATE SESSION, it is released.
5. The form's workset, the one that was active when the method was executed, is reactivated. It is now

the active workset.

Clicking the button again would only go through steps 3 through 5, because the form still has focus, so there is no focus change.

OODML

Use Session objects.

CREATE SESSION example

The following is the *onClick* event handler for a menu item that opens a customer form:

```
function View_Customer_onClick
  create session
  do CUSTOMER.WFM
```

By using the CREATE SESSION command, each customer form operates independently, as if they were being viewed by different people on different workstations. Navigation in one form does not affect the other. A record locked in one form will be respected by another form.

This example demonstrates some of the details of CREATE SESSION. Go to the *Visual* dBASE \Samples subdirectory. Select the Tables tab of the Navigator, and type the following statements in the Command window:

```
clear all          && Release all variables and close all tables
create session     && Nothing appears to happen
f = new Form()
use FISH           && FISH appears in status bar, table is italicized in
Navigator
create session     && The status bar is cleared
use SAMPLES        && SAMPLES appears in status bar, table is italicized in
Navigator
```

This creates two worksets—call them WS1 and WS2 for reference. The order of the statements within each workset is irrelevant; they are simply executed in the currently active workset. The Fish table is the currently selected table in WS1 and the Samples table is the currently selected table in WS2. Form F is bound to WS1. WS2 has no forms bound to it, so its reference count is zero. The table names are now italic in the Navigator to indicate that they are open somewhere.

Now watch the italic Samples.dbf while you click the Navigator. Clicking the Navigator selected the startup workset. In switching worksets, the current workset, WS2, was checked. Its reference count was zero, so it was released, closing all the tables in it. Now click the Command window. This checks the Navigator's workset, the startup workset. Its reference count is at least two for both the Command window and the Navigator, so it is never released. Now type:

```
f.alias = {; ? alias()}
```

This attaches a codeblock to the form so that it becomes a method of the form. Now execute the method:

```
f.alias()     && Displays FISH
? alias()     && Blank, no table selected in startup workset
```

Executing a form's method selects the form's workset, where the Fish table is the currently selected table. After the method is complete, the previously active workset is reselected (note that there is no focus change here). Finally, watch the italic Fish.dbf in the Navigator as you execute:

```
release f
```

The variable is the only reference to the form (it's not open on-screen), so the form is destroyed, reducing WS1's reference count to zero, which releases WS1 and closes all the tables in it.

CREATE...FROM

Topic group Related topics

Creates a table with the structure defined by using the COPY STRUCTURE EXTENDED or CREATE...STRUCTURE EXTENDED commands.

Syntax

```
CREATE <filename 1>
   [[TYPE] PARADOX | DBASE]
FROM <filename 2>
    [[TYPE] PARADOX | DBASE]
```

<filename 1>

The name of the table you want to create.

[TYPE] PARADOX | DBASE

Specifies the type of table you want to create, if <filename> does not include an extension. This option overrides the current SET DBTYPE setting. The TYPE keyword is included for readability only; it has no effect on the operation of the command.

FROM <filename 2>
[TYPE] PARADOX | DBASE

Identifies the table that contains the structure of the table you want to create.

Description

The CREATE...FROM command is most often used with the COPY STRUCTURE EXTENDED command in a program to create a new table from another table that defines its structure, instead of using the interactive CREATE or MODIFY STRUCTURE commands. To do this, you can

1. Use COPY STRUCTURE EXTENDED to create a table whose records provide information on each field of the original table.
2. Optionally, modify the structural data in the new table with any dBASE command used to manipulate data, such as REPLACE.
3. Use CREATE...FROM to create a new table from the structural information in the structure extended file. The new table is active when you exit CREATE...FROM.

The table created with CREATE...FROM becomes the current table in the currently selected work area. If the CREATE...FROM operation fails for any reason, no table remains open in the current work area.

If any fields in the table created with COPY STRUCTURE EXTENDED have index flag fields set, CREATE...FROM also creates a production .MDX file with the specified index tags.

OODML

No equivalent.

CREATE...STRUCTURE EXTENDED

Topic group Related topics

Creates and opens a table that you can use to design the structure of a new table.

Syntax

CREATE <filename> STRUCTURE EXTENDED
[[TYPE] PARADOX | DBASE]

<tablename> | ?

The name of the table you want to create.

[TYPE] PARADOX | DBASE

Specifies the type of table you want to create, if <filename> does not include an extension. This option overrides the current SET DBTYPE setting. The TYPE keyword is included for readability only; it has no effect on the operation of the command.

Description

CREATE...STRUCTURE EXTENDED creates an empty table, called a structure-extended table, containing five fields of fixed names, types, and lengths. The fields correspond to attributes that describe fields in the table you want to create:

Field	Contents
FIELD_NAME	Character field that contains the name of the field.
FIELD_TYPE	Character field that contains the field's data type.
FIELD_LEN	Numeric field that contains the field length.
FIELD_DEC	Numeric field that contains the number of decimal places for numeric fields.
FIELD_IDX	Character field that indicates if index tags were created on individual fields in the table.

The CREATE...STRUCTURE EXTENDED command is similar to the COPY STRUCTURE EXTENDED command. However, unlike COPY STRUCTURE EXTENDED, which creates a table with records providing information on fields in the current table, CREATE...STRUCTURE EXTENDED creates an empty structure-extended table. After using CREATE...STRUCTURE EXTENDED to create a new table, add records to define the structure of a new table. Then use the CREATE...FROM command to create a new table from the field definitions stored in the structure-extended table.

OODML

Use the SQL command CREATE TABLE to create the STRUCTURE EXTENDED table.

DATABASE()

Topic group Related topics

Returns the name of the current database from which tables are accessed.

Syntax

DATABASE()

Description

DATABASE() returns the name of the current default database selected with the SET DATABASE command. If no database is open, the DATABASE() function returns an empty string ("").

Note: Databases are defined with the BDE Administrator.

OODML

Check the Database object's *databaseName* property.

DBF()

Topic group Related topics

Returns the name of a table open in the current or a specified work area.

Syntax

DBF([<alias>])

<alias>

The work area to check.

Description

DBF() returns the name of the table open in a specified work area. If the table is a file on disk, as it is with DBF and DB tables, the filename includes the extension and the drive letter. If SET FULLPATH is ON, the DBF() function also returns the directory location of the table in addition to the table name.

If no table is in use in the current or specified work area, DBF() returns an empty string ("").

OODML

There is no concept of the "current" Query object. In most cases, you can ascertain the name of the table by parsing the SQL SELECT statement in the Query object's *sql* property.

DELETE

Topic group | Related topics | Example

Deletes records from the current table.

Syntax

DELETE
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is NEXT 1, the current record only.

Description

DBF tables support the concept of soft deletes, where the record is marked as deleted and normally hidden when SET DELETED is ON (the default). If you SET DELETED OFF, you can see the deleted records along with the records that are not marked as deleted. You can RECALL the record to undelete it. To actually remove the record from the table, you must PACK the table. If you use the LIST or DISPLAY commands to display records, records marked as deleted are displayed with an asterisk.

For other table types, when you delete a record, it is removed from the table and cannot be recovered. (Some tables still require you to perform a maintenance operation on the table to reclaim the unused space. For more information, refer to your database server documentation.)

Relying on soft deletes to be able to recover information from deleted records is not recommended. This technique does not scale well to other databases, because they don't support soft deletes. If you want to make data available for recover, consider using an identically-structured purge table that stores copies of the records that you have deleted.

Soft deletes are useful when you want to recycle deleted records. This obviates the need to PACK the table. You BLANK the record before you DELETE it. Then whenever you need to add a new record, you can search for a deleted record and reuse it.

To delete all records from a table, use ZAP.

OODML

Use the Rowset object's *delete*() method. There is no support for soft deletes; if you *delete*() a row in a DBF table, there is no corresponding method to recall it. You may still use the RECALL command.

DELETE example

The following function makes a copy of the record to be deleted from the table named Main in the purge table named Purge:

```
PROCEDURE DelMainRec
  store automem
  select PURGE
  append automem
  select MAIN
  blank
  delete
```

DELETE TABLE

Topic group Related topics

Deletes a specified table.

Syntax

DELETE TABLE <filename> [[TYPE] PARADOX | DBASE]

<filename>

The name of the table that you want to delete.

[TYPE] PARADOX | DBASE

Specifies the type of table you want to create, if <filename> does not include an extension. This option overrides the current SET DBTYPE setting. The TYPE keyword is included for readability only; it has no effect on the operation of the command.

Description

Use the DELETE TABLE command to delete a table and its index, memo, and other associated files. Make sure the table is not in use before you attempt to delete it.

OODML

Use the Database object's *dropTable*() method.

DELETE TAG

Topic group Related topics Example

Deletes index tags from tables.

Syntax

DELETE TAG <tag name 1>
    [OF <filename 1>]
[, <tag name 2>
    [OF <filename 2>]...]

<tag name 1>, <tag name 2>, ... <tag name n>

The index tag names to delete.

OF <filename 1> | ? | <filename skeleton 1>

For DBF tables, specifies the .MDX file containing the tag name to delete. If you specify a file without including an extension, *Visual* dBASE assumes an .MDX extension. If you don't specify an index file, *Visual* dBASE assumes the index tag you want to delete is in the index file with the same name as the current table.

Description

Use DELETE TAG to delete index tags from .MDX files for dBASE tables or secondary indexes on a Paradox table. *Visual* dBASE allows a maximum of 47 index tags in a single .MDX file, so deleting unneeded tags frees slots for new tags as well as reducing the amount of disk space and memory that an .MDX file requires.

For dBASE tables, the .MDX file must be open when you delete the tags. If you delete all tags in an .MDX file, the .MDX file is also deleted. If you delete the production .MDX file by deleting all index tags, the table file header is updated to indicate there is no longer a production index associated with the table.

The table associated with the indexes you want to delete must be opened in exclusive mode. When accessing a Paradox table, specifying DELETE TAG without an argument deletes the primary index.

OODML

Use the Database object's *dropIndex*() method.

DELETE TAG example

The following function deletes all the tags in the current table, which you would do before rebuilding all the tags from scratch.

```
PROCEDURE ZapTags
  do while "" # tag( 1 )
    delete tag tag( 1 )
  enddo
```

DELETED()

Topic group Related topics

Indicates if the current record is marked as deleted.

Syntax

DELETED([<alias>])

<alias>

A work area to check.

Description

DELETED() returns *true* if the current record in the specified work area is marked as deleted otherwise, DELETED() returns *false*.

If no table is open in the current or specified work area, DELETED() also returns *false*.

OODML

No support for soft deletes.

DESCENDING()

Topic group Related topics Example

Indicates if a specified index is in descending order.

Syntax

DESCENDING([<.mdx filename expC>,] [<index position expN> [,<alias>]])

<.mdx filename expC>

The .MDX file that contains the index tag you want to check. The .MDX must be opened in the specified work area. If omitted, all open indexes, including the production .MDX file, are searched.

<index position expN>

the numeric position of the index tag in the specified .MDX file, or the position of the index in the list of open indexes.

<alias>

The work area you want to check.

Note: Unlike most functions, the first parameter is optional. If you omit the first parameter, the remaining parameters shift forward one; the second parameter becomes the first parameter, and so on.

Description

DESCENDING() returns *true* if the index tag specified by the <index position expN> parameter was created with the DESCENDING keyword; otherwise, it returns *false*.

The index must be referenced by number. If you do not specify an .MDX file to check, index numbering in the list of open indexes is complicated if you have open .NDX indexes or you have open non-production .MDX files. For more information on index numbering, see SET INDEX. Either way, it is often easier to reference an index tag by name by using the TAGNO() function to get the corresponding position number.

If you do not specify an index tag, DESCENDING() checks the current master index tag and returns *false* if the master index is an .NDX file or there is no master index.

If the specified .MDX file or index tag does not exist, DESCENDING() returns *false*.

OODML

No equivalent

DISPLAY

Topic group Related topics

Displays records from the current table in the result pane of the Command window.

Syntax

DISPLAY
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]
[[FIELDS] <exp list>]
[OFF]
[TO FILE <filename>]
[TO PRINTER]

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is NEXT 1, the current record only.

FIELDS <exp list>

Field names or expressions whose contents (values) you want to display; the names of the fields in the list are separated by commas. If you omit <exp list>, *Visual* dBASE displays all fields in the current table. The FIELDS keyword is included for readability only; it has no affect on the operation of the command.

OFF

Suppresses display of the record number when displaying records from a DBF table.

TO FILE <filename>

Directs output to a file, as well as to the results pane of the Command window. By default, *Visual* dBASE assigns a .TXT extension to <filename>.

TO PRINTER

Directs output to the default printer, as well as to the results pane of the Command window.

Description

Use DISPLAY to view one or more records of the current table in the results pane of the Command window. If SET HEADINGS is OFF, *Visual* dBASE doesn't display field names when you issue DISPLAY. DISPLAY pauses when the results pane is full and displays a dialog box prompting you to display another screenful of information.

Use the TO FILE clause to send the information to a file. Use the TO PRINTER clause to send the information to the printer. In either case, you can use SET CONSOLE OFF to suppress the display of the information in the results pane.

The LIST command is almost identical to DISPLAY, except that:

- The default scope for LIST is ALL.
- LIST doesn't pause for each screenful of information but rather lists the information continuously.

This makes LIST more appropriate when directing output to a file or printer.

Memo fields are displayed as "MEMO" if they contain data or "memo" if they are empty; unless the field is listed in <exp list>, in which case the contents of the memo field is displayed.

OODML

No equivalent

EDIT

Topic group Related topics

Displays fields in the current table for editing.

Syntax

EDIT [COLUMNAR]

COLUMNAR

Creates a form with the field names in one column and the field controls in another column.

Description

EDIT displays the current record in the current table in a wizard-generated form for editing.

OODML

Use a form.

EOF()

Topic group Related topics Example

Indicates if the record pointer is at the end-of-file.

Syntax

EOF([<alias>])

<alias>

The work area to check.

Description

EOF() returns *true* when the record pointer in the current or specified work area is positioned past the last record; otherwise it returns *false*. If you attempt to navigate forward when EOF() is *true*, an error occurs.

When you first USE a table, EOF() is *true* if the table is empty, or you are using a conditional index with no matching records.

Many operations leave the record pointer at the end-of-file when they are complete or when they fail. For example, EOF() returns *true* after SCAN processes the last record in a table, when you use SKIP to pass the last record in a table, when you use LIST with no options, or when SEEK() or SEEK fails to find the specified record (and SET NEAR is OFF).

The position at the end-of-file is sometimes referred to as the phantom record. When you get the values of the fields at the phantom record, they are always blank. Attempting to REPLACE field values in the phatom record causes an error.

If no table is open in the specified work area, EOF() returns *false*.

OODML

The Rowset object's *endOfSet* property is *true* when the row pointer is past either end of the rowset. Unlike BOF() and EOF(), there is symmetry with the *endOfSet* property. You can determine which end you're on based on the direction of the last navigation.

There is also an *atLast*() method that determines whether you are on the last row in the rowset, the row before EOF().

EOF() example

The following is an event handler for a button that navigates forward through a table:

```
PROCEDURE nextButton_onClick
  if .not. eof()
    skip
  endif
  if eof()
    msgbox( "Last record", "Navigation", 64 )
  endif
```

This example demonstrates an atypical programming construct: instead of using IF and ELSE, there is an IF statement for a condition, followed by a separate IF statement for the opposite condition. In this case, it works like this: if you are already at EOF() you do not want to attempt to navigate forward, because that will cause an error. But if you end up at EOF(), or if you're already at EOF(), then you will get a message.

Many processes require traversing the entire table. The SCAN loop is designed to visit each record automatically, but sometimes you may want to manually code a loop and check for EOF() to see when you are done. For an example of this, see the example for COPY TO ARRAY.

FDECIMAL()

Topic group Related topics

Returns the number of decimal places in a specified field of a table.

Syntax

FDECIMAL(<field number expN> [, <alias>])

<field number expN>

The position of the field that you want to evaluate. The first field in a table is field number 1.

<alias>

The work area that contains the field to check.

Description

FDECIMAL() returns the number of decimal places in a specified field of a table. FDECIMAL() returns zero if the field has no decimal places, if the field is not a numeric field, or if the table doesn't contain a field in the specified position.

OODML

Check the *decimalLength* property of the Field object.

FIELD()

Topic group Related topics Example

Returns the name of the field in a specified position of a table.

Syntax

FIELD(<field number expN> [, <alias>])

<field number expN>

The position of the field whose name you want returned. The first field in a table is field number 1.

<alias>

The work area to check.

Description

FIELD() returns the name of a field in a table based on the specified <field number expN> parameter. The example shows a function that performs the reverse operation, returning the field number for a specified field name.

If the field name has spaces, FIELD() returns the name enclosed in colons, for example:

```
:Primary power coupling:
```

FIELD() returns an empty string ("") if the table does not contain a field in the specified position.

OODML

Check the *fieldName* property of the Field object.

FIELD() example

The following uses the FIELD() function to perform the reverse operation: return the number of a field with the given name.

```
PROCEDURE FieldNum( cName, xAlias )
  local nWork, nFld
  if argcount() < 2
    xAlias = workarea()
  endif
  for nFld = 1 to fldcount( xAlias )
    if upper( cName ) == upper( field( nFld, xAlias ))
      return nFld
    endif
  endfor
  return 0
```

This function takes an optional alias parameter, just like the FIELD() function. If the alias is not specified, the current work area number is used.

The names are converted to uppercase for comparison, so the field name specified does not have to match the case of the field in the table.

FLDCOUNT()

Topic group Related topics

Returns the number of fields in a table.

Syntax

FLDCOUNT([<alias>])

<alias>

The work area you want to check.

Description

FLDCOUNT() returns the number of fields for the table opened in the current or specified work area. FLDCOUNT() returns a value of 0 if no table is open in that work area.

OODML

Check the *size* property of Rowset object's *fields* array.

FLDLIST()

Topic group Related topics

Returns the fields and calculated field expressions of a SET FIELDS TO list.

Syntax

FLDLIST([<field number *expN*>])

<field number expN>

The position of the field or calculated field expression in a SET FIELDS TO list whose name you want returned. If you do not specify a field number, FLDLIST() returns the entire field list.

Description

FLDLIST() returns the field or calculated field expression in a SET FIELDS TO list that corresponds to a specified field number. If you do not specify a field number, FLDLIST() returns the entire field list. Each field name or expression in the field list is separated by a comma. FLDLIST() always returns fully-qualified field names, that is, it includes the table or alias name. For read-only fields, FLDLIST() appends "/R" to the field name.

FLDLIST() returns the field liest even if SET FIELDS is OFF. If there is no SET FIELDS TO list, or the specified field number exceeds the number of items in the field list, FLDLIST() returns an empty string ("").

OODML

Check the *fieldName* property of the Field object for a normal field. A calculated field is defined by either its *value* property, or by its *beforeGetValue* event.

FLENGTH()

Topic group Related topics Example

Returns the length of the field in a specified position of a table.

Syntax

FLENGTH(<field number expN> [, <alias>])

<field number expN>

The position of the field whose length you want returned. The first field in a table is field number 1.

<alias>

The work area you want to check.

Description

FLENGTH() returns the length of a field in a table based on the specified <field number expN> parameter. The field length for numeric fields includes the decimal digits and one for the decimal point character. Certain field types have fixed lengths. For example, in a DBF table, FLENGTH() returns 8 for date fields and 10 for memo fields.

FLENGTH() returns 0 if the table does not contain a field in the specified position.

OODML

Check the *length* property of the Field object.

FLENGTH() example

The following routine is used to read the data in a generated text file into the corresponding fields of a table. Character fields in the text file are the same length as in the table. Dates are formatted in six characters as MMDDYY (which matches the current SET DATE format). Numbers are always twelve characters and represent currency stored in cents, so it needs to be divided by 100.

```
function decodeLine( cLine, aDest )
  #define YEAR_LEN 2
  #define NUM_LEN  12
  local nPtr, nFld, cFld, nLen
  nPtr = 1                    && Pointer into string
  for nFld = 1 to fldcount()
    cFld = field( nFld )      && Store name of field in string variable for
reuse
    do case
      case type( cFld ) == "C"
        aDest[ nFld ] = substr( cLine, nPtr, flength( nFld ))
        nPtr += flength( nFld )
      case type( cFld ) == "D"
        aDest[ nFld ] = ctod( substr( cLine, nPtr, 2 ) + "/" + ;
                              substr( cLine, nPtr + 2, 2 ) + "/" + ;
                              substr( cLine, nPtr + 4, YEAR_LEN ) )
        nPtr += 2 + 2 + YEAR_LEN
      case type( cFld ) == "N"
        aDest[ nFld ] = val( substr( cLine, nPtr, NUM_LEN )) / 100
        nPtr += NUM_LEN
    endcase
  endfor
```

An array is passed to the routine along with the line to read. The field values are stored in the array, which is appended to the table with APPEND FROM ARRAY in the calling routine (not shown here). The function defines some manifest constants for the size of a numeric field and whether the year is two or four digits in case this changes in the future. A FOR loop goes through each field in the table. The name of each field is stored in a variable for convenience; it's used repeatedly in the DO CASE structure.

FLOCK()

Topic group Related topics

Locks a table.

Syntax

FLOCK([<alias>])

<alias>

The work area you want to lock.

Description

Use FLOCK() to lock the table in the current work area, or in another specified work area, preventing others from using the table.

When you lock a table with FLOCK(), only you can make changes to it. However, unlike USE...EXCLUSIVE and SET EXCLUSIVE ON, FLOCK() lets other users view the locked table while you are using it. When you lock a table with FLOCK(), it remains locked until you issue UNLOCK or close the table.

FLOCK() is similar to RLOCK(), except that FLOCK() locks an entire table, while RLOCK() lets you lock specific records of a table. Use FLOCK(), therefore, when you need to have sole access to an entire table or related tables—for example, when you need to update multiple tables related by a common key.

FLOCK() can lock a table even if another user is viewing data contained in the table. FLOCK() is unsuccessful only if another user has explicitly locked the table or a record in the table, or is using a command that automatically locks the table or a record in the table. FLOCK() returns *true* if it is successful, and *false* if it is not.

All commands that change table data cause *Visual* dBASE to attempt an automatic record or file lock. If *Visual* dBASE fails to get an automatic record or file lock, it an error occurs. You might want to use FLOCK() to handle a lock failure youself, instead of letting the error occur.

When SET REPROCESS is set to 0 (the default) and FLOCK() can't immediately lock a table, *Visual* dBASE prompts you to attempt the lock again or cancel the attempt. Until you choose to cancel the function, FLOCK() repeatedly attempts to lock the table. Use SET REPROCESS to eliminate being prompted to cancel the FLOCK() function, or to set the number of locking attempts.

When you set a relation to a parent table with SET RELATION and then lock the table with FLOCK(), *Visual* dBASE attempts to lock all child tables. For more information about relating tables, see SET RELATION.

OODML

Use the Rowset object's *lockSet*() method.

FLUSH

Topic group Related topics

Writes data buffers for the current work area to disk.

Syntax

FLUSH

Description

Use FLUSH to protect data integrity.

When you open a table, *Visual* dBASE loads a certain number of records from that table into a memory buffer, along with the portion of each open index that pertains to those records. When another block of records needs to be read or when you close tables, *Visual* dBASE writes the records in the buffer back to disk, storing any modifications you have made.

FLUSH allows you to save information from the data buffer to disk on-demand, without closing the table. Use FLUSH when you need to store critical information to disk that could otherwise be lost. However, don't use FLUSH too frequently, as it slows execution. For example, in an order-entry application in which only a few orders are entered each hour, FLUSH can save data that might be lost if the power is inadvertently turned off; since orders are entered infrequently, the time needed to execute FLUSH is not important.

OODML

Use the Rowset object's *flush*() method.

FOR()

Topic group Related topics Example

Returns the FOR clause of a specified index tag.

Syntax

FOR([<.mdx filename expC>,] [<index position expN> [,<alias>]])

<.mdx filename expC>

The .MDX file that contains the index tag you want to check. The .MDX must be opened in the specified work area. If omitted, all open indexes, including the production .MDX file, are searched.

<index position expN>

the numeric position of the index tag in the specified .MDX file, or the position of the index in the list of open indexes.

<alias>

The work area you want to check.

Note: Unlike most functions, the first parameter is optional. If you omit the first parameter, the remaining parameters shift forward one; the second parameter becomes the first parameter, and so on.

Description

FOR() returns a string containing the FOR expression of the specified .MDX tag. FOR() returns an empty string ("") if the specified index tag does not have a FOR expression.

The index must be referenced by number. If you do not specify an .MDX file to check, index numbering in the list of open indexes is complicated if you have open .NDX indexes or you have open non-production .MDX files. For more information on index numbering, see SET INDEX. Either way, it is often easier to reference an index tag by name by using the TAGNO() function to get the corresponding position number.

If you do not specify an index tag, FOR() checks the current master index tag and returns an empty string if the master index is an .NDX file or there is no master index.

If the specified .MDX file or index tag does not exist, FOR() returns an empty string.

OODML

No equivalent.

FOUND()

Topic group Related topics Example

Indicates if the last-issued search command found a match.

Syntax

FOUND([<alias>])

<alias>

The work area you want to check.

Description

FOUND() returns *true* if LOCATE, CONTINUE, SEEK, LOOKUP(), or SEEK() found a match in the current or specified table. FOUND() returns *false* if no previous search has been performed in that work area, or if the last search was unsuccessful. You can perform searches in different work areas and maintain the status of each FOUND() operation, independent of the other work areas.

If tables are linked by a SET RELATION TO command, *Visual* dBASE searches the related tables as you move in the active table with normal navigation or with a search command. This allows you to determine if there is a match in related tables.

When SET NEAR is ON and you use SEEK or SEEK(),

- FOUND() returns *true* if an exact match occurs.
- FOUND() returns *false* for a near match, and the record pointer is moved to the record whose key immediately follows the value searched for.

When SET NEAR is OFF, FOUND() returns *false* if a match does not occur.

OODML

Check the return value of the Rowset object's *findKey*() or *findKeyNearest*() method.

FOUND() example

The following statements create a relation between a table of customers and orders, and use FOUND() to show only those customers that have orders:

```
use CUSTOMER
use ORDERS in select() order CUST_DATE
set relation to CUST_ID into ORDERS
set filter to found( "ORDERS" )
```

GENERATE

Topic group Related topics

Adds random records to the current table.

Syntax

GENERATE [<expN>]

<expN>

A number of random-data records to add to the current table. If you specify a <expN> value that is less than or equal to 0, no records are generated. If you don't specify a value for <expN>, *Visual* dBASE prompts you for a number.

Description

GENERATE fills a table with sample data. If a table contains existing records, GENERATE leaves them intact and adds <expN> records to the table.

GENERATE does not create data for memo or binary fields.

OODML

No equivalent.

GO

Topic group Related topics

Moves the record pointer to the specified position in a table.

Syntax

GO[TO]
BOTTOM | TOP | <bookmark> | [RECORD] <expN>
[IN <alias>]

TO

Include for readability only; you may use GO or GOTO.

BOTTOM | TOP | <bookmark> | [RECORD] <expN>

Specifies where to move the record pointer. The following table describes each of the available keywords or options.

Option	Moves the record pointer to
BOTTOM	The last record in the table, using the current index order, if any.
TOP	The first record in the table, using the current index order, if any
<bookmark>	The record saved in <bookmark>
[RECORD] <expN>	That record number. Entering a number in the Command window is equivalent to GO <expN>. The RECORD keyword is included for readability only; it has no affect on the operation of the command.

IN <alias>

The work area where you want to move the record pointer.

Description

GO positions the record pointer in a table.

GO <expN> or GO RECORD <expN> moves the record pointer to a specific record, regardless of whether a master index is open or where that record number occurs in an indexed order. It works only for DBF tables. For tables that do not support record numbers (that is, Paradox and SQL tables), GO <expN> causes an error.

To go to a specific record, use the BOOKMARK() to get a bookmark for that record and store it in a variable or property. Then when you need to go back to that record, issue GO <bookmark>.

If an index isn't in use, TOP and BOTTOM refer to the first and last records in a table. If an index is in use for a table, TOP and BOTTOM refer to the first and last records in the index order.

If a relation is set up among several tables, moving the record pointer in the parent table with GOTO repositions the record pointer in a child table to a related record. If there is no related record, the child table record pointer is positioned at the end of the file. Moving the record pointer in a child table, however, doesn't reposition the record pointer in the parent table.

OODML

Use the Rowset object's *first*(), *last*(), and *goto*() methods.

INDEX

Topic group Related topics Example

Creates an index for the current table.

Syntax

For DBF tables:

```
INDEX ON <key exp>
TAG <tag name>
    [OF <.mdx filename>]
[FOR <condition>]
[DESCENDING]
[UNIQUE | DISTINCT | PRIMARY ]
```

or to create dBASE III-compatible .NDX index files:

```
INDEX ON <key exp> TO <.ndx filename> [UNIQUE]
```

For DB and SQL tables:

```
INDEX ON <field list>
PRIMARY | TAG <tag name> [UNIQUE]
```

<key exp>

For DBF tables, <key exp> can be a dBASE expression of up to 220 characters that includes field names, operators, or functions. The maximum length of the key—the result of the evaluated index <*key exp*>—is 100 characters.

<field list>

For Paradox and SQL tables, indexes can't include expressions; however, you can create indexes based on one or more fields. In that case, you specify the index key as a <field list>, separating the name of each field with a comma.

TAG <tag name>

Specifies the name of the index tag for the index

OF <.mdx filename>

Specifies the .MDX multiple index file that *Visual* dBASE adds new index tags to. If you do not specify an .MDX file, index tags are added to the production .MDX file. If you specify a file that doesn't exist, *Visual* dBASE creates it and adds the index tag name. By default, *Visual* dBASE assigns an .MDX extension and saves the file in the current directory.

TO <.ndx filename>

Specifies the name of an .NDX index file.

FOR <condition>

Restricts the records *Visual* dBASE includes in the index to those meeting the specified <condition>.

DESCENDING

Creates the index in descending order (Z to A, 9 to 1, later dates to earlier dates). Without DESCENDING, INDEX creates an index in ascending order.

UNIQUE

For DBF tables, prevents multiple records with the same <key exp> value from being included in the index; *Visual* dBASE includes in the index only the first record with that value. For DB and SQL tables, specifies creating a distinct index which prevents entry of duplicate index keys in a table.

DISTINCT

Prevents multiple records with the same <key exp> value from being included in the table; any such attempt causes a key violation error. Records marked as deleted are never included in a DISTINCT index. DISTINCT indexes may be created for DBF tables only.

PRIMARY

Specifies that the index is the primary key for the table. For DBF tables, the PRIMARY index is a distinct

index that is designated as the primary index; it currently has no other special meaning. For DB and SQL tables, the primary key has a specific meaning. A table may have only one primary key.

Description

Use INDEX to organize data for rapid retrieval and ordered display. INDEX doesn't actually change the order of the records in a table but rather creates an index in which records are arranged in numeric, alphabetical, or date order based on the value of a key expression. Like the index of a book, with ordered entries and corresponding page numbers, an index file contains ordered key expressions with corresponding record numbers. When the table is used with an index, the contents of the table appear in the order specified by the index.

DBF expression indexes

To index on multiple fields in a DBF table, you must create an expression index. When combining fields with different data types, use conversion functions to convert all the fields to the same data type. Most multi-field expression indexes are character type; numeric and date fields are converted to strings using the STR() and DTOS() functions. When using the STR() function, be sure to specify the length of the resulting string so that it matches the numeric field.

Note: Do not use the DTOC() function to convert a date to a string. In many date formats, the day comes before the month, or the month comes before the day and year, resulting in records in the wrong order.

To concatenate the fields, use the + or - operators.

Warning: Do not create an index where the length of the index key expression varies from record to record. Specifically, do not use TRIM() or LTRIM() to remove blanks from strings unless you compensate by adding enough spaces to make sure the index key values are all the same length. The - operator concatenates strings while rearranging trailing blanks. Varied key lengths may cause corrupted indexes.

If a function is used in a key expression, keep in mind that the index is ordered according to the function output. Thus, when you use search for a particular key, you must search for the key expression as it was generated. For example, INDEX ON SOUNDEX(Name) TO Names creates an index ordered by the values SOUNDEX() returns. When attempting to find data by the key value, you would have to use something like SEEK SOUNDEX("Jones") rather than SEEK "Jones".

FOR <condition> limits the records that are included in the index to those meeting the specified condition. For example, if you use INDEX ON Lastname + Firstname TO Salaried FOR Salary > 24000, *Visual* dBASE includes only records of employees with salaries higher than $24,000 in the index. The FOR condition can't include calculated fields.

The following built-in functions may be used in the index <key exp> and FOR <condition> expressions of a DBF index tag.

Table 13.1 List of functions supported in DBF expression indexes

ABS()	CHR()	FLOOR()	MEMLINES()	RTOD()
ACOS()	COS()	FV()	MIN()	RTRIM()
ANSI()	CTOD()	HTOI()	MLINE()	SECONDS()
ASC()	DATABASE()	ID()	MOD()	SIGN()
ASIN()	DATE()	INT()	MONTH()	SIN()
AT()	DAY()	ISALPHA()	OEM()	SOUNDEX()
ATAN()	DBF()	ISBLANK()	OS()	SPACE()
ATN2()	DELETED()	ISLOWER()	PAYMENT()	SQRT()
BITAND()	DIFFERENCE()	ISUPPER()	PI()	STR()
BITLSHIFT()	DOW()	ITOH()	PROPER()	STUFF()
BITNOT()	DTOC()	LEFT()	PV()	SUBSTR()
BITOR()	DTOR()	LEN()	RAND()	TAN()

BITRSHIFT()	DTOS()	LIKE()	RAT()	TIME()
BITSET()	ELAPSED()	LOG()	RECNO()	TRIM()
BITXOR()	EMPTY()	LOG10()	RECSIZE()	UPPER()
BITZRSHIFT()	EXP()	LOWER()	REPLICATE()	VAL()
CEILING()	FCOUNT()	LTRIM()	RIGHT()	VERSION()
CENTER()	FIELD()	MAX()	ROUND()	YEAR()

Index sort order

In an index, records are usually arranged in ascending order, with lowest key values at the beginning of the index. Using the DOS Code Page 437 (U.S.) character set, character keys are ordered in ASCII order (from A to Z and then from a to z); numeric keys are ordered from lowest to highest numbers; and date keys are ordered from earliest to latest date (a blank date is higher than all other dates). Use the UPPER() function on the key expression to convert all lowercase letters to uppercase and achieve alphabetical order for character-type indexes.

Note: Most non-U.S. character sets provide a different sort order for characters than the DOS Code Page 437 character set.

You can reverse the order of an index, arranging records in descending order, by including the DESCENDING keyword. (You can use DESCENDING only when building .MDX tags.)

Distinct, primary, and unique indexes

You may use an index to ensure that there are no duplicate key values. For example, in a table of customers, each customer is assigned their own unique customer ID number. To prevent an existing customer ID number from being used by another customer, you can create a special kind of index on the customer ID field. For DB and SQL tables, this type of index is called a unique index; the key value for each record in the table must be unique. For DBF tables, this type of index is called a distinct index; a unique index for a DBF table has a different meaning. For clarity, the DBF terms are used.

A distinct index is created with the DISTINCT option for DBF tables, and the UNIQUE option for DB and SQL tables. When a table has a distinct index, any attempt to create a duplicate key entry, either by adding a new record with a duplicate value or by changing an existing record so that its key field(s) duplicates another record, causes a key violation error. The new or changed record is not written to the table. Distinct indexes for DBF tables never include records that are marked as deleted.

A table may also have one distinct index designated as its primary index, or primary key. A primary index is usually created for the ID field or fields that uniquely identify each record in the table. For example, while you may index on the customer's name, their ID field is what uniquely identifies each customer, and that is the field you use for the primary key. For DB tables, a table's primary key determines the default order for the records in the table, and you must have a primary key to create other secondary indexes. For DBF tables, a primary key currently has no special meaning, other than self-documenting the primary key field(s) of the table. The PRIMARY clause is used to create the primary index. For DB and SQL tables, a primary index may have no other options other than the field list.

DBF tables support a kind of index that allows duplicate key values in the table, but only shows the first such record in the index. These are called unique indexes, not to be confused with the distinct unique indexes used by DB and SQL tables. For example, you may be interested in the names of the cities in which your customers reside. By using a unique index, each city is listed once (alphabetically), no matter how many customers you have in that city.

A record's index key value is tested for uniqueness only when the record is added or updated. For example, suppose you have a unique index on the City field, and have records in both "Bismark" and "Fargo". If you append another record in "Bismark", it does not appear in the index, although the table is updated with the new record. If you then change the first record, which was listed in the index, from "Bismark" to "Fargo", then it too becomes hidden because there is already a "Fargo" in the index. It also does not automatically expose the other record with "Bismark", because that record was not updated; no records in "Bismark" are in the index at that moment. REINDEX explicitly updates all key values in a unique index.

Indexing a table with SET UNIQUE ON has the same effect as INDEX with the UNIQUE option. With DB

and SQL tables, it creates a distinct index. With DBF tables, it creates a unique index.

Using indexes

Once a table has been indexed, use LOOKUP(), SEEK, and SEEK() to retrieve data. The structure of an index file allows these commands to quickly locate values of the key expression.

Whenever data in key fields is modified, *Visual* dBASE automatically updates all open index files. Index files closed when changes are made in a table can be opened and then updated using REINDEX.

Multiple index files simplify updating indexes, since *Visual* dBASE updates all indexes with tag names listed in .MDX files specified with USE...ORDER or SET ORDER. *Visual* dBASE automatically opens a production .MDX file, if one exists, when you use the associated table.

INDEX...TAG creates an index and adds the tag name to a multiple index file. If you don't include OF <filename>, INDEX...TAG adds the tag name to the production .MDX file. *Visual* dBASE creates the production .MDX or the specified file if it doesn't already exist.

INDEX is similar to SORT, another command that allows ordering of a table. Unlike INDEX, though, SORT physically rearranges the table records, a time-consuming process for large files. To maintain the sorted order, either new records must be inserted in their proper position, which is also very time-consuming, or the entire table must be resorted. Also, SORT doesn't support LOOKUP(), SEEK, or SEEK(), making the process of locating data in a sorted table much slower.

At the end of an indexing operation, the new index file is the master index, and the record pointer is positioned at the first record of the new indexed.

OODML

Use the Database object's *createIndex*() method.

INDEX example

The following example creates an index based on the last name and first name in a table:

```
index on upper( LAST_NAME + FIRST_NAME ) tag FULL_NAME
```

The next example indexes on a customer ID and the order date as the primary key for an Orders table:

```
index on CUST_ID + dtos( ORDER_DATE ) tag CUST_ORD primary
```

ISBLANK()

Topic group Related topics

Determines if a specified field or expression is blank.

Syntax

ISBLANK(<exp>)

<exp>

An expression of any data type.

Description

ISBLANK() returns *true* if a specified expression is blank or *null*; *false* if it contains data. A field is blank if it has never contained a value or if you used the BLANK command on it. ISBLANK() returns a different result from EMPTY() when used on numeric fields; ISBLANK() differentiates between zero and blank values, while EMPTY() does not.

ISBLANK() is especially useful when performing functions such as averaging, since it ensures that blank values are not included in the calculation. If you don't need to differentiate between 0 or blank values in numeric fields, you can use either ISBLANK() or EMPTY().

OODML

No equivalent.

ISTABLE()

Topic group Related topics

Tests for the existence of a table in a specified database.

Syntax

ISTABLE(<filename>)

<filename>

The name of the table to search for. You cannnot use a filename skeleton for ISTABLE(). If you do, it will return *false*.

Description

Use ISTABLE() to confirm the existence of a table. If the table exists, ISTABLE() returns *true*; otherwise it returns *false*.

OODML

Use the Database object's *tableExists*() method.

KEY()

Topic group Related topics Example

Returns the key expression of the specified index.

Syntax

KEY([<.mdx filename>,] [<index position expN> [,<alias>]])

<.mdx filename expC>

The .MDX file that contains the index tag you want to check. The .MDX must be opened in the specified work area. If omitted, all open indexes, including the production .MDX file, are searched.

<index position expN>

the numeric position of the index tag in the specified .MDX file, or the position of the index in the list of open indexes.

<alias>

The work area you want to check.

Note: Unlike most functions, the first parameter is optional. If you omit the first parameter, the remaining parameters shift forward one; the second parameter becomes the first parameter, and so on.

Description

KEY() returns a string containing the key expression of the specified index. To see the value of the key expression for a given record, store the string returned by KEY() in a private variable. Then use macro substitution to evaluate the expression.

The index must be referenced by number. If you do not specify an .MDX file to check, index numbering in the list of open indexes is complicated if you have open .NDX indexes or you have open non-production .MDX files. For more information on index numbering, see SET INDEX. Either way, it is often easier to reference an index tag by name by using the TAGNO() function to get the corresponding position number.

If you do not specify an index tag, KEY() checks the current master index tag and returns an empty string if there is no master index.

If the specified .MDX file or index tag does not exist, KEY() returns an empty string.

OODML

No equivalent.

KEY() example

The following example displays the current index key value during navigation for debugging purposes:

```
PROCEDURE Form_onNavigate
  private cKey
  cKey = key()
  ? "Key value: [" + &cKey + "]"
```

KEYMATCH()

Topic group Related topics

Indicates if a specified expression is found in an index.

Syntax

KEYMATCH (<exp> [,<index number> [,<alias>]])

where <index number> is:

<index position expN> | [<.mdx filename expC>,] <tag expN>

<exp list>

The expression, of the same data type as the index, that you want to look for.

<index position expN>

The numeric position of the index in the list of open indexes for the table.

<.mdx filename expC>

The .MDX file that contains the index tag you want to check. The .MDX must be opened in the specified work area.

<tag expN>

The numeric position of the index tag in the specified .MDX file.

<alias>

The work area you want to check.

Description

The KEYMATCH() function determines if a specified key expression is found in a particular index. KEYMATCH() returns *true* or *false* to indicate whether the specified expression was found. SET EXACT controls whether exact matches of character string data is required.

A primary use of the KEYMATCH() function is to check for duplicate values when adding records. Unlike SEEK(), KEYMATCH() looks for a matching index value without moving the record pointer and disturbing the current state of the record buffer.

KEYMATCH() ignores the settings for SET FILTER and SET KEY TO, ensuring the integrity of data in a table even when you work with a subset of the table records. KEYMATCH() honors SET DELETED, so that when SET DELETED is ON, existing key values in records marked as deleted are ignored, as if those records did not exist.

If you specify only an expression (<exp>) whose value you want to match, KEYMATCH() searches the current master index for an index key with the same value.

To search indexes other than the current master index, you must specify the index by index position. There are two ways to do this:

- By the index's position in the list of open indexes. Index numbering is complicated if you have open .NDX indexes or open non-production .MDX files. For information on index numbering, see SET INDEX.
- By an index tag's position in an .MDX file. If you do not specify <.mdx filename expC>, the production .MDX is used.

Either way, it is often easier to reference an index tag by name by using the TAGNO() function to get the corresponding position number.

OODML

No equivalent.

LIST

Topic group Related topics

Displays records from the current table in the result pane of the Command window.

Syntax

LIST
[<*scope*>]
[FOR <*condition 1*>]
[WHILE <*condition 2*>]
[[FIELDS] <*exp list*>]
[OFF]
[TO FILE <*filename*>]
[TO PRINTER]

Description

Both LIST and DISPLAY display records in the results pane of the Command window. There are two differences between the commands:

- LIST displays continuously until complete, while DISPLAY pauses after each screenful of information.
- The default scope of LIST is ALL, while the default scope of DISPLAY is NEXT 1, the current record only.

Because LIST does not pause between screens, it is more appropriate when directing output to a file or printer. For more information on the options of LIST, see DISPLAY.

OODML

No equivalent.

LKSYS()

Topic group | Related topics | Example

Returns information about a locked record or file.

Syntax

LKSYS(<expN>)

<expN>

A number representing the information for LKSYS() to return:

Value	Returns
0	Time when lock was placed
1	Date when lock was placed
2	Login name of user who locked record or file
3	Time of last update or lock
4	Date of last update or lock
5	Login name of user who last updated or locked record or file

Description

LKSYS() returns multiuser information contained in a _DBASELOCK field of a DBF table. For LKSYS() to return information, the current table must have a _DBASELOCK field. Use CONVERT to add a _DBASELOCK field to a table. If the current table doesn't contain a _DBASELOCK field, LKSYS() returns an empty string for any value of <expN>.

Note: LKSYS() works only with DBF tables.

LKSYS() always returns a string. When LKSYS() returns a date, it is a string containing the date in the current date format dictated by SET DATE and SET CENTURY. Use CTOD() to convert the date string to a date.

When a record is locked, either explicitly or automatically, the time, date, and login name of the user placing the lock are stored in the _DBASELOCK field of that record. When a file is locked, this same information is stored in the _DBASELOCK field of the first physical record in the table.

Passing 0, 1, or 2 as arguments to LKSYS() returns values only after an attempted file or record lock has failed. If a file or record lock on a converted table fails, the information for LKSYS() arguments 0, 1, and 2 is written to a buffer from the record's _DBASELOCK field. If you then pass 0, 1, or 2 to LKSYS(), the information is read from the buffer. The buffer isn't overwritten until you attempt another lock that fails. Thus, 0, 1, and 2 always return the information that was current at the time of the last lock failure.

You can pass 3, 4, or 5 as arguments to LKSYS() whether or not the current record or file is currently locked. These arguments return information about the last successful record or file lock. When you pass any of these arguments to LKSYS(), it returns information directly from the _DBASELOCK field rather than from an internal buffer.

If you pass 2 or 5 to obtain a user login name, and the _DBASELOCK field is only 8 characters wide, LKSYS() returns an empty string. The first 8 characters of a _DBASELOCK field are the count, time, and date information of the last update or lock, so the field must be wider than 8 characters to fit part or all of the login user name. Set the width of the field with CONVERT.

OODML

Check the properties of the rowset.fields["_DBASELOCK"] field.

LKSYS() example

The following function is used to lock individual records. If it fails, it uses LKSYS() to display information on who has the lock and when they got it. SET REPROCESS must be changed to 1 instead of 0 so that if the lock attempt fails the standard dialog, which does not have as much information, will not be displayed.

```
PROCEDURE RecLock
  local cMsg
  do while .t.
    if rlock()
      return .t.
    else
      cMsg = "Locked by: " + lksys(2) + chr(13) + ;
             "since: " + lksys(1) + " " + lksys(0)
      if msgbox( cMsg, "Record is locked by another", 5 + 48 ) == 2
        return .f.
      endif
    endif
  enddo
```

The MSGBOX() used is a Retry/Cancel dialog box. The button number, which MSGBOX() returns, is 2 if the Cancel button is clicked or the user presses Esc.

LOCATE

Topic group Related topics Example

Searches a table for the first record that matches a specified condition.

Syntax

LOCATE
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is ALL. LOCATE is usually used with a FOR condition.

Description

LOCATE performs a sequential search of a table and tests each record for a match to the specified condition. If a match is found the record pointer is left at that record. Issuing CONTINUE resumes the search, allowing additional records meeting the specified condition to be found.

Whenever a match is found, FOUND() returns *true*. If match is not found, the record pointer is left after the last record checked, which usually leaves it at the end-of-file. Also, FOUND() returns *false*.

If SET TALK is ON, LOCATE will display the record number of the matching record in the result pane of the Command window if you are searching a DBF table. If no match is found, LOCATE will display "End of Locate scope"

Because the default scope of the command is ALL, issuing LOCATE with no options will move the record pointer to the first record in the table, because that is the first matching record in that scope. However, there is no practical reason to use LOCATE in this manner. A FOR condition is usually used with LOCATE to find records that match a condition. An understanding of command scope is essesntial to using LOCATE effectively.

LOCATE does not require an indexed table; however, if an index is in use, LOCATE follows its index order. When using the = operator to compare strings, LOCATE uses the rules established by SET EXACT to determine whether the strings match. Use the == operator to perform exact matches regardless of SET EXACT.

The search commands LOCATE and SEEK are each designed for use under particular conditions. LOCATE is the most flexible, accepting expressions of any data type as input and searching any field of a table. For large tables, however, a sequential search using LOCATE might be slow.

Use SEEK or SEEK() for greater speed. Both conduct an indexed search, similar to looking up a topic in a book index and turning directly to the appropriate page, allowing information to be found almost immediately. Once you use the INDEX command to create an index for a table, SEEK uses this index to quickly identify an appropriate record.

You can use SEEK and LOCATE in combination. Use SEEK to quickly narrow down a search and then use LOCATE with the appropriate scope to find the exact you're looking for.

OODML

Use the Rowset object's *beginLocate*() and *applyLocate*() methods.

LOCATE example

The following example uses SEEK and LOCATE in combination to find the first vendor in Texas that is not in either Dallas or Houston. The table is indexed on state and city, but you cannot use SEEK alone to find a matching record.

```
use VENDOR order STATE_CITY
if seek( "TX" )
  locate while STATE == "TX" for CITY # "Dallas" .and. CITY # "Houston"
  if found()
    *-- Do something
  endif
endif
```

If SEEK() finds a vendor in Texas, the WHILE clause of the LOCATE command restricts the sequential search to Texas. The FOR clause looks for the city match, (or non-match in this case).

LOCK()

Topic group Related topics

Locks the current record or a specified list of records in a table.

Syntax

LOCK([<*record list expC*>,<*alias*>] | [<alias>])

<list expC>

The list of record numbers to lock, separated by commas.

<alias>

The work area in which to lock records.

Description

LOCK() is identical to RLOCK(). For more information, see RLOCK().

LOOKUP()

Topic group Related topics Example

Searches a field for a specified expression and, if the expression is found, returns the value of a field within the same record.

Syntax

LOOKUP(<return field>, <exp>, <lookup field>)

<return field>

The field whose value you want to return if a match is found.

<exp>

The expression to look for in the <lookup field>. Specify an alias when referring to fields outside the current work area.

<lookup field>

The field you want to search for the value <exp>.

The <return field> and <lookup field> are usually fields in the same table, a table that is not in the current work area. Use the alias name and alias operator (->) to reference fields in other tables.

Description

LOOKUP() looks for the first record where <lookup field> matches the specified expression <exp>. The record pointer is left at the matching record. If no match is found, the record pointer is left at the end-of-file. Either way, LOOKUP() then returns the value of <return field>.

Therefore, if no match is found, LOOKUP() returns the blank value for that field, either an empty string (""), zero, a blank date, or *false*, depending on the data type of <lookup field>. Calling FOUND() will also return *true* or *false* to indicate if the search was successful.

LOOKUP() performs a sequential search, unless an index whose key matches <lookup field> is available in the lookup table. To minimize the time LOOKUP() takes to search a table, you should create index keys for your most common lookups.

Because LOOKUP() moves the record pointer you can perform a lookup with related tables, where the <lookup field> is in the parent table, and <return field> is in the child table.

OODML

No equivalent.

LOOKUP() example

The following event handler displays the city for a zip code that is typed into the control:

```
PROCEUDRE zipCode_onChange
  form.city.text = lookup( ZIPCODE->CITY, this.value, ZIPCODE->ZIP_CODE )
```

LUPDATE()

Topic group Related topics

Returns the date of the last change to a table.

Syntax

LUPDATE([<alias>])

<alias>

The work area you want to check.

Description

LUPDATE() returns the last update date of the specified table. If no table is open, LUPDATE() returns a blank date.

OODML

No equivalent. You may use functions to check the last update date of the table file.

MDX()

Topic group | Related topics | Example

Returns the names of a DBF table's open .MDX index files.

Syntax

MDX([<mdx expN>[, <alias>]])

<mdx expN>

A number indicating which open .MDX file whose name to return.

<alias>

The work area you want to check.

Description

MDX() returns the name of an .MDX file open in the current or specified work area. .MDX files are numbered in the order in which they were opened. The production .MDX file, the one with the same name as the DBF file, is number 1.

If <mdx expN> is omitted, the name of the .MDX file containing the current master index tag is returned.

MDX() includes the drive letter (and colon) in the filename. If SET FULLPATH is ON, MDX() also returns the directory location of the .MDX file in addition to the drive and name.

If <mdx expN> is higher than the number of open .MDX files, or if you do not specify an index order number and the master index is an .NDX file, MDX() returns an empty string (""). MDX() also returns an empty string if there is no .MDX file open.

OODML

No equivalent.

MDX() example

The following utility function generates a program file that will recreate all indexes from scratch. This generated program also documents the index tags. It uses the MDX() function to get the name of the .MDX file that contains the active index tag. If there is no active index tag, the production .MDX is used.

```
PROCEDURE GenMDX( cFile )
  local cMdx, cMdxFile
  cMdx = mdx()
  if cMdx == ""
    *-- If no active index tag, try production .MDX
    cMdx = mdx( 1 )
    if cMdx == ""
      msgbox( "No MDX file", "Nothing to do", 48 )
      return
    endif
  endif

  *-- Set OF clause for non-production .MDX
  cMdxFile = iif( cMdx == mdx( 1 ), "", [ of "] + cMdx + ["] )
  *-- Remove drive and/or path from .MDX filename
  *-- (after setting OF clause, because that checks cMdx)
  cMdx = substr( cMdx, max( rat( ":", cMdx ), rat( "\", cMdx ) ) + 1 )
  local lSafety
  lSafety = ( set( "SAFETY" ) == "ON" )
  set safety on

  if argcount() < 1
    cFile = left( cMdx, rat( ".", cMdx ) - 1 ) + "X.PRG"
  endif

  set alternate to ( cFile )
  set console off
  ?
  set alternate on

  ??"* " + cFile
  ? "*"
  ? "* Index file for " + cMdx
  if cMdxFile == ""
    ?? " (production .MDX)"
  endif
  ? "*"
  ? "* Generated on " + dtoc( date() ) + " " + time()
  ? "*"
  ?
  ? [*-- Delete all current tags from specific .MDX only]
  ? [do while "" # tag( "] + cMdx + [", 1 )]
  ? [  delete tag tag( "] + cMdx + [", 1 )]
  ? [enddo]
  ?

  nNdx = 1
  do while "" # key( cMdx, nNdx )
    ? [index tag ] + transform( tag( cMdx, nNdx ), "@! XXXXXXXXXX" ) + ;
      cMdxFile + [ on ] + key( cMdx, nNdx )
```

```
    if "" # for( cMdx, nNdx )
      ?? [ for ] + for( cMdx, nNdx )
    endif
    if descending( cMdx, nNdx )
      ?? [ descending]
    endif
    if unique( cMdx, nNdx )
      ?? [ unique]
    endif
    nNdx = nNdx + 1
  enddo

  close alternate
  if .not. lSafety
    set safety off
  endif
```

The function uses the KEY(), FOR(), DESCENDING(), and UNIQUE() functions to get the definition of each index.

MEMLINES()

Topic group Related topics

Returns the number of lines in a memo field.

Syntax

MEMLINES(<memo field> [,<line length expN>])

<memo field>

The memo field the MEMLINES() function operates on.

<line length expN>

Specifies the line length used in calculating the number of lines in a memo field. <expN> can be set to any number from 8 to 255. If <expN> is not specified, MEMLINES() calculates each line using the memo width specified using the SET MEMOWIDTH command.

Description

The MEMLINES() function returns the number of lines in a memo field based on the memo width specified by the line length parameter. If you don't specify a line length, MEMLINES() uses the width specified by SET MEMOWIDTH, which defaults to 50.

If a word doesn't completely fit within the remainder of a line, MEMLINES() wraps that word and everything on the line following it to the beginning of the next line. If the number of characters in a word is longer than the default or specified memo field line length, MEMLINES() truncates the word at the end of the line and includes the remainder of the word at the beginning of the next line.

A carriage return/line feed combination in the memo text always starts a new line. Note that if the carriage return/line feed is at the end of the memo field contents, the empty blank line that follows it is counted in the total line count.

OODML

No equivalent. You cannot accurately determine the amount of text that can fit on a line when using proportional fonts.

MLINE()

Topic group Related topics

Extracts a specified line of text from a memo field in the current record.

Syntax

MLINE(<memo field> [, <line number expN > [, <line length expN>]])

<memo field>

The memo field the MLINE() function operates on.

<line number expN >

The number of the line in the memo field returned by the MLINE() function. The default for <line number expN> is 1, the first line.

<line length expN >

The number that determines the length of a line in the memo field. <line length expN> can be set to any number from 8 to 255. If <line length expN> is not set, the SET MEMOWIDTH setting specifies the length of the line.

Description

MLINE() returns a specified line of text from a memo field. MLINE() treats the text of the memo field as if it were wordwrapped within a display width specified by the SET MEMOWIDTH setting or by <line length expN>.

If a word doesn't completely fit within the remainder of a line, MLINE() wraps that word and everything on the line following it to the beginning of the next line. If the number of characters in a word is longer than the default or specified memo field line length, MLINE() truncates the word at the end of the line and includes the remainder of the word at the beginning of the next line.

OODML

No equivalent.

NDX()

Topic group Related topics

Returns the names of a DBF table's open .NDX files.

Syntax

NDX([<ndx expN> [, <alias>]])

<ndx expN>

A number indicating which open .NDX file whose name to return.

<alias>

The work area you want to check.

Description

NDX() returns the name of the .NDX file open in the current or specified work area. .NDX files are numbered in the order in which they were opened. The first one is number 1.

If <ndx expN> is omitted, the name of the .NDX file containing the current master index tag is returned.

NDX() includes the drive letter (and colon) in the filename. If SET FULLPATH is ON, NDX() also returns the directory location of the .NDX file in addition to the drive and name.

If <ndx expN> is higher than the number of open .NDX files, or if you do not specify an index order number and the master index is an index tag in an .MDX file, NDX() returns an empty string ("").

OODML

No equivalent.

OPEN DATABASE

Topic group Related topics

Establishes a connection to a database server or a database defined for a specific directory location.

Syntax

OPEN DATABASE <database name>
[LOGIN <username>/<password>]
[WITH <option string>]
[AUTOEXTERN]

<database name>

The name, or alias, of the database you want to open. Database aliases are created using the BDE Administrator.

<user name>/<password>

The user name and password, separated by a slash, required to access the database.

WITH <option string>

Character string specifying server-specific information required to establish a database server connection. For information about establishing database server connections, refer to your Borland SQL Link documentation, and contact your network or database administrator for specific connection information.

AUTOEXTERN

Treat all stored procedures as EXTERN. This eliminates the need for the user to EXTERN SQL any stored procedure calls. Once the database is open, the stored procedures are immediately available. For use with Interbase and Oracle databases only.

Description

The OPEN DATABASE command is used to establish a connection with a database defined with the BDE Administrator. When opening a database, you need to specify whatever login parameters and database-specific information that connection requires. Typically, your network or system administrator can provide you with the information necessary to establish connections to established databases and database servers at your site.

OODML

Use a Database object.

ORDER()

Topic group | Related topics | Example

Returns the name of the current master index.

Syntax

ORDER([<alias>])

<alias>

The work area you want to check.

Description

ORDER() returns the name of the current master index. For DBF tables, this could be either the name of an index tag in an .MDX file, or the name of an .NDX file (the name only, no drive or extension as returned by the NDX() function). For all other table types, the name is the name of an index tag.

ORDER() returns an empty string ("") if the table is in its natural order: either its primary key order, if it has a primary key; or no active index.

Some routines need to use a specific index. Use ORDER() to get the name of the current master index before switching to the desired index and then use the SET ORDER command to later restore the master index.

OODML

Check the *indexName* property of the Rowset object.

ORDER() example

In this example, a function switches to a specific index tag before calling another function that creates a new record:

```
PROCEDURE NewStudent
  local cOrder
  cOrder = order()
  set order to STUDENT_ID
  NewRec()
  set order to ( cOrder )
```

This example function assumes that the Students table is the currently selected table, which might be ordered according to name, average test score, or some other index. This function saves the index order of the table in the variable cOrder. At the end of the function, that index is restored with the SET ORDER command using the parentheses as indirection operators.

The NewRec function is shown in the example for APPEND.

PACK

Topic group Related topics

Removes all records from a DBF table that have been marked as deleted.

Syntax

PACK

Description

Use PACK to remove records from the current DBF table that were previously marked as deleted by the DELETE command. You need to open a table for exclusive use before using PACK.

After you execute a PACK command, the disk space used by the deleted records is reclaimed when the table is closed. All open index files are automatically re-indexed after PACK is executed. (Use REINDEX to update closed indexes.)

Space in .DBT memo files associated with deleted records is not reduced, however, when you use the PACK command. To reclaim space in a memo file, you need to use COPY to copy the original table.

Use PACK with caution. Records that have been marked for deletion but not yet eliminated with PACK can be undeleted and restored to a table using RECALL. Records eliminated with PACK are permanently lost and can't be recovered.

SET DELETED ON provides many of the benefits of PACK without actually removing records from a table. With SET DELETED ON, most commands function as if records marked for deletion had been eliminated from a table.

Because PACK requires the exclusive use of a table, it may be difficult to find a time to PACK a table for applications that run continuously. Also for large tables, PACK is time-consuming and requires enough disk space to make a copy of the table. Consider recycling deleted records instead, which is quicker and safer. For an example of how to implement record recycling, see the examples for APPEND and BLANK.

To permanently remove all records of the current table in one step, use the ZAP command.

OODML

Use the Database object's *packTable*() method.

RECALL

Topic group Related topics Example

Restores records that were previously marked as deleted in the current DBF table.

Syntax

RECALL
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is NEXT 1, the current record only.

Description

Use RECALL to undelete records that have been marked as deleted in the current DBF table with DELETE but have not yet been removed with PACK. Executing DELETE marks the record as deleted but doesn’t physically remove them from the table. If SET DELETED is ON (the default), these deleted records cannot be seen. RECALL reverses this process, unmarking the records and fully restoring them to the table.

Records eliminated with PACK or ZAP are permanently removed and can't be recovered using RECALL.

When using RECALL, SET DELETED should be OFF; otherwise you will not be able to see the deleted records you want to recall. Using RECALL on records that are not marked as deleted has no effect.

OODML

Soft deletes are not supported.

RECCOUNT()

Topic group Related topics

Returns the number of records in a table.

Syntax

RECCOUNT([<alias>])

<alias>

The work area you want to check.

Description

RECCOUNT() retrieves a count of a table's records from the table header, which holds information about the table structure. In contrast, COUNT with no options yields a record count by actually counting the table's records using the table's current filter, key constraints, the setting of SET DELETED and so on. RECCOUNT() includes all records, even those marked as deleted, and is always instantaneous; COUNT is not.

If no table is active in the specified work area, RECCOUNT() returns zero.

You can use RECSIZE() in combination with RECCOUNT() to determine the approximate size, in bytes, of a table.

OODML

In some cases, the Rowset object's *rowCount*() method will return the same value.

RECNO()

Topic group Related topics

For DBF tables, returns the current record number. For all other table types, returns a bookmark of the current position in a table.

Syntax

RECNO([<alias>])

<alias>

The work area you want to check.

Description

RECNO() returns the current record number of the table in the current or a specified work area, if that table is a DBF table. For all other table types, RECNO() behaves like BOOKMARK(), returning a bookmark. If no table is open in the specified work area, RECNO() returns a value of 0.

If the record pointer move to the end-of-file (past the last record in the table), RECNO() returns a value that is one more than the total number of records in the table. Therefore, RECNO() returns a value of 1 if there are no records in the table—RECCOUNT() would return zero.

The use of BOOKMARK() is recommended instead of RECNO(). Besides returning a consistent data type with all tables, with BOOKMARK() you can bookmark the position at the end-of-file and GO back to it. Although RECNO() will return a record number for the end-of-file, you cannot GO to that record number, because there actually is no record with that number.

OODML

Use the Rowset object's *bookmark*() method.

RECSIZE()

Topic group | Related topics | Example

Returns the number of bytes in a record of a table.

Syntax

RECSIZE([<alias>])

<alias>

The work area you want to check.

Description

RECSIZE() returns the number of bytes in a record of a table in the current or specified work area. If no table is open in the specified work area, RECSIZE() returns a value of zero.

LIST STRUCTURE and DISPLAY STRUCTURE also show the size of a table's records.

OODML

Use a loop to add up the *length* properties of the Field objects in the *fields* array.

RECSIZE() example

The following example uses RECSIZE() to determine if there is enough disk space to append the records contained in another file (which might be on a CD-ROM or other large capacity disk). The other file is opened with the alias "OTHERFILE":

```
if reccount( "OTHERFILE" ) * recsize() > diskspace()
  msgbox( "Insufficient disk space to append records", "Error", 48 )
endif
```

REFRESH

Topic group Related topics

Updates data buffers to reflect the latest changes to data.

Syntax

REFRESH [<alias>]

<alias>

The work area to refresh.

Description

Use REFRESH to update specified work area data buffers so that data you display reflects the latest changes made to tables by other users.

OODML

Use the Rowset object's *refresh*() method or the Query object's *requery*() method.

REINDEX

Topic group Related topics Example

Regenerates all open index files in the current work area.

Syntax

REINDEX

Description

Use REINDEX to manually regenerate all open indexes in the current work area. In a normal application, indexes remain open whenever their table is open. These indexes are automatically updated whenever there is a change to the table, so there is no need to manually REINDEX.

You would use REINDEX if your application uses non-production .MDX files or .NDX files that are not always open. To update these indexes, open them with the corresponding table and issue REINDEX.

You might also use REINDEX if you suspect that the index files have been damaged. REINDEX rebuilds the entire index file from scratch.

You must have exclusive use of a table to REINDEX it.

OODML

Use the Database object's *reindex*() method.

REINDEX example

In the following example, a DBF file is generated and downloaded from a mainframe on a weekly basis, overwriting the previous week's file. The DBF has an .MDX file that must be manually regenerated for each week's download before processing the downloaded data. The beginning of the process looks like this:

```
use DOWNLOAD index PROCESS.MDX exclusive
reindex
set order to NAME
*-- Rest of process
```

RELATION()

Topic group Related topics

Returns the link expression defined with the SET RELATION command.

Syntax

RELATION(<expN> [,<alias>])

<expN>

The number of a relation that you want to return.

<alias>

The work area you want to check.

Description

RELATION() returns a string containing the expression that links one table with another that was defined with the SET RELATION command. You must specify the number of the relation; if the table in the current or specified work area is linked to only one table, that <expN> is the number 1. RELATION() returns an empty string ("") if no relation is set in the <expN> position.

Use RELATION() to save the link expressions of all SET RELATION settings for later use when restoring relations. To save the target table (the table into which you SET a RELATION), use the TARGET() function.

OODML

Check the detail Rowset object's *masterFields* and *masterRowset* properties, or the detail Query object's *masterSource* property to determine the nature of the master-detail linkage.

RELEASE AUTOMEM

Topic group Related topics

Clears automem variables from memory.

Syntax

RELEASE AUTOMEM

Description

Automem variables are private or public memory variables that have the same name as the fields of the currently selected table. These variables can be created manually, or with the STORE AUTOMEM, CLEAR AUTOMEM, or USE...AUTOMEM commands.

RELEASE AUTOMEM releases any private or public memory variables that have the same name as one of the fields in the currently selected table, no matter how or for what purpose the variable was created.

Closing a table or moving to another work area doesn't automatically release a table's associated automem variables. *Visual* dBASE doesn't recognize a variable as an automem variable, even if it was created as an automem variable, if it doesn't have the same name as a field in the current table. But because automem variables are usually private variables, and private variables are automatically released when the routine that created them is complete, there is rarely any reason to issue RELEASE AUTOMEM in an application.

OODML

The Rowset object's contains an array of Field objects, accessed through its *fields* property. These Field objects have *value* properties that may be programmed like variables.

RENAME TABLE

Topic group Related topics

Changes the name of a specified table.

Syntax

RENAME TABLE <old table name> TO <new table name>
[[TYPE] PARADOX | DBASE]

<old table name>

The table you want to rename.

<new table name>

The new name of the table. If you rename a table in a database, you must specify the same database as the destination of the new table. Also, the new table name must be the same type as the old table.

[TYPE] PARADOX | DBASE

Specifies the type of table you want to rename, in case you do not specify a file extension with <old table name>. This option overrides the current SET DBTYPE setting. The TYPE keyword is included for readability only; it has no effect on the operation of the command.

Description

Use the RENAME TABLE command to change the name of a table and its associated files, if any. You cannot rename an open table, and the new table name cannot already exist in the same directory or database.

OODML

Use the Database object's *renameTable*() method.

REPLACE

Topic group Related topics

Replaces the contents of fields with data from expressions.

Syntax

REPLACE
<field 1> WITH <exp 1> [ADDITIVE]
[, <field 2> WITH <exp 2> [ADDITIVE]...]
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]
[REINDEX]

<field> WITH <exp>

Designates fields to be replaced by the value of the specified expressions. Multiple fields of a record may be changed by including additional <field n> WITH <exp n> expressions, separated by commas.

ADDITIVE

Adds text to the end of memo field text instead of replacing existing text. You can use ADDITIVE only when the specified field is a memo field in a DBF table.

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is NEXT 1, the current record only.

REINDEX

Specifies that all affected indexes are rebuilt once the REPLACE operation finishes. Without REINDEX, *Visual* dBASE updates all open indexes after replacing each record in the scope. When replacing many or all records in a table that has multiple open indexes, REPLACE executes faster with the REINDEX option.

Description

The REPLACE command overwrites a specified field with new data. The field you select can be any type, including memo fields. (To replace binary or OLE fields, use REPLACE BINARY and REPLACE OLE.) The field and the expression specified by the WITH clause must have the same data type.

When storing a long string or the contents of a memo field into a shorter character field, the data is truncated. Use the ADDITIVE option to add a character string to the end of existing memo field text. You can leave a blank space at the beginning of the string to provide proper spacing.

Be careful when replacing data in the key fields of the current master index, in more than one record (that is, with the <scope>, WHILE, or FOR options). *Visual* dBASE automatically updates all open index files after a REPLACE operation finishes. After replacing data that changes the value in the key field in the master index, the record and the record pointer immediately move to the position in the index based on the new value of a key. If replacement in the key field causes a record (and the pointer) to move down past other records that fall within the scope or meet the specified conditions, those records are not replaced. If replacement in the key field causes a record to move up before records that have already been replaced, those records may be replaced again.

To make replacements to an indexed table's key field, you may place the table in natural order with the SET ORDER TO command, or use other techniques, one of which is shown in the example. Replacements in key fields other than the key fields of the master index don't affect the order of the current index and can be made over multiple records without complications.

When replacing a Numeric or Float field in a DBF table, the magnitude of the new value should not exceed the integer portion of the field. For example, if the Numeric field is defined as width 4 with 1 decimal place, you cannot have a number greater than 99.9. If so, the field contents are replaced with an approximation to the new value in scientific notation, if it will fit; otherwise the field contents are replaced with asterisks, destroying stored data. Scientific notation requires a field width of at least 7

characters. This condition is not an error, but *Visual* dBASE will display a numeric overflow warning message in the results pane of the Command window.

Other field types that store numbers, including Long and Short integers, have a numeric range they support. Make sure that the number you attempt to store does not exceed those ranges.

Use the alias operator in the <field> (that is, alias->field) to REPLACE fields in tables other than the currently selected table. You may mix fields from different tables in the same REPLACE statement, although the scope of the command is based on the current table. If there is no relation between the current table and other tables, traversing the current table—for example, because of an ALL scope—does not move the record pointer in the other tables.

OODML

Assign values directly to the *value* properties of the Field objects in the Rowset object's *fields* array (in a loop that traverses the rowset if necessary).

REPLACE example

The following statement updates salaries to conform to the new minimum wage, which is in the variable nMinWage:

```
replace for SALARY < nMinWage SALARY with nMinWage
```

The following statement gives everyone a 10% raise, and two weeks (80 hours) extra vacation:

```
replace all SALARY with SALARY * 1.1, VACATION with VACATION + 80
```

The next example replaces all instances of an inadvertently assigned duplicate customer ID number with their actual customer number.

```
PROCEDURE ChangeCustID( oldCust, newCust )
  local cOrder
  cOrder = order()
  set order to CUST_ID
  do while seek( oldCust )
    replace CUST_ID with newCust
  enddo
  set order to ( cOrder )
```

The routine uses the SEEK() function to find any records that have the old customer ID number. The number is replaced in that record only, which moves the record into its updated position in the index. This movement doesn't matter because the loop uses the SEEK() function again to find another match.

The current index order is saved before the loop, and restored at the end of the routine.

REPLACE AUTOMEM

Topic group Related topics

Replaces fields in the current table that have corresponding automem variables.

Syntax

REPLACE AUTOMEM

Description

Automem variables are private or public memory variables that have the same name as the corresponding fields of the current table. Automem variables are used to hold data that will be stored in the fields of records. You can manipulate data stored in automem variables as memory variables rather than as field values, and you can validate the data before storing the data to a table.

Create a set of automem variables for the fields in a table with USE...AUTOMEM, CLEAR AUTOMEM, or STORE AUTOMEM (or create the variable manually). To add new records to a table and fill the fields with values from corresponding automem variables, use APPEND AUTOMEM. To update the fields of existing records with values from corresponding automem variables, use REPLACE AUTOMEM.

Use REPLACE AUTOMEM to update all the fields of a record without having to name the fields. By contrast, with the REPLACE command, you need to name every field you want updated.

Remember that an automem variable and its corresponding field have the same name. When a command allows an argument that could be either a field or a private or public memory variable, *Visual* dBASE assumes the argument refers to a field. To distinguish the memory variable from the field, prefix the names of automem variables with M->.

REPLACE AUTOMEM updates the current record. It can't update all records within a specified scope or all records matching a condition, as the REPLACE command can with the options <scope>, FOR <condition>, and WHILE <condition>.

REPLACE AUTOMEM doesn't replace field data with data from a memory variable with the same name but of a different data type. Those variables are ignored. If a field does not have a corresponding private or public variable with the same name, that field is left unchanged.

OODML

The Rowset object’s contains an array of Field objects, accessed through its *fields* property. These Field objects have *value* properties that may be programmed like variables.

REPLACE BINARY

Topic group Related topics

Replaces the contents of a binary field with the contents of a binary file.

Syntax

REPLACE BINARY <binary field name> FROM <filename>
[TYPE <binary type user number>]

<binary field name>

The binary field of the current table that is replaced by the contents of <filename>.

FROM <filename>

Specifies the file to copy to the binary field in the current record. If you specify a file without including its extension, *Visual* dBASE assumes a .BMP extension; however, the file may be any type.

TYPE <binary type user number>

Specifies a number that can be used to identify the type of binary data being stored. By default, *Visual* dBASE attempts to detect the type of file and assigns the appropriate binary type. Use the BINTYPE() function to retrieve the type number. The range is from 1 to 32K - 1 for user-defined file types and 32K to 64K - 1 for predefined types (although any number may be specified within the allowable range).

Predefined binary type numbers	Description
1 to 32K - 1 (32,767)	User-defined file types
32K (32,768)	.WAV files
32K + 1 (32,769)	Image files

Description

Use REPLACE BINARY to copy a binary file to the current record's binary field. You can copy one binary file to each binary field of each record in a table.

While memo fields may contain types of information other than text, binary fields are recommended for storing images, sound, or any other binary or BLOB type data.

See class Image for a list of image types that *Visual* dBASE can automatically detect and display.

OODML

Use the Field object's *replaceFromFile*() method. The binary type is not supported.

REPLACE BINARY example

The following event handler displays a dialog to pick an image file, then stores the contents of that file in a binary field, erasing any previous contents.

```
PROCEDURE importImageButton_onClick
  local cFile
  cFile = getfile( "*.bmp", "Image file to import" )
  if "" # cFile
    replace binary IMAG_FIELD from ( cFile )
  endif
```

GETFILE() will return an empty string if no file is selected. In the IF statement, the order of the empty string and the variable cFile is important. If they were the other way around and SET EXACT is OFF, then the IF statement would always be *false*.

The parentheses are used as indirection operators to get the name of the file from the variable. Without them, *Visual* dBASE would attempt to append a file named cFile.

The binary type for an image, 32,769, is automatically assigned.

REPLACE FROM ARRAY

Topic group Related topics

Transfers data stored in an array to the fields of the current table.

Syntax

REPLACE FROM ARRAY <array>
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]
[FIELDS <field list>]
[REINDEX]

<array>

The name of the array that you want to transfer data from.

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is REST. The dimensions and size of <array> also controls which records are updated.

FIELDS <field list>

Restricts data replacement to the fields specified by <field list>.

REINDEX

Specifies that all affected indexes are rebuilt once the REPLACE FROM ARRAY operation finishes. Without REINDEX, *Visual* dBASE updates all open indexes after replacing each record in the scope. When replacing many or all records in a table that has multiple open indexes, REPLACE FROM ARRAY executes faster with the REINDEX option.

Description

Use REPLACE FROM ARRAY to transfer values from an array into fields of the current table. REPLACE FROM ARRAY treats the columns in a one-dimensional array like a single record of fields; and treats a two-dimensional array like a table, with the rows (the first dimension) of the array like records, and the columns (the second dimension) like fields.

For a one-dimensional array, REPLACE FROM ARRAY will replace the first record in the command scope that matches the specified condition. If there is no specified scope and condition, the current record is replaced.

For a two-dimensional array, REPLACE FROM ARRAY will attempt to copy each row in the array to a record in the command scope that matches the specified condition until the end-of-scope or all rows of the array have been copied, in which case the record pointer is left at the last record replaced.

If the array has more columns than the table has fields, the additional elements are ignored. Similarly, if a two-dimensional array has more rows than can be copied to the table, the additional rows are ignored.

REPLACE FROM ARRAY does not replace memo (or binary) fields; these fields should not be counted when sizing the array, and cannot be included in the <field list>.

The data types of the array must match those of corresponding fields in the table you are replacing. If the data type of an array element and a corresponding field don't match, an error occurs.

OODML

Use a loop to copy the elements of the array into the *value* properties of the Field objects in the rowset's *fields* array, nested in another loop to traverse the rowset if necessary.

REPLACE MEMO

Topic group Related topics

Copies a text file into a memo field.

Syntax

REPLACE MEMO <memo field> FROM <filename>
[ADDITIVE]

<memo field>

The memo field to replace.

FROM <file name>

The name of the text file. The default extension is .TXT.

ADDITIVE

Causes the new text to be appended to existing text. REPLACE MEMO without the ADDITIVE option causes *Visual* dBASE to overwrite any text currently in the memo field.

Description

Use the REPLACE MEMO command to insert the contents of a text file into a memo field. You may use an alias name and the alias operator (that is, alias->memofield) to specify a memo field in the current record of any open table.

REPLACE MEMO is identical to APPEND MEMO, except that REPLACE MEMO defaults to overwriting the current contents of the memo field, and has the option of appending, while APPEND MEMO is the opposite.

While memo fields may contain types of information other than text, binary fields are recommended for storing images, sound, and other user-defined binary type information. Use OLE fields for linking to OLE documents from other Windows applications.

OODML

Use the Field object's *replaceFromFile*() method.

REPLACE MEMO example

The following event handler displays a dialog to pick a text file, then stores the contents of that file in a memo field, erasing any previous contents.

```
PROCEDURE importTextButton_onClick
  local cFile
  cFile = getfile( "*.txt", "Text file to import" )
  if "" # cFile
    replace memo MEMO_FIELD from ( cFile )
  endif
```

GETFILE() will return an empty string if no file is selected. In the IF statement, the order of the empty string and the variable cFile is important. If they were the other way around and SET EXACT is OFF, then the IF statement would always be *false*.

The parentheses are used as indirection operators to get the name of the file from the variable. Without them, *Visual* dBASE would attempt to append a file named cFile.

REPLACE OLE

Topic group Related topics

Inserts an OLE document into an OLE field.

Syntax

REPLACE OLE <OLE field name> FROM <filename>
[LINK]

<OLE field name>

The field where an OLE document is inserted.

FROM <file name>

The file that identifies an OLE document, including its extension. There is no default extension.

LINK

LINK stores a pointer to the OLE document. By default, *Visual* dBASE embeds the OLE document itself in the specified memo field.

Description

Use REPLACE OLE to insert the contents of an OLE document into an OLE field. You can either embed the actual OLE document in an OLE field (the default) or access the OLE document by linking it to the OLE field.

If you link the OLE document, the OLE field contains only a reference to the OLE document. As long as the OLE document remains in the same location, the OLE field displays the most current version of the document.

If you embed the OLE document, the OLE field contains a copy of the document. There are no links between the field and the OLE document: therefore, any changes to the original version of the OLE document are not reflected in the embedded document.

OODML

No equivalent.

RLOCK()

Topic group Related topics

Locks the current record or a specified list of records in the current or specified table.

Syntax

RLOCK([<list expC>, <alias>] | [<alias>])

<list expC>

The list of record numbers to lock, separated by commas. If omitted, the current record is locked.

<alias>

The work area to lock.

You don't have to specify record numbers if you want to specify a value for <alias>. However, if you have specified record numbers, you must precede <alias> with a comma (,).

Description

Use RLOCK() to lock the current record or a list of records in any open table. If you don't pass RLOCK() any arguments, it locks the current record in the current table. If you pass only <alias> to RLOCK(), it locks the current record in the specified table. If RLOCK() is successful in locking all the records you specify, it returns *true*; otherwise it returns *false*. You can lock up to 100 records in each table open at your workstation with RLOCK().

You can view and update a record you lock with RLOCK(). Other users can view this record but can't update it. When you lock a record with RLOCK(), it remains locked until you do one of the following:

- Issue UNLOCK
- Close the table

All commands that change table data cause *Visual* dBASE to attempt to execute an automatic record or file lock. If *Visual* dBASE fails to execute an automatic record or file lock, it an error occurs. You might want to use RLOCK() to handle a lock failure youself, instead of letting the error occur.

RLOCK() can't lock the records you specify when any of the following conditions exist:

- Another user has locked, explicitly or automatically, the current record or one of the records in <list expC>.
- Another user has locked, explicitly or automatically, the table that contains the records you’re trying to lock.

When SET REPROCESS is set to 0 (the default) and RLOCK() can't immediately lock its records, *Visual* dBASE prompts you to attempt the lock again or cancel the attempt. Until you choose to cancel the function, RLOCK() repeatedly attempts to get the record locks. Use SET REPROCESS to eliminate being prompted to cancel the RLOCK() function, or to set the number of locking attempts.

RLOCK() is similar to FLOCK(), except FLOCK() locks an entire table. Use FLOCK(), therefore, when you need to have sole access to an entire table or related tables—for example, when you need to update multiple tables related by a common key—or when you want to update more than 100 records at a time.

When you set a relation in a parent table with SET RELATION and then lock a record in that table with RLOCK(), *Visual* dBASE attempts to lock all child records in child tables. For more information on relating tables, see SET RELATION.

RLOCK() is equivalent to LOCK().

OODML

Use the Rowset object’s *lockRow*() method.

ROLLBACK()

Topic group Related topics

Cancels the transaction by undoing all logged changes.

Syntax

ROLLBACK([<database name expC>])

<database name expC>

The name of the database in which to rollback the transaction.

- If you began the transaction with BEGINTRANS(<database name expC>), you must issue ROLLBACK(<database name expC>). If instead you issue ROLLBACK(), *Visual* dBASE ignores the ROLLBACK() statement.
- If you began the transaction with BEGINTRANS(), <database name expC> is an optional ROLLBACK() argument. If you include it, it must refer to the same database as the SET DATABASE TO statement that preceded BEGINTRANS().

Description

A transaction works by logging all changes. If an error occurs while attempting one of the changes, or the changes need to be undone for some other reason, the transaction is canceled by calling ROLLBACK(). Otherwise, COMMIT() is called to clear the transaction log, thereby indicating that all the changes in the transaction were committed and that the transaction as a whole was posted.

Since new rows have already been written to disk, rows that were added during the transaction are deleted. In the case of DBF tables, the rows are marked as deleted, but are not physically removed from the table. If you want to actually remove them, you can pack the table with PACK. Rows that were just edited are returned to their saved values.

All locks made during a transaction are maintained until the transaction is completed. This ensures that no one else can make any changes until the transaction is committed or abandoned.

For more information on transactions, see BEGINTRANS().

OODML

Call the *rollback*() method of the Database object.

SCAN

Topic group Related topics

Steps through each record in the current table, executing specified statements on each record that meets specified conditions.

Syntax

SCAN [<scope>] [FOR <condition 1>] [WHILE <condition 2>]
    [<statements>]
ENDSCAN

<scope>

FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is ALL.

<statements>

Statements to execute for each record visited.

ENDSCAN

A required keyword that marks the end of the SCAN loop.

Description

Use SCAN to process the current table record by record. With no scope options, SCAN starts with the first record in the table in the current index order and visits all the records, stopping at the end-of-file. You may specify a different <scope> and a WHILE condition to control the range of records, and a FOR condition that each record must pass for the <statements> to be executed.

At the end of each loop, dBASE automatically moves the record pointer forward one record in the table before returning to the beginning of the loop; therefore, don't include a SKIP command. You may use the EXIT command to exit out of the loop and the LOOP command to go to the next record, skipping all remaining commands in the loop.

You may next SCAN loops, except that you cannot nest SCAN loops for the same table.

SCAN works like a DO WHILE .NOT. EOF()...SKIP...ENDDO construct; however, with SCAN you can specify conditions with FOR, WHILE, and <scope>. SCAN also requires fewer lines of code than DO WHILE.

When using SCAN with an indexed table, don't change the value of a field that is (or is part of) the master index key. When you change the value of such a field, *Visual* dBASE repositions the record in the index file, which might cause unintended results. For example, if you change a key field that causes its record to move to the end of the index, that record might have the SCAN...ENDSCAN statements executed on it a second time.

If you change work areas within a SCAN loop, select the work area containing the table being scanned before control passes back to the first statement in the SCAN loop.

OODML

This example opens a table named FOO and traverses all the records, copying the value of the character field C1 to a throw-away variable, using a SCAN loop and the OODML equivalent:

```
use FOO
scan
  x = C1
endscan
use
local q, r
q = new Query( "select * from FOO" )
r = q.rowset
if r.first()
```

```
  do
    x = r.fields[ "C1" ].value
  until not r.next()
endif
```

Of note:

- A “SELECT * FROM” query is equivalent to a plain USE command.
- A reference to the query’s rowset is assigned to another variable as shorthand. It also executes a bit quicker.
- A SCAN—without any scope qualifiers like REST or NEXT—always starts at the beginning of the table, so a call to the *first*() method is needed.
- If *first*() returns false, there’s nothing to do
- A DO...UNTIL loop is used so that the navigation happens after processing the current row. Since the *first*() method returned true to get into the loop, there must be at least one row to process.
- When *next*() returns false, you’ve hit the EOF, which terminates the loop.

SEEK

Topic group Related topics

Searches for the first record in an indexed table whose key fields matches the specified expression or expression list.

Syntax

SEEK <exp> | <exp list>

<exp>

The expression to search for in an index for a DBF table.

<exp list>

One or more expressions, separated by commas, to search for in a simple or composite key index for non-DBF tables.

Description

Visual dBASE can search a table for specific information either by a sequential search of a table or by an indexed search of the table's master index. A sequential search is similar to looking for information in a book by reading the first page, then the second, and so on, until the information is found or all pages have been read. LOCATE uses this method, checking each record until the information is found or the last record has been inspected.

An indexed search is similar to looking up a topic in a book index and turning directly to the appropriate page. Once a table index is created, SEEK can use this index to quickly identify the appropriate record.

SEEK looks for the first match in the index. If a match is found, the record pointer of the associated table is positioned at the record containing the match, and FOUND() returns *true*.

Use SKIP to access other records whose key fields match the index key fields or expression. SKIP advances the record pointer one record; because of the indexed order, other matches immediately follow the first. However, SKIP after SEEK (unlike CONTINUE after LOCATE) doesn't search for a match; it moves the record pointer one record whether or not it finds a match. You can combine SEEK and LOCATE or SEEK and SCAN (both with the WHILE clause) to do a quick indexed search for the first matching record before looking through or processing all the other matches.

The SET NEAR setting determines whether *Visual* dBASE, after an unsuccessful SEEK, positions the record pointer at the end-of-file or at the record in the indexed table immediately after the position at which the value searched for would have been found. If SET NEAR is OFF (the default) and SEEK is unsuccessful, EOF() returns *true* and FOUND() returns *false*. If SET NEAR is ON and SEEK is unsuccessful, EOF() returns *false* (unless the position at which the sought value would have been found is the last record in the index), and FOUND() returns *false*.

The expression you look for with SEEK must match the key expression or fields of the master index. For example, if the master index key uses UPPER(), the search expression must also be in uppercase.

For tables that support composite key indexes based on multiple fields, specify a value for each field in the composite key, separated by commas.

When you seek a key expression of type character, the rules established by SET EXACT determine if a match exists. If SET EXACT is OFF (the default) only the beginning characters of the key field need to be used for SEEK to find a match. For example, if SET EXACT is OFF, SEEK "S" will fine "Sanders", or whatever the first key value is that starts with "S". If SET EXACT is ON, the expression must be identical to the key field for a match to exist.

SEEK and LOCATE each have their own advantages. SEEK conducts the most rapid searches; however, it requires an indexed table and can search only for values of the key expression.

If the information for which you are searching is in an unindexed table or is not contained in the key fields of an index, you can use LOCATE. LOCATE accepts any logical condition, which can specify any fields in the table in any combination. For large tables, however, a sequential search using LOCATE can be slow. In such cases, you might want to use INDEX to create a new index and then use SEEK or SEEK().

The SEEK() function works like SEEK followed by FOUND(), except that SEEK searches in the current work area, while SEEK() can search in the current or a specified work area. However, SEEK() can only search for a single expression; it does not support composite keys based on multiple fields. SEEK() returns *true* or *false* depending on whether the search is successful.

OODML

Use the Rowset object's *findKey*() or *findKeyNearest*() methods.

SEEK()

Topic group Related topics Example

Searches for the first record in an indexed table whose keymatches the specified expression.

Syntax

SEEK(<exp> [,<alias>])

<exp>

The key value to search for.

<alias>

The work area you want to search

Description

SEEK() evaluates the expression <exp> and attempts to find its value in the master index of the table opened in the current or specified work area. SEEK() returns *true* if it finds a match of the key expression in the master index, and *false* if no match is found.

The SEEK() function combines the SEEK command and the FOUND() function, adding the ability to search in any work area. However, SEEK() does not support composite key indexes based on multiple fields used by non-DBF tables.

Because an index search is almost always followed by a test to see if the search was successful, when searching DBF tables, use SEEK() instead of SEEK and FOUND(). FOUND() will return the result of the last SEEK() as well.

SET NEAR and SET EXACT affect SEEK() the same way they affect SEEK. See SEEK for more details.

OODML

Use the Rowset object's *findKey*() or *findKeyNearest*() methods.

SEEK() example

The following example uses SEEK() to prune a customer table by deleting all records that do not have any orders.

```
use CUSTOMERS
use ORDERS in select() order CUST_ID
delete for .not. seek( CUST_ID, "ORDERS" )
```

The Customers table is in the current work area while the SEEK() is performed in the Orders table.

SELECT

Topic group Related topics

Sets the current work area in which to open or perform operations on a table.

Syntax

SELECT <alias>

<alias>

The work area to select.

Description

Use SELECT to choose a work area in which to open a table, or to specify a work area in which a table is already open. Many commands operate on the currently selected work area only, or by default.

To select a table that is already open, its alias name is preferred over the work area number, because tables may be opened in different work areas depending on conditions, and the alias name will always select the right table (or cause an error if the table is not opened), while the work area number may take you to the wrong table.

Each work area supports its own value of FOUND() and an independent record pointer. Changes in the record pointer of the active work area have no effect on the record pointers of any other work areas, unless you set a relation between the work areas with the SET RELATION command.

If the <alias> is in a variable, use the parentheses as indirection operators. For example, if xAlias is a variable containing a work area number or alias name, use SELECT(xAlias). Otherwise, *Visual* dBASE will attempt select a work area with the alias name "xAlias".

OODML

There is no concept of the "current" Query object. Use your usual object management techniques to manage Query objects.

SELECT()

Topic group Related topics Example

Returns the number of an available work area or the work area number associated with a specified alias.

Syntax

SELECT([<alias>])

<alias>

The work area to return. (If <alias> is a work area number, there is no need to call this function, because that number is what the function will return.)

Description

If you do not specify an alias, SELECT() returns the number of the next available work area, a number between 1 and 225; or zero if all work areas in the current workset are being used. If you specify an alias, SELECT() determines whether the specified alias name is already in use. If it is, SELECT() returns the work area number that's using the alias name; otherwise it returns zero.

Use SELECT() to locate an available work area in which to open a table, or to see if a table is already open so that you don't open it again.

OODML

There is no concept of the "current" Query object. Use your usual object management techniques to manage Query objects.

SELECT() example

It's common practice to use SELECT() to open a table in the next available work area. This way, you don't have to worry about accidentally closing an open table. You then always use the alias name to refer to that table. For example:

```
use CUSTOMER in select() order CUST_NAME
use ORDERS   in select() order CUST_ORD
use LINEITEM in select() order ORD_LINE
select CUSTOMER
```

SET AUTOSAVE

Topic group Related topics

Determines if dBASE writes data to disk each time a record is changed or added.

Syntax

SET AUTOSAVE on | OFF

Description

Use SET AUTOSAVE ON to reduce the chances of data loss. When SET AUTOSAVE is ON and you alter or add a record, *Visual* dBASE updates tables and index files on disk when you move the record pointer. When SET AUTOSAVE is OFF, changes are saved to disk as the record buffer is filled.

Since *Visual* dBASE periodically saves table changes to disk, in most situations you don't need to SET AUTOSAVE ON. SET AUTOSAVE OFF lets you process data faster, since *Visual* dBASE writes your changes to disk less often.

OODML

AUTOSAVE is always OFF. To force data to be written to disk, call the Rowset object's *flush*() method in the *onSave* event.

SET DATABASE

Topic group Related topics

Sets the default database from which tables are accessed.

Syntax

SET DATABASE TO [<database name>]

<database name>

Specifies the name of the database you want to make the current database.

Description

SET DATABASE sets the current database, which defines the default location for tables accessed by *Visual* dBASE commands. Using this command, you can select from any databases previously opened with the OPEN DATABASE command. Databases are defined using the BDE Administrator.

When you issue the SET DATABASE TO command without a database, *Visual* dBASE restores operation to accessing tables in the current directory (or in the directory specified by SET PATH) instead of through a database.

OODML

Assign the appropriate Database object to the Query object's *database* property.

SET DBTYPE

Topic group Related topics

Sets the default table type to either Paradox or dBASE.

Syntax

SET DBTYPE TO [PARADOX | DBASE]

PARADOX | DBASE

Sets the default table type to a Paradox (DB) or dBASE (DBF) table. The default is DBASE.

Description

SET DBTYPE sets the default type of table used by commands that open or create a table. You can override this selection by specifying a specific extension, that is, .DBF for a dBASE table or .DB for a Paradox table; or by using the TYPE option offered by many commands.

SET DBTYPE TO specified without a DBASE or PARADOX argument returns DBTYPE to its default (dBASE).

OODML

No equivalent.

SET DELETED

Topic group Related topics

Controls whether *Visual* dBASE hides records marked as deleted in a DBF table.

Syntax

SET DELETED ON | off

Description

Use SET DELETED to include or exclude records marked as deleted in a DBF table. When SET DELETED is OFF, all records appear in a table. When SET DELETED is ON, *Visual* dBASE excludes records that have been marked as deleted, hiding them from most operations.

INDEX, REINDEX, and RECCOUNT() aren't affected by SET DELETED.

If two tables are related with SET RELATION, SET DELETED ON suppresses the display of deleted records in the child table. The related record in the parent table still appears, however, unless the parent record is also deleted.

OODML

Soft deletes are not supported.

SET EXACT

Topic group Related topics

Establishes the rules used to determine whether two character strings are equal.

Syntax

SET EXACT on | OFF

Description

Use SET EXACT to choose between a partial string match and an exact string match for certain Xbase DML commands, the Array class scan() method, and the = comparison operator. The == comparison operator always behaves like SET EXACT is ON.

When SET EXACT is OFF, partial string matches are performed. For example, SEEK("S") will find "Smith" in an index, and "Smith"="S" evaluates to *true*.

When SET EXACT is ON, the two strings must match exactly, except that trailing blanks are ignored. For example, SEEK("Smith") will find "Smith " in an index and "Smith"="Smith " will evaluate to *true*.

A partial string match can be thought of as a "begins with" check. For example, the SEEK() function searches for an index key value that begins with certain characters, and the = operator checks to see if one string begins with another string.

In language drivers that have primary and secondary weights for characters (not U.S. language drivers but most others), *Visual* dBASE compares characters by their primary weights when SET EXACT is OFF and by their secondary weights when SET EXACT is ON. For example, when SET EXACT is OFF, and the current language driver is German, "drŸcker" and "drucker" are equal.

SET EXCLUSIVE

Topic group Related topics

Controls whether *Visual* dBASE opens tables and their associated index and memo files in exclusive or shared mode.

Syntax

SET EXCLUSIVE on | OFF

Description

When you issue SET EXCLUSIVE ON, subsequent tables you open—and their associated indexes and memos—are in exclusive mode, unless you open them with USE...SHARED. When you open a table in exclusive mode, other users can't open, view, or change the file or any of its associated index and memo files. If you try to open a table that another user has opened in exclusive mode, or if you try to open in exclusive mode a table that another user has opened, an error occurs.

Exclusive use of a table is different than a file lock that you would get with FLOCK(). With a file lock, others may have the table open and can read data, although only one user may have a file lock at any time. With exclusive use, no one else can have the table open.

SET EXCLUSIVE OFF causes subsequent tables you open—and their associated indexes and memos—to be in shared mode, unless you open them with USE...EXCLUSIVE. If a table in shared mode is in a shared network directory, other users on the network with access to the directory can open, view, and change the file and any of its associated index and memo files.

If you use SET INDEX and the table is open in exclusive mode, *Visual* dBASE opens the index in exclusive mode. If the table is open in shared mode by way of an overriding USE...SHARED, *Visual* dBASE opens the index in the mode specified by USE.

An index created with INDEX is opened in exclusive mode, regardless of whether the table is opened in shared or exclusive mode and regardless of the SET EXCLUSIVE setting. After creating an index, you can open the index in shared mode with USE...INDEX...SHARED or by issuing SET EXCLUSIVE OFF followed by SET INDEX TO.

The following commands require the exclusive use of a table with either SET EXCLUSIVE ON or USE...EXCLUSIVE:

- CONVERT
- DELETE TAG
- INDEX...TAG
- MODIFY STRUCTURE
- PACK
- REINDEX
- ZAP

OODML

EXCLUSIVE is always OFF. When a method like *packTable*() requires exclusive access to a table, the method always attempts to open the table in exclusive mode. If the table is already open in another query, the method will fail.

SET FIELDS

Topic group Related topics Example

Defines the list of fields a table appears to have.

Syntax

SET FIELDS TO
[<field list> | ALL [LIKE <skeleton 1>] [EXCEPT <skeleton 2>]]

SET FIELDS on | OFF

<field list> | ALL [LIKE <skeleton 1> | EXCEPT <skeleton 2>]

Adds the specified fields to the list of fields the table appears to have. The fields list may include fields from tables open in all work areas and may also include read-only calculated fields. The following table provides a description of SET FIELDS TO options:

Option	Description
ALL	Adds all fields in the current work area to the field list
LIKE <skeleton 1>	Adds all fields in the current work area whose names match <skeleton 1> to the field list
EXCEPT <skeleton 2>	Adds all fields in the current work area except those whose names match <skeleton 2> to the field list
LIKE <skeleton 1> EXCEPT <skeleton 2>	Adds all fields in the current work area whose names are like <skeleton 1> except those whose names match <skeleton 2> to the field list

Description

When there is no field list, or SET FIELDS is OFF, operations in a work area that use all fields (by default) use all the fields in the currently selected table. For example, if you LIST a Customer table with 10 fields and 500 records, those 10 fields are displayed.

A field list overrides this default behavior, making the table appear to have the fields you specify. This is usually done to either:

- Restrict the fields to certain fields in the table. For example, you can make the Customer table appear to have only a customer ID and name, hiding the other 8 fields.
- Include fields in other related tables. For example, you could set a relation to a table of sales people, and make the Customer table appear to have the customer ID, customer name, and the name of their account representative.

When a field list is active, it is the field list for all work areas in the workset. Because the fields in a field list always contain the full alias and field name, the fields in the field list will always be used, even if those fields are in another, unrelated work area. For example, suppose you create a field list with fields from the Customer table, and then select the Vendor, which has 90 records and is not related into the Customer table. If you then issue LIST, you will see 90 records, because the LIST command works on the current work area, but you will see the fields from the Customer table—the fields from the same record repeated 90 times, because the two tables are not related, and those are the values of the named fields for each record in the Vendor table.

Therefore, when you create a field list, it is usually used only for the work area in which it is created. If the field list contains fields from other work areas, some way of synchronizing the movement of the record pointers in those work areas, usually with SET RELATION, is required.

If there is no field list, SET FIELDS creates the specified field list and activates it. If there is a field list, whether it's active or not, SET FIELDS adds the specified fields to the field list, and activates it. Fields in other work areas that are added to the field list may be referred to by their field name only, without using an alias; those fields now appear to be fields in the current work area. The alias is still allowed, and is necessary if you have two fields with the same name from different tables in the field list.

A field may be added to the field list more than once, although this is not recommended. For example, if you execute SET FIELDS TO ALL twice, you will see all the fields in the current table twice. Be sure to use CLEAR FIELDS before issuing SET FIELDS if your intent is to create a new field list, not add to an

existing field list. To specify a field in other work areas, prefix the field name with the alias name and alias operator (that is, alias->field).

You can temporarily disable the field list with SET FIELDS OFF. To reactivate the field list, use SET FIELDS ON. Adding fields with SET FIELDS always reactivates the field list. If you SET FIELDS ON without using the SET FIELDS TO <field list> command, no fields are accessible. SET FIELDS TO with no fields has the same effect as CLEAR FIELDS, deactivating and clearing the field list.

Some commands have a FIELDS option, or some way of specifying fields. You may further restrict the fields used with this option, but you cannot reference fields that have been hidden because they have not been included with SET FIELDS.

When a field list is active, fields that are not on the field list cannot be used in expressions. However, some commands ignore the field list, including:

- INDEX and index expressions
- LOCATE
- SET FILTER
- SET RELATION

The fields list specified with SET FIELDS TO can include both table field names and calculated fields. The /R option provides a setting to specify read-only access to table fields, for example:

```
salary/R, hours/R
```

To specify a calculated field, you can specify any valid expression. For example,

```
gross_pay = salary * hours
```

OODML

No direct equivalent. When accessing the *fields* array, you may include program logic to include or exclude specific fields.

SET FIELDS example

This example takes a table of customers and a table of sales persons and creates a table that contains only the customer name and the name of their sales representative.

```
use CUSTOMER in select()
use SALESPER in select() order SALES_ID
select customer
set relation to SALES_ID into SALESPER
set fields to CUST_NAME = CUSTOMER->NAME, SALES_PERS = SALESPER->NAME
copy to CUSTSALES
```

The field list contains two calculated fields that are used simply to assign new names to the fields from two different tables that happen to have the same name.

Although the COPY command has a FIELDS option, it does not support calculated fields. Therefore SET FIELDS is required for this operation.

SET FILTER

Topic group Related topics Example

Hides records based on a logical condition.

Syntax

SET FILTER TO [<condition>]

<condition>

The condition that records must meet to be seen.

Description

A filter is a mechanism by which you can temporarily hide, or filter out, those records that do not match certain criteria so that you can see only those records that do match. The criteria is expressed as a logical expression, for example,

```
set filter to upper( FIRST_NAME ) == "WALDO"
```

In this case, you would see only those records in the current table whose First_name field was “Waldo” (capitalized in any way).

The filter does not take effect until some sort of record navigation is attempted. For example, any command with an ALL scope will attempt to start at the first record. In this case, the command will start at the first record that matches the filter condition, and process all matching records. A SKIP command would attempt to navigate to the next matching record, and SKIP -1 would attempt to navigate to the previous matching record. GO TOP is often used after SET FILTER to position the record pointer on the first matching record.

Any time you attempt to navigate to a record, the record is evaluated to see if it matches the filter condition. If it does, then the record pointer is allowed to position itself at that record and the record can be seen. If the record does not match the filter condition, the record pointer continues in the direction it was moving to find the next matching record. It will continue to move in that direction until it finds a match or gets to the end-of-file. For example, suppose you issue:

```
skip 4
```

If no filter is active, you would move four records forward. If a filter is active, the records pointer will move forward until it has encountered four records that match the filter condition, and stop at the fourth. That may be the next four records in the table, if they all happen to match, or the next five, or the next 400, or never, if there aren’t four records after the current record that match. In that last case, the record pointer will be at the end-of-file.

In other words, when there is no filter active, every record is considered a match. By setting a filter, you filter out all the records that don’t match certain criteria.

Note: You cannot use the special variables *this* or *form* in the <condition>. This is explicitly prohibited because these special variables automatically take on the value of whatever object and form has focus (or fires an event) at any given moment. Therefore, the filter condition will vary and quite likely be invalid. Generally speaking, you should not use variables in a filter condition at all, because the variables may go out of scope, making the filter condition an invalid expression. To solve these problems, use macro substitution, as shown in the example.

Many commands have scope option that includes FOR and WHILE conditions. These conditions are applied in addition to the filter condition.

SET FILTER applies to the current work area. Each work area may have its own filter condition. To disable the filter condition, issue SET FILTER TO with no options.

OODML

Use the rowset object’s *beginFilter*() and *applyFilter*() methods.

SET FILTER example

The following example sets a filter based on the state that is chosen from a combobox on a form:

```
PROCEDURE setFilter_onClick
  private cState
  cState = form.stateCombobox.value
  set filter to STATE == "&cState"
```

Note the use of macro substitution inside a literal string. A private variable is used; you cannot use the macro operator on a local variable. For example, if the variable contains the value "CA", then the macro substitution would evaluate to:

```
set filter to STATE == "CA"
```

SET HEADINGS

Topic group Related topics

Controls the display of field names in the output of DISPLAY and LIST.

Syntax

SET HEADINGS ON | off

Description

When SET HEADINGS is ON, the output of DISPLAY and LIST includes a heading identifying the fields of the table(s). Issue SET HEADINGS OFF before issuing DISPLAY or LIST to view the output without field-name headings.

OODML

No equivalent.

SET INDEX

Topic group Related topics

Opens index files for the current DBF table.

Syntax

SET INDEX TO [<filename list> [ORDER [TAG]
  <ndx filename> | <tag name> [OF <mdx filename>]]]

<filename list>

Specifies the index files to open, including both .NDX and .MDX indexes. The default extension is .MDX.

ORDER [TAG] <ndx filename> | <tag name>

Specifies a master index, which can be an .NDX file or a tag name contained within an .MDX index file. The TAG keyword is for readability only; it has no effect on the command.

OF <mdx filename>

Specifies a multiple index file containing <tag name>. The default extension is .MDX.

Description

Use SET INDEX to open the specified .NDX and .MDX files in the current work area. Open index files are updated when changes are made to the associated table. Including an index file list when issuing USE...INDEX is equivalent to following the USE command with the SET INDEX command.

If the first index opened with SET INDEX is an .NDX file, that index becomes the master index unless you specify another master index with the ORDER option or the SET ORDER command. If the first index opened with SET INDEX is an .MDX file and you don't specify the ORDER clause, no master index is defined, and records in the table appear in record number or natural order. To specify a master index for the current table, specify the ORDER option or use the SET ORDER command.

Before opening the indexes specified with the command, SET INDEX closes all open index files except the production .MDX file, the index file with the same name as the current table. Specifying SET INDEX TO without a list of indexes closes all open .NDX and .MDX files in the current work area, except for the production index file. You can also use the CLOSE INDEX command. All indexes, including the production .MDX file, are closed when you close the table.

The order in which you specify indexes with the SET INDEX command isn't necessarily the same as the order *Visual* dBASE uses for functions like TAG(). Open indexes for a specified work area are ordered as follows:

1 All .NDX index files in the order you list them in <filename list>.

2 All tags in the production .MDX file, in the order they were created. The tags are listed in order by the DISPLAY STATUS command.

3 All tags in other open .MDX files.

The order of the open indexes remains the same until you specify another index order with the USE...INDEX or SET INDEX commands, or you issue an INDEX command.

OODML

Assign to the Rowset object's *indexName* property.

SET KEY TO

Topic group Related topics

Constrains the records in a table to those whose key field values falls within a range.

Syntax

SET KEY TO
  [<exp1> | <exp list 1> |
  RANGE
    <exp2> [,] | ,<exp3> | <exp2>, <exp 3>
    [EXCLUDE] |
  LOW <exp list 2>] [HIGH <exp list 3>]
    [EXCLUDE]]
[IN <alias>]

<exp1>

Shows only those records whose key value matches <exp 1>.

<exp list 1>

For tables indexed on a composite (multi-field) key index, shows only those records whose key field values match the corresponding values in <exp list 1>, separated by commas.

RANGE <exp2> [,] | ,<exp3> | <exp2>, <exp3>
LOW <exp list 2> HIGH <exp list 3>

Shows only those records whose key values fall within a range. Use RANGE for single key values and LOW/HIGH for composite keys. You may use either the RANGE clause or LOW/HIGH, but not both in the same command. The following table summarizes how SET KEY constrains records in the master index:

Option	Description
RANGE <exp2> [,] LOW <exp list 2>	Shows only those records whose key values are greater than or equal to <exp2>/<exp list 2>
RANGE , <exp3> HIGH <exp list 3>	Shows only those records whose key values are less than or equal to <exp3>/<exp list 3>
RANGE <exp2>, <exp3> LOW <exp list 2> HIGH <exp list 3>	Shows only those records whose key values are greater than or equal to <exp2>/<exp list 2> and less than or equal to <exp3>/<exp list 3>

EXCLUDE

Excludes records whose key values are equal to <exp2>/<exp list 2> or <exp3>/<exp list 3>. If omitted, these records are included in the range.

IN <alias>

The work area in which to set the key constraint.

Description

SET KEY TO is similar to SET FILTER; SET KEY TO uses the table's current master index and shows only those records whose key value matches a single value or falls within a range of values. This is referred to as a key constraint. Because it uses an index, a key constraint is instantaneous, while a filter condition must be evaluated for each record. SET KEY TO with no arguments removes any range of key values previously established for the current table with SET KEY TO.

The key range values must match the key expression of the master index. For example, if the index key is UPPER(Name), specify uppercase letters in the range expressions. In determining whether the specified range expressions match key field expressions, SET KEY TO follows the rules established by SET EXACT. The SET KEY TO range takes effect after you move the record pointer.

When you issue both SET KEY and SET FILTER for the same table, *Visual* dBASE processes only records that are within the SET KEY index range and that also meet the SET FILTER condition.

OODML

Call the Rowset object's *applyLocate*() method with the equivalent SQL filter expression.

SET LOCK

Topic group Related topics

Determines whether *Visual* dBASE attempts to lock a shared table during execution of certain commands that read the table but don't change its data.

Syntax

SET LOCK ON | off

Description

Issue SET LOCK OFF to disable automatic file locking for certain commands that only read a table. This lets other users change data in the file while you access it with read-only commands. For example, you might want to issue SET LOCK OFF before using AVERAGE if you don't expect other users to alter the data in the table you're using significantly. Or, you might want to issue SET LOCK OFF before processing a range of records that other users aren't going to update.

The following commands automatically lock tables when SET LOCK is ON and don't lock tables when SET LOCK is OFF:

- AVERAGE
- CALCULATE
- COPY (source file)
- COPY MEMO
- COPY STRUCTURE
- COPY TO ARRAY
- COPY STRUCTURE [EXTENDED] (source file)
- COUNT
- SORT (source file)
- SUM
- TOTAL (source file)

Visual dBASE continues to lock records and tables automatically for commands that let you change data whether SET LOCK is ON or OFF.

OODML

This setting is not applicable.

SET MEMOWIDTH

Topic group Related topics

Sets the width of memo field display or output.

Syntax

SET MEMOWIDTH TO [<expN>]

<expN>

Specifies a number from 8 to 255 that sets the width of memo field display and output. The default is 50.

Description

Use SET MEMOWIDTH to change the column width of memo fields during display and output, and the default column width for the MEMLINES() and MLINE() functions. Memo fields can be displayed using the commands DISPLAY, LIST, ?, or ??. SET MEMOWIDTH doesn't affect the display of a memo field in an Editor control. If the system memory variable variable_wrap is set to *true*, the system memory variables _lmargin and _rmargin determine the memo width.

The @V (vertical stretch) picture function causes memo fields to be displayed in a vertical column when _wrap is *true*. When @V is specified, the _pcolno system memory variable is incremented by the @V value. This lets you change the appearance of the printed output of ? or ?? commands by using the @V function. When @V is equal to zero, memo fields wrap within the SET MEMOWIDTH width.

OODML

This setting is not applicable.

SET NEAR

Topic group Related topics

Specifies where to move the record pointer after a SEEK or SEEK() operation fails to find an exact match.

Syntax

SET NEAR on | OFF

Description

Use SET NEAR to position the record pointer in an indexed table close to a particular key value when a search does not find an exact match. When SET NEAR is ON, the record pointer is set to the record closest to the key expression searched for but not found with SEEK or SEEK(). When SET NEAR is OFF and a search is unsuccessful, the record pointer is positioned at the end-of-file.

The closest record is the the record whose key value follows the value searched for in the index order, toward the end-of-file. When SET DELETED is ON or a filter is set with the SET FILTER command, SET NEAR skips over deleted or filtered-out records in determining the record nearest the key value expression. The record pointer will be at the end-of-file if search value comes after the key value of the last record in the index order.

With SET NEAR ON, FOUND() and SEEK() return *true* for an exact match or *false* for a near match. With SET NEAR OFF, FOUND() and SEEK() return *false* if no match occurs.

OODML

Use either the *findKey*() or *findKeyNearest*() method of the Rowset object.

SET ODOMETER

Topic group

Specifies how frequently *Visual* dBASE updates and displays record counter information for certain commands in the status bar.

Syntax

SET ODOMETER TO [<expN>]

<expN>

The interval at which *Visual* dBASE updates the record counter. <expN> must be at least 1 and is truncated to an integer. If omitted, the default value, 100, is used.

Description

Use SET ODOMETER to specify how frequently *Visual* dBASE updates and displays record counter information during the execution of certain commands, such as AVERAGE, CALCULATE, COUNT, DELETE, GENERATE, INDEX, RECALL, SUM, and TOTAL. If the status bar is not enabled, SET ODOMETER has no effect. The status bar is enabled through _app.statusBar.

If SET TALK is OFF, dBASE does not display any record counter information in the status bar, regardless of the SET ODOMETER setting. If SET TALK is ON, use SET ODOMETER with a relatively high value to improve performance.

OODML

Use the Session object's *onProgress* event.

SET ORDER

Topic group Related topics

Specifies an open index file or tag as the master index of a table.

Syntax

SET ORDER TO [[TAG] <tag name> [OF <mdx>] [NOSAVE]]

[TAG] <tag name>

The name of an index tag in an open .MDX file or the name of an open .NDX file (without the file extension). The TAG keyword is included for readability only; TAG has no affect on the operation of the command.

OF <mdx>

The open .MDX file that contains <tag name>. Use this option when two open .MDX files have a tag with the same name. The default extension is .MDX.

If you use the <tag name> option but don't specify <mdx>, *Visual* dBASE searches for the named index in the list of open indexes.

NOSAVE

Used to delete a temporary index after the associated table is closed. If you decide after choosing this option that you want to keep the index, open the index again using SET ORDER without the NOSAVE option, before you close the table.

Description

Use SET ORDER to change the master index of a table without having to close and reopen indexes. You can choose the master index from the list of .NDX files or .MDX index tags opened with the SET INDEX or USE...INDEX commands.

If you specify SET ORDER without specifying an index, the table appears in primary key order, if the table has a primary key; or unindexed, in record number order.

OODML

Assign the tag name to the Rowset object's *indexName* property.

SET REFRESH

Topic group Related topics

Determines how often *Visual* dBASE refreshes the workstation screen with table information from the server.

Syntax

SET REFRESH TO <expN>

<expN>

A time interval expressed in seconds from 0 to 3,600 (1 hour), inclusive. The default is 0, meaning that *Visual* dBASE doesn't update the screen.

Description

Use SET REFRESH to set a refresh interval when working with shared tables on a network. Then, when you use BROWSE or EDIT to edit shared tables, your screen refreshes at the interval you set, showing you changes made by other users on the network to the same tables.

If another user has a lock on the file or records you're currently viewing, the file or records won't be refreshed until that user releases the lock.

OODML

Use a Timer object to periodically call the Rowset object's *refreshControls*() method.

SET RELATION

Topic group Related topics Example

Links two or more open tables with common fields or expressions.

Syntax

SET RELATION TO
[<key exp list 1> INTO <alias 1> [CONSTRAIN]
  [, <key exp list 2> INTO <alias 2> [CONSTRAIN]] ...
[ADDITIVE]]

<key exp list 1>

The key expression or field list that is common to both the current table and a child table and links both tables. The child table must be indexed on the key field and that index must be the master index in use for the child table.

<expN 1>

For DBF tables only, you can specify <expN>to link records in a child table. When <expN> is RECNO(), *Visual* dBASE links the current table to a child table by corresponding record numbers, in which case, the child table doesn't have to be indexed.

INTO <alias>

<alias> specifies the child table linked to the current table.

<key exp list 2> | <expN 2> INTO <alias 2> ...]

Specifies additional relationships from the current table into other tables.

CONSTRAIN

Limits records processed in the child table to those matching the key expression in the parent table.

ADDITIVE

Adds the new relation to any existing ones. Without ADDITIVE, SET RELATION clears existing relations before establishing the new relation.

Description

Use SET RELATION to establish a link between open tables based on common fields or expressions.

Before setting a relation, open each table in a separate work area. When a relation is set, the table in the current work area is referred to as the parent table, and a table linked to the parent table by the specified key is called a child table. The child table must be indexed on the fields or expressions that link tables and that index must be the master index in use for the child table.

A relation between tables is usually set through common keys specified by <key exp list>. The relating expression can be any expression derived from the parent table that matches the keys of the child table master index. The keys may be a single field or a set of concatenated fields contained in each table. The fields in each table can have different names but must contain the same type of data. For Paradox and SQL tables, you can specify single or composite index key fields.

SET RELATION clears existing relations before establishing a new one, unless you use the ADDITIVE option. SET RELATION TO without any arguments clears existing relations from the current table without establishing any new relations.

The CONSTRAIN option restricts access in the child table to only those records whose key values match records in a parent table. This is the same as using SET KEY TO on the key field of the child table. As a result, you can't use SET KEY TO and CONSTRAIN at the same time. If a SET KEY TO operation is in effect on the child table when you specify CONSTRAIN with SET RELATION, *Visual* dBASE returns a "SET KEY active in alias" message. If the CONSTRAIN option is in effect when SET KEY TO is specified, *Visual* dBASE returns the error "Relation using CONSTRAIN." You can use SET FILTER with the CONSTRAIN option, if you want to specify additional conditions to qualify records in a child table.

More than one relation can be defined from the same table. Also, more than one relation can be set from

the same parent table if you use the ADDITIVE option or if you specify multiple relations with the same SET RELATION command. You can also establish additional relations from a child table, thus defining a chain of relations. Cyclic relations aren't allowed; that is, *Visual* dBASE returns an error if you attempt to define a relation from a child table back into its parent table.

When a relation is set from a parent table to a child table, the relation can be accessed only from the work area that contains the parent table. To access fields of the child table from the current work area, use the alias operator(->) and prefix the name of fields in the child table by its alias name.

If a matching record can't be found in a linked table, the linked table is positioned at the end-of-file, and EOF() in the child alias returns *true* while FOUND() returns *false*. The setting of SET NEAR does not affect positioning of the record pointer in child tables.

When a SET SKIP list is active, the record pointer is advanced in each table, starting with the last work area in the relation chain and moving up the chain toward the parent table.

OODML

Use the Rowset object's *masterFields* and *masterRowset* properties, or the Query object's *masterSource* property.

SET RELATION example

The first example links a table of reviews to a table of authors. This is a one-to-one link that can be used to get the name of the lead author (stored in the Authors table) for each review:

```
use REVIEWS                                  && Open in current work area
use AUTHORS in select() order AUTH_ID        && Open in next available work
area
set relation to LEAD_AUTH into AUTHORS       && Link Reviews to Authors
```

The Reviews table has a Lead_auth field that contains the ID of the lead author for each review. The Authors table identifies each author with an ID field named Auth_id. The Auth_id field is indexed by itself, so the index has the same name.

The following example is a one-to-many link between a customer table and an orders table that shows only those customers that have made orders in the past:

```
use CUSTOMER
use ORDERS in select() order CUST_DATE
set relation to CUST_ID into ORDERS
set filter to found( "ORDERS" )
```

The Customer table has a Cust_id field that contains the customer ID. The same field is a foreign key in the Orders table. The Cust_date index is an expression index created with:

```
index on CUST_ID + dtos( ORDER_DATE ) tag CUST_DATE
```

The SET FILTER command shows only those Customers that have a record in the Orders table.

SET REPROCESS

Topic group Related topics

Specifies the number of times *Visual* dBASE tries to lock a file or record before generating an error or returning *false*.

Syntax

SET REPROCESS TO <expN>

<expN>

A number from -1 to 32,000, inclusive, that is the number of times for *Visual* dBASE to try get a lock. The default is 0; both 0 and -1 have a special meaning, described below.

Description

Use SET REPROCESS to specify how many times *Visual* dBASE should try to get a lock before giving up. RLOCK() and FLOCK() return *false* if the lock attempt fails. For automatic locks, failure to get a lock causes an error. SET REPROCESS affects RLOCK(), and FLOCK(), and all commands and functions that automatically attempt to lock a file or records.

SET REPROCESS TO 0 causes *Visual* dBASE to display a dialog that gives you the option of cancelling while it indefinitely attempts to get the lock.

Setting SET REPROCESS to a number greater than 0 causes *Visual* dBASE to retry getting a lock the specified number of times without prompting.

SET REPROCESS TO -1 causes *Visual* dBASE to retry getting a lock indefinitely, without prompting.

OODML

Set the Session object's *lockRetryCount* property.

SET SAFETY

Topic group Related topics

Determines whether *Visual* dBASE asks for confirmation before overwriting a file or removing records from a table when you issue ZAP.

Syntax

SET SAFETY ON | off

Description

When SET SAFETY is ON, dBASE prompts for confirmation before overwriting a file or removing records from a table when you issue ZAP. If you want your application to control the interaction between *Visual* dBASE and the user with regard to overwriting files, issue SET SAFETY OFF in your program.

SET SAFETY affects the following commands:

- Commands using a TO FILE option
- COPY
- COPY FILE
- COPY STRUCTURE [EXTENDED]
- CREATE/MODIFY commands
- INDEX
- SAVE
- SET ALTERNATE TO
- SORT
- TOTAL
- UPDATE
- ZAP

Note: SET TALK OFF does not suppress SET SAFETY warnings.

OODML

SAFETY is always OFF.

SET SKIP

Topic group Related topics

Specifies how to advance the record pointer through records of linked tables.

Syntax

SET SKIP TO [<alias1> [, <alias2>]...]

<alias1> [, <alias2>] ...

The work areas defined in the relation.

Description

SET SKIP works only with tables that have been linked with the SET RELATION command. Used together, the SET RELATION and SET SKIP commands determine the way in which the record pointer moves through parent and child tables.

Use SET SKIP when you set a relation from a parent table containing unique key values to child tables that contain duplicate key values, that is, a one-to-many relationship. SET SKIP causes commands that move the record pointer to move the pointer to every record with matching key values in a child table before moving the record pointer in the parent table. If you define a chain of relations and use SET SKIP to move from one table to the next down the chain, the record pointer moves to every record in the last child table before the pointer moves in its parent table.

You do not need to specify the root (parent) alias in the SET SKIP list. SET SKIP TO with no options cancels any previously defined SET SKIP behavior.

OODML

Override the *next*() method of the detail table. For example:

```
function next( nArg )
  if not rowset::next( nArg )               // Navigate as far as specified,
but
                                            //   if end of detail rowset
    this.masterRowset.next( sign( nArg ) )  // Move forward or backward in
master
    if nArg < 0                             // If navigating backwards
      this.last()                           // Go to last matching detail row
    endif
  endif
```

Then navigate by calling *next*() in detail rowset—not the master rowset, as you would with SET SKIP.

SET UNIQUE

Topic group Related topics

Determines if unique indexes are always created.

Syntax

SET UNIQUE on | OFF

Description

When SET UNIQUE is ON, the INDEX command always creates the index as if the UNIQUE option is specified. The UNIQUE option has different meanings for different table types. For DBF tables, it allows records with duplicate key values to be stored in the table, but only shows the first record with that key value.

For DB and SQL tables, it prevents records with duplicate key values from being stored in the table; attempting to do so causes a key violation error. This type of index is referred to as a distinct index. You can create the same kind of index for DBF tables by using the DISTINCT option.

Whenever you reindex an index file, *Visual* dBASE maintains the index in the same way it was created. For more information on unique and distinct indexes, see the INDEX command.

OODML

No equivalent.

SET VIEW

Topic group Related topics

Opens a previously defined query or view file.

Syntax

SET VIEW TO <filename>

<filename>

The query or view file containing the commands to define the current working environment or view. If you specify a file without including its extension, *Visual* dBASE looks for a .QBE, then a .VUE file.

Description

Use SET VIEW to change the working environment of the current workset to one that was previously defined by CREATE QUERY or CREATE VIEW. The working environment includes open tables and index files, all relations, the active fields list, and filter conditions.

OODML

Use a DataModule object.

SKIP

Topic group Related topics

Moves the record pointer in the current or specified work area.

Syntax

SKIP [<expN>] [IN <alias>]

<expN>

The number of records *Visual* dBASE moves the record pointer forward or backward in the table open in the current or specified work area. If <expN> evaluates to a negative number, the record pointer moves backward. SKIP with no <expN> argument moves the record pointer forward one record.

IN <alias>

The work area in which to move the record pointer.

Description

Use SKIP to move the record pointer relative to its current position, in the current index order, if any.

If you issue a SKIP command when the record pointer is at the last record in a table, the record pointer moves to the end-of-file; EOF() returns *true*. Issuing any additional SKIP commands (that move forward) causes an error. Similarly, if you issue a SKIP -1 command when the record pointer is at the first record of a file, BOF() returns *true*, and a subsequent negative SKIP command cause an error.

SKIP IN <alias> lets you advance the record pointer in another work area without selecting that work area first with the SELECT command.

If you are using SKIP in a loop to visit all the records in a table, consider using a SCAN loop instead.

OODML

Call the *next*() method of the desired Rowset object.

SORT

Topic group Related topics Example

Copies the current table to a new table, arranging records in the specified order.

Syntax

SORT TO <filename> [[TYPE] PARADOX | DBASE]
ON <field 1> [/A | /D [/C]]
    [,<field 2> [/A | /D [/C]]...]
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]
[ASCENDING | DESCENDING]

<filename>

The new table file to copy and sort the current table's records to.

[TYPE] PARADOX | DBASE

Specifies the type of table you want to create, if <filename> does not include an extension. This option overrides the current SET DBTYPE setting. The TYPE keyword is included for readability only; it has no effect on the operation of the command.

ON <field 1>

Makes <field 1> the first field of <filename>and sorts <filename> records by the values in <field 1>, which can be any data type except binary, memo, or OLE.

/A

Sorts records in ascending order (A to Z; 1 to 9; past to future (blank dates come after non-blank dates); *false* then *true*). Since this is the default sort order, include /A for readability only.

/D

Sorts records in descending order.

/C

Removes the distinction between uppercase and lowercase letters. When you specify both A and C, or both D and C, use only one forward slash (for example, /DC).

<field 2> [/A | /D [/C]] ...

Sorts on a second field so that the new table is ordered first according to <field 1>, then, for identical values of <field 1>, according to <field 2>. If a third field is specified, records with identical values in <field 1> and in <field 2> are then sorted according to <field 3>. The sorting continues in this way for as many fields as are specified.

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is ALL.

ASCENDING

Sorts all specified fields for which you don't include a sort order in ascending order. Since this is the default, include ASCENDING for readability only.

DESCENDING

Sorts all specified fields for which you don't include a sort order in descending order.

Description

The SORT command creates a new table in which the records in the current table are positioned in the order of the specified key fields.

When you use SORT, creates a temporary index file. During the sorting process, your disk must have space for this temporary index file and the new table file.

SORT differs from INDEX in that it creates a new table rather than provide an index to the original table. Although using SORT is generally not as efficient as using an index to organize tables, you might want to use SORT for the following applications:

- To archive an outdated table and store it in a sorted order
- To create a table that is a sorted subset of an original table
- To maintain a small table that needs to be sorted in only one order
- To create an ordered table where record numbers are sequential and contiguous

OODML

No equivalent.

SORT example

Suppose you have a large table and you want to delete any duplicate records, records that have the same value in 6 important fields. The easiest way to remove duplicate records in general is to index the table so that all duplicate records are next to each other. Unfortunately, some of the 6 important fields are large; the resulting the index key would be larger than the allowed limit, 100 characters. So you sort the table instead to a temporary table instead.

```
use THETABLE
sort to SORTTEMP on FIELD1, FIELD2, FIELD3, FIELD4, FIELD5, FIELD6
use SORTTEMP
set fields to KEY = FIELD1 + FIELD2 + FIELD3 + FIELD4 + FIELD5 + FIELD6
local cKey
do while .not. eof()
  cKey = KEY
  skip
  delete while KEY == cKey
enddo
clear fields
```

SET FIELDS is used to create a temporary calculated field to make it easier to compare the important field values for each record.

STORE AUTOMEM

Topic group Related topics

Stores the contents of all the current record's fields to a set of memory variables.

Syntax

STORE AUTOMEM

Description

STORE AUTOMEM copies every field of the current record to a set of matching automem variables. Each memory variable has the same name, length, and data type as one of the fields. *Visual* dBASE creates these memory variables if they don't already exist.

Automem variables let you temporarily store the data from table records, manipulate the data as memory variables rather than as field values, and then return the data to the table (using REPLACE AUTOMEM or APPEND AUTOMEM).

STORE AUTOMEM is one of three commands that create automem variables. The other two, USE <filename> AUTOMEM and CLEAR AUTOMEM, initialize blank automem variables for the fields of the current table.

When referring to the value of automem variables you need to prefix the name of an automem variable with M-> to distinguish the variable from the corresponding fields, which have the same name. The M-> prefix is not needed during variable assignment; the STORE command and the = and := operators do not work on Xbase fields.

OODML

The Rowset object's contains an array of Field objects, accessed through its *fields* property. These Field objects have *value* properties that may be programmed like variables.

SUM

Topic group Related topics

Computes a total for specified numeric fields in the current table.

Syntax

SUM [<*exp list*>]
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]
[TO <memvar list> | TO ARRAY <array>]

<exp list>

The numeric fields, or expressions involving numeric fields, to sum.

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is ALL.

TO <memvar list> | TO ARRAY <array>

Initializes and stores averages to the variables (or properties) of <memvar list> or stores averages to the existing array <array>. If you specify an array, each field average is stored to elements in the order in which you specify the fields in <exp list>. If you don't specify <exp list>, each field average is stored in field order. <array> can be a single- or multidimensional array; the array elements are accessed via their element numbers, not their subscripts.

Description

The SUM command computes the sum of numeric expressions and stores the results in specified variables or array elements. If you store the values in variables, the number of variables must be exactly the same as the number of fields or expressions averaged. If you store the values in an array, the array must already exist, and the array must contain at least as many elements as the number of averaged expressions.

If SET TALK is ON, SUM also displays its results in the results pane of the Command window. The SET DECIMALS setting determines the number of decimal places that SUM displays. Numeric fields in blank records are evaluated as zero. To exclude blank records, use the ISBLANK() function in defining a FOR condition. EMPTY() excludes records in which a specified expression is either 0 or blank.

SUM is similar to TOTAL, which operates on an indexed or sorted table to create a second table containing the sums of the numeric and float fields of records grouped on a key expression.

OODML

Loop through the rowset to calculate the sum.

TAG()

Topic group Related topics Example

Returns the name of an open index.

Syntax

TAG([<.mdx filename expC>,] [<index number expN> [,<alias>]])

<.mdx filename expC>

The .MDX file that contains the index tag you want to check. The .MDX must be opened in the specified work area. If omitted, all open indexes, including the production .MDX file, are searched.

<index position expN>

the numeric position of the index tag in the specified .MDX file, or the position of the index in the list of open indexes.

<alias>

The work area you want to check.

Note: Unlike most functions, the first parameter is optional. If you omit the first parameter, the remaining parameters shift forward one; the second parameter becomes the first parameter, and so on.

Description

TAG() returns the name of the specified index, either:

- The tag name of an index in an .MDX file, or
- The name of an .NDX file, without the file extension.

The index must be referenced by number. If you do not specify an .MDX file to check, index numbering in the list of open indexes is complicated if you have open .NDX indexes or you have open non-production .MDX files. For more information on index numbering, see SET INDEX.

If you do not specify an index tag, TAG() returns the name of the current master index tag, or an empty string if there is no master index.

If the specified .MDX file or index tag does not exist, TAG() returns an empty string.

OODML

No equivalent.

TAGCOUNT()

Topic group Related topics

Returns the number of active indexes in a specified work area or .MDX index file.

Syntax

TAGCOUNT([<.mdx filename> [,<alias>]])

<.mdx filename expC>

The .MDX file you want to check. The .MDX must be opened in the specified work area.

<alias>

The work area you want to check.

Description

TAGCOUNT() returns the total number of open indexes or the number of index tag names in a specified .MDX file. TAGCOUNT() returns 0 if there are no indexes or index tags open for the current or specified work area, or if the .MDX index file specified with <.mdx filename expC> does not exist. If you do not specify an .MDX file name, TAGCOUNT() returns the total number of indexes in the specified work area: the number of open .NDX files, plus the total number of tags in all open .MDX files. If you do not specify an alias, TAGCOUNT() returns the total number of indexes in the current work area.

OODML

No equivalent.

TAGNO()

Topic group Related topics

Returns the index number of the specified index.

Syntax

TAGNO([<tag name expC> [,<.mdx filename expC> [,<alias>]]])

<tag name expC>

The name of the index tag that you want to return the position of. If you don't specify a tag name, TAGNO() returns the position of the current master index.

<.mdx filename expC>

The .MDX file that contains the index tag you want to check. The .MDX must be opened in the specified work area. If omitted, all open indexes, including the production .MDX file, are searched.

<alias>

The work area you want to check.

Description

TAGNO() returns a number that indicates the position of the specified index name in the list of open indexes in the current or specified work area. The order of indexes is determined by the order in which they were opened with the USE or SET INDEX commands.

If you don't specify a tag name, TAGNO() returns the number of the master index. If you don't specify an .MDX file name, TAGNO() searches the list of open index files in the specified work area, including .NDX files. If you don't specify an alias, TAGNO() operates on the list of open indexes in the current work area.

TAGNO() returns zero if the specified index tag or .MDX file does not exist.

Use TAGNO() to get the index number of an index when you know the tag name for functions like DESCENDING(), FOR(), KEY(), and UNIQUE().

OODML

No equivalent.

TARGET()

Topic group Related topics

Returns the name of a table linked with the SET RELATION command.

Syntax

TARGET(<expN> [,<alias>])

<expN>

The number of the relation that you want to check.

<alias>

The work area you want to check.

Description

TARGET() returns a string containing the name of the child tables that are linked to a parent table by the SET RELATION command. You must specify the number of the relation; if the table in the current or specified work area is linked to only one table, that <expN> is the number 1. TARGET() returns an empty string ("") if no relation is set in the <expN> position.

Use TARGET() to save the link tables of all SET RELATION settings for later use when restoring relations. To save the link expression, use the RELATION() function.

OODML

No equivalent. The *masterSource* and *masterRowset* properties contain references to the parent query or rowset; TARGET() returns the names of the child tables.

TOTAL

Topic group Related topics Example

Creates a table that stores totals for specified numeric fields of records grouped by common key values.

Syntax

TOTAL ON <key field> TO <filename> [[TYPE] PARADOX | DBASE]
[<scope>]
[FOR <condition 1>]
[WHILE <condition 2>]
[FIELDS <field list>]

<key field>

The name of the field on which the current table has been indexed or sorted.

TO <filename>

The table to create.

[TYPE] PARADOX | DBASE

Specifies the type of table you want to create, if <filename> does not include an extension. This option overrides the current SET DBTYPE setting. The TYPE keyword is included for readability only; it has no effect on the operation of the command.

<scope>
FOR <condition 1>
WHILE <condition 2>

The scope of the command. The default scope is ALL.

FIELDS <field list>

Specifies which numeric and float fields to total. If you don't include FIELDS, *Visual* dBASE totals all numeric and float fields.

Description

Use TOTAL to total the value of numeric fields in a table and create a second table to store the results. The numeric fields in the table storing the results contain totals for all records that have the same key field in the original table.

The current table must be either indexed or sorted on the key field. All records with the same key field become a single record in the table storing the result totals. All numeric fields appearing in the fields list contain totals. All other fields contain data from the first record of the set of records with identical keys.

To limit the fields that are created in the new file, or to group on more than one key field, use SET FIELDS as shown in the example.

TOTAL is similar to SUM, except that SUM operates on an indexed or unindexed table, returning a sum for all records of each numeric field. SUM doesn't create another table, but stores the results to memory variables or an array.

OODML

No equivalent.

TOTAL example

Suppose you're totaling licensee fee revenue for a county, and you want totals for each city, for each different fee category. First you create an index on the city and fee category:

```
index on CITY + FEE_CAT tag CITY_FEE
```

Then you use SET FIELDS to create a calculated key field based on the two fields on which you can TOTAL:

```
set fields to CITY_FEE = CITY + FEE_CAT
set fields to CITY, FEE_CAT, LIC_PAID
total on CITY_FEE to CITY_PAD
```

Even though the composite field, which will appear in the result table, has the city and fee category, the city and fee category fields are included in the field list so that they will appear in the result table as separate fields. The field containing the license fee pad is also included in the field list, otherwise there would be nothing to total.

UNIQUE()

Topic group | Related topics | Example

Indicates if a specified index ignores duplicate records.

Syntax

UNIQUE([<.mdx filename expC>,] [<index position expN> [,<alias>]])

<.mdx filename expC>

The .MDX file that contains the index tag you want to check. The .MDX must be opened in the specified work area. If omitted, all open indexes, including the production .MDX file, are searched.

<index position expN>

the numeric position of the index tag in the specified .MDX file, or the position of the index in the list of open indexes.

<alias>

The work area you want to check.

Note: Unlike most functions, the first parameter is optional. If you omit the first parameter, the remaining parameters shift forward one; the second parameter becomes the first parameter, and so on.

Description

UNIQUE() returns *true* if the index tag specified by the <index position expN> parameter was created with the UNIQUE keyword or with SET UNIQUE ON; otherwise, it returns *false*.

The index must be referenced by number. If you do not specify an .MDX file to check, index numbering in the list of open indexes is complicated if you have open .NDX indexes or you have open non-production .MDX files. For more information on index numbering, see SET INDEX. Either way, it is often easier to reference an index tag by name by using the TAGNO() function to get the corresponding position number.

If you do not specify an index tag, UNIQUE() checks the current master index tag and returns *false* if there is no master index.

If the specified .MDX file or index tag does not exist, UNIQUE() returns *false*.

OODML

No equivalent.

UNLOCK

Topic group Related topics

Releases all explicit locks.

Syntax

UNLOCK [ALL | IN <alias>]

ALL

Releases all explicit locks in all work areas in the current workset.

IN <alias>

Releases all explicit locks in the specified work area.

Description

Use UNLOCK to unlock file locks you obtained with FLOCK(), or to unlock record locks you obtained with RLOCK() or LOCK(). Issue UNLOCK at the same workstation as the one at which you issued the FLOCK(), RLOCK(), and LOCK() functions. UNLOCK can't release locks obtained through other workstations, and does not release automatic file and record locks.

When you set a relation from parent table to child tables with SET RELATION and then unlock the parent table or records in the parent table with UNLOCK, *Visual* dBASE also unlocks child tables or records. For more information on relating tables, see SET RELATION.

OODML

Use the Rowset object's *unlock*() method.

UPDATE

Topic group Related topics Example

Replaces data in the specified fields of the current table with data from another table.

Syntax

UPDATE ON <key field> FROM <alias>
REPLACE <field 1> WITH <exp 1>
    [, <field 2> WITH <exp 2>...]
[RANDOM]
[REINDEX]

<key field>

The key field that is common to both the current table and the table containing the updated information.

FROM <alias>

The work area that provides updates to the current table.

REPLACE <field 1>

The field in the current table to be updated with data from the table specified by FROM <alias>.

WITH <exp 1>

The expression to store in field <field 1>. Use the FROM table's alias name and the alias operator (that is, alias->field) to refer to field values in the FROM table.

[,<field n> WITH <exp n> ...]

Specifies additional fields to be updated.

RANDOM

Specifies the FROM table is neither indexed nor sorted. (The current table must be indexed on the key field common to both tables.)

REINDEX

Rebuilds open indexes after all records have been updated. Without REINDEX, *Visual* dBASE updates all open indexes after updating each record. When the current table has multiple open indexes or contains many records, UPDATE executes faster with the REINDEX option.

Description

The UPDATE command uses data from a specified table to replace field values in the current table. It makes the changes by matching records in the two files based on a single key field.

The current table must be indexed on the field in the key field. Unless the RANDOM option is used, the table in the specified work area should also be indexed or sorted on the same field. The key fields must have identical names in the two tables.

UPDATE works by traversing the FROM table, finding the matching record in the current table (the current table must be indexed or sorted so that the match can be found quickly), and executing the REPLACE clause. If there is no match for a record in the FROM table, it is ignored. If there are multiple records in the FROM table that match a single record in the current table, all the replacements will be applied. For a simple REPLACE clause, only the last one will appear to have taken effect.

OODML

Use the *update*() method of an UpdateSet object.

UPDATE example

Suppose you have a list of students and you receive an update file containing their new grade point averages. You can use the UPDATE command to update your list of students:

```
use STUDENTS order STU_ID
use ? alias UPDATES
update on STU_ID from UPDATES replace GPA with UPDATES->GPA RANDOM
```

The ? option in the USE command displays a dialog box from which you can pick the new file. The file is always opened with the alias UPDATES.

USE

Topic group Related topics Example

Opens the specified table and its associated index and memo files, if any.

Syntax

USE
[<filename1> [[TYPE] PARADOX | DBASE]
[IN <alias>]
[INDEX <filename2> [, <filename3> ...]]
[ORDER [TAG] <.ndx filename> |
    <tag name> [OF <.mdx filename>]]
[AGAIN]
[ALIAS <alias name>]
[AUTOMEM]
[EXCLUSIVE | SHARED]
[NOSAVE]
[NOUPDATE]]

<filename 1>

The table you want to open.

[TYPE] PARADOX | DBASE

Specifies the type of table you want to create, if <filename> does not include an extension. This option overrides the current SET DBTYPE setting. The TYPE keyword is included for readability only; it has no effect on the operation of the command.

IN <alias>

The work area in which to open the table. You can specify the work area that is being used by another table, in which case that other table is closed first.

INDEX <filename2> [, <filename3> ...]

Applicable to DBF indexes only. (Indexes on other table types are specified by the ORDER clause.) Opens up to 100 individual index files for the specified table, which can include single (.NDX) and multiple index file (.MDX) names and wildcards.

ORDER [TAG] <tag name>

Makes the <tag name> index file the master index.

If you don't include the ORDER clause and the first file name after INDEX is a single index .NDX file, the single index file is the master index. If you don't include ORDER and the first file name after INDEX is a multiple index .MDX file, the table is in natural order. If the table has a primary key index, it is used; otherwise the table is unordered.

OF <.mdx filename>

The .MDX file that includes <tag name>. Without OF <filename>, *Visual* dBASE searches for <tag name> in the table's production .MDX file, the .MDX file with the same root name as the table.

ORDER [TAG] <.ndx filename>

Makes the single index file, <.ndx filename>, the master index. The .NDX file must be specified in the INDEX clause. Use the name of the index without the file extension.

AGAIN

Opens a table and its related index files in the current or specified work area, leaving the table open in one or more other work areas. This keyword is superfluous and included for compatiblity. *Visual* dBASE always opens table with AGAIN.

ALIAS <alias name>

An alternate alias name to assign to the table.

AUTOMEM

Initializes a memory variable for each field of the specified table (not including memo, binary, or OLE types). The memory variables are assigned the same names and types as the fields.

EXCLUSIVE | SHARED

EXCLUSIVE opens the table so that no other users can open the table until you close it; SHARED allows other users access while the table is opened. This option overrides the current setting of SET EXCLUSIVE.

NOSAVE

Used to open a table as a temporary table. When you close a table opened with NOSAVE, it is erased along with its associated index and memo files. If you inadvertently open a table with the NOSAVE option, use COPY to save the data.

NOUPDATE

Prevents users from altering, deleting, or recalling any records in the table.

Description

The USE command opens an existing table and its associated files, including index and memo files. You need to open a table before you can access any data stored in the table.

USE with no options closes the open table and its associated files in the current work area. USE IN <alias>, with no other options, does the same in the specified work area. CLOSE TABLES closes tables in all work areas.

You can open a table in any work area. It is common practice to USE IN SELECT() to open the table in the first available work area. If a table is already opened in the specified work area, that table is closed before the specified table is opened.

USE...INDEX specifies index files that are opened and maintained for a particular table. For a DBF table, its production .MDX is automatically opened and does not need to be listed.

The ORDER option specifies the master index from the list of indexes opened with the INDEX option and the production .MDX index. USE...INDEX is identical to USE followed by SET INDEX. See the SET INDEX and SET ORDER commands for an explanation of the open index order and specifying a master index.

You can include .NDX as well as .MDX index file names with the INDEX option. If a table has an .NDX and an .MDX index file with the same name, *Visual* dBASE opens indexes listed in the .MDX index file. In that case, to open the .NDX file you would need to specify its full name, including its extension.

When opening a table, you can name the work area by including the ALIAS option in the USE command line. ALIAS names follow the same rules as file names. Aliases are used when referring to a table from another work area. If you do not specify an <alias name> the table name (without the extension) is used, unless that name is invalid, because:

- That alias name is already in use by another open table, perhaps because the table is already open in another work area, or
- The table name is not a valid alias name because it is a single letter from A to J or M, which are all reserved alias names, or some other reason.

If the table name is not a valid alias, a valid default alias is generated.

The AUTOMEM option creates blank automem variables for the table, as if the CLEAR AUTOMEM command was executed immediately after opening the table.

Use the NOSAVE option of USE to open a table as a temporary file. *Visual* dBASE automatically erases the table, along with its associated memo and index files, when you close the table.

To open a table read-only, which prevents intentional or accidental changes, use the NOUPDATE option.

OODML

Use a Query object with "SELECT * FROM <table>" as the *sql* property.

USE example

The following opens the Flight table in the Fleet database with a specific index order:

```
use :FLEET:FLIGHT order :FROM ID:
```

Note the use of the colon delimiters to both specify a table in a database and an index tag name that has spaces in it.

WORKAREA()

Topic group Related topics

Returns a number representing the currently selected work area.

Syntax

WORKAREA()

Description

The WORKAREA() function returns the number of the currently selected work area. Use WORKAREA() in a program to save the current work area number and then later restore that work area using the SELECT command.

Using the work area name returned by ALIAS() is generally preferred, but WORKAREA() will work better there’s a possibility that no table is in use in the current work area.

OODML

There is no concept of the "current" Query object. Use your usual object management techniques to manage Query objects.

ZAP

Topic group Related topics

Removes all records from the current table.

Syntax

ZAP

Description

ZAP is the fastest way to delete all records from a table. DELETE ALL, followed by PACK, also deletes all records from a table. Using ZAP requires a table be opened exclusively.

When SET SAFETY is ON and you issue ZAP, *Visual* dBASE displays a warning message asking you to confirm the operation before removing records.

OODML

Use the Database object's *emptyTable*() method.

Local SQL overview

Topic group Related topics

The Borland Database Engine (BDE) enables access to database tables through the industry-standard SQL language. Different table formats, for example InterBase¨ and Oracle, use different dialects of SQL. Local SQL (sometimes called “client-based SQL”) is a subset of ANSI-92 SQL for accessing DB (Paradox) and DBF (dBASE) tables and fields (called “columns” in SQL).

Although it is called “local” SQL, the DB and DBF tables may reside on a remote network file server.

For information on the SQL dialect for other table formats, consult your SQL server documentation.

SQL statements are divided into two categories:

- Data definition language

These statements are used for creating, altering, and dropping tables, and for creating and dropping indexes.

- Data manipulation language

These statements are used for selecting, inserting, updating, and deleting table data.

In the examples, an SQL statement may be displayed on multiple lines for readability. But SQL is not line-oriented. When an SQL statement is specified in a string, as it is in a Query object’s *sql* property, the entire SQL statement is specified in a single line.

SQL is not case-sensitive. The convention for SQL keywords is all uppercase, which is used in this series of Help topics. SQL statements in the rest of the *Language Reference* may use either uppercase or lowercase.

Naming conventions

Topic group Related topics

This section describes the naming conventions for tables and columns in local SQL.

Tables

Local SQL supports full file and path specifications for table names. Table names with a path, spaces, or other special characters in their names must be enclosed in single or double quotation marks. You may use forward slashes instead of backslashes. For example,

```
SELECT * FROM PARTS.DB                // Simple name with extension; no quotes
required
SELECT * FROM "AIRCRAFT PARTS.DB"     // Name has space; quotes needed
SELECT * FROM "C:\SAMPLE\PARTS.DB"    // Filename with path
SELECT * FROM "C:/SAMPLE/PARTS.DB"    // Forward slash instead of backslash
```

Local SQL also supports BDE aliases for table names. For example,

```
SELECT * FROM :IBAPPS:KBCAT
```

If you omit the file extension for a local table name, the table is assumed to be the table type specified the current setting of SET DBTYPE.

Finally, local SQL permits table names to duplicate SQL keywords as long as those table names are enclosed in single or double quotation marks. For example,

```
SELECT PASSID FROM "PASSWORD"
```

Columns

Local SQL supports multi-word column names and column names that duplicate SQL keywords as long as those column names are

- Enclosed in single or double quotation marks
- Prefaced with an SQL table name or table correlation name

For example, the following column name is two words:

```
SELECT E."Emp Id" FROM EMPLOYEE E
```

In the next example, the column name duplicates the SQL DATE keyword:

```
SELECT DATELOG."DATE" FROM DATELOG
```

Operators

Topic group Related topics

Local SQL supports the following operators:

Table 12.1 Local SQL operators

Type	Operator	Type	Operator
Arithmetic	+ - * /	Logical	AND OR NOT
Comparison	< > = <> >= <= IS NULL IS NOT NULL	String concatenation	||

Note: The equality operator is a single equals sign; double equals are not allowed.

Reserved words

Topic group Related topics

The following is an alphabetical list of the 215 words reserved by local SQL:

Table 12.2 List of local SQL reserved words

ACTIVE	ADD	ALL	AFTER
ALTER	AND	ANY	AS
ASC	ASCENDING	AT	AUTO
AUTOINC	AVG	BASE_NAME	BEFORE
BEGIN	BETWEEN	BLOB	BOOLEAN
BOTH	BY	BYTES	CACHE
CAST	CHAR	CHARACTER	CHECK
CHECK_POINT_LENGTH	COLLATE	COLUMN	COMMIT
COMMITTED	COMPUTED	CONDITIONAL	CONSTRAINT
CONTAINING	COUNT	CREATE	CSTRING
CURRENT	CURSOR	DATABASE	DATE
DAY	DEBUG	DEC	DECIMAL
DECLARE	DEFAULT	DELETE	DESC
DESCENDING	DISTINCT	DO	DOMAIN
DOUBLE	DROP	ELSE	END
ENTRY_POINT	ESCAPE	EXCEPTION	EXECUTE
EXISTS	EXIT	EXTERNAL	EXTRACT
FILE	FILTER	FLOAT	FOR
FOREIGN	FROM	FULL	FUNCTION
GDSCODE	GENERATOR	GEN_ID	GRANT
GROUP	GROUP_COMMIT_WAIT_TIME	HAVING	HOUR
IF	IN	INT	INACTIVE
INDEX	INNER	INPUT_TYPE	INSERT
INTEGER	INTO	IS	ISOLATION
JOIN	KEY	LONG	LENGTH
LOGFILE	LOWER	LEADING	LEFT
LEVEL	LIKE	LOG_BUFFER_SIZE	MANUAL
MAX	MAXIMUM_SEGMENT	MERGE	MESSAGE
MIN	MINUTE	MODULE_NAME	MONEY
MONTH	NAMES	NATIONAL	NATURAL
NCHAR	NO	NOT	NULL
NUM_LOG_BUFFERS	NUMERIC	OF	ON
ONLY	OPTION	OR	ORDER
OUTER	OUTPUT_TYPE	OVERFLOW	PAGE_SIZE
PAGE	PAGES	PARAMETER	PASSWORD
PLAN	POSITION	POST_EVENT	PRECISION
PROCEDURE	PROTECTED	PRIMARY	PRIVILEGES
RAW_PARTITIONS	RDB$DB_KEY	READ	REAL
RECORD_VERSION	REFERENCES	RESERV	RESERVING
RETAIN	RETURNING_VALUES	RETURNS	REVOKE
RIGHT	ROLLBACK	SECOND	SEGMENT

SELECT	SET	SHARED	SHADOW
SCHEMA	SINGULAR	SIZE	SMALLINT
SNAPSHOT	SOME	SORT	SQLCODE
STABILITY	STARTING	STARTS	STATISTICS
SUB_TYPE	SUBSTRING	SUM	SUSPEND
TABLE	THEN	TIME	TIMESTAMP
TIMEZONE_HOUR	TIMEZONE_MINUTE	TO	TRAILING
TRANSACTION	TRIGGER	TRIM	UNCOMMITTED
UNION	UNIQUE	UPDATE	UPPER
USER	VALUE	VALUES	VARCHAR
VARIABLE	VARYING	VIEW	WAIT
WHEN	WHERE	WHILE	WITH
WORK	WRITE	YEAR	

Data definition

Topic group Related topics

Local SQL supports data definition language (DDL) for creating, altering, and dropping tables, and for creating and dropping indexes.

Local SQL does not permit the substitution of parameters for values in DDL statements.

The following DDL statements are supported:

- CREATE TABLE
- ALTER TABLE
- DROP TABLE
- CREATE INDEX
- DROP INDEX

Data manipulation

Topic group Related topics

This section describes functions available to data manipulation language (DML) statements in local SQL. It covers

- Parameter substitutions in DML statements
- Aggregate functions
- String functions
- Date function
- Updatable queries

With some restrictions, local SQL supports the following statements for data manipulation:

- SELECT, for retrieving existing data
- INSERT, for adding new data to a table
- UPDATE, for modifying existing data
- DELETE, for removing existing data from a table

Parameter substitutions in DML statements

Topic group Related topics

Parameters can be used in DML statements in place of values. Parameters must always be preceded by a colon (:). For example,

```
SELECT LAST_NAME, FIRST_NAME
   FROM "CUSTOMER.DB"
   WHERE LAST_NAME > :parm1 AND FIRST_NAME < :parm2
```

Assigning an SQL statement with parameters in a Query or StoredProc object automatically creates the corresponding elements in the object's params array. You then store values to substitute in that array.

Aggregate functions

Topic group Related topics

The following ANSI-standard SQL aggregate functions are available to local SQL for use with data retrieval:

- SUM(), for totaling all numeric values in a column
- AVG(), for averaging all non-NULL numeric values in a column
- MIN(), for determining the minimum value in a column
- MAX(), for determining the maximum value in a column
- COUNT(), for counting the number of values in a column that match specified criteria

Complex aggregate expressions are supported, such as

```
SUM( Field * 10 )
SUM( Field ) * 10
SUM( Field1 + Field2 )
```

String functions

Topic group Related topics Example

Local SQL supports the following ANSI-standard SQL string manipulation functions for retrieval, insertion, and updating:

- UPPER(), to force a string to uppercase:

```
UPPER(<expC>)
```

- LOWER(), to force a string to lowercase:

```
LOWER(<expC>)
```

- TRIM(), to remove repetitions of a specified character from the left, right, or both sides of a string:

```
TRIM( BOTH | LEADING | TRAILING
    <char> FROM <expC> )
```

- SUBSTRING() to create a substring from a string:

```
SUBSTRING(<expC> FROM <start expN> FOR <length expN>)
```

You may use the LIKE predicate for pattern matching in the WHERE clause:

```
WHERE <expC> LIKE <pattern expC> [ESCAPE <char>]
```

In <pattern expC>, the % (percent) character stands for zero or more wildcard characters, and the _ (underscore) stands for a single wildcard character. To include either special character as an actual pattern character, specify an ESCAPE character and precede the wildcard character with that escape character.

Enclose literal strings in single quotes. To specify a single quote in a literal string, use double single quotes.

String function examples

The following query returns the contents of the Title column, removing any double quotation marks around the text:

```
SELECT TRIM( BOTH '"' FROM TITLE ) FROM BOOKS
```

The following query returns all rows where the first three letters of the City column are “San”, capitalized in any way:

```
SELECT * FROM CUSTOMER WHERE UPPER( SUBSTRING( CITY FROM 1 FOR 3 )) = 'SAN'
```

The following query returns all rows where the letters “n’t” appear in the Title (e.g. “Can’t”, “Won’t”, “Ain’t”, “Don’t”):

```
SELECT * FROM BOOKS WHERE TITLE LIKE '%n''t%'
```

Date function

Topic group Related topics Example

Local SQL supports the EXTRACT() function for isolating a single numeric field from a date/time field on retrieval using the following syntax:

```
EXTRACT (<extract field> FROM <field name>)
```

where <extract_field> can be one of: YEAR, MONTH, DAY, HOUR, MINUTE, and SECOND.

In local SQL, EXTRACT() does not support the TIMEZONE_HOUR or TIMEZONE_MINUTE clauses.

Date function example

The following statement extracts the year value from a DATE field:

```
SELECT EXTRACT(YEAR FROM HIRE_DATE)
  FROM EMPLOYEE
```

Updateable queries

Topic group Related topics

These restrictions apply to updates:

- Linking fields cannot be updated
- Index switching will cause an error

Restrictions on live queries

Topic group Related topics

Single-table queries are updatable provided that

- There are no JOINs, UNIONs, INTERSECTs, or MINUS operations.
- There is no DISTINCT key word in the SELECT. (This restriction may be relaxed if all the fields of a unique index are projected.)
- Everything in the SELECT clause is a simple column reference or a calculated field; no aggregation is allowed.
- The table referenced in the FROM clause is either an updatable base table or an updatable view.
- There is no GROUP BY or HAVING clause.
- There are no subqueries that reference the table in the FROM clause and no correlated subqueries.
- Any ORDER BY clause can be satisfied with an index.

Restrictions on live joins

Topic group Related topics

Live joins may be used only if

- All joins are left-to-right outer joins.
- All join are equi-joins.
- All join conditions are satisfied by indexes.
- Output ordering is not defined.
- The query contains no elements listed above that would prevent single-table updatability.

Constraints

Topic group Related topics

You can constrain any updatable query by setting the Query object's *constrained* property to true before activating the query. This causes the query to behave more like an SQL-server-based query. New or modified rows that do not match the conditions of the query will disappear from the result set, although the data is saved.

Statements supported

Topic group Related topics

Local SQL supports the following DDL and DML statements:

ALTER TABLE

CREATE INDEX

CREATE TABLE

DELETE

DROP INDEX

DROP TABLE

INSERT

SELECT

FROM clause

WHERE clause

ORDER BY clause

GROUP BY clause

HAVING clause

UNION clause

UPDATE

ALTER TABLE

Topic group | Related topics | Example

Adds or drops (deletes) one or more columns (fields) from a table.

Syntax

ALTER TABLE table
ADD <column name> <data type> |
DROP <column name>
[, ADD <column name> <data type> |
DROP <column name> ...]

Description

Use ALTER TABLE to modify the structure of an existing table. ALTER TABLE with the ADD clause adds the column <*column name*> of the type <*data type*> to <*table name*>. Use the DROP clause to remove the existing column <*column name*> from <*table*>.

Warning: Data stored in a dropped column is lost without warning, regardless of the SET SAFETY setting.

Multiple columns may be added and/or dropped in a single ALTER TABLE command.: Use ALTER TABLE as a means of modifying the structure of a table without using the Table Designer.

ALTER TABLE examples

The following statement adds a column:

```
ALTER TABLE "employee.dbf" ADD BUILDING_NO SMALLINT
```

The next statement drops two columns:

```
ALTER TABLE "employee.db" DROP LAST_NAME, DROP FIRST_NAME
```

The following statement drops two columns and adds one:

```
ALTER TABLE "employee.dbf" DROP LAST_NAME, DROP FIRST_NAME, ADD FULL_NAME
CHAR[30]
```

CREATE INDEX

Topic group Related topics Example

Creates a new index on a table.

Syntax

CREATE INDEX <*index name*> ON <*table name*> (<*column name*> [, <*column name*>...])

Description

Use CREATE INDEX to create a new index <*index name*>, in ascending order, based on the values in one or more columns <*column name*> of <*table name*>. Expressions cannot be used to create an index, only columns.

When working with DBF tables, the index can only be created for a single column. The new index is created as a new index tag in the production index. A production index is created if it does not exist. Using CREATE INDEX is the only way to create indexes for DBF tables in SQL.

CREATE INDEX can create only secondary indexes for Paradox tables. Primary Paradox indexes can be created only by specifying a PRIMARY KEY constraint when creating a new table with CREATE TABLE. The secondary indexes are created as case-insensitive and maintained, when possible.

CREATE INDEX is equivalent to the INDEX ON <*field list*> TAG <*tag name*> syntax in the dBASE language.

CREATE INDEX examples

The following statement creates an index on a DBF table:

```
CREATE INDEX NAMEX ON employee.dbf (LAST_NAME)
```

The following statement adds an index called ZIP on the ZIP_POSTAL column of the CUSTOMER table:

```
CREATE INDEX ZIP ON CUSTOMER (ZIP_POSTAL)
```

CREATE TABLE

Topic group Related topics Example

Creates a new table.

Syntax

CREATE TABLE <table name> (<*column name*> <*data type*> [,<*column name*> <*data type*>...])

Description

Create a Paradox or dBASE table using local SQL by specifying the file extension when naming the table:

- DB for Paradox tables
- DBF for dBASE tables

If you omit the file extension for a local table name, the table created is the table type specified in the Default Driver setting in the System page of the BDE Configuration Utility.

CREATE TABLE has the following limitations:

- Column definitions based on domains are not supported.
- Constraints are limited to PRIMARY KEY for Paradox. Constraints are unsupported in dBASE.

At least one <*column name*> <*data type*> must be defined. The column definition list must be enclosed in parentheses.

CREATE TABLE is a alternate way of creating a table without using the Table Designer, the Database object's copyTable() method, or an UpdateSet object.

Data type mappings for CREATE TABLE

Topic group Related topics

The following table lists SQL syntax for data types used with CREATE TABLE, and describes how those types are mapped to Paradox (DB) and dBASE (DBF) types by BDE:

SQL syntax	DB	DBF 7	DBF 5
SMALLINT	Short	Long	Numeric (6,10)
INTEGER	Long Integer	Long	Numeric (20,4)
DECIMAL(x,y)	BCD	Numeric (x,y)	N/A
NUMERIC(x,y)	Number	Numeric (x,y)	Numeric (x,y)
FLOAT(x,y)	Number	Double	Float (x,y)
CHARACTER(n)	Alpha	Character (n)	Character (n)
VARCHAR(n)	Alpha	Character (n)	Character (n)
DATE	Date	Date	Date
BOOLEAN	Logical	Logical	Logical
BLOB(n,1)	Memo	Memo	Memo
BLOB(n,2)	Binary	Binary	Binary
BLOB(n,3)	Formatted memo	N/A	N/A
BLOB(n,4)	OLE	OLE	OLE
BLOB(n,5)	Graphic	N/A	N/A
TIME	Time	N/A	N/A
TIMESTAMP	Timestamp	Timestamp	N/A
MONEY	Money	Numeric (20,4)	Numeric (20,4)
AUTOINC	Autoincrement	Autoincrement	N/A
BYTES(n)	Bytes	N/A	N/A

x = precision (default: specific to driver)

y = scale (default: 0)

n = length in bytes (default: 0)

1-5 = BLOB subtype (default: 1)

CREATE TABLE examples

The following example creates a DBF table called SALES with the following structure:

Table 12.3 SALES.DBF structure

Field name	Field type	Field length	Decimal places
SALESID	Character	6	
CUSTOMERID	Character	10	
ORDERDATE	Date	8	
ORDERNMBR	Numeric	7	0
ORDERAMT	Numeric	9	2
DELIVERED	Logical	1	

```
CREATE TABLE SALES (
   SALESID         CHAR(6),
   CUSTOMERID      CHAR(10),
   ORDERDATE       DATE,
   ORDERNMBR       NUMERIC(7,0),
   ORDERAMT        NUMERIC(9,2),
   DELIVERED       BOOLEAN)
```

The following statement creates a Paradox table with a PRIMARY KEY constraint on the LAST_NAME and FIRST_NAME columns:

```
CREATE TABLE "employee.db" (
   LAST_NAME       CHAR(20),
   FIRST_NAME      CHAR(15),
   SALARY          NUMERIC(10,2),
   DEPT_NO         SMALLINT,
   PRIMARY KEY(LAST_NAME, FIRST_NAME) )
```

The same statement for a dBASE table should omit the PRIMARY KEY definition:

```
CREATE TABLE "employee.dbf" (
   LAST_NAME       CHAR(20),
   FIRST_NAME      CHAR(15),
   SALARY          NUMERIC(10,2),
   DEPT_NO         SMALLINT)
```

DELETE

Topic group Related topics Example

Deletes rows (records) from a table.

Syntax

DELETE FROM <*table name*> [WHERE <*search condition*>]

Description

Use DELETE to delete rows, or records, from <*table name*>. Without the WHERE clause, all the rows in the table are deleted. Use the WHERE clause to specify a <*search condition*>. Only records matching the <*search condition*> are deleted.

The Local SQL DELETE command is similar to the Xbase DELETE command; DELETE FROM with no WHERE clause is like the Xbase DELETE ALL.

In DBF tables, DELETE only **marks** rows as deleted; it does not remove them from the table. They may be recalled using the Xbase RECALL command. To remove the deleted records, use the Xbase PACK command. In Paradox tables, the rows are actually deleted, and are not recallable.

DELETE example

The following example deletes all the rows in a DBF table called CUSTOMER and results in a table with zero rows:

```
DELETE FROM CUSTOMER.DBF
```

The following example marks all the rows in a DBF table called CUSTOMER for deletion, but does not actually delete the rows from the table:

```
DELETE FROM CUSTOMER.DBF WHERE CUSTOMER_N > 0
```

The following example marks all the rows where the CITY field is equal to “Freeport” for deletion in a DBF table called CUSTOMER:

```
DELETE FROM CUSTOMER.DBF WHERE CITY = "Freeport"
```

The following example deletes all the rows where the CITY field is equal to “Freeport” in a Paradox table called CUSTOMER:

```
DELETE FROM CUSTOMER.DB WHERE CITY = "Freeport"
```

DROP INDEX

Topic group Related topics Example

Drops (deletes) an existing index from a table.

Syntax

DROP INDEX <table_name>.<index_name> | PRIMARY

Description

Use DROP INDEX to drop, or delete, the index <*index name*> from <*table name*>. For DBF tables <*index name*> must be the name of a tag in the production index.

The PRIMARY keyword is used to delete a primary Paradox index. For example, the following statement drops the primary index on EMPLOYEE.DB:

```
DROP INDEX "employee.db".PRIMARY
```

To drop any dBASE index, or to drop secondary Paradox indexes, provide the index name. For example, this statement drops a secondary index on a Paradox table:

```
DROP INDEX "employee.db".NAMEX
```

DROP INDEX example

The following statement drops the index tag NAME from the production index of a dBASE table called EMPLOYEE:

```
DROP INDEX EMPLOYEE.NAME
```

DROP TABLE

Topic group Related topics Example

Drops (deletes) a table.

Syntax

DROP TABLE <*table name*>

Description

Use DROP TABLE to delete the table <*table name*> from disk. The associated production index file and memo file, if any, are also deleted.

DROP TABLE example

The following statement drops a table named EMPLOYEE:

```
DROP TABLE EMPLOYEE
```

INSERT

Topic group Related topics Example

Adds new rows (records) to a table.

Syntax

INSERT INTO <*table name*>
  [(<*column list*>)] VALUES (<*value list*>) |
  SELECT <*command*>

Insertion from one table to another through a subquery is not allowed.

Description

Use INSERT to add rows, or records, to a table. There are two forms of this command. In the first form, you use <*value list*> to specify individual column values that are to be inserted for the new row. The values to be inserted must match in number, order, and type with the columns specified in <*column list*>, if <*column list*> is specified. Columns in the new row for which no value is given are left blank. If no <*column list*> is given, the order of the columns as they appear in the table is assumed. Without a <*column list*> a value must be provided for each column in the <*value list*>.

In the second form, the SELECT clause is executed just like a SELECT command. The row or rows returned by the SELECT are inserted into <*table name*>. The columns of the rows returned by the SELECT are matched up with the columns listed in <*column list*>. Therefore, the columns returned by SELECT must match in number, order, and type with the columns specified in <*column list*>, if <*column list*> is specified. If no <*column list*> is given, the number, order, and type of the columns returned by the SELECT must match the number, order, and type of the columns in <*table name*>.

INSERT examples

The following statement adds a row to a table, assigning values to two columns:

```
INSERT INTO EMPLOYEE_PROJECT (EMP_NO, PROJ_ID) VALUES (52, "DGPII")
```

The next statement specifies values to insert into a table with a SELECT statement:

```
INSERT INTO PROJECTS
   SELECT * FROM NEW_PROJECTS
      WHERE NEW_PROJECTS.START_DATE > '06/06/94'
```

SELECT

Topic group | Related topics | Example

Retrieves data from one or more tables.

Syntax

```
SELECT [DISTINCT] <column list>
  FROM <table reference>
  [WHERE <search condition>]
  [ORDER BY <order list>]
  [GROUP BY <group list>]
  [HAVING <having condition>]
  [UNION <select expr>]
```

Description

Use SELECT to retrieve data from a table or set of tables based on some criteria.

A SELECT that retrieves data from multiple tables is called a join.

<*column list*> is a comma-delimited list of columns in the table(s) you want to retrieve. The columns are retrieved in the order given in the list. If two or more tables used by SELECT use the same field names, distinguish the tables by using the table name and a dot (.). For example, if you're SELECTing from the CUSTOMER table and the PRODUCT table, and they both have a field called NAME, enter the fields as CUSTOMER.NAME and PRODUCT.NAME in <*column list*>. To retrieve all the columns from <*table list*>, use an asterisk (*) for <*column list*>. To eliminate rows containing duplicate values within the same column, precede the <*column list*> with the keyword DISTINCT.

For example, the following statement retrieves data from two columns:

```
SELECT PART_NO, PART_NAME
   FROM PARTS
```

You may include calculated fields in the <column list>, optionally using the AS option to name them. For example:

```
SELECT LAST_NAME || ', ' || FIRST_NAME AS FULL_NAME, PHONE
   FROM CUSTOMER
```

A SELECT statement that contains a join must have a WHERE clause in which at least one field from each table is involved in an equality check.

FROM clause

Topic group Related topics

The FROM clause specifies the table or tables from which to retrieve data. <table reference> can be a single table, a comma-delimited list of tables, or can be an inner or outer join as specified in the SQL-92 standard. For example, the following statement specifies a single table:

```
SELECT PART_NO FROM PARTS
```

The next statement specifies a left outer join for table_reference:

```
SELECT * FROM PARTS LEFT OUTER JOIN INVENTORY
   ON PARTS.PART_NO = INVENTORY.PART_NO
```

WHERE clause

Topic group Related topics

The optional WHERE clause reduces the number of rows returned by a query to those that match the criteria specified in <search condition>. For example, the following statement retrieves only those rows with PART_NO greater than 543:

```
SELECT * FROM PARTS
   WHERE PART_NO > 543
```

In addition to scalar comparison operators (=, <, > ...) additional predicates using IN, LIKE, ANY, ALL, and EXISTS are supported.

The IN predicate is followed by a list of values in parentheses. For example, the next statement retrieves only those rows where a part number matches an item in the IN predicate list:

```
SELECT * FROM PARTS
   WHERE PART_NO IN (543, 544, 546, 547)
```

ORDER BY clause

Topic group Related topics

The ORDER BY clause specifies the order of retrieved rows, using the keywords ASC (the default) and DESC for ascending and descending, respectively. For example, the following query retrieves a list of all parts listed in alphabetical order by part name:

```
SELECT * FROM PARTS
   ORDER BY PART_NAME ASC
```

The next query retrieves all part information ordered in descending numeric order by part number:

```
SELECT * FROM PARTS
   ORDER BY PART_NO DESC
```

Calculated fields can be ordered by correlation name or ordinal position. For example, the following query orders rows by FULL_NAME, a calculated field:

```
SELECT LAST_NAME || ', ' || FIRST_NAME AS FULL_NAME, PHONE
   FROM CUSTOMER
   ORDER BY FULL_NAME
```

Projection of all grouping or ordering columns is not required.

GROUP BY clause

Topic group Related topics

The GROUP BY clause specifies how retrieved rows are grouped for aggregate functions. For example,

```
SELECT PART_NO, SUM(QUANTITY) AS PQTY
   FROM PARTS
   GROUP BY PART_NO
```

Aggregates in the SELECT clause must have a GROUP BY clause if a projected field is used, as shown in the example above.

HAVING clause

Topic group Related topics

The HAVING clause specifies conditions records must meet to be included in the return from a query. It is a conditional expression used in conjunction with the GROUP BY clause. Groups that do not meet the expression in the HAVING clause are omitted from the result set.

Subqueries are supported in the HAVING clause. A subquery works like a search condition to restrict the number of rows returned by the outer, or parent, query. See WHERE Clause.

In addition to scalar comparison operators (=, <, > ...) additional predicates using IN, LIKE, ANY, ALL, and EXISTS are supported.

UNION clause

Topic group Related topics

The UNION clause combines the results of two or more SELECT statements to produce a single table.

Heterogeneous joins

Topic group Related topics

Local SQL supports joins of tables in different database formats; such a join is called a heterogeneous join.

When you specify a table name after selecting a local alias,

- For local tables, specify either the alias or the path.
- For remote tables, specify the alias.

The following statement retrieves data from a Paradox table and a dBASE table:

```
SELECT DISTINCT C.CUST_NO, C.STATE, O.ORDER_NO
   FROM CUSTOMER.DB C, ORDER.DBF O
   WHERE C.CUST_NO = O.CUST_NO
```

You can also use BDE aliases in conjunction with table names.

SELECT examples

The following is a basic query that selects an entire table:

```
SELECT * FROM BIOLIFE
```

The following examples show simple SELECTs:

```
SELECT NAME, PHONE FROM CUSTOMER WHERE STATE_PROV = "CA"
SELECT CUSTOMER_NO FROM CUSTOMER WHERE LAST_NAME = "Johnson"
SELECT PART_NO, SUM(QUANTITY) AS PQTY FROM PARTS GROUP BY PART_NO
```

The following example illustrates the ORDER BY with a DESCENDING clause:

```
SELECT DISTINCT CUSTOMER_NO
   FROM "C:/DATA/CUSTOMER"
   ORDER BY CUSTOMER_NO DESCENDING
```

The following example illustrates how the SELECT statement is supported as an equivalent to a JOIN:

```
SELECT DISTINCT P.PART_NO, P.QUANTITY, G.CITY
   FROM PARTS P, GOODS G
   WHERE P.PART_NO = G.PART_NO
   AND P.QUANTITY > 20
   ORDER BY P.QUANTITY, G.CITY, P.PART_NO
```

Sub-select queries are supported. The following example illustrates this syntax:

```
SELECT P.PART_NO
   FROM PARTS P
   WHERE P.QUANTITY IN
      (SELECT I.QUANTITY
         FROM INVENTORY I
         WHERE I.PART_NO = 'AA9393')
```

The following example shows a join in which fields from each table are involved in some type of equality check and require a WHERE clause:

```
SELECT DISTINCT PARTS.PART_NO, PARTS.QUANTITY, GOODS.CITY
   FROM PARTS, GOODS
   WHERE PARTS.PART_NO = GOODS.PART_NO AND PARTS.QUANTITY > 20
   ORDER BY PARTS.QUANTITY, GOODS.CITY, PARTS.PART_NO
```

The following example shows the use of the DESCENDING keyword in the ORDER BY clause. Note that in this case you must also specify DISTINCT.

```
SELECT DISTINCT CUSTOMER_NO
   FROM CUSTOMER
   ORDER BY CUSTOMER_NO DESCENDING
```

UPDATE

Topic group Related topics Example

Adds or changes values in existing columns in existing rows of a table.

Syntax

UPDATE <*table name*>
  SET <*column name*> = <*expression*> [, <*column name*> = <*expression*>...]
  WHERE <*search condition*>

Description

Use UPDATE to update (change) values within existing columns in existing rows of a table. The column specified by <*column name*> is updated with the value of <*expression*> in all rows that match the <*search criteria*> of the WHERE clause. If the WHERE clause is omitted, the column is updated in all rows in the table. Multiple columns may be updated in a single UPDATE command. A given column of a table may only appear once to the left of an equal sign (=) in the SET clause.

UPDATE example

The following command updates that YTD sales to zero for each customer that was contacted in the previous calendar year:

```
UPDATE CUSTOMER SET YTD_SALES = 0 WHERE FIRST_CONT < '01/01/95'
```

Data access objects overview

Topic group

Data access objects provide access to database tables and are used to link tables to the user interface.

The Borland Database Engine (BDE) considers the DBF (dBASE/FoxPro) and DB (Paradox) tables types as Standard tables. The BDE can access any Standard table directly through its path and file name, without having to use a BDE alias.

All other table types, including InterBase, Oracle, Microsoft/Sybase SQL Server, Informix, and any ODBC connection, require the creation of a BDE alias through the BDE Administrator. You may also create a BDE alias to access Standard tables. In that case, the alias specifies the directory in which the tables exist; the database consists of the Standard tables in that directory, and you may not open any others from another directory.

All tables, whether or not they require a BDE alias, are accessed through SQL and the data access objects.

NEXT...

Data access objects: Class hierarchy

Topic group

To understand the implications of using a BDE alias, you need to understand the class hierarchy of the data access objects.

At the top of the hierarchy is *Visual* dBASE itself. Next is the *Session* class. A session represents a separate user task. For example, a car rental application may allow several car rental forms to be open on-screen at the same time. The data for each one of these forms would be accessed through its own session, because each rental form is actually a separate user task, just as if you had multiple workstations with one form each. *Visual* dBASE supports up to 2048 simultaneous sessions. When *Visual* dBASE first starts, it already has a default session.

Each session contains one or more Database objects. A session always contains a default Database object, one that has no BDE alias and is intended to directly access Standard tables. You must create new Database objects to use tables through a BDE alias. Once you set the BDE alias, activate the Database object, and log in if necessary, you have access to that database's tables. You may also log transactions or buffer updates to each database to allow you to rollback, abandon, or post changes as desired.

Accessing tables

The *Query* object acts primarily as a container for an SQL statement and the set of rows, or *rowset*, that results from it. A rowset represents all or part of a single table or group of related tables. There is only one rowset per query, but you may have more than one query, and therefore more than one rowset, per database. A rowset maintains the current record or row, and therefore contains the typical navigation, buffering, and filtering methods.

The SQL statement may also contain parameters, which are represented in the Query object's *params* array.

Finally, a rowset also contains a *fields* property, which is an array of field objects that contain information about the fields and the values of the fields for the current row. There are events that allow you to morph the values so that the values stored in the table are different than the values displayed. Each field object can also be linked to a visual component through the component's *dataLink* property to form a link between the user interface and the table. When the two objects are linked in this way, they are said to be *dataLink*ed.

Putting the data access objects together

If you're using Standard tables only, at the minimum you create a query, which gets assigned to the default database in the default session, set the SQL statement and make the query active. If the query is successful, it generates a rowset, and you can access the data through the *fields* array.

A non-trivial application will require you to isolate data usage inside sessions, so for Standard tables, you would have to create a new session and assign that session to that query's *session* property before making the query active. This causes the session's default database to be assigned to that query as well.

When accessing tables through a BDE alias, you will need to create a new database, assign that database to a new session if necessary, create the query, assign the session if necessary to the query, assign the database to the query, then set the SQL and make the query active.

If you use the Form, Report, or Data Module designers, you design these relationships visually and code is generated.

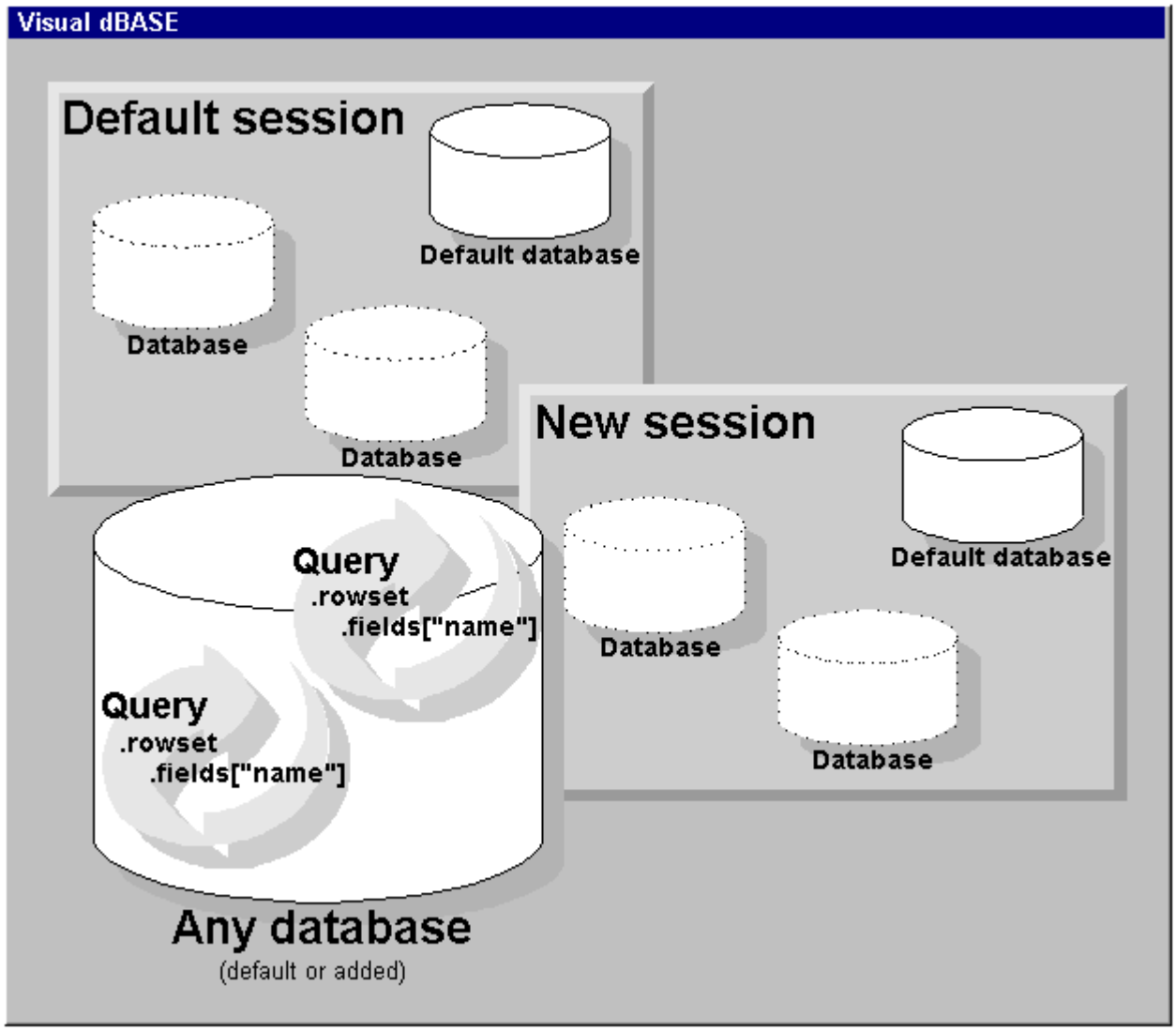
Using stored procedures

The object hierarchy for using stored procedures in an SQL-server database is very similar to the one used for accessing tables. The difference is that a StoredProc object is used instead of a Query object. Above the StoredProc object, the Database and Session objects do the same thing. If the stored procedure returns a rowset, the StoredProc object contains a rowset, just like a Query object.

A StoredProc object also has a *params* array, but instead of simple values to substitute into an SQL statement in a Query object, the *params* array of a StoredProc object contains Parameter objects. Each object describes both the type of parameter—input, output, or result—and the value of that parameter.

Before running the stored procedure, input values are set. After the stored procedure runs, output and result values can be read from the *params* array, or data can be accessed through its rowset.

Data access objects: Class hierarchy diagram



class Database

Topic group Related topics Example

A session's built-in database or a BDE database alias, which gives access to tables.

Syntax

[<oRef> =] new Database()

<oRef>

A variable or property—typically of a Form or Report object—in which to store a reference to the newly created Database object.

Properties

The following tables list the properties and methods of the Database class. (No events are associated with this class.) For details on each property, click on the property below.

Property	Default	Description
active	false	Whether the database is open and active or closed
cacheUpdates	false	Whether to cache changes locally for batch posting later
className	DATABASE	Identifies the object as an instance of the Database class
databaseName	Empty string	BDE alias, or empty string for built-in database
driverName	Empty string	Type (table format or server) of database
handle		BDE database handle
isolationLevel	Read committed	Isolation level of transaction
loginString	Empty string	User name and password to automatically try when opening database
parent	null	Container form or report
session	Default session	Session to which a database is assigned
share	All	How to share the database connection

Method	Parameters	Description
abandonUpdates()		Discards all cached changes
applyUpdates()		Attempts to post cached changes
beginTrans()		Begins transaction; starts logging changes
close()		Closes the database connection (called implicitly when *active* is set to *false*)
commit()		Commits changes made during transaction; ends transaction
copyTable()	<source name expC>, <destination name expC>	Makes a copy of a table in the same database
dropTable()	<table name expC>	Deletes table from database
emptyTable()	<table name expC>	Deletes all records from a table
executeSQL()	<expC>	Pass-through SQL statement
getSchema()	"DATABASES" |"TABLES" |"PROCEDURES" | "VIEWS"	Retrieves information about a database
open()		Opens the database connection (called implicitly when *active* is set to *true*)
packTable()	<table name expC>	Removes deleted records from DBF or DB table and reconsolidates disk usage
reindex()	<table name expC>	Rebuilds indexes for DBF or DB table

renameTable()	<old name expC>, <new name expC>	Renames table in database
rollback()		Undoes changes made during transaction; ends transaction
tableExists()	<table name expC>	Whether or not specified table exists in database or on disk

Description

All sessions, including the default session you get when you start *Visual* dBASE, contain a default database, which can access the Standard table types, DBF (dBASE) and DB (Paradox) tables, without requiring a BDE alias. Whenever you create a Query object, it is initially assigned to the default database in the default session. If you want to use Standard tables in the default session you don't have to do anything with that Query object's *database* or *session* properties. If you want to use a Standard table in another session assign that session to the Query object's *session* property, which causes that session's default database to be assigned to that Query object. Default databases are always active; their *active* property has no effect.

You may also set up a BDE alias to access Standard tables. By referring to your Standard tables through a database alias, you can move the tables to a different drive or directory without having to change any paths in your code. All you would have to do is change the path specification for that alias in the BDE Administrator. When using a BDE alias with Standard tables, you are restricted from opening a table in a different directory.

For all non-Standard table types, you will need to set up a BDE alias for the database if you haven't done so already. After creating a new Database object, you may assign it to another session if desired; otherwise it is assigned to the default session. Then you then need to do the following:

- Assign the BDE alias to the *databaseName* property.
- If you need to log in to that database, either set the *loginString* property if you already know the user name and password; or let the login dialog appear.
- Set the *active* property to *true*. This attempts to open the named database. If it's successful, you now have access to the tables in the database.

Each database, including any default databases, is able to independently support either transaction logging or cached updates. Transaction logging allows changes to be made to tables as usual, but keeps track of those changes. Those changes can then be undone through a *rollback*(), or OK'd with a *commit*(). In contrast, cached updates are not written to the table as they happen, but are cached locally instead. You can then either abandon all the updates or attempt to apply them as a group. If any of the changes fail to post—for a variety of reasons, like locked records or hardware failures—any changes that did take are immediately undone, and the updates remain cached. You can then attempt to solve the problem and reapply the update, or abandon the changes. You may also want to use cached updates to reduce network traffic.

Each non-Standard database is responsible for its own transaction processing, up to whatever isolation level it supports. For Standard tables opened through the default database, if you want simultaneous multiple transactions, you need to create multiple sessions, because each database can support only one active transaction or update cache, and there is only one default database per session. If you use a BDE alias to access Standard tables, even though you could open the same database alias more than once in the same session, the row locking that is used for transactions is session-based, so you would also have to use multiple sessions.

All Database objects opened by the Navigator are listed in the *databases* array property of the _app object. The default database of the default session is _app.*databases*[1].

A Database object also encapsulates a number of table maintenance methods. These methods occur in the context of the specified Database object. For example, the *copyTable*() method makes a copy of a table in the same database. To use these methods on Standard tables, call the methods through the default database of the default session; for example,

```
_app.databases[ 1 ].copyTable( "Stuff", "CopyOfStuff" )
```

class Database example

Suppose you have an Access database named PIBMUG.MDB. You create an alias named PIBMUG in the BDE Administrator. To open that database, execute the following code:

```
d = new Database()
d.databaseName = "PIBMUG"
d.active = true
```

The second example logs into a database named PERSONNEL in a new session with a preset user name and password:

```
s1 = new Session()
d1 = new Database()
d1.databaseName = "PERSONNEL"
d1.session = s1
d1.loginString = "visitor/jobsavail"
d1.active = true
```

class DataModule

Topic group Related topics Example

An empty container in which to store data access objects.

Syntax

These objects are usually instantiated through a DataModRef object.

Properties

The following table lists the properties of the DataModule class. (No events or methods are associated with this class.)

Property	Default	Description
className	DATAMODULE	Identifies the object as an instance of the DataModule class
rowset		The primary rowset of the data module

Description

Use data modules to maintain multiple data access objects and the relationships between them. Data modules bear some similarity to forms, except that they contain data access objects only. Session, Database, Query, and StoredProc objects are contained inside a DataModule object; the class is created visually with the Data Module designer. They are represented by source code in files with a .DMD extension. You can create custom data modules (in .CDM files) and subclass them.

The relationships between the objects—in particular any *masterSource*, *masterRowset*, or *masterFields* properties—in addition to other properties and event handlers can be set for all the objects in the data module. A primary rowset is assigned in the data module's *rowset* property, just like in a form. Other than that and *className*, the DataModule object has no properties; it is intended to be a simple container.

To use the data module, create a DataModRef object in the form or report. For more information, see class DataModRef.

class DataModule example

The following data module implements the classic teacher-classes-students database. In addition to those three tables, there is a fourth linking table called Attend for the many-to-many link between classes and students.

```
class TeacherClassesStudentsDataModule of DATAMODULE
   this.TEACHER1 = new QUERY()
   this.TEACHER1.parent = this
   with (this.TEACHER1)
      left = 2
      top = 1
      sql = 'select * from "TEACHER.DBF"'
      active = true
   endwith
   with (this.TEACHER1.rowset)
      indexName = "FULL_NAME"
   endwith
   this.CLASSES1 = new QUERY()
   this.CLASSES1.parent = this
   with (this.CLASSES1)
      left = 8
      top = 3
      sql = 'select * from "CLASSES.DBF"'
      active = true
   endwith
   with (this.CLASSES1.rowset)
      indexName = "TEACH_NAME"
      masterRowset = parent.parent.teacher1.rowset
      masterFields = "TEACH_ID"
   endwith
   this.ATTEND1 = new QUERY()
   this.ATTEND1.parent = this
   with (this.ATTEND1)
      left = 14
      top = 5
      sql = "@ATTEND STUDENT.SQL"
      params["class_id"] = ""
      masterSource = form.classes1.rowset
      active = true
   endwith
   this.STUDENT1 = new QUERY()
   this.STUDENT1.parent = this
   with (this.STUDENT1)
      left = 20
      top = 7
      sql = 'select * from "STUDENT.DBF"'
      active = true
   endwith
   with (this.STUDENT1.rowset)
      indexName = "STU_ID"
      masterRowset = parent.parent.attend1.rowset
      masterFields = "STU_ID"
   endwith
   this.rowset = this.TEACHER1.rowset
endclass
```

The Teacher table is ordered by the Full_name index. It is related into a table of classes through the classes1.rowset.*masterRowset* property. The Classes table is ordered on the Teach_name tag, a composite index of the Teach_id field (to match the *masterFields*) and the class name.

The classes1 query acts as the *masterSource* for the attend1 query. The Attend table has only two fields, Class_id and Stu_id. This table can be used to link classes and students in either direction. For this query, the goal is to create a set of students that attended the class in student name order. The Class_id field from the classes1 query is the parameter in the parameterized SQL statement stored in "Attend student.SQL" file:

```
SELECT Student.LAST_NAME, Student.FIRST_NAME, Student.STU_ID
FROM "ATTEND.DBF" Attend
   INNER JOIN "STUDENT.DBF" Student
   ON  (Attend.STU_ID = Student.STU_ID)
WHERE Attend.CLASS_ID = :class_id
ORDER BY Student.LAST_NAME, Student.FIRST_NAME
```

This SQL SELECT performs an inner join (matching rows only) between the Attend and Student table to get the students' names so that it can sort on them. (Local SQL requires that the ORDER BY fields be in the result set.) The ":class_id" in the WHERE clause is substituted with the value of the Class_id field in the *masterSource* query (classes1).

Finally, to actually display the student information, the student1 query's rowset specifies attend1.rowset as its *masterRowset*; a one-to-one link. The *indexName* is set to match. This link makes the student information editable. You could get similar results by using fewer queries with more joins, but then the result would be read-only.

class DataModRef

Topic group Related topics Example

A reference to a DataModule object.

Syntax

[<oRef> =] new DataModRef()

<oRef>

A variable or property—typically of a Form or Report object—in which to store a reference to the newly created DataModRef object.

Properties

The following table lists the properties of the DataModRef class. (No events or methods are associated with this class.) For details on each property, click on the property below.

Property	Default	Description
active	false	Whether the referenced data module is active
className	DATAMODREF	Identifies the object as an instance of the DataModule class
dataModClass		The class name of the data module
filename		The name of the file containing the data module class
parent	null	Container form or report
ref	null	A reference to the data module object
share	None	How to share the data module

Description

A DataModRef object is used to access data modules. The *filename* property is set to the .DMD file that contains the data module class definition. The *dataModClass* property is set to the class name of the desired data module. Then the *active* property is set to *true* to activate the data module.

If the *share* property is All instead of the None, any existing instance of the desired data module class is used. Otherwise a new instance is created. A reference to the data module is assigned to the *ref* property.

When a DataModRef object is activated in the Form designer, the DataModule object's *rowset* property is assigned to the form's *rowset* property. Therefore you can access the form's primary rowset, and all other rowsets relative to it, in the same way, whether you're using a data module or not. To reference the queries in the data module from the form, you have to go through two additional levels of objects. For example, instead of:

```
form.query1.rowset
```

you would have to use:

```
form.dataModRef1.ref.query1.rowset
```

However, if query1.*rowset* was the primary rowset of the data module, you would still use:

```
form.rowset
```

anyway, and in query1.*rowset*'s event handlers, you would still use:

```
this.parent.parent.query2.rowset
```

to access query2.rowset whether you're using a data module or not, because the two Query objects are in the same relative position in the object containership hierarchy.

class DataModRef example

The following code excerpt from a form class uses the data module shown in the example for class DataModule, which is stored in the file "teacher classes students.DMD"

```
this.DATAMODREF1 = new DATAMODREF()
this.DATAMODREF1.parent = this
with (this.DATAMODREF1)
   filename = "teacher classes students.dmd"
   dataModClass = "TeacherClassesStudentsDataModule"
   share = 0
   active = true
endwith
```

class DbError

Topic group Related topics Example

An object that describes a BDE or server error.

Syntax

These objects are created automatically by *Visual* dBASE when a DbException occurs.

Properties

The following table lists the properties of the DbError class. (No events or methods are associated with this class.) For details on each property, click on the property below.

Property	Default	Description
className	DBERROR	Identifies the object as an instance of the DbError class
code		BDE error number
context		Field name, table name, and so on, that caused error
message	Empty string	Text to describe the error
nativeCode		Server error code

Description

When an error using a data access object occurs, a DbException is generated. Its *errors* property points to an array of DbError objects.

Each DbError object describes a BDE or SQL server error. If *nativeCode* is zero, the error is a BDE error. If *nativeCode* is non-zero, the error is a server error. The *message* property describes the error.

class DbException

Topic group Related topics Example

An object that describes a data access exception. DbException subclasses the Exception class.

Syntax

These objects are created automatically by *Visual* dBASE when an exception occurs.

Properties

The following table lists the properties of the DbException class. DbException objects also contain those properties inherited from the Exception class. (No events or methods are associated with the DbException class.) For details on each property, click on the property below.

Property	Default	Description
className	DBEXCEPTION	Identifies the object as an instance of the DbException class
errors		Array of DbError objects

Description

The DbException class is a subclass of the Exception class. It is generated when an error using a data access object occurs. In addition to the *Visual* dBASE error code and message, it provides access to BDE and SQL server error codes and messages.

class DbException example

The following statements attempt to apply cached updates. If there is an error and the code is compiled with the debug flag on, the errors are displayed in the result pane of the Command window.

```
try
  form.database1.applyUpdates()
catch ( DbException e )
  msgbox( "Cached updates failed to post", "Fatal error", 16 )
  #ifdef DEBUG
    local n
    for n = 1 to e.errors.size
      with e.errors[ n ]
        ? nativeCode, message
      endwith
    endfor
  #endif
endtry
```

class DbfField

Topic group Related topics

A field from a DBF (dBASE) table. DbfField subclasses the Field class.

Syntax

These objects are created automatically by the rowset.

Properties

The following table lists the properties of the DbfField class. DbfField objects also contain those properties inherited from the Field class. (No events or methods are associated with the DbfField class.) For details on each property, click on the property below.

Property	Default	Description
className	DBFFIELD	Identifies the object as an instance of the DbfField class
decimalLength	0	Number of decimal places if the field is a numeric field
default		Default value for field (DBF7 only)
maximum		Maximum allowed value for field (DBF7 only)
minimum		Minimum allowed value for field (DBF7 only)
readOnly	false	Specifies whether the field has read-only access
required	false	Whether the field must be filled in (DBF7 only)

Description

The DbfField class is a subclass of the Field class. It represents a field from a DBF (dBASE) table, and contains properties that are specific to fields of that table type. Otherwise it is considered to be a Field object.

class Field

Topic group Related topics Example

A base class object that represents a field from a table and can be used as a calculated field.

Syntax

[<oRef> =] new Field()

<oRef>

A variable or property in which to store the reference to the newly created Field object for use as a calculated field.

Properties

The following tables list the properties, events. and methods of the Field class. For details on each property, click on the property below.

Property	Default	Description
className	FIELD	Identifies the object as an instance of the Field class
fieldName		Name of the field the Field object represents, or the assigned calculated field name
length		Maximum length
lookupRowset		Reference to lookup table for field
lookupSQL		SQL SELECT statement for field lookup values
parent	null	*fields* array that contains the object
type	Character	The field's data type
value	Empty string	Represents current value of field in row buffer

Event	**Parameters**	**Description**
beforeGetValue		When value property is to be read; return value is used as value
canChange	<new value>	When attempting to change value property; return value allows or disallows change
onChange		After value property is successfully changed
onGotValue		After *value* is read

Method	**Parameters**	**Description**
copyToFile()	<filename expC>	Copies data from BLOB field to external file
replaceFromFile()	<filename expC> [, <append expL>]	Copies data from external file to BLOB field

Description

The Field class acts as the base class for the DbfField (dBASE), PdxField (Paradox), and SqlField (everything else) classes. It contains the properties common to all field types. Each subclass contains the properties specific to that table type. You also create calculated fields with a Field object.

Each rowset has a *fields* property, which points to an array. Each element of that array is an object of one of the subclasses of the Field class, depending on the table type or types contained in the rowset. Each field object corresponds to one of the fields returned by the query or stored procedure that created the rowset.

While the *fieldName*, *length*, and *type* properties describe the field and are the same from row to row, the *value* property is the link to the field's value in the table. The *value* property's value reflects the current value of that field for the current row in the row buffer; assigning a value to the *value* property assigns that value to the row buffer. The buffer is not written to disk unless the rowset's *save*() method is explicitly called or there is an implicit save, which is usually caused by navigation in the rowset. You can abandon any changes you make to the row buffer by calling the rowset's *abandon*() method.

You may assign a Field object to the *dataLink* property of a control on a form. This makes the control data-aware, and causes it to display the current value of the Field object's *value* property; if changes are made to the control, the new value is written to the Field object's *value* property.

Calculated fields

Use a calculated field to generate a value based on one or more fields, or some other calculation. For example, in a line item table with both the quantity ordered and price per item, you can calculate the total price for that line item. There would be no need to actually store that total in the table, which wastes space.

Because a calculated field is treated like a field in most respects, you can do things like *dataLink* it to a control on a form, show it in a grid, or use it in a report. Because a calculated field does not actually represent a field in a table, writing to its value property directly or changing its value through a *dataLink*ed control never causes a change in a table.

To create a calculated field, create a new Field object and assign it a *fieldName*, then *add*() it to the *fields* array of a Rowset object.

Note: You must assign the *fieldName* before adding the field to the *fields* array.

Because a rowset is not valid until its query opens, you must make the query active before you add the Field object. The query's *onOpen* event, which fires after the query is activated, is a good place to create the calculated field. To set the value of a calculated field, you can do one of two things:

- Assign a code-reference, either a codeblock or function pointer, to the Field object's *beforeGetValue* event. The return value of the code becomes the Field object's value.
- Assign a value to the Field object's *value* property directly as needed, like in the rowset's *onNavigate* event.

class Field example

The following example creates a calculated field, using the Field's *beforeGetValue* event to calculate the total price from the quantity and price per item for each line item:

```
q = new Query()
q.sql := "select * from LINEITEM"
q.active := true
c = new Field()
c.fieldName := "Total"
q.rowset.fields.add( c )
c.beforeGetValue := {||this.parent["Quantity"].value *
this.parent["PricePer"].value}
```

Because *this* refers to the Field object itself, *this.parent* refers to the *fields* array, through which you can access the other field objects.

class LockField

Topic group Related topics

A _DBASELOCK field in a DBF table.

Syntax

These objects are created automatically by the rowset.

Properties

The following table lists the properties of the LockField class. (No events or methods are associated with this class.) For details on each property, click on the property below.

Property	Default	Description
className	LOCKFIELD	Identifies the object as an instance of the LockField class
fieldName	_DBASELOCK	Name of the field the LockField object represents (read-only)
lock		Date and time of last row lock
parent	null	*fields* array that contains the object
update		Date and time of last row update
user		Name of user that last locked or updated the row

Description

A LockField object is used to represent the _DBASELOCK field in a DBF table that has been CONVERTed. By examing the properties of a LockField object, you may determine the nature of the last row lock or update.

When a row is locked, either explicitly or automatically, the time, date, and login name of the user placing the lock are stored in the _DBASELOCK field of that row. When a file is locked, this same information is stored in the _DBASELOCK field of the first physical record in the table.

If a DBF table has a _DBASELOCK field, the LockField object is always the last field in the *fields* array, and is referenced by its field name, “_DBASELOCK".

All the properties of a LockField object are read-only.

class Parameter

Topic group Related topics Example

A parameter for a stored procedure.

Syntax

These objects are created automatically by the stored procedure.

Properties

The following table lists the properties of the Parameter class. (No events or methods are associated with this class.) For details on each property, click on the property below.

Property	Default	Description
className	PARAMETER	Identifies the object as an instance of the Parameter class
type	Input	The parameter type (0=Input, 1=Output, 2=InputOutput, 3=Result)
value		The value of the parameter

Description

Parameter objects represent parameters to stored procedures. Each element of the *params* array of a StoredProc object is a Parameter object. The Parameter objects are automatically created when the *procedureName* property is set, either by getting the parameter names for that stored procedure from the SQL server or by using parameter names specified directly in the *procedureName* property.

A parameter may be one of four types, as indicated by its *type* property:

- Input: an input value for the stored procedure. The *value* must be set before the stored procedure is called.
- Output: an output value from the stored procedure. The *value* must be set to the correct data type before the stored procedure is called; any dummy value may be used. Calling the stored procedure sets the *value* property to the output value.
- InputOutput: both input and output. The *value* must be set before the stored procedure is called. Calling the stored procedure updates the *value* property with the output value.
- Result: the result value of the stored procedure. In this case, the stored procedure acts like a function, returning a single result value, instead of updating parameters that are passed to it. Otherwise, the *value* is treated like an output value. The name of the Result parameter is always “Result”.

A Parameter object may be assigned as the *dataLink* of a component in a form. Changes to the component are reflected in the *value* property of the Parameter object, and updates to the *value* property of the Parameter object are displayed in the component.

class Parameter example

The following statements call a stored procedure that returns an output parameter. The result is displayed in the result pane of the Command window.

```
d = new Database()
d.databaseName = "IBLOCAL"
d.active = true
p = new StoredProc()
p.database = d
p.procedureName = "DEPT_BUDGET"
p.params[ "DNO" ].value = "670"                    // Set input parameter
p.active = true
? p.params[ "TOT" ].value                          // Display output
```

The following statements call a stored procedure in a database that does not return any parameter information. Therefore, the parameters must be declared in the procedureName property. Note that the parameter names are case-sensitive, and you must initialize any output parameters by assigning a dummy value of the correct data type.

```
#define PARAMETER_TYPE_INPUT        0
#define PARAMETER_TYPE_OUTPUT       1
#define PARAMETER_TYPE_INPUT_OUTPUT 2
#define PARAMETER_TYPE_RESULT       3
```

```
d = new Database()
d.databaseName = "WIDGETS"
d.active = true
p = new StoredProc()
p.database = d
p.procedureName = "PROJECT_SALES( :month, :units )"
p.params[ "month" ].type  = PARAMETER_TYPE_INPUT
p.params[ "month" ].value = 6
p.params[ "units" ].type  = PARAMETER_TYPE_OUTPUT
p.params[ "units" ].value = 0                      // Output will be numeric
p.active = true
? p.params[ "TOT" ].value                          // Display output
```

class PdxField

Topic group Related topics

A field from a DB (Paradox) table. PdxField subclasses the Field class.

Syntax

These objects are created automatically by the rowset.

Properties

The following table lists the properties of the PdxField class. PdxField objects also contain those properties inherited from the Field class. (No events or methods are associated with the PdxField class.) For details on each property, click on the property below.

Property	Default	Description
className	PDXFIELD	Identifies the object as an instance of the PdxField class
default		Default value for field
lookupTable	Empty string	Table to use for lookup value
lookupType	Empty string	Type of lookup
maximum		Maximum allowed value for field
minimum		Minimum allowed value for field
picture	Empty string	Formatting template
required	false	Whether the field must be filled in
readOnly	false	Whether the field has read-only access

Description

This class is called PdxField—not “DbField”—to avoid confusion and simple typographical errors between it and the DbfField class.

The PdxField class is a subclass of the Field class. It represents a field from a DB (Paradox) table, and contains properties that are specific to fields of that table type. Otherwise it is considered to be a Field object.

class Query

Topic group Related topics Example

A representation of an SQL statement that describes a query and contains the resulting rowset.

Syntax

[<oRef> =] new Query()

<oRef>

A variable or property—typically of a Form or Report object—in which to store a reference to the newly created Query object.

Properties

The following tables list the properties, events, and methods of the Query class. For details on each property, click on the property below:

Property	Default	Description
active	false	Whether the query is open and active or closed
className	QUERY	Identifies the object as an instance of the Query class
constrained	false	Whether the WHERE clause of the SQL SELECT statement will be enforced when attempting to update Standard tables
database	null	Database to which the query is assigned
handle		BDE statement handle
masterSource	null	Query that acts as master query and provides parameter values
params	AssocArray	Associative array that contains parameter names and values for the SQL statement
parent	null	Container form or report
requestLive	true	Whether you want a writable rowset
rowset	null	Results of the query
session	null	Session to which the query is assigned
sql	Empty string	SQL statement that describes the query
unidirectional	false	Whether to assume forward-only navigation to increase performance on SQL-based servers
updateWhere	AllFields	Enum to determine which fields to use in constructing the WHERE clause of an SQL UPDATE statement, used for posting changes to SQL-based servers

Event	Parameters	Description
canClose		When attempting to close query; return value allows or disallows closure
canOpen		When attempting to open query; return value allows or disallows opening
onClose		After query closes
onOpen		After query first opens

Method	Parameters	Description
execute()		Executes query (called implicitly when *active* property is set to *true*)
prepare()		Prepares SQL statement
requery()		Rebinds and executes SQL statement
unprepare()		Cleans up when query is deactivated (called implicitly when *active* property is set to *false*)

Description

The Query object is where you specify which fields you want from which rows in which tables and the order in which you want to see them, through an SQL SELECT statement stored in the query's *sql* property. The results are accessed through the query's *rowset* property. To use a stored procedure that results in a rowset, use a StoredProc object instead.

Whenever you create a query object, it is initially assigned to the default database in the default session. If you want to use Standard tables in the default session you don't have to do anything with that query's *database* or *session* properties. If you want to use a Standard table in another session, assign that session to the query's *session* property, which causes that session's default database to be assigned to that query.

For non-Standard tables, you will need to set up a BDE alias for the database if you haven't done so already. After creating a new Database object, you may assign it to another session if desired; otherwise it is assigned to the default session. Once the Database object is active, you can assign it to the query's *database* property. If the database is assigned to another session, you need to assign that session to the query's *session* property first.

After the newly created query is assigned to the desired database, an SQL SELECT statement describing the data you want is assigned to the query's *sql* property.

If the SQL statement contains parameters, the Query object's *params* array is automatically populated with the corresponding elements. The value of each array element must be set before the query is activated. A Query with parameters can be used as a detail query in a master-detail relationship through the *masterSource* property.

Setting the Query object's *active* property to *true* opens the query and executes the SQL statement stored in the *sql* property. If the SQL statement fails, for example the statement is misspelled or the named table is missing, an error is generated and the *active* property remains *false*. If the SQL statement executes but does not generate any rows, the *active* property is *true* and the *endOfSet* property of the query's *rowset* is *true*. Otherwise the *endOfSet* property is *false*, and the rowset contains the resulting rows.

Setting the *active* property to *false* closes the query, writing any buffered changes.

class Query example

The first example opens a table named VACATION.DBF:

```
q= new Query()
q.sql = "select * from VACATION"
q.active = true
```

The second example opens a table named REQS in a database named PERSONNEL in a new session with a preset user name and password:

```
s1 = new Session()
d1 = new Database()
d1.databaseName = "PERSONNEL"
d1.session = s1
d1.loginString = "visitor/jobsavail"
d1.active = true
q1 = new Query()
q1.session = s1
q1.database = d1
q1.sql = "select * from REQS"
q1.active = true
```

The third example uses an SQL statement with parameters. Note that the parameter name is case-sensitive; the name in the *params* array must match the name in the SQL statement:

```
q1 = new Query()
q1.sql = "select * from CUSTOMER where STATE = :state"
q1.params[ "state" ] = "VA"
q1.active = true
```

class Rowset

Topic group Related topics Example

The data that results from an SQL statement in a Query object.

Syntax

These objects are created automatically by the query.

Properties

The following tables list the properties, events, and methods of the Rowset class. For details on each property, click on the property below.

Property	Default	Description
autoEdit	true	Whether the rowset automatically switches to Edit mode when a change is made in a *dataLink*ed component.
className	ROWSET	Identifies the object as an instance of the Rowset class
endOfSet		Whether the row cursor is at either end of the set
fields		Array of field objects in row
filter	Empty string	Filter SQL expression
filterOptions	Match length and case	Enum designating how the filter expression should be applied
handle		BDE cursor handle
indexName	Empty string	Active index tag
live	true	Whether the data can be modified
locateOptions	Match length and case	Enum designating how the locate expression should be applied
masterFields	Empty string	Field list for master-detail link
masterRowset	null	Reference to master Rowset object
modified	false	Whether the row has changed
notifyControls	true	Whether to automatically update *dataLink*ed controls
parent	null	Query object that contains the Rowset object
state	Closed	Enum that describes the mode the rowset is in

Event	**Parameters**	**Description**
canAbandon		When *abandon*() is called; return value allows or disallows abandoning of row
canAppend		When *beginAppend*() is called; return value allows or disallows start of append
canDelete		When *delete*() is called; return value allows or disallows deletion
canEdit		When *beginEdit*() is called; return value allows or disallows switch to Edit mode
canGetRow		When attempting to read row; return value acts as an additional filter
canNavigate		When attempting row navigation; return value allows or disallows navigation
canSave		When *save*() is called; return value allows or disallows saving of row
onAbandon		After successful *abandon*()
onAppend		After successful *beginAppend*()
onDelete		After successful *delete*()

onEdit		After successful *beginEdit*()
onNavigate	<method expN>, <rows expN>	After rowset navigation
onSave		After successful *save*()

Method	Parameters	Description
abandon()		Abandons pending changes to current row
applyFilter()		Applies filter set during rowset's Filter mode
applyLocate()	[<locate expC>]	Finds first row that matches specified criteria
atFirst()		Returns *true* if current row is first row in rowset
atLast()		Returns *true* if current row is last row in rowset
beginAppend()		Starts append of new row
beginEdit()		Puts rowset in Edit mode, allowing changes to fields
beginFilter()		Puts rowset in Filter mode, allowing entry of filter criteria
beginLocate()		Puts rowset in Locate mode, allowing entry of search criteria
bookmark()		Returns bookmark for current row
bookmarksEqual()	<bookmark 1> [,<bookmark 2>]	Compares two bookmarks or one bookmark with current row to see if they refer to same row
clearFilter()		Disables filter created by *applyFilter*() and clears *filter* property
count()		Returns number of rows in rowset, honoring filters
delete()		Deletes current row
findKey()	<key exp>	Finds the row with the exact matching key value
findKeyNearest()	<key exp>	Finds the row with the nearest matching key value
first()		Moves row cursor to first row in set
flush()		Commits the rowset buffer to disk
goto()	<bookmark>	Moves row cursor to specified row
last()		Moves row cursor to last row in set
locateNext()	[<rows expN>]	Finds other rows that match search criteria
lockRow()		Locks current row
lockSet()		Locks entire set
next()	[<rows expN>]	Navigates to adjacent rows
refresh()		Refreshes entire rowset
refreshControls()		Refreshes *dataLink*ed controls
refreshRow()		Refreshes current row only
rowCount()		Returns logical row count if known
rowNo()		Returns logical row number if known
save()		Saves current row
unlock()		Releases locks set by *lockRow*() and *lockSet*()

Description

A Rowset object represents a set of rows that results from a query. It maintains a cursor that points to one of the rows in the set, which is considered the current row, and a buffer to manage the contents of that row. The row cursor may also point outside the set, either before the first row or after the last row, in which case it is considered to be at the end-of-set. Each row contains fields from one or more tables. These fields are represented by an array of Field objects that is represented by the rowset's *fields* property. For a simple query like the following, which selects all the fields from a single table with no conditions,
the rowset represents all the data in the table:

```
select * from CUSTOMER
```

As the cursor moves from row to row, you can access the fields in that row.

A Query object always has a *rowset* property, but that rowset is not open and usable and does not contain any fields until the query has been successfully activated. Setting the Query object's *active* property to *true* opens the query and executes the SQL statement stored in the *sql* property. If the SQL statement fails, for example the statement is misspelled or the named table is missing, an error is generated and the *active* property remains *false*. If the SQL statement executes but does not generate any rows, the *active* property is *true* and the *endOfSet* property of the query's *rowset* is *true*. Otherwise the *endOfSet* property is *false*, and the rowset contains the resulting rows.

Once the rowset has been opened, you can do any of the following:

- Navigate the rowset; that is, move the row cursor
- Filter and search for rows
- Add, modify, and delete rows
- Explicitly lock individual rows or the entire set
- Get information about the rowset, including row cursor's current position

The individual Field objects in a rowset's *fields* array property may be *dataLink*ed to controls on a form. As the row cursor is navigated from row to row, the controls will be updated with the current row's values, unless the rowset's *notifyControls* property is set to *false*. Changing the values shown in the controls will change the *value* property of the *dataLink*ed Field objects. You may also directly modify the *value* property of the Field objects. All of the values are maintained in the row buffer.

Rowset objects support master-detail linking. Navigation and updates in the master rowset change the set of rows in the detail rowset. The detail rowset is controlled by changing the key range of an existing index in the detail rowset. The *masterRowset* and *masterFields* properties are set in the detail rowset. This allows a single master rowset to control any number of detail rowsets.

When a query opens, its rowset is in Browse mode. By default, a rowset's *autoEdit* property is *true*, which means that its fields are changeable through *dataLink*ed controls. Typing a destructive key in a *dataLink*ed control automatically attempts to switch the rowset into Edit mode. By setting *autoEdit* to *false*, the rowset is read-only, and the *beginEdit*() method must be called to switch to Edit mode and allow editing. *autoEdit* has no effect on assignments to the *value* of a field; they are always allowed.

The rowset's *modified* property indicates whether any changes have been made to the current row. Changes made to the row buffer are not written until the *save*() method is explicitly called or there is an implicit save, which can be caused by one of the following:

- Navigation in the rowset: calling *next*(), *first*(), *last*(), *goto*(), *findKey*(), *findKeyNearest*(), or *applyLocate*(<SQL exp>); or assigning to *filter*
- A *state* or mode change in the rowset: calling *beginAppend*(), *beginFilter*(), or *beginLocate*()
- The rowset's query is closed.

In all cases, even with an explicit *save*() call, no attempt is made to save data if the rowset's *modified* property is *false*. This architecture lets you define row-validation code once in the *canSave* event handler that is called whenever it is needed and only when it is needed.

In addition to normal data access through Browse and Edit modes, the rowset supports three other modes: Append, Filter, and Locate, which are initiated by *beginAppend*(), *beginFilter*(), and *beginLocate*() respectively. At the beginning
of all three modes, the row buffer is disassociated from whatever row it was buffering and cleared. This allows the entry of field values typed into *dataLink*ed controls or assigned directly to the *value* property. In Append mode, these new values are saved as a new row if the row buffer is written. In Filter mode, executing an *applyFilter*() causes the non-blank field values to be used as criteria for filtering rows, showing only those that match. In Locate mode, calling *applyLocate*() causes the non-blank field values to be used as criteria to search for matching rows. In all three modes, using the field values cancels that mode. Also, calling the *abandon*() method causes the rowset to revert back to Browse mode without using the values.

You can easily implement filter-by-form and locate-by-form features with the Filter and Locate modes. Instead of using Filter mode, you can assign an SQL expression directly to the rowset's *filter* property.

The rowset's *canGetRow* event will filter rows based on any dBASE code, not just an SQL expression, and can be used instead of or in addition to Filter mode and the *filter* property. You can also use *applyLocate*() without starting Locate mode first by passing an SQL expression to find the first row for which the expression is *true*.

Any row-selection criteria—from the WHERE clause of the query's SQL SELECT statement, the key range enforced by a master-detail link, or a filter—
is actively enforced. *applyLocate*() will not find a row that does not match the criteria. When appending a new row or changing an existing row, if the fields
in the row are written such that the row no longer matches the selection criteria, that row becomes out-of-set, and the row cursor moves to the next row, or to the end-of-set if there are no more matching rows. To see the out-of-set row, you must remove or modify the selection criteria to allow that row.

Row and set locking support varies among different table types. The Standard (DBF and DB) tables fully support locking, as do some SQL servers. For servers that do not support true locks, the Borland Database Engine emulates optimistic locking. Any lock request is assumed to succeed. Later, when the actual attempt to change the data occurs, if the data has changed since the lock attempt, an error occurs.

Any attempt to change the data in a row, like typing a letter in a *dataLink*ed Entryfield control, causes an automatic row lock to be attempted. If that row is already locked, the lock is retried up to the number of times specified by the session's *lockRetryCount* property; if after those attempts the lock is unsuccessful, the change does not take. If the automatic lock is successful, the lock remains until navigation off the locked row occurs or the row is saved or abandoned; then the lock is automatically removed.

class Rowset example

The following code gives everyone an extra day of vacation:

```
q= new Query()
q.sql = "select * from EMPLOYEE"
q.active = true
do while not q.rowset.endOfSet
  q.rowset.fields[ "VacHours" ].value += 8
  q.rowset.next()
enddo
```

class Session

Topic group Related topics Example

An object that manages simultaneous database access.

Syntax

[<oRef> =] new Session()

<oRef>

A variable or property—typically of a Form or Report object—in which to store a reference to the newly created Session object.

Properties

The following tables list the properties, events, and methods of the Session class. For details on each property, click on the property below.

Property	Default	Description
className	SESSION	Identifies the object as an instance of the Session class
handle		BDE session handle
lockRetryCount	0	Number of times to retry a failed lock attempt
lockRetryInterval	0	Number of seconds to wait between each lock attempt
parent	null	Container form or report

Event	**Parameters**	**Description**
onProgress	<percent expN>, <message expC>	Periodically during data processing operations

Method	**Parameters**	**Description**
access()		Returns the user's access level for the session
addPassword()	<password expC>	Adds a password to the password table for access to encrypted DB (Paradox) tables
login()	<group expC>, <user expC>, <password expC>	Logs the specified user into the session to access encrypted DBF (dBASE) tables
user()		Returns the user's login name for the session

Description

A session represents a separate user task. For example, a car rental application may allow several car rental forms to be open on-screen at the same time. The data for each one of these forms would be accessed through its own session, because each rental form is actually a separate user task, just as if you had multiple workstations with one form each. *Visual* dBASE supports up to 2048 simultaneous sessions. When *Visual* dBASE first starts, it already has a default session.

By using sessions, each task is allowed to access tables without having to worry about other tables which may be open for other tasks. This includes the same tables open for different tasks, as with the car rental forms mentioned earlier. Sessions allow a single user doing multiple tasks to appear as multiple users, with all the data integrity issues that implies.

DBF and DB table security is session-based. (SQL-table security is database-based.) When you create a new Session object, it copies the security settings of the default session. Therefore, if you have the user log in when *Visual* dBASE starts, all the new sessions you create to handle multiple tasks will have the access level.

Unlike the Database and Query objects, a Session object does not have an *active* property. Sessions are always active. To close a session, you must destroy it by releasing all references to it.

class Session example

This example assigns a query that accesses the encrypted PAYROLL.DBF table to a new Session object. When the query is activated, a password dialog will be automatically displayed by *Visual* dBASE to access the table.

```
s1 = new Session()
q1 = new Query()
q1.session = s1
q1.sql = "select * from PAYROLL"
q1.active = true
```

class SqlField

Topic group Related topics

A field from an SQL-server-based table. SqlField subclasses the Field class.

Syntax

These objects are created automatically by the rowset.

Properties

The following table lists the properties of the SqlField class. SqlField objects also contain those inherited from the Field class. (No events or methods are associated with the SqlField class.) For details on each property, click on the property below.

Property	Default	Description
className	SQLFIELD	Identifies the object as an instance of the SqlField class
precision		The number of digits of precision
scale		How the number is scaled

Description

The SqlField class is a subclass of the Field class. It represents a field from an SQL-server-based table, including any ODBC connection, and contains properties that are specific to fields of that table type. Otherwise it is considered to be a Field object.

class StoredProc

Topic group Related topics Example

A representation of a stored procedure call.

Syntax

[<oRef> =] new StoredProc()

<oRef>

A variable or property—typically of a Form or Report object—in which to store a reference to the newly created StoredProc object.

Properties

The following tables list the properties, events, and methods of the StoredProc class. For details on each property, click on the property below:

Property	Default	Description
active	false	Whether the stored procedure is open and active or closed
className	STOREDPROC	Identifies the object as an instance of the StoredProc class
database	null	Database to which the stored procedure is assigned
handle		BDE statement handle
params	AssocArray	Associative array that contains Parameter objects for the stored procedure call
parent	null	Container form or report
procedureName	Empty string	Name of the stored procedure
rowset	null	Results of the stored procedure call
session	null	Session to which the stored procedure is assigned

Event	Parameters	Description
canClose		When attempting to close stored procedure; return value allows or disallows closure
canOpen		When attempting to open stored procedure; return value allows or disallows opening
onClose		After stored procedure closes
onOpen		After stored procedure first opens

Method	Parameters	Description
execute()		Executes stored procedure (called implicitly when *active* property is set to *true*)
prepare()		Prepares stored procedure call
requery()		Rebinds and executes stored procedure
unprepare()		Cleans up when stored procedure is deactivated (called implicitly when *active* property is set to *false*)

Description

Use a StoredProc object to call a stored procedure in a database. Most stored procedures take one or more parameters as input and may return one or more values as output. Parameters are passed to and from the stored procedure through the StoredProc object's *params* property, which points to an associative array of Parameter Objects.

Some stored procedures return a rowset. In that case, the StoredProc object is similar to a Query object; but instead of executing an SQL statement that describes the data to retrieve, you name a stored procedure, pass parameters to it, and execute it. The resulting rowset is accessed through the StoredProc object's *rowset* property, just like in a Query object.

Because stored procedures are SQL-server-based, you must create and activate a Database object and assign that object to the StoredProc object's *database* property. Standard tables do not support stored procedures.

Next, the *procedureName* property must be set to the name of the stored procedure. For most SQL servers, the BDE can get the names and types of the parameters for the stored procedure. On some servers, no information is available; in that case you must include the parameter names in the *procedureName* property as well.

Getting or specifying the names of the parameters automatically creates the corresponding elements in the StoredProc object's *params* array. Each element is a Parameter object. Again, for some servers, information on the parameter types is available. For those servers, the *type* properties are automatically filled in and the *value* properties are initialized. For other servers, you must supply the missing *type* information and initialize the *value* to the correct type.

To call the stored procedure, set its *active* property to *true*. If the stored procedure does not generate a rowset, the *active* property is reset to *false* after the stored procedure executes and returns its results, if any. This facilitates calling the stored procedure again if desired, after reading the results from the *params* array.

If the stored procedure generates a rowset, the *active* property remains true, and the resulting rowset acts just like a rowset generated by a Query object.

You can *dataLink* components in a form to fields in a rowset, or to the Parameter objects in the *params* array.

class StoredProc example

The following statements call a stored procedure that returns an output parameter. The result is displayed in the result pane of the Command window.

```
d = new Database()
d.databaseName = "IBLOCAL"
d.active = true
p = new StoredProc()
p.database = d
p.procedureName = "DEPT_BUDGET"
p.params[ "DNO" ].value = "670"
p.active = true
? p.params[ "TOT" ].value                          // Display output
```

The following statement calls a stored procedure in a database that does not return any parameter information. Therefore, the parameters must be declared in the procedureName property. Note that the parameter names are case-sensitive, and you must initialize any output parameters by assigning a dummy value of the correct data type.

```
#define PARAMETER_TYPE_INPUT        0
#define PARAMETER_TYPE_OUTPUT       1
#define PARAMETER_TYPE_INPUT_OUTPUT 2
#define PARAMETER_TYPE_RESULT       3
d = new Database()
d.databaseName = "WIDGETS"
d.active = true
p = new StoredProc()
p.database = d
p.procedureName = "PROJECT_SALES( :month, :units )"
p.params[ "month" ].type  = PARAMETER_TYPE_INPUT
p.params[ "month" ].value = 6
p.params[ "units" ].type  = PARAMETER_TYPE_OUTPUT
p.params[ "units" ].value = 0                      // Output will be numeric
p.active = true
? p.params[ "TOT" ].value                          // Display output
```

class UpdateSet

Topic group Related topics Example

An object that updates one table with data from another.

Syntax

[<oRef> =] new UpdateSet()

<oRef>

A variable or property in which to store a reference to the newly created UpdateSet object.

Properties

The following tables list the properties and methods of the UpdateSet class. (No events are associated with this class.) For details on each property, click on the property below.

Property	Default	Description
changedTableName		Table to collect copies of original values of changed rows
className	UPDATESET	Identifies the object as an instance of the UpdateSet class
destination		Rowset object or table name that is updated or created
indexName		Name of index to use
keyViolationTableName		Table to collect rows with duplicate primary keys
problemTableName		Table that collects problem rows
source		Rowset object or table name that contains updates

Method	**Parameters**	**Description**
append()		Adds new rows
appendUpdate()		Updates existing rows and adds new rows
copy()		Creates destination table
delete()		Deletes rows in destination that match rows in source
update()		Updates existing rows

Description

The UpdateSet object is used to update data from one rowset to another, or to copy or convert data from one format to another, either in the same database or across databases.

To update a DBF table with *appendUpdate*(), *delete*(), or *update*(), the *indexName* property of the UpdateSet object must be set to a valid index. To update a DB table with the same operations, the DB table's primary key is used by default, or you can assign a secondary index to the *indexName* property.

The *source* and *destination* can be either a character string containing the name of a table, or an object reference to a rowset. If the source is a rowset, the data used in the update can be filtered.

For Standard table names, specify the name of the table and the extension (DBF or DB). For all other tables, place the database name (the BDE alias) in colons before the table name; that is, in this form:

```
:alias:table
```

The named database must be open when the UpdateSet() method is executed.

class UpdateSet example

The following example copies the result set from a query on an SQL-based-server to a local DBF file:

```
d = new Database()
d.databaseName = "SOMESQL"
d.active = true
q = new Query()
q.database = d
q.sql = "select * from SOMETABLE where THIS = 'that' order by ID"
q.active = true
u = new UpdateSet()
u.source = q.rowset
u.destination = "RESULTS.DBF"
u.copy()
```

This example copies all the rows from the same SQL-based-server table to a local DBF file without using a Query object:

```
d = new Database()
d.databaseName = "SOMESQL"
d.active = true
u = new UpdateSet()
u.source = ":SOMESQL:SOMETABLE"
u.destination = "SOMEDUP.DBF"
u.copy()
```

abandon()

Topic group Related topics Example

Abandons any pending changes to the current row.

Syntax

<oRef>.*abandon*()

<oRef>

The rowset whose current row buffer you want to abandon.

Property of

Rowset

Description

Changes made to a row, either through *dataLink*ed controls or by assigning values to the *value* property of fields, are not written to disk until the rowset's *save*() method is explicitly called or there is an implicit save, which is usually caused by navigation in the rowset. You can discard any pending changes to the rowset with the *abandon*() method. This is usually done in response to the user's request.

You can check the *modified* property first to see if there have been any changes made to the row. Calling *abandon*() when there's nothing to abandon has no ill effects (although the *canAbandon* and *onAbandon* events are still fired).

You may also want to discard unwritten changes when a query is closed, the opposite of the default behavior. If you are relying on the query's event handlers to do this instead of abandoning and closing the query through code, you must call *abandon*() during the query's *canClose* event and return *true* from the *canClose* event handler; calling *abandon*() during the *onClose* event will have no effect, since the *onClose* event fires after the query has already closed, and any changes have been written.

When using *abandon*() to discard changes to an existing row, all fields are returned to their original values and any *dataLink*ed controls are automatically restored. If the row was automatically locked when editing began, it is unlocked.

You may also use *abandon*() to discard a new row created by the *beginAppend*() method, in which case the new row is discarded, and the row that was current at the time *beginAppend*() was called is restored. This is not considered navigation, so the rowset's *onNavigate* does not fire. If you have a *onNavigate* event handler, call it from the *onAbandon* event. *abandon*() also cancels a rowset's Filter or Locate mode in the same manner.

The order of events when calling *abandon*() is as follows:

1 If the rowset has a *canAbandon* event handler, it is called. If not, it's as if *canAbandon* returns *true*.

2 If the *canAbandon* event handler returns *false*, nothing else happens and *abandon*() returns *false*.

3 If the *canAbandon* event handler returns *true*:

- The current row buffer/state is abandoned, restoring the rowset to its previous row/state.
- The *onAbandon* event fires.
- *abandon*() returns *true*.

While *abandon*() discards unwritten changes to the current row, there are two mutually exclusive ways of abandoning changes to more than one row in more than one table in a database, which you can use instead of or in addition to single-row buffering. Calling *beginTrans*() starts transaction logging which logs all changes and allows you to undo them by calling *rollback*() if necessary. The alternative is to set the database's *cacheUpdates* property to *true* so that changes are written to a local cache but not written to disk, and then call *abandonUpdates*() to discard all the changes if needed.

abandon() example

The following *onClick* event handler for an Abandon button calls the *abandon*() method for the form's primary rowset:

```
function abandonButton_onClick()
  form.rowset.abandon()
```

abandonUpdates()

Topic group | Related topics | Example

Abandons all cached updates in the database.

Syntax

<oRef>.*abandonUpdates*()

<oRef>

The database whose cached changes you want to abandon.

Property of

Database

Description

abandonUpdates() discards all changes to a database that have been cached. Unlike *applyUpdates*(), it cannot fail. See *cacheUpdates* for more information on caching updates.

Changes to the current row that have not been written are still in the row buffer, and have not been cached. To abandon changes made to the row buffer, call the rowset's *abandon*() method.

abandonUpdates() example

Suppose you have a form that's used for redeeming prizes for points accumulated for dining at the corporate cafeteria. As each prize is chosen, the choice is written to the prize redemption table, using cached updates. The points aren't actually spent until you press the Redeem button, and you can cancel all the choices that have been made and start over by pressing the Start Over button. The following is the *onClick* event handler for the Start Over button.

```
function startOverButton_onClick()
  form.rowset.parent.database.abandonUpdates()  // Discard cached updates
  form.rowset.abandon()                         // and current choice
```

access()

Topic group Related topics

Returns the access level of the current session for DBF table security.

Syntax

<oRef>.*access*()

<oRef>

The session you want to test.

Property of

Session

Description

DBF table security is session-based. All queries assigned to the same session in their *session* property have the same access level.

access() returns a number from 0 to 8. 8 is the lowest level of access, 1 is the highest level of access, and 0 is returned if the session is not using DBF security.

access() example

The following method overrides the form's *open*() method. It checks the user's current access level and hides a button to display the administration form if the access level isn't high enough. An overriding method is used instead of the *onOpen* event because *onOpen* fires after the form has already opened on-screen, which means that the administration button might appear briefly before it vanishes.

```
function open()
  local nAccess
  nAccess = form.rowset.parent.session.access()
  if nAccess == 0 or nAccess > 4
    form.adminButton.visible = false
  endif
  return super::open()
```

The session is referenced via the form's primary rowset. The rowset's parent is the query object, which is assigned to a session. The access level is stored in a variable for convenience because it needs to be checked twice: first to make sure security is enabled, and second to check the access level itself.

active

Topic group Related topics

Specifies whether an object is open and active or closed.

Property of

Database, DataModRef, Query, StoredProc

Description

When created, a new session's default database is active since it does not require any setup. Other Database, DataModRef, Query, and StoredProc objects do require setup, so their *active* property defaults to *false*. Once they have been set up, set their *active* property to *true* to open the object and make it active.

When a Query or StoredProc object's *active* property is set to *true*, its *canOpen* event is called. If there is no *canOpen* event handler, or the event handler returns *true*, the object is activated. In a Query object, the SQL statement in its *sql* property is executed; in a StoredProc object, the stored procedure named in its *procedureName* property is called. Then the object's *onOpen* event is fired.

To close the object, set its *active* property to *false*. Closing an object closes all objects below it in the class hierarchy. Attempting to close a Query or StoredProc object calls its *canClose* event. If there is no *canClose* event handler, or the event handler returns *true*, the object is closed. Closing a Database object closes all its Query and StoredProc objects. After the objects are closed, all the Query and StoredProc objects' *onClose* events are fired.

Activating and deactivating an object implicitly calls a number of advanced methods. You may override or completely redefine these methods for custom data classes; in typical usage, don't touch them. When you set *active* to *true*, a Database object's *open*() method is called; activating a query or stored procedure calls *prepare*(), then *execute*(). When you set *active* to *false*, a Database object's *close*() method is called; deactivating a query or stored procedure calls its *unprepare*() method. These methods are called as part of the activation or deactivation of the object, before the *onOpen* or *onClose* event.

Closing a query or a StoredProc object that generated a rowset attempts to write any changes to its rowset's current row buffer, and to apply all cached updates or commit all logged changes. To circumvent this, you must call the *abandon*(), *abandonUpdates*(), and/or *rollback*() before the object's *onClose* event—for example, during the *canClose* event or before setting the *active* property to *false*—because *onClose* fires after the object has already closed.

Once an object has been closed, you may change its properties if desired and reopen it by setting its *active* property back to *true*.

addPassword()

Topic group | Related topics | Example

Adds a password to the session's password list for DB table security.

Syntax

<oRef>.*addPassword*(<expC>)

<oRef>

The session you want to receive the password.

<expC>

The password string.

Property of

Session

Description

DB table security is based on password lists. If you know a password, you have access to all the files that use that password. There is no matching between a user name and password. The access level for each file may be different for the same password.

Password lists are session-based. Once a password has been added to a session, it will continue to be tried for all encrypted tables. All queries assigned to the same session in their *session* property use the same password list. If you attempt to open an encrypted table and there is no valid password that gives access to that table in the list, you will be prompted for the password. Responding with a password adds it to the list.

The *addPassword*() method allows you add passwords directly to the session's password list. You can do this if you want to add a default password, so that users won't be prompted, or if you're writing your own custom login form, and need to add the password to the session.

addPassword() example

The following *onClick* event handler for the login button on a custom login form adds the password typed into the password1 component, a custom entryfield that obscures text as it is typed, and runs the main form:

```
function loginButton_onClick()
  form.rowset.parent.session.addPassword( form.password1.value )
  do MAIN.WFM
```

append()

Topic group | Related topics | Example

Adds rows from one rowset or table to another.

Syntax

<oRef>.*append*()

<oRef>

The UpdateSet object that describes the append.

Property of

UpdateSet

Description

Use *append*() to add rows from a source rowset or table to an existing destination rowset or table. If there is no primary key in the destination, the rows from the source are always added. If there is a primary key in the destination, rows with keys that already exist in the destination will be copied to the table specified by the UpdateSet object's *keyViolationTableName* property instead.

To update rows with the same primary key in the destination, use the *appendUpdate*() method. To move data to a new table instead of an existing table or rowset, use the *copy*() method.

append() example

The following code accumulates records from the Daily table in an archive. The Archive table is occasionally moved to tape, so the code uses the *append*() or *copy*() method, depending on whether the Archive table already exists. The Daily table is stored in a database that supports the CURRENT_DATE SQL function.

```
d = new Database()
d.databaseName = "TRAFFIC"
d.loginString = "backup/murphy"
d.active = true
q = new Query()
q.database = d
q.sql = "select * from DAILY where POSTED = CURRENT_DATE"
q.active = true
u = new UpdateSet()
u.source = q.rowset
u.destination = "ARCHIVE.DBF"
if _app.databases[ 1 ].tableExits( "ARCHIVE.DBF" )
  u.append()
else
  u.copy()
endif
```

appendUpdate()

Topic group Related topics

Updates one rowset or table from another by updating existing rows and adding new rows.

Syntax

<oRef>.*appendUpdate*()

<oRef>

The UpdateSet object that describes the update.

Property of

UpdateSet

Description

Use *appendUpdate*() to update a rowset, allowing new rows to be added. You must specify the UpdateSet object's *indexName* property which will be used to match the records. The index must exist for the destination rowset. The original values of all changed records will be copied to the table specified by the updateSet's *changedTableName* property.

To update existing rows only, use the *update*() method instead. To always add new rows, use the *append*() method.

applyFilter()

Topic group Related topics Example

Applies the filter that was set during a rowset's Filter mode.

Syntax

<oRef>.*applyFilter*()

<oRef>

The rowset whose filter criteria you want to apply.

Property of

Rowset

Description

Rowset objects support a Filter mode in which values can be assigned to Field objects and then used to filter the rows in a rowset to show only those rows with matching values. *beginFilter*() puts the rowset in Filter mode and *applyFilter*() applies the filter values. *clearFilter*() cancels the filter. Because *dataLink*ed controls on forms write to the *value* properties of Field objects, a call to those three methods are all you need to implement a filter-by-form feature in your application.

When *applyFilter*() is called, the row cursor is repositioned to the first matching row in the set, or to the end-of-set if there are no matches. The rowset's *filter* property is updated to contain the resulting SQL expression used for the filter. *applyFilter*() returns *true* or *false* to indicate if a match was found.

To filter rows with a condition without using Filter mode, set the rowset's *filter* property directly. See the *filter* property for more information on how filters are applied to data. To filter rows with dBASE code instead of or in addition to an SQL expression, use the *canGetRow* event.

applyFilter() example

The following two event handlers demonstrate the basic filter-by-form functionality. First, before switching to Filter mode, get the bookmark for the current row:

```
function beginFilterButton_onClick()
  form.bookmark = form.rowset.bookmark()
  form.rowset.beginFilter()
  // Good place to visually indicate form is now Filter mode
```

Then when the user attempts to apply the filter criteria, you can try to go back to the row they were on:

```
function applyFilterButton_onClick()
  form.rowset.notifyControls := false  // Suppress display of all this
navigation
  if not form.rowset.applyFilter()
    form.rowset.clearFilter()          // No matches, get rid of filter
    try
      form.rowset.goto( form.bookmark )
    catch ( Exception e )              // Couldn't go to saved row (maybe
deleted)
      form.rowset.first()              // Go to first row in rowset instead
    endtry
    msgbox( "No matches found", "Filter", 48 )
  endif
  // Undo any visual indications of Filter mode here
  form.rowset.notifyControls := true
  form.rowset.refreshControls()        // Refresh controls on form
```

applyLocate()

Topic group | Related topics | Example

Finds the first row that matches specified criteria.

Syntax

<oRef>.*applyLocate*([<SQL condition expC>])

<oRef>

The rowset you want to search for the specified criteria.

<SQL condition expC>

An SQL condition expression.

Property of

Rowset

Description

Rowset objects support a Locate mode in which values can be assigned to Field objects and then used to find rows in a rowset that contains matching values. *beginLocate*() puts the rowset in Locate mode and *applyLocate*() finds the first matching row. *locateNext*() finds other matching rows. Because *dataLink*ed controls on forms write to the *value* properties of Field objects, a call to those three methods are all you need to implement a search-by-form feature in your application.

applyLocate() moves the row cursor to the first row that matches the criteria set during the rowset's Locate mode.

You may also use *applyLocate*() without calling *beginLocate*() first to put the rowset in Locate mode: call *applyLocate*() with a parameter string that contains an SQL condition expression. Doing so finds the first row that matches the condition. (Calling *applyLocate*() with a parameter when the rowset is in Locate mode discards any field values entered during Locate mode and uses the specified condition expression only to find a match.)

Calling *applyLocate*() with a parameter will attempt an implicit save if the rowset is not in Locate mode and the rowset's *modified* property is *true*. If the implicit save fails, because the *canSave* returns *false* or any other reason, the search is not attempted.

If a search is attempted, *applyLocate*() returns *true* or *false* to indicate if a match is found. *onNavigate* always fires after a search attempt, either on the first matching row, or the current row if the search failed.

applyLocate() will use available indexes to find a match more quickly. When searching on the current index specified by the rowset's *indexName* property, you may find the *findKey*() and *findKeyNearest*() methods more convenient and direct.

applyLocate() example

The following statement finds the first row where the City field matches the value typed into a Entryfield component in a form. Note the use of single quotation marks to delimit the value of the Entryfield component.

```
form.rowset.applyLocate( "CITY = '" + form.cityText.value + "'" )
```

applyUpdates()

Topic group Related topics

Attempts to apply all cached updates in the database.

Syntax

<oRef>.*applyUpdates*()

<oRef>

The database whose cached updates you want to apply.

Property of

Database

Description

applyUpdates() attempts to apply all changes to a database that have been cached and returns *true* or *false* to indicate success or failure. If it succeeds, all cached updates are cleared; if it fails, the updates remain cached. Since *applyUpdates*() uses a transaction while attempting to apply the changes and you cannot nest transactions in a database, cached updates and transaction logging with *beginTrans*() are mutually exclusive. See *cacheUpdates* for more information on caching updates.

Changes to the current row that have not been written are still in the row buffer, and have not been cached. To apply changes made to the row buffer, call the rowset's *save*() method before you call *applyUpdates*().

applyUpdates() example

Suppose you have a form that's used for redeeming prizes for points accumulated for dining at the corporate cafeteria. As each prize is chosen, the choice is written to the prize redemption table, using cached updates. The points aren't actually spent until you press the Redeem button, and you can cancel all the choices that have been made and start over by pressing the Start Over button. The following is the *onClick* event handler for the Redeem button.

```
function redeemButton_onClick()
  if form.rowset.save()                          // Save current row
    form.rowset.parent.database.applyUpdates()   // Apply cached updates
  endif
```

atFirst()

Topic group | Related topics | Example

Returns *true* if the row cursor is at the first row in the rowset.

Syntax

<oRef>.*atFirst*()

<oRef>

The rowset whose position you want to check.

Property of

Rowset

Description

Use *atFirst*() to determine if the row cursor is at the first row in the rowset. When *atFirst*() returns *true*, the row cursor is at the first row. In most cases, *atFirst*() is an inexpensive operation. The current row is usually compared with a bookmark of the first row made when the query is first opened. However, *atFirst*() may be time-consuming for certain data drivers.

A common use of *atFirst*() is to conditionally disable backward navigation controls. If you know you are on the first row, you can't go backward, and you reflect this visually with a disabled control.

The end-of-set is different from the first row, so *endOfSet* cannot be *true* if *atFirst*() returns *true*. *endOfSet* is *true* if the row cursor is before the first row in the rowset (or after the last row).

atFirst example

The following *onNavigate* event handler sets the *enabled* properties of the navigation buttons on a form, based on the return values of *atFirst*() and *atLast*().

```
function Rowset_onNavigate
  if this.endOfSet
    return          // Do nothing if end-of-set
  endif
  local lBackward, lForward
  lBackward = not this.atFirst()
  lForward  = not this.atLast()
  with this.parent.parent
    buttonFirst.enabled := lBackward
    buttonPrev.enabled  := lBackward
    buttonNext.enabled  := lForward
    buttonLast.enabled  := lForward
  endwith
```

The event handler does nothing if the rowset is at the end-of-set, expecting that the row cursor will be moved in the reverse direction of the navigation. If the navigation attempt was forward, the row cursor would be moved back to the last row, and if the navigation attempt was backward, the row cursor would be moved forward to the first row. In this way, the rowset is never on the end-of-set. This technique cannot be used for rowsets where there may not be any matching rows.

atLast()

Topic group | Related topics | Example

Returns *true* if the row cursor is at the last row in the rowset.

Syntax

<oRef>.*atLast*()

<oRef>

The rowset whose position you want to check.

Property of

Rowset

Description

Use *atLast*() to determine if the row cursor is at the last row in the rowset. When *atLast*() returns *true*, the row cursor is at the last row. *atLast*() may be an expensive operation. For example, if you have not navigated to the last row in a rowset returned by an SQL server, such a navigation would have to be attempted to determine if you are at the last row, which could be time-consuming for large rowsets.

A common use of *atLast*() is to conditionally disable forward navigation controls. If you know you are on the last row, you can't go forward, and you reflect this visually with a disabled control.

The end-of-set is different from the last row, so *endOfSet* cannot be *true* if *atLast*() returns *true*; *endOfSet* is *true* if the row cursor is after the last row in the rowset (or before the first row).

autoEdit

Topic group Related topics

Specifies whether the rowset automatically switches to Edit mode when changes are made through *dataLink*ed components.

Property of

Rowset

Description

When a query (or stored procedure) is activated, its rowset opens in Browse mode. If a rowset's *autoEdit* property is *true* (the default), typing a destructive keystroke in a *dataLink*ed component automatically attempts to switch the rowset into Edit mode by implicitly calling *beginEdit*(). If you set *autoEdit* to *false*, data displayed in a form is read-only, and you must explicitly call *beginEdit*() to switch to Edit mode.

autoEdit has no effect on assignments to the *value* of a field; the first assignment to a row always calls *beginEdit*() implicitly to secure a row lock.

beforeGetValue

Topic group | Related topics | Example

Event fired when reading a field's *value* property, which returns its apparent value.

Parameters

none

Property of

Field (including DbfField, PdxField, SqlField)

Description

By using a field's *beforeGetValue* event, you can make its *value* property appear to be anything you want. For example, in a table you can store codes, but when looking at the data, you see descriptions. This effect is called field morphing. The *beforeGetValue* event is also the primary way to set up a calculated field.

A field's *beforeGetValue* event handler must return a value. That value is used as the *value* property. During the *beforeGetValue* event handler, the field's *value* property represents its true value, as stored in the row buffer, which is read from the table.

Be sure to include checks for blank values—which will occur when a *beginAppend*() starts—and the end-of-set. Any attempt to access the field values when the rowset is at the end-of-set will cause an error. Return a *null* instead.

beforeGetValue is fired when reading a field's *value* property explicitly and when read to update a *dataLink*ed control. It does not fire when accessed internally for SpeedFilters, index expressions, or master-detail links, or when calling *copyToFile*().

To reverse the process, use the field's *canChange* event.

beforeGetValue example

In this example, a table of messages stores a message section number, but in the form, the section name is displayed in a ComboBox component. To display the section name, the section number is located in the table of section numbers that is opened in the query sections1. Note the tests for the end-of-set and *beginAppend*()

```
function messages1_section_beforeGetValue()
  if this.parent.parent.endOfSet
    // When navigating to end-of-set
    return null
  elseif this.value == null
    // For beginAppend()
    return ""
  else
    // Normal lookup, with value in case lookup fails
    local r
    r = this.parent.parent.parent.parent.sections1.rowset
    return iif( r.applyLocate( '"Section #" = ' + this.value ),;
                r.fields[ "Name" ].value, "Closed section" )
  endif
```

In the event handler, *this* refers to the field. *this*.*parent*.*parent* refers to the rowset that contains the field (the first *parent* is the *fields* array). The form that contains the query that contains the rowset is *this*.*parent*.*parent*.*parent*.*parent*, from which you can reference the other queries on the form.

An SQL expression to perform the section number lookup is passed to *applyLocate*(). *Visual* dBASE automatically converts the numeric field value to a string when concatenating. If a match is found, the value of the corresponding Name field is returned; otherwise, a generic string is returned.

beginAppend()

Topic group Related topics Example

Starts append of a new row.

Syntax

<oRef>.*beginAppend*()

<oRef>

The rowset you want to put in Append mode.

Property of

Rowset

Description

beginAppend() clears the row buffer and puts the rowset in Append mode, allowing the creation of a new row, via data entry through *dataLink*ed controls, by directly assigning values to the *value* property of fields, or a combination of both. The row buffer is not written to disk until the rowset's *save*() method is explicitly called or there is an implicit save, which is usually caused by navigation in the rowset. At that point, a save attempt is made only if the rowset's *modified* property is *true*; this is intended to prevent blank rows from being added. Calling *beginAppend*() again to add another row will also cause an implicit save first, if the row has been modified.

The integrity of the data in the row, for example making sure that all required fields are filled in, should be checked in the rowset's *canSave* event. The *abandon*() method will discard the new row, leaving no trace of the attempt.

The rowset's *canAppend* event is fired when *beginAppend*() is called. If there is a *canAppend* event handler, it must return *true* or the *beginAppend*() will not proceed.

The *onAppend* event is fired after the row buffer is cleared, allowing you to preset default values for any fields. After you preset values, set the *modified* property to *false*, so that the values in the fields immediately after the *onAppend* event are considered as the baseline for whether the row has been changed and needs to be saved.

The order of events when calling *beginAppend*() is as follows:

1 If the rowset has a *canAppend* event handler, it is called. If not, it's as if *canAppend* returns *true*.

2 If the *canAppend* event handler returns *false*, nothing else happens and *beginAppend*() returns *false*.

3 If the *canAppend* event handler returns *true*, the rowset's *modified* property is checked.

4 If *modified* is *true*:

- The rowset's *canSave* event is fired. If there is no *canSave* event, it's as if *canSave* returns *true*.
- If *canSave* returns *false*, nothing else happens and *beginAppend*() returns *false*.
- If *canSave* returns *true*, *Visual* dBASE tries to save the row. If the row is not saved, perhaps because it fails some database engine-level validation, a DbException occurs—*beginAppend*() does not return.
- If the row is saved, the *modified* property is set to *false*, and the *onSave* event is fired.

5 After the current row is saved (if necessary):

- The rowset is switched to Append mode.
- The *onAppend* event fires.
- *beginAppend*() returns *true*.

An exception occurs when calling *beginAppend*() if the rowset's *live* property is *false*, or if the user has insufficient rights to add rows.

beginAppend() example

The following event handler is used to add new rows. It carries over the values of some fields from the current row.

```
function addButton_onClick()
  local cCity, cZip, cInsp
  // Make copies of field values to carry over
  cCity = form.rowset.fields[ "City"      ].value
  cZip  = form.rowset.fields[ "Zip"       ].value
  cInsp = form.rowset.fields[ "Inspector" ].value
  // Add new row
  if form.rowset.beginAppend()
    form.rowset.fields[ "City"      ].value := cCity
    form.rowset.fields[ "Zip"       ].value := cZip
    form.rowset.fields[ "Inspector" ].value := cInsp
    form.rowset.modified := false     // Clear flag to set baseline for
change
  endif
```

The field values are copied only if *beginAppend*() succeeds. It could fail if the current row has been modified, but contains invalid data. In that case, you would not want to overwrite the current field values and clear the *modified* flag.

beginEdit()

Topic group Related topics

Makes contents of a row editable.

Syntax

<oRef>.*beginEdit*()

<oRef>

The rowset you want to put in Edit mode.

Property of

Rowset

Description

By default, a rowset's *autoEdit* property is *true*, which means that data is immediately editable. The rowset implicitly calls *beginEdit*() when a destructive keystroke is typed in a *dataLink*ed component. But you can more strictly control how editing occurs by setting *autoEdit* to *false* and explicitly calling *beginEdit*() as needed.

As usual, the row buffer is not written until the rowset's *save*() method is explicitly called or there is an implicit save, which is usually caused by navigation in the rowset. The integrity of the data in the row, for example making sure that there are no invalid entries in any fields, should be checked in the rowset's *canSave* event. The *abandon*() method will discard any changes to the row. After saving or abandoning any changes, the rowset goes back to Browse mode.

The rowset's *canEdit* event is fired when *beginEdit*() is called. If there is a *canEdit* event handler, it must return *true* or the *beginEdit*() will not proceed. The *onEdit* event is fired after switching to Edit mode.

The order of events when calling *beginEdit*() is as follows, even if the rowset is already in Edit mode:

1 If the rowset has a *canEdit* event handler, it is called. If not, it's as if *canEdit* returns *true*.

2 If the *canEdit* event handler returns *false*, nothing else happens and *beginEdit*() returns *false*.

3 If the *canEdit* event handler returns *true*:

- The rowset attempt to switch to Edit mode by getting an automatic row lock. If the lock cannot be secured, the mode switch fails and *beginEdit*() returns *false*.
- If the lock is secured, the *onEdit* event fires.
- *beginEdit*() returns *true*.

An exception occurs if the rowset's *live* property is *false*, or if the user has insufficient rights to edit rows, and they call *beginEdit*().

beginFilter()

Topic group Related topics

Puts a rowset in Filter mode, allowing the entry of filter criteria.

Syntax

<oRef>.*beginFilter*()

<oRef>

The rowset you want to put in Filter mode.

Property of

Rowset

Description

Rowset objects support a Filter mode in which values can be assigned to Field objects and then used to filter the rows in a rowset to show only those rows with matching values. *beginFilter*() puts the rowset in Filter mode and *applyFilter*() applies the filter values. *clearFilter*() cancels the filter. Because *dataLink*ed controls on forms write to the *value* properties of Field objects, a call to those three methods are all you need to implement a filter-by-form feature in your application.

When *beginFilter*() is called, the row buffer is cleared. Values that are set either through *dataLink*ed controls or by assigning values to *value* properties are used for matching. Fields whose *value* property is left blank are not considered. To cancel Filter mode, call the *abandon*() method.

If navigation is attempted while in Filter mode, Filter mode is canceled and the navigation occurs, relative to the position of the row cursor at the time *beginFilter*() was called.

To filter rows with a condition without using Filter mode, set the rowset's *filter* property. See the *filter* property for more information on how filters are applied to data. To filter rows with dBASE code instead of or in addition to Filter mode, use the *canGetRow* event.

beginLocate()

Topic group Related topics

Puts a rowset in Locate mode, allowing the entry of search criteria.

Syntax

<oRef>.*beginLocate*()

<oRef>

The rowset you want to put in Locate mode.

Property of

Rowset

Description

Rowset objects support a Locate mode in which values can be assigned to Field objects and then used to find rows in a rowset that contain matching values. *beginLocate*() puts the rowset in Locate mode and *applyLocate*() finds the first matching row. *locateNext*() finds other matching rows. Because *dataLink*ed controls on forms write to the *value* properties of Field objects, a call to those three methods are all you need to implement a search-by-form feature in your application.

When *beginLocate*() is called, the row buffer is cleared. Values that are set either through *dataLink*ed controls or by assigning values to *value* properties are used for matching. Fields whose *value* property is left blank are not considered. To cancel Locate mode, call the *abandon*() method.

If navigation is attempted while in Locate mode, Locate mode is canceled and the navigation occurs, relative to the position of the row cursor at the time *beginLocate*() was called.

beginTrans()

Topic group | Related topics | Example

Begins transaction logging.

Syntax

<oRef>.*beginTrans*()

<oRef>

The database in which you want to start transaction logging.

Property of

Database

Description

Separate changes that must be applied together are considered to be a transaction. For example, transferring money from one account to another means debiting one account and crediting another. If for whatever reason one of those two changes cannot be done, the whole transaction is considered a failure and any change that was made must be undone.

Transaction logging records all the changes made to all the tables in a database. If no errors are encountered while making the individual changes in the transaction, the transaction log is cleared with the *commit*() method and the transaction is done. If an error is encountered, all changes made so far are undone by calling the *rollback*() method.

Transaction logging differs from caching updates in that changes are actually written to the disk. This means that others who are accessing the database can see your changes. In contrast, with cached updates your changes are written all at once later, when and if you decide to post the changes. For example, if you're reserving seats on an airplane, you want to post a reservation as soon as possible. If the customer changes their mind, you can undo the reservation with a rollback. With cached updates, the seat might be taken by someone else between the time the data entry for the reservation begins and the time it is actually posted.

All locks made during a transaction are maintained until the transaction is completed. This ensures that no one else can make any changes until the transaction is committed or abandoned.

For SQL-server databases, the Database object's *isolationLevel* property determines the isolation level of the transaction.

A Database object may have only one transaction active at one time; you cannot nest transactions.

beginTrans() example

The following demonstrates a simple batch transaction, transfering money from one account to another. The account table is indexed on the account number.

```
function transferButton_onClick
  try
    form.rowset.database.beginTrans()
    if form.transferAmt.value <= 0
      throw new AppException( "Transfer amount must be greater than zero" )
    endif
    do ; until form.rowset.lockSet()   // Wait for set lock to prevent
deadlock
    if form.rowset.find( form.transferFrom.value )
      form.rowset.fields[ "Balance" ].value -= form.transferAmt.value
    else
      throw new AppException( "Transfer From account not found" )
    endif
    if form.rowset.find( form.transferTo.value )
      form.rowset.fields[ "Balance" ].value += form.transferAmt.value
    else
      throw new AppException( "Transfer To account not found" )
    endif
    form.rowset.save()
    form.rowset.database.commit()
  catch ( AppException e )
    form.rowset.database.rollback()
    msgbox( e.message, "Tranfer failed!", 48 )
  catch ( Exception e )
    form.rowset.database.rollback()
    logException( e )
    #ifdef DEBUG
      throw e
    #else
      fatalError( e )
    #endif
  endtry
```

As the example demonstrates, there are quite a few things that can go wrong with the transaction. These are separated into application logic errors, and all other unexpected errors. A custom class, AppException, is used for the application errors. It provides an easy way to THROW an exception with an error message.

The debit to the first row is saved when calling *findKey*() to find the second row. The credit to the second row must be saved before committing the transaction. If an application logic exception occurs, whatever is done so far (if anything) is rolled back. Then a dialog box is displayed, detailing the error. The user can try again. For all other exceptions, a function is called to log the exception for debugging purposes. Then the exception is either THROWn so that the standard error dialog appears, if the application is compiled with the debug flag on; or another function is called that details the error for the user before telling them they have to terminate the application.

logException() and fatalError() are custom functions that are left as an exercise for the developer. Here is the code for the AppException class:

```
class AppException( cMsg, nCode ) of Exception
  if argcount() < 2
    nCode := -1
    if argcount() < 1
      cMsg := "Application logic exception"
    endif
```

```
  endif
  this.code    := nCode
  this.message := cMsg
endclass
```

bookmark()

Topic group Related topics

Returns the current position in a rowset.

Syntax

<oRef>.*bookmark*()

<oRef>

The rowset whose current position you want to return.

Property of

Rowset

Description

A bookmark represents a position in a rowset. *bookmark*() returns the current position in the rowset. The bookmark may be stored in a variable or property so that you can go back to that position later with the *goto*() method.

A bookmark is valid only as long as the rowset stays open.

bookmark() example

See the example for *applyFilter*() for an example of using *bookmark*() to store the current row in case specified filter condition finds no matches.

cacheUpdates

Topic group Related topics

Whether to cache updates locally instead of writing to disk as they occur.

Property of

Database

Description

Normally, when a row buffer is saved, it is written to disk. By setting the *cacheUpdates* property to *true*, those changes are cached locally instead of being written to disk. One reason to do this is to reduce network traffic. Changes are accumulated and then posted with the *applyUpdates*() method, after a certain amount of time or a certain number of changes have been made.

Another reason is to simulate a transaction when you have more than one change in an all-or-nothing situation. For example, if you need to fill a customer order and reduce the stock in inventory, you cannot let one happen and not the other. When the changes are posted with *applyUpdates*(), they are applied inside a transaction at the database level. Because you cannot nest transactions, you cannot have a transaction with *beginTrans*() and use cached updates at the same time. If any of the changes do not post, for example one of the records is locked, all of the changes that did post are undone and *applyUpdates*() returns *false* to indicate failure. The cached updates remain cached so that you can retry the posting. If all the changes are posted successfully, *applyUpdates*() returns *true*.

Finally, because of the all-or-nothing nature of cached updates, you can use them to allow the user to tentatively make changes that you can simply discard as a group. For example, you could allow a user to modify a lookup table. If the user submits the changes they are applied, but if the user chooses to cancel, any changes made can be discarded by calling the *abandonUpdates*() method. Note that with cached updates, the changes aren't actually written until posted. In contrast, transaction logging actually makes the changes as they happen, but allows you to undo them if desired.

canAbandon

Topic group Related topics Example

Event fired when attempt to abandon rowset occurs; return value determines if changes to row are abandoned.

Parameters

none

Property of

Rowset

Description

A rowset may be abandoned explicitly by calling its *abandon*() method, or implicitly via the user interface by pressing Esc or choosing Abandon Row from the default Table menu or toolbar while editing table rows. *canAbandon* may be used to verify that the user wants to abandon any changes that they have made. You may check the *modified* property first to see if there are any changes to abandon; if not, there is no need to ask.

The *canAbandon* event handler must return *true* or *false* to indicate whether the changes to the rowset, if any, are abandoned.

canAbandon example

The following method handles these conditions:

- Abandoning changes to an existing row
- Abandoning a new row
- Choosing to abandon an existing row when there are no changes
- Choosing to abandon a new row when there are no changes
- Abandoning other rowset modes

It uses manifest constants created with the #define preprocessor directive (and available in the VDBASE.H include file) to represent the options of the *state* property, which makes the code more readable, and macro-functions to display a simple alert dialog box to display a yes/no dialog box and return *true* or *false*.

```
#define STATE_CLOSED   0
#define STATE_BROWSE   1
#define STATE_EDIT     2
#define STATE_APPEND   3
#define STATE_FILTER   4
#define STATE_LOCATE   5
#define alert(m)    (msgbox(m,"Alert",64))
#define confirm(m)  (msgbox(m,"Confirm",4+32)==6)
function Rowset_canAbandon
  if this.state == STATE_EDIT
    if this.modified
      return confirm( "Abandon changes?" )
    else
      alert( "No changes made; nothing to abandon" )
      return false   // Do not fire onAbandon
    endif
  elseif this.state == STATE_APPEND
    if this.modified
      return confirm( "Abandon new entry?" )
    else
      return true    // Discard new blank row
    endif
  else
    return true      // OK to abandon Filter and Locate modes
  endif
```

canAppend

Topic group Related topics

Event fired when attempting to put rowset in Append mode; return value determines if the mode switch occurs.

Parameters

none

Property of

Rowset

Description

A rowset may be put in Append mode explicitly by calling its *beginAppend*() method, or implicitly via the user interface by choosing Append Row from the default Table menu or toolbar while editing table rows. *canAppend* may be used to verify that the user wants to add a new row. You can check the *modified* property first to see if the user has made any changes to the current row; if not, you may not want to ask.

The *canAppend* event handler must return *true* or *false* to indicate whether *beginAppend*() proceeds. For information on how *canAppend* interacts with other events and implicit saves, see *beginAppend*().

canChange

Topic group Related topics Example

Event fired when a change to the *value* property of a Field object is attempted; return value determines if the change occurs.

Parameters

<new value>

The proposed new value.

Property of

Field

Description

Use *canChange* to determine whether changes to individual fields occur. *canChange* fires when something is assigned to the *value* property of a Field object, either directly or through a *dataLink*ed control. The proposed new value is passed as a parameter to the *canChange* event handler. If the *canChange* event handler returns *false*, the Field object's *value* remains unchanged.

While *canChange* provides field-level validation to see whether changes are saved into the row buffer, use *canSave* to provide row-level validation to determine whether the buffer can be saved to disk. You should always do row-level validation no matter whether you do field-level validation or not.

The *canChange* event operates separately from database engine-level validation. Even if *canChange* returns *true*, attempting to write an invalid value to a field, for example exceeding a field's maximum allowed value, will fail and the field's *value* property will remain unchanged.

You can also use *canChange* to reverse the field morphing performed by *beforeGetValue*. Inside the *canChange* event handler, examine the <new value> parameter and assign the value you want to store in the table directly to the *value* property of the Field object. Doing so does not fire *canChange* recursively. Then have the *canChange* event handler return *false* so that the <new value> does not get saved into the row buffer.

canChange example

In this example, a table of messages stores a message section number, but in the form, the section name is displayed in a ComboBox component. When a section is chosen by name, the section number is stored in the table instead with the following *canChange* event handler. The table of section numbers is opened in the query sections1.

```
function messages1_section_canChange( newValue )
  local r
  r = this.parent.parent.parent.parent.sections1.rowset;  // Lookup table
  if r.applyLocate( ["Name" = '] + newValue +['] )        // If name found
    this.value = r.fields[ "Section #" ].value            // save section #
  endif
  return false    // Always return false so that newValue is not saved
```

In the event handler, *this* refers to the field. *this*.*parent*.*parent* refers to the rowset that contains the field (the first *parent* is the *fields* array). The form that contains the query that contains the rowset is *this*.*parent*.*parent*.*parent*.*parent*, from which you can reference the other queries on the form.

An SQL expression to perform the section name lookup is passed to *applyLocate*(). If a match is found, the value of the corresponding section number field is stord in the *value* property of the field. Then the event handler returns *false*. If no match is found, the field is not changed.

canClose

Topic group Related topics

Event fired when there's an attempt to deactivate a query or stored procedure; return value determines if the object is deactivated.

Parameters

none

Property of

Query, StoredProc

Description

If the *active* property of a Query or StoredProc object is set to *false*, that object's *canClose* event fires. If the *canClose* event handler returns *false*, the close attempt fails and the *active* property remains *true*.

A StoredProc object may be deactivated only if it returns a rowset. If it returns values only, the *active* property is automatically reset to *false* after the stored procedure is called; there is nothing to deactivate.

Normally when a Query or StoredProc object closes, it saves any changes in its rowset's row buffer, if any. In attempting to save those changes, the rowset's *canSave* event is also fired, before *canClose*. If *canSave* returns *false*, the row is not saved, and the object is not closed.

If you want to abandon uncommitted changes instead of saving them when closing the object, call the rowset's *abandon*() method before closing.

canDelete

Topic group Related topics

Event fired when attempting to delete the current row; return value determines if the row is deleted.

Parameters

none

Property of

Rowset

Description

A row may be deleted explicitly by calling the *delete*() method, or implicitly via the user interface by choosing Delete Rows from the default Table menu or toolbar. *canDelete* may be used to make sure that the user wants to delete the current row.

canDelete may also be used to do something with the current row, just before you delete it. In this case, the *canDelete* event handler would always return *true*.

The *canDelete* event handler must return *true* or *false* to indicate whether the row is deleted. For information on how *canDelete* interacts with other events, see *delete*()

canDelete example

The following event handler copies the row that is about to be deleted to a separate archive table that is opened in another query in the form.

```
function Rowset_canDelete
  local n, rArchive
  rArchive = this.parent.parent.archive1.rowset
  rArchive.beginAppend()
  for n = 1 to this.fields.size
    rArchive.fields[ n ].value = this.fields[ n ].value
  endfor
  rArchive.save()
  return true
```

This *canDelete* event handler always returns *true* after making the copy so that the row is deleted.

canEdit

Topic group Related topics

Event fired when attempting to put rowset in Edit mode; return value determines if the mode switch occurs.

Parameters

none

Property of

Rowset

Description

The *beginEdit*() method is called (implicitly or explicity) to put the rowset in Edit mode. *canEdit* may be used to verify that the user is allowed to or wants to edit the row.

The *canEdit* event handler must return *true* or *false* to indicate whether the switch to Edit mode proceeds.

canGetRow

Topic group Related topics Example

Event fired when attempting to read a row into the row buffer; return value determines if the row stays in or is filtered out.

Parameters

none

Property of

Rowset

Description

In addition to setting an SQL filter expression in the *filter* property, you can filter out rows through dBASE code with *canGetRow*. In a *canGetRow* handler, the rowset acts as if the row is read into the row buffer. You can test the *value* properties of the field objects, or anything else.

If *canGetRow* returns *true*, that row is kept. If it returns *false*, the row is discarded and the next row is tried.

canGetRow example

Suppose a message database supports private messages that can be seen only by the sender and the recipient. You can prevent others from seeing private messages with a *canGetRow* event handler. The name of the user is stored as a property of the form. That name must match either the From or To fields in the message.

```
function messages1_canGetRow()
  return this.fields[ "From" ].value == this.parent.parent.userName or
         this.fields[ "To"   ].value == this.parent.parent.userName
```

canNavigate

Topic group Related topics

Event fired when attempting navigation in a rowset; return value determines if row cursor is moved.

Parameters

none

Property of

Rowset

Description

Navigation in a rowset may occur explicitly by calling a navigation method like *next*() or *goto*(), or implicitly via the user interface by choosing a navigation option from the default Table menu or toolbar while viewing a rowset. *canNavigate* may be used to verify that the user wants to leave the current row to go to another. You may check the *modified* property first to see if the user has made any changes to the current row; if not, you may not want to ask.

canNavigate may also be used to do something with the current row, just before you leave it. In this case, the *canNavigate* event handler would always return *true*.

The *canNavigate* event handler must return *true* or *false* to indicate whether the navigation occurs. For information on how *canNavigate* interacts with other events and implicit saves, see *next*().

canOpen

Topic group Related topics

Event fired when attempting to open a query or stored procedure; return value determines if object is opened.

Parameters

none

Property of

Query, StoredProc

Description

canOpen fires when a Query or StoredProc object's *active* property is set to *true*.

If an event handler is assigned to the *canOpen* property, the event handler must return *true* or *false* to indicate whether the object is opened and activated.

canOpen may also be used to do something with the query, just before you open it. In this case, the *canOpen* event handler would always return *true*.

canSave

Topic group Related topics Example

Event fired when attempting to save the row buffer; return value determines if the buffer is written.

Parameters

none

Property of

Rowset

Description

The row buffer may be saved explicitly by calling *save*() or implicitly, usually by navigating in the rowset. Use *canSave* to verify that the data is good before attempting to write it to the disk.

The *canSave* event handler must return *true* or *false* to indicate whether the row is saved. If the user has changed the current row and attempts to append a new row or navigate, *canAppend* or *canNavigate* fires first. If that event returns *true*, then the *canSave* event fires. If *canSave* returns *false*, the row is not saved, and the attempted action does not occur. If *canSave* returns *true*, then the row is saved and the action occurs. This allows you to put row validation code in the *canSave* event handler that you do not need to duplicate in either *canAppend* or *canNavigate*.

The *canSave* event operates separately from database engine-level validation. Even if *canSave* returns *true*, attempting to write an invalid row, for example one that fails to pass a table contraint, will fail and cause an exception.

canSave example

The following event handler verifies that required fields are filled in, and displays a dialog box detailing any missing data.

```
function Rowset_canSave()
  local cErrors
  cErrors = ""     // String for errors
  if empty( this.fields[ "Last name" ].value )
    cErrors += "- LAST NAME cannot be blank" + chr(13)
  endif
  if empty( this.fields[ "ZIP" ].value )
    cErrors += "- ZIP CODE cannot be blank" + chr(13)
  endif
  if "" # cErrors
    msgbox( "Can't save current entry because:" + chr(13) + cErrors, "Bad
entry", 48 )
    return false
  else
    return true
  endif
```

changedTableName

Topic group Related topics

Name of the table for which you want to collect copies of original values of rows that were changed.

Property of

UpdateSet

Description

When doing an *update*() or *appendUpdate*(), rows will be changed. The original contents of the rows that are changed are copied to the table specified by the *changedTableName* property. If the table does not exist, it is created. If it does exist, it is erased first so that it contains only those rows that were changed on the last update.

By making copies of the original values of the rows that are changed, you can undo the changes by doing another *update*(), using the *changedTableName* table as the *source* table.

clearFilter()

Topic group Related topics

Clears any active filter on a rowset.

Syntax

<oRef>.*clearFilter*()

<oRef>

The rowset whose filter to clear.

Property of

Rowset

Description

clearFilter() clears the *filter* property and any filter set through the rowset's Filter mode, thereby deactivating any filters. Rows that were hidden by the filter become visible. The row cursor is not moved.

close()

Topic group Related topics

Closes a database connection.

Syntax

This method is called implicitly by the Database object.

Property of

Database

Description

The *close*() method closes the database connection. It is called implicitly when you set the Database object's *active* property to *false*. In typical usage, you do not call this method directly.

Advanced applications may override the definition of this method to perform supplementary actions when closing the database connection. Custom data drivers must define this method to perform the appropriate actions to close their database connection.

commit()

Topic group | Related topics | Example

Clears the transaction log, committing all logged changes

Syntax

<oRef>.*commit*()

<oRef>

The database whose changes you want to commit.

Property of

Database

Description

A transaction works by logging all changes. If an error occurs while attempting one of the changes, or the changes need to be undone for some other reason, the transaction is canceled by calling the *rollback*() method. Otherwise, *commit*() is called to clear the transaction log, thereby indicating that all the changes in the transaction were committed and that the transaction as a whole was posted.

constrained

Topic group Related topics Example

Specifies whether updates to a rowset will be constrained by the WHERE clause of the query's SQL SELECT command. Applies to Standard tables only.

Property of

Query

Description

When *constrained* is set to *true*, any time a row is saved, if the query's SQL SELECT statement—which was stored in the *sql* property and used to generate the rowset—contains a WHERE clause, the newly saved row is evaluated against the WHERE clause. If the row no longer matches the condition set by the WHERE clause, the row is considered to be out-of-set, and the row cursor moves to the next row in the set, or to the end-of-set if already at the last row.

This property applies only to Standard tables and defaults to *false*, which means that the SQL SELECT statement is used only to generate the rowset, not to actively constrain it. By setting the *constrained* property to *true*, Standard tables behave more like SQL-server based tables, which always constrain rows according to the WHERE clause.

copy()

Topic group Related topics

Copies one rowset or table to another rowset or table.

Syntax

<oRef>.*copy*()

<oRef>

The UpdateSet object that describes the copy.

Property of

UpdateSet

Description

The Database's *copyTable*() method is used to copy all of the rows from a single table in a database to another new table in the same database. The *copy*() method can be used for any other type of row copy: from one rowset to another in the same database, from one rowset to another in a different database, from one rowset to a table, or from one table to a rowset.

The *source* and *destination* properties specify what to copy and where to copy it. Because you can use a rowset as a *source*, you can copy only part of a table, by selecting only those rows you want to copy for the rowset. When using a table name as a *destination*, that table is created, or overwritten if it already exists. To convert from one table type to another, create a rowset of the desired result type and assign it to the *destination* property.

copyTable()

Topic group Related topics

Makes a copy of one table to create another table in the same database.

Syntax

<oRef>.*copyTable*(<source table expC>, <destination table expC>)

<oRef>

The database in which you want to copy the table.

<source table expC>

The name of the table you want to duplicate.

<destination table expC>

The name of the table you want to create.

Property of

Database

Description

copyTable() copies all of the rows from a single table in a database to another new table in the same database. The resulting destination table will be the same table type as the source table. Use the UpdateSet's *copy*() method for any other type of row copy.

The table to copy should not be open.

To make a copy of a Standard table, you can always use the default database in the default session by referring to it through the *databases* array property of the _app object. For example,

```
_app.databases[ 1 ].copyTable( "Stuff", "CopyOfStuff" )
```

copyToFile()

Topic group Related topics Example

Copies the contents of a BLOB field to a new file.

Syntax

<oRef>.*copyToFile*(<file name expC>)

<oRef>

The BLOB field to copy.

<file name expC>

The name of the file you want to create.

Property of

Field

Description

copyToFile() copies the specified BLOB field (including memo fields) to the named file.

copyToFile() example

The following event handler copies the contents of a memo field named Notes in the current row to a text file.

```
function exportMemoButton_onClick
  local cFile
  cFile = putfile( "Export memo", "*.txt" )
  if "" # cFile
    form.rowset.fields[ "Notes" ].copyToFile( cFile )
  endif
```

count()

Topic group Related topics

Returns the number of rows in a rowset, respecting any filter conditions and events.

Syntax

<oRef>.*count*()

<oRef>

The rowset you want to measure.

Property of

Rowset

Description

count() returns the number of rows in the current rowset. For a rowset generated by a simple query like the following, which selects all the fields from a single table with no conditions, *count*() returns the number of rows in the table:

```
select * from CUSTOMER
```

You can use *count*() while a filter is active—with the *filter* property or the *canGetRow* event—to count the number of rows that match the filter condition. This may be time-consuming with large rowsets.

database

Topic group Related topics

The Database object to which the query or stored procedure is assigned.

Property of

Query, StoredProc

Description

A query or stored procedure must be assigned to the database that provides access to the tables it wants before it is activated. When created, a Query or StoredProc object is assigned to the default database in the default session.

To assign the object to the default database in another session, assign that session to the *session* property. Assigning the *session* property always sets the *database* property to the default database in that session.

To assign the object to another database in another session, assign the object to that session first. This makes the databases in that session available to the object.

databaseName

Topic group Related topics

The BDE alias that the object represents.

Property of

Database

Description

To use a BDE alias, create a Database object and assign the alias to the object's *databaseName* property. Then set the *active* property to *true* to activate the database. While the database is active, you cannot change the *databaseName* property.

The *databaseName* property for a session's default database is always blank.

dataModClass

Topic group Related topics

The class name of the desired data module.

Property of

DataModRef

Description

After setting the *filename* property to the file that contains the data module class definition, set the *dataModClass* property to the name of the desired class.

Note: When declaring a class name, the name may exceed 32 characters, but the rest are ignored. When attempting to use a class, the name should not exceed 32 characters; otherwise the named class may not be found.

decimalLength

Topic group Related topics

The number of decimal places in a DBF (dBASE) numeric or float field.

Property of

DbfField

Description

The DBF (dBASE) table format supports two kinds of fields that store numbers: numeric and float. Both field types have a fixed number of decimal places. The *decimalLength* property represents the number of decimal places for any Field objects that represent a numeric or float field. For other field types, *decimalLength* is zero.

default

Topic group Related topics

The default value for a field.

Property of

DbfField, PdxField

Description

default indicates the default value of the field represented by the field object. When a rowset switches to Append mode to add a new row, the field objects take on their default values.

For date fields, the special value TODAY indicates today's date. For timestamp fields, the special value NOW indicates the current date and time.

delete() [Rowset]

Topic group Related topics

Deletes the current row.

Syntax

<oRef>.*delete*()

<oRef>

The rowset whose current row you want to delete.

Property of

Rowset

Description

delete() deletes the current row in the rowset. When *delete*() is called, the *canDelete* event is fired. If there is no *canDelete* event handler or the event handler returns *true*, the current row is deleted, the *onDelete* event fires, and the row cursor moves to the next row, or to the end-of-set if the last row was the one that was deleted. This movement is not considered navigation, so the rowset's *onNavigate* does not fire. If you have a *onNavigate* event handler, call it from the *onDelete* event.

While the DBF (dBASE) table format supports soft deletes, in which the rows are only marked as deleted and not actually removed until the table is packed, there is no method in the data access classes to recall those records. Therefore a *delete*() should always be considered final.

delete() [UpdateSet]

Topic group Related topics

Deletes the rows in the destination that are listed in the source.

Syntax

<oRef>.*delete*()

<oRef>

The UpdateSet object that describes the delete.

Property of

UpdateSet

Description

delete() deletes the rows listed in the *source* rowset or table from the *destination* rowset or table. The *destination* must be indexed.

destination

Topic group Related topics

The target rowset or table of an UpdateSet operation.

Property of

UpdateSet

Description

The *destination* property contains an object reference to a rowset or the name of a table that is the target of an UpdateSet operation. For an *append*(), *update*(), or *appendUpdate*(), it refers to the rowset or table that is changed. For a *copy*(), it refers to the rowset or table that receives the copies. If a table name is specified, that table is created, or overwritten if it already exists. For a *delete*(), the *destination* property refers to the table from which rows are deleted.

The *source* property specifies the other end of the UpdateSet operation.

driverName

Topic group Related topics

The database driver used for the database connection.

Property of

Database

Description

The *driverName* property reflects the database driver used for the connection. It's determined by the database driver for the database's BDE alias and set automatically once the database is successfully made active.

For default databases, the *driverName* matches the System setting in the BDE Administrator.

dropTable()

Topic group Related topics

Deletes (drops) a table from a database.

Syntax

<oRef>.*dropTable*(<table name expC>)

<oRef>

The database in which the table exists.

<table name expC>

The name of the table you want to delete.

Property of

Database

Description

dropTable() deletes a table and any existing secondary files, like memo files and indexes. *dropTable*() does not ask for confirmation; the deletion is immediate. The table cannot be open anywhere at the time of the *dropTable*(); if it is, *dropTable*() fails.

To delete a Standard table, you can always use the default database in the default session by referring to it through the *databases* array property of the _app object. For example,

```
_app.databases[ 1 ].dropTable( "Temp" )
```

emptyTable()

Topic group Related topics

Deletes all the rows in a table.

Syntax

<oRef>.*emptyTable*(<table name expC>)

<oRef>

The database in which the table exists.

<table name expC>

The name of the table you want to empty.

Property of

Database

Description

emptyTable() deletes all of the rows in a table, leaving an empty table structure, as if the table was just created. *emptyTable*() does not ask for confirmation; the deletion is immediate. The table cannot be open anywhere at the time of the *emptyTable*(); if it is, *emptyTable*() fails.

To empty a Standard table, you can always use the default database in the default session by referring to it through the *databases* array property of the _app object. For example,

```
_app.databases[ 1 ].emptyTable( "YtdSales" )
```

endOfSet

Topic group Related topics

Specifies whether the row cursor is at the end-of-set.

Property of

Rowset

Description

The row cursor is always positioned at either a valid row or the end-of-set. There are two end-of-set positions: one before the first row and one after the last row. *endOfSet* is *true* if the row cursor is positioned at either end-of-set position.

When you first make a query active successfully, *endOfSet* is *true* if there are no rows that match the specified criteria in the query's SQL SELECT statement, or simply no rows in the tables selected.

When you apply a filter by calling *applyFilter*() or setting the *filter* property, *endOfSet* becomes *true* if there are no rows that match the filter criteria. Otherwise, the row cursor is positioned at the first matching row.

If you navigate backward before the first row in the set or after the last row in the set, this moves the row cursor to the end-of-set, so *endOfSet* becomes *true*. You can call the *first*() or *last*() methods to attempt to move the row cursor to the first or last row in the set. If after calling one of those methods, *endOfSet* is still *true*, then there are no visible rows in the current set.

Attempting to read or change a field value while at end-of-set causes an error.

execute()

Topic group Related topics

Executes a query or stored procedure.

Syntax

This method is called implicitly by the Query or StoredProc object.

Property of

Query, StoredProc

Description

The *execute*() method executes a query or stored procedure. It is called implicitly after *prepare*() when you set the object's *active* property to *true*. In typical usage, you do not call this method directly.

Advanced applications may override the definition of this method to perform supplementary actions when executing the query or stored procedure. Custom data drivers must define this method to perform the appropriate actions to retrieve a rowset or call a stored procedure.

executeSQL()

Topic group

Executes the specified SQL statement.

Syntax

<oRef>.*executeSQL*(<SQL expC>)

<oRef>

The database in which you want to execute the SQL statement.

<SQL expC>

The SQL statement.

Property of

Database

Description

Use *executeSQL*() to perform an SQL operation that does not have a data access object equivalent, for example, to use data definition language (DDL) SQL where no rowset is desired, and for server-specific SQL.

fieldName

Topic group Related topics

The name of the field represented by the Field object.

Property of

Field (including DbfField, PdxField, SqlField)

Description

The *fieldName* property contains the name of the field that the Field object represents. The *fieldName* property is automatically filled in when the rowset object is generated.

For a calculated field, the *fieldName* contains the name of the fieldassigned when the Field object is created.

fields

Topic group Related topics

An array that contains the Field objects in a rowset.

Property of

Rowset

Description

A rowset's *fields* property contains an object reference to the array of field objects in the rowset. These fields can be accessed by their field name or their ordinal position; for example, if *this* refers to a rowset:

```
this.fields[ "State" ].value = "CA"    // Assign "CA" to State field
this.fields[ 1 ].value = 12            // Assign 12 to first field
```

To access the value of the field, you must reference the field's *value* property. You can use the *add*() method to add new Field objects to the *fields* array as calculated fields.

filename

Topic group Related topics

The name of the file that contains the desired data module.

Property of

DataModRef

Description

After setting the *filename* property to the file that contains the data module class definition, set the *dataModClass* property to the name of the desired class. Data modules are stored in files with a .DMD extension.

filter

Topic group Related topics

An SQL expression that filters out rows that do not match specified criteria.

Property of

Rowset

Description

A filter is a mechanism by which you can temporarily hide, or filter out, those rows that do not match certain criteria so that you can see only those rows that do match. The criteria is in the form of a character string that contains an SQL expression, like the one used in the WHERE clause of an SQL SELECT. For example,

```
"Firstname = 'Waldo'"
```

In this case, you would see only those rows in the current rowset whose Firstname field was “Waldo”. You can use the rowset’s Filter mode, initiated by calling the *beginFilter*() method, to build the expression automatically, and then apply it with the *applyFilter*() method. The alternative is to assign the character string directly to the *filter* property.

If the filter expression contains a quoted string that contains an apostrophe, precede the apostrophe with a backslash. Note that the single quote used in SQL expressions for strings and the apostrophe are represented by the same single quote character on the keyboard. For example, if *this* is the rowset and you want to display rows with the Lastname “O’Dell”:

```
this.filter := "Lastname = 'O\'Dell'"
```

Setting the *filter* property causes the row cursor to move to the first matching row. If no rows match the filter expression, the row cursor is moved to the end-of-set; the *endOfSet* property is set to *true*.

While a filter is active, the row cursor will always be at either a matching row or the end-of-set. Any time you attempt to navigate to a row, the row is evaluated to see if it matches the filter condition. If it does, then the row cursor is allowed to position itself at that row and the row can be seen. If the row does not match the filter condition, the row cursor continues in the direction it was moving to find the next matching row. It will continue to move in that direction until it finds a match or gets to the end-of-set. For example, suppose that *this* is the rowset, and you execute the following to your program. If no filter is active, you would move four rows forward, toward the last row:

```
this.next( 4 )
```

If a filter is active, the row cursor will move forward until it has encountered four rows that match the filter condition, and stop at the fourth. That may be the next four rows in the rowset, if they all happen to match, or the next five, or the next 400, or never, if there aren’t four rows after the current row that match. In that last case, the row cursor will be at the end-of-set.

In other words, when there is no filter active, every row is considered a match. By setting a filter, you filter out all the rows that don’t match certain criteria.

To clear a filter, you can assign an empty string to the *filter* property, or call the *clearFilter*() method.

In addition to using an SQL expression, you can filter out rows with more complex code by using the *canGetRow* event.

filterOptions

Topic group Related topics

Determines how values are matched for filtering.

Property of

Rowset

Description

The *filterOptions* property is an enumerated property that controls how the *value* properties in the field objects entered during Filter mode are matched against the values in the table. These are the options:

Value	Effect
0	Match length and case
1	Match partial length
2	Ignore case
3	Match partial length and ignore case

When matching partial length, the entire search value must match all or part of the value in the table, starting at the beginning of the field. For example, searching for “Central Park”, will match “Central Park West”, but “West” alone would not.

filterOptions also determines how fields are matched when specifying an SQL expression in the *filter* property.

The *filterOptions* property takes effect when you assign the SQL expression to the *filter* property or call *applyFilter*(). Changing *filterOptions* after activating the filter has no effect (until you change the filter).

findKey()

Topic group Related topics

Finds the row with the exact matching key value.

Syntax

<oRef>.*findKey*(<exp>)

<oRef>

The rowset in which to do the search.

<exp>

The value to search for.

Property of

Rowset

Description

findKey() performs an indexed search in the rowset, using the index specified by the rowset's *indexName* property. It looks for the first row in the index whose index key value matches <exp>, returning *true* or *false* to indicate whether a match is found.

findKey() is a navigation method; calling it fires the *canNavigate* event. If it returns *false*, no search is attempted. If the search fails, the row cursor goes to the current row. *onNavigate* always fires after a search attempt. For more information on how navigation methods interact with navigation events and implicit saves, see *next*().

findKey() always performs a partial key match with strings. For example, *findKey*("S") will find "Sanders", or whatever is the first key value that starts with the letter "S". To perform a full key match, pad <exp> with extra spaces, enough spaces to match the length of the index key value.

findKeyNearest()

Topic group Related topics

Finds the row with the nearest matching key value.

Syntax

<oRef>.*findKeyNearest*(<exp>)

<oRef>

The rowset in which to do the search.

<exp>

The value to search for.

Property of

Rowset

Description

findKey() performs an indexed search in the rowset, using the index specified by the rowset's *indexName* property. It looks for the first row in the index whose index key value matches <exp>, returning *true* or *false* to indicate if an exact match is found. If an exact match is not found, the row cursor is left at the nearest match; the row where the match would have been. For example, if "Smith" is followed by "Smythe" in the index, and the search expression is "Smothers", the search will fail and the row cursor will be left at "Smythe". "Smothers" comes after "Smith" and before "Smythe", so if it was in the index, it would be where "Smythe" is.

You can think of this exact or nearest matching as "equal or the one after," as long as you remember that "after" depends on the index order. If the index is descending instead of ascending, then in the previous example, "Smythe" would be followed by "Smith", and a search for "Smothers" would end up on "Smith". The row cursor will end up on the end-of-set if the search value comes after the last value in the index.

findKeyNearest() is a navigation method; calling it fires the *canNavigate* event. If it returns *false*, no search is attempted. *onNavigate* always fires after a search attempt. For more information on how navigation methods interact with navigation events and implicit saves, see *next*().

findKeyNearest() always performs a partial key match with strings. For example, *findKeyNearest*("Smi") will find "Smith". To perform a full key match, pad <exp> with extra spaces, enough spaces to match the length of the index key value.

first()

Topic group Related topics

Moves the row cursor to the first row in the rowset.

Syntax

<oRef>.*first*()

<oRef>

The rowset in which you want to move the row cursor.

Property of

Rowset

Description

Call *first*() to move the row cursor to the first row in the rowset. If a filter is active, it moves the row cursor to the first row in the rowset that matches the filter criteria.

As a navigation method, *first*() interacts with *canNavigate*, *onNavigate*, and implicit saves. For more information, see *next*().

If the *endOfSet* property is *true* after a call to *first*(), then there are no rows that match the filter criteria if there is a filter set. If there is no filter, then that means there are no rows at all in that rowset.

flush()

Topic group | Related topics | Example

Commits data buffers to disk.

Syntax

<oRef>.*flush*()

<oRef>

The rowset you want to write to disk.

Property of

Rowset

Description

When a row is saved, the changes are written to the rowset data buffer in memory. This buffer is written to disk only as needed; for example, before another block of rows are read into the buffer. This eliminates redundant disk writes that would slow your application.

flush() explicitly writes the rowset's data buffers to disk. Note that if a disk cache is active, the buffer is written to the disk cache; the cache decides when to actually write the data onto the physical disk.

refresh() is similar to *flush*() because in purging cached rows, *refresh*() writes any rows that have been changed but not yet committed to disk. *flush*() writes the rows, but does not purge the data buffer; the rows are still cached.

flush() example

The following *onSave* event handler calls the rowset's *flush*() method to make sure that the data is written to disk as each record is saved:

```
function Rowset_onSave
  this.flush()
```

getSchema()

Topic group | Related topics | Example

Returns information about a database.

Syntax

<oRef>.*getSchema*(<item expC>)

<oRef>

The database you want to get information about.

<item expC>

The information to retrieve, which may be one of the following strings (which are not case-sensitive):

String	Information
DATABASES	A list of all databases aliases
PROCEDURES	A list of stored procedures defined in the database
TABLES	A list of all tables in the database
VIEWS	A list of all views in the database

Property of

Database

Description

Use *getSchema*() to get a list of all database aliases, or to get information about a specific database. Some databases may not support PROCEDURES or VIEWS. All lists are returned in an Array object; if the item is not supported, the array is empty.

Custom data drivers must define this method to return the appropriate information for their database.

getSchema() example

The following class subclasses the Database class to provide support for RapidFile tables. The code shown here implements the *getSchema*() method:

```
class RapidFileDatabase of Database
  this.path = ""
  function getSchema( cArg )
    local cItem
    cItem = upper( cArg )
    do case
      case cItem == "DATABASES"
        return super::getSchema( "DATABASES" )
      case cItem == "TABLES"
        local aRet, nFiles
        aRet = new Array()
        nFiles = aRet.dir( this.path + "*.RPD" )  // Get all RapidFile files
        if nFiles > 0
          aRet.resize( nFiles, 1, 1 )             // Filenames only in 2-D
array
          aRet.resize( nFiles, 0 )                // Convert to 1-D array
        endif
        return aRet
    case cItem == "PROCEDURES" or cItem == "VIEWS"
      return new Array()
    otherwise
      return super::getSchema( cItem )
  endcase
endclass
```

goto()

Topic group | Related topics | Example

Moves the row cursor to a specific row in the rowset.

Syntax

<oRef>.*goto*(<bookmark>)

<oRef>

The rowset in which you want to move the row cursor.

<bookmark>

The bookmark you want to move to.

Property of

Rowset

Description

Call *goto*() to move the row cursor to a specific row in the rowset. Store the current row position in a bookmark with the *bookmark*() method. Then you can return to that row later by calling *goto*() with that bookmark as long as the rowset has remained open. If the rowset has been closed, the bookmark is not guaranteed to return you to the correct row, since the table may have changed.

If you attempt to *goto*() a row that is out-of-set, you will generate an error.

As a navigation method, *goto*() interacts with *canNavigate*, *onNavigate*, and implicit saves. For more information, see *next*().

handle

Topic group

The BDE handle of the object.

Property of

Database, Query, Rowset, Session, StoredProc

Description

The *handle* property represents the BDE handle for the object in question. The handle can be used if you want to call BDE functions directly.

indexName [Rowset]

Topic group Related topics Example

The name of the index to use in the rowset.

Property of

Rowset

Description

indexName contains the name of the active controlling index tag for those table types that support index tags. It is set automatically when the query is activated to represent the tag used in the SQL SELECT's ORDER BY clause, if the ORDER BY is satisfied by an index. Assigning a new value to *indexName* supersedes any ORDER BY designated in the SQL SELECT statement.

For tables with primary keys, a blank *indexName* indicates that the primary key is the controlling index.

The index tag is also used in a master-detail link. The index tag of the detail rowset must match the field or fields specified in the *masterFields* property.

When specifying an *indexName* for data in a report, be sure to set the report's *autoSort* property to *false* to prevent the report from modifying the SQL statement. The modified SQL statement may generate a temporary result set that has no indexes; attempting to designate an *indexName* would cause an error.

indexName [Rowset] example

In the following example, a form has a number of radio buttons with text labels like Name and Address that by design match the name of indexes in the primary rowset of the form. The following *onChange* event handler, used by all the radio buttons, sets the index of the primary rowset to the selected radio button.

```
function indexRadio_onChange
  if this.value
    form.rowset.indexName := this.text
  endif
```

indexName [UpdateSet]

Topic group Related topics

The name of the index to use for indexed UpdateSet operations.

Property of

UpdateSet

Description

The *destination* rowset or table must be indexed for the *update*(), *appendUpdate*(), and *delete*() operations. The *indexName* property specifies the key or tag name that is to be used. For tables with primary keys, the primary key is used by default. Set the *indexName* property only if you want to use another key. For DBF (dBASE) tables, you must specify an index tag name.

isolationLevel

Topic group Related topics

Determines the isolation level of a transaction.

Property of

Database

Description

The *isolationLevel* property is an enumerated property that determines the isolation level of a transaction. It applies to SQL-server database transactions only. For Standard table transactions, it has no effect. These are the options:

Value	Effect
0	Read uncommitted
1	Read committed
2	Repeatable read

The default is Read committed.

keyViolationTableName

Topic group Related topics

Name of the table in which you want to collect rows that could not be added because they would have caused a key violation.

Property of

UpdateSet

Description

In tables with primary keys, only one row in the table may have a particular primary key value. If the row to be added during an *append*() contains a key value that is the same as an already-existing primary key, that row cannot be added to the table, since it would have caused a primary key violation. Instead of being added to the *destination* rowset or table, that row is copied to the table specified by the *keyViolationTableName* property.

last()

Topic group Related topics

Moves the row cursor to the last row in the rowset.

Syntax

<oRef>.*last*()

<oRef>

The rowset in which you want to move the row cursor.

Property of

Rowset

Description

Call *last*() to move the row cursor to the last row in the rowset. If a filter is active, it moves the row cursor to the last row in the rowset that matches the filter criteria.

As a navigation method, *last*() interacts with *canNavigate*, *onNavigate*, and implicit saves. For more information, see *next*().

If the *endOfSet* property is *true* after a call to *last*(), then there are no rows that match the filter criteria if there is a filter set. If there is no filter, then that means there are no rows at all in that rowset.

Going to the last row in a rowset may not be an optimized operation on some SQL servers. For those servers, calling *last*() may take a long time for large rowsets.

length

Topic group Related topics

The maximum length of the field.

Property of

Field

Description

A field's length represents the number of bytes used in the table for that field, and for character and numeric fields, the maximum length of the item that it can store.

For character fields, the *length* property represents the maximum number of characters in the string. Attempting to store more characters in that field results in the string being truncated.

For numeric fields, the *length* property represents the maximum number of characters in the number, including the digits, and any sign or decimal point. Attempting to store a number with more digits than the maximum results in numeric overflow, in which the actual value of the number is lost, and is simply considered to be bigger than the maximum allowed; it is usually represented by a string of asterisks.

live

Topic group Related topics

Specifies whether the rowset can be modified.

Property of

Rowset

Description

Before making a query active, you can determine whether the rowset that is generated is editable or not. You can choose to make it not editable to prevent accidental modification of the data.

The *live* property is read-only.

locateNext()

Topic group Related topics

Applies the locate criteria again to search for another row.

Syntax

<oRef>.*locateNext*([<rows expN>])

<oRef>

The rowset in which to move the row cursor.

<rows expN>

The Nth row to find. By default, the next row forward.

Property of

Rowset

Description

When the *applyLocate*() method is called, it moves the row cursor to the first row that matches the locate criteria. From then on, you can move forward and backward to other rows that match the same criteria by calling *locateNext*().

locateNext() takes an optional numeric parameter that specifies in which direction, forward or backward, to look and at which match to stop, relative to the current row position. A negative number indicates a search backward, toward the first row; a positive number indicates a search forward, toward the last row. For example, a parameter of -3 means to look backward from the current row to find the third matching row.

If the row cursor encounters the end-of-set before the desired match is found, the search stops, leaving the row cursor at the end-of-set.

As a navigation method, *locateNext*() interacts with *canNavigate*, *onNavigate*, and implicit saves. For more information, see *next*().

locateNext() returns *true* to indicate that the desired match was found and *false* to indicate that it wasn't.

locateOptions

Topic group Related topics

Determines how values are matched for locating.

Property of

Rowset

Description

The *locateOptions* property is an enumerated property that controls how the *value* properties in the field objects entered during Locate mode are matched against the values in the table. These are the options:

Value	Effect
0	Match length and case
1	Match partial length
2	Ignore case
3	Match partial length and ignore case

When matching partial length, the entire search value must match all or part of the value in the table, starting at the beginning of the field. For example, searching for “Century City”, will match “Century City East”, but “East” alone would not.

locateOptions also determines how fields are matched when using an SQL expression with the *applyLocate*() method.

lock

Topic group Related topics Example

The date and time of the last successful lock made to the row.

Property of

LockField

Description

Use *lock* after a failed lock attempt to determine the date and time of the current lock that is blocking your lock attempt. The date and time are represented in a string in the following format:

```
MM/DD/YY HH:MM:SS
```

This format is accepted by the constructor for a Date object, so you can easily convert the *update* string into an actual date/time.

This property is available only for DBF tables that have been CONVERTed.

lock example

The following form method attempts to lock the current row in the form's primary rowset. If the lock cannot be secured, it displays information about the current lock.

```
function lockRow()
  local cMsg
  form.rowset.parent.session.lockRetryCount := 1
  do while true
    if form.rowset.lockRow()
      return true
    else
      cMsg = "Locked by: " + form.rowset.fields[ "_DBASELOCK" ].user +
chr(13) + ;
             "since: " + form.rowset.fields[ "_DBASELOCK" ].lock
      if msgbox( cMsg, "Record is locked by another", 5 + 48 ) == 2
        return false
      endif
    endif
  enddo
```

The *lockRetryCount* for the rowset's query's session is set to 1 so that the *lockRow*() method will try the lock only once before failing. If left at its default value of zero, *Visual* dBASE would display its own lock failure dialog, which doesn't display as much information, and retries continuously to get the lock, which you don't necessarily want to do.

The MSGBOX() used is a Retry/Cancel dialog box. The button number, which MSGBOX() returns, is 2 if the Cancel button is clicked or the user presses Esc.

lockRetryCount

Topic group Related topics

The number of times to retry a lock attempt.

Property of

Session

Description

Any attempt to change the data in a row, for example, typing a letter in a *dataLink*ed Entryfield control, causes an automatic row lock to be attempted. In addition to the automatic row locking, you may request an explicit row or rowset lock with the *lockRow*() and *lockSet*() methods.

If someone else already has a conflicting lock, the initial lock attempt fails. The *lockRetryCount* property indicates the number of times the lock attempt will be retried, while the *lockRetryInterval* indicates the number of seconds to wait between each attempt. If after all the attempts the lock has not been secured, the lock request fails.

lockRetryInterval

Topic group Related topics

The number of seconds to wait between each lock retry attempt.

Property of

Session

Description

Any attempt to change the data in a row, for example, typing a letter in a *dataLink*ed Entryfield control, causes an automatic row lock to be attempted. In addition to the automatic row locking, you may request an explicit row or rowset lock with the *lockRow*() and *lockSet*() methods.

If someone else already has a conflicting lock, the initial lock attempt fails. The *lockRetryCount* property indicates the number of times the lock attempt will be retried, while the *lockRetryInterval* indicates the number of seconds to wait between each attempt. If after all the attempts, the lock has not been secured, the lock request fails.

lockRow()

Topic group | Related topics | Example

Attempts to lock the current row.

Syntax

<oRef>.*lockRow*()

<oRef>

The rowset in which you want to lock the current row.

Property of

Rowset

Description

An automatic row lock is attempted whenever the *value* property of a Field object is modified, either directly by assignment, or indirectly through a *dataLink*ed control.

You may use *lockRow*() to attempt an explicit row lock. Whether the lock is automatic or explicit, it will fail if the current row or the entire rowset is already locked.

lockRow() returns *true* to indicate that the lock was successful and *false* to indicate that it wasn't.

Row locking support varies among different table types. The Standard (DBF and DB) tables fully support row locking; most SQL servers do not. For servers that do not support true locks, the Borland Database Engine emulates optimistic locking. Any lock request is assumed to succeed. Later, when the actual attempt to change the data occurs, if the data has changed since the lock attempt, an error occurs.

lockRow() example

The following is a custom Query control designed to work with a table that contains generated key values. Whenever a new key value is needed, the genKey() method is called. After getting an explicit row lock, the previous key vlaue is read, incremented, and saved. The row is then unlocked.

```
class KeyGenerator of Query custom
  this.session := new Session()
  this.session.lockRetryCount := 5
  this.sql     := "select * from GENKEY"
  function genKey( cField, kGen )
    this.active := true
    this.rowset.locateOptions := 2  // Ignore case
    local xRet
    if this.rowset.applyLocate( "KEY_FIELD = '" + upper( cField ) + "'" )
      if argcount() < 2
        if isblank( this.rowset.fields[ "KEY_GEN" ].value )
          // Set default incrementor -- add one to number
          kGen := {|x| val( x ) + 1}
        else
          try
            private cb
            cb = this.rowset.fields[ "KEY_GEN" ].value
            kGen := &cb.
          catch ( Exception e )
            local e
            e = new DbException()
            e.message := "Key generator failure. " + ;
                         "Bad generator algorithm for field: " + cField
            throw e
          endtry
        endif
      endif
      do ; until this.rowset.lockRow()   // Wait for lock
      xRet = "" + kGen( this.rowset.fields[ "KEY_VALUE" ].value )
      this.rowset.fields[ "KEY_VALUE" ].value := xRet
      this.rowset.save()
      this.rowset.unlock()
    else
      local e
      e = new DbException()
      e.message := "Key generator failure. Unknown key field: " + cField
      throw e
    endif
    this.active := false
    return xRet
endclass
```

The Genkey table has three character fields:

- Key_field contains the name of the key field being maintained
- Key_value contains the last generated value of the key field
- Key_gen optionally contains the text of a codeblock that will generate the next key value.

If the Key_gen field is blank, the default action is to treat the key field simply as a number, and increment it. The key field is always stored as a string, so the VAL() function must be used to convert it to a number first. If a generator codeblock is specified, it is copied into a private variable and evaluated with the macro operator.

The next step is to get a lock on that field. The method uses a DO...UNTIL loop to secure the lock; it

simply keeps trying until it gets it. Even if many people are attempting to get a lock, the entire process is quick enough so that there shouldn't be much if any of a noticeable delay.

After the lock is secured, the current value is passed through the generator, which returns the next value. This value is converted back into a string and stored in the table. The row is saved and unlocked. Finally, the new key value string is returned.

lockSet()

Topic group Related topics

Attempts to lock the entire rowset.

Syntax

<oRef>.*lockSet*()

<oRef>

The rowset you want to lock.

Property of

Rowset

Description

You may use *lockSet*() to attempt to lock the entire rowset. The rowset cannot be locked if someone else already has any other row or set locks on the rowset.

Set locks are session-based. Once a *lockSet*() attempt succeeds, all other *lockSet*( ) requests for the same set from rowsets in queries assigned to the same session will succeed. Query objects must be assigned to different Session objects for set locking to work properly.

Locking the rowset is not the same as accessing the table exclusively. Exclusive access means that you are the only one who has the table open. In contrast, locking a rowset allows others to view, but not modify, the rowset.

lockSet() returns *true* to indicate that the lock was successful and *false* to indicate that it wasn't.

Set locking support varies among different table types. The Standard (DBF and DB) tables fully support set locking, as do a few SQL servers. For servers that do not support true locks, the Borland Database Engine emulates optimistic locking. Any lock request is assumed to succeed. Later, when the actual attempt to change the data occurs, if the data has changed since the lock attempt, an error occurs.

login()

Topic group | Related topics | Example

Logs in user to DBF table security for a session.

Syntax

<oRef>.*login*(<group name expC>, <user name expC>, <password expC>)

<oRef>

The session to log into.

<group name expC>

The group name.

<user name expC>

The user name.

<password expC>

The password.

Property of

Session

Description

DBF table security is session-based. All queries assigned to the same session in their *session* property have the same access level.

If someone attempts to open an encrypted table and has not logged in to the session, they will be prompted for the group name, user name, and password. Responding attempts to log the user into the session.

The *login*() method allows you to log in to the session directly. You can do this if you're assigning a default access level, so that users won't be prompted; or if you're writing your own custom login form, in which case you will need to call *login*() with the values you have gotten.

login() returns *true* or *false* to indicate whether the login was successful.

login() example

The following *onClick* event handler for the login button on a custom login form logs in the user with the values typed in the form and runs the main form:

```
function loginButton_onClick()
  if form.rowset.parent.session.login( form.groupNameText.value, ;
                                       form.userNameText.value, ;
                                       form.password1.value )
    do MAIN.WFM
  endif
```

loginString

Topic group Related topics

The user name and password to use to log in to a database.

Property of

Database

Description

Some databases require that you log in to them to access their tables. When you set the Database object's *active* property to *true* to open the connection, a login dialog will appear, prompting the user for the user name and password.

You can prevent the login dialog from appearing by setting the *loginString* property to a string containing a valid user name and password of the form "userName/password". If the user name and password provided through *loginString* are not valid, the login dialog will appear when you attempt to activate the database.

lookupRowset

Topic group Related topics Example

The rowset containing lookup values for a field.

Property of

Field

Description

Use *lookupSQL* or *lookupRowset* to implement automatic lookups for a field. For information on how automatic lookups work, see *lookupSQL*.

The simpler implementation is to set the *lookupSQL* property. This automatically generates a lookup rowset, which you can reference through the *lookupRowset* property.

The more advanced technique is to generate your own lookup rowset, which must follow the same structure as detailed for *lookupSQL*. Then assign a reference to this rowset to the *lookupRowset* property. Doing so releases any internal rowset generated for *lookupSQL*, if any. This technique might be used if you want to use the same lookup for multiple fields.

lookupRowset example

The first example updates a Text control with the address for a name chosen from a ComboBox control. The field that is *dataLink*ed to the ComboBox control has a *lookupSQL* property, so the lookup rowset is automatically generated. The address is retrieved through the *lookupRowset* property. This is the field's *onChange* event handler.

```
function name_onChange
  local f,r                              // Variables for the form and
lookupRowset
  f = this.parent.parent.parent.parent  // Form is 4 parents up
  r = this.lookupRowset
  if r.endOfSet                          // No match
    f.address.text := ""                 // Blank text
  else
    f.address.text := r.fields[ "Address" ].value + "<BR>" + ;
                      r.fields[ "City"    ].value + " " + ;
                      r.fields[ "State"   ].value + " " + ;
                      r.fields[ "Zip"     ].value
  endif
```

Whenever the value in the ComboBox control changes, a lookup is performed, moving the row cursor in the lookup rowset. Wherever it is, you can retrieve the values for any other field in that row, as long as you include those fields in the SQL SELECT statement.

The second example assigns an existing rowset, opened earlier in the instantiation of the form, to two fields in the rowset in the query's *onOpen* event.

```
function inspection1_onOpen
  this.rowset.fields[ "Primary" ].lookupRowset :=
this.parent.inspector1.rowset
  this.rowset.fields[ "Backup"  ].lookupRowset :=
this.parent.inspector1.rowset
```

lookupSQL

Topic group Related topics Example

An SQL SELECT statement describing a rowset that contains lookup values for a field.

Property of

Field

Description

Use *lookupSQL* or *lookupRowset* to implement automatic lookups for a field. When a control that supports lookups, like the ComboBox control, is *dataLink*ed to a field with either *lookupSQL* or *lookupRowset* defined, the control will:

- Populate itself with display values from the lookup rowset
- Lookup the true value of the field in the lookup rowset
- Display the corresponding lookup value in the control
- Do the reverse lookup when the display value in the control is changed
- Write the corresponding true value back to the field

If the display lookup fails, a blank is displayed in the control. If the reverse lookup fails, a *null* is written to the field.

The same automatic lookups are applied when accessing the *value* property of the field. The *value* of the field will appear to be the lookup value. Assigning to the *value* will perform the reverse lookup.

Setting the *lookupSQL* property is the simpler way of implementing automatic lookups. *lookupSQL* contains an SQL statement of the form:

```
SELECT <lookup field>, <display field> [,...] FROM <lookup table> [<options>]
```

The first two fields must be the lookup field and the display field, respectively. The display field may be a calculated field. You may include other fields so that you can get information about the chosen row. The SQL SELECT statement may include the usual options; in particular, you may want the table to be ordered on the lookup field (or use a table where such an index is available) for faster lookups. The SQL statement is executed in the same database as the query (or stored procedure) that contains field's rowset.

When an SQL statement is assigned to *lookupSQL*, the *lookupRowset* property will contain a reference to the generated rowset. You may refer to the fields in the matched lookup row through this reference. For advanced applications, you may assign your own rowset to *lookupRowset*. This releases the generated rowset.

lookupSQL example

The following SQL SELECT statement is assigned to the Field object for a Customer ID field in an Orders table:

```
select CUST_ID, FIRST_NAME || ' ' || LAST_NAME as FULL_NAME from CUSTOMER
```

The || symbols act as concatenation operators in SQL (like the + operator in *Visual* dBASE). Now when *dataLink*ing to the field or accessing the field's *value*, the full name will appear instead of the ID.

lookupTable

Topic group Related topics

The table used for a DB (Paradox) field's lookup.

Property of

PdxField

Description

lookupTable contains the name of the lookup table used to assist in the filling in of the field represented by the PdxField object. For more information on Paradox table lookups, see *lookupType*.

lookupType

Topic group Related topics

The type of lookup used by a DB (Paradox) field.

Property of

PdxField

Description

lookupType specifies the type of lookup used to assist in the filling in of the field represented by the PdxField object. It is an enumated property that can have one of the following values:

Value	Description
0	No lookup
1	Lookup field only, no help
2	Lookup and fill all corresponding fields, no help
3	Lookup field only, with help
4	Lookup and fill all corresponding fields, with help

Visual dBASE does not support the user interface required for Paradox lookup help. Also, validity checking is not performed whenever all corresponding fields are filled; this is so that (in Paradox) you can substitute the field value with the value of a same-named field in the lookup table that is not the lookup field.

Therefore, the only support for Paradox lookups in *Visual* dBASE is for validity checking; to make sure the value stored in the field is listed in the lookup field in the lookup table, and only when *lookupType* is set to 1 or 3. For example, a Customer ID field in an Orders table can check that the Customer ID is listed in the Customer table. An attempt to store an unlisted value in the field results in a database engine-level exception.

Consider using the automatic lookup provided by *lookupSQL* and *lookupRowset* instead.

masterFields

Topic group Related topics Example

A list of fields in the master rowset that link it to the detail rowset.

Property of

Rowset

Description

The *masterFields* property is set in the detail rowset. It is a string that contains a list of fields in the master rowset that are matched against the detail rowset's active controlling index, as specified by the *indexName* property. By setting the property in the detail rowset, one master rowset can control multiple detail rowsets.

The *masterRowset* property should be set before *masterFields*. Once *masterFields* is set, the detail rowset is constrained to show the detail rows that match the current row in the master rowset. You may cancel the master-detail link by setting either property to an empty string.

If there is more than one field in the list, they are separated by semicolons. You may link the rowsets through an expression by creating a calculated field in the master rowset and using that calculated field name in the *masterFields* list.

masterFields example

Suppose you have a Customer.dbf table that you want to link to an Orders.dbf table, to show each customer's orders by date. The Customer table has an autoincrement field named Cust_id. The Orders table also has a Cust_id field and an Order_date field. The index on the Cust_id and Order_date field is defined as:

```
str( CUST_ID ) + dtos( ORDER_DATE )
```

Because the Cust_id field is converted to a string in the expression index, the Cust_id field in the Customer table must also be converted to string in a calculated field to link the two tables. (If the Cust_id field was a character field in both tables, this extra step would be unnecessary, because you could use the Cust_id field as-is to link to the expression index.)

Use the Customer query's *onOpen* event to create the calculated field, arbitrarily named Cust_link:

```
function customer1_onOpen()
  c = new Field()
  c.fieldName := "CUST_LINK"
  this.rowset.fields.add( c )
  c.beforeGetValue := {|| str( this.parent[ "CUST_ID" ].value )}
```

Note that when working in the Form (or other) designer, creating the *onOpen* event handler for the Customer query does not immediately execute it. The calculated field will not be present until the query is reexecuted. Toggling the query's *active* property alone won't work, because although the event has been assigned, its code has not been compiled and is therefore not available. You can force the designer to recompile all the code and reexecute the query by making a change in the constructor of the form (adding and removing a blank line is sufficient); then the calculated field will be present.

Once the calculated field is present (it will be in the Field palette), specify the Customer rowset as the *masterRowset* of the Orders rowset, and the Cust_link field in the *masterFields* property.

After the calculated field is created, its *beforeGetValue* will be streamed in the form class constructor in the WITH block of the query's rowset (right after the query itself). This means that the *beforeGetValue* code is present in two places, both in the constructor and the *onOpen* event handler. You can leave them both there, but if you change the code in the *onOpen*, you must either also change or remove the assignment in the WITH block, because it executes after the query's *onOpen* event. Or you can remove the code in the *onOpen*, and assign the *beforeGetValue* directly to the calculated Field object in the Inspector.

If you use this relation often, you can create and reuse a data module that contains this code.

masterRowset

Topic group Related topics Example

A reference to the master rowset that is linked the detail rowset.

Property of

Rowset

Description

The *masterRowset* property is set in the detail rowset. It is an object reference to the master rowset that constrains the detail rowset. By setting the property in the detail rowset, one master rowset can control multiple detail rowsets.

The *masterRowset* property should be set before *masterFields*. Once *masterFields* is set, the detail rowset is constrained to show the detail rows that match the current row in the master rowset. You may cancel the master-detail link by setting either property to an empty string.

masterRowset example

The following example links an employee to the various positions they have held over the years:

```
emp = new Query()
emp.sql = "select * from EMPLOYEE"
emp.active = true
pos = new Query()
pos.sql = "select * from POSITION"
pos.active = true
pos.rowset.indexName = "EMP_ID"
pos.rowset.masterRowset = emp.rowset    // Identify master rowset
pos.rowset.masterFields = "EMP_ID"      // Field matches index order
```

masterSource

Topic group Related topics Example

A reference to the rowset that acts as the master in a master-detail link and provides parameter values.

Property of

Query

Description

Use *masterSource* to create a master-detail link between two queries where parameters are used in the detail query. *masterSource* is assigned a reference to the *rowset* in the master query.

By setting the *masterSource* property, the parameters in the SQL statement are automatically substituted with matching fields from the master rowset, thereby constraining the detail query. Calculated fields may be used. The fields are matched to the parameters by name. The field name match is not case-sensitive.

As navigation occurs in the *masterSource* rowset, the parameter values are resubstituted and the detail query is requeried.

An alternate approach to creating a master-detail link is through the *masterRowset* and *masterFields* properties. While *masterRowset* and *masterFields* are used to link one rowset to another using an index and matching field values, *masterSource* creates a query-to-rowset link between the parameters in the detail query and the master rowset.

masterSource example

Suppose you have a table of customers named CUST, and a table of their orders named ORDERS. The customers and their orders are both identified by a customer ID field, that happens (by design) to be named CUST_ID in both tables. The following statements create a master-detail link between two queries.

```
qCust = new Query()
qCust.sql = "select * from CUST"
qCust.active = true
qOrder = new Query()
qOrder.sql = "select * from ORDERS where CUST_ID = :CUST_ID order by
ORDER_DATE"
qOrder.masterSource = qCust.rowset
qCust.active = true
```

The parameter CUST_ID in the SQL statement for the ORDERS table is automatically filled in with the CUST_ID field in the CUST table.

maximum

Topic group Related topics

The maximum allowed value of a field.

Property of

DbfField, PdxField

Description

maximum specifies the maximum allowed value of the field represented by the field object. A blank value indicates no maximum. The *maximum* is the same data type as the field, except for numeric fields that have no *maximum*; in that case, *maximum* is *null*.

Only character, date, and numeric fields (all variations) have a *maximum*. DBF tables must be level 7 to support *maximum*.

If you *dataLink* a SpinBox component to a field with a *maximum*, that value becomes the default *rangeMax* property of that component.

minimum

Topic group Related topics

The minimum allowed value of a field.

Property of

DbfField, PdxField

Description

minimum specifies the minimum allowed value of the field represented by the field object. A blank value indicates no minimum. The *minimum* is the same data type as the field, except for numeric fields that have no *minimum*; in that case, *minimum* is *null*.

Only character, date, and numeric fields (all variations) have a *minimum*. DBF tables must be level 7 to support *minimum*.

If you *dataLink* a SpinBox component to a field with a *minimum*, that value becomes the default *rangeMin* property of that component.

modified

Topic group Related topics Example

A flag to indicate whether the current row has been modified.

Property of

Rowset

Description

The *modified* property indicates whether the current row has been modified. It is automatically set to *true* whenever the *value* of any Field object is changed, either directly by assignment, or indirectly through a *dataLink*ed control.

If *modified* is *true*, then an attempt to save the row is made if there is navigation off the row or a *state* switch in the rowset. If *modified* is *false*, then this implicit save is not attempted.

modified is set to *false* whenever a row is read into the row buffer after navigating to it, is refreshed by *refreshRow*() or *refresh*(), or is saved. You may also set the *modified* property to *true* or *false* manually. For example, you can set *modified* to *false* after assigning some *value* properties during an *onAppend* event. This makes the values you filled in default values, and the row will not be automatically saved if the user does not add more information.

In addition to tracking changes during normal data entry, the *modified* property is also set to *true* during Filter and Locate modes. This allows you to determine if any criteria have been specified before attempting an *applyFilter*() or *applyLocate*(). When in either of these modes, navigation cancels the mode and moves the row cursor relative to the last row position, but no save is attempted, even if *modified* is *true*.

modified example

The following example is the *onClick* event handler for a Reply button in an E-mail viewer. It copies the name from the From field of the original to the To field of the reply and duplicates the Subject field. After setting the *value* properties, the rowset's *modified* property is set to *false* to indicate that these are the default values.

```
function replyButton_onClick()
  local cTo, cSubject
  cTo      = form.rowset.fields[ "From"    ].value
  cSubject = form.rowset.fields[ "Subject" ].value
  if form.rowset.beginAppend()
    form.rowset.fields[ "To"      ].value = cTo
    form.rowset.fields[ "Subject" ].value = cSubject
    form.rowset.modified = false
  endif
```

next()

Topic group Related topics

Moves the row cursor to another row relative to the current position.

Syntax

<oRef>.*next*([<rows expN>])

<oRef>

The rowset in which you want to move the row cursor.

<rows expN>

The number of rows you want to move. By default, the next row forward.

Property of

Rowset

Description

next() takes an optional numeric parameter that specifies in which direction, forward or backward, to move and how many rows to move through, relative to the current row position. A negative number indicates a search backward, toward the first row; a positive number indicates a search forward, toward the last row. For example, a parameter of 2 means to move forward two rows.

If a filter is active, it is honored.

If the row cursor encounters the end-of-set while moving, the movement stops, leaving the row cursor at the end-of-set, and *next*() returns *false*. Otherwise *next*() returns *true*.

Navigation methods such as *next*() will cause the rowset to attempt an implicit save if the rowset's *modified* property is *true*. The order of events when calling next() is as follows:

1 If the rowset has a *canNavigate* event handler, it is called. If not, it's as if *canNavigate* returns *true*.

2 If the *canNavigate* event handler returns *false*, nothing else happens and *next*() returns *false*.

3 If the *canNavigate* event handler returns *true*, the rowset's *modified* property is checked.

4 If *modified* is *true*:

- The rowset's *canSave* event is fired. If there is no *canSave* event, it's as if *canSave* returns *true*.
- If *canSave* returns *false*, nothing else happens and *next*() returns *false*.
- If *canSave* returns *true*, *Visual* dBASE tries to save the row. If the row is not saved, perhaps because it fails some database engine-level validation, a DbException occurs—*next*() does not return.
- If the row is saved, the *modified* property is set to *false*, and the *onSave* event is fired.

5 After the current row is saved (if necessary):

- The row cursor moves to the designated row.
- The *onNavigate* event fires.
- *next*() returns *true* (if the navigation did not end up at the end-of-set).

Other navigation methods go through a similar chain of events.

notifyControls

Topic group Related topics

Specifies whether *dataLink*ed controls are updated as field values change or the row cursor moves.

Property of

Rowset

Description

notifyControls is usually *true* so that *dataLink*ed controls are automatically updated as you navigate from row to row or when you directly assign values to the *value* property of Field objects.

You may set *notifyControls* to *false* if you are performing some data manipulation and don't want the overhead of constantly updating the controls.

When *notifyControls* is set to *true*, the controls are always refreshed, as if *refreshControls*() was called.

onAbandon

Topic group | Related topics | Example

Event fired after the rowset is successfully abandoned.

Parameters

none

Property of

Rowset

Description

A rowset may be abandoned explicitly by calling its *abandon*() method, or implicitly via the user interface by pressing Esc or choosing Abandon Row from the default Table menu or toolbar while editing table rows. While the *canAbandon* event fires first to see if the abandon actually takes place, *onAbandon* fires after the abandon occurs.

If you are abandoning changes made to a row, the row is automatically refreshed, so there is no need to call *refreshRow*() in the *onAbandon*. However, this is not considered navigation, so if you have an *onNavigate* event handler, you should call it from *onAbandon*.

onAbandon example

This basic *onAbandon* event handler calls *onNavigate* if one is defined.

```
function Rowset_onAbandon
  if not empty( this.onNavigate )
    this.onNavigate()
  endif
```

onAppend

Topic group | Related topics | Example

Event fired after the rowset successfully enters Append mode.

Parameters

none

Property of

Rowset

Description

A rowset may be put in Append mode explicitly by calling its *beginAppend*() method, or implicitly via the user interface by choosing Append Row from the default Table menu or toolbar while editing table rows. While the *canAppend* event fires first to see if the new append actually takes place, *onAppend* fires after the row buffer has been cleared and is ready for new values.

You can use *onAppend* to do things like automatically time stamp the new row or fill in default values. If you use *onAppend* to set field values, set the *modified* property to *false* at the end of the event handler to indicate that the row hasn't been changed by the user. This way, if the user does not add any more data, the row will not be saved automatically if they navigate to another row or try to append another.

onAppend example

The following example saves the user's network ID to all newly created rows.

```
function invoice_onAppend()
  this.fields[ "USER_ID" ].value := id()
  this.modified := false
```

This event handler could be used in combination with a table that has default values set for certain fields, like a timestamp for the date and time of entry. The user's network ID is not something the database engine can get, so you have to set this manually.

onChange

Topic group | Related topics | Example

Event fired after a field's *value* property is successfully changed.

Parameters

none

Property of

Field (including DbfField, PdxField, SqlField)

Description

A Field object's *value* property may be changed directly by assigning a value to it, or indirectly through a *dataLink*ed control. When assigning a value, the change occurs during the assignment statement. When using a *dataLink*ed control, the change doesn't happen until the user tries to move the focus to another control. In both cases, *canChange* fires first to see if the change can actually take place. If it does, the value is changed and then *onChange* is fired.

onChange example

The following *canChange* and *onChange* event handlers work together to record all change attempts to a field (even if the modified row is abandoned later). An audit table is open in another query on the form.

```
function Field_canChange()
  this.initValue = this.value    // Save initial value
  return true                    // Always allow change
function Field_onChange()
  if not this.initValue == this.value    // Perform exact comparison
    local r                              // Assign reference to audit rowset
    r = this.parent.parent.parent.parent.audit1.rowset
    if r.beginAppend()
      r.fields[ "Field"     ].value := this.fieldName
      r.fields[ "Old value" ].value := this.initValue
      r.fields[ "New value" ].value := this.value
      r.fields[ "User"      ].value := id()
      r.save()
    endif
  endif
```

onClose

Topic group Related topics

Event fired after a query or stored procedure is successfully closed.

Parameters

none

Property of

Query, StoredProc

Description

An attempt to close a query or stored procedure occurs when its *active* property, or the *active* property of the object's database, is set to *false*. If the object's rowset has been modified, *Visual* dBASE will try to save it, so the close attempt can be canceled by the rowset's *canSave* event handler. If not, the row is saved.

The close can also be prevented by the Query or StoredProc object's *canClose* event handler. If not, the object is closed, and its *onClose* event fires.

Because *onClose* fires after the rowset has closed, you can no longer affect its fields. If you want to do something with the rowset's data when the rowset closes, use the *canClose* event instead, and have the event handler return *true*.

onDelete

Topic group Related topics

Event fired after a row is successfully deleted.

Parameters

none

Property of

Rowset

Description

A row may be deleted explicitly by calling the *delete*() method, or implicitly via the user interface by choosing Delete Rows from the default Table menu or toolbar while editing table rows. While the *canDelete* fires first to determine if the row is actually deleted, *onDelete* fires after the row has been removed.

Because the row has been removed by the time *onDelete* fires, the row cursor is at the next row or the end-of-set when *onDelete* fires. However, this movement is not considered navigation, so if you have an *onNavigate* event handler, you should call it from *onDelete*.

onEdit

Topic group Related topics

Event fired after the rowset successfully enters Edit mode.

Parameters

none

Property of

Rowset

Description

The *beginEdit*() method is called (implicitly or explicity) to put the rowset in Edit mode. While the *canEdit* event fires first to see if the switch to Edit mode actually takes place, *onEdit* fires after the rowset has switched to Edit mode.

You can use *onEdit* to do things like automatically record when edits take place, or to save original values for auditing.

onGotValue

Topic group Related topics

Event fired after a field's *value* property is successfully read.

Parameters

none

Property of

Field (including DbfField, PdxField, SqlField)

Description

onGotValue is fired when reading a field's *value* property explicitly and when it is read to update a *dataLink*ed control. It does not fire when the field is accessed internally for SpeedFilters, index expressions, or master-detail links, or when calling *copyToFile*().

onNavigate

Topic group Related topics Example

Event fired after successful navigation in a rowset.

Parameters

<method expN>

Numeric value that indicates which method was called to fire the event:

Value	Method
1	*next*()
2	*first*()
3	*last*()
4	All other navigation

<rows expN>

Number of rows *next*() method was called with. Zero if *next*() was not used.

Property of

Rowset

Description

Navigation in a rowset may occur explicitly by calling a navigation method like *next*() or *goto*(), or implicitly via the user interface by choosing a navigation option from the default Table menu or toolbar while viewing a rowset. While *canNavigate* fires first before the row cursor has moved to see if the navigation actually takes place, *onNavigate* fires after the row position has settled on the desired row or end-of-set.

Because *onNavigate* fires when moving to the end-of-set and you cannot access field values when you're at the end-of-set, you may want to test the rowset's *endOfSet* property before you attempt to access field values in your *onNavigate* handler.

You can use *onNavigate* to update non-*dataLink*ed controls or calculated fields. In that case, you may want to call your *onNavigate* handler from the *onOpen* event as well, so that these objects are up-to-date when the rowset first opens.

When navigation occurs because a row has been abandoned or deleted, *onNavigate* does not fire. Call the *onNavigate* event handler from the *onAbandon* and *onDelete* event handler.

onNavigate example

The following *onNavigate* event handler calls a custom form method called refreshUnlinked(), which has the job of updating any controls that are not *dataLink*ed to the rowset. It also displays a message if the end-of-set has been reached.

```
function Rowset_onNavigate()
  if this.endOfSet
    msgbox( "No more entries", "Alert", 48 )
  else
    this.parent.parent.refreshUnlinked()
  endif
```

In most applications, when navigating to the end-of-set the row cursor is always put back to the previous valid row. Therefore, the message displayed here will appear when the row cursor is on the end-of-set. Once the dialog box is dismissed, the row cursor will be moved back. There is no reason to call refreshUnlinked() when at end-of-set either, because the navigation that follows will cause the method to be called again.

onOpen

Topic group | Related topics | Example

Event fired after query or stored procedure is opened successfully.

Parameters

none

Property of

Query, StoredProc

Description

onOpen fires after the Query or StoredProc object has successfully opened after its *active* property has been set to *true*.

onOpen example

The following *onOpen* event handler adds a calculated field to a query.

```
function invoice1_onOpen()
  c = new Field()
  c.fieldName := "Total"
  this.rowset.fields.add( c )
  c.beforeGetValue := {||this.parent["Qty"].value *
this.parent["PricePer"].value}
```

Note that the *this* in the second statement refers to the query, but in the codeblock, *this* refers to the calculated field.

onProgress

Topic group Example

Event fired periodically during long-running data processing operations.

Parameters

<percent expN>

The approximate percent-complete of the operation, from 0 to 100. When a message is passed, <percent expN> is the value -1.

<message expC>

A text message from the database engine.

Property of

Session

Description

Use *onProgress* to display progress information during data processing operations such as copying or indexing.

onProgress fires for the following operations:

Database::copyTable()	COPY TABLE	All UpdateSet methods	APPEND FROM
Database::createIndex()	COPY TO	INDEX ON	SORT

The *onProgress* event handler receives two parameters, but only one of them is valid for any given event. You may get either:

- A percent-complete from 0 to 100 in <percent expN>, in which case <message expC> is a blank string, or
- A message in <message expC>, in which case <percent expN> is -1.

onProgress example

Suppose you want to rebuild an index tag as part of a table maintenance feature, and while it's working, display progress information in a form. You could create a form with a Progress control to display the percentage complete and a Text control for messages. Here are the two pertinent form methods:

```
function Form_onOpen
  _app.session.onProgress = class::onProgress
  _app.session.form       = form
  index on LAST_NAME + FIRST_NAME tag FULL_NAME
  _app.session.onProgress = null
function onProgress( nPercent, msg )
  if nPercent >= 0
    this.form.progress1.value = nPercent
  elseif not empty( msg )
    this.form.message1.text      = msg
  endif
```

By using an onOpen event, everything happens simply by opening the form. First, the onProgress() method in the form is assigned as the onProgress event handler for the _app object's session. Then a reference to the current form is assigned as a property of the session so that the session's event handler can easily access the form. Then the actual indexing is performed, and when it's done, the onProgress event is cleared by assigning null.

In the onProgess() method, the nPercent parameter is checked. If it's greater than zero, the method is being passed an updated percentage, so the Progress control is updated. Otherwise, if the msg parameter is not blank, its contents are displayed in the Text control on the form.

onSave

Topic group Related topics

Event fired after successfully saving the row buffer.

Parameters

none

Property of

Rowset

Description

The row buffer may be saved explicitly by calling *save*(), or implicitly by navigating in the rowset or closing the rowset. While *canSave* is fired first to verify that data is good before allowing it to be written, *onSave* fires after the row has been saved.

onSave example

The following *onSave* event handler calls the rowset's *flush*() method to make sure that the data is written to disk as each record is saved:

```
function Rowset_onSave
  this.flush()
```

open()

Topic group Related topics

Opens a database connection.

Syntax

This method is called implicitly by the Database object.

Property of

Database

Description

The *open*() method opens the database connection. It is called implicitly when you set the Database object's *active* property to *true*. In typical usage, you do not call this method directly.

Advanced applications may override the definition of this method to perform supplementary actions when opening the database connection. Custom data drivers must define this method to perform the appropriate actions to open their database connection.

packTable()

Topic group Related topics

Packs a Standard table by removing all deleted rows.

Syntax

<oRef>.*packTable*(<table name expC>)

<oRef>

The database in which the table exists.

<table name expC>

The name of the table you want to pack.

Property of

Database

Description

For DBF (dBASE) tables, *packTable*() removes all the records in a table that have been marked as deleted, making all the remaining records contiguous. As a result, the records are assigned new record numbers and the disk space used is reduced to reflect the actual number of records in the table.

For DB (Paradox) tables, *packTable*() removes all deleted records and redistributes the remaining records in the record blocks, optimizing the block structure.

Packing is a maintenance operation and requires exclusive access to the table; no one else may have it open at the time, or *packTable*() will fail.

To refer to a Standard table, you can always use the default database in the default session by referring to it through the *databases* array property of the _app object. For example,

```
_app.databases[ 1 ].packTable( "Customer" )
```

params

Topic group Related topics Example

Parameters for an SQL statement or stored procedure call.

Property of

Query, StoredProc

Description

The *params* property contains an associative array that contains parameter names and values, if any, for an SQL statement in a Query object or a stored procedure call in a StoredProc object.

For a Query object, assigning an SQL statement with parameters to the *sql* property automatically creates the corresponding elements in the *params* array. Parameters are indicated by colons. The values you want to substitute are then assigned to the array elements in one of two ways:

- Manually, before the query is activated or requeried with *requery*().
- By assigning a *masterSource* to the query, in which case parameters are substituted with the matching fields from the *fields* array of the *masterSource*'s *rowset*. Parameters are matched to fields by name.

For a StoredProc object, the Borland Database Engine will try to get the names and types of any parameters needed by a stored procedure, once the procedure name is assigned to the *procedureName* property. This works to varying degrees for most SQL servers. If it succeeds, the *params* array is filled automatically with the corresponding Parameter objects. You must then assign the values you want to substitute to the *value* property of those objects.

For SQL servers that do not return the necessary stored procedure information, include the parameters, preceded with colons, in parentheses after the procedure name. The corresponding Parameter objects in the *params* array will be created for you; then you must assign the necessary *type* and *value* information.

params example

The following statements create a query with a parameter. The parameter in the SQL statement, preceded by a colon, automatically creates the corresponding element in the *params* array.

```
q = new Query()
q.sql = "select * from CUST where CUST_ID = :custid"
q.params[ "custid" ] = 123
q.active = true
```

picture

Topic group Related topics

A template that formats input to a DB (Paradox) field.

Property of

PdxField

Description

A *picture* uses special template symbols to format data entry into a field. However, many Paradox template symbols do not match *Visual* dBASE template symbols, so a *picture* for a DB field probably won't work as-is in the *picture* property of a control unless it's very simple, for example "999.99".

Visual dBASE does not enforce the DB field template. The *picture* property is informational only.

precision

Topic group Related topics

The number of digits of precision of an SQL-based field.

Property of

SqlField

Description

precision represents the numeric accuracy to which numbers are stored in the field represented by the SqlField object.

prepare()

Topic group | Related topics | Example

Prepares an SQL statement or stored procedure.

Syntax

<oRef>.*prepare*()

<oRef>

The object you want to prepare.

Property of

Query, StoredProc

Description

prepare() prepares the stored procedure named in the *procedureName* property of a StoredProc object or the SQL statement stored in the *sql* property of a Query object. If the object is connected to an SQL-server-based database, the prepare message is passed on to the server.

Preparing an SQL statement or stored procedure call includes compiling the statement and setting up any optimizations. If the statement includes parameters, the statement can be prepared first, and, sometime later, you can get the parameter values from the client. Then the prepared statement and its parameters are ready for execution. By separating the client and server activities, things run a bit faster.

Preparing is part of the process that occurs when you set an object's *active* property to *true*, so you're never required to call *prepare*() explicitly.

prepare() example

In this example, a query is executed using a value that is entered by the user. You can prepare the query first, placing the parameter in the SQL statement with a colon in front of it:

```
q = new Query()
q.database = someDatabase
q.sql = "select * from EMPLOYEE where EMP_ID = :id"
q.prepare()
```

Then when the user enters the value of the parameter, you assign it to the query's *params* array and execute the query:

```
q.params[ "id" ] = someForm.empIdText.value
q.active = true
```

Because the query has already been prepared, making it active takes less time. Later, when the parameter changes, you reassign the parameter and requery:

```
q.params[ "id" ] = someForm.empIdText.value
q.requery()
```

problemTableName

Topic group Related topics

Name of the table in which you want to collect rows that could not be used during an update operation because of some problem other than a key violation.

Property of

UpdateSet

Description

In addition to key violations, problems during update operations are often caused by things like mismatched fields. If a row could not be transferred from the *source* to the *destination* because of a problem, it is instead copied to the table specified by the *problemTableName* property.

procedureName

Topic group Related topics Example

The name of the stored procedure to call.

Property of

StoredProc

Description

Set the *procedureName* property to the name of the procedure to call. The Borland Database Engine will try to get the names and types of any parameters needed by the stored procedure.

The following databases return complete parameter name and type information:

- InterBase
- Oracle
- ODBC, if the particular ODBC driver provides it

The following databases return the parameter name but not the type:

- Microsoft SQL Server
- Sybase

The following database does not return any parameter information:

- Informix

If the BDE can get the parameter names, the *params* array is filled automatically with the corresponding Parameter objects. You must then assign the values to substitute to the *value* property of those objects.

For SQL servers that do not return the necessary stored procedure information, include the parameters, preceded with colons, in parentheses after the procedure name. Empty Parameter objects will be created.

If the *type* of the parameter or the data type of the *value* for output parameters is not provided automatically, it must be set before calling the stored procedure, in addition to any input values.

procedureName example

The following statements call a stored procedure that returns an output parameter. The result is displayed in the result pane of the Command window.

```
d = new Database()
d.databaseName = "IBLOCAL"
d.active = true
p = new StoredProc()
p.database = d
p.procedureName = "DEPT_BUDGET"
p.params[ "DNO" ].value = "670"
p.active = true
? p.params[ "TOT" ].value   // Display output
```

The following statement calls a stored procedure in a database that does not return any parameter information. Therefore, the parameters must be declared in the *procedureName* property. Note that the parameter names are case-sensitive, and you must initialize any output parameters by assigning a dummy value of the correct data type.

```
#define PARAMETER_TYPE_INPUT        0
#define PARAMETER_TYPE_OUTPUT       1
#define PARAMETER_TYPE_INPUT_OUTPUT 2
#define PARAMETER_TYPE_RESULT       3
d = new Database()
d.databaseName = "WIDGETS"
d.active = true
p = new StoredProc()
p.database = d
p.procedureName = "PROJECT_SALES( :month, :units )"
p.params[ "month" ].type  = PARAMETER_TYPE_INPUT
p.params[ "month" ].value = 6
p.params[ "units" ].type  = PARAMETER_TYPE_OUTPUT
p.params[ "units" ].value = 0                      // Output will be numeric
p.active = true
? p.params[ "TOT" ].value                           // Display output
```

readOnly

Topic group Related topics

Whether a DBF (dBASE) or DB (Paradox) field is read-only.

Property of

DbfField, PdxField

Description

readOnly indicates whether the field represented by the Field object is read-only or not.

ref

Topic group Related topics Example

A reference to the active data module object.

Property of

DataModRef

Description

After activating the DataModRef object, you may reference the data module object through the DataModRef object's *ref* property.

ref example

The following statement, generated by the Form designer, assigns the data module's primary rowset, the one in its teacher1 query, as the form's primary rowset.

```
this.rowset = this.dataModRef1.ref.teacher1.rowset
```

refresh()

Topic group Related topics

Refreshes data in the entire rowset.

Syntax

<oRef>.*refresh*()

<oRef>

The rowset you want to refresh.

Property of

Rowset

Description

To increase performance, rows are cached in memory as they are encountered. If the row cursor revisits a cached row, it can be reread quickly from memory instead of the disk. *refresh*() purges all cached rows —not to be confused with cached updates—for the rowset, forcing *Visual* dBASE to reread the data from disk. It discards any changes to the row buffer, so a row that has been modified is not saved. When the rowset is refreshed, any *dataLink*ed controls are also refreshed with values for the current row if *notifyControls* is *true*.

refresh() does not regenerate the rowset. If the rowset is not *live*, *refresh*() has no effect. Use *requery*() to regenerate the rowset.

refreshControls()

Topic group Related topics

Refreshes any controls that are *dataLink*ed to the current row.

Syntax

<oRef>.*refreshControls*()

<oRef>

The rowset you want to refresh.

Property of

Rowset

Description

refreshControls() updates any controls that are *dataLink*ed to Field objects in the rowset, regardless of the setting of the *notifyControls* property. The controls are updated with the values in the row buffer, not the values on disk.

Use *refreshRow*() first to refresh the fields in the row buffer with the values on disk if desired.

refreshRow()

Topic group Related topics

Refreshes data in the current row.

Syntax

<oRef>.*refresh*()

<oRef>

The rowset you want to refresh.

Property of

Rowset

Description

refreshRow() rereads the data for the current row from disk. It discards any changes to the row buffer, so a row that has been modified is not saved. When the row is refreshed, any *dataLink*ed controls are also refreshed if *notifyControls* is *true*.

Use *refresh*() to refresh the entire rowset.

reindex()

Topic group

Rebuilds a Standard table's indexes from scratch.

Syntax

<oRef>.*reindex*(<table name expC>)

<oRef>

The database in which the table exists.

<table name expC>

The name of the table you want to reindex.

Property of

Database

Description

Indexes can become unbalanced during normal use. Occasionally, they can also be corrupted. In both cases, you can fix the problem by using *reindex*(), which rebuilds the indexes from scratch.

Reindexing is a maintenance operation and requires exclusive access to the table; no one else may have it open at the time, or *reindex*() will fail.

To refer to a Standard table, you can always use the default database in the default session by referring to it through the *databases* array property of the _app object. For example,

```
_app.databases[ 1 ].reindex( "Customer" )
```

renameTable()

Topic group Related topics

Renames a table in a database.

Syntax

<oRef>.*renameTable*(<old name expC>, <new name expC>)

<oRef>

The database in which to rename the table.

<old name expC>

The current name of the table.

<new name expC>

The new name of the table.

Property of

Database

Description

renameTable() renames a table in a database, including all secondary files such as index and memo files.

The table to rename should not be open.

To rename a Standard table, you can always use the default database in the default session by referring to it through the *databases* array property of the _app object. For example,

```
_app.databases[ 1 ].renameTable( "Before", "After" )
```

replaceFromFile()

Topic group | Related topics | Example

Copies the contents of a file into a BLOB field.

Syntax

<oRef>.*replaceFromFile*(<file name expC> [,<append expL>])

<oRef>

The BLOB field you want to copy into.

<file name expC>

The name of the file you want to copy.

<append expL>

Whether to append the new data or overwrite.

Property of

Field

Description

replaceFromFile() copies the contents of the named file into the specified BLOB field.

By specifying <append expL> as *true*, the contents of the file are added to the end of the current contents of the BLOB field. If the parameter is specified as *false* or left out, the BLOB field will be overwritten and end up containing only the contents of the file.

replaceFromFile() example

The following event handler copies the contents of an image file on disk to a binary field named Mugshot in the current row.

```
function importImageButton_onClick
  local cFile
  cFile = getfile( "*.bmp", "Import mugshot image" )
  if "" # cFile
    form.rowset.fields[ "Mugshot" ].replaceFromFile( cFile )
  endif
```

requery()

Topic group | Related topics | Example

Re-executes the query or stored procedure, regenerating the rowset.

Syntax

<oRef>.*requery*()

<oRef>

The query or stored procedure you want to re-execute.

Property of

Query, StoredProc

Description

requery() re-executes a stored procedure or a query's SQL statement, generating an up-to-date rowset. Calling *requery*() is similar to setting the object's *active* property to *false* and back to *true*, except that *requery*() does not prepare the SQL statement. This includes attempting to save the current row if necessary and closing the object, firing all the events along the way. If those actions are halted by the *canSave* or *canClose* event handlers, the *requery*() attempt will stop at that point.

Use *requery*() when a parameter in the SQL statement has changed to re-execute the query with the new value.

Use *refresh*() to refresh the rowset without re-executing the query, which is faster. But *refresh*() has no effect on a rowset that is not *live*; use *requery*() instead.

requery() example

In this example, a query is executed using a value that is entered by the user. You can prepare the query first, placing the parameter in the SQL statement with a colon in front of it:

```
q = new Query()
q.database = someDatabase
q.sql = "select * from EMPLOYEE where EMP_ID = :id"
q.prepare();
```

Then when the user enters the value of the parameter, you assign it to the query's *params* array and execute the query:

```
q.params[ "id" ] = someForm.empIdText.value
q.active = true
```

Because the query has already been prepared, making it active takes less time. Later, when the parameter changes, you reassign the parameter and requery:

```
q.params[ "id" ] = someForm.empIdText.value
q.requery()
```

requestLive

Topic group Related topics

Specifies whether the query should generate an editable rowset.

Property of

Query

Description

Before making a query active, you can determine whether the rowset that is generated is editable or not. You can choose to make it not editable to prevent accidental modification of the data.

requestLive defaults to *true*.

required

Topic group Related topics

Whether a field is required to be filled in and not left blank.

Property of

DbfField, PdxField

Description

required indicates whether the field represented by the Field object is a required field; that is, whether it must be filled in.

rollback()

Topic group | Related topics | Example

Cancels the transaction by undoing all logged changes

Syntax

<oRef>.*rollback*()

<oRef>

The database whose changes you want to rollback.

Property of

Database

Description

A transaction works by logging all changes. If an error occurs while attempting one of the changes, or the changes need to be undone for some other reason, the transaction is canceled by calling the *rollback*() method. Otherwise, *commit*() is called to clear the transaction log, thereby indicating that all the changes in the transaction were committed and that the transaction as a whole was posted.

Since new rows have already been written to disk, rows that were added during the transaction are deleted. In the case of DBF (dBASE) tables, the rows are marked as deleted, but are not physically removed from the table. If you want to actually remove them, you can pack the table with *packTable*(). Rows that were just edited are returned to their saved values.

All locks made during a transaction are maintained until the transaction is completed. This ensures that no one else can make any changes until the transaction is committed or abandoned.

rowCount()

Topic group Related topics

Returns the logical row count.

Property of

Rowset

Description

rowCount() returns the logical row count of the rowset, if known. The logical row count is the number of rows in the rowset, using the rowset's current index and filter conditions.

Determining the logical row count is often an expensive operation, requiring that the rows actually be counted individually. When the count is not known, *rowCount*() returns the value -1; it does not attempt to get the count. If your application requires the actual row count, use the *count*() method to count the rows if *rowCount*() returns -1.

Note: *rowCount*() is different from the function RECCOUNT(). RECCOUNT() returns the number of physical records in a table. *rowCount*() returns the logical count in a rowset. These numbers are not guaranteed to be the same, even with a SELECT * query of a DBF table, because *rowCount*() must consider deleted records—it does not know if there are any unless it actually looks—while RECCOUNT() does not.

rowNo()

Topic group Related topics

Returns the current logical row number in the rowset.

Property of

Rowset

Description

rowNo() returns the current logical row number in the rowset, if known. The logical row number is the relative row number, using the rowset's current index and filter conditions. The first row is row number 1 and the last row is equal to the number of rows in the current rowset.

In some cases, for example scrolling with the scrollbar in a grid to an arbitrary location and clicking on a row, the logical row number is not known, and would have to be calculated. In contrast, if you were to page down repeatedly to that same location, the row number is known, because it is updated as you move from page to page in the grid. When the row number is not known, *rowNo*() returns the value -1.

Note: *rowNo*() is different from the function RECNO(). RECNO() returns the physical record number of the current row in a DBF table, which never changes (unless the table is PACKed). *rowNo*() returns the logical row number; the same physical record will have a different logical row number, depending on the current index and filter.

rowset

Topic group Related topics

A reference to the query's or stored procedure's rowset, or a data module's primary rowset.

Property of

DataModule, Query, StoredProc

Description

A Query object always contains a *rowset* property, but that property does not refer to a valid Rowset object until the query has been activated and the rowset has been opened.

Some stored procedures generate rowsets. If that is the case, the StoredProc object's *rowset* property refers to that rowset after the stored procedure is executed.

A data module may designate a primary rowset. This rowset is assigned to a form's *rowset* property by the Form designer when the data module is used in the form.

For Query and StoredProc objects, the *rowset* property is read-only.

save()

Topic group Related topics

Saves the current row buffer.

Syntax

<oRef>.*save*()

<oRef>

The rowset you want to save.

Property of

Rowset

Description

A row is saved automatically if it has been modified and there is either navigation in the rowset, a mode change, or the rowset's query is closed. You may call *save*() explicitly to write the row buffer. By design, *save*() has no effect if the rowset's *modified* property is *false*, because supposedly there are no changes to save; and a successful *save*() sets the *modified* property to *false*, to reflect that the values in the controls are the ones on disk. You can manipulate the *modified* property to control this designed behavior.

The *canSave* event fires after calling *save*(). If there is no *canSave* event handler, or *canSave* returns *true*, then the row buffer is saved, the *modified* property is set to *false*, and the *onSave* event fires.

The row cursor does not move after a *save*() unless the values that were saved cause the row to become out-of-set, in which case the row cursor is moved to the next available row, or the end-of-set if there are no more available rows.

Changes are written to disk unless the *cacheUpdates* property is set to *true*, in which case the changes are cached. Whether the changes are actually written to a physical disk depends on the operating system and its own disk caches, if any.

scale

Topic group Related topics

The scale of an SQL-based field.

Property of

SqlField

Description

scale represents the scale of the field represented by the SqlField object.

session

Topic group Related topics

The Session object to which the database, query, or stored procedure is assigned.

Property of

Database, Query, StoredProc

Description

A database must be assigned to a session. When created, a Database object is assigned to the default session.

A query or stored procedure must be assigned to a database, which in turn is assigned to a session. When created, a Query or StoredProc object is assigned to the default database in the default session.

To assign the object to the default database in another session, assign that session to the *session* property. Assigning the *session* property always sets the *database* property to the default database in that session.

To assign the object to another database in another session, assign the object to that session first. This makes the databases in that session available to the object.

share

Topic group

How to share data access resources.

Property of

Database, DataModRef

Description

The *share* property controls how database connections and data modules are shared. *share* is an enumerated property that can be one of the following:

Value	Description
0	None
1	All

Database objects

Multiple Database objects may share the same database connection. Sharing database connections reduces resource usage on both the client and server. Some servers have a maximum number of simultaneous connections, so sharing connections will also allow more users to connect to the server.

When set to All (the default), all Database objects with the same *databaseName* property (running in the same instance of *Visual* dBASE) will share the same database connection. When set to None, each Database object will use its own connection.

DataModref objects

When set to All, all DataModRef objects with the same *dataModClass* property will share the same instance of that class; the same DataModule object. This means that, for example navigation performed by one user of the DataModRef is seen by all users of that same *dataModClass* if their *share* property is also All. Data module sharing is only useful in limited cases. For typical usage, *share* should be None, the default.

source

Topic group Related topics

The source rowset or table of an UpdateSet operation.

Property of

UpdateSet

Description

The *source* property contains an object reference to a rowset or the name of a table that is the source of an UpdateSet operation. For an *append*(), *update*(), or *appendUpdate*(), it refers to the rowset or table that contains the new data. For a *copy*(), it refers to the rowset or table that is to be duplicated. For a *delete*(), the *source* property refers to the table that contains the list of rows to be deleted.

The *destination* property specifies the other end of the UpdateSet operation.

sql

Topic group | Related topics | Example

The SQL statement that describes the query.

Property of

Query

Description

The *sql* property of a Query object contains an SQL SELECT statement that describes the rowset to be generated. To use a stored procedure in an SQL server that returns a rowset, use the *procedureName* property of a StoredProc object instead.

The *sql* property must be assigned before the Query object is activated.

The SQL SELECT statement may contain an ORDER BY clause to set the row order, a WHERE clause to select a subset of rows, perform a JOIN, or any other SQL SELECT clause.

But to take full advantage of the data access objects' features—such as locating and filtering—with SQL-server-based tables, the SQL SELECT used to access a table must be a simple SELECT: all the fields from a single table, with no options. For example,

```
select * from CUSTOMER
```

If the SQL statement is not a simple SELECT, locating and filtering is performed locally, instead of by the SQL server. If the result of the SELECT is a small rowset, local searching will be fast; but if the result is a large rowset, local searching will be slow. For large rowsets, you should use a simple SELECT, or use parameters in the SQL statement and *requery*() as needed instead of relying on the Locate and Filter features.

Master-detail linking through the *masterRowset* and *masterFields* properties with SQL-server-based tables also requires a simple SELECT. An alternative is master-detail linking though Query objects with the *masterSource* property and parameters in the SQL statement. There is no simple SELECT restriction when using Standard tables.

Parameters in an SQL statement are indicated by a colon. For example,

```
select * from CUST where CUST_ID = :cust_id
```

Whenever the SQL property is assigned, it is scanned for parameters. *Visual* dBASE automatically creates corresponding elements in the query's *params* array, with the name of the parameter as the array index. For more information, see the *params* property.

In addition to assigning the SQL statement directly to the *sql* property, you may also use an SQL statement in an external file. To use an external file, place an "@" symbol before the file name in the *sql* property. For example,

```
@ORDERS.SQL
```

The external file must be a text file that contains an SQL statement.

sql example

The following SQL statement will select all the fields in the table MESSAGES:

```
select * from MESSAGES
```

state

Topic group Related topics Example

An enumerated value indicating the rowset's current mode.

Property of

Rowset

Description

The *state* property is read-only, indicating which mode the rowset is in, as listed in the following table:

Value	Mode
0	Closed
1	Browse
2	Edit
3	Append
4	Filter
5	Locate

- When the rowset's query is not active, the rowset is Closed.
- While the query is active, the rowset is in Browse mode when it's not in one of the next four modes.
- The rowset is in Edit mode after a successful *beginEdit*() (implicit or explicit) and it stays in that mode until the row is saved or abandoned.
- After a successful *beginAppend*(), it is in Append mode. It stays in that mode until the new row is saved or abandoned.
- After a *beginFilter*(), it is in Filter mode. It stays in that mode until there is an *applyFilter*() or the Filter mode is abandoned.
- After a *beginLocate*(), it is in Locate mode. It stays in that mode until there is an *applyLocate*() or the Locate mode is abandoned.

state example

The following *onClick* event handler for a button labeled “Apply” tests the rowset’s *state* property so that it calls either *applyFilter*() or *applyLocate*(), depending on the rowset’s current mode. It uses manifest constants created with the #define preprocessor directive (and available in the VDBASE.H include file) to represent the options of the *state* property, which makes the code more readable.

```
#define STATE_CLOSED   0
#define STATE_BROWSE   1
#define STATE_EDIT     2
#define STATE_APPEND   3
#define STATE_FILTER   4
#define STATE_LOCATE   5
function applyButton_onServerClick()  // Apply Filter or Locate
  do case
    case form.rowset.state == STATE_FILTER
      this.form.rowset.applyLocate()
    case form.rowset.state == STATE_LOCATE
      this.form.rowset.applyFilter()
  endcase
```

tableExists()

Topic group Related topics

Checks to see if a specified table exists in a database.

Syntax

<oRef>.*tableExists*(<table name expC>)

<oRef>

The database in which to see if the table exists.

<table name expC>

The name of the table you want to look for.

Property of

Database

Description

tableExists() returns *true* if a table with the specified name exists in the database.

To look for a Standard table, you can always use the default database in the default session by referring to it through the *databases* array property of the _app object. For example,

```
_app.databases[ 1 ].tableExists( "Billing" )
```

If you do not specify an extension, *Visual* dBASE will look for both a DBF (dBASE) and DB (Paradox) table with that name.

type [Field]

Topic group Related topics

The data type of the value stored in a field.

Property of

Field (including DbfField, PdxField, SqlField)

Description

The *type* property reflects the data type stored in the field represented by the Field object.

type [Parameter]

Topic group Related topics

An enumerated value indicating the type of parameter.

Property of

Parameter

Description

The *type* property indicates the type of parameter a Parameter object represents, as listed in the following table:

Value	Type
0	Input
1	Output
2	InputOutput
3	Result

See the Parameter object's *value* property for details on each type.

unidirectional

Topic group Related topics

Specifies whether to assume forward-only navigation to increase performance on SQL-based servers.

Property of

Query

Description

If *unidirectional* is set to *true*, previously visited rows are not cached and less communication is required between *Visual* dBASE and the SQL server. This results in fewer resources consumed and better performance, but is worthwhile only if you never want to go backward in the rowset.

If *unidirectional* is *true*, you may still be able to go backward, depending on the server, but if so it would be time-consuming.

unlock()

Topic group | Related topics | Example

Releases row and rowset locks.

Syntax

<oRef>.*unlock*()

<oRef>

The rowset that contains the lock.

Property of

Rowset

Description

unlock() releases automatic row locks and locks set by *lockRow*() and *lockSet*()

You cannot release locks during a transaction.

unprepare()

Topic group Related topics

Releases the server resources used by a query or stored procedure.

Syntax

This method is called implicitly by the Query or StoredProc object.

Property of

Query, StoredProc

Description

The *unprepare*() method cleans up after a query or stored procedure is deactivated. It is called implicitly when you set the object's *active* property to *false*. In typical usage, you do not call this method directly.

Advanced applications may override the definition of this method to perform supplementary actions when deactivating the query or stored procedure. Custom data drivers must define this method to perform any necessary actions to clean up when a query or stored procedure is deactivated.

update

Topic group Related topics Example

The date and time of the last update made to the row.

Property of

LockField

Description

Use *update* to determine the date and time the row or table was last updated. The date and time are represented in a string in the following format:

```
MM/DD/YY HH:MM:SS
```

This format is accepted by the constructor for a Date object, so you can easily convert the *update* string into an actual date/time.

This property is available only for DBF tables that have been CONVERTed.

update example

The following event handler displays the last update date and time in a Text control on a form for the current row, in GMT format.

```
function Rowset_onNavigate
  local dUpdate
  dUpdate = new Date( this.fields[ "_DBASELOCK" ].update )  // Convert to
Date
  this.parent.parent.updateText.text := iif( dUpdate.getDay() == 0, ;
    "No update on record", "Last updated on " + dUpdate.toGMTString() )
```

The *day* of an invalid or blank date is zero.

update()

Topic group Related topics

Updates existing rows in one rowset from another.

Syntax

<oRef>.*update*()

<oRef>

The UpdateSet object that describes the update.

Property of

UpdateSet

Description

Use *update*() to update a rowset. You must specify the UpdateSet object's *indexName* property that will be used to match the records. The index must exist for the destination rowset. The original values of all changed records will be copied to the table specified by the UpdateSet object's *changedTableName* property.

To add new rows and update existing rows only, use the *appendUpdate*() method instead.

updateWhere

Topic group Related topics

Determines which fields to use in constructing the WHERE clause in an SQL UPDATE statement. SQL-based servers only.

Property of

Query

Description

updateWhere is an enumerated property that may be one of the following values:

Value	Description
0	All fields
1	Key fields
2	Key fields and changed fields

user

Topic group | Related topics | Example

The name of the user that last locked or updated the row.

Property of

LockField

Description

Use *user* to determine the username of the person that currently has a lock when a lock attempt fails, or the name of the user that last had a lock on the row. The maximum length of *user* depends on the size of the _DBASELOCK field specified when the table was CONVERTed.

This property is available only for DBF tables that have been CONVERTed.

user()

Topic group Related topics

Returns the login name of the user currently logged in to the session.

Syntax

<oRef>.*user*()

<oRef>

The session you want to check.

Property of

Session

Description

user() returns the login name of the user currently logged in to a session on a system that has DBF table security in place. If no DBF table security has been configured, or no one has logged in to the session, *user*() returns an empty string.

value [Field]

Topic group Related topics Example

The value of a field in the row buffer.

Property of

Field (including DbfField, PdxField, SqlField)

Description

All of the Field objects in the rowset's *fields* array property have a *value* property, which reflects the value of the field in the row buffer, which in turn reflects the values of the fields in the current row.

You may attempt to change the value of a *value* property directly by assignment, in which case the attempt occurs immediately, or through a *dataLink*ed control, in which case the attempt occurs when the control loses focus. In either case, the field's *canChange* property fires to see whether the change is allowed. If *canChange* returns *false*, then the assignment doesn't take; if the change was through a *dataLink*ed control, the control still contains the proposed new value. If *canChange* returns *true* or there is no *canChange* event handler, the field's value is changed and the *onChange* event fires.

When a field is changed, the rowset's *modified* property is automatically set to *true* to indicate that the rowset has been changed.

By using a field's *beforeGetValue* event, you can make the *value* property appear to be something else besides what is in the row buffer.

value [Field] example

The following example is the *onClick* event handler for a Reply button in an E-mail viewer. It copies the name from the From field of the original to the To field of the reply and duplicates the Subject field. After setting the *value* properties, the rowset's *modified* property is set to *false* to indicate that these are the default values.

```
function replyButton_onClick()
  local cTo, cSubject
  cTo      = form.rowset.fields[ "From"    ].value
  cSubject = form.rowset.fields[ "Subject" ].value
  if form.rowset.beginAppend()
    form.rowset.fields[ "To"      ].value = cTo
    form.rowset.fields[ "Subject" ].value = cSubject
    form.rowset.modified = false
  endif
```

value [Parameter]

Topic group Related topics Example

The input, output, or result value of a stored procedure.

Property of

Parameter

Description

Values are transmitted to and from stored procedures through Parameter objects. Each object's *type* property indicates what type of parameter the object represents. Depending on which one of the four types the parameter is, its *value* property is handled differently.

- Input: an input value for the stored procedure. The *value* must be set before the stored procedure is called.
- Output: an output value from the stored procedure. The *value* must be set to the correct data type before the stored procedure is called; any dummy value may be used. Calling the stored procedure sets the *value* property to the output value.
- InputOutput: both input and output. The *value* must be set before the stored procedure is called. Calling the stored procedure updates the *value* property with the output value.
- Result: the result value of the stored procedure. In this case, the stored procedure acts like a function, returning a single result value, instead of updating parameters that are passed to it. Otherwise, the *value* is treated like an output value. The name of the Result parameter is always "Result".

If a Parameter object is assigned as the *dataLink* of a component in a form, changes to the component are reflected in the *value* property of the Parameter object, and updates to the *value* property of the Parameter object are displayed in the component.

value [Parameter] example

The following statements call a stored procedure that returns an output parameter. The result is displayed in the Script Pad.

```
d = new Database()
d.databaseName = "IBLOCAL"
d.active = true
p = new StoredProc()
p.database = d
p.procedureName = "DEPT_BUDGET"
p.params[ "DNO" ].value = "670"                    // Set input parameter
p.active = true
? p.params[ "TOT" ].value                           // Display output
```

Form objects

Topic group

Forms are the primary visual components in *Visual* dBASE applications. You can create forms visually through the Form wizard or Form designer, or programatically by writing code and saving your work as a .WFM file.

Common visual component properties

Topic group

These properties, events, and methods are common to many visual form components:

Property	Default	Description
before		The next object in the z-order
borderStyle	Default	Specifies whether a box border appears (0=Default, 1=Raised, 2=Lowered, 3=None, 4=Single, 5=Double, 6-Drop Shadow, 7=Client, 8=Modal, 9=Etched In, 10=Etched Out)
enabled	true	Whether a component can get focus and operate
fontBold	false	Whether the text in a component appears in bold face
fontItalic	false	Whether the text in a component appears italicized
fontName	Arial	The typeface of the text in a component
fontSize	10	The point size of the text in a component
fontStrikeout	false	Whether the text in a component appears striked-through
fontUnderline	false	Whether the text in a component is displayed underlined
form		The form that contains a component
height		Height in the form's current *metric* units
helpFile		Help file name
helpId		Help index topic or context number for context-sensitive help
hWnd		The Windows handle for a component
id	-1	Supplementary control ID number
left	0	The location of the left edge of a component in the form's current *metric* units, relative to the left edge of its container
mousePointer	0	The mouse pointer type when the pointer is over a component
name		The name of a component
pageno	1	The page of the form on which a component appears
parent		A component's immediate container
printable	true	Whether a component is printed when the form is printed
speedTip		Tool tip displayed when pointer hovers over a component
statusMessage		Message displayed in status bar when a component has focus
tabStop	true	Whether a component is in the tab sequence
top	0	The location of the top edge of a component in the form's current *metric* units, relative to the top edge of its container
visible	true	Whether a component is visible
width		Width in the form's current *metric* units

Event	Parameters	Description
canRender		Reports only: before a component is rendered; return value determines whether component is rendered
onDesignOpen	<from palette expL>	After a component is first added from the palette and then every time the form is opened in the Form Designer
onGotFocus		After a component gains focus
onHelp		When F1 is pressed—overrides context-sensitive

		help
onLeftDblClick	<flags expN>, <column expN>, <row expN>	When the left mouse button is double-clicked
onLeftMouseDown	<flags expN>, <column expN>, <row expN>	When the left mouse button is pressed
onLeftMouseUp	<flags expN>, <column expN>, <row expN>	When the left mouse button is released
onLostFocus		After a component loses focus
onMiddleDblClick	<flags expN>, <column expN>, <row expN>	When the middle mouse button is double-clicked
onMiddleMouseDown	<flags expN>, <column expN>, <row expN>	When the middle mouse button is pressed
onMiddleMouseUp	<flags expN>, <column expN>, <row expN>	When the middle mouse button is released
onMouseMove	<flags expN>, <column expN>, <row expN>	When the is moved over a component
onOpen		After the form containing a component is opened
onRender		Reports only: after a component is rendered
onRightDblClick	<flags expN>, <column expN>, <row expN>	When the right mouse button is double-clicked
onRightMouseDown	<flags expN>, <column expN>, <row expN>	When the right mouse button is pressed
onRightMouseUp	<flags expN>, <column expN>, <row expN>	When the right mouse button is released
when	<form open expL>	When attempting to give focus to a component; return value determines whether the component gets focus.

Method	**Parameters**	**Description**
move()	<left expN> [,<top expN> [,<width expN> [,<height expN>]]]	Repositions and/or resizes a component
release()		Explicitly releases a component from memory
setFocus()		Sets focus to a component

class ActiveX

Topic group Related topics

Representation of an ActiveX control.

Syntax

[<oRef> =] new ActiveX(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created ActiveX object.

<container>

The container—typically a Form object—to which you're binding the ActiveX object.

<name expC>

An optional name for the ActiveX object. If not specified, the ActiveX class will auto-generate a name for the object.

Properties

The following table lists the properties of interest in the ActiveX class. (No particular events or methods are associated with this class.)

Property	Default	Description
anchor	None	How the ActiveX object is anchored in its container (0=None, 1=Bottom, 2=Top, 3=Left, 4=Right, 5=Center, 6=Container)
classId		The ID string that identifies the ActiveX control
className	ACTIVEX	Identifies the object as an instance of the ActiveX class
description		A short description of the ActiveX control
nativeObject		The object that contains the ActiveX control's own properties, events, and methods

The following table lists the common properties, events, and methods of the ActiveX class:

Property		Event	Method
before	*pageno*	none	*move*()
borderStyle	*parent*		*release*()
form	*printable*		*setFocus*()
height	*top*		
left	*width*		
name			

Description

An ActiveX object in *Visual* dBASE is a place holder for an ActiveX control, not an actual ActiveX control.

To include an ActiveX control in a form, create an ActiveX object on the form. Set the *classId* property to the component's ID string.Once the *classId* is set, the component inherits all the published properties, events, and methods of the ActiveX control, which are accessible through the *nativeObject* property. The object can be used just like a native *Visual* dBASE component.

class Browse

Topic group Related topics

A data-editing tool that displays multiple records in row-and-column format.

Syntax

[<oRef> =] new Browse(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created Browse object.

<container>

The container—typically a Form object—to which you're binding the Browse object.

<name expC>

An optional name for the Browse object. If not specified, the Browse class will auto-generate a name for the object.

Properties

The following tables list the properties, events, and methods of interest in the Browse class.

Property	Default	Description
alias		The table that is accessed
anchor	None	How the Browse object is anchored in its container (0=None, 1=Bottom, 2=Top, 3=Left, 4=Right, 5=Center, 6=Container)
append	true	Whether rows can be added
className	BROWSE	Identifies the object as an instance of the Browse class
colorHighlight	WindowText /Window	The color of the highlighted cell
colorNormal	WindowText /Window	The color of all other cells
cuaTab	true	Whether pressing Tab follows CUA behavior and moves to next control, or moves to next cell
fields		The fields to display, and the options to apply to each field
modify	true	Whether the user can alter data
scrollBar	Auto	When a scroll bar appears for the Browse object (0=Off, 1=On, 2=Auto, 3=Disabled)
text		The caption to display in the header

Event	Parameters	Description
onAppend		After a record is added to the table
onChange		After the user changes a value

onNavigate	After the user moves to a different record

Method	Parameters	Description
copy()		Copies selected text to the Windows Clipboard
cut()		Cuts selected text and to the Windows Clipboard
keyboard()	<expC>	Simulates typed user input to the Browse object
paste()		Copies text from the Windows clipboard to the current cursor position
undo()		Reverses the effects of the most recent *cut*(), *copy*(), or *paste*() action

The following table lists the common properties, events, and methods of the Browse class:

Property		Event		Method
before	*id*	*onDesignOpen*	*onMiddleMouseDown*	*move*()
borderStyle	*left*	*onGotFocus*	*onMiddleMouseUp*	*release*()
enabled	*mousePointer*	*onHelp*	*onMouseMove*	*setFocus*()
fontBold	*name*	*onLeftDblClick*	*onOpen*	
fontItalic	*pageno*	*onLeftMouseDown*	*onRightDblClick*	
fontName	*parent*	*onLeftMouseUp*	*onRightMouseDown*	
fontSize	*printable*	*onLostFocus*	*onRightMouseUp*	
form	*statusMessage*	*onMiddleDblClick*	*when*	
height	*tabStop*			
helpFile	*top*			
helpId	*visible*			
hWnd	*width*			

Description

The Browse object is maintained for compatibility and is suitable only for viewing and editing tables open in work areas. For forms that use data access objects, use a Grid object instead.

Two properties specify which table is displayed in the Browse object.

- The *view* property of the parent form
- The *alias* property of the browse object

You can specify individual fields to display with the *fields* property. For example, if the browse object's form is based on a query, you use *fields* to display fields from any of the query's tables. (You must specify a file with *alias* before you can use *fields*.)

class CheckBox

Topic group Related topics

A check box on a form.

Syntax

[<oRef> =] new CheckBox(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created CheckBox object.

<container>

The container—typically a Form object—to which you're binding the CheckBox object.

<name expC>

An optional name for the CheckBox object. If not specified, the CheckBox class will auto-generate a name for the object.

Properties

The following tables list the properties and events of interest in the CheckBox class. (No particular methods are associated with this class.)

Property	Default	Description
className	CHECKBOX	Identifies the object as an instance of the CheckBox class
colorNormal	BtnText/BtnFace	The color of the checkbox's text label
dataLink		The Field object that is linked to the CheckBox
group		The group to which the check box belongs
text	<same as name>	The text label that appears beside the check box
textLeft	false	Whether the check box's text label appears to the left or to the right of the check box
transparent	false	Whether the CheckBox object has the same background color or image as its container
value		The current value of the check box (*true* or *false*)

Event	Parameters	Description
onChange		After the check box is toggled

The following table lists the common properties, events, and methods of the CheckBox class:

Property		Event		Method
before	*id*	*canRender*	*onMiddleMouseDown*	*move*()
borderStyle	*left*	*onDesignOpen*	*onMiddleMouseUp*	*release*()
enabled	*mousePointer*	*onGotFocus*	*onMouseMove*	*setFocus*()
fontBold	*name*	*onHelp*	*onOpen*	
fontItalic	*pageno*	*onLeftDblClick*	*onRender*	
fontName	*parent*	*onLeftMouseDown*	*onRightDblClick*	
fontSize	*printable*	*onLeftMouseUp*	*onRightMouseDown*	
fontStrikeout	*speedTip*	*onLostFocus*	*onRightMouseUp*	
fontUnderline	*statusMessage*	*onMiddleDblClick*	*when*	
form	*tabStop*			
height	*top*			
helpFile	*visible*			
helpId	*width*			
hWnd				

Description

Use a CheckBox component to represent a *true*/*false* value.

class ComboBox

Topic group Related topics

A component on a form which can be temporarily expanded to show a list from which you can pick a single item.

Syntax

[<oRef> =] new ComboBox(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created ComboBox object.

<container>

The container—typically a Form object—to which you're binding the ComboBox object.

<name expC>

An optional name for the ComboBox object. If not specified, the ComboBox class will auto-generate a name for the object.

Properties

The following tables list the properties, events, and methods of the ComboBox class.

Property	Default	Description
autoDrop	false	Whether the drop-down list automatically drops down when the combobox gets focus
className	COMBOBOX	Identifies the object as an instance of the ComboBox class
colorNormal	WindowText /Window	The color of the text in the ComboBox object
dataLink		The Field object that is linked to the ComboBox object
dataSource		The option strings of the ComboBox object
dropDownHeight		The number of options displayed in the drop-down list
dropDownWidth		The width of the drop-down list in the form's current metric units
sorted	false	Whether the options are sorted
style	DropDown	The style of the ComboBox: 0=Simple, 1=DropDown, 2=DropDownList
value		The value of the currently selected option

Event	Parameters	Description
key	<char expN>, <position expN>, <shift expL>, <ctrl expL>	When a key is pressed. Return value may change or cancel keystroke.
onChange		After the selection has changed and the ComboBox object loses focus, but before *onLostFocus*

Method	Parameters	Description
copy()		Copies selected text to the Windows clipboard
cut()		Cuts selected text and to the Windows clipboard
keyboard()	<expC>	Simulates typed user input to the ComboBox object
paste()		Copies text from the Windows clipboard to the current cursor

	position
undo()	Reverses the effects of the most recent *cut*(), *copy*(), or *paste*() action

The following table lists the common properties, events, and methods of the ComboBox class:

Property		Event		Method
before	*id*	*canRender*	*onMiddleMouseDown*	*move*()
borderStyle	*left*	*onDesignOpen*	*onMiddleMouseUp*	*release*()
enabled	*mousePointer*	*onGotFocus*	*onMouseMove*	*setFocus*()
fontBold	*name*	*onHelp*	*onOpen*	
fontItalic	*pageno*	*onLeftDblClick*	*onRender*	
fontName	*parent*	*onLeftMouseDown*	*onRightDblClick*	
fontSize	*printable*	*onLeftMouseUp*	*onRightMouseDown*	
fontStrikeout	*speedTip*	*onLostFocus*	*onRightMouseUp*	
fontUnderline	*statusMessage*	*onMiddleDblClick*	*when*	
form	*tabStop*			
height	*top*			
helpFile	*visible*			
helpId	*width*			
hWnd				

Description

Use a ComboBox object when you want the user to pick one item from a list. When the user is not choosing an item, the list is not visible. The list of options is set with the *dataSource* property.

If a ComboBox is *dataLink*ed to a field object that has implemented its *lookupSQL* or *lookupRowset* properties, the combobox will automatically be populated with the appropriate lookup values, and store the corresponding key values in the *dataLink*ed field.

class Container

Topic group

A container for other controls.

Syntax

[<oRef> =] new Container(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created Container object.

<container>

The container—typically a Form object—to which you're binding the Container object.

<name expC>

An optional name for the Container object. If not specified, the Container class will auto-generate a name for the object.

Properties

The following table lists the properties of interest in the Container class. (No particular events or methods are associated with this class.)

Property	Default	Description
className	CONTAINER	Identifies the object as an instance of the Container class
colorNormal	BtnFace	The background color
expandable	true	Reports only: whether the container expands to show all its components
transparent	false	Whether the container has the same background color or image as the its own container (usually the form)

The following table lists the common properties, events, and methods of the Container class:

Property		Event		Method
before	*name*	*canRender*	*onMiddleMouseDown*	*move*()
borderStyle	*pageno*	*onDesignOpen*	*onMiddleMouseUp*	*release*()
form	*parent*	*onLeftDblClick*	*onMouseMove*	
height	*printable*	*onLeftMouseDown*	*onRender*	
hWnd	*top*	*onLeftMouseUp*	*onRightDblClick*	
left	*visible*	*onMiddleDblClick*	*onRightMouseDown*	
mousePointer	*width*		*onRightMouseUp*	

Description

Use the Container object to create groups of controls, a custom control that contain multiple controls, or to otherwise group controls in a form. When a control is dropped in a Container object, it becomes a child object of the Container object. Its *parent* property references the container, while its *form* property references the form.

To make the rectangle that contains the controls invisible, set the *borderStyle* property to None (3) and the *transparent* property to *true*.

class Editor

Topic group Related topics

A multiple-line text input field on a form.

Syntax

[<oRef> =] new Editor(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created Editor object.

<container>

The container—typically a Form object—to which you're binding the Editor object.

<name expC>

An optional name for the Editor object. If not specified, the Editor class will auto-generate a name for the object.

Properties

The following tables list the properties, events, and methods of interest in the Editor class.

Property	Default	Description
anchor	None	How the Editor object is anchored in its container (0=None, 1=Bottom, 2=Top, 3=Left, 4=Right, 5=Center, 6=Container)
border	true	Whether the Editor object is surrounded by the border specified by *borderStyle*
className	EDITOR	Identifies the object as an instance of the Editor class
colorNormal	WindowText /Window	The color of the text in the Editor object
cuaTab	true	Whether pressing Tab follows CUA behavior and moves to next control, or inserts tab in text
dataLink		The Field object that is linked to the Editor object
evalTags	true	Whether to evaluate any HTML formatting tags in the text or display them as-is
lineNo	1	The current line number in the editor
marginHorizontal		The horizontal margin between the text and its rectangular frame
marginVertical		The vertical margin between the text and its rectangular frame
modify	true	Whether the text is editable or not
popupEnable	true	Whether the Editor object's context menu is available
scrollBar	Auto	When a scroll bar appears for the Editor object (0=Off, 1=On, 2=Auto, 3=Disabled)
value		The string currently displayed in the Editor object
wrap	true	Whether to word-wrap the text in the editor

Event	Parameters	Description
onChange		After the string in the Editor object has changed and the Editor object loses focus, but before *onLostFocus*
valid		When attempting to remove focus. Must return *true*, or focus remains.

Method	Parameters	Description
copy()		Copies selected text to the Windows clipboard
cut()		Cuts selected text and to the Windows clipboard
keyboard()	<expC>	Simulates typed user input to the Editor object
paste()		Copies text from the Windows clipboard to the current cursor position
undo()		Reverses the effects of the most recent *cut*(), *copy*(), or *paste*() action

The following table lists the common properties, events, and methods of the Editor class:

Property		Event		Method
before	*id*	*canRender*	*onMiddleMouseDown*	*move*()
borderStyle	*left*	*onDesignOpen*	*onMiddleMouseUp*	*release*()
enabled	*mousePointer*	*onGotFocus*	*onMouseMove*	*setFocus*()
fontBold	*name*	*onHelp*	*onOpen*	
fontItalic	*pageno*	*onLeftDblClick*	*onRender*	
fontName	*parent*	*onLeftMouseDown*	*onRightDblClick*	
fontSize	*printable*	*onLeftMouseUp*	*onRightMouseDown*	
fontStrikeout	*speedTip*	*onLostFocus*	*onRightMouseUp*	
fontUnderline	*statusMessage*	*onMiddleDblClick*	*when*	
form	*tabStop*			
height	*top*			
helpFile	*visible*			
helpId	*width*			
hWnd				

Description

Use a Editor component to display and edit multi-line text. To display the text but not allow changes, set the *modify* property to *false*.The Editor component understands and displays basic HTML formatting tags. It has a context menu that is accessible by right-clicking the editor (unless its *popupEnable* property is *false*). The context menu lets you find and replace text, toggle word wrapping and HTML formatting, and show or hide the Format toolbar.

class Entryfield

Topic group Related topics

A single-line text input field on a form.

Syntax

[<oRef> =] new Entryfield(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created Entryfield object.

<container>

The container—typically a Form object—to which you're binding the Entryfield object.

<name expC>

An optional name for the Entryfield object. If not specified, the Entryfield class will auto-generate a name for the object.

Properties

The following tables list the properties, events, and methods of interest in the Entryfield class.

Property	Default	Description
border	true	Whether the Entryfield object is surrounded by the border specified by *borderStyle*
className	ENTRYFIELD	Identifies the object as an instance of the Entryfield class
colorHighlight		The color of the text in the Entryfield object when the object has focus
colorNormal	WindowText /Window	The color of the text in the Entryfield object when the object does not have focus
dataLink		The Field object that is linked to the Entryfield object
function		A text formatting function
maxLength		The maximum length of the text in the Entryfield object
memoEditor		The memo editor control used when editing a memo field
phoneticLink		The control that mirrors the phonetic equivalent of the current value
picture		Formatting template
selectAll	true	Whether the entryfield contents are initially selected when the Entryfield object gets focus
validErrorMsg	Invalid input	The message that is displayed when the *valid* event fails
validRequired	false	Whether to fire the *valid* event even when no change has been made
value		The value currently displayed in the Entryfield object

Event	Parameters	Description
key	<char expN>, <position expN>, <shift expL>, <ctrl expL>	When a key is pressed. Return value may change or cancel keystroke.
onChange		After the string in the Entryfield object has changed and the Entryfield object loses focus, but before *onLostFocus*
valid		When attempting to remove focus. Must return *true*, or

focus remains.

Method	Parameters	Description
copy()		Copies selected text to the Windows clipboard
cut()		Cuts selected text and to the Windows clipboard
keyboard()	<expC>	Simulates typed user input to the Entryfield object
paste()		Copies text from the Windows clipboard to the current cursor position
showMemoEditor()		Opens the specified *memoEditor*
undo()		Reverses the effects of the most recent *cut*(), *copy*(), or *paste*() action

The following table lists the common properties, events, and methods of the Entryfield class:

Property		Event		Method
before	*id*	*canRender*	*onMiddleMouseDown*	*move*()
borderStyle	*left*	*onDesignOpen*	*onMiddleMouseUp*	*release*()
enabled	*mousePointer*	*onGotFocus*	*onMouseMove*	*setFocus*()
fontBold	*name*	*onHelp*	*onOpen*	
fontItalic	*pageno*	*onLeftDblClick*	*onRender*	
fontName	*parent*	*onLeftMouseDown*	*onRightDblClick*	
fontSize	*printable*	*onLeftMouseUp*	*onRightMouseDown*	
fontStrikeout	*speedTip*	*onLostFocus*	*onRightMouseUp*	
fontUnderline	*statusMessage*	*onMiddleDblClick*	*when*	
form	*tabStop*			
height	*top*			
helpFile	*visible*			
helpId	*width*			
hWnd				

Description

Entryfield objects are the primary data display and entry component.

class Form

Topic group

A Form object.

Syntax

[<oRef> =] new Form([<title expC>])

<oRef>

A variable or property in which to store a reference to the newly created Form object.

<title expC>

An optional title for the Form object. If not specified, the title will be “Form”.

Properties

The following tables list the properties, events, and methods of the Form class.

Property	Default	Description
activeControl		The currently active control
autoCenter	false	Whether the form automatically centers on-screen when it is opened
autoSize	false	Whether the form automatically sizes itself to display all its components
background		Background image
className	FORM	Identifies the object as an instance of the Form class
clientEdge	false	Whether the edge of the form has the sunken client appearance
colorNormal	BtnFace	Background color
cuaEnter	true	Whether pressing Enter follows CUA behavior and submits the form, or moves to the next control
designView		A view that is used when designing the form
elements		An array containing object references to the components on the form
escExit	true	Whether pressing Esc closes the form
first		The first component on the form in the z-order
	0	
hWndClient		The Windows handle for the form's client area
icon		An icon file or resources that displays when the form is minimized
inDesign		Whether the form was instantiated by the Form designer
maximize	true	Whether the form can be maximized when not MDI
mdi	true	Whether the form is MDI or SDI
menuFile		The name of the form’s .MNU menu file
metric	Chars	Units of mesurement (0=Chars, 1=Twips, 2=Points, 3=Inches, 4=Centimeters, 5=Millimeters, 6=Pixels)
minimize	true	Whether the form can be minimized when not MDI
moveable	true	Whether the form is moveable when not MDI
nextObj		The object that’s about to receive focus
popupMenu		The form’s Popup menu object
refreshAlways	true	Whether to refresh the form after all form-based navigation and

		updates
rowset		The primary rowset
scaleFontBold	false	Whether the base font used for the Chars *metric* is boldface
scaleFontName	Arial	The base font used for the Chars *metric*
scaleFontSize	10	The point size of the base font used for the Chars *metric*
scrollBar	Off	When a scroll bar appears for the form (0=Off, 1=On, 2=Auto, 3=Disabled)
showSpeedTip	true	Whether to show tool tips
sizeable	true	Whether the form is resizeable when not MDI
smallTitle	false	Whether the form has the smaller palette-style title bar when not MDI
sysMenu	true	Whether the form's system menu icon and close icon are displayed when not MDI
text		The text that appears in the form's title bar
topMost	false	Whether the form stays on top when not MDI
useTablePopup	false	Whether to use the default table navigation popup when no popup is assigned as the form's *popupMenu*.
view		The query or table on which the form is based
windowState	Normal	The state of the window (0=Normal, 1=Minimized, 2=Maximized)

Event	**Parameters**	**Description**
canClose		When attempting to close form; return value allows or disallows closure
canNavigate	<workarea expN>	When attempting to navigate in work area; return value allows or disallows leaving current record
onAppend		After a new record is added
onChange	<workarea expN>	After leaving a record that was changed, before *onNavigate*
onClose		After the form has been closed
onMove		After the form has been moved
onNavigate	<workarea expN>	After navigation in a work area
onSelection	<control ID expN>	After the form is submitted
onSize	<expN>	After the form is resized or changes *windowState*

Method	**Parameters**	**Description**
abandonRecord()		Abandons changes to the current record
beginAppend()		Starts append of new record
close()		Closes the form
isRecordChanged()		Checks whether the current record buffer has changed
open()		Loads and opens the form
pageCount()		Returns the highest *pageno* of any component
print()		Prints the form
readModal()		Opens the form modally

refresh()		Redraws the form
saveRecord()		Saves changes to the current or new record
showFormatBar()	<expL>	Displays or hides the formatting toolbar

The following table lists the common properties, events, and methods of the Form class:

Property		Event		Method
enabled	*mousePointer*	*onDesignOpen*	*onMiddleMouseDown*	*move*()
height	*pageno*	*onGotFocus*	*onMiddleMouseUp*	*release*()
helpFile	*statusMessage*	*onHelp*	*onMouseMove*	*setFocus*()
helpId	*top*	*onLeftDblClick*	*onOpen*	
hWnd	*visible*	*onLeftMouseDown*	*onRightDblClick*	
left	*width*	*onLeftMouseUp*	*onRightMouseDown*	
		onLostFocus	*onRightMouseUp*	
		onMiddleDblClick		

Description

A Form object acts as a container for other visual components (also known as controls) and the data access objects that are linked to them. Consequently, releasing a form object from memory automatically releases the objects it contains.

An object reference to all the visual components in a form is stored in its *elements* array. All of the visual components have a *form* property that points back to the form.

The form has a *rowset* property that refers to its primary rowset. Components can access this rowset in their event handlers generically with the object reference *form.rowset*. For example, a button on a form that goes to the first row in the rowset would have an *onClick* event handler like this:

```
function firstButton_onClick()
  form.rowset.first()
```

```
If the form has more than one rowset, each one can be addressed through the
rowset property of the Query objects, which are properties of the form. For
example, to go to the last row in the rowset of the Query object members1,
the onClick event handler would look like this:
```

```
function lastMemberButton_onClick()
  form.members1.rowset.last()
```

A form can consist of more than one page. One way to implement multi-page forms is to use the *pageno* property of controls to determine on which page they appear, and use a TabBox control to let users easily switch between pages. You may also use a NoteBook control to create a multi-page container in a form.

You can create two types of forms: modal and modeless. A modal form halts execution of the routine that opened it until the form is closed. When active, it takes control of the user interface; users can't switch to another window in the same application without exiting the form. A dialog box is an example of a modal form; when it is opened, program execution stops and focus can't be given to another window until the user closes the dialog box.

In contrast a modeless form window allows users to freely switch to other windows in an application. Most forms that you create for an application will be modeless. A modeless form window conforms to the Multiple Document Interface (MDI) protocol, which lets you open multiple document windows within an application window.

To create and use a modeless form, set the *mdi* property to *true* and open the form with the *open*() method. To create and use a modal form, set *mdi* to *false* and open the form with the *readModal*() method.

You can also create SDI (Single Document Interface) windows that appear like application windows. To do so, set the *mdi* property to *false* and use SHELL(*false*). SHELL(*false*) hides the standard *Visual* dBASE environment and lets your form take over the user interface. The *Visual* dBASE application

window disappears, and the form name appears in the Windows Task List.

class Grid

Topic group Related topics

A grid of other controls.

Syntax

[<oRef> =] new Grid(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created Grid object.

<container>

The container—typically a Form object—to which you're binding the Grid object.

<name expC>

An optional name for the Grid object. If not specified, the Entryfield class will auto-generate a name for the object.

`Properties`

The following tables list the properties, events, and methods of interest in the Grid class.

Property	Default	Description
allowAddRows	true	Whether navigating down past the last row automatically calls *beginAppend*()
allowColumnMoving	true	Whether columns may be moved with the mouse
allowColumnSizing	true	Whether columns may be sized with the mouse
allowEditing	true	Whether editing is allowed or the grid is read-only
allowRowSizing	true	Whether rows may be sized with the mouse
anchor	None	How the Grid object is anchored in its container (0=None, 1=Bottom, 2=Top, 3=Left, 4=Right, 5=Center, 6=Container)
bgColor	white	Background color
cellHeight		The height of each cell
className	GRID	Identifies the object as an instance of the Grid class
columnCount		The number of columns in the grid
columns		An array of objects for each column in the grid
cuaTab	false	Whether pressing Tab follow CUA behavior and moves to next control, or moves to next cell
currentColumn		The number of the column that has focus in the grid
dataLink		The Rowset object that is linked to the grid
dragScrollRate	300	The delay time, in milliseconds, between each column scroll when dragging columns
gridLineWidth	1	Width of grid lines in pixels (0=no grid lines)
hasColumnHeading	true	Whether column headings are displayed
hasColumnLines	true	Whether column (vertical) grid lines are displayed
hasIndicator	true	Whether the indicator column is displayed
hasRowLines	true	Whether row (horizontal) grid lines are displayed
hScrollBar	Auto	When a horizontal scrollbar appears (0=Off, 1=On, 2=Auto, 3=Disabled)
integralHeight	false	Whether a partial row at the bottom of the grid is displayed
multiSelect	false	Whether multiple rows may be visually selected

rowSelect	false	Whether the entire row is visually selected
vScrollBar	Auto	When a vertical scrollbar appears (0=Off, 1=On, 2=Auto, 3=Disabled)

Event	Parameters	Description
onFormSize		After the form containing the grid is resized
onSelChange		After moving to another row in the grid

Method	Parameters	Description
refresh()		Repaints the grid
selected()		Returns an array of bookmarks for the currently selected rows in the grid

The following table lists the common properties, events, and methods of the Grid class:

Property		Event		Method
before	*name*	*onDesignOpen*	*onMiddleMouseDown*	*move*()
borderStyle	*pageno*	*onGotFocus*	*onMiddleMouseUp*	*release*()
enabled	*parent*	*onLeftDblClick*	*onMouseMove*	*setFocus*()
form	*printable*	*onLeftMouseDown*	*onOpen*	
height	*speedTip*	*onLeftMouseUp*	*onRightDblClick*	
helpFile	*tabStop*	*onLostFocus*	*onRightMouseDown*	
helpId	*top*	*onMiddleDblClick*	*onRightMouseUp*	
hWnd	*visible*			
id	*width*			
left				

Description

The Grid object is a multi-column grid control for displaying the contents of a rowset. The *dataLink* property is set to the rowset. Columns are automatically created for each field in the rowset.

Each column is represented by a GridColumn object. If the default columns are used, these objects are hidden, and all fields are displayed. By explicitly creating a GridColumn object for each column as an element in the grid's *columns* array, you may control the fields that are displayed and assign different kinds of controls in different columns.

class GridColumn

Topic group Related topics

A column in a grid.

Syntax

[<oRef> =] new GridColumn(<grid>)

<oRef>

A variable or property—typically an array element of the <grid> object's *columns* array—in which to store a reference to the newly created GridColumn object.

<grid>

The Grid object that contains the GridColumn object.

Properties

The following tables list the properties of interest of the GridColumn class. (No particular events or methods are associated with this class.)

Property	Default	Description
className	GRIDCOLUMN	Identifies the object as an instance of the GridColumn class
dataLink		The field object that is linked to the column in the grid
editorControl		The editable control that comprises the body of the grid in the column
editorType	Default	The type of editing control (0=Default, 1=EntryField, 2=CheckBox, 3=SpinBox, 4=ComboBox) in the column
headingControl		The control that displays the grid column heading

The following table lists the common properties, events, and methods of the GridColumn class:

Property		Event	Method
parent	*width*	none	none

Description

Each column in a grid is represented by a GridColumn object. Each GridColumn object is an element in the grid's *columns* array, and contains a reference to a heading control and an edit control. You may assign different kinds of controls in different columns. The following types of controls are supported:

- Entryfield
- CheckBox
- SpinBox
- ComboBox

When these controls are used in a grid, they have a reduced property set. The combobox is always the DropDownList style. Each type of field has a default control type. Logical and boolean fields default to CheckBox. Numeric and date fields default to SpinBox.

class Image

Topic group Related topics

A rectangular region on a form that displays a bitmap image.

Syntax

[<oRef> =] new Image(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created Image object.

<container>

The container—typically a Form object—to which you're binding the Image object.

<name expC>

An optional name for the Image object. If not specified, the Image class will auto-generate a name for the object.

Properties

The following table lists the properties of interest in the Image class. (No particular events or methods are associated with this class.)

Property	Default	Description
alignment	Stretch	Determines the size and position of the graphic inside the Image object (0=Stretch, 1=Top left, 2=Centered, 3=Keep aspect stretch, 4=True size)
anchor	None	How the Image object is anchored in its container (0=None, 1=Bottom, 2=Top, 3=Left, 4=Right, 5=Center, 6=Container)
className	IMAGE	Identifies the object as an instance of the Image class
dataSource		The file or field that is displayed in the Image object
fixed	false	Whether the Image object's position is fixed or if it can be "pushed down" or "pulled up" by the rendering or suppression of other objects

The following table lists the common properties, events, and methods of the Image class:

Property		Event		Method
before	*name*	*canRender*	*onMiddleMouseDown*	*move*()
enabled	*pageno*	*onDesignOpen*	*onMiddleMouseUp*	*release*()
form	*parent*	*onLeftDblClick*	*onMouseMove*	
height	*printable*	*onLeftMouseDown*	*onOpen*	
hWnd	*top*	*onLeftMouseUp*	*onRender*	
id	*visible*	*onMiddleDblClick*	*onRightDblClick*	
left	*width*		*onRightMouseDown*	
mousePointer			*onRightMouseUp*	

Description

Use an Image object to display a bitmap image. The image can be data from a field, or a static image like a company logo.

Visual dBASE supports the following bitmap image formats:

- Graphics Interchange Format (GIF), including animated GIF
- Joint Photographic Experts Group (JPG, JPEG)
- Portable Network Graphics (PNG)
- X BitMap (XBM)
- Windows bitmap (BMP)
- Windows icon (ICO)

- Device Independent Bitmap (DIB)
- Windows metafile (WMF)
- Enhanced Windows metafile (EMF)
- PC Paintbrush (PCX)
- Tag Image File Format (TIF, TIFF)
- Encapsulated PostScript (EPS)

Visual dBASE will resize images according to the Image object's *alignment* property. When resizing, transparent GIF backgrounds are lost. To prevent resizing, set the *alignment* property to 4 (True size).

For TIFF, *Visual* dBASE supports uncompressed, single-bit Group 3, PackBits, and LZW (Lempel-Ziv & Welch) compression. Group 4 compression is not supported. Color TIFF images must have a palette. Except when rendering an EPS file on a PostScript-capable printer, *Visual* dBASE uses the bitmap preview in the EPS file, which must be in TIFF or WMF format.

class Line

Topic group Related topics

A line on a form.

Syntax

[<oRef> =] new Line(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created Line object.

<container>

The container—typically a Form object—to which you're binding the Line object.

<name expC>

An optional name for the Line object. If not specified, the Line class will auto-generate a name for the object.

Properties

The following tables list the properties of interest of the Line class. (No particular events or methods are associated with this class.)

Property	Default	Description
bottom		The location of the bottom end of the Line in the form's current metric units, relative to the top edge of its container
className	LINE	Identifies the object as an instance of the Line class
colorNormal	WindowText	Color of the line
fixed	false	Whether the Line object's position is fixed or if it can be "pushed down" or "pulled up" by the rendering or suppression of other objects
left		The location of the left end of the Line in the form's current metric units, relative to the left edge of its container
pen	Solid	The pen style used to draw the line (0=Solid, 1=Dash, 2=Dot, 3=DashDot, 4=DashDotDot)
right		The location of the right end of the Line in the form's current metric units, relative to the left edge of its container
top		The location of the top of the Line in the form's current metric units, relative to the top edge of its container
width	1	Width in pixels

The following table lists the common properties, events, and methods of the Line class:

Property		Event		Method
before	*pageno*	*canRender*	*onOpen*	*release*()
form	*parent*	*onDesignOpen*	*onRender*	
id	*printable*			
name	*visible*			

Description

Use a Line object to draw a line in a form or report. Note that the position properties—*top*, *left*, *bottom*, and *right*—work different for the Line object than they do with other components. The *width* property controls the thickness of the line.

A Line has no *hWnd* because it is drawn on the surface of the form; it is not a genuine Windows control. Despite its position in the form's z-order, a Line can never be drawn on top of another component (other than a Line or Shape).

class ListBox

Topic group Related topics

A selection list on a form, from which you can pick multiple items.

Syntax

[<oRef> =] new ListBox(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created ListBox object.

<container>

The container—typically a Form object—to which you're binding the ListBox object.

<name expC>

An optional name for the ListBox object. If not specified, the ListBox class will auto-generate a name for the object.

Properties

The following tables list the properties, events, and methods of interest in the ListBox class.

Property	Default	Description
className	LISTBOX	Identifies the object as an instance of the ListBox class
colorHighlight	HighlightText /Highlight	The color of selected options
colorNormal	WindowText /Window	The color of unselected options
curSel		The number of the option that has the focus rectangle
dataSource		The options strings of the ListBox object
multiple	false	Whether the ListBox object allows selection of more than one option
sorted	false	Whether the options are sorted
value		The value of the option that currently has focus

Event	Parameters	Description
onChange		After the selection has changed and the ListBox object loses focus, but before *onLostFocus*
onSelChange		After the focus moves to another option in the list

Method	Parameters	Description
count()		Returns the number of options in the list
selected()		Returns the currently selected option(s) or checks if a specified option is selected

The following table lists the common properties, events, and methods of the ListBox class:

Property		Event		Method
before	*hWnd*	*canRender*	*onMiddleMouseDown*	*move*()
borderStyle	*id*	*onDesignOpen*	*onMiddleMouseUp*	*release*()
enabled	*left*	*onGotFocus*	*onMouseMove*	*setFocus*()
fontBold	*mousePointer*	*onHelp*	*onOpen*	

fontItalic	*name*	*onLeftDblClick*	*onRender*
fontName	*pageno*	*onLeftMouseDown*	*onRightDblClick*
fontSize	*parent*	*onLeftMouseUp*	*onRightMouseDown*
fontStrikeout	*printable*	*onLostFocus*	*onRightMouseUp*
fontUnderline	*statusMessage*	*onMiddleDblClick*	*when*
form	*tabStop*		
height	*top*		
helpFile	*visible*		
helpId	*width*		

Description

Use a ListBox object to present the user with a scrollable list of items. If the *multiple* property is *true*, the user can choose more than one item. The list of options is set with the *dataSource* property.The list of items selected is returned by calling the *selected*() method.

class NoteBook

Topic group

A multi-page container with rectangular tabs on top.

Syntax

[<oRef> =] new NoteBook(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created NoteBook object.

<container>

The container—typically a Form object—to which you're binding the NoteBook object.

<name expC>

An optional name for the NoteBook object. If not specified, the NoteBook class will auto-generate a name for the object.

Properties

The following tables list the properties and events of interest in the NoteBook class. (No particular methods are associated with this class.)

Property	Default	Description
buttons	false	Whether the notebook tabs appear as buttons instead
className	NOTEBOOK	Identifies the object as an instance of the NoteBook class
colorNormal	BtnFace	Color of the notebook background
curSel		The number of the currently selected tab
dataSource		The tab names for the notebook
focus	Normal	When to give focus to the notebook tabs (0=Normal, 1=OnMouseDown, 2=Never)
multiple	false	Whether the notebook tabs are displayed in multiple rows, or in a single row with a scrollbar
visualStyle	Right Justify	The style of the notebook tabs (0=Right Justify, 1=Fixed Width, 2=Ragged Right)

Event	Parameters	Description
onSelChange		After a different notebook tab is selected

The following table lists the common properties, events, and methods of the NoteBook class:

Property	Event	Method

before	*id*	*onDesignOpen*	*onMiddleMouseDown*	*move*()
borderStyle	*left*	*onGotFocus*	*onMiddleMouseUp*	*release*()
enabled	*mousePointer*	*onHelp*	*onMouseMove*	*setFocus*()
fontBold	*name*	*onLeftDblClick*	*onOpen*	
fontItalic	*pageno*	*onLeftMouseDown*	*onRightDblClick*	
fontName	*parent*	*onLeftMouseUp*	*onRightMouseDown*	
fontSize	*printable*	*onLostFocus*	*onRightMouseUp*	
fontStrikeout	*speedTip*	*onMiddleDblClick*	*when*	
fontUnderline	*statusMessage*			
form	*tabStop*			
height	*top*			
helpFile	*visible*			
helpId	*width*			
hWnd				

Description

The NoteBook object combines apsects of the Form, Container, and TabBox objects. It's a multi-page control, like the Form; it acts as a container, and it has tabs, although they're on top. Selecting a tab automatically changes the page of the notebook to display the controls assigned to that page. The notebook's *pageno* property indicates which page of the form the notebook is in. The notebook's *curSel* property indicates the current page the notebook is displaying.

class OLE

Topic group Related topics

Displays an OLE document that is stored in an OLE field, and lets the user initiate an action in the server application that created the document.

Syntax

[<oRef> =] new OLE(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created OLE object.

<container>

The container—typically a Form object—to which you're binding the OLE object.

<name expC>

An optional name for the OLE object. If not specified, the OLE class will auto-generate a name for the object.

Properties

The following tables list the properties, events, and methods of interest in the OLE class.

Property	Default	Description
alignment	Stretch	Determines the size and position of the contents of the OLE object (0=Stretch, 1=Top left, 2=Centered, 3=Keep aspect stretch, 4=True size)
anchor	None	How the OLE object is anchored in its container (0=None, 1=Bottom, 2=Top, 3=Left, 4=Right, 5=Center, 6=Container)
border	false	Whether the OLE object is surrounded by the border specified by *borderStyle*
className	OLE	Identifies the object as an instance of the OLE class
dataLink		The Field object that is linked to the OLE object
linkFileName		The OLE document file (if any) that is linked with the current OLE field.
oleType		Number that reflects whether an OLE field is empty (0), contains an embedded document (1), or contains a link to a document file (2)
serverName		The server application that is invoked when the user double-clicks on an OLE viewer object

Event	Parameters	Description
onChange		After the contents of the OLE object have changed
onClose		After the form containing the OLE object has been closed

Method	Parameters	Description
doVerb()	<OLE verb expN>, <title expC>	Starts an OLE server session

The following table lists the common properties, events, and methods of the OLE class:

Property		Event		Method
before	*name*	*onDesignOpen*	*onLostFocus*	*release*()
borderStyle	*pageno*	*onGotFocus*	*onOpen*	*setFocus*()
enabled	*parent*			

form	*printable*
height	*statusMessage*
hWnd	*tabStop*
id	*top*
left	*visible*
mousePointer	*width*

Description

Place an OLE object in a form to view and edit a document stored in an OLE field. For example, if an OLE field contains a bitmap image created in Paintbrush, double-clicking the OLE object linked to the field starts a session in Paintbrush and places the image in the Paintbrush work area.

OLE stands for object linking and embedding. When you link a document to an OLE object, the OLE field does not contain the document itself; instead, it holds a link to a file containing the document. When you embed a document in an OLE field, a copy of the document is inserted into the OLE field, and no connection is made to a document file.

By double-clicking the OLE object, the user can invoke the application that created the OLE document. Therefore, if an image was created in Paintbrush and linked or embedded in the OLE field, double-clicking on the field starts a session in Paintbrush; the image is displayed in the Paintbrush drawing area, ready for editing. If the object was linked, any changes made in the Paintbrush session are stored in the document file; if the object was embedded, the changes are stored in the OLE field only.

An OLE viewer window object displays the contents of an OLE field. (Use the *dataLink* property to identify the field.) Each time the record pointer is moved, the contents of the viewer window are refreshed to display the OLE field in the current record.

class PaintBox

Topic group

A generic control that can be placed on a form.

Syntax

[<oRef> =] new PaintBox(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created PaintBox object.

<container>

The container—typically a Form object—to which you're binding the PaintBox object.

<name expC>

An optional name for the PaintBox object. If not specified, the PaintBox class will auto-generate a name for the object.

Properties

The following tables list the properties and events of interest in the PaintBox class. (No particular methods are associated with this class.)

Property	Default	Description
className	PAINTBOX	Identifies the object as an instance of the PaintBox class
colorNormal	BtnText/BtnFace	The color of the paintbox
transparent	false	Whether the paintbox background is the same as the background color or image of its container

Event	Parameters	Description
onChar	<char expN>, <repeat expN>, <flags expN>	After a non-cursor key or key combination is pressed
onClose		After the form containing the PaintBox object has been closed
onFormSize		After the form containing the paintbox is resized
onKeyDown	<char expN>, <repeat expN>, <flags expN>	After any key is pressed
onKeyUp	<char expN>, <repeat expN>, <flags expN>	After any key is released
onPaint		Whenever the paintbox needs to be redrawn

The following table lists the common properties, events, and methods of the PaintBox class:

Property		Event		Method
before	*name*	*onDesignOpen*	*onMiddleMouseDown*	*move*()
borderStyle	*pageno*	*onGotFocus*	*onMiddleMouseUp*	*release*()
enabled	*parent*	*onLeftDblClick*	*onMouseMove*	*setFocus*()
form	*printable*	*onLeftMouseDown*	*onOpen*	
height	*statusMessage*	*onLeftMouseUp*	*onRightDblClick*	
hWnd	*tabStop*	*onLostFocus*	*onRightMouseDown*	
id	*top*	*onMiddleDblClick*	*onRightMouseUp*	
left	*visible*			
mousePointer	*width*			

Description

The PaintBox object is a generic control you can use to create a variety of objects. It is designed for advanced developers who want to create their own custom controls using the Windows API. It is simply a rectangular region of a form that has all the standard control properties such as *height*, *width*, and *before*, as well as all the standard mouse events.

In addition to the standard events or properties, the PaintBox object has three events that let you detect keystrokes entered when it has focus: *onChar*, *onKeyDown*, and *onKeyUp*. These let you create customized editing controls. The *onPaint* and *onFormSize* events let you modify the appearance of the object based on user interaction.

class Progress

Topic group

A progress indicator.

Syntax

[<oRef> =] new Progress(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created Progress object.

<container>

The container—typically a Form object—to which you're binding the Progress object.

<name expC>

An optional name for the Progress object.

Properties

The following tables list the properties of interest in the Progress class. (No particular events or methods are associated with this class.)

Property	Default	Description
className	PROGRESS	Identifies the object as an instance of the Progress class
rangeMax		The maximum value
rangeMin		The minimum value
value		The current value

The following table lists the common properties, events, and methods of the Progress class:

Property		Event		Method
before	*pageno*	*onDesignOpen*	*onMiddleMouseDown*	*move*()
borderStyle	*parent*	*onLeftMouseDown*	*onMiddleMouseUp*	*release*()
form	*printable*	*onLeftMouseUp*	*onMouseMove*	
height	*speedTip*		*onOpen*	
hWnd	*top*		*onRightMouseDown*	
left	*visible*		*onRightMouseUp*	
mousePointer	*width*			
name				

Description

Use a Progress object to graphically indicate progress during processing. For example to display percentage completed, set the *rangeMin* to 0 and the *rangeMax* to 100. Then as the process progresses, set the *value* to the approximate percentage. The control will display the percentage graphically.

class PushButton

Topic group

A button on a form.

Syntax

[<oRef> =] new PushButton(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created PushButton object.

<container>

The container—typically a Form object—to which you're binding the PushButton object.

<name expC>

An optional name for the PushButton object. If not specified, the PushButton class will auto-generate a name for the object.

Properties

The following tables list the properties and events of interest in the PushButton class. (No particular methods are associated with this class.)

Property	Default	Description
className	PUSHBUTTON	Identifies the object as an instance of the PushButton class
colorNormal	BtnText/BtnFace	The color of the button
default	false	Whether the button is the default button on the form
disabledBitmap		The bitmap to display on the button when it's disabled
downBitmap		The bitmap to display on the button when it's pressed down
focusBitmap		The bitmap to display on the button when it has focus
group		The group to which the button belongs
speedBar	false	Whether the button acts like a tool button, which never gets focus
text	<same as name>	The text that appears on the PushButton face
textLeft	false	When a button has both a bitmap and text label, whether the text appears to the left or right of the bitmap
toggle	false	Whether the button acts like a toggle switch, staying down when pressed
upBitmap	0	The bitmap to display on the button when it's not down and does not have focus
value	false	Whether the button is pressed (used when *toggle* is *true*)

Event	Parameters	Description
onClick		After the PushButton is clicked

The following table lists the common properties, events, and methods of the PushButton class:

Property		Event		Method
before	*id*	*canRender*	*onMiddleMouseDown*	*move*()
borderStyle	*left*	*onDesignOpen*	*onMiddleMouseUp*	*release*()
enabled	*mousePointer*	*onGotFocus*	*onMouseMove*	*setFocus*()
fontBold	*name*	*onHelp*	*onOpen*	
fontItalic	*pageno*	*onLeftDblClick*	*onRender*	

fontName	*parent*	*onLeftMouseDown*	*onRightDblClick*
fontSize	*printable*	*onLeftMouseUp*	*onRightMouseDown*
fontStrikeout	*speedTip*	*onLostFocus*	*onRightMouseUp*
fontUnderline	*statusMessage*	*onMiddleDblClick*	*when*
form	*tabStop*		
height	*top*		
helpFile	*visible*		
helpId	*width*		
hWnd			

Description

Use a PushButton object to execute an action when the user clicks it.

class RadioButton

Topic group Related topics

A single radio button on a form. The user may choose one from a set.

Syntax

[<oRef> =] new RadioButton(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created RadioButton object.

<container>

The container—typically a Form object—to which you're binding the RadioButton object.

<name expC>

An optional name for the RadioButton object. If not specified, the RadioButton class will auto-generate a name for the object.

Properties

The following tables list the properties and events of interest in the RadioButton class. (No particular methods are associated with this class.)

Property	Default	Description
className	RADIOBUTTON	Identifies the object as an instance of the RadioButton class
colorNormal	BtnText/BtnFace	The color of the radio button's text label
dataLink		The Field object that is linked to the Radio object
group		The group to which the radio button belongs
text	<same as name>	The text label that appears beside the radio button
textLeft	false	Whether the radio button's text label appears to the left or to the right of the radio button
transparent	false	Whether the RadioButton object has the same background color or image as its container
value		Whether the radio button is visually marked as selected

Event	Parameters	Description
onChange		After the radio button gets selected or loses its selection

The following table lists the common properties, events, and methods of the RadioButton class:

Property		Event		Method
before	*id*	*canRender*	*onMiddleMouseDown*	*move*()
borderStyle	*left*	*onDesignOpen*	*onMiddleMouseUp*	*release*()
enabled	*mousePointer*	*onGotFocus*	*onMouseMove*	*setFocus*()
fontBold	*name*	*onHelp*	*onOpen*	
fontItalic	*pageno*	*onLeftDblClick*	*onRender*	
fontName	*parent*	*onLeftMouseDown*	*onRightDblClick*	
fontSize	*printable*	*onLeftMouseUp*	*onRightMouseDown*	
fontStrikeout	*speedTip*	*onLostFocus*	*onRightMouseUp*	
fontUnderline	*statusMessage*	*onMiddleDblClick*	*when*	
form	*tabStop*			
height	*top*			
helpFile	*visible*			

helpId *width*
hWnd

Description

Use a group of RadioButton objects to present the user a set of multiple choices, from which they can choose only one.

Each set of choices on a form must have the same *group* property. If there is only one group of radio buttons on a form, the *group* can be left blank. You may use any string or number as the *group*.

You may also use *true* and *false* in the *group* property to create radio button groups. Use *true* for the first button in each radio button group, and *false* for the rest. For example, if you create seven radio buttons and set the *group* property of the first and fourth radio button to *true*, the first three buttons form one group, and the last four form another. The two groups are independent; the user can select one button in the first group and one button in the other.

class Rectangle

Topic group Related topics

A rectangle with a caption.

Syntax

[<oRef> =] new Rectangle(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created Rectangle object.

<container>

The container—typically a Form object—to which you're binding the Rectangle object.

<name expC>

An optional name for the Rectangle object.

Properties

The following tables list the properties of interest of the Rectangle class. (No particular events or methods are associated with this class.)

Property	Default	Description
border	true	Whether the Rectangle object's rectangle is visible
borderStyle	Default	Specifies the rectangle style (0=Default, 1=Raised, 2=Lowered, 3=None, 4=Single, 5=Double, 6-Drop Shadow, 7=Client, 8=Modal, 9=Etched In, 10=Etched Out)
className	RECTANGLE	Identifies the object as an instance of the Progress class
colorNormal	BtnText/ BtnFace	The color of the caption and the rectangle fill
patternStyle	Solid	The fill pattern style (0=Solid, 1=BDiagonal, 2=Cross, 3=Diagcross, 4=FDiagonal, 5=Horizontal, 6=Vertical)
text	<same as name>	The text caption that appears at the top right of the rectangle

The following table lists the common properties, events, and methods of the Rectangle class:

Property		Event		Method
before	*hWnd*	*canRender*	*onMiddleMouseDown*	*move*()
borderStyle	*left*	*onDesignOpen*	*onMiddleMouseUp*	*release*()
fontBold	*mousePointer*	*onLeftDblClick*	*onMouseMove*	
fontItalic	*name*	*onLeftMouseDown*	*onOpen*	
fontName	*pageno*	*onLeftMouseUp*	*onRender*	
fontSize	*parent*	*onMiddleDblClick*	*onRightDblClick*	
fontStrikeout	*printable*		*onRightMouseDown*	
fontUnderline	*top*		*onRightMouseUp*	
form	*visible*			
height	*width*			

Description

Use a Rectangle object to enclose an area of a form. For example, you can use a Rectangle object to draw a border around a group of related objects, such as a group of radio buttons.

To assign a label that describes the group of objects, use the *text* property. The label appears in the top left corner of the rectangle.

A Rectangle object does not affect other objects. The user can't give focus to the Rectangle object, and it doesn't display or modify data.

class ReportViewer

Topic group

A control to display a report on a form.

Syntax

[<oRef> =] new ReportViewer(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created ReportViewer object.

<container>

The container—typically a Form object—to which you're binding the ReportViewer object.

<name expC>

An optional name for the ReportViewer object.

Properties

The following tables list the properties and methods of interest in the ReportViewer class. (No particular events are associated with this class.)

Property	Default	Description
anchor	None	How the ReportViewer object is anchored in its container (0=None, 1=Bottom, 2=Top, 3=Left, 4=Right, 5=Center, 6=Container)
className	REPORTVIEWER	Identifies the object as an instance of the ReportViewer class
filename		The name of the .REP file containing the report to view
params		Parameters passed to the .REP file
ref		A reference to the Report object being viewed
scrollBar	Auto	When a scroll bar appears for the ReportViewer object (0=Off, 1=On, 2=Auto, 3=Disabled)

Method	Parameters	Description
reExecute()		Regenerates the report

The following table lists the common properties, events, and methods of the ReportViewer class:

Property		Event	Method
before	*name*	none	*move*()
borderStyle	*pageno*		*release*()
form	*parent*		*setFocus*()
height	*top*		
left	*width*		

Description

Use a ReportViewer object to view a report in a form. The *filename* property is set to the name of the .REP file, and the report is executed when the form is opened. You may access the report object being viewed through the *ref* property.

class ScrollBar

Topic group Related topics

A vertical or horizontal scrollbar used to represent a range of numeric values.

Syntax

[<oRef> =] new ScrollBar(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created ScrollBar object.

<container>

The container—typically a Form object—to which you're binding the ScrollBar object.

<name expC>

An optional name for the ScrollBar object. If not specified, the ScrollBar class will auto-generate a name for the object.

Properties

The following tables list the properties and events of interest in the ScrollBar class. (No particular methods are associated with this class.)

Property	Default	Description
className	SCROLLBAR	Identifies the object as an instance of the ScrollBar class
colorNormal	ScrollBar	The color of the scrollbar
dataLink		The Field object that is linked to the ScrollBar object
rangeMax		The maximum value
rangeMin		The minimum value
value		The current value
vertical	true	Whether the scrollbar is vertical or horizontal

Event	Parameters	Description
onChange		After the scrollbar value changes

The following table lists the common properties, events, and methods of the ScrollBar class:

Property		Event		Method
before	*name*	*onDesignOpen*	*onMiddleMouseDown*	*move*()
borderStyle	*pageno*	*onGotFocus*	*onMiddleMouseUp*	*release*()
enabled	*parent*	*onHelp*	*onMouseMove*	*setFocus*()
form	*printable*	*onLeftDblClick*	*onOpen*	
height	*speedTip*	*onLeftMouseDown*	*onRightDblClick*	
helpFile	*statusMessage*	*onLeftMouseUp*	*onRightMouseDown*	
helpId	*tabStop*	*onLostFocus*	*onRightMouseUp*	
hWnd	*top*	*onMiddleDblClick*	*when*	
id	*visible*			
left	*width*			
mousePointer				

Description

The ScrollBar object is maintained primarily for compatiblity. Use a Slider instead.

class Shape

Topic group Related topics

A simple colored geometric shape.

Syntax

[<oRef> =] new Shape(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created Shape object.

<container>

The container—typically a Form object—to which you're binding the Shape object.

<name expC>

An optional name for the Shape object. If not specified, the Shape class will auto-generate a name for the object.

Properties

The following tables list the properties of interest of the Shape class. (No particular events or methods are associated with this class.)

Property	Default	Description
className	SHAPE	Identifies the object as an instance of the Shape class
colorNormal	WindowText /Window	The pen and fill color of the shape
penStyle	Solid	The pen style used to draw the outline of the shape (0=Solid, 1=Dash, 2=Dot, 3=DashDot, 4=DashDotDot)
penWidth	1	Width of the outline in pixels
shapeStyle	Circle	The type of shape to draw (0=Round Rectangle, 1=Rectangle, 2=Ellipse, 3=Circle, 4=Round square, 5=Square)

The following table lists the common properties, events, and methods of the Shape class:

Property		Event		Method
before	*pageno*	*canRender*	*onOpen*	*move*()
form	*parent*	*onDesignOpen*	*onRender*	*release*()
height	*printable*			
left	*top*			
name	*visible*			
	width			

Description

Use a Shape object to draw a basic geometric shape on a form.

A Shape has no *hWnd* because it is drawn on the surface of the form; it is not a genuine Windows control. Despite its position in the form's z-order, a Shape can never be drawn on top of another component (other than a Line or Shape).

class Slider

Topic group

A horizontal or vertical slider for choosing magnitude.

Syntax

[<oRef> =] new Slider(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created Slider object.

<container>

The container—typically a Form object—to which you're binding the Slider object.

<name expC>

An optional name for the Slider object.

Properties

The following tables list the properties, events, and methods of interest in the Slider class.

Property	Default	Description
className	SLIDER	Identifies the object as an instance of the Slider class
colorNormal	BtnFace	The color of the slider
enableSelection	false	Whether to display the selection range
endSelection		The value of the end of the selection range
rangeMax		The maximum value
rangeMin		The minimum value
startSelection		The value of the start of the selection range
tics	Auto	How to display the tic marks (0=Auto, 1=Manual, 2=None)
ticsPos	Bottom Right	Where to display the tic marks (0=Both, 1=Bottom Right, 2=Top Left)
value		The current value
vertical	false	Whether the slider is vertical or horizontal

Event	Parameters	Description
onChange		After the slider position changes

Method	Parameters	Description
clearTics()		Clears all manually-set tic marks
setTic()	<expN>	Manually sets a tic mark at the specified position
setTicFrequency()	<expN>	Sets the automatic tic mark interval

The following table lists the common properties, events, and methods of the Slider class:

Property		Event		Method
before	*name*	*onDesignOpen*	*onMiddleMouseDown*	*move*()
borderStyle	*pageno*	*onGotFocus*	*onMiddleMouseUp*	*release*()
enabled	*parent*	*onHelp*	*onMouseMove*	*setFocus*()
form	*printable*	*onLeftMouseDown*	*onOpen*	
height	*speedTip*	*onLeftMouseUp*	*onRightMouseDown*	
helpFile	*statusMessage*	*onLostFocus*	*onRightMouseUp*	
helpId	*tabStop*		*when*	

hWnd	*top*
id	*visible*
left	*width*
mousePointer	

Description

Use a slider to let users vary numeric values visually. Unlike spinboxes, sliders don't accept keyboard input or use a step value. Instead, the user drags the slider pointer to increase or decrease the value.

As the user moves the slider pointer, the value is continually updated to reflect the position of the pointer. For example, a slider that varies a numeric value between 1 and 100 sets the value to 50 when the slider pointer is at the center of the slider.

To set a range for the slider, set *rangeMin* to the minimum value and *rangeMax* to the maximum value.

You may also designate a separate selection region inside the slider with the *startSelection*, *endSelection*, and *enableSelection* properties.

You have complete control over the tick makrs that appear in the slider.

class SpinBox

Topic group Related topics

An entryfield with a spinner for entering numeric or date values.

Syntax

[<oRef> =] new SpinBox(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created SpinBox object.

<container>

The container—typically a Form object—to which you're binding the SpinBox object.

<name expC>

An optional name for the SpinBox object. If not specified, the SpinBox class will auto-generate a name for the object.

Properties

The following tables list the properties, events, and methods of interest in the SpinBox class.

Property	Default	Description
border	true	Whether the SpinBox object is surrounded by the border specifed by *borderStyle*
className	SPINBOX	Identifies the object as an instance of the SpinBox class
colorHighlight	WindowText /Window	The color of the text in the SpinBox object when the object has focus
colorNormal	WindowText /Window	The color of the text in the SpinBox object when the object does not have focus
dataLink		The Field object that is linked to the SpinBox object
function		A text formatting function
picture		Formatting template
rangeMax		The maximum value
rangeMin		The minimum value
rangeRequired	false	Whether the range values are enforced even when no change has been made
selectAll	true	Whether the entryfield contents are initially selected when the SpinBox object gets focus
spinOnly	false	Whether the value may changed using the spinner only or typing is allowed
step	1	The value added or subtracted when using the spinner
validErrorMsg	Invalid input	The message that is displayed when the *valid* event fails
validRequired	false	Whether to fire the *valid* event even when no change has been made
value		The value currently displayed in the SpinBox object

Event	Parameters	Description
onChange		After the spinner is clicked
valid		When attempting to remove focus. Must return *true*, or focus remains.

Method	Parameters	Description
copy()		Copies selected text to the Windows Clipboard

cut()		Cuts selected text and to the Windows Clipboard
keyboard()	<expC>	Simulates typed user input to the SpinBox object
paste()		Copies text from the Windows Clipboard to the current cursor position
undo()		Reverses the effects of the most recent *cut*(), *copy*(), or *paste*() action

The following table lists the common properties, events, and methods of the SpinBox class:

Property		Event		Method
before	*id*	*onDesignOpen*	*onMiddleMouseDown*	*move*()
borderStyle	*left*	*onGotFocus*	*onMiddleMouseUp*	*release*()
enabled	*mousePointer*	*onHelp*	*onMouseMove*	*setFocus*()
fontBold	*name*	*onLeftDblClick*	*onOpen*	
fontItalic	*pageno*	*onLeftMouseDown*	*onRightDblClick*	
fontName	*parent*	*onLeftMouseUp*	*onRightMouseDown*	
fontSize	*printable*	*onLostFocus*	*onRightMouseUp*	
fontStrikeout	*speedTip*	*onMiddleDblClick*	*when*	
fontUnderline	*statusMessage*			
form	*tabStop*			
height	*top*			
helpFile	*visible*			
helpId	*width*			
hWnd				

Description

Use a spinbox to let users enter values by typing them in the textbox or by clicking the spinner arrows.

By setting *spinOnly* to *true*, you can control the rate at which users change numeric or date values. For example, one spin box might change an interest rate in increments of hundredths, while another might change a date value in week increments. Set the size of each increment with the *step* property; for example, if you set *step* to 5, each click on an arrow changes a numeric value by 5 or a date value by 5 days.

To restrict entries to those within a particular range of values, set the *rangeMin* property to the minimum value and *rangeMax* to the maximum value, then set *rangeRequired* to *true*.

class TabBox

Topic group Related topics

A set of folder-style (trapezoidal) bottom-tabs.

Syntax

[<oRef> =] new TabBox(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created TabBox object.

<container>

The container—typically a Form object—to which you're binding the TabBox object.

<name expC>

An optional name for the TabBox object. If not specified, the TabBox class will auto-generate a name for the object.

Properties

The following tables list the properties and events of interest in the TabBox class. (No particular methods are associated with this class.)

Property	Default	Description
anchor	Bottom	How the TabBox object is anchored in its container (0=None, 1=Bottom, 2=Top, 3=Left, 4=Right, 5=Center, 6=Container)
className	TABBOX	Identifies the object as an instance of the TabBox class
colorHighlight	BtnText/BtnFace	The color of the selected tab
colorNormal	BtnFace	The color of the background behind the tabs
curSel		The number of the currently selected tab
dataSource		The tab names

Event	Parameters	Description
onSelChange		After a different tab is selected

The following table lists the common properties, events, and methods of the TabBox class:

Property		Event		Method
before	*id*	*onDesignOpen*	*onMiddleMouseDown*	*move*()
enabled	*left*	*onGotFocus*	*onMiddleMouseUp*	*release*()
fontBold	*mousePointer*	*onHelp*	*onMouseMove*	*setFocus*()
fontItalic	*name*	*onLeftDblClick*	*onOpen*	
fontName	*pageno*	*onLeftMouseDown*	*onRightDblClick*	
fontSize	*parent*	*onLeftMouseUp*	*onRightMouseDown*	
fontStrikeout	*printable*	*onLostFocus*	*onRightMouseUp*	
fontUnderline	*statusMessage*	*onMiddleDblClick*	*when*	
form	*tabStop*			
height	*top*			
helpFile	*visible*			
helpId	*width*			
hWnd				

Description

A TabBox contains a number of tabs that users can select.

By setting the *pageno* property of a TabBox control to 0 (the default), you can implement a tabbed multi-page form where the user can easily switch pages by selecting tabs. Use the *pageno* property of a

control to determine on which page the control appears, and use the *curSel* property and *onSelChange* event of the TabBox to switch between pages.

class Text

Topic group Related topics

Non-editable HTML text on a form.

Syntax

[<oRef> =] new Text(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created Text object.

<container>

The container—typically a Form object—to which you're binding the Text object.

<name expC>

An optional name for the Text object. If not specified, the Text class will auto-generate a name for the object.

Properties

The following tables list the properties and methods of interest in the Text class. (No particular events are associated with this class.)

Property	Default	Description
alignHorizontal	Left	Determines how the text displays within the horizontal plane of its rectangular frame (0=Left, 1=Center, 2=Right, 3=Justify)
alignment	Top left	Combines the *alignHorizontal*, *alignVertical*, and *wrap* properties (maintained for compatibility)
alignVertical	Top	Determines how the text displays in the vertical plane of its rectangular frame (0=Top, 1=Center, 2=Bottom, 3=Justify)
anchor	None	How the Text object is anchored in its container (0=None, 1=Bottom, 2=Top, 3=Left, 4=Right, 5=Center, 6=Container)
border	false	Whether the Text object is surrounded by the border specified by *borderStyle*
className	TEXT	Identifies the object as an instance of the Text class
colorNormal	BtnText/BtnFace	The color of the text
fixed	false	Whether the Text object's position is fixed or if it can be "pushed down" or "pulled up" by the rendering or suppression of other objects
function		A text formatting function
leading	0	The distance between consecutive lines; if 0 uses the font's default leading
marginHorizontal		The horizontal margin between the text and its rectangular frame
marginVertical		The vertical margin between the text and its rectangular frame
picture		Formatting template
rotate	0	The text orientation, in increments of 90 degrees (0=0, 1=90, 2=180, 3=270)
supressIfBlank	false	Whether the Text object is suppressed (not rendered) if it is blank
supressIfDuplicate	false	Whether the Text object is suppressed (not rendered) if its value is the same as the previous time it was rendered

text	<same as name>	The value of the Text object; the text that appears
tracking	0	The space between characters; if 0 uses the font's default
trackJustifyThreshold	0	The maximum amount of added space between words on a fully justified line; 0 indicates no limit
transparent	false	Whether the Text object has the same background color or image as its container
variableHeight	false	Whether the Text object's height can increase based on its value
verticalJustifyLimit	0	The maximum additional space between lines that can be added to attempt to justify vertically. If the limit is exceeded the Text object is top justified. A value of 0 means no limit.
wrap	true	Whether to word-wrap the text in the Text object

Method	**Parameters**	**Description**
getTextExtent()	<expC>	Returns the width of the specified string using the Text object's font

The following table lists the common properties, events, and methods of the Text class:

Property		Event		Method
before	*id*	*canRender*	*onMiddleMouseDown*	*move*()
borderStyle	*left*	*onDesignOpen*	*onMiddleMouseUp*	*release*()
fontBold	*mousePointer*	*onLeftDblClick*	*onMouseMove*	
fontItalic	*name*	*onLeftMouseDown*	*onOpen*	
fontName	*pageno*	*onLeftMouseUp*	*onRender*	
fontSize	*parent*	*onMiddleDblClick*	*onRightDblClick*	
fontStrikeout	*printable*		*onRightMouseDown*	
fontUnderline	*top*		*onRightMouseUp*	
form	*visible*			
height	*width*			
hWnd				

Description

Use a Text component to display information in a form or report. The *text* property of the component may contain any text, including HTML tags.

The *text* property may be an expression codeblock, which is evaluated every time it is rendered.

class TreeItem

Topic group Related topics

An item in a TreeView.

Syntax

[<oRef> =] new TreeItem(<parent> [,<name expC>])

<oRef>

A variable or property—typically of <parent>—in which to store a reference to the newly created TreeItem object.

<parent>

The parent object—a TreeView object for top-level items, or another TreeItem—to which you're binding the TreeItem object.

<name expC>

An optional name for the TreeItem object. If not specified, the TreeItem class will auto-generate a name for the object.

Properties

The following tables list the properties and methods of interest in the TreeItem class. (No particular events are associated with this class.)

Property	Default	Description
bold	false	Whether the text label is bold
className	TREEITEM	Identifies the object as an instance of the TreeItem class
expanded	false	Whether the item's children are shown or hidden
firstChild		The first child tree item
handle		The Windows tree item handle (similar to *hWnd*)
image		Image displayed between checkbox and text label when item does not have focus
level		The tree level of the item
nextSibling		The next tree item with the same parent
noOfChildren		The number of child tree items
prevSibling		The previous tree item with the same parent
selectedImage		Image displayed between checkbox and text label when item has focus
text		The text label of the tree item

Method	Parameters	Description
ensureVisible()		Expands the tree and scrolls the tree view if necessary to make the tree item visible
select()		Makes the tree item the selected item in the tree
setAsFirstVisible()		Expands the tree and scrolls the tree view if necessary to try to make the tree item the first (topmost) visible tree item
sortChildren()		Sorts the child tree items

The following table lists the common properties, events, and methods of the TreeItem class:

Property	Event	Method
name *parent*	none	*release*()

class TreeView

Topic group Related topics

An expandable tree.

Syntax

[<oRef> =] new TreeView(<container> [,<name expC>])

<oRef>

A variable or property—typically of <container>—in which to store a reference to the newly created TreeView object.

<container>

The container—typically a Form object—to which you're binding the TreeView object.

<name expC>

An optional name for the TreeView object. If not specified, the TreeView class will auto-generate a name for the object.

Properties

The following tables list the properties, events, and methods of interest in the TreeView class.

Property	Default	Description
allowEditLabels	true	Whether the text labels of the tree items are editable
allowEditTree	true	Whether items can be added or deleted from the tree
checkBoxes	true	Whether each tree item has a checkbox
checkedImage		The image to display when a tree item is checked instead of a checked check box
className	TREEVIEW	Identifies the object as an instance of the TreeView class
colorNormal	WindowText /Window	The color of the text labels and background
disablePopup	false	Whether the tree view's popup menu is disabled
firstChild		The first child tree item
firstVisibleChild		The first child tree item that is visible in the tree view area
hasButtons	true	Whether + and - icons are displayed for tree items that have children
hasLines	true	Whether lines are drawn between tree items
image		Default image displayed between checkbox and text label when a tree item does not have focus
imageScaleToFont	true	Whether the *image* and *selectedImage* images automatically scale to match the *fontSize*
imageSize		The height of the *image* and *selectedImage* images in pixels
indent		The horizontal indent, in pixels, for each level of tree items
linesAtRoot	true	Whether a line connects the tree items at the first level
selected		The currently selected tree item
selectedImage		Default image displayed between checkbox and text label when a tree item has focus
showSelAlways	true	Highlight the selected item in the tree even when the tree view does not have focus
toolTips	true	Whether to display the highlighted text label as a tooltip if it is too long to fully display in the tree view area

trackSelect	true	Whether to highlight and underline tree items as the mouse passes over them
uncheckedImage		The image to display when a tree item is not checked instead of an empty check box

Event	Parameters	Description
canChange		Before selection moves to another tree item; return value determines if selection can leave current tree item
canEditLabel		When attempting to edit text label; return value determines whether editing is allowed
canExpand		When attempting to expand or collapse a tree item; return value determines whether expland/collapse occurs
onChange		After the selection moves to another tree item
onCheckBoxClick		After a checkbox in a tree item is clicked
onEditLabel	<text expC>	After the text label in a tree item is edited; passes the new not-yet-posted value as a parameter
onExpand		After a tree item is expanded or collapsed

Method	Parameters	Description
count()		Returns the total number of tree items in the tree
releaseAllChildren()		Deletes all tree items in the tree
sortChildren()		Sorts child tree items
visibleCount()		Returns the number of tree items visible in the tree view area

The following table lists the common properties, events, and methods of the TreeView class:

Property		Event		Method
before	*hWnd*	*onDesignOpen*	*onMiddleDblClick*	*move*()
borderStyle	*id*	*onGotFocus*	*onMiddleMouseDown*	*release*()
enabled	*left*	*onHelp*	*onMiddleMouseUp*	*setFocus*()
fontBold	*mousePointer*	*onLeftDblClick*	*onMouseMove*	
fontItalic	*name*	*onLeftMouseDown*	*onOpen*	
fontName	*pageno*	*onLeftMouseUp*	*onRightDblClick*	
fontSize	*parent*	*onLostFocus*	*onRightMouseDown*	
fontStrikeout	*printable*		*onRightMouseUp*	
fontUnderline	*statusMessage*			
form	*tabStop*			
height	*top*			
helpFile	*visible*			
helpId	*width*			

abandonRecord()

Topic group | Related topics | Example

Abandons changes to the current record.

Syntax

<oRef>.*abandonRecord*()

<oRef>

An object reference to the form.

Property of

Form

Description

Use *abandonRecord*() for form-based data handling with tables in work areas. When using the data access objects, *abandonRecord*() has no effect; use the rowset's *abandon*() method instead.

Form-based data buffering lets you manage the editing of existing records and the appending of new records. The temporary record created by *beginAppend*() and editing changes to the current record are not written to the table until there is navigation off the record, or until *saveRecord*() is called. Each work area has its own separate edit buffer. For example, if you *beginAppend*() in two separate work areas, you must call *abandonRecord*() while each work area is selected to abandon the changes.

Before calling *abandonRecord*(), you can use *isRecordChanged*() to determine if changes have been made. If so, you may want to confirm the action before proceeding.

activeControl

Topic group Related topics

Contains a reference to the object that currently has focus.

Property of

Form

Description

Use the *activeControl* property to reference the object that currently has focus.

An object gets focus in three ways:

- The user tabs to the object.
- The user clicks the object.
- The *setFocus*() method of the object is executed.

alias

Topic group Related topics

Determines the table that is accessed by a Browse object.

Property of

Browse

Description

Use the *alias* property to identify a table to display in a browse object. For example, when the form is based on a .QBE query that opens two or more files in a parent-child relation, you use *alias* to determine which table appears in the Browse object.

Aliases are used for tables open in work areas, not data access objects. When the form uses data access objects, use a Grid control, which can *dataLink* directly to a Rowset object.

alignHorizontal

Topic group Related topics

Determines the horizontal alignment of text in a Text component.

Property of

Text

Description

alignHorizontal determines the way the text displays within the horizontal plane of its rectangular frame. Set it to one of the following:

Value	Alignment
0	Left
1	Center
2	Right
3	Justify

alignment [Image]

Topic group Related topics

Determines the size and position of the graphic inside an Image object.

Property of

Image

Description

If a graphic is smaller than the Image object that displays it, it can be stretched to fill the Image object or positioned inside the Image object with empty space around it. Assign one of the following settings to the *alignment* property of an Image object to determine how the graphic is aligned.

Setting	Description
0 (Stretch)	Enlarge graphic to fill the entire Image object
1 (Top Left)	In the top left corner of the Image object
2 (Center)	Centered in the Image object
3 (Keep Aspect Stretch)	Maintains the original height/width (aspect) ratio when stretching the graphic until it fills either dimension of the Image object
4 (True Size)	No changes to the graphic

If the graphic is larger than the Image object, both Stretch and Keep Aspect Stretch will reduce the graphic to fit the Image object so that the entire image is visible. Top Left and Center will both display whatever fits in the Image object.

True Size does not change the graphic at all. The Image object is dynamically resized to display the graphic. This is the fastest option, because *Visual* dBASE doesn't have to do any stretching or shrinking.

alignment [Text]

Topic group Related topics

Positions text in a Text object.

Property of

Text

Description

The Text object's *alignment* property is maintained primarily for compatibility. It is an enumerated property that can have the following values:

Setting	Description
0 (Top Left)	Adjacent to the top edge and the left edge
1 (Top Center)	Adjacent to the top edge and centered horizontally
2 (Top Right)	Adjacent to the top edge and the right edge
3 (Center Left)	Centered vertically and adjacent to left edge
4 (Center)	Centered horizontally and vertically
5 (Center Right)	Centered vertically and adjacent to right edge
6 (Bottom Left)	Adjacent to the bottom edge and the left edge
7 (Bottom Center)	Centered horizontally and adjacent to the bottom edge
8 (Bottom Right)	Adjacent to the bottom edge and the right edge
9 (Wrap Left)	Same as Top Left
10 (Wrap Center)	Same as Top Center
11 (Wrap Right)	Same as Top Right

The Text object's *alignHorizontal* and *alignVertical* properties control the alignment in the horizontal and vertical plane separately. They also include options to justify the text. When either property is set, the *alignment* property is also changed to match (justify becomes top or left). When the *alignment* property is set, the other two properties are changed to match.

Text wrapping is controlled by the *wrap* property.

alignVertical

Topic group Related topics

Determines the vertical alignment of text in a Text component.

Property of

Text

Description

alignVertical determines the way the text displays within the vertical plane of its rectangular frame. Set it to one of the following:

Value	Alignment
0	Top
1	Middle
2	Bottom
3	Justify

allowAddRows

Topic group Related topics

Whether rows can be added directly through a Grid object.

Property of

Grid

Description

allowAddRows determines whether moving down past the last row in a grid starts the append of a new row. It has no control over adding row in other ways, like by calling the rowset's *beginAppend*() method. If the rowset switches to Append mode, the grid will synchronize itself with the rowset and display the new row.

Set *allowAddRows* to *false* to prevent the accidental appending of new rows when navigating through a grid.

allowColumnMoving

Topic group Related topics

Whether the user may rearrange the columns in a grid with the mouse.

Property of

Grid

Description

By default, *allowColumnMoving* is *true*, which means that the user can rearrange the columns in a grid by clicking and dragging the column headings. Set *allowColumnMoving* to *false* to disable this ability.

allowColumnSizing

Topic group Related topics

Whether the user may resize the columns in a grid with the mouse.

Property of

Grid

Description

By default, *allowColumnSizing* is *true*, which means that the user can resize the columns in a grid by clicking and dragging between the columns headings. Set *allowColumnSizing* to *false* to disable this ability.

allowEditing

Topic group Related topics

Whether a grid is read-only.

Property of

Grid

Description

By default, *allowEditing* is *true*. Set *allowEditing* to *false* to make the grid read-only.

allowRowSizing

Topic group Related topics

Whether the user may resize the rows in a grid with the mouse.

Property of

Grid

Description

By default, *allowRowSizing* is *true*, which means that the user can resize the rows in a grid by clicking and dragging between the row indicator in the left column. Set *allowRowSizing* to *false* to disable this ability.

anchor

Topic group Related topics

Specifies whether an object stays in the same relative position when its container is resized.

Property of

ActiveX, Browse, Editor, Image, Grid, OLE, ReportViewer, TabBox, Text

Description

Use *anchor* to specify whether a control should maintain its location and resize itself to match its container, which is usually the form. *anchor* is an enumerated property with the following values:

Value	Description
0	None, do not anchor
1	Bottom
2	Top
3	Left
4	Right
5	Center
6	Container

When anchored to the bottom or top, the *width* of the control resizes to match the width of its container. When anchored to the left or right, the *height* of the control resizes to match the height of its container. When anchored to the container, the control resizes to fill its container.

append

Topic group Related topics

Whether records can be added directly through a Browse object.

Property of

Browse

Description

append determines whether moving down past the last record in a browse starts the append of a new record. It has no control over adding records in other ways, like by calling the form's *beginAppend*() method. If a new record is added, the browse will show it.

Set *append* to *false* to prevent the accidental appending of new records when navigating through a browse.

autoCenter

Topic group Related topics

Determines if a form is automatically centered when it is opened.

Property of

Form

Description

Use *autoSize* to automatically center a form when it is opened. If *autoCenter* is *true*, MDI forms are centered in the MDI frame window; SDI forms are centered on-screen. If *autoCenter* is *false*, the form is positioned according to its *top* and *left* properties.

autoDrop

Topic group Related topics

Determines if the drop-down list drops automatically when the combobox gets focus.

Property of

ComboBox

Description

Set *autoDrop* to *true* to make the drop-down list portion of a combobox drop automatically when the combobox gets focus. Whenever the combobox loses focus, its drop-down list is always closed, no matter how it was opened.

autoDrop has no effect when the *style* of the combobox is Simple (0).

autoSize

Topic group Related topics

Determines if a form is automatically sized to contain its objects when the form is opened.

Property of

Form

Description

Use *autoSize* to determine how a form is sized and proportioned.

If you set the *autoSize* property of a form to *true*, the form is automatically adjusted to contain its objects when it is opened. If you set *autoSize* to *false*, the form assumes its assigned *height* and *width* when it is opened.

When you set the *autoSize* property of a form to *true*, the default dimensions are ignored. The user can still move or resize the form, but if the form is closed and reopened it is automatically resized again to contain its objects.

background

Topic group Related topics

A form's background image.

Property of

Form

Description

Set the *background* property to the file name of a bitmap you want tiled in the background of your form. See class Image for the list of bitmap formats supported by *Visual* dBASE.

You may use any *Visual* dBASE-supported bitmap format.

Setting a background image supersedes the background color designated by the form's *colorNormal* property.

before

Topic group Related topics Example

The next object in the z-order of the form.

Property of

All form components

Description

An object's *before* property contains a reference to the next object in the z-order, in other words, the object the current object comes before. The z-order is the order in which controls are created on the form. It is the same order in which they are created; the same order as they are listed in the .WFM file. If objects overlap, the one that is later in the z-order is drawn on top, with the exception of Line and Shape objects, which are always drawn on the form surface.

The form's *first* property contains a reference to the first control in the z-order. The z-order is a closed loop. The before property of the last control in the z-order points back to the first control.

The form's tab order is related to the z-order. The objects are in the same order, but only those objects that can receive focus are in the tab order. All visual components in the form are somewhere in the z-order. Non-visual components, such as Query objects, are not in the z-order.

The *before* property is read-only. You must reorder the objects in the form's class definition, by editing the code in the .WFM file or using the Form designer to visually reorder the objects.

before example

Suppose you have a form that contains a bunch of spinboxes for measurements. You want to be able to set them all to zero with the click of a button.

```
function resetButton_onClick()
  local obj
  obj = form.first         // First control in z-order
  do
    if obj.className == "SPINBOX"
      obj.value := 0
    endif
    obj := obj.before      // Next control in z-order
  until obj == form.first  // Until you get back to first control
```

Compare this loop with the example for *elements*.

beginAppend()

Topic group Related topics

Creates a temporary buffer in memory for a record that is based on the structure of the current table, letting the user input data to the record without automatically adding the record to the table.

Syntax

<oRef>.*beginAppend*()

<oRef>

An object reference to the form.

Property of

Form

Description

Use *beginAppend*() for form-based data handling with tables in work areas. When using the data access objects, *beginAppend*() has no effect; use the rowset's *beginAppend*() method instead.

beginAppend() creates a single record buffer in the current table, without actually adding the record to the table until *saveRecord()* is issued. While this buffer exists, the user can input data to the record with controls such as an entry field or a check box. Use *saveRecord()* to append the record to the currently active table, and use *abandonRecord()* to discard the record. Calling *beginAppend*() instead of *saveRecord*() will write the new record and empty the buffer again so you can add another record. Use *isRecordChanged()* to determine if the record has been changed since the *beginAppend()* was issued.

When appending records with *beginAppend*() the new record will not be saved when you call *saveRecord*() unless there have been changes to the record; the blank new record is abandoned. This prevents the saving of blank records in the table. (If you want to create blank records, use APPEND BLANK). You can check there have been changes by calling *isRecordChanged*(). If *isRecordChanged*() returns *true*, you should validate the record with form-level or row-level validation before writing it to the table.

Using *beginAppend()* has different results than using either BEGINTRANS() and APPEND BLANK or APPEND AUTOMEM. With these commands, if you cancel the append operation, you have a record marked as deleted added to the table. If you use *abandonRecord()* to cancel the *beginAppend()* operation, a new record is never added to the table.

bgColor

Topic group Related topics

The background color of an object.

Property of

Grid

Description

You may specify any single color for the background color. For a list of valid colors, see *colorNormal*.

border

Topic group Related topics

Determines whether an object is surrounded with a border.

Property of

Editor, Entryfield, OLE, Rectangle, SpinBox, Text

Description

The *border* property is maintained primary for compatability. Every object that has a *border* property also has a *borderStyle* property. One of the choices for *borderStyle* is None, while *border* can be either *true* or *false*. Both these properties apply.

If you pick an actual border with *borderStyle*, *border* determines whether that border is displayed. If you choose the None *borderStyle*, no border will appear, even if *border* is *true*.

borderStyle

Topic group Related topics

Determines the border around the object.

Property of

Most form components

Description

borderStyle determines the display style of an object's rectangular frame. Set it to one of the following:

Value	Alignment
0	Default
1	Raised
2	Lowered
3	None
4	Single
5	Double
6	Drop shadow
7	Client
8	Modal
9	Etched in
10	Etched out

The border is drawn inside the bounds of the object; therefore for thick borders like Drop shadow, there is noticeably less space in the object for the actual contents.

The border is not drawn if *border* is *false*. If *borderStyle* is None, no border appears even if *border* is *true*.

bottom

Topic group Related topics

The vertical position of the lower end of a Line object.

Property of

Line

Description

Use the *bottom* property in combination with the *right*, *left*, and *top* properties to determine the position and length of a line object.

The unit of measurement in a form or report is controlled by its *metric* property. The default metric for forms is characters, and for reports it's twips.

buttons

Topic group Related topics

Whether a notebook's tabs appear as buttons

Property of

NoteBook

Description

Set *buttons* to *true* if you want the notebook tabs to appear as separate buttons instead of tabs attached to the notebook page.

canClose

Topic group Related topics Example

Event fired when an attempt is made to close the form; return value determines if the form can be closed.

Parameters

none

Property of

Form

Description

Use *canClose* to prevent a form from closing until certain conditions are met.

The *canClose* event handler can either return a value of *true*, which allows the form to close, or *false*, which prevents the form from closing.

When a form is closed by calling *close*() or clicking the Close icon, pending changes in the data buffer are saved. When attempting to close, the form fires the current control's *valid* event, if any, so there's no need to verify individual controls if they have *valid* event handlers. However, you should always perform form- or row-level validation to check controls that you have not visited.

canClose example

The following *canClose* event handler fires the form's row-level validation method:

```
function form_canClose()
  return form.recValid()  // If row is bad, don't close
```

canNavigate

Topic group Related topics

Event fired when an attempt is made to navigate in a table; return value determines if the record pointer moves.

Parameters

<workarea expN>

The work area number where the navigation is attempted.

Property of

Form

Description

The form's *canNavigate* event is used mainly for form-based data handling with tables in work areas. It also fires when attempting navigation in the form's primary rowset.

Use *canNavigate* to prevent navigation until certain conditions are met. Navigation saves pending changes in the data buffer, so you should call row- or form-level validation in the *canNavigate* to make sure data should be saved.

Because *canNavigate* fires while still on the current record, you may also use it to perform some action just before you leave. In this case, the *canNavigate* would always return *true* to allow the navigation.

When using tables in work areas, *canNavigate* will not fire unless the form is open and has controls *dataLink*ed to fields. For example, if you USE a table, create and open an empty Form, assign an *canNavigate* event handler, and SKIP in the table, the *canNavigate* will not fire simply because the form is open.

When attempting navigation in the form's primary rowset, the form's *canNavigate* fires before the rowset's *canNavigate*, and the <workrea expN> parameter is zero. If the form's *canNavigate* returns *false*, nothing further happens; the rowset's *canNavigate* does not fire, and no navigation occurs.

canNavigate example

The following *canNavigate* event handler fires the form's row-level validation method, but only if the navigation occurred in the current table; for example not in some table being used for a lookup.

```
function form_canNavigate( nWorkArea )
  if nWorkArea == workarea()
    return form.recValid()  // If row is bad, don't move
  else
    return true
  endif
```

cellHeight

Topic group Related topics

The height of each cell in the grid.

Property of

Grid

Description

The *cellHeight* property reflects the height of the cells in the body of the grid.

classId

Topic group Related topics

The ID string of an ActiveX control.

Property of

ActiveX

Description

To use an ActiveX control in a form, set the *classId* property to the control's ID string.

clearTics()

Topic group Related topics

Clears manually-set tic marks in a Slider object.

Syntax

<oRef>.*clearTics*()

<oRef>

The Slider object whose tics to clear.

Property of

Slider

Description

Call *clearTics*() to clear all tic marks set by *setTic*()

clientEdge

Topic group Related topics

Whether an object appears to have a beveled inside edge.

Property of

Form

Description

Set *clientEdge* to *true* to bevel a form's inside edge.

close()

Topic group Related topics

Closes a form.

Syntax

<oRef>.*close*()

<oRef>

An object reference to the form to close.

Property of

Form

Description

Use *close*() to close an open form or report.

When you try to close a form, *Visual* dBASE does the following:

1. Fires the *valid* event of the current object. If it returns a value of *false*, the form doesn't close.
2. Fires the *onLostFocus* event of the current object.
3. Fires the *canClose* event of the form. If it returns *false*, the form doesn't close.
4. Fires the *onLostFocus* event of the form.
5. Removes the form and the objects it contains from the screen.
6. Fires the *onClose* event of the form.
7. Removes the form from memory if there are no other object references pointing to the form.

When a form is closed with *close*() or by clicking the Close icon, any pending changes in the record buffer are saved, as if *saveRecord*() was called. Closing a form by pressing Esc abandons changes before closing (if *escExit* is *true*).

If the form definition is not removed from memory, you can open the form again with *open*().

colorHighlight

Topic group Related topics

Sets the color of the object that has focus.

Property of

Browse, Entryfield, ListBox, SpinBox, TabBox

Description

Use the *colorHighlight* and *colorNormal* properties of an object so that users can differentiate visually when an object has focus and when it doesn't. You may choose from the same color settings as the *colorNormal* property.

The *colorHighlight* of most controls defaults to an empty string, meaning that it is colored no differently when it has focus. This way, you may set a particular color in the control's *colorNormal* property, without having to override a default *colorHighlight* color as well.

The color scheme in a TabBox is different. There, the *colorNormal* designates the color of the background behind the tabs, and the *colorHighlight* is the color of the selected tab. The unselected tabs are a fixed color, WindowText/Window.

colorNormal

Topic group Related topics Example

The color of an object.

Property of

Most form objects

Description

Use the *colorNormal* and *colorHighlight* properties of an object so that users can differentiate visually when an object has focus and when it doesn't.

For some controls, in particular background colors, you specify a single color. For other controls, you specify two color settings with *colorNormal*: a foreground color (for text), and a background color. Color settings must be separated with a forward slash (/). Each color may be one of the following five color types, in any combination:

- Windows-named color
- Basic 16-color color code
- Hexadecimal RGB color triplet
- User-defined color name
- JavaScript color name

Color settings are not case-sensitive.

Windows-named colors are taken from the settings in the Display Properties. If the colors are changed in the Display Properties while a form is open, the form and any controls that use these values will change automatically. You can use any of the following Windows-named color settings for either the foreground or background color:

Table 15.1 Windows-named colors

Color	Corresponding Display Properties Appearance Color
ActiveBorder	Active window border
ActiveCaption	Active title bar
AppWorkspace	Application background
Background	Desktop
BtnFace	3D objects
BtnHighlight	A shade lighter than 3D objects
BtnShadow	A shade darker than 3D objects
BtnText	3D objects font
CaptionText	Active title bar font
GrayText	preset gray—not available
Highlight	Selected items
HighlightText	Selected items font
InactiveBorder	Inactive window border
InactiveCaption	Inactive title bar
InactiveCaptionText	Inactive title bar font
InfoText	ToolTip
InfoBk	ToolTip font
Menu	Menu
MenuText	Menu font
Scrollbar	A shade lighter than 3D objects
Window	Window
WindowFrame	preset drop shadow—not available
WindowText	Window font

The following one- and two-letter basic color codes (with an optional + or * for brightness) are provided primary for compatibility with earlier versions of dBASE.

Table 15.2 Basic 16-color color codes

Color name	Foreground code	Background code
Black	N	
Dark Blue	B	
Green	G	
Cyan	GB or BG	
Dark Red	R	
Purple	RB or BR	
Brown	RG or GR	
Light Gray	W	
Dark Gray	N+	N*
Blue	B+	B*
Bright Green	G+	G+
Bright Cyan	GB+ or BG+	GB* or BG*
Red	R+	R*
Magenta	RB+ or BR+	RB* or BR*
Yellow	RG+ or GR+	RG* or GR*
White	W+	W*

Hexadecimal RGB (Red Green Blue) color triplets are expressed backwards in *Visual* dBASE; that is, Blue, Green, Red. You may specify one of approximately 16 million colors using a triplet. The color will be displayed as well as the settings of the display allow.

You may create your own RGB combinations and give them a name with the DEFINE COLOR command.

Finally, *Visual* dBASE supports JavaScript-standard color names. The following table lists those colors and their corresponding RGB values.

Table 15.3 JavaScript color names and RGB values

Color	Red	Green	Blue
aliceblue	F0	F8	FF
antiquewhite	FA	EB	D7
aqua	00	FF	FF
aquamarine	7F	FF	D4
azure	F0	FF	FF
beige	F5	F5	DC
bisque	FF	E4	C4
black	00	00	00
blanchedalmond	FF	EB	CD
blue	00	00	FF
blueviolet	8A	2B	E2
brown	A5	2A	2A
burlywood	DE	B8	87
cadetblue	5F	9E	A0
chartreuse	7F	FF	00
chocolate	D2	69	1E
coral	FF	7F	50

cornflowerblue	64	95	ED
cornsilk	FF	F8	DC
crimson	DC	14	3C
cyan	00	FF	FF
darkblue	00	00	8B
darkcyan	00	8B	8B
darkgoldenrod	B8	86	0B
darkgray	A9	A9	A9
darkgreen	00	64	00
darkkhaki	BD	B7	6B
darkmagenta	8B	00	8B
darkolivegreen	55	6B	2F
darkorange	FF	8C	00
darkorchid	99	32	CC
darkred	8B	00	00
darksalmon	E9	96	7A
darkseagreen	8F	BC	8F
darkslateblue	48	3D	8B
darkslategray	2F	4F	4F
darkturquoise	00	CE	D1
darkviolet	94	00	D3
deeppink	FF	14	93
deepskyblue	00	BF	FF
dimgray	69	69	69
dodgerblue	1E	90	FF
firebrick	B2	22	22
floralwhite	FF	FA	F0
forestgreen	22	8B	22
fuchsia	FF	00	FF
gainsboro	DC	DC	DC
ghostwhite	F8	F8	FF
gold	FF	D7	00
goldenrod	DA	A5	20
gray	80	80	80
green	00	80	00
greenyellow	AD	FF	2F
honeydew	F0	FF	F0
hotpink	FF	69	B4
indianred	CD	5C	5C
indigo	4B	00	82
ivory	FF	FF	F0
khaki	F0	E6	8C
lavender	E6	E6	FA
lavenderblush	FF	F0	F5
lawngreen	7C	FC	00
lemonchiffon	FF	FA	CD

lightblue	AD	D8	E6
lightcoral	F0	80	80
lightcyan	E0	FF	FF
lightgoldenrodyellow	FA	FA	D2
lightgreen	90	EE	90
lightgrey	D3	D3	D3
lightpink	FF	B6	C1
lightsalmon	FF	A0	7A
lightseagreen	20	B2	AA
lightskyblue	87	CE	FA
lightslategray	77	88	99
lightsteelblue	B0	C4	DE
lightyellow	FF	FF	E0
lime	00	FF	00
limegreen	32	CD	32
linen	FA	F0	E6
magenta	FF	00	FF
maroon	80	00	00
mediumaquamarine	66	CD	AA
mediumblue	00	00	CD
mediumorchid	BA	55	D3
mediumpurple	93	70	DB
mediumseagreen	3C	B3	71
mediumslateblue	7B	68	EE
mediumspringgreen	00	FA	9A
mediumturquoise	48	D1	CC
mediumvioletred	C7	15	85
midnightblue	19	19	70
mintcream	F5	FF	FA
mistyrose	FF	E4	E1
moccasin	FF	E4	B5
navajowhite	FF	DE	AD
navy	00	00	80
oldlace	FD	F5	E6
olive	80	80	00
olivedrab	6B	8E	23
orange	FF	A5	00
orangered	FF	45	00
orchid	DA	70	D6
palegoldenrod	EE	E8	AA
palegreen	98	FB	98
paleturquoise	AF	EE	EE
palevioletred	DB	70	93
papayawhip	FF	EF	D5
peachpuff	FF	DA	B9
peru	CD	85	3F
pink	FF	C0	CB

plum	DD	A0	DD
powderblue	B0	E0	E6
purple	80	00	80
red	FF	00	00
rosybrown	BC	8F	8F
royalblue	41	69	E1
saddlebrown	8B	45	13
salmon	FA	80	72
sandybrown	F4	A4	60
seagreen	2E	8B	57
seashell	FF	F5	EE
sienna	A0	52	2D
silver	C0	C0	C0
skyblue	87	CE	EB
slateblue	6A	5A	CD
slategray	70	80	90
snow	FF	FA	FA
springgreen	00	FF	7F
steelblue	46	82	B4
tan	D2	B4	8C
teal	00	80	80
thistle	D8	BF	D8
tomato	FF	63	47
turquoise	40	E0	D0
violet	EE	82	EE
wheat	F5	DE	B3
white	FF	FF	FF
whitesmoke	F5	F5	F5
yellow	FF	FF	00
yellowgreen	9A	CD	32

colorNormal example

Both of the following strings represent the color orange and can be used as the *colorNormal* property:

```
0x00a5ff
orange
```

columnCount

Topic group Related topics

The number of columns in the grid.

Property of

Grid

Description

columnCount is a read-only property that contains the number of columns in the grid; either the number of columns that are automatically created when no GridColumn objects are specified, or the number of GridColumn objects explicitly added.

columns

Topic group Related topics

An array of objects for each column in the grid.

Property of

Grid

Description

A grid's *columns* array contains explicitly created GridColumn objects, one for each column. If no GridColumn objects are created, the grid automatically creates columns, but the *columns* array is empty.

copy

Topic group Related topics

Copies selected text to the Windows clipboard.

Syntax

<oRef>.*copy*()

<oRef>

An object reference to the control from which to copy the text.

Property of

Browse, ComboBox, Editor, Entryfield, SpinBox

Description

Use *copy*() when the user has selected text and wants to copy it to the Windows clipboard.

When calling this method from a pushbutton's *onClick* event, the pushbutton should have its *speedBar* property set to *true*, so that it doesn't get focus. Otherwise, the edit control loses focus when the button is clicked, and there's nothing to copy.

If you have assigned a menubar to the form, you can use a menu item assigned to the menubar's *editCopyMenu* property instead of using the *copy*() method of individual objects on the form.

count()

Topic group Related topics

Returns the number of prompts in a listbox

Syntax

<oRef>.*count*()

<oRef>

An object reference to the listbox whose prompts to count.

Property of

ListBox

Description

Use *count*() when you can't anticipate the number of prompts a listbox might have at runtime. For example, when you specify “FILE *.*” for the *dataSource* property, the number of prompts depends on the number of files in the current directory.

When using an array as the *dataSource* for a listbox, you can check the array’s *size* property to get the number of items.

cuaTab

Topic group Related topics

Determines cursor behavior when you press Tab while a control has focus.

Property of

Browse, Editor, Grid

Description

When *cuaTab* is *true*, pressing Tab moves to the next control in the form's tab order. When *cuaTab* is *false*, pressing Tab moves to the next field in a Grid or Browse object or moves the cursor to the next tab stop in an Editor object.

The same applies to pressing Shift+Tab, except that the movement is in reverse.

currentColumn

Topic group Related topics

The number of the column that has focus in the grid.

Property of

Grid

Description

Use the *currentColumn* property as an index into the *columns* array to refer to the GridColumn object that represents the column that currently has focus.

curSel

Topic group Related topics Example

Determines which prompt is selected in a component.

Property of

ListBox, NoteBook, TabBox

Description

Use *curSel* to get or set which prompt in a ListBox, NoteBook, or TabBox is highlighted. The prompts are determined by the component's *dataSource* property. The first prompt is prompt number 1.

Assigning a value to *curSel* fires the control's *onSelChange* event, as if the change was made manually.

curSel example

Suppose a form displays status information about an account on page 1, and background information on page 2, with a TabBox to choose pages. Clicking the Add button switches the form to page 2 so the user can add the data for the new account. By setting the *curSel* of the tabbox, the tabbox is updated, and *onSelChange* for the tabbbox changes the *pageno* of the form.

```
function addButton_onClick()
  form.rowset.beginAppend()
  form.pageTabbox.curSel := 2
```

See the example for *onSelChange* for the tabbox's *onSelChange* event handler.

cut

Topic group Related topics

Cuts selected text and places it on the Windows Clipboard.

Syntax

<oRef>.*cut*()

<oRef>

An object reference to the control from which to cut the text.

Property of

Browse, ComboBox, Editor, Entryfield, SpinBox

Description

Use *cut*() when the user has selected text and wants to remove it from the edit control and place it on the Windows clipboard.

When calling this method from a pushbutton's *onClick* event, the pushbutton should have its *speedBar* property set to *true*, so that it doesn't get focus. Otherwise, the edit control loses focus when the button is clicked, and there's nothing to cut.

If you have assigned a menubar to the form, you can use a menu item assigned to the menubar's *editCutMenu* property instead of using the *cut*() method of individual objects on the form.

dataLink

Topic group Related topics Example

The Field object that is linked to the component.

Property of

Many form components

Description

You link a form component to a table's field by assigning a reference to the *dataLink* property of the component. The reference you assign is to the Field object that represents the field in an open query. This assignment is called *dataLink*ing. When a form component and Field object are linked in this way, they are said to be *dataLink*ed.

Exception: a Grid object is *dataLink*ed to a rowset, not a field.

For compatibility with earlier versions of *Visual* dBASE, you may also assign the field name in a string. This technique is used for form-based data handling with tables open in work areas only.

Both field and component objects have a *value* property. (Fields in a table open in a work area do not have any properties, but they have a value; the concept is the same.)When they are *dataLink*ed, changes in one object's *value* property are echoed in the other. The form component's *value* property reflects the value displayed in the component at any given moment. If the component's value is changed, it is copied into the field after the component loses focus.

The *value* property for all fields in a rowset are set when you first open a query and updated as you navigate from row to row. The *value* properties for components *dataLink*ed to those fields are also updated at the same time, unless the rowset's *notifyControls* property is set to *false*. You can also force the components to be updated by calling the rowset's *refreshControls*() method, which is useful if you have set a field's *value* property through code.

Form-based data events such as *onNavigate* will not work unless the form has controls *dataLink*ed to fields. For example, if you USE a table, create and open an empty Form, assign an *onNavigate* event handler, and SKIP in the table, the *onNavigate* will not fire simply because the form is open.

The *dataLink* property is similar to the *dataSource* property used for Image objects, except that data displayed through the *dataLink* property can be changed, while data displayed through the *dataSource* property is always read-only.

A component's *dataLink* is automatically set when you use the Form wizard or use a field in the Field palette.

dataLink example

The following is the statement in a .WFM file that assigns the *dataLink* property to a field in a rowset:

```
dataLink = form.student1.rowset.fields["LAST_NAME"]
```

Note that this is a link to the field object itself, not the object's *value* property.

The equivalent link for a field in a table open in a work area would look like:

```
dataLink = "STUDENT->LAST_NAME"
```

dataSource [options]

Topic group Related topics Example

The options that are displayed in a ComboBox, ListBox, NoteBook, or TabBox object.

Property of

ComboBox, ListBox, NoteBook, TabBox

Description

Use the *dataSource* property to set the options that are displayed in a ComboBox, ListBox, NoteBook, or TabBox object. The *dataSource* property for a ComboBox or ListBox is a string in one of the following five forms:

- ARRAY <array>

creates prompts from elements in an array object.

- FIELD <field name>

creates prompts from all the values in a field in a table file.

- FILE [<filename skeleton>]

creates prompts from file names in the current default directory that match the optional filename skeleton.

- STRUCTURE

creates prompts from all the field names in the currently selected table.

- TABLES

creates prompts from the names of all tables in the currently selected database. For the default database, this is all the .DBF and .DB files in the current dirctory.

For a NoteBook or TabBox, only the ARRAY *dataSource* is allowed. The *dataSource* string in general is not case-sensitive, except that if you specify a literal array, the array contents will appear as specified.

Adding elements to an array after it has been assigned as a component's *dataSource* may not automatically update the component's options. Files added to the directory after the *dataSource* property has been set to a file mask will not automatically appear either.

To update the *dataSource*, you need to reassign the *dataSource* property. In most cases, you can simply reassert the property by assigning its current value to itself. For example, if you had originally specified all the GIF files in the current directory, the *dataSource* property assignment would look like this:

```
with (this.fileCombobox)
  dataSource = "FILENAME *.GIF"
endwith
```

To update the file list when you press an Update button on your form, the button's *onClick* would look like this:

```
function updateButton_onClick()
  form.fileCombobox.dataSource += ""
```

You don't have to specify what the *dataSource* string is again, since it's already contained in the *dataSource* property. The += operator adds an empty string to reassign the value, which reasserts the *dataSource*. This makes your code easier to maintain, since the *dataSource* string is specified in only one place.

When using an array in the *dataSource* string, you can use a literal array, for example,

```
array {"Chocolate", "Strawberry", "Vanilla"}
```

Or you can use a reference to an array object, for example,

```
array aFlavors
```

If you use a reference, that array must exist at the time the *dataSource* property is assigned. Since the *dataSource* property contains that string (in this example, array aFlavors), if you reassert the *dataSource* property as shown above, an updated version of the named array must exist. In this example, the array aFlavors must be accessible in the method updateButton_onClick().

For this reason, when using an updatable array as the *dataSource* property, the array is usually created as a property of the form. This makes the array equally accessible from the component that uses the

array and from any other component that tries to reassert the *dataSource* property. In this example, the array aFlavors would be created as a property of the form, and the *dataSource* string would contain:

```
array form.aFlavors
```

The reference *form*.aFlavors is valid from the event handler of any component on the form.

dataSource [options] example

The following *onOpen* event handler reads the contents of a field in a table into an array to be used as the ComboBox object's options. A table of ice cream flavors has already been opened in a query named flavors1.

```
function flavorCombobox_onOpen()
  form.aFlavors = new Array()
  if form.flavors1.rowset.first()
    do
      form.aFlavors.add( form.flavors1.rowset.fields[ "Name" ].value )
    until not form.flavors1.rowset.next()
  endif
  this.dataSource := "array form.aFlavors"
```

Later, if someone adds a new flavor, they can add it to the array and update the ComboBox object immediately. (The flavor will be added to the table once it's approved by the flavor committee.)

```
function addFlavorButton_onClick()
  form.aFlavors.add( this.form.newFlavorText.value )  // Add new flavor
  form.flavorCombobox.dataSource += ""  // Reassert by adding empty string
```

dataSource [Image]

Topic group Related topics Example

The bitmap that is displayed in an Image object.

Property of

Image

Description

An Image object can display either a static file from disk, a resource image, or a bitmap stored in a table. Set the *dataSource* property to either one of the following:

- A string containing the word FILENAME, a space, and the name of a file. The string is not case-sensitive.
- A string of the form “RESOURCE <resource id> <dll name>”, which specifies a bitmap resource and the DLL file that holds it.
- A string containing the form BINARY, a space, and the name of a binary field in a table open in a work area that contains bitmapped images.
- A reference to a field object in an open query that contains bitmapped images.

If you assign a field object (or a field in a work area) as the *dataSource*, the Image object will automatically update as you navigate from row to row, unless the rowset’s *notifyControls* property is set to *false*.

The *dataSource* property is similar to the *dataLink* property used for Field objects, except that data displayed through the *dataLink* property can be changed, while data displayed through the *dataSource* property is always read-only.

An Image object’s *dataSource* is automatically set when you use the Form Wizard or use a bitmap image field in the Field Palette.

dataSource [Image] example

The following string would set the *dataSource* of an Image object to the file LOGO.GIF in the current directory:

```
filename LOGO.GIF
```

default

Topic group Related topics

Determines if a pushbutton is the form's default pushbutton.

Property of

PushButton

Description

Use the *default* property to make a pushbutton the default pushbutton when the user submits a form by pressing Enter. This behavior is used primarily for dialog boxes, with the either the OK or Cancel button being the default, whichever is more appropriate. Setting the *default* property of a pushbutton to *true* gives the pushbutton a visual highlight that identifies it as the default.

Setting the *default* property to *true* causes two things to happen when the user presses Enter when the focus is not on a pushbutton:

- The *onClick* subroutine of the default pushbutton executes.
- The *id* property of the default pushbutton is passed to the form's *onSelection* event handler.

However, if the user clicks on any pushbutton, the *onClick* event handler of that pushbutton executes. The *id* value of that pushbutton is passed to the *onSelection* event, even if the *default* property of another pushbutton is *true*.

If you give more than one pushbutton a *default* value of *true*, the last pushbutton to get the value is the default.

description

Topic group

A short description for an ActiveX control.

Property of

ActiveX

Description

An ActiveX object's *description* property contains a short description of the ActiveX control it represents. The description is provided by the control and is read-only.

designView

Topic group Related topics

Designates a .QBE query or table that is used when designing a form.

Property of

Form

Description

Use *designView* to facilitate creating and *dataLink*ing a form that uses form-based data handling with tables in work areas. The value in *designView* is ignored at runtime. When using the data access objects, do not use *designView* or *view*.

There are two main instances in which you may want to use *designView* instead of *view*.

- If you know which tables will be open when the form is opened at runtime, use *designView* to avoid opening the tables again with *view* when the form is opened.
- If you don't know which tables will be open when the form is opened at runtime, but need certain tables open to design the form, use *designView* to automatically open the tables at design time, regardless of the tables needed at runtime.

If you specify a *view* property for a form, you should not also specify a *designView* property.

disabledBitmap

Topic group Related topics

Specifies the graphic image to display in a pushbutton when the pushbutton is disabled.

Property of

PushButton

Description

Use *disabledBitmap* to indicate visually when a pushbutton is not available for use. A pushbutton is disabled when its *enabled* property is set to *false*.

The *disabledBitmap* setting can take one of two forms:

- RESOURCE <resource id> <dll name>

specifies a bitmap resource and the DLL file that holds it.

- FILENAME <filename>

specifies a bitmap file. See class Image for a list of bitmap formats supported by *Visual* dBASE.

When you specify a character string for the pushbutton with *text* and an image with *disabledBitmap*, the image is displayed with the grayed-out character string

doVerb

Topic group | Related topics | Example

Starts an action in an OLE server application.

Syntax

<oRef>.*doVerb*(<verb expN> [, <title expC>])

<oRef>

The OLE control that contains the linked or embedded object.

<verb expN>

The numeric value of the OLE verb.

<title expC>

An optional text string to display in the title bar of the server window.

Property of

OLE

Description

Use *doVerb*() to initiate an action from an OLE document stored in an OLE field and to specify what action to take.

Every OLE object accepts one or more verbs. Each verb determines which actions are taken, and each is represented by a number.

doVerb example

Most sound applications accept one of two verbs:

- 0 (Play) plays a sound stored in an OLE field.
- 1 (Edit) opens the Sound Recorder to edit the sound.

Double-clicking the OLE control plays the sound, but to edit the sound, use a button that calls the OLE control's *doVerb*() method:

```
function editSound_onClick()
  form.soundOLE.doVerb( 1 )
```

downBitmap

Topic group Related topics

Specifies the graphic image to display in a pushbutton when the user presses the button.

Property of

PushButton

Description

Use *downBitmap* to give visual confirmation when the user clicks a pushbutton. When the user releases the mouse button or moves the pointer off the pushbutton, the image and/or text specified by *focusBitmap* and *text* is displayed.

The *downBitmap* setting can take one of two forms:

- RESOURCE <resource id> <dll name>

specifies a bitmap resource and the DLL file that holds it.

- FILENAME <filename>

specifies a bitmap file. See class Image for a list of bitmap formats supported by *Visual* dBASE.

When you specify a character string for the pushbutton with *text* and an image with *downBitmap*, the image is displayed with the character string.

dragScrollRate

Topic group Related topics

The delay time between each column scroll when dragging columns.

Property of

Grid

Description

The *dragScrollRate* property controls how fast the scrolls horizontally when rearranging columns in the grid by dragging. The delay time is measured in milliseconds.

dropDownHeight

Topic group Related topics

The number of lines displayed in the list portion of the combobox.

Property of

ComboBox

Description

Use *dropDownHeight* to specify how much information will appear when a user drops down a list from a combo box.

dropDownWidth

Topic group Related topics

The width of the list portion of the combobox.

Property of

ComboBox

Description

The width of the drop-down list of a combobox may be different than the width of the text entry portion. If *dropDownWidth* is zero (the default), the width of the drop-down list is sized to match the width of the control. Otherwise, the combobox's *dropDownWidth* setting is used.

The *dropDownWidth* is expressed in the form's current *metric* units (the same as the *width*).

elements

Topic group | Related topics | Example

An array containing object references to all the components in a form.

Property of

Form

Description

The *elements* array contains an object reference for each visual component in a form. Other types of objects, like data access objects, are not included.

You can determine the number of components in the form by checking the *elements* array's *size* property. Each element in the array can be addressed by its element number or by the *name* of the component.

The *elements* array is not a member of the Array class, but rather an ObjectArray class with specific capabilities for managing a list of objects. It does not support most of the methods of the Array class. The *elements* array is not meant to be changed directly, although it is safe to scan to get the object references for the components in the form.

elements example

Suppose you have a form that contains a bunch of spinboxes for measurements. You want to be able to set them all to zero with the click of a button.

```
function resetButton_onClick()
  local nObj
  for nObj = 1 to form.elements.size
    if form.elements[ nObj ].className == "SPINBOX"
      form.elements[ nObj ].value := 0
    endif
  endfor
```

Compare this loop with the example for *before*.

enabled

Topic group | Related topics | Example

Determines if an object can get focus and operate.

Property of

Most form components

Description

When you set the *enabled* property of an object to *true*, the user can select and use the object. When you set the *enabled* property to *false*, the object is dimmed and the user can't select or use the object. This is a visual indication that the object cannot get focus. The object is removed from the tab sequence and clicking the object has no effect.

enabled example

Suppose you have a checkbox to echo output to a file and an entryfield for the file name. When the checkbox is unchecked, you disable the entryfield:

```
function outputFileCheckbox_onChange()
  form.outputFileEntryfield.enabled := this.value
```

enableSelection

Topic group Related topics

Whether the selection range is displayed in the Slider object.

Property of

Slider

Description

If *enableSelection* is *true*, the selection range set by the slider's *startSelection* and *endSelection* properties is displayed inside the slider as a colored area with matching tic marks. You may use the selection range to show the current or preferred range.

If *enableSelection* is *false*, the *startSelection* and *endSelection* properties have no effect.

endSelection

Topic group Related topics

The high end of the selection range in a Slider object.

Property of

Slider

Description

endSelection contains the high value in the selection range. It should be equal to or higher than *startSelection*, and between the *rangeMin* and *rangeMax* values of the slider.

The selection is not displayed unless the slider's *enableSelection* property is *true*.

escExit

Topic group Related topics

Determines if the user can close a form by pressing Esc.

Property of

Form

Description

Set *escExit* to *false* to prevent the user from closing a form by pressing Esc.

You can verify that the user wants to close the form by using the form's *canClose* event handler. Closing a form by pressing Esc abandons all pending changes in the data buffer, as if *abandonRecord*() was called.

When a form is opened with *readModal*(), it returns *false* when it is closed by pressing Esc.

evalTags

Topic group Related topics

Whether to evaluate HTML tags in the text.

Property of

Editor

Description

Visual dBASE supports common HTML formatting tags. You may choose to evaulate any tags that appear in the text of the editor and apply the formatting, or to leave the HTML tag as-is so that they can be edited.

Use the Format toolbar to format the text with HTML tags. You may also type in the tags manually, but they will not be interpreted until you toggle *evalTags* to *true*.

The editor's *evalTags* property corresponds to the Apply Formatting option in the editor's popup menu. The Format toolbar is not active if the editor's *evalTags* property is *false*.

fields

Topic group Related topics Example

Specifies the fields to display in a Browse object, and the field options to apply to each field.

Property of

Browse

Description

The *fields* is a string with the following the following format:

```
<field 1> [<field option list 1>] |
<calculated field 1> = <exp1> [<calculated field option list 1>]
    [, <field 2> [<field option list 2>] |
    <calculated field 2> = <exp1> [<calculated field option list 2>], ...]
```

The fields are displayed in the order they're listed, and the <field option list> affects the way each field is displayed. The options are as follows:

Option	Description
\<column width>	The width of the column within which the field appears
\H = <expC>	HEADER option; causes <expC> to appear above the field column in the browse, replacing the field name
\P = <expC>	PICTURE option; formats the field according to the *picture* template <expC>
\R	READ-ONLY option; specifies that the field is read-only and can't be edited
\V = <condition> [\F] [\E = <expC>]	VALID option; allows a new field value to be entered only when <condition> evaluates to *true*
	VALID REQUIRED option; the \F option prevents the user from leaving the field and the editing session from ending until <condition> evaluates to *true*
	ERROR MESSAGE option; \E = <expC> causes <expC> to appear when <condition> evaluates to *false*
\W = <condition>	WHEN option; allows the field to be edited only when <condition> evaluates to *true*

Calculated fields are read-only and are composed of an assigned field name and an expression that results in the calculated field value, for example:

```
Commission = Rate * Saleprice
```

Options for calculated fields affect the way these fields are displayed. These options are as follows:

Option	Description
\<column width>	The width of the column within which the calculated field is displayed
\H = <expC>	Causes <expC> to appear above the calculated field column in the browse, replacing the calculated field name

fields example

The following *fields* string:

```
CONTCITY->CITY_NAME\H="Contract City"\15,CONTCITY->CONTACT\H="Contact
Person"\25
```

Displays two fields in the browse from the Contcity table:

- The City_name field, with the heading “Contract City” in a column 15 characters wide
- The Contact field, with the heading “Contact Person” in a column 25 characters wide

fieldWidth

Topic group Related topics

Specifies the default width of the columns in a Browseobject.

Property of

Browse

Description

Use *fieldWidth* to set the default column width for the columns in a Browse object. A value of zero means no default; the columns are sized to match the field width.

filename

Topic group Related topics

The name of the file that contains the desired report.

Property of

ReportViewer

Description

Set the *filename* property to the file that contains the report class definition. Reports are stored in files with a .REP extension.

first

Topic group | Related topics | Example

The first component in the form's z-order.

Property of

Form

Description

Use a form's *first* property to reference the first component in the form's z-order. For more information on the form's z-order, see *before*.

If the *first* component can receive focus, it gets focus initially when you open a form. Otherwise, the next component in the z-order is tried until one is found that can receive focus.

first is a read-only property.

focusBitmap

Topic group Related topics

Specifies the graphic image to display in a pushbutton when the pushbutton has focus.

Property of

PushButton

Description

Use *focusBitmap* to indicate visually when a pushbutton is selected.

The *focusBitmap* setting can take one of two forms:

- RESOURCE <resource id> <dll name>

specifies a bitmap resource and the DLL file that holds it.

- FILENAME <filename>

specifies a bitmap file. See class Image for a list of bitmap formats supported by *Visual* dBASE.

When you specify a character string for the pushbutton with *text* and an image with *focusBitmap*, the image is displayed with the character string.

fontBold

Topic group Related topics

Specifies whether the component displays its text in bold type.

Property of

Many form components

Description

Set *fontBold* to *true* if you want the component to display its text in boldface.

fontItalic

Topic group Related topics

Specifies whether the component displays its text in italics.

Property of

Many form components

Description

Set *fontItalic* to *true* if you want the component to display its text in italics.

fontName

Topic group Related topics

The typeface of the component's text.

Property of

Many form components

Description

Set *fontName* to the name of the typeface you want to apply to the text in the component.

fontSize

Topic group Related topics

The point size of the component's text.

Property of

Many form components

Description

Set *fontSize* to the point size in which you want the text of the component to be displayed. There are approximately 72 points per inch. Common text is from 8 to 12 points. Default: 10.

fontStrikeout

Topic group Related topics

Specifies whether the component displays its text struck through.

Property of

Many form components

Description

Set *fontStrikeout* to *true* if you want the component to display its text struck through.

fontUnderline

Topic group Related topics

Specifies whether the component displays its text underlined.

Property of

Many form components

Description

Set *fontUnderline* to *true* if you want the component to display its text underlined.

form

Topic group | Related topics | Example

The form or report that contains the component.

Property of

All form components.

Description

A component's *form* property is a reference to the form or report that contains it. It is set automatically when the component is created and cannot be changed.

Use the *form* property in component event handlers and methods to generically refer to the object that contains the component.

In a form, a component's *form* and *parent* property refer to the same thing—the form—if the component is placed directly on the form. However, if for example you place a component in a NoteBook control on a form, then the component's *parent* is the NoteBook control, not the form; and the NoteBook control's *parent* is the form. In a report, components are contained deeper in the object hierarchy and their *parent*s are never the report.

By using the *form* property, you can immediately get back to the top of the object hierarchy and refer to its properties, events, or methods; or refer to other objects in the form or report.

In addition to the *form* property, a local variable named *form* is also created for any event handler for form, report, or a visual component. The *form* variable is not created for events in other kinds of classes. The variable and the *form* property both refer to the same object. In most event handlers, the *form* variable is used.

form example

The following is an *onClick* event handler for a button that puts the form's primary rowset—a data access component—in Append mode to add a new row.

```
function addButton_onClick()
  this.form.rowset.beginAppend()  // Use form property to get to other
objects in form
```

The following function uses the *form* variable instead of the *form* property, and behaves identically:

```
function addButton_onClick()
  form.rowset.beginAppend()
```

function

Topic group Related topics Example

Formats text in an object.

Property of

Entryfield, SpinBox, Text

Description

Use a formatting *function* to format the display and entry of data. While a *picture* gives you character-by-character control, a *function* formats the entire value.

Visual dBASE recognizes the following *function* symbols:

Symbol	Description
(	Encloses negative numbers in parentheses.
!	Converts letters to uppercase.
^	Displays numbers in exponential form.
$	Inserts a dollar sign or the symbol defined with SET CURRENCY TO instead of leading spaces.
A	Restricts entry to alphabetic characters.
B	Left-aligns a numeric entry.
C	Displays CR (credit) after a positive number.
D	Displays and accepts entry of a date in the current SET DATE format.
E	Displays and accepts entry of a date in European (DD/MD/YY) format.
I	Centers the entry.
J	Right-aligns the entry.
L	Displays numbers with leading zeros.
R	Inserts literal characters into the display without including them in the field.
T	Removes leading and trailing spaces from character values.
V<n>	? and ?? command only: Wraps a character string within a width specified by <n>.
X	Displays DB (debit) after a negative number.
Z	Displays zeros as a blanks.

function example

Suppose you want a character field to be right-aligned, and all the letters typed to be converted into uppercase. Set the *function* of the control to “J!”.

getTextExtent

Topic group Related topics

Returns the length of a text string based on the current font settings of the Text control.

Syntax

<oRef>.*getTextExtent*(<expC>)

<oRef>

The Text object used to calculate the text size.

<expC>

The string to measure

Property of

Text

Description

getTextExtent() calculates the *width* required to display <expC> in the Text object, using the object's current font settings. It returns a value in the form's current *metric*.

gridLineWidth

Topic group Related topics

The width of the grid lines in a Grid object.

Property of

Grid

Description

gridLineWidth controls the width, in pixels, of the lines that separate the cells in a Grid object.

group

Topic group Related topics Example

Creates component groups in the form's tab order.

Property of

CheckBox, PushButton, RadioButton

Description

Use *group* to determine if an object is part of a group within which the user can move focus with the arrow keys. Pressing Tab does not move the focus within the group; it moves to the next object outside the group. All objects in a group must be of the same class.

Radiobuttons must be used in groups of two or more. Only one radio button in the group may be selected at any time.

To create a group of radio buttons, assign the same string to each RadioButton object's *group* property. The value of the string doesn't really matter; it has no other function besides grouping the radio buttons, and is not related to any other property.

You may also use *true* and *false* to create groups. Set the *group* property of the first object in the group to *true*. For all other objects that belong to the group, set *group* to *false*. The next object with a *group* setting of *true* begins another group.

group example

Suppose you're creating an order entry screen. For the options "Cash, Check, or Charge," you use three RadioButton objects with the *group* "payment". For the options "Phone, Fax, or E-mail," you use three other RadioButton objects with the *group* "orderedBy".

hasColumnHeading

Topic group Related topics

Whether column headings are displayed.

Property of

Grid

Description

Set *hasColumnHeading* to *false* to suppress column headings in a grid. If *hasIndicator* is also *false*, the grid will contain data cells only.

hasColumnLines

Topic group Related topics

Whether column (vertical) grid lines are displayed.

Property of

Grid

Description

Set *hasColumnLines* to *false* to suppress the vertical lines that separate columns in the grid.

hasIndicator

Topic group Related topics

Whether the indicator column is displayed.

Property of

Grid

Description

The indicator column is the left-most column in the grid, and contains an icon indicating the current column. The icon changes when a row is being appended.

Set *hasIndicator* to *false* to suppress the indicator column. If *hasColumnHeading* is also *false*, the grid will contain data cells only.

hasRowLines

Topic group Related topics

Whether row (horizontal) grid lines are displayed.

Property of

Grid

Description

Set *hasRowLines* to *false* to suppress the horizontal lines that separate rows in the grid.

header3D

Topic group Related topics

Specifies whether the top and left portions of a Browse object appear raised (three-dimensional).

Property of

Browse

Description

header3D affects the appearance of the top and left sides of a browse window when *showHeading* and/or *showRecNo* (respectively) are *true*. If *header3D* is *true*, the Heading and Record number appear three-dimensional, making it easier to see that they don't represent values contained in the table. If *showHeading* and *showRecNo* are *false*, *header3D* has no effect.

height

Topic group Related topics

The height of an object.

Property of

Form components; report components: Band, PageTemplate, StreamFrame.

Description

The unit of measurement in a form or report is controlled by its *metric* property. The default metric for forms is characters, and for reports it's twips.

helpFile

Topic group Related topics

Identifies a Windows Help file (.HLP) that contains context-sensitive Help topics.

Property of

Most form objects.

Description

Use *helpFile* in combination with *helpId* to provide context-sensitive help from a Windows Help file. Context-sensitive help appears for the object that has focus when the user gives focus presses F1, or chooses Help | Context Sensitive Help from the default menu.

After creating the Windows Help file, follow these steps:

1. Assign the name of the Help file to the form's *helpFile* property. This assigns the default Help file for all help topics.
2. Assign a context ID or index string for the form's default Help topic to the form's *helpId* property.
3. For individual controls that have their own help, assign the appropriate value to the control's *helpId* property.
4. If an individual control has a topic in a different Help file, assign that file to the control's *helpFile* property.

Warning: If you assign the F1 key as the *shortCut* key to your own menu item, pressing F1 executes the *onClick* for that menu item; it does not display context-sensitive help. Context-sensitive help is also disabled if you assign an *onHelp* event handler.

helpId

Topic group Related topics

Specifies the Help context ID or index entry for an object.

Property of

Most form objects

Description

Use *helpId* in combination with *helpFile* to assign context-sensitive help to a control. Context-sensitive help appears for the object that has focus when the user gives focus presses F1, or chooses Help | Context Sensitive Help from the default menu.

Warning: If you assign the F1 key as the *shortCut* key to your own menu item, pressing F1 executes the *onClick* for that menu item; it does not display context-sensitive help. Context-sensitive help is also disabled if you assign an *onHelp* event handler.

The *helpId* is a string that contains either:

- A context ID number, preceded by the "#" symbol, for example:

  ```
  #2002
  ```

  Choosing help displays the topic with that context ID number. If that context ID is not found, Help displays an error.

- A help index string, for example

  ```
  Deleting accounts
  ```

  Choosing help searches the index for that string. If only one topic is found that uses that index string, it is displayed. If there are multiple matches, Help displays a Topic Found dialog, letting the user choose which topic to view. If the string is not found in the index, the Help index is displayed, with the *helpId* property as the current search value.

As with *helpFile*, you may set a default *helpId* in the form. If the control that has focus does not have its own *helpId* property, the form's value is used.

hScrollBar

Topic group Related topics

Determines when an object has a horizontal scroll bar.

Property of

Grid

Description

The *hScrollBar* property determines when and if a control displays a horizontal scrollbar. It may have any of four settings:

Value	Description
0 (Off)	The object never has a horizontal scroll bar.
1 (On)	The object always has a horizontal scroll bar.
2 (Auto)	Displays a horizontal scroll bar only when needed.
3 (Disabled)	The horizontal scroll bar is visible but not usable.

hWnd

Topic group Related topics

The Windows object handle for the form object.

Property of

Most form objects

Description

Use *hWnd* when you need to pass the handle of an form object to a Windows API function or other external DLL.

The *hWnd* of a form is the not the immediate parent of the controls in it. For that, use the *hWndClient* property.

The *hWnd* property is read-only.

hWndClient

Topic group Related topics

The Windows object handle of the window that contains a form's controls.

Property of

Form

Description

hWndClient is the handle for the parent window that contains a form's controls. In contrast, *hWnd* is the handle for the form itself; the parent of the *hWndClient* window, and the grandparent of the controls.

icon

Topic group Related topics

Specifies an icon file (.ICO) or resource that displays when a form is minimized.

Property of

Form

Description

Use *icon* to specify an image to be used when a form is minimized. The *icon* property is a string that can take one of two forms:

- RESOURCE <resource id> <dll name>

specifies a bitmap resource and the DLL file that holds it.

- FILENAME <filename>

specifies an .ICO file.

id

Topic group Related topics

Identifies an object with a numeric value.

Property of

Most form components

Description

Use *id* to give a unique supplementary identifier to an object.

In most cases, you use an object's *name* or compare object references directly to determine the identity of an object. *id* is used primary with the the *onSelection* event, which is an antiquated and rarely-used event.

The *id* property defaults to -1.

inDesign

Topic group Related topics

Whether the object was instantiated normally or by a visual designer.

Property of

Form, Report

Description

The Form and Report designers create a special instance of the form or report when designing them. Some actions that occur when the form or report is executed also take place when it is designed, such as the activation of queries. However, other things are missing; the Header is not executed and parameters that are usually passed are not present.

The *inDesign* property is *true* when the object was created for design instead of execution. Use it to take shortcut actions to allow the design of the object without error.

integralHeight

Topic group Related topics

Whether a partial row at the bottom of the grid is displayed.

Property of

Grid

Description

Set *integralHeight* to *false* to show complete rows only. If the row at the bottom of the grid is clipped, the entire row is hidden.

isRecordChanged()

Topic group Related topics Example

Returns a logical value that indicates whether data in the current record buffer has been modified.

Syntax

<oRef>.*isRecordChanged*(<keystroke expC>)

<oRef>

An object reference to the form.

Property of

Form

Description

Use *isRecordChanged*() for form-based data handling with tables in work areas. When using the data access objects, *isRecordChanged*() has no effect; check the rowset's *modified* property instead.

Form-based data buffering lets you manage the editing of existing records and the appending of new records. Editing changes to the current record are not written to the table until there is navigation off the record, or until *saveRecord*() is called. Each work area has its own separate edit buffer. *isRecordChanged*() returns *true* if the any fields in the currently selected work area have changed; otherwise it returns *false*.

isRecordChanged example

The following example shows the *onClick* event handler for a Cancel button. It checks if any changes have been made to the current record. If there has, it asks for confirmation before abandoning the changes.

```
function cancelButton_onClick()
  if form.isRecordChanged()
    if msgbox( "Are you sure you want to lose these changes?", "Cancel", 4+32
) # 6
      return   // Did not choose Yes, don't cancel (or anything else)
    endif
  else
  form.abandonRecord()
```

key

Topic group Related topics

Event fired when the user types a keystroke in a control; return value may alter or cancel the keystroke.

Parameters

<char expN>

The ASCII value of the character typed.

<position expN>

The position of the new character in the string.

<shift expL>

Whether the Shift key was down.

<ctrl expL>

Whether the Ctrl key was down.

Property of

ComboBox, Entryfield

Description

Use *key* to evaluate and possibly modify each character that the user enters in a control, or to perform some action for each keystroke.

The *key* event handler must return a numeric or a logical value. A numeric value is interpreted as the ASCII code of a character, which automatically replaces the character input by the user. A logical value is interpreted as a decision to accept or reject the character input by the user.

keyboard

Topic group Related topics

Stuffs a character string into an edit control, simulating typed user input.

Syntax

<oRef>.*keyboard*(<keystroke expC>)

<oRef>

The control to receive the keystrokes.

<keystroke expC>

A string, which may include key codes.

Property of

Browse, ComboBox, Editor, Entryfield, SpinBox

Description

Use *keyboard*() when you want to simulate typing keystrokes into a control. The control does not have to be the one that has focus.

Note: If you want to set a value in a control, it's better to assign the *value* property directly.

Use curly braces ({ }) in <keystroke expC> to indicate cursor keys or characters by ASCII code. The following key labels may be used inside the curly braces:

Alt+0 through Alt+9	Ctrl+Home	End	PgDn
Alt+A through Alt+Z	Ctrl+LeftArrow	Enter	PgUp
Backspace	Ctrl+PgDn	Esc	RightArrow
Backtab	Ctrl+PgUp	F1 through F10	Shift+F1 through Shift+F9
Ctrl+A through Ctrl+Z	Ctrl+RightArrow	Home	Space or Spacebar
Ctrl+End	Del	Ins	Tab
Ctrl+F1 through Ctrl+F10	DnArrow	LeftArrow	UpArrow

You may specify a character by its ASCII code by enclosing the value in the curly braces. If the value inside the curly braces is not a recognized key label or ASCII value, the curly braces and whatever is between them are ignored.

Calling *keyboard*() immediately fires the control's *key* event, if any. In contrast, the KEYBOARD command stuffs keystrokes in the main typeahead buffer. The control that has focus then picks up the keys from the typeahead buffer as usual.

left

Topic group Related topics

The position of the left edge of an object relative to its container.

Property of

All form objects.

Description

The unit of measurement in a form or report is controlled by its *metric* property. The default metric for forms is characters, and for reports it's twips.

lineNo

Topic group Related topics

The current line in an Editor object.

Property of

Editor

Description

Use *lineNo* to move the cursor to a specified line in an Editor object, or to determine what line the cursor is on.

When you set *lineNo*, the cursor moves to the beginning of the specified line.

linkFileName

Topic group Related topics

Identifies which OLE document file (if any) is linked with the current OLE field when that field is displayed in an OLE viewer.

Property of

OLE

Description

Use *linkFileName* to identify which OLE document file is linked with the current OLE field when that field is displayed in an OLE viewer. *linkFileName* is a read-only property.

maximize

Topic group Related topics

Determines if a form can be maximized when it's not MDI.

Property of

Form

Description

Set *maximize* to *false* to disable the maximize icon and the Maximize option in the system menu. You must set *maximize* before you open the form. If both *maximize* and *minimize* are *false*, their icons do not appear in the title bar. If either one is *true*, they both appear, with one of them disabled.

minimize has no effect unless the form's *mdi* property is *false*; if it is *true*, the form follows the MDI specification and has its maximize icon enabled.

maxLength

Topic group Related topics

Specifies the maximum number of characters allowed in an entryfield.

Property of

Entryfield

Description

When an Entryfield control is *dataLink*ed to a field, the control automatically reads the length of the field into its *maxLength* property to set the maximum number of characters allowed.

You may set *maxLength* manually to override this setting, or when using an entryfield that is not *dataLink*ed to a field. If you set the *maxLength* longer than the field, the entry is allowed, but the field value will be truncated when the value is stored in the table.

mdi

Topic group Related topics

Determines if a form conforms to the Multiple Document Interface (MDI) standard.

Property of

Form

Description

MDI is a Windows specification for opening multiple document windows within the application window. Most word processors are MDI applications. In *Visual* dBASE, all windows are forms. MDI forms have the following characteristics:

- Like application windows, they are moveable and sizeable.
- They are listed on the Windows menu of the application.
- They have a a title bar, and in that title bar are the system menu, minimize, maximize, and close icons.
- When one MDI form is maximized, all other MDI forms in the same application are maximized.
- When they are active, their menus replace the menus in the main menu bar.
- They cannot be modal.
- The shortcut keystroke to close the form is Ctrl+F4.

The opposite of MDI is SDI (Single Document Interface), where each document is in its own application window. The Windows Explorer is an SDI application. SDI forms have the following features:

- They each have complete control over their appearance; whether they are movable, sizeable, have a title bar, or any control icons enabled.
- Each form is listed separately in the Windows Taskbar.
- Their menus appear in the form.
- They can be modeless or modal.
- They can be set to always display on top of other windows, or appear as palette windows.
- The shortcut keystroke to close the form is Alt+F4.

A form's *mdi* property determines whether a form is MDI or SDI. When *mdi* is *true*, the following properties are ignored:

- *maximize*
- *minimize*
- *moveable*
- *sizeable*
- *smallTitle*
- *sysMenu*
- *topMost*

Those properties default to the corresponding values for an MDI form.

Because an MDI form cannot be modal, you cannot open an MDI form with the *readModal*() method.

memoEditor

Topic group Related topics

A reference to a control's memo editor object.

Property of

Entryfield

Description

When editing a memo field with a *dataLink*ed entryfield, you may open an Editor object in another form by double-clicking the entryfield, or by calling the entryfield's *showMemoEditor*() method.

When the editor is open, the entryfield's *memoEditor* property contains a reference to that Editor object. You may use the *memoEditor* property to manipulate the editor, or close the form that contains it. The memo editor is a standard Editor object, *anchor*ed to a form, so the form is the *memoEditor* object's *form* and *parent* object.

menuFile

Topic group Related topics

Assigns a menubar to a form.

Property of

Form

Description

Use *menuFile* to designate the menu that is displayed when the form has focus. If a form's *menuFile* property is empty, a default menu is displayed when the form has focus.

Menubars created by the Menu designer are stored in .MNU files, which is the default extension for file names assigned to *menuFile*. Assigning a file to *menuFile* executes the named file with the form as the parameter. The default bootstrap code for a .MNU file creates a menu named root as a child of the form. The file assigned to *menuFile* is automatically loaded as a procedure file. The procedure file's reference count is decremented when the form is released; if that was the last form that used that menu file, it is automatically unloaded.

metric

Topic group Related topics

The units of measurement for the position and size of an object.

Property of

All form objects.

Description

metric is an enumerated property that can have the following values:

Value	Description
0	Chars (default)
1	Twips
2	Points
3	Inches
4	Centimeters
5	Millimeters
6	Pixels

The Chars *metric* is based on the average height and width for characters in a specific base font. The base font is set through the form's *scaleFontBold*, *scaleFontName*, and *scaleFontSize* properties.

All position and size properties such as *top*, *left*, *height*, and *width* are expressed in the form's current *metric* units. The form's *metric* cannot be changed once the form is opened. If the form is closed, changing the *metric* scales the position and size properties of all the components on the form.

When a control is saved as a custom control, the *metric* of the form is saved with the control definition. This way, when the control is dropped on another form, assigning the original *metric* of the control will resize the control appropriately on the new form.

minimize

Topic group Related topics

Determines if a form can be minimized when it's not MDI.

Property of

Form

Description

Set *minimize* to *false* to disable the minimize icon and the Minimize option in the system menu. The form can still be minimized in other ways, such as choosing Minimize All Windows from the context menu of the Windows Taskbar. You must set *minimize* before you open the form. If both *maximize* and *minimize* are *false*, their icons do not appear in the title bar. If either one is *true*, they both appear, with one of them disabled.

minimize has no effect unless the form's *mdi* property is *false*; if it is *true*, the form follows the MDI specification and has its minimize icon enabled.

modify

Topic group Related topics

Determines if the user can alter data in a Browse or Editor object.

Property of

Browse, Editor

Description

Set *modify* to *false* when you want to make a control read-only.

mousePointer

Topic group Related topics

Changes the appearance of the mouse pointer.

Property of

Most form objects

Description

Use *mousePointer* to provide a visual cue when the user moves the mouse pointer over an object. For example, one pointer style might mean an object is disabled, while another pointer style might mean the object is ready for input.

You can specify the following settings for *mousePointer*:

0 (Default)	N/A	6 (Size NESW)
1 (Arrow)		7 (Size S)
2 (Cross)		8 (Size NWSE)
3 (I-Beam)		9 (Size E)
4 (Icon)		10 (UpArrow)
5 (Size)		11 (Wait)

move()

Topic group | Related topics | Example

Repositions and resizes an object.

Syntax

<oRef>.*move*(<left expN> [, <top expN> [, <width expN> [, <height expN>]]])

<oRef>

The object to move or resize.

<left expN>

The new *left* property.

<top expN>

The new *top* property.

<width expN>

The new *width* property. To change the size of the image, you must specify both the <left expN> and the <top expN>.

<height expN>

The new *height* property.

Property of

Most form objects

Description

Use *move*() to reposition and/or resize an object in one step. You could assign the four properties directly, but doing so would require four separate steps, and the object would have to be moved and/or resized after each step. Using *move*() is faster.

If you want to resize the object without moving it, pass the current *left* and *top* properties as parameters to *move*(), along with the new width and height.

If you're using *move*() to resize an image, the object's *alignment* property should be set to either Stretch (0) or Keep Aspect Stretch (3).

move() example

The following are two *onClick* event handlers for buttons that zoom and unzoom a bitmap image.

```
function zoomButton_onClick()
  with form.mapImage
    move( left, top, 60, 20 )
  endwith
function unzoomButton_onClick()
  with form.mapImage
    move( left, top, 30, 10 )
  endwith
```

moveable

Topic group Related topics

Determines if a form can be moved when it's not MDI.

Property of

Form

Description

Set *moveable* to *false* to prevent the form from being moved in the usual manner. Dragging the title bar has no effect, and the Move option in the system menu is disabled. However, if *sizeable* is *true*, you can move the edges of the form and in-effect move the form.

sizeable has no effect unless the form's *mdi* property is *false*; if it is *true*, the form follows the MDI specification and is always resizeable.

multiple

Topic group Related topics

Specifies whether a ListBox object allows selection of more than one item at a time, or whether a NoteBook object can have more than one row of tabs.

Property of

ListBox, NoteBook

Description

Set *multiple* to *true* if you want to allow the selection of more than one item at one time in a ListBox object. The selections—whether there's one, many, or none—are returned by the ListBox object's *selected*() method.

If a NoteBook object's *multiple* property is *false*, all its tabs are displayed in a single row. If there are more tabs than will fit in the width of the notebook, scroll arrows appear. If you set *multiple* to *true*, the tabs are stacked, taking up as many rows as needed, decreasing that amount of space below the tabs. The notebook's *visualStyle* property has more effect when *multiple* is *true*.

multiSelect

Topic group Related topics

Whether multiple rows are visually selected.

Property of

Grid

Description

multiSelect is like *rowSelect*, except that you can select multiple rows. Use the *selected*() method to get the bookmarks for the rows that have been selected.

name

Topic group Related topics

The name of the form property that is used to refer to a component.

Property of

All form components

Description

A component's *name* property reflects the name of the property of the form that is used to refer to the component.

For example, if pushing one button makes another button visible, the code looks like this:

```
function oneButton_onClick()
  form.anotherButton.visible = true
```

In oneButton's event handler, *form* refers to the form that contains the button, and anotherButton is a property of the form that contains an object reference to the PushButton object anotherButton.

When the form was created in the Form designer, the *name* property of the PushButton object was set to anotherButton. When the form is saved into a .WFM file, the resulting code for the button looks like this:

```
this.anotherButton = new PushButton(this)
with (this.anotherButton)
  left = 10
  top = 0
  width = 8
endwith
```

The name of the button is never assigned to the *name* property. Instead, the name of the button is determined by the name of the form property that contains the reference to the object. This is true for any form component that has a *name* property.

To change the name of a component in the .WFM file, change the name of the property in the initial assignment statement and the WITH statement below it.

When you read a component's *name* property, *Visual* dBASE returns the name of the property that the component's *parent* (the form unless the component is in a Container or NoteBook object) uses to refer to the object. The *name* is always all-uppercase.

If you assign a value to a component's *name* property, you actually change the name of the form property that contains the component's object reference. While this is allowed, there aren't many reasons you would want to do that—avoid it.

nativeObject

Topic group | Related topics | Example

The object that contains the native properties, events, and methods of the ActiveX control.

Property of

ActiveX

Description

An ActiveX object's *nativeObject* property contains a reference to an object that contains the properties, events, and methods, of the actual ActiveX control. Placing the native properties in a separate object prevents name conflicts between the properties of the *Visual* dBASE ActiveX object, and any ActiveX control it represents.

The *nativeObject* object is empty until the *classId* property is set.

nativeObject example

Suppose the ActiveX control on your form has a Launch() method. This method is called through the *nativeObject* property; for example:

```
function launchButton_onClick()
  form.someActiveX.nativeObject.Launch()
```

nextObj

Topic group Related topics Example

The object that is going to get focus during a focus change.

Property of

Form

Description

nextObj contains a reference to the control that is going to get focus during a focus change, for example when you click on another control or press Tab or Shift+Tab. If no focus change is pending, *nextObj* is *null*.

nextObj example

Use *nextObj* in *valid* event handlers to determine if validation is needed before moving to the other control. For example, the following event handler determines if the selected control is a Cancel button:

```
function somedata_valid()
  if form.nextObj == form.cancelButton
    return true  // Don't bother with validation code
  else
    // Validate as usual
  endif
```

Note that this approach only works if the Cancel button is not the next button in the tab order. Otherwise pressing Tab would make *nextObj* the Cancel button, but simply tabbing to that button doesn't mean the user will click it. In that case, you would want to validate the data. You can remove the Cancel button from the tab order so that the user must click the button or press the pick key for the button, which would cancel the form.

oleType

Topic group | Related topics | Example

Returns a number that reveals whether an OLE field is empty, contains an embedded document, or contains a link to a document file.

Property of

OLE

Description

Use *oleType* to determine the state of an OLE field. It is a read-only property that may have one of the following three values:

Value	Description
0	Empty
1	Document link
2	Embedded document

onAppend

Topic group Related topics

Event fired when a record is added to a table.

Parameters

none

Property of

Browse, Form

Description

The form's (or browse's) *onAppend* event is used mainly for form-based data handling with tables in work areas. It also fires when the *onAppend* event of the form's primary rowset fires.

Use *onAppend* to make your application respond each time the user adds a record. *onAppend* fires after the new record is saved. If the record is saved because the user navigated to another record, *onAppend* fires after arriving at the other record, before *onNavigate*.

onAppend will not work unless the form is open and has controls *dataLink*ed to fields. For example, if you USE a table, create and open an empty Form, assign an *onAppend* event handler, and APPEND BLANK, the *onAppend* will not fire simply because the form is open.

onChange

Topic group Related topics Example

When the contents of the component have been changed.

Parameters

none

Property of

Many form objects

Description

onChange fires when the user changes data, which includes the following actions:

- Inserts or removes a checkmark in a checkbox
- Selects a different radio button in the radiobutton group
- Changes a value in an entryfield
- Changes a value in the text box portion of a combo box or a spin box
- Clicks the spinner on a spinbox
- Moves the scroll thumb in a scrollbar object
- Changes a value in a field and moves to another row in a browse

The *onChange* event of an OLE object fires each time the record pointer moves from one record to another. The *onChange* event of a form fires after moving to another record, if the previous record was changed, but only if the form is open and has controls *dataLink*ed to fields.

onChange example

The following *onChange* event handler for a radiobutton sets the *wrap* property of an editor control on the same form to match:

```
function wrapCheckbox_onChange()
  form.editor1.wrap := this.value
```

In this example, three radiobuttons, whose *text* properties happen to match the names of the index tags of the current table, use the same *onChange* event handler. When a different radiobutton is selected, *onChange* fires twice: once for the radiobutton that was deselected, and once for the button that is selected. The *value* of the radiobutton is checked to set the index for the radiobutton that was clicked.

```
function indexRadios_onChange
  if this.value
    set order to ( this.text )
  endif
```

onChar

Topic group Related topics

Event fired when a “printable” key or key combination is pressed while the control has focus.

Parameters

<char expN>

The ASCII code of the key or key combination

<repeat count expN>

The number of times the keystroke is repeated based on how long the key is held down.

<key data expN>

A double-byte value that contains information about the key reelased, stored in separate bit fields. The bits of this parameter contain the following information:

Bit numbers	Description
0-7	Keyboard scan code (OEM dependent)
8	Extended key (1 if *true*) such as right Alt and Ctrl, and numbers on numeric keypad
9-12	Reserved
13	Context code: 1 if Alt was pressed during keystroke
14	Previous key state: 1 if key was held down
15	Transition state: 1 if key is being released, 0 if key is pressed (usually 0)

Property of

PaintBox

Description

If you have created a PaintBox object to develop a custom edit control, use *onChar* to do something when the object has focus and the user presses a key; that is, when they type a normal character.

onChar is similar to *onKeyDown*. However, *onChar* doesn’t fire for non-printable keys, such Caps Lock, while *onKeyDown* fires for any key pressed.

onClick

Topic group | Related topics | Example

After a button is clicked.

Parameters

none

Property of

Menu, PushButton

Description

Use *onClick* to execute code when you click a button or choose a menu item.

onClick example

The following *onClick* event handler for an Add button puts the form's primary rowset in Append mode to allow entry of a new row.

```
function newButton_onClick()
  form.rowset.beginAppend()
```

The *onClick* of a menu item often executes a method of the form. In this example, a menu item calls the *onClick* event handler of the equivalent button on the form.

```
function addMenu_onClick()
  form.newButton.onClick()
```

This example demonstrates a Next Page button in a report.

```
function nextPageButton_onClick()
  form.endPage := ++form.startPage
  form.render()
```

onClose

Topic group Related topics

After the form has been closed.

Parameters

none

Property of

Form, OLE

Description

Use *onClose* to perform any extra manual cleanup, if necessary, when you close a form or report. Normally, *Visual* dBASE automatically discards anything in the form when you close it. You might use *onClose* if you created an object in the *onOpen* that you did not bind to the form or report.

Before executing the *onClose* event handler, *Visual* dBASE does the following:

1. Executes the *canClose* event handler (if any) of the form. If it returns *false*, the form does not close; nothing further happens.
2. Executes the *valid* event handler (if any) of the object that currently has input focus. If it returns a value of *false*, the form does not close; nothing further happens.
3. Executes the *onLostFocus* event handler (if any) of the object that currently has input focus.
4. Executes the *onLostFocus* event handler (if any) of the form.

The *onClose* events of an OLE controls execute when the parent form is closed, after the *onClose* of that form.

onDesignOpen

Topic group

After a form or component is loaded in the Form designer.

Parameters

<from palette expL>

Whether the component was added from the palette. If *true*, the component has just been created. If *false*, the component has been reloaded into the Form designer (when editing an existing form).

Property of

All form objects.

Description

Use *onDesignOpen* to execute code whenever a form or component is loaded into the Form Designer, either when it is first created (for components only), or when it is subsequently loaded into the Form Designer.

onFormSize

Topic group Related topics

Event fired whenever the parent form of a PaintBox object is resized.

Parameters

none

Property of

PaintBox

Description

onFormSize fires whenever the parent form of a paintbox object is resized, restored, or maximized. This lets you reposition or resize the object based on the form's new size. For example, you could use *onFormSize* to implement behavior similar to the *anchor* property, keeping the bottom of the PaintBox object positioned at the bottom of the form.

onFormSize is similar to *onPaint*. However, *onPaint* is triggered when the parent form is opened and when items covering the paintbox object are moved away, while *onFormSize* is not.

onGotFocus

Topic group Related topics

Event fired when a component gains focus.

Parameters

none

Property of

Form and all form components that get focus

Description

onGotFocus fires whenever the form or component gains focus.

onHelp

Topic group Related topics

Event fired when the user presses F1 while an object has focus, instead of context-sensitive help.

Parameters

none

Property of

Most form objects

Description

Use *onHelp* to override the built-in context-sensitive help system (based on the *helpFile* and *helpId* properties) and execute your own code when the user presses F1. For example, you might use *onHelp* if you have not yet written a Help file, if the help you want to give is very simple, or you want to *Visual* dBASE drive the help (as you would with an an online assistant).

As with context-sensitive help, if you assign an *onHelp* event handler to a form, that is the default handler for all the controls in the form. Each control may then have its own *onHelp* if necessary; otherwise, the form's *onHelp* is fired when the user presses F1.

onKeyDown

Topic group Related topics

Event fired when any key is pressed while the control has focus.

Parameters

<virtual key expN>

The Windows virutal-key code of the key released. For a list of virtual-key codes, see the Win32 Programmer's Reference (search for "Virtual-key Codes" in the index).

<repeat count expN>

The number of times the keystroke is repeated based on how long the key is held down.

<key data expN>

A double-byte value that contains information about the key reelased, stored in separate bits. The bits of this parameter contain the following information:

Bit numbers	Description
0-7	Keyboard scan code (OEM dependent)
8	Extended key (1 if *true*) such as right Alt and Ctrl, and numbers on numeric keypad
9-12	Reserved
13	Context code: always 0 for *onKeyDown*
14	Previous key state: 1 if key was held down
15	Transition state: always 0 for *onKeyDown*

Property of

PaintBox

Description

Use *onKeyDown* and *onKeyUp* for complete control of keystrokes while a PaintBox object has focus. Each key is treated separately, with none of their normal relationships, and pressing and releasing the key are two separate actions. For example, holding down Shift and pressing the A key is normally interpreted as a capital "A". With *onKeyDown* and *onKeyUp*:

- *onKeyDown* fires when the Shift is pressed
- *onKeyDown* continues to fire as the Shift is held down
- *onKeyDown* fires when the A is pressed
- *onKeyDown* continues to fire if the A is held down
- *onKeyUp* fires when the A is released
- Releasing a key stops the repeat action of *onKeyDown* for the Shift key
- *onKeyUp* fires when the Shift is released

To know that this was a capital "A", you would have to keep track of the fact that the Shift key was down when the A key was pressed.

A similar event, *onChar* is used when you want the PaintBox to respond to normal "printable" characters. For example, *onChar* would fire just once, getting the ASCII code for the capital "A". *onKeyDown* and *onKeyUp* deal with Windows virtual-key codes, which are not the same as the key character value in many cases.

onKeyUp

Topic group Related topics

Event fired when any key is released while the control has focus.

Parameters

<virtual key expN>

The Windows virutal-key code of the key released. For a list of virtual-key codes, see the Win32 Programmer's Reference (search for "Virtual-key Codes" in the index).

<repeat count expN>

The number of times the keystroke is repeated based on how long the key is held down; always 1 for *onKeyUp*.

<key data expN>

A double-byte value that contains information about the key reelased, stored in separate bits. The bits of this parameter contain the following information:

Bit numbers	Description
0-7	Keyboard scan code (OEM dependent)
8	Extended key (1 if *true*) such as right Alt and Ctrl, and numbers on numeric keypad
9-12	Reserved
13	Context code: always 0 for *onKeyUp*
14	Previous key state: always 1 for *onKeyUp*
15	Transition state: always 1 for *onKeyUp*

Property of

PaintBox

Description

Use *onKeyUp* with *onKeyDown* for complete control of keystrokes while a PaintBox object has focus. For more information, see *onKeyDown*.

onLeftDblClick

Topic group | Related topics | Example

Event fired when the user double-clicks a form or an object.

Parameters

<flags expN>

A single-byte value that tells you which other keys and mouse buttons were pressed when the user double-clicked the button.

<col expN>

The horizontal position of the mouse when the user double-clicked the button.

<row expN>

The vertical position of the mouse when the user double-clicked the button.

Property of

Most form objects

Description

Use *onLeftDblClick* to perform an action when the user double-clicks with the left mouse button. *onLeftDblClick* can also trap Shift, Ctrl, middle mouse button, or right mouse button presses if they occur at the same time the user double-clicks the button.

The state of each of the three mouse buttons and the Shift and Ctrl keys is stored in a separate bit in the <flags expN> parameter, as follows:

Bit number	Flag for
0	Left mouse button
1	Right mouse button
2	Shift
3	Ctrl
4	Middle mouse button

To check if the key or button was down, use the BITSET() function with the <flags expN> as the first parameter, and corresponding the bit number as the second parameter. BITSET() will return *true* if the key or button was down, and *false* if it was not.

The <col expN> and <row expN> parameters contain values that are relative to the object that fired the event. For example, the upper left corner of a button is always row 0, column 0, even if that button is in the bottom corner of the form.

All other onLeft-, onRight-, and onMiddle- mouse events operate in the same way, and receive the same parameters.

When you double-click a button, its button events fire in the following order:

1 mouse down

2 mouse up

3 mouse double click

4 mouse up

onLeftDblClick example

Suppose you have a secret function that you want to activate by double-clicking a Text object while holding down the Shift, Ctrl, and right mouse button:

function someText_onLeftDblClick(flags, col, row)

```
  if bitsset( flags, 1 ) and bitset( flags, 2 ) and bitset( flags, 3 )
    // Do secret function
  endif
```

onLeftMouseDown

Topic group Related topics Example

Event fired when the user presses the left mouse button while the pointer is over a form or an object.

Description

Use *onLeftMouseDown* to perform an action when the user presses the left mouse button. Other than the initiating action, this event is identical to *onLeftDblClick*.

onLeftMouseUp

Topic group Related topics Example

Event fired when the user releases the left mouse button while the pointer is over a form or an object.

Description

Use *onLeftMouseUp* to perform an action when the user releases the left mouse button. Other than the initiating action, this event is identical to *onLeftDblClick*.

onLostFocus

Topic group Related topics

Event that fires when a component loses focus.

Parameters

none

Property of

Form and all form components that get focus

Description

onLostFocus fires whenever the component loses focus.

onLostFocus differs from *valid*, which specifies a condition that must evaluate to *true* before the object can lose focus.

onMiddleDblClick

Topic group | Related topics | Example

Event fired when the user double-clicks with the middle mouse button while the pointer is on a form or an object.

Description

Use *onMiddleDblClick* to perform an action when the user double-clicks with the middle mouse button. Other than the initiating action, this event is identical to *onLeftDblClick*.

onMiddleMouseDown

Topic group Related topics Example

Event fired when the user presses the middle mouse button while the pointer is over a form or an object.

Description

Use *onMiddleMouseDown* to perform an action when the user presses the middle mouse button. Other than the initiating action, this event is identical to *onLeftDblClick*.

onMiddleMouseUp

Topic group Related topics Example

Event fired when the user releases the middle mouse button while the pointer is over a form or an object.

Description

Use *onMiddleMouseUp* to perform an action when the user releases the middle mouse button. Other than the initiating action, this event is identical to *onLeftDblClick*.

onMouseMove

Topic group | Related topics | Example

Event fired when the user moves the mouse over a form or control.

Parameters

<flags expN>

A single-byte value that tells you which keys and mouse buttons were pressed while the user moved the mouse. You can interpret this value with the BITSET() function, which examines individual bits in numeric values. For more information, see *onLeftDblClick*.

<col expN>

The horizontal position of the mouse inside the bounds of the object.

<row expN>

The vertical position of the mouse inside the bounds of the object.

Property of

Most form objects

Description

Use *onMouseMove* to perform actions when the user moves the mouse over an object. A control's *onMouseMove* fires when the mouse moves over that control. The form's *onMouseMove* fires when the mouse moves over an area of the form where there is no control.

The <col expN> and <row expN> parameters contain values that are relative to the object that fired the event. For example, the upper left corner of a button is always row 0, column 0, even if that button is in the bottom corner of the form.

onMouseMove example

The following *onMouseMove* event handler makes a button harder to click.

```
function PUSHBUTTON1_onMouseMove(flags, col, row)
   static jump = {|| 2 + rand() * 2}
   local nLeft, nTop
   // Calculate horizontal movement
   nLeft = this.left + jump() * sign( rand() - 0.5 )
   if nLeft < 0
     nLeft = form.width - this.width - jump()
   elseif nLeft > form.width - this.width
     nLeft = jump()
   endif
   // Calculate vertical movement
   if row < this.height / 2
     nTop = this.top + jump() * row
   else
     nTop = this.top - jump() * ( this.height - row )
   endif
   if nTop < 0
     nTop = form.height - this.height - jump()
   elseif nTop > form.height - this.height
     nTop = jump()
   endif
   this.move( nLeft, nTop )
```

onMove

Topic group Related topics

Event fired after the user moves the form.

Parameters

<left expN>

The new horizontal position of the upper left corner of the form's client area.

<top expN>

The new vertical position of the upper left corner of the form's client area.

Property of

Form

Description

Use *onMove* to perform actions automatically when a form is moved.

The two parameters passed to the event handler indicate the new position of the client area of the form, the area below the title bar and inside the edges of the form. To get the new position of the entire form, check the form's *left* and *top* properties directly.

onNavigate

Topic group Related topics Example

Event fired when the record pointer in a table in a work area is moved.

Parameters

<workarea expN>

The work area number where the navigation took place.

Property of

Browse, Form

Description

The form's (or browse's) *onNavigate* event is used mainly for form-based data handling with tables in work areas. It also fires when there is navigation in the form's primary rowset.

Use *onNavigate* to make your application respond each time the user moves from one record to another.

When using tables in work areas, *onNavigate* will not fire unless the form is open and has controls *dataLink*ed to fields. For example, if you USE a table, create and open an empty Form, assign an *onNavigate* event handler, and SKIP in the table, the *onNavigate* will not fire simply because the form is open.

When navigating in the form's primary rowset, the form's *onNavigate* fires after the rowset's *onNavigate*, and the <workrea expN> parameter is zero.

onNavigate example

The following *onNavigate* event handler calls a custom form method called refreshUnlinked() method to update components on the form that are not *dataLink*ed directly to fields so that the components contain the correct information as the user moves from record to record. It does this only if the navigation occurred in the main work area, the one that's usually selected; not in another work area that, for example, has a lookup table.

```
function Form_onNavigate( nWorkArea )
  if nWorkArea == workarea()
    form.refreshUnlinked()
  endif
```

For example, you might display the current record number in a Text component, which does not get automatically updated.

```
function refreshUnlinked()
  form.recnoText.text := "" + recno() + "/" + reccount()
```

onOpen

Topic group | Related topics | Example

After the form or component has been opened.

Parameters

none

Property of

All form objects.

Description

onOpen events fire after a form has been opened. First the *onOpen* event for the form or report fires, then the *onOpen* for each component, if one has been assigned. Use *onOpen* to set up items in the form that cannot be set in the Form designer.

onOpen example

The following example is the *onOpen* event handler for the FISH.WFM form. It assigns the popup in FISH.POP as the popup menu for the form. There is no way to set up a popup menu directly in the Form designer.

```
function Form_onOpen
  set procedure to FISH.POP additive
  this.popupMenu := new fishPopup(this,"POPUP")
```

In this example, a CheckBox control toggles the *wrap* property of an editor on the same form. It reads the *wrap* property of the editor when the form is opened. This way, the two properties are in sync, and you don't have to set the checkbox's *value* property whenever you change the editor's *wrap* property.

```
function wrapCheckbox_onOpen()
  this.value := form.editor1.wrap
```

onPaint

Topic group Related topics

Event fired whenever a PaintBox object needs to be redrawn.

Parameters

none

Property of

PaintBox

Description

onPaint is called whenever a PaintBox object needs to be redrawn. Events that trigger *onPaint* include:

- the parent form is opened
- a minimized parent form is restored or maximized
- a window or object which has been covering the paintbox object is moved away

onRightDblClick

Topic group Related topics Example

Event fired when the user double-clicks with the right mouse button while the pointer is on a form or an object.

Description

Use *onRightDblClick* to perform an action when the user double-clicks with the right mouse button. Other than the initiating action, this event is identical to *onLeftDblClick*.

This event will not fire for the form if you have a popup menu assigned to the form's *popupMenu* property.

onRightMouseDown

Topic group Related topics Example

Event fired when the user presses the right mouse button while the pointer is on a form or an object.

Description

Use *onRightMouseDown* to perform an action when the user presses the right mouse button. Other than the initiating action, this event is identical to *onLeftDblClick*.

If the form has a popup menu assigned to its *popupMenu* property, the sequence of events when you right-click the form is:

1 The popup menu appears

2 After making a choice or dismissing the menu, the *onRightMouseDown* event fires.

3 If a choice was made from the popup menu, its *onClick* fires.

onRightMouseUp

Topic group Related topics Example

Event fired when the user releases the right mouse button while the pointer is on a form or an object.

Description

Use *onRightMouseUp* to perform an action when the user releases the right mouse button. Other than the initiating action, this event is identical to *onLeftDblClick*.

This event will not fire for the form if you have a popup menu assigned to the form's *popupMenu* property.

onSelChange

Topic group | Related topics | Example

Event fired when a selection is changed in a component.

Parameters

none

Property of

Grid, ListBox, NoteBook, TabBox

Description

onSelChange is used in components that have a specific set of options to choose from; the tabs in a NoteBook or TabBox, the items in a ListBox, and the rows in a Grid. It fires whenever the focus changes from one option to another.

onSelChange example

The following is the standard *onSelChange* event handler for a tabbox used to display the pages of a multi-page form.

```
function pageTabbox_onSelChange()
  form.pageno := this.curSel
```

The *pageno* of the form is changed to the corresponding tab number, reflected in the tabbox's *curSel* property.

onSelection

Topic group Related topics

Event fired when the user submits a form.

Parameters

<id expN>

The *id* property of the control that had focus when the form was submitted.

Property of

Form

Description

A form is submitted when the user either:

- Presses Enter when the form has focus and no Editor, Grid, or Browse object has focus.
- Presses Spacebar when a pushbutton has focus.
- Clicks a pushbutton.

The concept of submitting a form is antiquated and rarely used. You should code the *onClick* event handler for a specific pushbutton, and set the *default* property of a pushbutton to *true* so that pushbutton is clicked when Enter is pressed.

onSize

Topic group | Related topics | Example

Event fired after the user resizes a form.

Parameters

<nType>

A number that indicates how the user resized the form. It has three possible values:

Value	Description
0	The user resized the form with the mouse or restored the form from a maximized or minimized condition.
1	The user minimized the form.
2	The user maximized the form.
3	The form is not an MDI form, and the user maximized another non-MDI form.
4	The form is not an MDI form, and the user minimized another non-MDI form.

<width>

The new width of the client area of the form.

<height>

The new height of the client area of the form.

Property of

Form

Description

Use *onSize* to perform actions when the user resizes a form.

The two parameters passed to the event handler indicate the new size of the client area of the form, the area below the title bar and inside the edges of the form. To get the new size of the entire form, check the form's *width* and *height* properties directly.

Some controls have an *onFormSize* event that fires when the form is resized; any actions specific to those controls should be handled with that event. Other controls have an *anchor* property, and are resized to automatically.

onSize example

Suppose you have a form with a horizontal Line object that goes all the way across the form. You could handle form resizing by making the line excessively long, or you can resize it with the form's *onSize* event handler:

```
function form_onSize( nSizeType, nWidth, nHeight )
  form.line1.right := nWidth
  return
```

open()

Topic group Related topics

Opens a form.

Syntax

<oRef>.*open*()

<oRef>

The form to open.

Property of

Form

Description

Use *open*() to open a form.

The form you open with *open*() is modeless, and has the following characteristics:

- While the form is open, focus can be transferred to other forms.
- Execution of the routine that opened the form continues after the form is opened and active.

pageCount

Topic group | Related topics | Example

Returns the highest numbered page used in a form.

Syntax

<oRef>.*pageCount*()

<oRef>

An object reference to the form you want to check.

Property of

Form

Description

pageCount() returns the highest *pageno* used by the controls in the form. (There are actually no pages or page objects in a form.)

In most cases, you know how many pages there are in a form because you decide on which pages to place the form's controls. Use *pageCount*() if you do not want to keep track of the highest page manually, or if the form creates objects on different pages dynamically.

pageCount() example

The following is the *onClick* event handler for a button that displays the next page on a form. If the last page is displayed, the button is disabled.

```
function nextButton_onClick()
  if ++form.pageno >= form.pageCount()   // Goto next page, and if it's the
last page
    this.visible := false                // You can't go any further
  endif
```

pageno

Topic group Related topics Example

The page of the form on which a component appears, or the form's active page.

Property of

All form objects.

Description

All form objects have a *pageno* property that can be between 0 and 255. The form's *pageno* property indicates the form's active page, the one it is displaying. All the components in the form that have the same *pageno* as the form are displayed on that "page"; the rest are hidden. There are no actual pages or page objects to manage.

When a form's *pageno* property is zero, all components are displayed. If a component's *pageno* property is zero, it appears on all pages. For example, a company logo that appears on every page can be placed on page zero.

The *pageno* property can be changed at any time. Changing a form's *pageno* displays another page of the form. Changing a component's *pageno* moves that component to that page.

In addition to the *pageno* property, you can set a component's *visible* property if you want to hide or display it under particular circumstances.

pageno example

Suppose you have a 12-page survey form. There are buttons to move to the next and previous pages. These buttons are on page zero, so that they appear on every page. The Previous button has its *visible* property initially set to *false*, because the form starts on page 1 and there is no previous page to go to. When you get to page 12, you want to hide the Next button, since there are no more pages.

The *onClick* event handlers for the two buttons would look like:

```
function nextPageButton_onClick()
  if ++form.pageno >= 12           // Goto next page, and if it's the last
page
    this.visible := false          // You can't go any further
  endif
  form.prevButton.visible := true  // Always make previous button visible
function prevPageButton_onClick()
  if --form.pageno <= 1            // Goto previous page, and if it's the
first page
    this.visible := false          // You can't go any further
  endif
  form.nextButton.visible := true  // Always make next button visible
```

The prefix increment and decrement operators are used so that the page number is changed before it is tested. It's not necessary to see if you should be allowed to change pages; if the button is visible, you can go in that direction. Finally, going in one direction always makes it possible to go the other way.

params

Topic group Example

Parameters passed to a report.

Property of

ReportViewer

Description

The *params* property contains an associative array that contains parameter names and values, if any, that are passed to the specified .REP file. The parameters are passed in the order they are assigned to the *params* property.

params example

Suppose you have a form that uses a ReportViewer to preview a report of the grade point average of all students. You include the option of showing students in a specific grade, by using a SpinBox for the grade number, and a CheckBox to enable or disable the grade restriction. From the CheckBox or SpinBox components' *onChange* event, you call the following form method to redisplay the report with the latest options:

```
function viewReport()
  if form.gradeCheckbox.value     // Use grade
    form.reportViewer1.params[ "grade" ] = form.gradeSpinbox.value
  else                                    // No grade, remove the element
    form.reportViewer1.params.removeAll()  // Only one element, so just
removeAll()
  endif
  form.reportViewer1.reExecute()  // Re-execute report with new parameters
```

The .REP file has the following statements in the Header:

```
if argcount() >= 1
  local r
  r = new GPAReport()
  r.streamSource1.rowset.filter := "GRADE = " + argvector(1)
  r.render()
  return
endif
```

If a parameter is passed, the report's StreamSource object's rowset's *filter* property is set so that only the specified grade is shown. The report is rendered, and the RETURN statement prevents the execution of the standard report bootstrap code.

paste

Topic group Related topics

Copies text from the Windows clipboard to the control.

Syntax

<oRef>.*paste*()

<oRef>

An object reference to the control in which to paste the text.

Property of

Browse, ComboBox, Editor, Entryfield, SpinBox

Description

Use *paste*() when the user wants to copy text from the Windows clipboard into the specified control.

If you have assigned a menubar to the form, you can use a menu item assigned to the menubar's *editPasteMenu* property instead of using the *paste*() method of individual objects on the form.

patternStyle

Topic group Related topics

Specifies the background hatching pattern.

Property of

Rectangle

Description

Use *patternStyle* to select a background hatching pattern for a Rectangle object.

You can specify the following settings for *patternStyle*

Table 15.4 Fill patterns

Value	Description	Example
0	Solid	
1	BDiagonal	
2	Cross	
3	Diagcross	
4	FDiagonal	
5	Horizontal	
6	Vertical	

The color of the pattern is determined by the foreground and background colors specified in the rectangle's *colorNormal* property.

pen

Topic group Related topics

Specifies the pattern of a Line object.

Property of

Line

Description

Use *pen* to control the appearance of a Line object when its *width* is 1.

You can specify any of five settings for *pen*:

Table 15.5 Pen patterns

Value	Description	Example
0	Solid	
1	Dash	
2	Dot	
3	Dash Dot	
4	DashDotDot	

If the line's *width* is greater than 1, the *pen* property is ignored and the line is always drawn with a solid pen.

penStyle

Topic group Related topics

Specifies the type of line to be used as the border of a Shape object.

Property of

Shape

Description

Use *penStyle* to control the appearance of the border of a Shape object when the *penWidth* is 1.

You can specify any of five settings for *penStyle*:

Value	Description	Example
0	Solid	
1	Dash	
2	Dot	
3	Dash Dot	
4	DashDotDot	

If *penWidth* is greater than 1, the *penStyle* property is ignored and the outline is always drawn with a solid pen.

penWidth

Topic group Related topics

Specifies the width in pixels of the line used as the border of a Shape object.

Property of

Shape

Description

Use *penWidth* to specify the thickness of the line used to border a shape object. If you set *penWidth* to a value greater than 1, then *penStyle* is always treated as 0 (Solid).

phoneticLink

Topic group

Contains a reference to the control that mirrors the phonetic equivalent of the current value.

Property of

Entryfield

Description

phoneticLink is used in double-byte operating systems to store the single-byte phonetic representation of a value in an entryfield. It contains an object reference or the *name* of the mirror Entryfield object.

picture

Topic group Example

A formatting template for text.

Property of

Entryfield, SpinBox, Text

Description

Specify the *picture* property with a character string called a template. A template can consist of

- Picture template characters, which represent and modify individual characters in the text string.
- Function symbols, which usually modify the entire text string. (For information on function symbols, see the *function* property.)
- Literal characters, which are inserted into the text string.

Here are the *picture* template characters:

9	Restricts entry of character data to numbers, and restricts entry of numeric data to numbers and + and - signs
#	Restricts entry to numbers, spaces, periods, and signs
!	Converts letters to uppercase
$	Inserts a dollar sign or the symbol defined with SET CURRENCY TO instead of leading blanks
*	Inserts asterisks in place of leading spaces
.	Marks the position of the decimal point
,	Separates thousands with a comma (or with another character indicated by SET SEPARATOR)
A	Restricts entry to alphabetic characters
L	Restricts entry to T, t, F, f, Y, y, N, or n, and converts it to uppercase
N	Restricts entry to letters and numbers
X	Allows any character
Y	Restricts entry to Y, y, N, or n, and restricts display to Y and N

You may include *function* symbols in a template by preceding them with the @ symbol. If you combine template characters and function symbols in the same template, list function symbols first and separate them from the template characters with a space.

If the data is longer than the length of the *picture* string, it is truncated to match.

When displaying a calculated or morphed field, use a *picture* that represents the field's maximum size.

picture example

The following *picture* is for a phone number field that stores the digits only. By using the R *function*, preceded by the @ symbol in the *picture*, the literal characters in the template are not stored in the value, and are inserted when the value is displayed:

```
@R (999) 999-9999
```

Suppose you're using a morphed field that stores an ID number but displays a name. The name can be a maximum of 30 characters, so you set the *picture* property of Entryfield component that displays the name to 30 "X" characters:

```
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

popupEnable

Topic group Related topics

Whether an editor's popup menu is available.

Property of

Editor

Description

An Editor object has a popup menu that contains options to:

- Find and replace text
- Toggle its *wrap* and *evalTags* properties
- Show the Format toolbar

You may set the *popupEnable* property to *false* to prevent this menu from appearing when the user right-clicks the Editor object.

popupMenu

Topic group Related topics Example

Specifies a pop-up menu for a form.

Property of

Form

Description

After creating the Popup object as a child of the form, assign a reference to that Popup object to the form's *popupMenu* property to have the popup appear when the user right clicks on the form. In this way, you may have more than one popup menu defined for a form and change the popup menu that appears as needed.

Note: You cannot name your popup *popupMenu*; that would conflict with the name of the existing property.

popupMenu example

The following example is the *onOpen* event handler for the FISH.WFM form. It assigns the popup in FISH.POP as the popup menu for the form.

```
function Form_onOpen
  set procedure to FISH.POP additive
  this.popupMenu := new fishPopup(this,"POPUP")
```

After opening the FISH.POP file as a procedure file to load the popup class that it contains, the second statement creates the Popup object as a child object of the form with the name “POPUP”, and assigns the resulting object to the form’s *popupMenu* property.

print()

Topic group Related topics

Prints a form and the objects it contains.

Syntax

<oRef>.*print*()

<oRef>

An object reference to the form you want to print.

Property of

Form

Description

Use the *print*() method to print a form on a selected printer. Executing the *print*() method opens the standard Print dialog box. If the user clicks OK, the current page of the form is printed on the selected printer.

You may set the *printable* property of individual controls to *false* to prevent them from printing.

printable

Topic group Related topics

Whether the component is printed when the form is printed.

Property of

Most form components.

Description

You may suppress the printing of individual components on the form by setting their *printable* property to *false*.

rangeMax

Topic group Related topics

Determines the upper limit for values in a component.

Property of

Progress, ScrollBar, Slider, SpinBox

Description

Use RangeMax in combination with RangeMin to specify a range restriction for values entered into a component. (*rangeMax* sets the upper limit and *rangeMin* sets the lower limit.) For example, an application that lets the user input a percentage would prevent the input of a value less than 0 or greater than 100. The same ranges would apply for a Progress component showing percent complete.

In a SpinBox component, if the value is too high, the value is set to *rangeMax*. SpinBox components allow both numbers and dates; the *rangeMax* must be the same data type. The Progress, Slider, and ScrollBar allow numbers only. *rangeMax* must be greater than *rangeMin*.

Note: Range restrictions in a SpinBox have effect only when the *rangeRequired* property is *true*.

rangeMin

Topic group Related topics

Determines the lower limit for values in a component.

Property of

Progress, ScrollBar, Slider, SpinBox

Description

Use *rangeMin* in combination with *rangeMax* to specify a range restriction for values entered into a component. (*rangeMin* sets the lower limit and *rangeMax* sets the upper limit.) For example, an application that lets the user input a percentage would prevent the input of a value less than 0 or greater than 100. The same ranges would apply for a Progress component showing percent complete.

In a SpinBox component, if the value is too low, the value is set to *rangeMin*. SpinBox components allow both numbers and dates; the *rangeMin* must be the same data type. The Progress, Slider, and ScrollBar allow numbers only. *rangeMin* must be less than *rangeMax*.

Note: Range restrictions in a SpinBox have effect only when the *rangeRequired* property is *true*.

rangeRequired

Topic group Related topics

Determines whether the range you specify with the *rangeMax* and *rangeMin* properties is enforced.

Property of

SpinBox

Description

Set *rangeRequired* to *true* to enforce a range limitation specified by the *rangeMax* and *rangeMin* properties. You may set *rangeRequired* to *false* to temporarily disable range checking.

When range checking is active, existing values are checked when they are displayed in the control. The spinbox also will not allow the entry of a number that is higher than *rangeMax* or lower than *rangeMin*. If the number—an existing number or new number—is out of range, the spinbox will change the number to the range limit; to *rangeMax* if the number is too large, or to *rangeMin* if the number is too small.

readModal

Topic group | Related topics | Example

Opens a form as a modal window and returns an optional value.

Syntax

<oRef>.*readModal*()

<oRef>

The form to open.

Property of

Form

Description

Use *readModal*() to open a form as a modal window. A modal window has the following characteristics:

- While the form is open, focus can't be transferred to other forms.
- Execution of the routine that opened the form stops until the form is closed. When the form is closed, control transfers to the statement after the one that opened the form.

The form's *close*() method takes an optional parameter. If the form is closed with a parameter, the value of that parameter is returned by *readModal*(). Otherwise *readModal*() returns *false*.

Many applications use modal forms as dialog boxes, which typically require users to take an action before the dialog box can be closed.

You can't open a form with the *readModal*() method when the MDI property is set to *true*.

To open a form as a modeless window, use the *open*() method.

readModal example

The standard bootstrap code generated for a .WFM form file contains code to open the form with *readModal*() if the DO the .WFM with the parameter *true*, for example:

```
do ABOUT.WFM with true
```

By adding a couple of lines in the Header of the .WFM, you can make the form open modally by default. For example:

```
openForm( true )        // Call bootstrap with true
function openForm()     // Convert bootstrap into its own function
// Everything below is geneated code
** END HEADER -- do not remove this line
//
// Generated on 09/28/97
//
parameter bModal
local f
f = new AboutForm()
if (bModal)
   f.mdi = false // ensure not MDI
   f.readModal()
else
   f.open()
endif
```

This is appropriate for forms that are always modal and do not have a return value, like About and Print dialogs.

reExecute()

Topic group | Related topics | Example

Re-executes the report

Syntax

<oRef>.*reExecute*()

<oRef>

The ReportViewer object that contains the report to re-execute.

Property of

ReportViewer

Description

Call *reExecute*() to execute the report again with a new set of parameters. To render another page in the existing report, call the report's *render*() method through the ReportViewer object's *ref* property.

ref

Topic group | Related topics | Example

A reference to the Report object in a ReportViewer.

Property of

ReportViewer

Description

Use the ReportViewer object's *ref* property to access the report displayed.

ref example

Suppose you have a simple report preview form. To display the next page of the report, you increment the report's *startPage* and re-*render*() the report through the ReportViewer object's *ref* property.

```
function nextPage_onClick()
  with form.reportViewer1.ref
    endPage = ++startPage
    render()
  endwith
```

refresh()

Topic group Related topics

Redraws the form or grid.

Syntax

<oRef>.*refresh*()

<oRef>

The object to refresh

Property of

Form, Grid

Description

Use *refresh*() to update the controls on the form to reflect the current state of the data in the buffer when using tables in work areas. To update the data buffer, use the REFRESH command first. When using the data access objects, call the rowset's *refreshControls*() method instead.

Call a grid's *refresh*() method to repaint the grid. The current row in the rowset becomes the top row in the grid, and all visible columns are repainted from the current row down.

refreshAlways

Topic group Related topics

Whether to update the form after all form-based navigation and updates.

Property of

Form

Description

Set *refreshAlways* to *false* when performing extensive navigation or data processing during an event. When *refreshAlways* is *true*, *Visual* dBASE updates the form periodically during processing, which causes flicker and slows the process. When *refreshAlways* is *false*, the form is not updated until the event has completed.

You may force the update for the form during the event by calling *refresh*().

right

Topic group Related topics

The position of the right edge of an object relative to its container.

Property of

Line

Description

The unit of measurement in a form or report is controlled by its *metric* property. The default metric for forms is characters, and for reports it's twips.

rowSelect

Topic group Related topics

Whether the entire row is visually selected.

Property of

Grid

Description

Set *rowSelect* to *true* to create the visual effect of highlighting the entire row in the grid.

rowset

Topic group | Related topics | Example

The form's primary rowset.

Property of

Form

Description

For forms that use data objects, the *rowset* property identifies the form's primary rowset.

If the form uses only one query, then the Form designer assigns that query's rowset as the primary rowset. If the form uses a data module, the Form designer assigns the data module's primary rowset as the form's primary rowset.

The primary rowset is where navigation and other actions from the default menu and toolbar take place. Navigation in the primary rowset causes the form's *canNavigate* and *onNavigate* events to fire.

rowset example

A button on a form that goes to the first row in the primary rowset would have an *onClick* event handler like this:

```
function firstButton_onClick()
  form.rowset.first()
```

saveRecord

Topic group Related topics

Saves changes to the current record in the currently active table.

Syntax

<oRef>.*saveRecord*()

<oRef>

An object reference to the form.

Property of

Form

Description

Use *saveRecord*() for form-based data handling with tables in work areas. When using the data access objects, *saveRecord*() has no effect; use the rowset's *save*() method instead.

Form-based data buffering lets you manage the editing of existing records and the appending of new records. Editing changes to the current record are not written to the table until there is navigation off the record, or until *saveRecord*() is called. Each work area has its own separate edit buffer. For example, if you have two controls *dataLink*ed to two different work areas, and you change both controls, you must call *saveRecord*() while each work area is selected to commit the changes.

To append a new record, call *beginAppend*(). This empties the record buffer for the currently selected work area. Calling *saveRecord*() writes the new record to the table, leaving you at the newly added record. Calling *beginAppend*() instead of *saveRecord*() will write the new record and empty the buffer again so you can add another record.

When appending records with *beginAppend*() the new record will not be saved when you call *saveRecord*() unless there have been changes to the record; the blank new record is abandoned. This prevents the saving of blank records in the table. (If you want to create blank records, use APPEND BLANK). You can check there have been changes by calling *isRecordChanged*(). If *isRecordChanged*() returns *true*, you should validate the record with form-level or row-level validation before writing it to the table.

To abandon the changed or new record instead of saving it, call *abandonRecord*().

scaleFontBold

Topic group Related topics

Whether the base font used for the Chars *metric* of a form is boldface.

Property of

Form

Description

The Chars *metric* of a form is based on the average height and width for characters in a specific base font. The base font is set through the form's *scaleFontBold*, *scaleFontName*, and *scaleFontSize* properties.

scaleFontBold determines whether the base font is boldface. Boldface fonts are wider than non-boldface fonts.

scaleFontName

Topic group Related topics

The base font typeface used for the Chars *metric* of a form.

Property of

Form

Description

The Chars *metric* of a form is based on the average height and width for characters in a specific base font. The base font is set through the form's *scaleFontBold*, *scaleFontName*, and *scaleFontSize* properties.

scaleFontName is the name of the base font typeface.

scaleFontSize

Topic group Related topics

The point size of the base font used for the Chars *metric* of a form.

Property of

Form

Description

The Chars *metric* of a form is based on the average height and width for characters in a specific base font. The base font is set through the form's *scaleFontBold*, *scaleFontName*, and *scaleFontSize* properties.

scaleFontSize is the size of the base font, in points.

scrollBar

Topic group Related topics

Determines when an object has a scroll bar.

Property of

Browse, Editor, Form

Description

The *scrollBar* property determines when and if a control displays a scrollbar. It may have any of four settings:

Value	Description
0 (Off)	The object never has scroll bars.
1 (On)	The object always has scroll bars.
2 (Auto)	Displays scroll bars only when needed.
3 (Disabled)	The scroll bars are visible but not usable.

selectAll

Topic group Related topics

Determines if the value contained in a control initially appears selected (highlighted) when tabbing to the control.

Property of

Entryfield, SpinBox

Description

Set *selectAll* to *true* to give the user a shortcut for deleting or replacing the initial value in an entry field or a spin box. The entire value is highlighted when the user tabs to the control. The first character the user enters overwrites the value. Pressing Del or Backspace deletes the value. Pressing a direction key (such as Home or End) removes the highlight without erasing the value.

Clicking a control ignores *selectAll*; the cursor goes to the position clicked, and nothing is highlighted.

selected()

Topic group | Related topics | Example

Returns the currently selected item(s) in an object, or checks if a specified item is selected.

Syntax

<oRef>.*selected*([<item expN>])

<oRef>

An reference to the object you want to check.

<item expN>

The item number to check. If omitted, the currently selected item(s) are returned. This parameter is allowed only for the ListBox control; the Grid method takes no parameters.

Property of

Grid, ListBox

Description

Calling *selected*() with no parameters returns the control's currently selected item or items. If a listbox's *multiple* property is *false*, *selected*() returns the currently selected item in the listbox. If *multiple* is *true*, *selected*() returns an array containing the currently selected items, one element per selection.

For a grid, *selected*() returns bookmarks to the row or rows (in an array) that are selected when *rowSelect* or *multiSelect* are *true*.

As with any Array object, check its *size* property to determine how many items have been selected. The items in the *selected*() array are always listed in the same order as they are in the ListBox.

If you specify <item expN>, *selected*() will return *true* or *false* to indicate whether that numbered item is selected.

The ListBox object's *value* property contains the value of the item that currently has focus, whether it's selected or not.

selected() example

The following *onClick* event handler copies all the selected items in the ListBox object select1 into another ListBox object named select2:

```
function makeSelections_onClick()
  form.select2.dataSource := "array form.select1.selected()"
```

serverName

Topic group Related topics

Identifies the server application that is invoked when the user double-clicks an OLE viewer object.

Property of

OLE

Description

serverName is a read-only property that contains the name of the OLE server for the current contents of the OLE control. You may use *serverName* to anticipate which server application is activated if the user double-clicks the current OLE viewer object.

setFocus()

Topic group Related topics

Sets focus to a component.

Syntax

<oRef>.*setFocus*()

<oRef>

A reference to the object to receive focus.

Property of

Form and all form components that get focus

Description

Calling a component's *setFocus*() method moves the focus to that component (unless it already has focus).When you call a form's *setFocus*() method, the component on the form that last had focus gets the focus.

setTic()

Topic group Related topics

Manually sets a tic mark in a Slider object.

Syntax

<oRef>.*setTic*(<expN>)

<oRef>

The Slider object whose tic mark to set.

<expN>

The location of the tic mark.

Property of

Slider

Description

To manually set tic marks in a slider, set the slider's *tics* property to Manual. Call *clearTics*() to clear any previously set tic marks. Then call *setTic*() with the location of each tic mark.

The <expN> should be between the *rangeMin* and *rangeMax* of the Slider control.

setTicFrequency()

Topic group Related topics

Sets the tic mark interval for automatic tic marks in a Slider object.

Syntax

<oRef>.*setTicFrequency*(<expN>)

<oRef>

The Slider object whose tic mark to set.

<expN>

The frequency of the tic marks.

Property of

Slider

Description

For automatic tic marks, set the slider's *tics* property to Auto. The default interval is 1. Call *setTicFrequency*() to use another interval value.

shapeStyle

Topic group Related topics

Determines the shape of a Shape object.

Property of

Shape

Description

Use *shapeStyle* to specify a shape for a Shape object. The shapes you can specify are as follows:

Value	Shape
0	Rectangle with rounded corners
1	Rectangle
2	Ellipse
3	Circle
4	Square with rounded corners
5	Square

showDeleted

Topic group Related topics

Determines if the delete box column in a browse is displayed.

Property of

Browse

Description

Use *showDeleted* to display or omit delete boxes at the left of each record in a browse object.

showDeleted has no effect when SET DELETED is ON (the default); the delete boxes are not displayed.

showFormatBar()

Topic group Related topics

Displays or hides the Format toolbar.

Syntax

<oRef>.*showFormatBar*(<expL>)

<oRef>

A Form object.

<expL>

true to show the toolbar, *false* to hide the toolbar.

Property of

Form

Description

You may show or hide the Format toolbar when the form has focus by calling *showFormatBar*().

showHeading

Topic group Related topics

Determines if field name headings are displayed at the top of each column in a browse.

Property of

Browse

Description

Use *showHeading* to determine whether the top line in a browse object displays a record or a heading line.

showMemoEditor()

Topic group Related topics

Displays or hides the memo editor control for an entryfield.

Syntax

<oRef>.*showMemoEditor*(<expL>)

<oRef>

The Entryfield that's *dataLink*ed to the memo field.

<expL>

true to show the editor, *false* to hide the editor.

Property of

Entryfield

Description

When an entryfield control is *dataLink*ed to a memo field, double-clicking the control opens a memo editor in a form. You may show or hide this editor by calling *showMemoEditor*().

showRecNo

Topic group Related topics

Determines if the record number column in a browse is displayed.

Property of

Browse

Description

Use *showRecNo* to display or hide record numbers at the left of each record in a browse object.

showSpeedTip

Topic group Related topics

Determines if tool tips defined for a control appear.

Property of

Form

Description

Set *showSpeedTip* to false to suppress the display of all tool tips defined in the controls' *speedTip* property.

sizeable

Topic group Related topics

Determines if the user can resize a form when it's not MDI.

Property of

Form

Description

Set *sizeable* to *false* to prevent the form from being resized. You must set *sizeable* before you open the form.

sizeable has no effect unless the form's *mdi* property is *false*; if it is *true*, the form follows the MDI specification and is always resizeable.

smallTitle

Topic group Related topics

Determines if the form has the small palette-style title bar when it's not MDI.

Property of

Form

Description

Set *sizeable* to *true* to make the form look like a palette window, with the smaller title bar and no minimize, maximize, or system menu icons. You must set *smallTitle* before you open the form.

smallTitle has no effect unless the form's *mdi* property is *false*; if it is *true*, the form follows the MDI specification and has a normal-sized title bar.

sorted

Topic group Related topics

Determines whether the prompts in a listbox or a combobox are listed in sorted order or in natural order.

Property of

ComboBox, ListBox

Description

Set *sorted* to *true* when you want the prompts in a list box or a combo box to appear in sorted order (alphabetically, numerically, or chronologically). For example, a list of names is more accessible if it is sorted alphabetically.

The natural order of a list box or a combo box depends on the order in which the prompts are generated. For example, when you specify "FILE *.*" for the *dataSource* property of a list box, the prompts consist of the file names in the default directory. The prompts are created in the order in which the files are listed in the directory, so they are not necessarily arranged alphabetically when you set *sorted* to *false*.

sorted has no effect when the *dataSource* property of the list box or combo box specifies "FIELD" followed by a field name. In this case, the order of prompts in the list box or combo box depends on the record sequence in the table containing the specified field.

speedBar

Topic group Related topics

Determines whether a pushbutton behaves like a toolbar button or a standard pushbutton.

Property of

PushButton

Description

Set *speedBar* to *true* when you want a pushbutton to behave like a toolbar button. A toolbar button is not included in the tab order of a form, so you can't get to it by pressing Tab or Shift+Tab; and when clicked, it does not receive focus.

For example, navigation controls on a form usually have their *speedBar* property set to *true*. When you navigate from row to row, the control that has focus, typically one *dataLink*ed to a field, never loses focus.

speedTip

Topic group Related topics

Specifies the tooltip text that appears when the mouse remains on a control for more than one second.

Property of

CheckBox, ComboBox, Editor, Entryfield, Grid, NoteBook, Progress, PushButton, RadioButton, ScrollBar, Slider, SpinBox

Description

Use *speedTip* to create a tool tip that appears when the mouse rests on a control. Usually this message gives the user a clue as to the function of the control. To suppress the display of these tool tips, set the *showSpeedTip* property of the form to *false*.

spinOnly

Topic group Related topics

Determines if users can enter a value in the text box portion of a spin box.

Property of

SpinBox

Description

A spinbox lets users enter values in a text box or select values by clicking the arrows on the right edge of the spinbox. When you set the *spinOnly* property to *false*, the text box is enabled. When you set the *spinOnly* property to *true* the text box is disabled, restricting input to a predefined *step* value.

statusMessage

Topic group Related topics

The message to display on the status bar while an object has focus.

Property of

Form and all form components that can receive focus

Description

Use *statusMessage* to provide instructions to the user when the user selects an object. If you set the *statusMessage* of the form, that message is displayed in the status bar when a component's *statusMessage* is blank.

step

Topic group Related topics

Determines how the amount added or subtracted by clicking an arrow in a spinbox.

Property of

SpinBox

Description

Use *step* to control the rate at which a user can increase or decrease a numeric or date value. For example, a program that expresses large dollar values only in increments of $500.00 would give a spinbox a *step* value of 500.

style

Topic group Related topics

Specifies which parts of a combobox are usable and which parts are displayed automatically.

Property of

ComboBox

Description

Use *style* to determine how the user selects values in a combobox.

The user selects a value from a combobox by entering initial characters in an entryfield or by selecting the value directly from the prompt list. The *style* property determines whether the text box is usable and whether the prompt list is displayed automatically.

You can give Style one of three values:

Style value	Description
0 (Simple)	The drop-down list is displayed automatically.
1 (DropDown)	The user has to click the arrow to display the drop-down list.
2 (DropDownList)	The user has to click the arrow to display the drop-down list, and the text box does not accept input; the user must choose from the list.

Pressing Alt+DownArrow when the combobox has focus also displays the drop-down list.

sysMenu

Topic group Related topics

Determines if a form has a control menu and close icon when it's not MDI.

Property of

Form

Description

Set *sysMenu* to *false* to hide the control menu and close icon on a form. You must set *sysMenu* before you open the form.

sysMenu has no effect unless the form's *mdi* property is *false*; if it is *true*, the form follows the MDI specification and always has a control menu and close icon.

tabStop

Topic group Related topics

Determines if the user can select an object by pressing Tab or Shift+Tab.

Property of

All form components that can receive focus

Description

Set the *tabStop* property to *false* when you want to remove an object from the tab order of the parent form. For example, a TabBox object to select pages on a form is often not put in the tab order because it's not a data entry control. (For data entry purposes, you could put a button at the end of the tab order to move the user to the next page.)

If you have a PushButton component that you don't want in the tab order, you may not want it to receive focus either. If that's the case, set its *speedBar* property to *true* instead, which prevents both tabbing and focus.

text

Topic group Related topics Example

The non-editable text that appears in a component.

Property of

Browse, CheckBox, Form, Menu, PushButton, RadioButton, Rectangle, Text

Description

The *text* of a CheckBox or RadioButton object is the descriptive text that appears beside the actual check box or radio button. The *text* of a PushButton object is the text that appears on the button face, and the *text* of a Menu object is the menu prompt.

The *text* of a Browse or Rectangle object is the caption text that appears at the top of the control. The *text* of a Form object is the text that appears in the form's title bar.

Use a pick character to let the user select a menu item or simulate clicking a CheckBox, RadioButton, or PushButton by pressing Alt and the pick character. To designate a character as a pick character, precede it with an ampersand (&) in the object's *text* property. The pick character is underlined when the object is displayed. A pick character may also be used for the *text* of a Rectangle object; pressing the key combination gives focus to the first control that follows the Rectangle object in the z-order that can receive focus.

The *text* of an Text object is the content of the object: the actual HTML text that is displayed in the form or report.

You may assign any of the following types of data to the *text* property of a Text component:

- Boolean
- Numeric
- Integer
- Character
- Object
- Null
- DateTime
- Codeblock

If you assign a codeblock to the *text* property, it must return a value. Use either an expression codeblock or a statement codeblock that uses RETURN to return a value. The codeblock is evaluated whenever it is rendered.

text example

If the following string is assigned to a Menu object's *text* property, the menu has the character A as its pick character.

```
Select &All
```

textLeft

Topic group Related topics

Whether the component's text displays to the left or the right of the graphic element.

Property of

CheckBox, PushButton, RadioButton

Description

The CheckBox, PushButton, and RadioButton objects combine a text label and a graphic element. (The PushButton uses the *upBitmap*, *downBitmap*, *focusBitmap*, and *disabledBitmap* properties to display a bitmap on the button face). Set *textLeft* to *true* if you want to text to display on the left side of the control. By default, *textLeft* is *false*, so the text displays on the right.

tics

Topic group Related topics

How to display the tic marks in a Slider object.

Property of

Slider

Description

tics is an enumerated property that can be one of the following values:

Value	Description
0	Auto
1	Manual
2	None

If *tics* is Auto, set the tic mark interval with *setTicFrequency*(). For Manual tics, use the *setTic*() method. Use the *ticsPos* property to set where the tic marks are displayed.

ticsPos

Topic group Related topics

Where to display the tic marks in a Slider object.

Property of

Slider

Description

ticsPos is an enumerated property that can be one of the following values:

Value	Description
0	Both
1	Bottom Right
2	Top Left

Tic marks are displayed if the *tics* property is not set to None. If the slider is vertical, the tic marks are displayed on the right or left side of the slider, or both. If the slider is horizontal, the tic marks are displayed on the top or bottom, or both.

Make sure the Slider object is large enough to display the tic marks.

toggle

Topic group Related topics

Determines if a button acts as a two-state toggle.

Property of

PushButton

Description

Set *toggle* to *true* to have a PushButton object behave like a two-state toggle button that stays down when clicked. Clicking the button again makes it pop back up.

To check the state of a toggle button, check its *value* property.

top

Topic group Related topics

The position of the top edge of an object relative to its container.

Property of

All form objects.

Description

The unit of measurement in a form or report is controlled by its *metric* property. The default metric for forms is characters, and for reports it's twips.

The container for an MDI form is the main *Visual* dBASE application window, also known as the MDI frame window, below the menu and any toolbars docked on the top of the window. For a non-MDI form, the container is the screen.

topMost

Topic group Related topics

Specifies whether a form displays on top of all other forms when it's not MDI.

Property of

Form

Description

Set a form's *topMost* property to *true* to make the form stay in the foreground while focus transfers to other windows. If more than one open form has *topMost* set to *true*, those windows behave normally in relation to each other, while always staying on top of all other windows.

topMost has an effect only when the *mdi* property is *false*.

transparent

Topic group Related topics

Specifies whether an object's background matches the background color or image of its container.

Property of

CheckBox, Container, PaintBox, RadioButton, Text

Description

By setting an object's *transparent* property to *true*, its background takes on the the background color or image of its container, making the background appear to be transparent. Note that the background is not actually transparent; if the coontrol overlaps another control, you will still see the background of the container, not the portion of the control that has been overlapped.

undo

Topic group Related topics

Reverses the effects of the last Cut or Paste action.

Syntax

<oRef>.*undo*()

<oRef>

An object reference to the control you want to restore.

Property of

Browse, ComboBox, Editor, Entryfield, SpinBox

Description

Use *undo*() when the user wants reverse the effects of the last Copy, Cut or Paste action.

If you have assigned a menubar to the form, you can use a menu item assigned to the menubar's *editUndoMenu* property instead of using the *undo*() method of individual objects on the form.

upBitmap

Topic group Related topics

Specifies the graphic image to display in a pushbutton when it isn't selected.

Property of

PushButton

Description

Use *upBitmap* to give visual confirmation that a pushbutton is enabled and the user is not clicking it.

The *upBitmap* setting can take one of two forms:

- RESOURCE <resource id> <dll name>

specifies a bitmap resource and the DLL file that holds it.

- FILENAME <filename>

specifies a bitmap file. See class Image for a list of bitmap formats supported by *Visual* dBASE.

When you specify a character string for the pushbutton with *text* and an image with *upBitmap*, the image is displayed with the character string.

useTablePopup

Topic group Related topics

Specifies whether to use the default table navigation popup when no popup has been assigned to a form.

Property of

Form

Description

Set *useTablePopup* to *true* to have the default table navigation popup displayed when the user right-clicks the form and no popup has been assigned to the form's *popupMenu* property.

If a popup is assigned to *popupMenu*, that popup is always used.

valid

Topic group Related topics Example

Event fired when attempting to leave a control; return value determines if focus can be removed.

Parameters

none

Property of

Editor, Entryfield, SpinBox

Description

Use *valid* to validate data. *valid* fires when attempting to leave the control only when data has been changed, unless *validRequired* is *true*; then *valid* always fires.

The *valid* event handler must return *true* or *false*. If it returns *true*, operation continues normally. If it returns *false*, the *validErrorMsg* is displayed in a dialog box and the focus remains on the control.

valid does not fire if the user never visits the control, even if *validRequired* is *true*. Therefore, unless the control is the first or only control on the form that gets focus, you should always use form-level or row-level validation in addition to control-level or field-level validation.

To enforce a simple numeric range in a SpinBox control, use *rangeMax* and *rangeMin* instead of *valid*.

To perform an action when a control loses focus, use *onLostFocus*.

valid example

The following event handler is assigned as the *valid* event handler for an order number entryfield in a form for entering new orders. The order numbers are preprinted on a paper form. The validation checks if the order number is valid, and if it's valid, whether the order has already been entered.

```
function ORDER_NUM_valid
  local lRet
  lRet = false
  if form.nextObj == form.cancelButton
    lRet := true   // Allow cancel
  elseif empty( this.value ) or ;
         transform( val( this.value ), "@L " + this.picture ) # this.value
    this.validErrorMsg := "Order number must be four digits"
  elseif keymatch( this.value, tagno( "ORDER_NUM" ))
    this.validErrorMsg := "That order has already been entered"
  else
    lRet := true
  endif
  return lRet
```

The order number field is the first field in the form that gets focus, so the user must get by this validation to continue. If they click the Cancel button—on this form, it's appropriately named cancelButton—the validation is bypassed so that the user can cancel the new order. The format of the field value is checked to make sure it is not blank and the correct length. A *picture* is set in the control to enforce digits-only, but it can't check for length; the *valid* routine does. Finally, KEYMATCH() checks if that order number has already been entered. If it passes these checks, the *valid* returns *true*. If either check fails, the *validErrorMsg* is set appropriately and the event handler returns *false* so that the message is displayed and the focus remains in the control.

validErrorMsg

Topic group Related topics

Specifies the message to display when the *valid* event handler returns *false*.

Property of

Entryfield, SpinBox

Description

When validating data with *valid*, set the *validErrorMsg* property of the control to a more specific error message than the default, “Invalid input”. You may set a static message for each specific control, for example “Bad account number"; or you may dynamically set the *validErrorMsg* from within the *valid* event with specifics about the particular error, for example “Account number requires six digits” or “Account expired”.

validRequired

Topic group Related topics

Determines if the *valid*event fires even if the data is not changed.

Property of

Entryfield, SpinBox

Description

Set *validRequired* to *true* to validate existing data as well as new data. For *validRequired* to take effect, you must assign a *valid* event handler.

You typically set *validRequired* to *true* when you change a validation condition and need to verify and update existing data. For example, a business might add a digit to its account numbers and change the *valid* event handler of an entry field to require the new digit. If the *validRequired* property is set to *true*, *Visual* dBASE also detects any existing account numbers that lack the digit and forces the user to make appropriate changes.

valid does not fire if the user never visits the control, even if *validRequired* is *true*. Therefore, unless the control is the first or only control on the form that gets focus, you should always use form-level or row-level validation in addition to control-level or field-level validation.

value

Topic group Related topics

The component's current value.

Property of

CheckBox, ComboBox, Editor, Entryfield, ListBox, Progress, PushButton, RadioButton, ScrollBar, Slider, SpinBox

Description

A component's *value* property reflects its value, which is

- The value that is displayed in a Entryfield, Editor, SpinBox, or ComboBox component
- *true* if a CheckBox component is checked; *false* if it's not checked
- *true* if a RadioButton component is the one in its group that is selected; *false* if it's not selected
- The item that has focus in a ListBox component
- The interpolated number for the current position in a Slider, Progress, or ScrollBar object.
- *true* if a *toggle* PushButton is down; *false* if it's up

Both field and component objects have a *value* property. (Fields in a table open in a work area do not have any properties, but they have a value; the concept is the same.)When they are *dataLink*ed, changes in one object's *value* property are echoed in the other. The form component's *value* property reflects the value displayed in the component at any given moment. If the component's value is changed, it is copied into the field.

The *value* property for all fields in a rowset are set when you first open a query and updated as you navigate from row to row. The *value* properties for components *dataLink*ed to those fields are also updated at the same time, unless the rowset's *notifyControls* property is set to *false*. You can also force the components to be updated by calling the rowset's *refreshControls*() method, which is useful if you have set a field's *value* property through code.

When reading or writing values to *dataLink*ed components, you can use the *value* property of either the visual component or the field object; there's no difference, although you should be consistent. You may choose to program the visual interface, if the underlying data is more likely to change; or you might choose to work with the data access objects, so you don't have to worry about the names of the form components and whether they're correctly *dataLink*ed. In general, it's easier and more portable for data access object events to access the fields, so you're more likely to assign to the *value* properties of the fields.

vertical

Topic group Related topics

Determines whether a Slider or ScrollBar object is vertical or horizontal.

Property of

ScrollBar, Slider

Description

Slider and ScrollBar objects may be horizontal or vertical. If *vertical* is *true* it's vertical; if *vertical* is *false*, it's horizontal.

Changing the *vertical* property does not resize the object. For example, if you have a long horizontal scrollbar, setting *vertical* to *true* results in a short, fat vertical scrollbar.

view

Topic group | Related topics | Example

Specifies the name of a .QBE query or a table on which a form is based.

Property of

Form

Description

Use *view* for form-based data handling with tables in work areas. When using the data access objects, do not use *view*.

view determines which tables are automatically opened whenever the form is opened. You may specify a single table, or a .QBE query file. If you specify a single table, *Visual* dBASE internally issues CLOSE DATABASES to close all tables open in work areas (in the current workset) before opening the specified table in work area 1, in its natural or primary key order.

A .QBE file is a program file that is supposed to open one or more tables in a specific index order, and contains the appropriate Xbase DML commands such as SET RELATION and SET SKIP to create a multi-table view. In .QBE files generated by earlier versions of *Visual* dBASE, the first command in the file is CLOSE DATABASES, so using a generated .QBE also closes all open tables.

The specified table is opened (or the .QBE is executed) immediately when the *view* property is assigned.

Instead of using the *view* property, you may open the necessary tables yourself. All tables containing fields that are *dataLink*ed to controls on the form must be open when the form is instantiated; otherwise the *dataLink* propeties will fail (because the specified fields cannot be found), causing an error.

If one form opens another form that is supposed to use the current record in the first form, you don't want to set the *view* property in the second form, because instantiating that second form would close the tables used by the first form. This is a common situation where a form would use the current view, and not have anything assigned to its *view* property.

If a form does not have its own *view*, you may assign a *designView* property to the form so that the necessary tables are opened when you edit the form in the Form designer. The *designView* property has no effect when you actually run the form.

view example

The following are example values for *view*:

ZIPCODES.DBF **// A single DBF table in the current directory**

```
:IBLOCAL:EMPLOYEE     // A table in a database
ORDERS.QBE            // A .QBE file in the current directory
```

visible

Topic group Related topics

Specifies whether a component is visible.

Property of

All form components.

Description

Use the *visible* property to conditionally hide a component. You may also disable a component without making it invisible by setting its *enabled* property to *false*. This makes the component appear grayed-out. Depending on the application, it may be more appropriate to completely hide something when it's not needed, or to let the user see it but not be able to do anything with it.

visualStyle

Topic group Related topics

The style of the tabs in a NoteBook object.

Property of

NoteBook

Description

visualStyle is an enumerated property that can be one of the following values:

Value	Description
0	Right Justify
1	Fixed Width
2	Ragged Right

The Fixed Width style makes all tabs the same width. The Right Justify and Ragged Right Styles are the same when the notebook's *multiple* property is *false*; the tabs are sized to the width of their text label.

When *multiple* is *true* and there are enough tabs to create multiple rows, Right Justify makes the tab edges line up on both the left and right sides, while Ragged Right lines up the tabs on the left edge only.

vScrollBar

Topic group Related topics

Determines when an object has a vertical scroll bar.

Property of

Grid

Description

The *vScrollBar* property determines when and if a control displays a vertical scrollbar. It may have any of four settings:

Value	Description
0 (Off)	The object never has a vertical scroll bar.
1 (On)	The object always has a vertical scroll bar.
2 (Auto)	Displays a vertical scroll bar only when needed.
3 (Disabled)	The vertical scroll bar is visible but not usable.

when

Topic group Related topics

Event fired when attempting to give focus to an object; return value determines if object gets focus.

Parameters

<form open expL>

true for when the *when* event handler is called when the form is opened; *false* from then on.

Property of

All form components that can get focus

Description

Use *when* to conditionally prevent an object from getting focus without disabling the object. If you set an object's *enabled* property to *false*, the object will appear grayed-out and disabled. This is a visual indication that the object cannot get focus. The object is removed from the tab sequence and clicking the object has no effect.

If an object is enabled, you may define a *when* event handler to determine if an object is available. The event handler must return *true* to allow the object to get focus. If it returns *false*, the object does not get focus. If the object was clicked, focus remains on the object that previously had focus. If Tab or Shift+Tab was pressed, the focus goes to the next control in the tab sequence.

Using *when* gives you the flexibility of displaying a message or taking some other action when the focus is not allowed. But in most cases, it's better to conditionally disable controls so that they are clearly not available. For example, if you have a checkbox to echo output to a file and an entryfield for the file name, you can disable the entryfield when the checkbox is unchecked in the checkbox's *onChange* event handler.

If the *when* event handler returns *true*, or there is no *when* event handler, *onGotFocus* fires after the object receives focus.

The *when* event for all controls is fired when the form first opens. Use the <form open expL> parameter if necessary to distinguish that event from all other normal focus attempts.

width

Topic group Related topics

The width of an object.

Property of

Most form objects

Description

Use an object's *width* property in combination with its *height* property to adjust the size of an object.

width is an integer expressed in the current *metric* unit of the form that contains the object. The value includes any border, bevel or shadow effect assigned to the object.

The default *metric* unit is characters, which is the average width of characters in the form's base font (default *scaleFontName* is MS Sans Serif, default *scaleFontSize* is 8 points). Thus, if the parent form's *metric* unit is set to characters, and its *scaleFontName* or *scaleFontSize* properties are changed, the objects on the form are automatically scaled relative to the new form size.

Exception: The *width* property of Line objects is used to set the thickness of the line, and is always measured in pixels.

windowState

Topic group Related topics

The maximized/minimized state of the form window.

Property of

Form

Description

Use *windowState* to get or set the display state of a form. A window may be maximized, minimized, or in its non-maximized "normal" (restored) state. The appearance of the window also depends on whether it is an MDI window, as noted in the following table.

Setting	Effect on an MDI form	Effect on a non-MDI form
0 (Normal)	If minimized or maximized, the form is restored to its most recent non-maximized size and position within the MDI frame window.	If minimized or maximized, the form is restored to its most recent non-maximized size and position on the screen.
1 (Minimized)	Reduces a normal or maximized form to an iconized title bar at the bottom of the MDI frame window.	Reduces a normal or maximized form to an iconized button on the Windows taskbar.
2 (Maximized)	Enlarges the form to the extent of the MDI frame window.	Enlarges the form to the extent of the screen.

The MDI frame window is the main *Visual* dBASE application window.

If you assign a value to *windowState* that changes its state, the form's *onSize* event fires and the form is also given focus. To give focus to the window without changing its state, call the form's *setFocus*() method.

windowState example

wrap

Topic group Related topics

Determines if an Editor or Text object wraps text automatically.

Property of

Text, Editor

Description

Use *wrap* to wrap long lines of text in the editor or in a text object. When *wrap* is *true*, text won't exceed the width of the object and a horizontal scrollbar will not appear. The Text or Editor object will attempt to break each line at a space.

If *wrap* is *false*, long lines extend past the right edge of the Editor. If *scrollBar* is On or Auto, a horizontal scrollbar is used (where needed) to view long lines of text. Even without scrollbars, you can use the cursor to move to the end of long lines.

Appshell

Topic group

This section covers supporting application elements such as menus, popups, toolbars, standard dialogs, keyboard behavior, and the *_app* object.

_app

Topic group Related topics Example

The global object representing the currently running instance of *Visual* dBASE.

Syntax

The *_app* object is automatically created when you start *Visual* dBASE.

Properties

The following tables list the properties and events of the *_app* object. (No methods are associated with the *_app* object.)

Property	Default	Description
className	APPLICATION	Identifies the object as an instance of the *Visual* dBASE application
databases	Object array	An array containing references to all database objects used by the Navigatior
ddeServiceName	VDB	The name used to identify each instance of *Visual* dBASE when used as a DDE service
frameWin	Object	The *Visual* dBASE MDI frame window
insert	true	Whether text typed at the cursor is inserted or overwrites existing text
printer	Object	Configuation properties for the default printer
session	Object	The default Session object
speedBar	true	Whether to display the default toolbar
statusBar	true	Whether to display the status bar at the bottom of the MDI frame window

Event	Parameters	Description
onInitiate		When a client application requests a DDE link with *Visual* dBASE as the server.

Description

Use *_app* to control and get information about the currently running instance of *Visual* dBASE. The insert property controls the insert or overwrite behavior of typed text in all forms, the Source Editor, and the Command window. It is toggled by pressing the Insert key. You may show or hide the default toolbars and the status bar. To control other aspects of the main application window, use the *_app.frameWin* object.

The databases array contains references to all databases opened by the Navigator. The default database is the first element in that array. The session property points to the default session. Therefore _app.databases[1].session and _app.session point to the same object.

To use *Visual* dBASE as a DDE server, set the ddeServiceName to a unique identifier if there is more than one instance of *Visual* dBASE running, then assign an *onInitiate* event handler to handle the service request. .

The *_app* object is also used to store important global values and other objects used by your application. Dynamically creating properties of *_app* is better than creating public variables. Variables may be inadvertently released or conflict with other variable names. Objects referenced only in variables cannot communicate with each other using object-oriented techniques like objects attached to the same parent object—in this case *_app*—can.

_app example

To set Insert off for your application:

```
_app.insert = false
```

The following example attaches a form manger object (a custom class) to the *_app* object.

```
set procedure to MANAGER.CC additive
_app.manager = new FormMangager()
```

_app.frameWin

Topic group Related topics Example

The *Visual* dBASE MDI frame window.

Syntax

The *_app.frameWin* object is automatically created when you start *Visual* dBASE.

Properties

The following table lists the properties of the *_app.frameWin* object. (No events or methods are associated with the *_app.frameWin* object.)

Property	Default	Description
className	FRAMEWINDOW	Identifies the object as an instance of an MDI frame window
hWnd		The Windows handle to the frame window
text	*Visual* dBASE	The title displayed in the frame window
visible	true	Whether the frame window is visible
windowState		The state of the frame window: 0=Normal, 1=Minimized, 2=Maximized

Description

_app.frameWin represents the main *Visual* dBASE application window. This window is the frame window that contains all MDI windows during development and in an MDI application. If your application uses SDI windows only, the MDI frame window is usually hidden with the SHELL() function.

If you assign a MenuBar to *_app.frameWin*, that menu becomes the default menu that is visible when no MDI windows are open, or the current MDI window has no menu of its own.

_app.frameWin example

The following statements are used at the beginning of an application to set the title in the MDI frame window to the name of the application and attach a default menu.

```
_app.frameWin.text := "Data Dazzler 3000"
do EMPTY.MNU with _app.framewin
set procedure to EMPTY.MNU additive
```

class Menu

Topic group Related topics

A menu system assigned to a form.

Properties

The following table lists the properties of the Menu class.

Property	Default	Description
before	[editable list]	Specifies which other menu object the menu object precedes.
checked	false	Logical value to show or hide a checkmark next to a menu item.
checkedBitmap	[empty string]	Graphic file (any supported format) or resource reference that contain an image to represent the mark you want to appear next to the menu item if *checked* is True.
className	MENU	Identifies the menu class.
enabled	true	Determines if the menu can be selected.
helpFile	[empty string]	Identifies a Windows Help file (.HLP) that contains context-sensitive Help topics.
helpId	[empty string]	Specifies the context string or context number of a Help topic in a Windows Help file (.HLP).
id	-1	Identifies the menu with a numeric value.
name	MENU1	Specifies the name of the menu item.
parent	[empty string]	An object reference that points to the parent form.
separator	false	Determines if the menu prompt is a menu item that the user can't select.
shortCut	[empty string]	Specifies a key combination that executes the OnClick subroutine.
statusMessage	[empty string]	Specifies a message to display on the status bar.
text	N/A	Specifies a character string to display in the menu prompt.
uncheckedBitmap	[empty string]	Graphic file (any supported format) or resource reference that contain an image to represent the mark you want to appear next to the menu item if *checked* is False.

Event	Parameters	Description
onClick		Executes a subroutine when the user chooses the menu.
onHelp		Executes a subroutine when the user presses F1.

Method	Parameters	Description
release( )		Removes the menu definition from memory.

Description

Use menu objects to create a menu system for a form.

A menu system consists of two elements:

- The object reference variable that identifies the entire menu system. You must create this variable before you can create the menu system. (The variable name is not displayed anywhere.)

- Menu items, the prompts offered by the menu system. You can display menu items in four places:
- The dBASE application menu bar, a row near the top of the application frame window. (This happens only when the MDI property is set to true.)
- The Menu Bar, an unmarked row at the top of the form. (This happens only when the MDI property is set to false.) The first menu item you create is automatically displayed at the left end of the menu bar.
- A pull-down menu, which the user opens by selecting a menu item from the menu bar.
- A cascading menu, which the user opens by selecting a menu item from a pull-down menu or another cascading menu.

You create the object reference variable and menu items with the DEFINE MENU command. To create a top-level menu that contains the standard Windows Edit and Window pull-down menus, use DEFINE MENUBAR. For more information, see "class MenuBar."

You can also add popup menus to a form. Popup menus let users perform an action (usually right-click) to bring up a list of menu items. For more information, see "class Popup."

The following commands create a form and declare a name for its menu system:

```
MyForm = NEW FORM()
DEFINE MENU Main OF MyForm
```

The following command creates a menu item (File) on the application menu bar:

```
DEFINE MENU File OF MyForm.Main PROPERTY Text "File"
```

The following command moves the menu item (File) to the menu bar of the form:

```
MyForm.MDI = .F.
```

The following commands create two menu items (Open and Close) in a pull-down menu:

```
DEFINE MENU xOpen OF;
   MyForm.Main.File PROPERTY Text "Open"
DEFINE MENU xClose OF;
  MyForm.Main.File PROPERTY Text "Close"
```

The user opens this pull-down menu by selecting File, the menu item on the menu bar.

The following commands create a cascading menu with two menu items (Close Without Saving, and Close and Save):

```
DEFINE MENU NoSave OF MyForm.Main.File.xClose;
   PROPERTY Text "Close Without Saving"
DEFINE MENU YesSave OF MyForm.Main.File.xClose;
  PROPERTY Text "Close and Save"
```

The user opens this cascading menu by selecting the Close menu item.

Creating pick characters

To let the user select a menu item with a key press, specify a pick character by placing an ampersand to the left of the character in the menu item prompt. For example, the previous command could have specified "S" as the pick character for the Close and Save menu item:

```
DEFINE MENU YesSave OF MyForm.Main.File.xClose;
   PROPERTY Text "Close and &Save"
```

The method for entering a pick character depends on the level of the menu item. When the pick character selects a menu item from the menu bar, the user presses the <Alt> key before entering the character. To select any other menu item, the user inputs the character only.

Assigning actions to menu items

You assign an action to a menu item with the OnClick subroutine. For example, the following command assigns a subroutine named ClsSave to the Close and Save menu item:

```
MyForm.Main.File.xClose.YesSave.OnClick = ClsSave
```

Note: You can move a menu object from one form to another by changing the Parent property of the menu object. The Parent property is read-only for all other classes.

You can design a menu with the Menu designer, a tool that creates a menu file (.MNU). The menu file contains dBASE code that generates the menu you design. To access the Menu designer, click the Tool button next to the MenuFile property in the Inspector.

class MenuBar

Topic group Related topics

A MenuBar object specifies a top-level menu for a form. Using the MENUBAR class lets you add the standard Windows Edit and Window pull-down menus to a form.

Properties

The following table lists the properties of the Menubar class.

Property	Default	Description
className	MENUBAR	Identifies the menubar object's class.
editCopyMenu	null	Specifies a menu item that copies selected text from a control to the Windows clipboard.
editCutMenu	null	Specifies a menu item that deletes selected text from a control and copies it to the Windows clipboard.
editPasteMenu	null	Specifies a menu item that pastes text from the Windows clipboard to the edit control with focus.
editUndoMenu	null	Specifies a menu item that restores the form to the state before the last edit operation was performed.
id	1	Identifies the menubar object with a numeric value.
name	MENUBAR1	Specifies the menubar object's name.
parent	N/A	An object reference that points to the parent form.
windowMenu	null	Specifies a top-level menu that lists open MDI windows.

Event	Parameters	Description
onInitMenu		Specifies code that executes when the menu is opened.

Method	Parameters	Description
release( )		Removes the menubar definition from memory.

Description

A Menubar object specifies a top-level menu for a form. A form's top-level menu doesn't contain any menu prompts itself; it is only the container for child menu objects. The child menu objects of the top-level menu contain the form's actual menu items.

Menu objects that have a Menubar as a parent appear on the top line of a form. By default, the Menu designer creates a MenuBar subclass when creating an .MNU file.

You can design and implement menus without using Menubars, as in earlier versions of dBASE. The advantage of using the MenuBar class is that you can implement an Edit pulldown menu that uses the Windows Clipboard for Cut, Copy, Paste, and Undo operations, and you can implement a Window pulldown menu that offers the standard MDI window list. The properties that enable these menu choices (*editCutMenu*, *editCopyMenu*, and so on) all take an object reference to a Menu object as their value.

To quickly add the Edit and Window menus and their drop-down options, use the Menu designer and add these options using the Menu pulldown menu.

Note: The command CREATE MENU creates a Menubar subclass. You can also use DEFINE MENUBAR M of X to create a menu bar for form X.

class Popup

Topic group Related topics

A popup menu assigned to a form.

Properties

The following tables list the properties, events and methods of the Popup class.

Property	Default	Description
alignment	1 - Align Left	Lets you align items on your popup menus and submenus. Options are left-aligned, centered, and right-aligned.
className	POPUP	Identifies the Popup class.
id		Identifies the popup with a numeric value.
left		Sets the position of the left border.
name		Specifies the name of the popup menu.
parent		An object reference that points to the parent form.
top		Sets the position of the top border.
trackRight	true	Determines whether the popup menu responds to a right mouse click for selection of a menu item.

Event	Parameters	Description
onInitMenu		Specifies code that executes when the popup menu is opened.

Method	Parameters	Description
open( )		Opens the popup menu.
release( )		Removes the popup definition from memory.

Description

Use class Popup to add a popup menu to a form. Popup menus give users a "shortcut" way to perform actions without pulling down a menu bar. A Popup's parent is always a Form. Individual menu items are attached to a Popup by defining Menu objects with the Popup as parent.

A .POP file is similar to an .MNU file in format with the name of the Popup passed as a parameter instead of the explicit "Root" used in .MNU files.

A popup menu consists of two elements:

- The object reference variable that identifies the entire popup menu. You must create this variable before you can create the menu. (The variable name is not displayed anywhere.)
- Menu items, the choices offered by the popup menu.

When you create a popup menu with the NEW operator, you can specify two parameters:

- <parent form reference>-An object reference pointing to the parent form.
- <object name expC>-A character string assigned to the Name property of the new popup menu. This value is optional.

For example, the following commands create a form and a popup to display in it:

```
MyForm = NEW FORM()
MyForm.MyPop = NEW POPUP(MyForm, "OurPopup")
MyForm.MyPop.Item1 = NEW MENU(MyForm.MyPop, "Close")
MyForm.MyPop.Item2 = NEW MENU(MyForm.MyPop, "Close and Save")
MyForm.Open()
MyForm.MyPop.Open()
```

The Name property of the new popup object contains "OurPopup".

Assigning actions to popup menu items

You assign an action to a popup menu item with the OnClick subroutine. For example, the following command assigns a subroutine named ClsSave to the Close and Save menu item of the example above:

```
MyForm.MyPop.Item2.OnClick = ClsSave
```

Note: You can design a popup menu with the Popup designer, a tool that creates a popup menu file (.POP). A popup menu file contains dBASE code that generates the popup menu you design. To access the Popup designer, click the File menu and select New|Popup.

class ToolBar

Topic group Related topics Example

A toolbar assigned to a form.

Properties

The following tables list the properties, events and methods of the ToolBar class.

Property	Default	Description
className	TOOLBAR	Identifies the ToolBar class.
flat	true	Logical value which toggles the appearance of buttons on the toolbar between always raised (false) to only raised when the pointer is over a button (true).
floating	false	Logical value that lets you specify your toolbar as docked (false) or floating (true).
form	null	Returns the object reference of the form to which the toolbar is attached.
hWnd	0	Returns the toolbar's handle.
imageHeight	0	Adjusts the default height for all buttons on the toolbar. Since all buttons must have the same height, if ImageHeight is set to 0, all buttons will match the height of the tallest button. If *ImageHeight* is set to a non-zero positive number, images assigned to buttons are either padded (by adding to the button frame) or truncated (by removing pixels from the center of the image or by clipping the edge of the image).
imageWidth	0	Specifies the width, in pixels, for all buttons on the toolbar.
left	0	Specifies the distance from the left side of the screen to the edge of a floating toolbar.
text		String that appears in the title bar of a floating toolBar.
top	0	Specifies the distance from the top of the screen to the top of a floating toolbar.
visible	true	Logical property that lets you hide or reveal the toolbar.

Event	Parameters	Description
onUpdate		Fires repeatedly while application is idle to update the status of the toolbuttons

Method	Parameters	Description
attach()	<form>	Establishes link between the toolbar and a form
detach()	<form>	Breaks link between the toolbar and a form

Description

Use class ToolBar to add a toolbar to a form.

class ToolBar example

Here's an example of an object definition program, MYTOOLBR.PRG, which defines a basic two-button toolbar for use in any form or application.

```
parameter FormObj
   if pcount() < 1
      msgbox("DO mytoolbr.prg WITH <form reference>")
      return
   endif
t = findinstance( "myTBar" )
if empty( t )
   ? "Creating toolbar"
   t = new myTBar()
endif
try
   t.attach( FormObj )
catch ( Exception e )
   // Ignore already attached error
   ? "Already attached"
endtry
class myTBar of toolbar
   this.imagewidth = 16
   this.flat = true
   this.floating = false
   this.b1 = new toolbutton(this)
   this.b1.bitmap = 'filename ..\artwork\button\dooropen.bmp'
   this.b1.onClick = {;msgbox("door is open")}
   this.b1.speedtip = 'button1'
   this.b2 = new toolbutton(this)
   this.b2.bitmap = 'filename ..\artwork\button\doorshut.bmp'
   this.b2.onClick = {;msgbox("door is shut")}
   this.b2.speedtip = 'button2'
endclass
```

class ToolButton

Topic group Related topics Example

Defines the buttons on a toolbar.

Properties

The following tables list the properties and events of the ToolButton class. (No methods are associated with this class.)

Property	Default	Description
bitmap		Graphic file (any supported format) or resource reference that contains one or more images that are to appear on the button.
bitmapOffset	0	Specifies the distance, in pixels, from the left of the specified Bitmap to the point at which your button graphic begins. This property is only needed when you specify a Bitmap that contain a series of images arranged from left to right. Use with *BitmapWidth* to specify how many pixels to display from the multiple-image Bitmap. Default is 0 (first item in a multiple-image Bitmap).
bitmapWidth	0	Specifies the number of pixels from the specified Bitmap that you want to display on your button. This property is only needed when you specify a Bitmap that contain a series of images arranged from left to right. Use with *BitmapOffset*, which specifies the starting point of the image you want to display.
checked	false	Returns true if the button has its *TwoState* property set to true. Otherwise returns false.
className	TOOLBUTTON	Identifies the ToolButton class.
enabled	true	Logical value that specifies whether or not the button responds when clicked. When set to false, the operating system attempts to visually change the button with hatching or a low-contrast version of the bitmap to indicate that the button is not available.
parent	N/A	An object reference that points to the parent ToolBar.
separator	false	Logical value that lets you set a vertical line on the toolbar to visually group buttons. If you specify a separator button, only its Visible property has any meaning.
speedTip		Specifies the text that appears when the mouse rests over a button for more than one second.
twoState	true	Logical value that determines whether the button displays differently when it has been depressed and consequently sets the *Checked* property to true.
visible	false	Logical value that lets you hide (*false*) or show (*true*) the button.

Event	Parameters	Description
onClick		After the button is clicked.

Description

Use class ToolButton to define the buttons on an existing toolbar.

attach

Topic group Related topics

Establishes link between a toolbar and a form.

Breaks links between a toolbar and a form.

Property of

TOOLBAR

Description

Along with *detach*, this method lets you manage toolbars in your application by connecting and disconnecting the objects as needed.

Typically, however, a toolbar is attached when a form calls a program in which the toolbar is defined, as is done in the included CLIPBAR.PRG sample:

```
parameter FormObj, bLarge
   private typeCheck
   local t, bNew
   bNew = false
   if ( PCOUNT() == 0 )
       MSGBOX("To attach this toolbar to a form use: " + ;
              CHR(13) + CHR(13) + ;
             "DO " + PROGRAM() + " WITH <form reference>","Alert")
   else
      typeCheck = FindInstance("ClipToolbar")
      if ( TYPE("typeCheck") == "O" )
         t = typeCheck
      else
         SET PROCEDURE TO (PROGRAM()) ADDITIVE
         t = new ClipToolbar( bLarge )
         bNew := true
      endif
      t.attach( FormObj )
    endif
return ( bNew )
```

checked

Topic group

Determines if a checkmark appears beside a menu command.

Property of

MENU

Description

Use Checked to indicate that a condition or a process is turned on or off.

The checkmark appears to the left of the menu command when you set the Checked property to true; the checkmark is removed when you set the Checked property to false. The user usually adds or removes a checkmark by clicking the menu item.

You can query the current Checked setting and make branching decisions accordingly. For example, if Checked is true, you can execute a procedure or a codeblock; and if Checked is false, you can execute a different procedure or codeblock (or none at all).

CLEAR TYPEAHEAD

Topic group Related topics

Clears the typeahead buffer, where keystrokes are stored while *Visual* dBASE is busy.

Syntax

CLEAR TYPEAHEAD

Description

If you have not issued a SET TYPEAHEAD TO 0 command, the keyboard typeahead buffer stores keystrokes the user enters while dBASE is busy processing other data. When the processing is complete and keyboard input is enabled again, dBASE processes and deletes the values in the buffer in the order they were entered until the buffer is empty. Use CLEAR TYPEAHEAD to discard any keystrokes that may have been entered during processing, to ensure that the keyboard data currently being processed comes directly from the keyboard.

For example, if you want to be able to fill in multiple screens quickly, one after the other, you would not issue CLEAR TYPEAHEAD during processing. This would let you continue typing data while data from one screen was being saved and the next (blank) one being displayed. The data you entered during processing would be entered onto the new screen when it appeared. On the other hand, if you want to make sure that no data is entered until the next screen is displayed, issue CLEAR TYPEAHEAD after displaying the blank screen and before beginning data entry.

DEFINE COLOR

Topic group Related topics Example

Creates and names a customized color.

Syntax

DEFINE COLOR <color name>
<red expN>, <green expN>, <blue expN>

<red expN>, <green expN>, <blue expN>

Specifies the proportions of red, green, and blue (RGB) that make up the defined color. Each number determines the intensity of the color it represents, and can range from 0 (least intensity) to 255 (greatest intensity).

Description

Use DEFINE COLOR to create a custom color. Once you have defined <color name>, you can use it instead of one of the standard colors such as R, W, BG, silver, lemonchiffon, and so on.

The color you create with DEFINE COLOR is based on three numbers, <red expN>, <green expN>, and<blue expN>. Adjusting these numbers alters the color you create. For example, increasing or decreasing <green expN> increases or decreases the amount of green contained in the customized color.

Use the GETCOLOR() function to open a dialog box in which you create a custom color or choose from a palette of available colors. After exiting GETCOLOR(), issue DEFINE COLOR with the values it returns to define the desired color.

You can't override any standard color definitions. For a full list of standard colors, see the color property.

Colors defined with DEFINE COLOR are active only during the current *Visual* dBASE session. If you restart *Visual* dBASE, you must redefine the colors. You may redefine a custom color as often as you wish. Changing the definition of a color does not automatically change the color of objects that have been set to that color; you must reassign the color.

DEFINE COLOR example

The following example defines some standard departmental colors from RGB values stored in a table:

```
function setCorporateColors( cDeptName )
  local q, r
  q = new Query( "select * from COLORSCHEME" )
  r = q.rowset
  if r.applyLocate( "DEPTNAME = '" + cDeptName + "'" )
    private rgbValue    // Use private var for &macro
    rgbValue = r.fields[ "BACKGROUND" ].value
    define color DEPT_BG &rgbValue
    rgbValue = r.fields[ "LOGO" ].value
    define color DEPT_LOGO &rgbValue
    rgvValue = r.fields[ "TEXT" ].value
    define color DEPT_TEXT &rgbValue
  endif
```

The function takes the department name as a parameter. If that department has a listing in the table, RGB values like "115,180,40" are read from the table and used for different standard colors, such as the background and text color. &macro substitution is used to convert the value strings into the literal numeric values, separated by commas, that are expected by the DEFINE COLOR command.

Presumably, default departmental colors have already been defined so that if no match is found, the color names can be used.

detach

Topic group Related topics

Establishes link between a toolbar and a form.

Breaks links between a toolbar and a form.

Property of

TOOLBAR

Description

Along with *attach*, this method lets you manage toolbars in your application by connecting and disconnecting the objects as needed.

Typically, however, a toolbar is detached as part of a form's cleanup routines, as is done in the included MUGS sample:

```
function close
      private sFolder
      sFolder = this.restoreSet.folder
      CLOSE FORMS
      SET DIRECTORY TO &sFolder.
      this.toolbars.appbar.detach( _app.framewin )
      with (_app)
         framewin.text := this.restoreSet.frameText
         speedbar      := this.restoreSet.speedBar
         app           := null
      endwith
      shell( true, true )
   return
```

editCopyMenu

Topic group Related topics

Specifies a menu item that copies selected text from a control to the Windows Clipboard.

Property of

MENUBAR

Description

editCopyMenu contains a reference to a menu object users select when they want to copy text.

You can use the *editCopyMenu* property of a form's menubar to copy selected text to the Windows Clipboard from any edit control in the form, instead of using the control's Copy() property. In effect, *editCopyMenu* calls Copy() for the active control. This lets you provide a way to copy text with less programming than would otherwise be needed. The Copy menu item is automatically disabled when no text is selected, and enabled when text is selected.

For example, suppose you have a Browse object (b) and an Editor object (e) on a form (f). To implement text copying, you could specify actions that would call b.Copy() or e.Copy() whenever a user wanted to copy text. However, if you use a menubar, you can set the *editCopyMenu* property to the menu item the user will select to copy text. Then, when the user selects that menu item, the text is automatically copied to the Windows Clipboard from the currently active control. You don't need to use the control's Copy() property at all.

If you use the Menu designer to create a menubar, *editCopyMenu* is automatically set to an item named Copy on a pulldown menu named Edit when you add the Edit menu to the menubar:

```
this.EditCopyMenu = this.Edit.Copy
```

editCutMenu

Topic group Related topics

Specifies a menu item that cuts selected text from a control and places it on the Windows Clipboard.

Property of

MENUBAR

Description

editCutMenu contains a reference to a menu object users select when they want to cut text.

You can use the *editCutMenu* property of a form's menubar to cut (delete) selected text and place it on the Windows Clipboard from any edit control in the form, instead of using the control's Cut() property. In effect, *editCutMenu* calls Cut() for the active control. This lets you provide a way to copy text with less programming than would otherwise be needed. The Cut menu item is automatically disabled when no text is selected and enabled when text is selected.

For more information, see *editCopyMenu*.

editPasteMenu

Topic group Related topics

Specifies a menu item that copies text from the Windows clipboard to the currently active edit control.

Property of

MENUBAR

Description

editPasteMenu contains a reference to a menu object users select when they want to paste text to the cursor position in the currently active edit control.

You can use the *editPasteMenu* property of a form's menubar to paste text from the Windows Clipboard into any edit control in the form, instead of using the control's Paste() property. In effect, *editPasteMenu* calls Paste() for the active control. This lets you provide a way to paste text with less programming than would otherwise be needed. The Paste menu item is automatically disabled when the clipboard is empty, and enabled when text is copied or cut to the Clipboard.

For more information, see *editCopyMenu*.

editUndoMenu

Topic group Related topics

Specifies a menu item that reverses the effects of the last Cut, Copy, or Paste action.

Property of

MENUBAR

Description

editUndoMenu contains a reference to a menu object users select when they want to undo their last Cut, Copy, or Paste action.

You can use the *editUndoMenu* property of a form's menubar to undo a Cut or Paste action from any edit control in the form, instead of using the control's Undo() property. In effect, *editUndoMenu* calls Undo() for the active control. This lets you provide a way to undo with less programming than would otherwise be needed.

For more information, see *editCopyMenu*.

GETCOLOR()

Topic group Related topics Example

Calls a dialog box in which you can define a custom color or select a color from the color palette. Returns a character string containing the red, green, and blue values for the color selected.

Syntax

GETCOLOR([<title expC>])

<title expC>

A character string to appear as the title of the dialog box.

Description

Use GETCOLOR() to open a dialog box in which you can choose a color from a palette of predefined colors or create a customized color. In this dialog box, you choose and create colors in the same way you do if you use the Color Palette available when you choose Color in the Windows Control Panel.

GETCOLOR() returns a string in the format "red value, green value, blue value", with each color value ranging from 0 to 255; for example "115,180,40". If you cancel the color dialog, GETCOLOR() returns an empty string.

You can use the string returned by GETCOLOR() in a related command, DEFINE COLOR, to use a specific color in a program.

GETCOLOR() example

The following event handler displays the color dialog to choose a color in a color scheme:

```
function backgroundColorButton_onClick
  private rgbValue      // Use private for &macro
  rgbValue = getcolor()
  if rgbValue # ""
    form.colorscheme1.rowset.fields[ "BACKGROUND" ].value = rgbValue
    define color SAMPLE_BG &rgbValue
    form.sampleBackground.colorNormal = "SAMPLE_BG"
  endif
```

If a color is chosen, the RGB string is stored in a field in a color scheme table, but the row is not saved, in case the user changes their mind. A sample color is defined (or redefined), and a sample rectangle's color is set to the newly defined color.

Note that you can assign RGB values directly to a color property, but those RGB values are expected to be in hexadecimal and in BGR (blue-green-red) order, for example "0x28b473" instead of "115,180,40". It's easier to define a custom color than to do the conversion.

GETFONT()

Topic group Related topics

Calls a dialog box in which you select a character font. Returns a string containing the font name, point size, font style (if you choose a style other than Regular), and family.

Syntax

GETFONT([<title expC>])

<title expC>

A character string to appear as the title of the dialog box.

Description

Use GETFONT() to place the values associated with a specified font into a character string, as shown in the following examples. If you want to add a font to the [Fonts] section of VDB.INI but don't know its exact name or family, use GETFONT(). Then add the information GETFONT() returns into VDB.INI.

INKEY()

Topic group Related topics Example

Gets the first keystroke waiting in the keyboard typeahead buffer. Can also be used to wait for a keystroke and return its value.

Syntax

INKEY([<seconds expN>] [, <mouse expC>])

<seconds expN>

The number of seconds INKEY() waits for a keystroke. Fractional times are allowed. If <expN> is zero, INKEY() waits indefinitely for a keystroke. If <expN> is less than zero, the parameter is ignored.

<mouse expC>

Determines whether INKEY() returns a value when you click the mouse. If <expC> is "M" or "m", INKEY() returns -100. If <expC> is not "M" or "m", INKEY() ignores a mouse click and waits for a keystroke.

Description

The keyboard typeahead buffer stores keystrokes the user enters while *Visual* dBASE is busy. A very fast typist may also fill the keyboard typeahead buffer—*Visual* dBASE is busy trying to keep up. These keystrokes are normally handled automatically; for example, characters are typed into entryfields and menu choices are made. Use INKEY() to handle the keystrokes yourself.

INKEY() returns the decimal value associated with the first key or key combination held in the keyboard typeahead buffer and removes that keystroke from the buffer. If the typeahead buffer is empty, INKEY() returns the value of zero.

Table 19.1 INKEY() return values

Key pressed	Return value	Shift+key return value	Ctrl+Key return value	Alt+key* return value
0	48	Depends on keyboard	-404	-452
1	49	Depends on keyboard	-404	-451
2	50	Depends on keyboard	-404	-450
3	51	Depends on keyboard	-404	-449
4	52	Depends on keyboard	-404	-448
5	53	Depends on keyboard	0	-447
6	54	Depends on keyboard	-30	-446
7	55	Depends on keyboard	-404	-445
8	56	Depends on keyboard	-404	-444
9	57	Depends on keyboard	-404	-443
a	97	65	1	-435
b	98	66	2	-434
c	99	67	3	-433
d	100	68	4	-432
e	101	69	5	-431
f	102	70	6	-430

g	103	71	7	-429
h	104	72	8	-428
i	105	73	9	-427
j	106	74	10	-426
k	107	75	11	-425
l	108	76	12	-424
m	109	77	13	-423
n	110	78	14	-422
o	111	79	15	-421
p	112	80	16	-420
q	113	81	17	-419
r	114	82	18	-418
s	115	83	19	-417
t	116	84	20	-416
u	117	85	21	-415
v	118	86	22	-414
w	119	87	23	-413
x	120	88	24	-412
y	121	89	25	-411
z	122	90	26	-410
F1 (Ctrl+\)	28	-20	-10	-30
F2	-1	-21	-11	-31
F3	-2	-22	-12	-32
F4	-3	-23	-13	-33
F5	-4	-24	-14	-34
F6	-5	-25	-15	-35
F7	-6	-26	-16	-36
F8	-7	-27	-17	-37
F9	-8	-28	-18	-38
F10	-9	-29	-19	-39
F11	-544	-546	-548	-550
F12	-545	-547	-549	-551
Left Arrow	19	-500	1	0
Right Arrow	4	-501	6	0
Up Arrow	5	5	5	0
Down Arrow	24	24	24	0
Home (Ctrl+])	26	26	29	0
End	2	2	23	0
Tab	9	-400	0	0
Enter	13	0	-402	0
Esc (Ctrl+[)	27	27	-	-
Ins	22	0	0	0
Del	7	-502	7	7
Backspace	127	127	-401	-403
PgUp	18	18	31	0
PgDn	3	3	30	0

***Note:** The Alt+key value returned for all character keys, except lower-case letters a through z, is the

character value minus 500. For lower-case letters, the Alt+key values are the same as those for upper-case letters.

Because of the event-driven nature of *Visual* dBASE, INKEY() is rarely used. When it is used, it's in one of three ways:

- When keystrokes are expected to be buffered, INKEY() is used to get those keystrokes.
- In a loop that's busy doing something, INKEY() is used to see if a key has been pressed, and if so to take an action.
- INKEY() can be used to wait for a keystroke, and then take an action.

In any of these cases, because *Visual* dBASE is busy executing your INKEY() code, it will not respond to keystrokes and mouse clicks as it normally would.

To check if there is a key waiting in the buffer without removing it, or to determine a value in the buffer in a position other than the first position, use NEXTKEY().

INKEY() example

Execute the following program and follow the on-screen directions:

```
? "In the next 5 seconds, press [C] and [Alt+F]
sleep 5
? inkey()
? inkey()
```

KEYBOARD

Topic group Related topics Example

Inserts keystrokes into the typeahead buffer.

Syntax

KEYBOARD <expC> [CLEAR]

<expC>

A character string, which may include mnemonic strings representing key labels.

CLEAR

Empties the typeahead buffer before inserting <expC>.

Description

Use KEYBOARD to simulate keystrokes by placing or "stuffing" them in the typeahead buffer.

KEYBOARD can place any number of characters in the typeahead buffer, up to the limit specified by SET TYPEAHEAD; subsequent characters are ignored. If SET TYPEAHEAD is 0, you may KEYBOARD one character.

Keystrokes simulated with KEYBOARD are treated like normal keystrokes, going into the control that currently has focus. Some controls support a Keyboard() method that enables you to send keystrokes to that specific control.

In addition to the simple alphanumeric keys on the keyboard, you may also use mnemonic strings to simulate must function keys. For a list of mnemonic strings, see the Keyboard() method.

KEYBOARD example

The following method is a Key event handler for a custom entryfield that executes a SEEK in the current workarea as keys are pressed—an incremental search control.

```
function Key( nChar, nPosition )
  if nextkey() # 0          // If keys pending
    return ( nChar # 255 )  // do nothing, and suppress keystroke if value is
255
  endif
  if nChar == 255           // If keystroke is special value 255
    if not isblank( this.value )
      this.seek()           // call control's seek() method to do actual SEEK
    endif
  else
    if nChar >= 32 and nChar < 255
      keyboard "{255}"      // For alphanumeric keystrokes, stuff special key
255
    endif
  endif
  return nChar
```

Like all Key event handlers, this one receives two parameters: the value of the keystroke, and the current position in the control. This method does not use the position parameter. It does use a specific keystroke, which is chosen so that it does not conflict with typical keys. That keystroke has the INKEY() value 255.

The method first checks if there are keystrokes pending in the keyboard typeahead buffer—which would happen for a fast typist—and if so, no further action is taken, since those pending keystrokes would immediately cause the Key event handler to fire again, and any action at this point would be wasted.

For an alphanumeric keystroke—that is, one that is not a control or function key—the special key is stuffed into the keyboard buffer by the KEYBOARD command. This causes the Key event to be fired again, after the key that was actually typed goes into the entryfield as usual. The Key method detects the special key and perfoms the SEEK, which is coded in a separate seek() method for modularity; that is, the SEEK behavior may be modified without changing the Key method.

The KEYBOARD command is used instead of the Keyboard() method because the Keyboard() method inserts keystrokes directly into the control, causing the Key event to fire immediately from within the Key event handler, which in turn would cause the stuffed keystroke to be handled before the key that was actually typed. The KEYBOARD command uses the general typeahead buffer instead, and the keys would be handled in sequence.

MSGBOX()

Topic group Related topics Example

Opens a dialog box that displays a message and pushbuttons, and returns a numeric value that corresponds to the pushbutton the user chooses.

Syntax

MSGBOX(<message expC>, [<title expC>, [<box type expN>]])

<*message expC***>**

The message to display in the dialog box.

<*title expC***>**

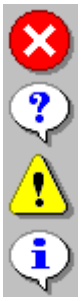
The title to display in the title bar of the dialog box.

<*box type expN***>**

A numeric value that determines which icon (if any) and which pushbuttons to display in the dialog box. To specify a dialog box with pushbuttons and no icon, use the following numbers:

<box type expN>	Pushbuttons
0	OK
1	OK, Cancel
2	Abort, Retry, Ignore
3	Yes, No, Cancel
4	Yes, No
5	Retry, Cancel

To specify a dialog box with pushbuttons and an icon, add any of the following numbers to <box type expN>:

Number to add	Icon displayed
16	
32	
48	
64	

When a dialog box has more than one pushbutton, the left most pushbutton is normally the default, However, if you add 256 to <*box type expN*>, the second pushbutton is the default, and if you add 512 to <*box type expN*>, the third pushbutton is the default.

If you omit <box type expN>, box type 0—one with just the title, message, and an OK button—is used by default.

Note: If you specify <box type expN>, make sure it's a valid combination of the choices outlined above. An invalid number may result in a dialog box that you cannot close.

Description

Use MSGBOX() to prompt the user to make a choice or acknowledge a message by clicking a pushbutton in a modal dialog box.

While the dialog box is open, program execution stops and the user cannot give focus to another window. When the user chooses a pushbutton, the dialog box disappears, program execution resumes, and MSGBOX() returns a numeric value that indicates which pushbutton was chosen.

Pushbutton	Return value

OK	1
Cancel	2
Abort	3
Retry	4
Ignore	5
Yes	6
No	7

MSGBOX() example

The simplest dialog box displays a message only, for example:

```
calculate avg( SALARY ) to nAvgSalary
msgbox( "The average salary is $" + ltrim( str( nAvgSalary, 10, 2 )),
"Results")
```

With only one OK button, you don't care what the return value from MSGBOX() is. You can put an icon in the dialog box to dress it up:

```
msgbox( "The average salary is $" + ltrim( str( nAvgSalary, 10, 2 )),
"Results", 64 )
```

This example shows a dialog asking for confirmation before proceeding:

```
function revertButton_onClick
  if msgbox( "Undo changes to this record?", "Revert", 4) == 6
    form.rowset.abandon()
  endif
```

In addition to adding an icon to the confirmation dialog, in this case you probably want "No", the second pushbutton, to be the default. You can also make your code easier to write and more readable by creating manifest constants for the various return values:

```
#define BUTTON_OK     1
#define BUTTON_CANCEL 2
#define BUTTON_ABORT  3
#define BUTTON_RETRY  4
#define BUTTON_IGNORE 5
#define BUTTON_YES    6
#define BUTTON_NO     7
```

These manifest constants would be defined in a standard include file, and included in the Header of the form. You could then use them in any of the methods of the form. With these three enhancements, the IF statement would look like:

```
  if msgbox( "Undo changes to this record?", "Revert", 4+48+256 ) ==
BUTTON_YES
```

While you could do the math in advance (4 + 48 + 256 = 308), *Visual* dBASE is perfectly capable of doing it at runtime with no noticeable delay. In fact, you could extend this idea by using the preprocessor to create standard MSGBOX() combinations, for example:

```
#define CONFIRM(m,t) (msgbox(m,t,4+32)==BUTTON_YES)
```

This combines the dialog box options and the test to see if the Yes button was clicked. Then in your programs, you would use the CONFIRM() macro like a function that returns a logical value:

```
if CONFIRM( "This record will be lost forever! You sure?", "Delete" )
```

NEXTKEY()

Topic group Related topics Example

Checks for and returns a keystroke held in the keyboard typeahead buffer.

Syntax

NEXTKEY([<expN>])

<expN>

The position of the key or key combination in the typeahead buffer. If <expN> is omitted, NEXTKEY() returns the value of the first keystroke in the buffer. If <expN> is larger than the number of keystrokes in the buffer, NEXTKEY() returns 0.

Description

The keyboard typeahead buffer stores keystrokes the user enters while *Visual* dBASE is busy. A very fast typist may also fill the keyboard typeahead buffer—*Visual* dBASE is busy trying to keep up. These keystrokes are normally handled automatically; for example, characters are typed into entryfields and menu choices are made. Use NEXTKEY() to check if there are any buffered keystrokes, or to look for a keystroke in a specific position in the buffer.

NEXTKEY() returns the decimal value associated with the key or key combination held in the keyboard typeahead buffer at the specified position in the buffer. Unlike INKEY(), NEXTKEY() does not remove the keystroke from the buffer. If the buffer is empty or there is no keystroke at the specified position, NEXTKEY() returns a value of zero.

For a list of keystroke values, see INKEY().

NEXTKEY() example

The following method is a Key event handler for a custom entryfield that executes a SEEK in the current workarea as keys are pressed—an incremental search control. It checks if there are keystrokes pending in the keyboard typeahead buffer—which would happen for a fast typist—and if so, no SEEK is executed, since those pending keystrokes would immediately cause another SEEK.

```
function Key( nChar, nPosition )
  if nextkey() # 0          // If keys pending
    return ( nChar # 255 )  // do nothing, and suppress keystroke if value is
255
  endif
  if nChar == 255           // If keystroke is special value 255
    if not isblank( this.value )
      this.seek()           // call control's seek() method to do actual SEEK
    endif
  else
    if nChar >= 32 and nChar < 255
      keyboard "{255}"      // For alphanumeric keystrokes, stuff special key
255
    endif
  endif
  return nChar
```

Like all Key event handlers, this one receives two parameters: the value of the keystroke, and the current position in the control. This method does not use the position parameter. It does use a specific keystroke, which is chosen so that it does not conflict with typical keys. That keystroke has the INKEY() value 255.

For an alphanumeric keystroke—that is, one that is not a control or function key—the special key is stuffed into the keyboard buffer by the KEYBOARD command. This causes the Key event to be fired again, after the key that was actually typed goes into the entryfield as usual. The Key method detects the special key and perfoms the SEEK, which is coded in a separate seek() method for modularity; that is, the SEEK behavior may be modified without changing the Key method.

ON ESCAPE

Topic group Related topics

Changes the default behavior of the Esc key so that it executes a specified command instead of interrupting command or program execution.

Syntax

ON ESCAPE [<command>]

<command>

The command to execute when the following conditions are in effect:

- SET ESCAPE is ON
- The user presses Esc during command or program execution

The <command> may be any valid *Visual* dBASE command, including a DO command to execute a program file, a function call that executes a program or function loaded in memory, or a codeblock.

ON ESCAPE without a <command> option disables any previous ON ESCAPE <command>.

Description

The primary purpose of the Esc key is to interrupt command or program execution. This behavior may be changed with ON ESCAPE; either way it occurs only when SET ESCAPE is ON (its default setting).

When no ON ESCAPE <command> is in effect, pressing Esc interrupts program execution and displays the *Visual* dBASE Program Interrupted dialog box. If ON ESCAPE <command> is in effect, pressing Esc during program execution executes the specified command instead and then continues program execution.

While executing a command (like CALCULATE) from the Command window, pressing Esc with ON ESCAPE <command> in effect executes <command> and then terminates the command, returning control to the Command window. If no ON ESCAPE <command> is in effect, pressing Esc during a command from the Command window simply terminates that command and displays a message in the status bar.

Note that user interface elements such as menus, forms, and dialog boxes handle Esc differently, usually closing or dismissing that UI element. (For forms, this behavior is controlled by its escExit property.) In those cases, ON ESCAPE and SET ESCAPE have no effect. In fact, with the exception of dialog boxes and forms opened with ReadModal(), because of the event-driven nature of *Visual* dBASE there is no program executing when you use a menu or type into a form, so there is nothing to interrupt.

Use ON KEY to specify a new meaning or mapping for Esc or any other key. If both ON KEY and ON ESCAPE are in effect, ON KEY takes precedence when Esc is pressed. In other words, while ON ESCAPE changes the Escape behavior, ON KEY changes the meaning of the Esc key, so that pressing it no longer causes that Escape behavior. While the Escape behavior affects only programs or commands that are executing, ON KEY works at all times.

If you issue ON ESCAPE<command> in a program, you should disable the current ON ESCAPE condition by issuing ON ESCAPE without a <command> option before the program ends. Otherwise, the ON ESCAPE condition remains in effect for any subsequent commands and programs you issue and run until you exit *Visual* dBASE.

ON KEY

Topic group Related topics

Changes the keyboard mapping to execute a command when a specified key or key combination is pressed.

Syntax

ON KEY [LABEL <key label>] [<command>]

LABEL <key label>

Identifies the key or key combination that, when pressed, causes <command> to execute. Without LABEL <key label>, *Visual* dBASE executes <command> when you press any key. ON KEY LABEL is not case-sensitive.

<command>

The command that is executed when you press the key or key combination. If you omit <command>, the command previously assigned by ON KEY is disabled.

Description

Each key on the keyboard has a default meaning or mapping. For alphanumeric keys, that mapping simply types that character. Function keys have predefined actions. The Esc key terminates program execution. Use ON KEY to specify a command that executes when the user presses a key or key combination, overriding the default mapping.

Actions defined by ON KEY will interrupt programs, but not commands; in a program, the ON KEY action will occur after the current command has completed and then the program will continue. ON KEY also doesn't affect the execution of some commands or functions that are specifically looking for keystrokes, such WAIT or INKEY(). On the other hand, if you KEYBOARD a key that has been remapped, the remapped behavior will occur.

When you issue both ON KEY LABEL <key label> <command> and ON KEY <command>, the key or key combination you specify with ON KEY LABEL <key label> <command> takes precedence and executes its associated <command>. This way you can define actions for specific keys, and a default global action for all other keys. There may be only one ON KEY specification for each specific key and one global action defined at a given time.

ON KEY without arguments removes the effect of all previously-entered ON KEY <command> commands, with or without a LABEL.

To change the default Escape behavior, which interrupts the currently executing program or command, use ON ESCAPE. If both ON KEY and ON ESCAPE are in effect, ON KEY takes precedence when Esc is pressed. In other words, while ON ESCAPE changes the Escape behavior, ON KEY changes the meaning of the Esc key, so that pressing it no longer causes that Escape behavior. While the Escape behavior affects only programs or commands that are executing, ON KEY works at all times.

To assign strings to function keys, use SET FUNCTION. If both ON KEY on SET FUNCTION are in effect, ON KEY takes precedence.

ON KEY LABEL

The <key label> for the standard alphanumeric keys is simply the character on that key, for example, A, b, 2, or @. Use the following key label names to assign special keys or key combinations with ON KEY LABEL <key label>.

Key identification	<key label>
Backspace	Backspace
Back Tab	Backtab
Delete	Del
End	End
Home	Home
Insert	Ins

Page Up	PgUp
Page Down	PgDn
Tab	Tab
Left arrow	Leftarrow
Right arrow	Rightarrow
Up arrow	Uparrow
Down arrow	Downarrow
F1 to F10	F1, F2, F3, ...
Control+<key>	Ctrl-<key> or Ctrl+<key>
Shift+<key>	Shift-<key> or Shift+<key>
Alt+<key>	Alt-<key> or Alt+<key>
Enter	Enter
Escape	Esc
Space bar	Spacebar

onInitiate

Topic group

Event fired when a DDE client attempts to access *Visual* dBASE as a DDE server.

Property of

_app object

Description

OnInitiate executes an initiation-handler subroutine. You write this routine to create DDETopic objects, which handle DDE server events. OnInitiate executes the subroutine whenever a client application requests a DDE link with the *Visual* dBASE session. For more information, see CLASS DDETopic.

Use the *DdeServiceName* property to let a client application establish a DDE link to a particular *Visual* dBASE session when multiple *Visual* dBASE sessions exist.

The value you specify with DdeServiceName is the name of a *Visual* dBASE application object. Any active *Visual* dBASE session is an application object; when you start a *Visual* dBASE session, you are actually creating an instance of a *Visual* dBASE application object.

For example, when you start two *Visual* dBASE sessions, you create two *Visual* dBASE application objects. Setting the DdeServiceName property of one application object to "NEWSERV" (or some other unique name) lets an external application like Quattro Pro distinguish between the two sessions. You use the _app system memory variable to reference and set the DdeServiceName property of one of the sessions:

```
_app.DdeServiceName = "NEWSERV"
```

To create a DDE link to the NEWSERV session, Quattro Pro could execute the following {INITIATE} request:

```
{INITIATE  "NEWSERV", "MyTopic", CHANNEL}
```

To create a DDE link to the other session (whose DdeServiceName property still contains the default value "VDB"), Quattro Pro could execute the following {INITIATE} request:

```
{INITIATE  "VDB", "MyTopic", CHANNEL}
```

onInitMenu

Topic group Related topics

Specifies code that executes when a menubar or popup is opened.

Property of

MENUBAR, POPUP

Description

OnInitMenu is called whenever a menubar or popup is invoked, and is processed before the menubar's child menus or the popup is displayed.

You can use onInitMenu to determine the status of menu items that will be displayed. For example, use onInitMenu to determine if the enabled or checked property of a menu item should be true or false.

onUpdate

Topic group

Fires repeatedly while application is idle to refresh toolbuttons.

Property of

TOOLBAR

Description

This event maintains the status of toolbuttons on a toolbar by firing whenever the application hosting the toolbar is idle.

separator

Topic group

Determines if a menu item is a separator line instead of a menu option.

Property of

MENU

Description

Set Separator to True when you want to use a menu item as a separator between groups of menu commands. When Separator is true, other properties such Text and onClick are ignored.

SET CONFIRM

Topic group

Controls the cursor's movement from one entry field to the next during data entry.

Syntax

SET CONFIRM ON | off

Description

When SET CONFIRM is OFF, *Visual* dBASE moves the cursor immediately to the next input area when the current one is full. When SET CONFIRM is ON, the cursor moves to the next input area only when you press Enter or a cursor-control key, or when you click another input area with the mouse.

Use SET CONFIRM ON to prevent moving the cursor from one input area to the next automatically, thus avoiding data-entry errors such as the overflow of contents from one input area into the next. Use SET CONFIRM OFF when input speed is more important.

SET CUAENTER

Topic group Related topics

Determines whether Enter simulates Tab in a form.

Syntax

SET CUAENTER ON | off

Default

The default for SET CUAENTER is ON. To change the default, update the CUAENTER setting in VDB.INI. To do so, either use the SET command to specify the setting interactively, or enter the CUAENTER parameter directly in VDB.INI.

Description

The CUA (Common User Access) interface standard dictates that the Tab key moves focus from one control to another, while the Enter key submits the entire form (which fires the form's onSelection event). Use SET CUAENTER to control whether Enter follows the CUA standard. If SET CUAENTER is OFF, the Enter key emulates the Tab key, moving the focus to the next control.

There are two good reasons to ignore the CUA behavior:

- In many forms, especially ones that take advantage of the numeric keypad, using the Enter key to move to the next control speeds data entry.
- For non-trivial forms, there are usually a number of pushbuttons which take completely different actions; for example, adding a new record, deleting the current record, navigating forward, navigating backward, etc. If you press Enter while the focus is in an entryfield for example, the act of submitting the form tells you nothing about what the user wants to do next.

In fact, few applications consider the action of submitting the form; the onSelection event is rarely used. When the *onSelection* event is left undefined, nothing happens when you press Enter (except in a control like the Editor). So you might as well make the Enter key do something useful and have it move the focus to the next control.

Regardless of the setting of SET CUAENTER, you can move focus from object to object with the mouse or by pressing Tab and Shift-Tab.

SET ESCAPE

Topic group

Specifies whether pressing Esc interrupts program execution.

Syntax

SET ESCAPE ON | off

Default

The default for SET ESCAPE is ON. To change the default, set the ESCAPE parameter in VDB.INI.

Description

The primary purpose of the Esc key is to interrupt command or program execution. While this behavior may be changed with ON ESCAPE, this behavior occurs only when SET ESCAPE is ON.

Typically, SET ESCAPE is ON during application development. This allows you to stop processes which are taking too long or have run amok. When an application is deployed, you should either:

- SET ESCAPE OFF so that the user cannot cause your application to terminate abnormally, or
- Define a specific ON ESCAPE behavior so that your application or process can shutdown or be cancelled gracefully, usually after confirming that the user really wants to do so.

Note: If SET ESCAPE is OFF and you have not used ON KEY or some other method to interrupt your program, you can interrupt program execution only by forcing the termination of *Visual* dBASE or your *Visual* dBASE application. Forced termination can cause data loss.

Note that user interface elements such as menus, forms, and dialog boxes handle Esc differently, usually closing or dismissing that UI element. (For forms, this behavior is controlled by its escExit property.) In those cases, ON ESCAPE and SET ESCAPE have no effect. In fact, with the exception of dialog boxes and forms opened with ReadModal(), because of the event-driven nature of *Visual* dBASE there is no program executing when you use a menu or type into a form, so there is nothing to interrupt.

SET FUNCTION

Topic group Related topics Example

Assigns a string to a function key or to a combination of the Ctrl (control) key or the Shift key and a function key.

Syntax

SET FUNCTION <key> TO <expC>

<key>

A function key number, function key name, or character expression of a function key name—for example, 3, F3, or "F3". Specify a character expression for <key> to assign a key combination using the Ctrl or Shift key with a function key. Type "CTRL+" or "SHIFT+" and then a function key name—for example, "shift+F5" or "Ctrl+f3". The function key names are not case-sensitive and you may use a hyphen in place of the plus sign. You can't combine Ctrl and Shift, such as "Ctrl+Shift+F3".

<expC>

Any character string, often the text of a command. Use a semicolon (;) to represent the Enter key. Placing a semicolon at the end of a command has the effect of executing that command when you press the function key in the Command window. You can execute more than one command by separating each command in the list with a semicolon.

Default

The following function key settings are in effect when *Visual* dBASE starts:

Key	Command	Key	Command
F1	HELP;	F7	DISPLAY MEMORY;
F3	LIST;	F8	DISPLAY;
F4	DIR;	F9	APPEND;
F5	DISPLAY STRUCTURE;	F10	Activates the menu
F6	DISPLAY STATUS;		

Description

Use SET FUNCTION to simulate typing a string with a single keystroke. These strings are usually commands to be executed in the Command window, or common strings used in data entry.

Note: F2 is reserved for toggling between views while in the Browse window. You can program it, but it will not be recognized when in the Browse window. You cannot program F10, or any combination using F11 or F12. You cannot program Shift-F4 or Shift-F5, which are shortcuts for the Window/Tile Vertically and Window/Cascade commands, respectively. You also cannot program keys that are used as standard Windows functions, such as Ctrl-F4.

When you press the programmed function key or key combination, the assigned string appears at the cursor. Strings for the Command window usually end in a semicolon, which represents the Enter key. The simulated Enter key causes the command to be executed immediately.

While SET FUNCTION is specifically intended to simulate typing a string, you can use the ON KEY command to program a function key or any other key to execute any command. For example, these two commands (executed separately, not consecutively):

```
set function f7 to "display memory;"
on key label f7 display memory
```

would both cause the F7 key to execute the DISPLAY MEMORY command if the key was pressed on a blank line in the Command window. But suppose the line in the Command window contained the word "field" and the cursor was at the beginning of that line. Then with SET FUNCTION F7, pressing the function key would cause the string "display memory" to be typed into the line, resulting in "display memoryfield", and then the Enter key would be simulated, causing *Visual* dBASE to attempt to display a field named "memoryfield" in the current workarea. With ON KEY LABEL F7, the DISPLAY MEMORY command would be executed with nothing being typed into the Command window.

If the cursor was in an entryfield for a city in a form, then with SET FUNCTION F7, you would get the city of "display memory" and the cursor would move to the next control if SET CUAENTER was OFF. Again, with ON KEY LABEL F7, the DISPLAY MEMORY command would be executed without affecting the data entry.

To see the list of strings currently assigned to function keys, use DISPLAY STATUS.

SET FUNCTION example

The following example changes the F8 key to the string "modify command ". Without the semicolon at the end, you type the name of the file you want to edit and press Enter:

```
set function f8 to "modify command "
```

SET MESSAGE

Topic group

Specifies the default message to display in the status bar.

Syntax

SET MESSAGE TO [<message expC>]

<message expC>

The message to display

Description

Use SET MESSAGE to set the default message that appears the status bar. Menu items and controls on forms have a statusMessage property. When that object has focus, and that property is not empty, that message is displayed instead.

SET MESSAGE TO without the option <message expC> sets the default message to an empty string, and removes any message from the status bar.

The status bar may be suppressed by setting the _app.statusBar property to *false*.

SET TYPEAHEAD

Topic group Related topics

Sets the size of the typeahead buffer, where keystrokes are stored while *Visual* dBASE is busy.

Syntax

SET TYPEAHEAD TO <expN>

<expN>

the size of the keyboard typeahead buffer, any number from 0 to 1600.

Default

The default size of the typeahead buffer is 50 characters. To change the default, set the TYPEAHEAD parameter in VDB.INI.

Description

The keyboard typeahead buffer stores keystrokes the user enters while *Visual* dBASE is busy, for example while reindexing a table. When the processing is complete and the application is ready to accept keystrokes, *Visual* dBASE fetches and deletes the values in the buffer in the order they were entered. Any keys typed while there are still keystrokes in the buffer are added to the end of the buffer.

If the size of the typeahead buffer is set to 50, dBASE can store values for 50 keypresses; further keystrokes are ignored without any warnings. A large typeahead buffer is useful if the user does not want to stop typing when dBASE is unavailable for processing direct keyboard input.

For some programs, you may want to disable the typeahead buffer with SET TYPEAHEAD TO 0. This ensures that user input comes directly from the keyboard, rather than from the typeahead buffer.

For example, if you want to be able to fill in multiple forms quickly, one after the other, you might SET TYPEAHEAD to a relatively high number during form processing. This would let you continue typing data while one form was being saved and the next (blank) one being displayed. The data you entered during processing would be entered onto the new form when it appeared. On the other hand, if you want to make sure that no data is entered until the form is displayed on the screen, you can issue SET TYPEAHEAD TO 0.

You can also clear the typeahead buffer manually with CLEAR TYPEAHEAD.

SET TYPEAHEAD limits the number of characters you can put into the typeahead buffer using KEYBOARD.

SHELL()

Topic group Related topics

Hides or restores the components of the application shell: the Command window (and Navigator) and the MDI frame window. Returns a logical value corresponding to the previous SHELL() state.

Syntax

SHELL([<expL*1*>, [<expL*2*>]])

<expL*1*>

The value that determines whether to display the shell.

<*expL2***>**

The value that determines whether to force the display of the MDI frame window. If <*expL1*> is true, the full shell is on and <expL2> is ignored. If <*expL1*> is false, <expL2> defaults to false.

Description

SHELL() controls the display of the components of the application shell:

- The Command window
- The Navigator
- The MDI frame window, which contains the Command window, Navigator, and all MDI forms and their toolbars and menus. This window is represented by the _app.frameWin object.

In *Visual* dBASE, SHELL() defaults to true; all three components are displayed. In a compiled application, SHELL() defaults to false; none of the elements are displayed, unless either:

- An MDI form is open, in which case the MDI frame window must be displayed to contain the MDI form(s), or
- A menu has been assigned to _app.frameWin.

In either case, the MDI frame window stays visible regardless of the <expL2> value.

shortCut

Topic group Related topics

Specifies a key combination that fires the OnClick event of a menu object.

Property of

MENU

Description

Use ShortCut to provide a quick way to execute a menu command with the keyboard. For example, if you assign the character string "CTRL+S" to a menu option's ShortCut property, the user can execute that menu option by pressing Ctrl+S.

The value you specify with ShortCut is displayed next to the prompt you specify with the Text property.

SLEEP

Topic group Related topics Example

Pauses a program for a specified interval or until a specified time.

Syntax

SLEEP
  <seconds expN> |
  UNTIL <time expC> [,<date expC>]

<seconds expN>

The number of seconds to pause the program. The number must be greater than zero and no more than 65,000 (a little over 18 hours). Fractional times are allowed. Counting starts from the time you issue the SLEEP command.

UNTIL <time expC>

Causes program execution to pause until a specified time (<time expC>) on the current day. If you also specify <date expC>, the program pauses until the time on that day. The time and date *Visual* dBASE uses are the system time and date. You can set the system time with SET TIME and the system date with SET DATE TO. If the time has already passed, SLEEP UNTIL <time expC> has no effect.

The <time expC> argument is a 24-hour time that matches the format returned by the TIME() function. A typical format for <time expC> is "HH:MM:SS". The delimiter is conventionally a colon but can be changed through the Regional Settings in the Windows Control Panel. The time string must include the seconds.

<date expC>

An optional date until which the program is to pause. The <date expC> argument is a character expression (not a date expression) that represents a date in the current date format; it would match the string returned by the DTOC() function. For example, if SET DATE is AMERICAN, the format would be "MM/DD/YY".

If the date has already passed, SLEEP UNTIL <time expC> [,<date expC>] has no effect. If you want to specify a value for <date expC>, you must also specify a value for <time expC>.

Description

Use SLEEP to pause a program either for <seconds expN> seconds or until a specified time (<time expC>). The specified time is the same day the program is running unless you specify a date with <date expC>. If SET ESCAPE is ON, you can interrupt SLEEP by pressing Esc.

Note: If SET ESCAPE is OFF, there is no way to interrupt SLEEP. However, you can use Ctrl+Esc and Alt+Tab to switch to another Windows application, or Alt+F4 to exit *Visual* dBASE.

Although SLEEP can generate a pause from the Command window, programmers use it primarily within programs. For example, you can use SLEEP to generate a pause between multiple displaying windows or to allow a user to read a message on the screen or complete an action. Pauses are also useful when you need to delay program execution until a specific time.

While SLEEP is active, *Visual* dBASE is considered busy; that is, busy sleeping. Program execution is suspended, keystrokes go into the typeahead buffer, and *Visual* dBASE does not respond to events like mouse clicks or timers. If you want an event to occur at a specified time without putting *Visual* dBASE to sleep, use a Timer object.

SLEEP is an alternative to using a DO WHILE loop, a FOR loop, or WAIT to generate pauses in a program. SLEEP is more accurate than using loops because it's independent of the execution speed of the system. You can also use INKEY(<expN>) if you want the user to be able to interrupt the pause and continue with program processing.

SLEEP example

The following example uses SLEEP to delay execution for five seconds:

```
sleep 5
```

The next example uses SLEEP to delay execution until 7:30 p.m. on the same day the program is running. If it's already past 7:30 p.m., execution is delayed until that time the next day:

```
#define SLEEP_TIME "19:30:00"
if time() > SLEEP_TIME
  sleep until SLEEP_TIME, dtoc( date() + 1 )
else
  sleep until SLEEP_TIME
endif
```

The last example uses SLEEP to delay execution until 11:59:59 p.m. on December 31, 1999 (SET DATE is AMERICAN):

```
sleep until "23:59:59", "12/31/99"
```

trackRight

Topic group Related topics

Determines if the user can select a popup menu item with a right mouse click.

Property of

POPUP

Description

When TrackRight is true (the default), users can select popup menu items with either the right mouse button or the left mouse button.

Set TrackRight to false if you don't want users to be able to select items from a popup menu with a right mouse click.

WAIT

Topic group Related topics

Pauses the current program, displays a message in the results pane of the Command window, and resumes execution when any key is pressed. The keystroke may be stored in a variable.

Syntax

WAIT [<prompt expC>] [TO <memvar>]

<prompt expC>

A character expression that prompts the user for input. If you don't specify <prompt expC>, *Visual* dBASE displays "Press any key to continue..." when you issue WAIT.

TO <memvar>

Assigns a single character to the memory variable you specify for <memvar> as a character-type variable. If <memvar> doesn't exist, *Visual* dBASE creates it. If <memvar> does exist, WAIT overwrites it.

Description

Use WAIT to halt program execution temporarily. Pressing any key exits WAIT and resumes program execution. WAIT is usually used during application development to display information and create simple breakpoints. It is usually not used in deployed applications.

In simple test applications, you can also WAIT to get a single key or character. If the user presses Enter without typing any characters, WAIT assigns an empty string ("") to <memvar>.

Note: If SET ESCAPE is ON, pressing Esc at the WAIT prompt causes *Visual* dBASE to interrupt program execution. If SET ESCAPE is OFF, pressing Esc in response to WAIT causes program execution to resume the same as any other key.

windowMenu

Topic group Related topics

Specifies a menu object that displays a list of all open MDI windows.

Property of

MENUBAR

Description

WindowMenu contains a reference to a menu object that has a menubar as its parent. When users open this menu object, dBASE displays a pulldown list of all open MDI windows.

WindowMenu automatically places a separator line on the pulldown list between any menu prompts and the list of open windows. The currently active window shows a check next to the window name.

If you use the Menu Designer to create a menubar, WindowMenu is automatically set to an item named Window on the menubar:

```
this.WindowMenu = this.Window
```

Report objects

Topic group

Report objects generate formatted output from data in tables. The Report wizard and Report designer allow you to create and modify reports visually. Reports are saved as code in a .REP file that you can modify.

Measurements in reports default to twips (20th of a point). There are exactly 1440 twips per inch.

At the top of the report object class hierarchy is the Report class. A Report object acts as a container for four main groups of objects:

- Data access objects, which give access to data in tables
- Query objects
- Database objects
- Session objects

  These objects are created and used the same way they are in forms, except that a report does not have a primary rowset like a form does.

- Report layout objects, which determine the appearance of the page and where data is output, or streamed
- PageTemplate objects
- StreamFrame objects

  A Report object contains one or more PageTemplates, and each PageTemplate usually contains one or more StreamFrames.

- Data stream objects, which read and organize the data from a query's rowset and stream it out to a report's StreamFrame objects
- StreamSource objects
- Band objects
- Group objects

  Each StreamSource object contains a Band object that is assigned to its *detailBand* property. The contents of the *detailBand* are rendered for each row in the rowset. A StreamSource may also have one or more Group objects, which group data and have their own header and footer Band objects.

- Visual components—objects that display the report's data
- Text objects
- Image objects
- Line objects
- Rectangle objects
- Shape objects
- CheckBox objects
- RadioButton objects

  These objects are created as properties of a PageTemplate object if they are fixed elements on the page, such as a report's date and page number; otherwise they are properties of a Band object and are used to display data.

The primary method of displaying information in a report is through Text objects. For text that varies, such as the data from the rowset, the *text* property of the Text object is set to an expression codeblock, which is evaluated every time the object is rendered. By using an expression in the codeblock that accesses the fields in the rowset, the Text object displays data from tables.

You may use the other visual components in a report to display static images or images from a table, draw lines, or display table data with check boxes or radio buttons.

Note: Visual component objects are used in forms as well as reports, and most of the properties, methods, and events associated with the objects are described in the Form objects series of topics. Some Text object properties used only in reports are described in this series.

A simple report example

Topic group Related topics

To get a sense of how everything fits together, imagine a report of students grouped by grade, with the total number of students in each grade.

The report has a query that accesses the table of students, named students1; a StreamSource object, by default named streamSource1, to stream the data from the query; and a PageTemplate object, by default named pageTemplate1, that describes the physical attributes of the page, such as its dimensions, background color, and margins.

pageTemplate1 contains one StreamFrame object, by default named streamFrame1, where the data stream will be rendered. It occupies most of the space inside pageTemplate1's margins. The rest of the space is used by Text components that display the report title, date, and page.

streamFrame1 has a *streamSource* property that identifies its StreamSource object. It is assigned streamSource1.

streamSource1 has a *rowset* property that identifies the StreamSource object's rowset. It is assigned students1.*rowset*.

students1.*rowset* and streamFrame1 are now linked. To fill streamFrame1 with data, the report engine will traverse students1.*rowset*, from the first row to the last row. But at this point, no data will be displayed, because there are no visual components in any Band objects.

Text components are assigned to streamSource1.*detailBand*. The *text* properties of these components are expression codeblocks that refer to the *value* properties of the fields of the *rowset* of the StreamSource object. For example, the *text* of the Text component that displays the student's last name is

```
{||this.form.students1.rowset.field[ "Last name" ].value}
```

When a visual component is placed in a report, its *form* property refers to the report.

To group the data, a Group object, named group1 by default, is assigned to streamSource1. Its *groupBy* property contains the name of the group field, "Grade". The report engine will watch the value of this field in the rowset, that is:

```
students1.rowset.field[ "Grade" ].value
```

and whenever the value of the field changes, a new group begins. Therefore, it's important that the data is sorted by grade. If the report's *autoSort* property is *true*, all of the report's queries will automatically be sorted to match the groups in the StreamSource objects.

group1 has two Band objects of its own: a header band and a footer band, assigned to the *headerBand* and *footerBand* properties respectively. The *headerBand* is currently empty, and the *footerBand* displays the count of the students in that grade.

The Group object's *agCount*() method counts the number of rows in the group. To display that number, the *text* of the Text component in the *footerBand* is set to the following expression codeblock:

```
{||"Count: " + this.parent.parent.agCount({||
this.parent.rowset.fields["ID"].value})}
```

The expression codeblock concatenates the text label with the return value of the Group object's *agCount*() method. To get to that method from a component in the *footerBand*,

- *this* is the component.
- The component's *parent* is the *footerBand*.
- The *footerBand*'s *parent* is the Group.

The *agCount*() method expects a code reference as a parameter that it can evaluate. If the return value is not *null*, the count is incremented. The code reference here is another expression codeblock that uses dot operators:

- *this* is the Group object group1.
- group1's *parent* is streamSource1.
- streamSource1's *rowset* is students1.*rowset*, the rowset that the report engine is traversing to fill

streamFrame1.

That's all the objects that go into a report of students, grouped by grade, with the number of students in each grade. There are two final details that are needed to make the report work.

Because a report can have multiple PageTemplate objects, a Report object has a *firstPageTemplate* property that refers to the PageTemplate object to use for the first page. It is assigned pageTemplate1.

Each PageTemplate object has a *nextPageTemplate* property that refers to the PageTemplate object to use when the current page is done. For pageTemplate1, it is assigned a reference to itself. This means that the same page layout is used for every page in the report.

Everything described in this sample report can be handled automatically by the Report Wizard. To run the report, call the Report object's *render*() method.

How a report is rendered

Topic group Related topics

When a Report object's *render*() method is called, the first thing the report does is check its *firstPageTemplate* property to find the first page to render. It renders the page by rendering all the components and StreamFrame objects assigned to it, in the order they were originally created (the same order as they appear in the class definition in the .REP file).

To render a StreamFrame object, *Visual* dBASE looks to its *streamSource* property. The Band objects in that StreamSource object—the *detailBand* and the *headerBand* and *footerBand* of any groups—are rendered in the StreamFrame object to fill it with data.

Before each component in the band is rendered, its *canRender* event fires.
The *canRender* event can be used to supplement the *supressIfBlank* and *supressIfDuplicate* properties of the Text component by returning *false*, but it is more often used to alter the properties of a component just before it is rendered. For example, you can set a component's *colorNormal* to red if it's going to display a negative number. When used this way, the *canRender* event handler does what it wants and returns *true*, so that component is rendered. After the component is rendered, its *onRender* event fires. You can use the *onRender* event to reset the component to its original state.

Until the data from the StreamSource object is exhausted—that is unless the StreamSource object's *rowset* reaches the end-of-set—*Visual* dBASE knows that it needs to fill another StreamFrame. If there is another StreamFrame object in the same PageTemplate that used the same *streamSource*, the report engine will continue to stream bands from that StreamSource into that StreamFrame.

For example, if a PageTemplate has three tall StreamFrame objects side-by-side that have the same *streamSource* property, data would be printed in three columns on each page. To create a page of labels, create one StreamFrame for each label, all with the same *streamSource* property. Then set the *beginNewFrame* property of the *streamSource*'s *detailBand* to *true*, so that each row of data is rendered in a new StreamFrame.

If there are no more StreamFrame objects that can be filled on the current page, another page is scheduled. The current PageTemplate object's *nextPageTemplate* property refers to the PageTemplate to use.

Once the current page has finished rendering, the Report object's *onPage* event fires. If there is another page scheduled, it is rendered. Its StreamFrame objects are filled with data and the process repeats itself until all the StreamSource objects are exhausted. The *onPage* event fires one last time and the report is done.

class Band

Topic group Related topics

Contains the objects to output for a single row in a stream, or the header or footer of a group.

Syntax

These objects are automatically created by the StreamSource and Group objects.

Properties

The following table lists the properties of the Band class. (No events or methods are associated with this class.)

Property	Default	Description
beginNewFrame	false	Whether rendering always starts in a new StreamFrame
className	BAND	Identifies the object as an instance of the Band class
context	Normal	The context in which the band is being rendered: (0=Normal) or for (1=For Drilldown summary)
expandable	true	Whether the band will increase in size automatically to accommodate the objects within it
firstOnFrame		Whether the band is being rendered for the first time in a StreamFrame.
height	0	The height of the band in the Report object's current metric units
name		The name of the Band object
parent		The StreamSource or Group object that contains the Band
visible		Whether the band is visible

Description

A Band object acts as a container for visual components. They are created automatically for StreamSource and Group objects and cannot be created manually. There are three kinds of Band objects: detail bands, header bands, and footer bands.

A detail band is assigned to a StreamSource's *detailBand* property. The contents of the band are output once for each row in the StreamSource's rowset. Header and footer bands are assigned to a Group object's *headerBand* and *footerBand* properties respectively. They are rendered at the beginning and end of each group.

For a detail band, setting its *beginNewFrame* property to *true* causes each row from the StreamSource's rowset to be rendered in a new StreamFrame, which is the desired behavior when creating labels.

For a summary-only report, leave the detail band empty and set its *height* to zero.

When a band's *expandable* property is *true* and it contains components, the band will expand to show those components, even if its *height* is set to zero.

class Group

Topic group Related topics

Describes a group in a report.

Syntax

[<oRef> =] new Group(<streamSource>)

<oRef>

A variable or property—typically of <streamSource>—in which you want to store a reference to the newly created Group object.

<streamSource>

The StreamSource object to which the Group object binds itself.

Properties

The following tables list the properties and methods of the Group class. (No events are associated with this class.)

Property	Default	Description
className	GROUP	Identifies the object as an instance of the Group class.
drillDown	None	How the group's bands are displayed in drilldown format.
footerBand		Specifies a Band that renders after a group of detail bands.
groupBy		A character string containing the field name by which groups are formed. If blank, the group is for the entire report.
headerBand		Specifies a Band that renders before a group of detail bands.
headerEveryFrame	false	Specifies whether to repeat the *headerBand* when a Group spans more than one StreamFrame.
name		The name of the Group object.
parent		The Report or StreamSource object that contains the Group.

Method	Parameters	Description
agAverage()	<codeblock>	Aggregate method that returns the mean average for a group
agCount()	<codeblock>	Aggregate method that returns the number of items in a group
agMax()	<codeblock>	Aggregate method that returns the highest value within a group
agMin()	<codeblock>	Aggregate method that returns the lowest value in a group
agStandardDeviation()	<codeblock>	Aggregate method that returns the standard deviation of the values in a group
agSum()	<codeblock>	Aggregate method that returns the total of a group
agVariance()	<codeblock>	Aggregate method that returns the variance of the values in a group
release()		Explicitly releases the Group object from memory

Description

Use Group objects to group data and calculate aggregate values for the group. Groups may be nested, and are handled in the order that they are created (the same order that they appear in the class definition in a .REP file).

The *groupBy* property contains the name of the field that defines the group, and may include an optional ascending or descending modifier. Whenever the value of that field changes, a new group starts. Therefore, the data must be sorted on the grouping field(s).

A Group object's *headerBand* is rendered before each group and its *footerBand* is rendered afterward. If the *headerEveryFrame* property is *true*, the group's *headerBand* is rendered at the beginning of every StreamFrame.

If the Report object's *autoSort* property is true, data in a report is automatically sorted to match groups.

The Report object has its own Group object that is referred to by its *reportGroup* property. Its *groupBy* property is an empty sting, and the group is used for report-wide aggregates.

You may organize the report in drilldown format: the header and footer bands showing summary information are displayed first, followed by the detail rows. This allows you to see summary information at the top, and then "drill down" to the supporting data.

class PageTemplate

Topic group Related topics

Describes the layout of a page of a report.

Syntax

[<oRef> =] new PageTemplate(<report>)

<oRef>

A variable or property—typically of <report>—in which you want to store a reference to the newly created PageTemplate object.

<report>

The Report object to which the PageTemplate object binds itself.

Properties

The following tables list the properties and methods of the PageTemplate class. (No events are associated with this class.)

Property	Default	Description
background		Background image on the page
className	PAGETEMPLATE	Identifies the object as an instance of the PageTemplate class
colorNormal	white	Background color for the page
gridLineWidth	0	Width of lines around elements in the report (0=no grid lines)
height		Height of the page in current metric units
marginBottom	.75 inch = 1080 twips	The space between the bottom of the page and the usable area of the PageTemplate
marginLeft	.75 inch = 1080 twips	The space between the left side of the page and the usable area of the PageTemplate
marginRight	.75 inch = 1080 twips	The space between the right side of the page and the usable area of the PageTemplate
marginTop	.75 inch = 1080 twips	The space between the top of the page and the usable area of the PageTemplate
name		The name of the PageTemplate object
nextPageTemplate		The PageTemplate object that is used for the following page
parent		The Report object that contains the PageTemplate
width		Width of the page in current metric units

Method	Parameters	Description
release()		Explicitly releases the PageTemplate object from memory

Description

A PageTemplate object describes the layout of a page, including its background color or image. It acts as a container for StreamFrame objects and visual components, which represent fixed output, such as a report date and page number.

The location of these objects is relative to (and restricted by) the four margin- properties that dictate the usable area of the page. Changing the *marginLeft* or *marginTop* will move everything that's inside the PageTemplate.

Although you may create multiple PageTemplate objects in a report, for example a different first page or alternating odd and even pages, the Report Designer currently does not support multiple PageTemplate objects visually.

class Report

Topic group Related topics

A container and controller of report elements.

Syntax

[<oRef> =] new Report()

<oRef>

A variable or property in which you want to store a reference to the newly created Report object.

Properties

The following tables list the properties, events, and methods of the Report class.

Property	Default	Description
autoSort	true	Whether to automatically sort data to match specified groups
className	REPORT	Identifies the object as an instance of the Report class
endPage	-1	Last page number to render (-1 for no limit)
elements		An array containing object references to thevisual components on the reports
firstPageTemplate		Reference to the first PageTemplate object, which describes the first page
inDesign		Whether the report was instantiated by the Report designer
mdi		Whether the report window is an MDI window
metric	Twips	Units of measurement (0=Chars, 1=Twips, 2=Points, 3=Inches, 4=Centimeters, 5=Millimeters, 6=Pixels)
output	Default	Target media (0=Window, 1=Printer, 2=Printer file, 3=Default, 4=HTML, 5=HTML file)
outputFilename		Name of file if output goes to printer or HTML file
printer		An object describing various printer output options
reportGroup		Reference to a Group object for the report as a whole, for master counts and totals
reportPage		Current page number being rendered
reportViewer	null	Reference to the ReportViewer object that instantiated the report, if any.
scaleFontBold	false	When the *metric* is Chars, determines whether the Char units of the ScaleFont assume that the font is bold
scaleFontName	Arial	When the *metric* is Chars, the typeface of the font used as the basis of measurement
scaleFontSize	10	When the *metric* is Chars, the point size of font used as the basis of measurement
startPage	1	First page number to output
title		Title of the report; appears in the title bar of the preview window

Event	Parameters	Description
onDesignOpen		After the report is first loaded into the Report Designer
onPage		After a page is rendered

Method	Parameters	Description
close()		Closes the report window
isLastPage()		Determines whether there are any more pages to render

release()	Explicitly releases the Report object from memory
render()	Generates the report

Description

A Report object acts as the controlling container for all the objects that make up the report, including data access, page layout, and data stream objects.

The *reportGroup* property refers to a report-level Group object that can be used for report-wide summaries. This Group object is created automatically.

To generate the report, call its *render*() method.

You can control the pages that are output by setting the *startPage* and *endPage* properties.

class StreamFrame

Topic group Related topics

Describes an area on a page into which output is streamed.

Syntax

[<oRef> =] new StreamFrame(<pageTemplate>)

<oRef>

A variable or property—typically of <pageTemplate>—in which you want to store a reference to the newly created StreamFrame object.

<pageTemplate>

The PageTemplate object to which the StreamFrame object binds itself.

Properties

The following table lists the properties of the StreamFrame class. (No events or methods are associated with this class.)

Property	Default	Description
borderStyle	Default	The border around the StreamFrame object (0=Default, 1=Raised, 2=Lowered, 3=None, 4=Single, 5=Double, 6-Drop Shadow, 7=Client, 8=Modal, 9=Etched In, 10=Etched Out)
className	STREAMFRAME	Identifies the object as an instance of the StreamFrame class
form		Reference to the report that contains the StreamFrame object
height	0	Height of the StreamFrame object in its PageTemplate's Report's current metric units
left	0	The location of the left edge of the StreamFrame object in its PageTemplate's Report's current metric units, relative to the PageTemplate's *marginLeft*
marginHorizontal	0	Horizontal margin inside the StreamFrame
marginVertical	0	Vertical margin inside the StreamFrame
name		The name of the StreamFrame object
parent		The PageTemplate object that contains the StreamFrame
streamSource		Reference to a StreamSource object that contains objects to be rendered in the StreamFrame
top	0	The location of the top edge of the StreamFrame object in its PageTemplate's Report's current metric units, relative to the PageTemplate's *marginTop*
width		Width of the StreamFrame object in its PageTemplate's Report's current metric units

Description

A StreamFrame object describes a rectangular region inside the margins of a PageTemplate into which data from a StreamSource object is rendered.

Although you may create multiple StreamFrame objects in a PageTemplate, the Report Designer currently does not support multiple StreamFrame objects visually.

class StreamSource

Topic group Related topics

Describes a data source for streaming.

Syntax

[<oRef> =] new StreamSource(<report>)

<oRef>

A variable or property—typically of <report>—in which you want to store a reference to the newly created StreamSource object.

<report>

The Report object to which the StreamSource object binds itself.

Properties

The following tables list the properties and methods of the StreamSource class. (No events are associated with this class.)

Property	Default	Description
className	STREAMSOURCE	Identifies the object as an instance of the StreamSource class
detailBand		A Band object that corresponds to the *rowset*
maxRows		The maximum number of rows the StreamSource will provide per StreamFrame per page
name		The name of the StreamSource object
parent		The Report object that contains the StreamSource
rowset		The Rowset object that drives the StreamSource

Method	Parameters	Description
release()		Explicitly releases the StreamSource object from memory

Description

A StreamSource object acts as the common ground between a rowset that contains data you want to display and a band that contains components to display that data.

Every StreamFrame is assigned a StreamSource. The same StreamSource object may be assigned to multiple StreamFrame objects. The data from a StreamSource is rendered in all the StreamFrame objects that are linked to it. You may limit the number of rows that are rendered per StreamFrame, and therefore per page, by setting the StreamSource object's *maxRows* property.

A StreamSource object may contain Group objects that group data to perform aggregate functions.

agAverage()

Topic group Related topics Example

Aggregate method that returns the mean average for a group.

Syntax

<oRef>.*agAverage*(<codeblock>)

<oRef>

The Group object that defines the group you want to summarize.

<codeblock>

A codeblock or pointer to a function that returns the value to average.

Property of

Group

Description

Use *agAverage*() to calculate the mean average of the value returned by <codeblock> in the group. <codeblock> is usually an expression codeblock that returns the *value* property of a field in the Group object's *parent* StreamSource object's *rowset*.

If <codeblock> returns a *null* value, it is not considered in the average.

You may call *agAverage*() at any time. If necessary, the report engine will look ahead to calculate the result.

agAverage() example

Suppose you're reporting test scores, grouped by age. You display the average in an Text component in the group's *footerBand*. The *text* of the Text component is an expression codeblock that calls the *agAverage*() method:

```
{||this.parent.parent.agAverage({||
this.parent.rowset.fields[ "Score" ].value})}
```

To get to the Group object's *agAverage*() method from a component in the *footerBand*,

- *this* is the component.
- The component's *parent* is the *footerBand*.
- The *footerBand*'s *parent* is the Group.

The expression codeblock that is passed to *agAverage*() also uses dot operators:

- *this* is the Group object that performs the calculation.
- The Group object's *parent* is the StreamSource.
- The StreamSource object contains the *rowset*.

agCount()

Topic group | Related topics | Example

Aggregate method that returns the number of items in a group.

Syntax

<oRef>.*agCount*(<codeblock>)

<oRef>

The Group object that defines the group you want to summarize.

<codeblock>

A codeblock or pointer to a function that returns the value you want to count.

Property of

Group

Description

Use *agCount*() to count the number of items in the group. <codeblock> is usually an expression codeblock that returns the *value* property of a field in the *rowset* of the Group object's *parent* StreamSource object.

If <codeblock> returns a *null* value, that item is not counted, so that empty rows will be skipped. To count a row even if it is empty, have the <codeblock> return a constant non-*null* value, for example,

```
{||1}
```

You may call *agCount*() at any time. If necessary, the report engine will look ahead to calculate the result.

agCount() example

Suppose you're reporting test scores, grouped by age. You display the number of tests scored in an Text component in the group's *footerBand*. The *text* of the Text component is an expression codeblock that calls the *agCount*() method:

```
{||this.parent.parent.agCount({||
this.parent.rowset.fields[ "Score" ].value})}
```

To get to the Group object's *agCount*() method from a component in the *footerBand*,

- *this* is the component.
- The component's *parent* is the *footerBand*.
- The *footerBand*'s *parent* is the Group.

The expression codeblock that is passed to *agCount*() also uses dot operators:

- *this* is the Group object that performs the calculation.
- The Group object's *parent* is the StreamSource.
- The StreamSource object contains the *rowset*.

agMax()

Topic group | Related topics | Example

Aggregate method that returns the highest value within a group.

Syntax

<oRef>.*agMax*(<codeblock>)

<oRef>

The Group object that defines the group you want to summarize.

<codeblock>

A codeblock or pointer to a function that returns the value you want to track.

Property of

Group

Description

Use *agMax*() to return the highest value returned by <codeblock> in the group. <codeblock> is usually an expression codeblock that returns the *value* property of a field in the *rowset* of the Group object's *parent* StreamSource object.

If <codeblock> returns a *null* value, it is ignored.

You may call *agMax*() at any time. If necessary, the report engine will look ahead to determine the result.

agMax() example

Suppose you're reporting test scores, grouped by age. You display the highest score in an Text component in the group's *footerBand*. The *text* of the Text component is an expression codeblock that calls the *agMax*() method:

```
{||this.parent.parent.agMax({||this.parent.rowset.fields[ "Score" ].value})}
```

To get to the Group object's *agMax*() method from a component in the *footerBand*,

- *this* is the component.
- The component's *parent* is the *footerBand*.
- The *footerBand*'s *parent* is the Group.

The expression codeblock that is passed to *agMax*() also uses dot operators:

- *this* is the Group object that performs the calculation.
- The Group object's *parent* is the StreamSource.
- The StreamSource object contains the *rowset*.

agMin()

Topic group | Related topics | Example

Aggregate method that returns the lowest value within a group.

Syntax

<oRef>.*agMin*(<codeblock>)

<oRef>

The Group object that defines the group you want to summarize.

<codeblock>

A codeblock or pointer to a function that returns the value you want to track.

Property of

Group

Description

Use *agMin*() to return the lowest value returned by <codeblock> in the group. <codeblock> is usually an expression codeblock that returns the *value* property of a field in the *rowset* of the Group object's *parent* StreamSource object.

If <codeblock> returns a *null* value, it is ignored.

You may call *agMin*() at any time. If necessary, the report engine will look ahead to determine the result.

agMin() example

Suppose you're reporting test scores, grouped by age. You display the lowest score in an Text component in the group's *footerBand*. The *text* of the Text component is an expression codeblock that calls the *agMin*() method:

```
{||this.parent.parent.agMin({||this.parent.rowset.fields[ "Score" ].value})}
```

To get to the Group object's *agMin*() method from a component in the *footerBand*,

- *this* is the component.
- The component's *parent* is the *footerBand*.
- The *footerBand*'s *parent* is the Group.

The expression codeblock that is passed to *agMin*() also uses dot operators:

- *this* is the Group object that performs the calculation.
- The Group object's *parent* is the StreamSource.
- The StreamSource object contains the *rowset*.

agStandardDeviation()

Topic group Related topics Example

Aggregate method that returns the standard deviation of the values in a group.

Syntax

<oRef>.*agAverage*(<codeblock>)

<oRef>

The Group object that defines the group you want to summarize.

<codeblock>

A codeblock or pointer to a function that returns the value you want to sample.

Property of

Group

Description

Use *agStandardDeviation*() to calculate the standard deviation of the value returned by <codeblock> in the group. <codeblock> is usually an expression codeblock that returns the *value* property of a field in the *rowset* of the Group object's *parent* StreamSource object.

If <codeblock> returns a *null* value, it is not considered in the sample.

You may call *agStandardDeviation*() at any time. If necessary, the report engine will look ahead to calculate the result.

agStandardDeviation() example

Suppose you're reporting test scores, grouped by age. You display the standard deviation in an Text component in the group's *footerBand*. The *text* of the Text component is an expression codeblock that calls the *agStandardDeviation*() method:

```
{||this.parent.parent.agStandardDeviation({||
this.parent.rowset.fields[ "Score" ].value})}
```

To get to the Group object's *agStandardDeviation*() method from a component in the *footerBand*,

- *this* is the component.
- The component's *parent* is the *footerBand*.
- The *footerBand*'s *parent* is the Group.

The expression codeblock that is passed to *agStandardDeviation*() also uses dot operators:

- *this* is the Group object that performs the calculation.
- The Group object's *parent* is the StreamSource.
- The StreamSource object contains the *rowset*.

agSum()

Topic group | Related topics | Example

Aggregate method that returns the total of a group.

Syntax

<oRef>.*agSum*(<codeblock>)

<oRef>

The Group object that defines the group you want to summarize.

<codeblock>

A codeblock or pointer to a function that returns the value you want to total.

Property of

Group

Description

Use *agSum*() to calculate the total of the value returned by <codeblock> in the group. <codeblock> is usually an expression codeblock that returns the *value* property of a field in the *rowset* of the Group object's *parent* StreamSource object.

If <codeblock> returns a *null* value, it is ignored.

You may call *agSum*() at any time. If necessary, the report engine will look ahead to calculate the result.

agSum() example

Suppose you're tracking overtime hours, grouped by employee. You display the average in an Text component in the group's *footerBand*. The *text* of the Text component is an expression codeblock that calls the *agSum*() method:

```
{||this.parent.parent.agSum({||
this.parent.rowset.fields[ "Overtime" ].value})}
```

To get to the Group object's *agSum*() method from a component in the *footerBand*,

- *this* is the component.
- The component's *parent* is the *footerBand*.
- The *footerBand*'s *parent* is the Group.

The expression codeblock that is passed to *agSum*() also uses dot operators:

- *this* is the Group object that performs the calculation.
- The Group object's *parent* is the StreamSource.
- The StreamSource object contains the *rowset*.

agVariance()

Topic group Related topics Example

Aggregate method that returns the variance of the values in a group.

Syntax

<oRef>.*agVariance*(<codeblock>)

<oRef>

The Group object that defines the group you want to summarize.

<codeblock>

A codeblock or pointer to a function that returns the value you want to sample.

Property of

Group

Description

Use *agVariance*() to calculate the variance of the value returned by <codeblock> in the group. <codeblock> is usually an expression codeblock that returns the *value* property of a field in the *rowset* of the Group object's *parent* StreamSource object.

If <codeblock> returns a *null* value, it is not considered in the sample.

You may call *agVariance*() at any time. If necessary, the report engine will look ahead to calculate the result.

agVariance() example

Suppose you're reporting test scores, grouped by age. You display the variance in an Text component in the group's *footerBand*. The *text* of the Text component is an expression codeblock that calls the *agVariance*() method:

```
{||this.parent.parent.agVariance({||
this.parent.rowset.fields[ "Score" ].value})}
```

To get to the Group object's *agVariance*() method from a component in the *footerBand*,

- *this* is the component.
- The component's *parent* is the *footerBand*.
- The *footerBand*'s *parent* is the Group.

The expression codeblock that is passed to *agVariance*() also uses dot operators:

- *this* is the Group object that performs the calculation.
- The Group object's *parent* is the StreamSource.
- The StreamSource object contains the *rowset*.

autoSort

Topic group Related topics

Whether to automatically sort data to match specified groups.

Property of

Report

Description

For groups to work properly, data must be sorted to match the groups.

If a Report object's *autoSort* property is *true* (the default), then the *sql* property of any query that is accessed by a StreamSource object that has groups will be modified automatically to include an ORDER BY clause that sorts the rowset in the correct order.

For example, if you have two Group objects, the first grouping by the field State and the second by Zip, then even if the query's *sql* property is set as:

```
select * from SALES
```

the rowset will actually be generated internally with the SQL statement:

```
select * from SALES order by STATE, ZIP
```

If *autoSort* is *false*, the rowset is not altered by the report engine. It assumes that the query is correct and contains the necessary fields in the right order. Therefore, if you use the *indexName* property to set the rowset order, you should set *autoSort* to *false*; otherwise it defeats the purpose of using *indexName*.

beginNewFrame

Topic group Related topics

Specifies whether rendering always starts in a new StreamFrame.

Property of

Band

Description

Set the *beginNewFrame* property of the StreamSource object's *detailBand* to *true* if you want each row to be rendered in its own StreamFrame. If you have one StreamFrame in each PageTemplate, you will get one row per page. If you have multiple StreamFrames in each PageTemplate, each one will have at most one row of data.

You would create a page of labels by creating a StreamFrame for each label, set all the StreamFrame objects' *streamSource* property to the same StreamSource, and set its *detailBand*'s *beginNewFrame* property to *true*.

Set the *beginNewFrame* property of a group's *headerBand* to *true* if you want each group to start in a new StreamFrame. If you have one StreamFrame per page, that makes each group start on a new page.

If the *beginNewFrame* property of a group's *footerBand* is *true*, then whenever it is rendered, it will start in a new StreamFrame. For example, you could print a summary page for a report by creating a large *footerBand* for the Report object's *reportGroup* and set its *beginNewFrame* property to *true*.

context

Topic group Related topics

Reports the context in which the band is being rendered.

Property of

Band

Description

Check the band's *context* property to determine the context in which it's being rendered. *context* is a read-only enumerated property that can have the following values:

Value	Context
0	Normal
1	For drilldown summary

For detail bands, the value will always be Normal, since they are never rendered in the drilldown summary. For footer and header bands, the value will change accordingly.

The *context* property is checked primarily during the *canRender* event of components in a header or footer band when the the header or footer is shown in both the summary and details in a drilldown report; you can change the content of the component accordingly.

canRender

Topic group | Related topics | Example

Just before the component is rendered; return value determines whether the component is displayed.

Parameters

none

Property of

All visual components on a report

Description

canRender fires for visual components only when they are in a report. It is fired every time the object is rendered. For a component in a detail band, that means for every row in the rowset.

While you can use *canRender* to evaluate some condition and return *false* to prevent the component from being displayed, the more common use of *canRender* is to alter a component's properties conditionally and always return *true*. You can create a calculated field in a report by altering an HTML component's *text* property in its *canRender* event handler.

You can use the *onRender* event to reset the component to its default state afterward, or always choose the desired state in the *canRender* event.

canRender example

Suppose you're printing a balance sheet and you want to highlight all the negative numbers by making them red. The default *colorNormal* property of the Text component is black. Use the following *canRender* event handler to set the *colorNormal* property appropriately just before the component is rendered:

```
function someFigure_canRender()
  this.colorNormal := iif( this.text() < 0, "red", "black" )
  return true
```

Because the *text* property of the Text component is an expression codeblock, to get the value that is going to be displayed, call the component's *text* property. Don't forget to RETURN *true*; otherwise the component is never displayed.

detailBand

Topic group Related topics

The Band object in a StreamSource, which displays data from the rowset.

Property of

StreamSource

Description

A StreamSource object automatically has a Band object assigned to its *detailBand* property. This is the band that is rendered to display data in the rowset.

Visual components for displaying detail rows in the report should be created as a property of the StreamSource object's *detailBand*.

drillDown

Topic group Related topics

How the group's bands are displayed in drilldown format.

Property of

Group

Description

By choosing a drilldown format, the header and footer bands in the specified group are displayed first, followed by the detail rows. The *drillDown* property controls whether the header and footer bands are repeated with the detail rows. *drillDown* is an enumerated property that can have one of the following values:

Value	Description
0	None—do not format as drilldown (default)
1	Drilldown. Do not repeat headers or footers
2	Drilldown, repeat headers
3	Drilldown, repeat footers
4	Drilldown, repeat headers and footers

endPage

Topic group Related topics

The last page number to render.

Property of

Report

Description

When rendering to a window (the default), only one page, the *startPage*, is rendered at a time. When rendering to a printer or file, pages are rendered from the *startPage* to the *endPage*.

By default, *endPage* is -1, which means that all the pages in the report are rendered. Set *endPage* to a number greater than zero to set the last page to render. When and if the report engine gets to that page, it stops after it has finished rendering it.

expandable

Topic group Related topics

Specifies whether an object will increase in size automatically to accommodate the objects within it.

Property of

Band

Description

If a Band object's *expandable* property is *true* (the default), it will increase in size to display all the components inside it, even if its *height* is set to zero.

Set *expandable* to *false* if you want to make the size and number of rows displayed on each page constant, no matter what is displayed.

firstOnFrame

Topic group Related topics

Whether the band is being rendered for the first time in the StreamFrame.

Property of

Band

Description

Check the *firstOnFrame* property in a component's *canRender* event if you want to render it (or don't want to render it) the first time the component's band is being rendered in a StreamFrame only.

Example

If you place column headings inside a StreamFrame, you can create Text components in the detail band that have the following *canRender* event:

```
{||this.parent.firstOnFrame}
```

firstPageTemplate

Topic group Related topics

The PageTemplate object that is used for the report's first page.

Property of

Report

Description

Because a report may have multiple PageTemplate objects, the *firstPageTemplate* property is used to identify the PageTemplate that the report should render as its first page.

Once the first PageTemplate has been chosen, each PageTemplate object has a *nextPageTemplate* property that identifies the page to render next.

fixed

Topic group Related topics

Specifies whether an object's position in a band is fixed or if it can be "pushed down" or "pulled up" by the rendering or suppression of other objects.

Property of

Visual components in a band.

Description

Consider two components in a band named object1 and object2. Suppose that

- The bottom of object1 is at or above the *top* of object2.
- object1's *variableHeight* property is *true*.
- object1 grows in height to accommodate the data in it.
- The bottom of object1 is now below the *top* of object2.

Then if object2's *fixed* property is *false* (the default), object2 will be pushed down by object1 so that object2's *top* will be at the bottom of object1. This in turn might push down other objects in the band.

object2 can also be pulled up if the bottom of object1 is at or above the top of object2 and object1 is suppressed by its *supressIfBlank* or *supressIfDuplicate* properties.

The horizontal position of the objects in question doesn't matter, only the vertical position of their top and bottom ends.

If an object's *fixed* property is *true*, it is not moved by the rendering or suppression of other objects.

After the band has been rendered, all the objects return to their original positions and sizes.

footerBand

Topic group Related topics Example

The Band object that renders after each group.

Property of

Group

Description

A Group object automatically has a Band object assigned to its *footerBand* property. This band is rendered after each group is completed; that is, just before the next group starts or at the end of the rowset. It usually contains components that display summary information.

For components in the *footerBand*, the Group object's aggregate functions will return summary values for the group that has just completed.

footerBand example

Topic group

Suppose you're printing a list of students grouped by grade. At the end of each grade, you want to display the number of students in that grade. In the Group object's *footerBand*, you create an Text component with the following expression codeblock assigned to its *text* property:

```
{||"Count: " + this.parent.parent.agCount({||
this.parent.rowset.fields["ID"].value})}
```

groupBy

Topic group Related topics Example

The name of the field upon which groups are formed.

Property of

Group

Description

Visual dBASE groups rows by monitoring the value of a field in the rowset. The *groupBy* property contains the name of a field as a character string with an optional ascending or descending sort designation (not case-sensitive, ascending is the default). You may abbreviate ascending as “ASC” and descending as “DESC”. For example, if you’re grouping by the Age field, you could have one of the following strings as the *groupBy* property:

```
Age
Age asc
Age desc
Age ascending
Age descending
```

The ascending and descending options have an effect only if the report’s *autoSort* property is set to *true*. In that case, *Visual* dBASE will make sure that the data in the rowset is sorted by the correct field in the correct direction.

No matter what the value of *autoSort* is, the named field must exist in the rowset. *Visual* dBASE looks for that field in the rowset’s *fields* array, just as you would. For example,

```
rowset.fields[ "Age" ].value
```

Because *Visual* dBASE uses the rowset’s *fields* array, you can group on calculated fields. There are two ways to do this. You can create a calculated field in a SQL SELECT statement, in which case set *autoSort* to *true*; or you can create the calculated field by adding a Field object to the rowset’s *fields* array, in which case you must set *autoSort* to *false*, because the named field doesn’t exist in the table, so you can’t sort on it. You would still have to make sure that the rows are sorted in the correct order so that all the rows in the same group are contiguous in the rowset.

groupBy example

Suppose you're tracking sales and want to generate a summary report, grouped by quarter. The data stores the actual date, so you'll need to calculate the quarter.

To calculate the quarter, divide the month of the date by 3 and round up:

Month	Month number	Divided by 3	Rounded up
January	1	1/3	1
March	3	1	1
April	4	1 1/3	2
December	12	4	4

You can add the calculated field in the query's *onOpen* event:

```
function sales1_onOpen()
  local c
  c = new Field()               // Create a new Field object
  c.fieldName := "Quarter"      // Give it a name
  this.rowset.fields.add( c )   // Add it to the fields array
  c.beforeGetValue := {||ceiling( month( this.parent.fields[ "Date" ].value )
/ 3 )}
```

The group's *groupBy* property is set to "Quarter". You still need to sort the report by date so that the groups will be in the right order. You can't use *autoSort*, since it will try to sort by a field named "Quarter", and there isn't one. So you use the following SQL SELECT statement in the query's *sql* property:

```
select * from OVERTIME order by OVERTIME."DATE"
```

DATE is an SQL reserved word, so you need to place the field name in quotes and use the table name.

headerBand

Topic group | Related topics | Example

The Band object that renders before each group.

Property of

Group

Description

A Group object automatically has a Band object assigned to its *headerBand* property. This band is rendered before the start of a new group, including the first group in the report; and if the Group object's *headerEveryFrame* property is true, at the beginning of every StreamFrame. It usually contains components that identify the current group or display summary information.

headerBand example

Suppose you're tracking sales and want to generate a summary report, grouped by quarter. You've already created a calculated field "Quarter" that contains a number from 1 to 4. To print "1st quarter", "2nd quarter" and so forth, set the *text* property of an Text component to the following expression codeblock (all in one line):

```
{||{"1st","2nd","3rd","4th"}
[this.parent.parent.parent.rowset.fields["Quarter"].value] +
" quarter"}
```

This codeblock uses a literal array that contains the corresponding text for the quarter number. To get the quarter number in the calculated field "Quarter" from the Text component:

- *this* is the component
- the component's *parent* is the *headerBand*
- the *headerBand*'s *parent* is the Group object
- the group's *parent* is the StreamSource object
- from the StreamSource object, you can access its *rowset*

headerEveryFrame

Topic group Related topics

Specifies whether to repeat a group's *headerBand* when a group spans more than one StreamFrame.

Property of

Group

Description

A group's *headerBand* is rendered at the beginning of the group. By default, *headerEveryFrame* is *false*; that means that if the contents of the group go into another frame, the *headerBand* is not repeated.

Set *headerEveryFrame* to *true* if you want a group's *headerBand* to be rendered at the top of every StreamFrame. For example, if you have one StreamFrame per page, setting *headerEveryFrame* to *true* will print the *headerBand* at the top of each page, underneath the fixed components (for example column headings) on the page.

If you have nested groups with *headerEveryFrame* set to *true* for each *headerBand*, the header bands will appear in group order at the top of every StreamFrame.

The *headerBand*'s *beginNewFrame* property determines whether the header band for a new group should start in a new StreamFrame. In contrast, *headerEveryFrame* determines whether the header band should be repeated in subsequent StreamFrame objects.

isLastPage()

Topic group Related topics Example

Returns *true* or *false* to let you know if additional pages are due to be rendered.

Syntax

<oRef>.*isLastPage*()

<oRef>

An object reference to the report you want to check.

Property of

Report

Description

isLastPage() returns *true* if the current page is the last page of the report, and *false* if additional pages are to be rendered.

Its main purpose is to allow you to make informed decisions about whether or not to display a button to display additional pages. You may also use *isLastPage*() to display something on the last page of a report.

Visual dBASE does not determine in advance how many pages a report will take. It renders the report one page at a time by filling all the StreamFrame objects on that page with data drawn from the StreamFrame objects' *streamSource*. If there is more data to render and all the StreamFrame objects in the page are full, another page is scheduled.

If the page being rendered is before the report's *startPage*, the rendering is not output. When rendering to a window (the default), rendering stops once a page is output; the window only displays one page at a time. Rendering to a printer or file renders multiple pages. After the page has finished rendering, if another page is scheduled, it is rendered. The process repeats until all the pages are rendered, or the report's *endPage* page is rendered. In that case, the rendering process stops, even though another page may be scheduled.

isLastPage() ignores the *endPage* setting and determines if another page is scheduled to be rendered. It can be reliably called only after the last StreamFrame on a PageTemplate has been rendered, since it is the rendering of StreamFrame objects that determines the scheduling of new pages.

isLastPage() is usually called from the *canRender* event handler for a component attached to the PageTemplate—not in a band—that is defined after all the StreamFrame objects. The order in which objects are created and assigned in the report class constructor directly determines their order of definition and rendering.

isLastPage() example

The following is the *canRender* event handler for a next page button on the PageTemplate. It hides the button on the last page of the report.

```
{||not this.form.isLastPage()}
```

leading

Topic group Related topics

The distance between consecutive lines inside a component.

Property of

Text

Description

leading controls the line spacing within an Text component. By default, it's zero, which uses the default line space for the font.

You can set *leading* to a non-zero value to set the baseline-to-baseline distance of the text in the component.

marginBottom

Topic group Related topics

The space between the bottom of the page and the usable area of the PageTemplate.

Property of

PageTemplate

Description

Use *marginBottom* in conjunction with the PageTemplate's other margin- properties to define the usable area of the page. The position of StreamFrame objects and components bound to the PageTemplate is relative to the top left corner of the usable area and cannot extend beyond the bottom right corner.

marginBottom indicates the distance, in the report's current *metric* units, between the bottom of the page and the bottom of the usable area.

When using multiple PageTemplate objects, you can position items differently just by changing the margins. For example, you may use different left and right pages that have increased margins on the inside edge (the gutter space) for binding.

marginHorizontal

Topic group Related topics

The horizontal margin between the edge of the object and its contents.

Property of

Editor, Text, StreamFrame

Description

An object's horizontal margin is the same on both the left and right sides. In a Text component, the text is indented inside its rectangular frame. The *left* position of all bands inside a StreamFrame object are relative to the horizontal margin on the left and restricted by the horizontal margin on the right.

marginHorizontal is measured in the form or report's current *metric* units.

marginLeft

Topic group Related topics

The space between the left edge of the page and the usable area of the PageTemplate.

Property of

PageTemplate

Description

Use *marginLeft* in conjunction with the PageTemplate's other margin- properties to define the usable area of the page. The position of StreamFrame objects and components bound to the PageTemplate is relative to the top left corner of the usable area and cannot extend beyond the bottom right corner.

marginLeft indicates the distance, in the report's current *metric* units, between the left edge of the page and the left edge of the usable area.

When using multiple PageTemplate objects, you can position items differently just by changing the margins. For example, you may use different left and right pages that have increased margins on the inside edge (the gutter space) for binding.

marginRight

Topic group Related topics

The space between the right edge of the page and the usable area of the PageTemplate.

Property of

PageTemplate

Description

Use *marginRight* in conjunction with the PageTemplate's other margin- properties to define the usable area of the page. The position of StreamFrame objects and components bound to the PageTemplate is relative to the top left corner of the usable area and cannot extend beyond the bottom right corner.

marginRight indicates the distance, in the report's current *metric* units, between the right edge of the page and the right edge of the usable area.

When using multiple PageTemplate objects, you can position items differently just by changing the margins. For example, you may use different left and right pages that have increased margins on the inside edge (the gutter space) for binding.

marginTop

Topic group Related topics

The space between the top of the page and the usable area of the PageTemplate.

Property of

PageTemplate

Description

Use *marginTop* in conjunction with the PageTemplate's other margin- properties to define the usable area of the page. The position of StreamFrame objects and components bound to the PageTemplate is relative to the top left corner of the usable area and cannot extend beyond the bottom right corner.

marginTop indicates the distance, in the report's current *metric* units, between the top of the page and the top of the usable area.

When using multiple PageTemplate objects, you can position items differently just by changing the margins. For example, you may use different left and right pages that have increased margins on the inside edge (the gutter space) for binding.

marginVertical

Topic group Related topics

The vertical margin between the edge of the object and its contents.

Property of

Editor, Text, StreamFrame

Description

An object's vertical margin is the same on both the top and bottom. All rendering in the object, whether it's text in a Text component or bands inside a StreamFrame object, is relative to the vertical margin on the top and restricted by the vertical margin on the bottom.

marginVertical is measured in the form or report's current *metric* units.

maxRows

Topic group Related topics

The maximum number of rows a StreamSource will provide to a StreamFrame on each page.

Property of

StreamSource

Description

Use *maxRows* to limit the number of rows displayed in each StreamFrame. For example, on a page with a single StreamFrame, if *maxRows* is 10, only 10 rows maximum will displayed in the StreamFrame on each page.

nextPageTemplate

Topic group Related topics

The PageTemplate object that is used for the following page.

Property of

PageTemplate

Description

Because a report may have multiple PageTemplate objects, the *firstPageTemplate* property is used to identify the PageTemplate that the report should render as its first page.

Once the first PageTemplate has been chosen, each PageTemplate object has a *nextPageTemplate* property that identifies the page to render next.

For a report that uses the same page over and over, the same PageTemplate object is used for both the report's *firstPageTemplate* property and that PageTemplate's own *nextPageTemplate* property.

You can create a different introduction or cover page for a report by specifying the cover page as the report's *firstPageTemplate* property, and then set the cover page's *nextPageTemplate* property to the PageTemplate for the body pages.

To alternate left and right pages, set the *nextPageTemplate* of the left page to the right page, and vice versa. Then specify the page on the right as the report's *firstPageTemplate*.

onPage

Topic group Example

After the page has finished rendering.

Parameters

none

Property of

Report

Description

onPage fires after each page has finished rendering, including the last page. By that time, it's too late to do anything to the page, but you can take actions for the next page.

In an *onPage* event handler, the report's *reportPage* property indicates the page that has just finished rendering.

onPage example

Suppose you're going to print a report, make two-sided copies, and bind them. You want to shift the margins slightly on both pages to accommodate the binding. The right pages need to move to the right and the left pages need to move to the left. Other than that, the pages are identical.

You can use the *onPage* event handler to shift the margins of the PageTemplate after each page has printed, in preparation for the next page:

```
function Report_onPage()
  #define TWIPS(x) ((x)*1440)
  if this.reportPage % 2 == 0    // Finished left page, start right
    this.pageTemplate1.marginLeft  = TWIPS( 1.0 )
    this.pageTemplate1.marginRight = TWIPS( 0.5 )
  else                           // Finished right page, start left
    this.pageTemplate1.marginLeft  = TWIPS( 0.5 )
    this.pageTemplate1.marginRight = TWIPS( 1.0 )
  endif
```

Pages on the left are even-numbered. An even number modulo 2 yields zero, so if a left page has just been printed, the margins are set to those for a right page, and vice versa.

onRender

Topic group | Related topics | Example

After the component is rendered.

Parameters

none

Property of

All visual components in a report

Description

onRender fires for visual components only when they are in a report. It is fired every time the object is rendered, after it has finished rendering. For a component in a detail band, that means for every row in the rowset.

You can use the *onRender* event to reset the component to its default state after changing it in its *canRender* event.

onRender example

Suppose you're printing a list of test scores, grouped by age. You have a *headerBand* that prints in every StreamFrame. After printing in the first StreamFrame, you want it to add the word "continued". Every time a new group starts, you want to remove the word. There is also a *footerBand* to print totals for the group.

You create an Text object with the following expression codeblock as its *text* property:

```
{||"Age: " + this.parent.parent.parent.rowset.fields["Age"].value}
```

In the component's *onRender* event, you change the codeblock to include the word "continued":

```
function header1_html1_onRender()
  this.text = {||"Age: " +
this.parent.parent.parent.rowset.fields["Age"].value + " continued"}
```

So now, once it is rendered at the beginning of the group, it is changed so that it will contain the word "continued" for the rest of the group.

To change it back for the start of a new group, use the following *onRender* event handler for the Text component in the *footerBand*:

```
function footer1_html1_onRender()
  this.text = {||"Age: " +
this.parent.parent.parent.rowset.fields["Age"].value}
```

This restores the original codeblock at the end of the group, preparing the Text component for the beginning of the next group.

output

Topic group Related topics

Designates the target medium for the report.

Property of

Report

Description

Set the report's *output* property to designate how you want the report to be rendered. *output* may contain one of the following values:

Value	Target
0	Window
1	Printer
2	Printer file
3	Default
4	HTML file

The Default output is to a window. When rendering to a window, only one page at a time is rendered.

If you designate either Printer file or HTML file, the report's *outputFilename* property must be set to the name of the target file.

outputFilename

Topic group Related topics

The name of the target output file.

Property of

Report

Description

If a report's *output* property is set to either Printer file or HTML file, the *outputFilename* property must be set to the target file.

The file will contain the output from the report. If the file already exists, it will be overwritten.

printer

Topic group Related topics

An object that describes various printer output options.

Property of

Report

Description

A *printer* object contains properties for the following printer options:

Property	Default	Description
color	Monochrome	Whether the output should be in color/grayscale or plain monochrome (0=Default, 1=Monochrome, 2=Color)
copies	1	Number of copies
duplex	None	Whether to print in duplex, and in which orientation (0=Default, 1=None, 2=Vertical, 3=Horizontal)
orientation	Portrait	The orientation of the output (0=Default, 1=Portrait, 2=Landscape)
paperSize	printer-dependent	The size of the paper to use
paperSource	printer-dependent	The paper tray or bin to use
printerName		The name of the target printer (blank for default printer)
printerSource	*Visual* dBASE default	Which printerName to use (0=*Visual* dBASE default, 2=Windows default, 3=Specific)
resolution	High	Graphics resolution (0=Default, 1=Draft, 2=Low, 3=Medium, 4=High)
trueTypeFonts	Depends on the currently specified default printer	How to handle TrueType fonts (0=Default, 1=Bitmap, 2=Download, 3=Substitute, 4=Outline)

render()

Topic group | Related topics | Example

Renders the reports to the designated target.

Syntax

<oRef>.*render*()

<oRef>

An object reference to the report you want to render.

Property of

Report

Description

Call a Report object's *render*() method to generate the report. The output of the report goes to the target designated by the report's *output* property.

The report engine renders the report internally and outputs the results starting with the page designated by the *startPage* property. When rendering to a window (the default), rendering stops once a page is output; the window only displays one page at a time. Rendering to a printer or file renders multiple pages. It continues to render all the objects on each page until it exhausts all StreamSource objects, or it has finished rendering the page designated by the *endPage* property.

render() example

The following is the *onClick* event handler for button on the report that displays the next page. It increments the *startPage* and re-renders the report.

```
{; this.form.startPage++; this.form.render()}
```

reportGroup

Topic group

A Group object for the report as a whole.

Property of

Report

Description

A Report object automatically has a Group object assigned to its *reportGroup* property. The *groupBy* property of this Group object is an empty string.

Use the *reportGroup* to calculate aggregates for the entire report, for example, a grand total; and for items in a report introduction or summary.

A *reportGroup* has a *headerBand*, a *footerBand*, and aggregate methods, just like any other Group object. Because the *parent* of the *reportGroup* is the Report object instead of a StreamSource or Group object, the object reference path to data is slightly different for components in the *reportGroup*.

reportPage

Topic group Example

The current page number being rendered.

Property of

Report

Description

The *reportPage* property contains the number of the page that is being rendered.

During an *onPage* event, the *reportPage* is the page that has just finished rendering.

reportPage example

To display the current page number on a report, create an Text component on the PageTemplate that contains the following expression codeblock as its *text* property:

```
{||"Page " + this.parent.parent.reportPage}
```

reportViewer

Topic group

A reference to the ReportViewer object that instantiated the report.

Property of

Report

Description

Use the *reportViewer* property to reference the ReportViewer object that instantiated the report. You may access the form that contains the ReportViewer through the ReportViewer object's *form* property.

If the report was not instantiated through a ReportViewer object, *reportViewer* is *null*.

rotate

Topic group

The orientation of an object, in 90-degree increments.

Property of

Text

Description

To rotate the text inside an Text component, set its *rotate* property to one of the following values:

Value	Clockwise rotation
0	none
1	90 degrees
2	180 degrees
3	270 degrees

startPage

Topic group Related topics

The first page number to output.

Property of

Report

Description

When rendering to a window (the default), only one page, the *startPage*, is rendered at a time. When rendering to a printer or file, pages are rendered from the *startPage* to the *endPage*.

By default, *startPage* is 1, which means that all the pages that are rendered are output. Set *startPage* to a number greater than 1 to delay the beginning of the output.

The report engine must still render each page until it gets to the *startPage* because it dynamically paginates the report. The position of a row in a report may change whenever someone changes the table, so use caution when using *startPage* to display segments of a report.

streamSource

Topic group

The StreamSource object that contains objects to render in the StreamFrame.

Property of

StreamFrame

Description

A StreamFrame object's *streamSource* property identifies the StreamSource object that supplies the StreamFrame object's data stream.

If multiple StreamFrame objects have the same *streamSource* property, that StreamSource will stream data to those StreamFrame objects in series, in the order in which the StreamFrame objects were created (the same order as they are listed in the class definition in the .REP file).

If multiple StreamFrame objects have different *streamSource* properties, each StreamFrame will be filled from its own StreamSource object (in the same order as above) until all the StreamFrame objects in the page are filled. If a particular StreamFrame object's StreamSource is exhausted, it is no longer filled. When all StreamSource objects are exhausted, all the objects on that last PageTemplate are rendered, and the report is done.

supressIfBlank

Topic group Related topics

Specifies whether an object is suppressed, or not rendered, if it is blank.

Property of

Text

Description

supressIfBlank has an effect only for visual components that are in a report. If *true*, it suppresses the rendering of the component if its display value is blank.

For example, suppose you're printing two-line addresses with the city underneath. If the second address line is blank, you don't want it to occupy any space. By setting that component's *supressIfBlank* property to *true*, if it's blank, nothing gets rendered and all the components below it that have their *fixed* properties set to *false* are moved up to fill the space.

Components are rendered in their z-order, the order in which they are defined in the report. *supressIfBlank* does not affect the position of components that have already been rendered. The z-order of the components in the report should match their top-to-bottom order; otherwise *supressIfBlank* will have no effect.

By default *supressIfBlank* is *false*. You can also use the component's *canRender* event to suppress rendering.

supressIfDuplicate

Topic group Related topics

Specifies whether an object is suppressed, or not rendered, if its value is the same as the previous time it was rendered.

Property of

Text

Description

supressIfDuplicate has an effect only for visual components that are in a report. If *true*, it suppresses the rendering of the component if its display value is the same as the previous time it was rendered in the same report, even if the previous time was in another group in the report.

Use *supressIfDuplicate* to eliminate duplicating the same data value over and over again for multiple rows in a report. For example, you may have information sorted by date. With *supressIfDuplicate* set to *true*, each date will be rendered only once.

By default *supressIfDuplicate* is *false*. You can also use the component's *canRender* event to suppress rendering.

title

Topic group Related topics

The title of a report.

Property of

Report

Description

The *title* property contains the title of the report. It is displayed in the title bar of the report preview window

tracking

Topic group Related topics

The amount of extra space between characters.

Property of

Text

Description

tracking adds extra space between characters within an Text component. By default, it's zero, which means no extra spacing.

You can set *tracking* to a non-zero value to add extra space between characters.

trackJustifyThreshold

Topic group Related topics

The maximum amount of added space allowed between words in a fully justified line. Exceeding that amount switches to character tracking.

Property of

Text

Description

trackJustifyThreshold sets a threshold for the amount of extra space between words that can be added to try to justify the line. If a line requires more than the threshold amount, the line is justified by adding space between each character in the line, in addition to the maximum space between each word.

If a line contains only one word and *trackJustifyThreshold* is non-zero, the word will be fully justified with character tracking, unless it is on the last line of text. The last line of text is never justified.

An Text component's *alignHorizontal* property must be set to Justify in order for *trackJustifyThreshold* to have any effect.

variableHeight

Topic group Related topics

Whether an object's *height* can increase automatically to accommodate its contents.

Property of

Text

Description

Set *variableHeight* to *true* so that an object can grow to accommodate its contents. If an object's *height* is not large enough to display everything, it is increased. *variableHeight* does not shrink objects to fit their contents.

If the object is in a Band object in a report and it grows, it might push down other objects in the band if those objects have their *fixed* property set to *false*.

By default *variableHeight* is *false*.

verticalJustifyLimit

Topic group Related topics

The maximum amount of added space allowed between lines in a vertically justified object. Exceeding that amount makes the text top-aligned instead.

Property of

Text

Description

verticalJustifyLimit sets the maximum amount of extra space between lines that can be added to try to vertically justify the lines in an object. If the maximum amount does not justify the lines, *Visual* dBASE gives up and makes the text top-aligned instead.

An Text component's *alignVertical* property must be set to Justify in order for *verticalJustifyLimit* to have any effect.

Text streaming

Topic group

This Help section describes *Visual* dBASE commands that control text streaming to the Command window, a file, or a printer.

?

Topic group Related topics Example

Outputs the results or return values of one or more expressions to a new line in the Command window results pane. You can also simultaneously stream output to a print buffer and/or text file.

Syntax

?
[<exp 1>
  [PICTURE <format expC>]
  [FUNCTION <function expC>]
  [AT <column expN>]
  [STYLE [<fontstyle expN>] *or* [<fontstyle expC>]]
[,<exp 2>...]

<exp 1>[,<exp 2> ...]

Expression(s) of any data type. Output consists of expression results or return values.

PICTURE <format expC>

Formats <exp 1>, or a specified portion of it, with the picture template <format expC>, a character expression consisting of one of the following:

- Template characters.
- Function symbols preceded by @. (You can also use the FUNCTION option, discussed below.)
- Literal characters.
- A combination of template characters, function symbols, and literal characters.
- A variable containing the character expression.

You can use all the template character and function symbols except A, M, R, and S.

FUNCTION <function expC>

Formats all characters in <exp 1> with the function template <function expC>, which must contain one or more function symbols. When you specify function symbols with the FUNCTION option, you don't have to precede them with @.

AT <column expN>

Specifies a character position at which to start the line. The <column expN> argument, effectively a temporary indent, must be between 0 and 255. Note: The AT parameter is ignored if _wrap is *true*.

STYLE [<font expN>] *or* [<style expC>]

Specifies a font number or style for printed output only. Does not apply to file or Command window output (files always use the default printer font, typically Courier, and Command window font style is controlled through Command window properties). See description below for print STYLE specification details.

Description

Use ? to output the results or return values of one or more expressions to a new line in the Command window results pane. You can also simultaneously stream output to a print buffer and/or text file.

Output can be streamed to any or all of these targets at the same time, and streaming to a print buffer or file can be switched on or off any time without affecting the stream to other targets.

You can also stream output using the ?? command. The difference is that ?? appends output to the current line and ? always outputs to a new line.

To use either command, type ? or ?? in the input pane of the Command window (or issue it from a program), follow it with your expression(s) and any optional parameters, then press Enter. The results or return values are immediately streamed to the results pane of the Command window as well as to a print buffer and/or file, if either of those streams is turned on.

To erase the contents of the results pane any time, use the CLEAR command in the input pane. Note that this command only clears the results pane of the Command window and does not affect output to a

print buffer or file, if either stream is turned on.

To clear all or a portion of the input pane, select the portion you want to clear and press Del.

Streaming output to a text file

To stream output to a file, first specify a target file with the command SET ALTERNATE TO, e.g.,

```
set alternate to "c:\output.log"
```

A filename is required (no default is supplied).

Then turn on the file output stream with the command SET ALTERNATE ON.

If you specify a file name without an extension, .TXT is appended to the name. If you don't specify a path, the current path (as shown in the Navigator "Look In" path selector) is used.

You can pause streaming to a file with the command SET ALTERNATE OFF (and resume it again with SET ALTERNATE ON), but to stop streaming and close the file, you must either use CLOSE ALTERNATE or switch output files by issuing another SET ALTERNATE TO command with a different filename or with no filename parameter.

Only one file at a time can be open for text output streaming, and the contents of that open file cannot be viewed until the file is closed using one of the methods above.

If the file you specify in a SET ALTERNATE TO command already exists, you're given the option of overwriting the existing file. If you choose No, text the named file is not opened for text streaming. In addition, if another file was already open for output, streaming to that file stops and the file is closed. To reopen the closed file, you must reissue SET ALTERNATE TO with the filename; to resume output (append to the previously closed file at the point output was cut off), use ADDITIVE as described below, then reissue the SET ALTERNATE ON command.

If you do choose Yes and overwrite the existing file, the file is immediately emptied. Text streaming will not start again, however, until you issue the SET ALTERNATE ON command.

To append to an existing file, use ADDITIVE with SET ALTERNATE TO:

```
set alternate to "c:\output.log" additive
```

The overwrite warning is not issued when ADDITIVE is used.

Tip: Since ? begins with a line feed to create each new output line, the first line in a new output file or print buffer will be blank. If you want the first line to contain text output instead, use the ?? command for the first item (rather than the ? command).

```
?? "first item"
? "second item"
```

Streaming output to a printer

To stream output to a print buffer, use SET PRINTER ON. To print the contents of the print buffer to your current printer, use SET PRINTER TO. To print the buffer to a different printer, specify a port or network printer, e.g.,

```
set printer to lpt1
```

or

```
set printer to \\server9\printer4
```

The print buffer continues to receive output until you print the contents of the buffer or issue SET PRINTER OFF.

To format printed output in a particular font, size and style, you can either specify a font in "Font,Size,Style" format or use GETFONT() to choose a style. Either way, the font definition is applied to the ? command's STYLE parameter to format the associated line, word or block. This example shows three ways to set the font:

```
// turn on the print buffer
set printer on
// assign a font definition to the variable headingStyle by using getfont()
```

```
headingStyle = getfont()
? "Program Log" style headingStyle
// you can also specify a font and apply it without using getfont()
bodyStyle = "Arial,9,Swiss"
// font formatting for the date() item in this block
// is specified directly with the STYLE parameter
? "Date: " style "Arial,9,BI,Swiss", date() style bodyStyle
// print the two lines to the default printer
set printer to
```

You can get definitions for any font on your system by using GETFONT() to open a Font dialog, selecting your font options, and examining the result:

```
s = getfont()
? s
// selecting 16-pt Arial bold in the Font dialog returns "Arial,16,B,Swiss"
```

To apply a print style to the default font, you can use codes as shown below in place of a font specification:

```
//make default text:
? "bold" style "B"
? "italic" style "I"
? "strikeout" style "S"
? "underlined" style "U"
? "superscript" style "R"
? "subscript" style "L"
? "or use any combination, such as bold italic" style "BI"
```

To overstrike a line of text from a program file in printed output, use the AT option with _wrap set to *false*. To overwrite rather than overstrike text in printed output, use the AT option with _wrap set to *true*, which causes only the second line to print.

To override both an overall _alignment setting and individual paragraph alignments in a memo field, use the B, I, or J functions.

Tip: If SET SPACE is ON (startup default; to test, use ? SET("SPACE")), a space is inserted between multiple expressions streamed out to the same line and between expressions appended to the current line with the ?? command. To remove the spaces for literal formatting, use SET SPACE OFF.

? example

This example uses ? and ?? to display a first and last name in various formats:

```
Firstname="Sally    "
Lastname ="Stephens "
? Firstname,Lastname
// simple display, no formatting or positioning
// Sally     Stephens
? Firstname picture "@T"
?? " "
?? Lastname picture "@!"
// trim Firstname, make lastname uppercase
// Sally STEPHENS
? Lastname STYLE "B"
?? Firstname AT 20
// display in fixed columns.
// Lastname will print in boldface
// Stephens            Sally
```

This example formats -3273.68 four different ways:

```
n=-3273.68
? n picture "9,999,999.99" // insert commas
//    -3,273.68
? n picture "9,999,999"    // no decimals
//    -3,274
? n picture "@L 9,999,999" // zero fill
// -0003,274
? n picture "@(BT"         // use () for negative number, left-align, and
trim
// (3273.68)
```

??

Topic group Related topics Example

Appends the value of one or more expressions to the current line in the Command window, print buffer or a file.

Syntax

??
[<exp 1>
  [PICTURE <format expC>]
  [FUNCTION <function expC>]
  [AT <column expN>]
  [STYLE [<fontstyle expN>] [<fontstyle expC>]]
[,<exp 2>...]

Description

The ?? command is identical to the ? command, except it appends output to the end of the current line rather than to a new line.

CHOOSEPRINTER()

Topic group Related topics

Opens a printer setup dialog box. Returns *false* if you cancel out of the dialog, *true* otherwise.

Syntax

CHOOSEPRINTER([<title expC>])

<*title expC***>**

Optional custom title for the printer setup dialog box.

Description

Use CHOOSEPRINTER() to open a printer setup dialog box, which lets you change the current printer or printer options.

```
p=chooseprinter()
? p
// opens the printer setup dialog; p = false only if the dialog is cancelled
chooseprinter ("Tip: For 2-sided printing, see Options, Paper/Output
options")
// opens the printer setup dialog with a printing tip in the title
```

If you use CHOOSEPRINTER() to switch printers, SET PRINTER TO, _pdriver, _plength, and _porientation will automatically point to the new printer.

To activate a specific printer driver, you can also use _pdriver.

Menu equivalent: File | Print opens the Print dialog, which offers a printer selection list and properties dialog for the selected printer.

CLEAR

Topic group Related topics

Clears the Command window results pane.

Syntax

CLEAR

Description

Use CLEAR to remove the contents of the results pane of the Command window.

CLOSE ALTERNATE

Topic group Related topics

Close the text stream file opened with SET ALTERNATE

Syntax

CLOSE ALTERNATE

Description

CLOSE ALTERNATE is equivalent to issuing SET ALTERNATE TO with no filename. See SET ALTERNATE for details.

CLOSE PRINTER

Topic group Related topics

Close the print buffer, sending buffered output to the printer.

Syntax

CLOSE PRINTER

Description

CLOSE PRINTER is equivalent to issuing SET PRINTER TO with no options. See SET PRINTER for details.

EJECT

Topic group Related topics Example

Advances printer paper to the top of the next page.

Syntax

EJECT

Description

Use EJECT to position printed output on the page. If you are using a tractor-feed printer (such as a dot matrix printer) and the paper is correctly positioned, EJECT advances the paper to the top of the next sheet. If you are using a single-sheet printer (such as a laser printer), EJECT prints any data in the print queue and ejects the page. Before printing or executing EJECT, connect and turn on the printer.

EJECT works in conjunction with _padvance, _plength, and _plineno. If _padvance is set to "FORMFEED" (the default), issuing the EJECT command from dBASE is equivalent to using your printer's formfeed button or sending the formfeed character (ASCII 12) to the printer. If _padvance is set to "LINEFEEDS", issuing EJECT sends individual linefeeds to the printer until _plineno equals _plength, then resets _plineno to 0. Then, _pageno is incremented by 1. For more information, see _padvance.

EJECT is often used in when printing reports. For example, if PROW() returns a value that is close to the bottom of the page, issue EJECT to continue the report at the top of the next page. EJECT automatically resets the printhead to the top left corner of the new page, which is where PROW() = 0 and PCOL() = 0.

EJECT is the same as EJECT PAGE, except EJECT PAGE also executes any page-handling routine you've defined with ON PAGE.

EJECT example

In this example, one line is written to the printer and EJECT is then used to ensure that further commands are written on the next page:

```
set printer on
? "This page intentionally left blank"
eject
```

EJECTPAGE

Topic group Related topics Example

Advances printer paper to the top of the next page and executes any ON PAGE command.

Syntax

EJECT PAGE

Description

Use EJECT PAGE with ON PAGE to control the ejection of pages by a printer. If you define a page-handling routine with ON PAGE AT LINE <expN> and then issue EJECT PAGE, dBASE checks to see if the current line number (_plineno) is greater than the line number specified by <expN>. If _plineno is less than the ON PAGE line, EJECT PAGE sends sufficient linefeeds to trigger the ON PAGE page-handling routine.

If _plineno is greater than the ON PAGE line, or if you don't have an ON PAGE page-handling routine, EJECT PAGE advances the output as follows:

- If _padvance is set to "FORMFEED" and SET PRINTER is ON, dBASE issues a formfeed (ASCII code 12).
- If _padvance is set to "LINEFEEDS" and SET PRINTER is ON, dBASE issues sufficient linefeeds (ASCII code 10) to advance to the next page. It uses the formula _plength - _plineno to calculate the number of linefeeds.
- If you direct output to a destination other than the printer (for example, if you use SET ALTERNATE or SET DEVICE), dBASE uses the formula _plength - _plineno to calculate the number of linefeeds.

After ejecting a page, EJECT PAGE increments _pageno by 1 and resets _plineno to 0.

ON PAGE

Topic group Related topics Example

Executes a specified command when printed output reaches a specified line on the current page.

Syntax

ON PAGE
[AT LINE <expN> <command>]

AT LINE <expN>

Identifies the line number at which to execute the specified page-formatting command.

<command>

The command to execute when printed output reaches the specified line number, <expN>. To execute more than one command, issue ON PAGE DO <filename>, where <filename> is a program or procedure file containing the sequence of commands to execute.

Description

Use ON PAGE to specify a command to execute when printed output reaches a specific line number. ON PAGE with no options disables any previous ON PAGE statement.

The value of the _plineno system variable indicates the number of lines that have been printed on the current page. As soon as the _plineno value is equal to the value you specify for <expN>, dBASE executes the ON PAGE command.

Use the ON PAGE command to print headers and footers. For example, the on page command can call a procedure when the _plineno system memory variable reaches the line number that signifies the end of a page. In turn, that procedure can call two procedures, one to print the footer on the current page and one to print the header on the next page.

You can begin header routines with EJECT PAGE to ensure that the header text prints at the top of the following page. EJECT PAGE also sets the _plineno system memory variable to 0. Use the ? command at the beginning of a header procedure to skip several lines before printing the header information. You can also use the ? command at the end of the procedure to skip several lines before printing the text for the page.

Begin footer routines with the ? command to move several lines below the last line of text. You can use the ?? command with the _pageno system memory variable to print a page number for each page on the same line as the footer.

To calculate the appropriate footer position, add the number of lines for the bottom margin and the number of lines for the footer text to get the total lines for the bottom of the page. Subtract this total from the total number of lines per page. Use this result to specify a number for the AT LINE argument. If the footer text exceeds the number of lines per page, the remainder prints on the next page.

ON PAGE example

This example uses EJECT PAGE in conjunction with ON PAGE to print a footer on each page. In this example, a page length of 5 is set up (lines 0 through 4). Text is printed on four lines: 0,1,2,3, and the footer prints on line 4. Eight lines of text are printed on two pages:

```
set talk off
clear
set printer on
_padvance="LINEFEEDS"
_plength=5
_pageno=1
eject
on page at line 3 do Page_Brk
printjob
for i = 1 to 8
  ?? "Line of text   ",_pageno,_plineno,i
  ?
endfor
on page  // turn off on page
endprintjob
close printer
procedure Page_Brk
??  "   Page Footer",_pageno,_plineno
eject page
return
////                         Page       Line          i
// This prints out as:
//
// Line of text              1          0          1
// Line of text              1          1          2
// Line of text              1          2          3
// Line of text              1          3          4
//    Page Footing           1          4
// Line of text              2          0          5
// Line of text              2          1          6
// Line of text              2          2          7
// Line of text              2          3          8
//    Page Footer            2          4
```

PCOL()

Topic group Related topics Example

Returns the printing column position of a printer. Column numbers begin at 0.

Syntax

PCOL()

Description

Use PCOL() to determine the horizontal printing position of a printer—that is, the column at which the printer is set to begin printing. Use PCOL() in mathematical statements to direct the printer to begin printing at a position relative to its current column position. For example, PCOL() + 5 represents a position five columns to the right of the current position, and PCOL() - 5 represents a position five columns to the left of the current position.

When you direct output to the printer, dBASE maps each character according to the coordinate plane, a two-dimensional grid. The coordinate plane is divided into character cells whose widths depend on the value of _ppitch. See the table in the description of _ppitch, which lists _ppitch values. The height of each character cell is determined by the size of the font of the parent form window.

PCOL() returns a column number that reflects the current value of _ppitch, regardless of whether you're printing with proportional or monospaced fonts. If you're printing with a proportional font, you can add and subtract fractional numbers to and from the PCOL() value to move the printing position accurately.

SET PRINTER must be ON or SET DEVICE TO PRINTER must be in effect for PCOL() to return a column position; otherwise, it returns 0.

PCOL() example

The following example writes "Jack & Jill" to the printer. It uses PCOL() to note the column position three times, at the beginning, after "Jack", and after "Jill":

```
set talk off
set printer on
// now ?s are directed to printer
?          // sets printer at col 0 of next line
beginpos=pcol()  // note the current column
?? "Jack"
lastjackpos=pcol()
?? " & Jill"
lastjillpos=pcol()
set printer off
close printer
? beginpos       //  0.00
? lastjackpos    //  4.00
? lastjillpos    // 11.00
set talk on
```

PRINTJOB...ENDPRINTJOB

Topic group Related topics Example

Uses the values stored in system memory variables to control a printing operation.

Syntax

printjob
<statements>
ENDPRINTJOB
<statements>

Any valid dBASE statements.

Description

Use PRINTJOB...ENDPRINTJOB to control a printing operation with the values of the system memory variables _pbpage, _pepage, _pcopies, _peject, and _plineno. When dBASE begins executing PRINTJOB, it does the following:

1 Closes the current print document (if any) and begins a new one, as if you had issued CLOSE PRINTER before issuing PRINTJOB
2 Ejects a page if _peject is set to "BEFORE" or "BOTH"
3 Sets _pcolno to 0

When dBASE reaches ENDPRINTJOB, it does the following:

1 Ejects a page if _peject is set to "AFTER" or "BOTH"
2 Resets _pcolno to 0

Before using PRINTJOB...ENDPRINTJOB, set the relevant system memory variables and issue SET PRINTER ON. After ENDPRINTJOB, use CLOSE PRINTER to close and print the document.

PRINTJOB example

The following example uses PRINTJOB to print one line of text making three copies:

```
_pcopies=3          // 3 copies
_peject="none"      // no page eject before or after
_plineno=0          // initialized to 0
set printer on
printjob
? "A one line print job"
?
endprintjob
close printer       // initiate printing
// prints:
// A one line print job
//
// A one line print job
//
// A one line print job
//
```

PRINTSTATUS()

Topic group Related topics Example

Returns *true* if the print device is ready to accept output.

Syntax

PRINTSTATUS([<port name expC>])

<port name expC>

A character expression such as "lpt1" that identifies the printer port to check.

Description

Use PRINTSTATUS() to determine whether you've designated a printer port as an output device with SET PRINTER TO <port name expC>. In *Visual* dBASE, the Windows Print Manager spools print output to and manages the printer port. Therefore, the Print Manager informs you when a printer isn't ready to receive output.

If you don't pass <port name expC> to PRINTSTATUS(), it checks the default port you specified with SET PRINTER TO. PRINTSTATUS() returns only *false* if you haven't specified a printer port with SET PRINTER TO or if the port you specify hasn't been set with SET PRINTER TO.

Note: *Visual* dBASE automatically executes SET PRINTER TO on startup if the WIN.INI file contains a valid printer definition. See your Windows documentation for information on WIN.INI settings.

PRINTSTATUS() example

This example reads the default PRINTSTATUS and then queries LPT1, LPT2 and LPT3:

```
? printstatus()
? printstatus("lpt1")
? printstatus("lpt2")
? printstatus("lpt3")
```

PROW()

Topic group Related topics

Returns the printing row position of a printer. Row numbers begin at 0.

Syntax

PROW()

Description

Use PROW() to determine the vertical printing position of a printer—that is, the row at which the printer is set to begin printing. Use PROW() in mathematical statements to direct the printer to begin printing at a position relative to its current row position. For example, PROW() + 5 represents a position five rows below the current position and PROW() - 5 represents a position five rows above the current position.

When you direct output to the printer, *Visual* dBASE maps each character according to the coordinate plane, a two-dimensional grid. The coordinate plane is divided into character cells whose widths depend on the value of _ppitch. See the table in the description of _ppitch, which lists _ppitch values. The height of each character cell is determined by the size of the font of the parent form window.

If you're printing with a proportional font, you can add and subtract fractional numbers to and from the PROW() value to move the printing position accurately. If you issue ? without the STYLE option and use only integer coordinates, *Visual* dBASE uses the default printer font (typically Courier or another monospaced font).

SET PRINTER must be ON or SET DEVICE TO PRINTER must be in effect for PROW() to return a row position; otherwise, it returns 0.

SET ALTERNATE

Topic group Related topics Example

Controls the recording of input and output in an alternate text file.

Syntax

SET ALTERNATE on | OFF

SET ALTERNATE TO [<filename> | ? | <filename skeleton> [ADDITIVE]]

<filename> | ? | <filename skeleton>

The alternate text file, or target file, to create or open. The ? and <filename skeleton> options display a dialog box in which you can specify a new file or select an existing file. If you specify a file without including its path, dBASE looks for the file in the current directory, then in the path you specify with SET PATH. If you specify a file without including its extension, dBASE assumes .TXT.

ADDITIVE

Appends dBASE output that appears in the results pane of the Command window to the specified existing alternate file. If the file doesn't exist, dBASE returns an error message.

Default

The default for SET ALTERNATE is OFF. To change the default, set the ALTERNATE parameter in the [OnOffSetting Settings] section of VDB.INI. To set a default file name for use with SET ALTERNATE, specify an ALTERNATE parameter in the [CommandSettings] section of VDB.INI.

Description

Use SET ALTERNATE TO to create a record of dBASE output and commands. You can edit the contents of this file with the Text Editor for use in documents, or store it on disk for future reference. You can record, edit, and incorporate command sequences into new programs.

SET ALTERNATE TO <filename> only opens an alternate file, while SET ALTERNATE ON | OFF controls the storage of input and output to that file. Only one alternate file can be open at a time. When you issue SET ALTERNATE TO <filename> to open a new file, dBASE closes the previously open alternate file.

When SET ALTERNATE is ON, dBASE stores output to the results pane of the Command window in the text file you've opened by previously issuing SET ALTERNATE TO <filename>. An alternate file must be open for SET ALTERNATE ON to have an effect. SET ALTERNATE doesn't affect a program's output; it only determines when that output is saved in the alternate file. (Keyboard entries in the Command window aren't stored to the alternate file.)

To prevent your text file from beginning with a blank line, use two question marks (??) before the first word that you send to the alternate file.

Issuing SET ALTERNATE OFF does not close the alternate file. Before accessing the contents of an alternate file, formally close it with CLOSE ALTERNATE or SET ALTERNATE TO (with no file name). This ensures that all data recorded by *Visual* dBASE for storage in the alternate file is transferred to disk, and automatically turns SET ALTERNATE to OFF.

If SET SAFETY is ON and you don't use the ADDITIVE option, and a file exists with the same name as the target file, *Visual* dBASE displays a dialog box asking if you want to overwrite the file. If SET SAFETY is OFF and you don't use the ADDITIVE option, any existing file with the same name as the target file is overwritten without warning.

SET ALTERNATE example

This example uses the SET ALTERNATE commands to write text to the screen and an ASCII file:

```
set alternate to Rose
// Open Rose.txt for text output
? "Opening alternate file" // to screen only
set alternate on
// ?,?? commands now go to Rose.txt
? "A rose "
set alternate off  // Stop storing to Rose.txt.
?? "tended carefully in your garden "
set alternate on         // Add to Rose.txt.
?? "is a rose "
?? "is a rose "
? "You will be proud of"
close alternate    // Close Rose.txt
// Rose.txt contains:
// A rose is a rose is a rose
// You will be proud of
```

SET CONSOLE

Topic group Example

Controls the display of output in the results pane of the Command window during program execution.

Syntax

SET CONSOLE ON | off

Description

When SET CONSOLE is ON, *Visual* dBASE displays all text stream output in the results pane of the Command window. Use SET CONSOLE OFF to disable this output. For example, if you are creating a text file with SET ALTERNATE, you usually do not need to see the output in the Command window at the same time. By using SET CONSOLE OFF, your program will execute faster.

Whenever the input pane of the Command window gets focus, SET CONSOLE is always turned ON. The SET CONSOLE command has no effect when issued in the Command window.

You may use the WAIT command while SET CONSOLE is OFF; however, *Visual* dBASE displays neither the prompt for the input nor the input itself.

SET CONSOLE example

In the following example, SET CONSOLE is used with SET ALTERNATE when creating a text file:

```
set console off
?
set alternate to RESULTS.TXT
// Generate text file
close alternate
set console on
```

After disabling output to the Command window, the ? command is used to help ensure that the output in the text file starts at the beginning of the line.

SET MARGIN

Topic group Related topics Example

Sets the width of the left border of a printed page.

Syntax

SET MARGIN TO <expN>

<expN>

The column number at which to set the left margin. The valid range is 0 to 254, inclusive. You can specify a fractional number for <expN> to position output accurately with a proportional font.

Default

The default for SET MARGIN is 0. To change the default, set the MARGIN parameter in VDB.INI.

Description

Use SET MARGIN to adjust the printer offset for the left margin for all printed output. The margin established by SET MARGIN becomes the printer's column 0 position. set margin resets the value of the _ploffset system memory variable but doesn't affect the value of the _lmargin system memory variable.

Use SET MARGIN to adjust the position of text on the printed page according to the type of paper. For example, if you're printing to three-hole paper, you might need to increase the left border. You can also use SET MARGIN to compensate for the placement of paper in the printer. For example, if the paper is off-center in the printer, you can adjust the width of the left border to properly place the text.

When you direct output to the printer, dBASE maps each character according to the coordinate plane, a two-dimensional grid. The coordinate plane is divided into character cells whose widths depend on the value of _ppitch. See the table in the description of _ppitch, which lists _ppitch values. The height of each character cell is determined by the size of the font.

If you change the value of SET MARGIN, dBASE takes the current value of _ppitch into consideration when calculating the cell width of the coordinate plane. This happens regardless of whether you're printing with proportional or monospaced fonts.

SET MARGIN example

This example displays the 10 digits with the default margin and then sets the margin to column 10 and displays the 10 digits this time indented:

```
set printer on
set margin to 0                         // The default
? "1234567890"
set margin to 10
? "1234567890"
? _ploffset
set margin to 0                         // reset margin
set printer off
close printer
```

Produces:

```
// this displays as:
// 1234567890
//           1234567890
//                    10
//
// _ploffset is set by set margin
```

SET PCOL

Topic group Related topics Example

Sets the printing column position of a printer, which is the value of PCOL().

Syntax

SET PCOL TO <expN>

<expN>

The column number to which to set PCOL(). The valid range is 0 to 32,767, inclusive.

Description

Use SET PCOL to set the horizontal printing position of a printer, which is the value the PCOL() function returns. Generally, you use the command SET PCOL TO 0 to reset the printer column to the left edge of the page.

When you move the printing position to a new line, dBASE reinitializes PCOL() to 0, so SET PCOL affects the value of PCOL() for the current line only. When you send output to your printer, dBASE updates PCOL() by adding 1 to the current PCOL() value for each character it sends to the printer. The printing position moves one column for each character the printer prints.

When you send a printer control code or escape sequence to your printer, the printing position doesn't move. (Printer control codes and escape sequences are strings that give the printer instructions, such as to print underlining, boldface type, or different fonts.) Although control codes and escape sequences don't move the printing position, dBASE nonetheless increments the PCOL() value by the number of characters that you send to the printer. Each control code character increments the value of PCOL() by 1 just like any other character. As a result, the value of PCOL() might not reflect the actual printing position. Use SET PCOL to reset the value of PCOL() to the same value as the printing position.

To send a control code to the printer without changing the value of PCOL(), save the current value of PCOL() to a memory variable, send the control code to the printer, then SET PCOL to the contents of the memory variable.

SET PCOL example

The following example writes "Jack & Jill" to the printer. It uses PCOL() to note the column position three times, at the beginning, after "Jack", and after "Jill":

```
set talk off
set printer on
// now ?s are directed to printer
?                                   // printer at col 0 of next line
beginpos=pcol()                     // note the current column
?? "Jack"
lastjackpos=pcol()
?? " & Jill"
lastjillpos=pcol()
// prints:
// Jack & Jill
set printer off
close printer
? beginpos                          //  0.00
? lastjackpos                       //  4.00
? lastjillpos                       // 11.00
// Displays column positions for reference
```

SET PRINTER

Topic group Related topics Example

The SET PRINTER TO setting specifies a file to receive streaming output, or uses a device code recognized by the Windows Print Manager to designate a printer. The On/Off setting controls whether dBASE also directs streaming output that appears in the Command window to the device or file specified by SET PRINTER TO.

Syntax

SET PRINTER on | OFF

SET PRINTER TO [<filename> | ? | <filename skeleton>] | [<device>]

<filename> | ? | <filename skeleton>

The text file to send output to instead of the printer. By default, dBASE assigns a .PRT extension to <filename> and saves the file in the current directory. The ? and <filename skeleton> options display a dialog box, in which you specify the name of the target file and the directory to save it in.

<device>

The printer port of the printer to send output to. Specify printers and their ports with the Windows Control Panel.

Default

The default for SET PRINTER is OFF. To change the default, set the PRINT parameter in the [OnOffCommandSettings] section in VDB.INI. The default for SET PRINTER TO is the default printer you specify with the Windows Control Panel.

Description

Use SET PRINTER TO to direct streaming output from commands such as ?, ??, and LIST to a printer or a text file. SET PRINTER TO with no option sends this output to the default printer.

Use SET PRINTER ON/OFF to enable or disable the printer you specify with SET PRINTER TO.

To send streaming output to a file rather than the printer, issue SET PRINTER TO FILE <filename>. When you issue SET PRINTER TO FILE <filename>, issuing SET PRINTER ON directs streaming output to the text file <filename> rather than to the printer. The file has the default extension of .PRT.

When SET PRINTER is OFF, dBASE directs streaming output only to the result pane of the Command window. SET PRINTER must be ON to output data to a text file unless you issue a command with its TO PRINTER option. The following example illustrates this behavior:

```
set printer off
set printer to file test.prt
type file.txt                          // displays on screen only
type file.txt to print                 // output sent to screen and
test.prt
```

To send non-streaming output to the printer, use SET DEVICE TO PRINTER. To send non-streaming output to a text file, use SET DEVICE TO FILE.

SET PRINTER example

The following example uses SET PRINTER ON and OFF:

```
set printer to                          // Set printer to default
set printer on
? "Hello"                               // to printer
set printer off
? prow(),pcol()                         // only displayed to  screen
close printer                           // initiate printing
set printer to                          // resets to default
set printer to prn                      // sets to DOS output device
set printer to lpt1
set printer to null
set printer to file Test
// Test.prt receives streaming output, including any control codes,
// that would have gone to the printer.
```

SET PROW

Topic group Related topics

Sets the current row position of a printer's print head, which is the value of PROW().

Syntax

SET PROW TO <expN>

<expN>

The row number to which to set PROW(). The valid range is 0 to 32,767, inclusive.

Description

Use SET PROW to set the vertical printing position of a printer, which is the value the PROW() function returns. Generally, you use the command SET PROW TO 0 to reset the printer row to top-of-page.

SET SPACE

Topic group Related topics Example

Determines whether dBASE inserts a space between expressions displayed or printed with a single ? or ?? command.

Syntax

SET SPACE ON | off

Default

The default for SET SPACE is ON. To change the default, set the SPACE parameter in VDB.INI.

Description

Use SET SPACE OFF when you use a single ? or ?? command to print a list of expressions and you don't want spaces between the expressions. If you want the expressions printed with spaces between them, issue SET SPACE ON.

SET SPACE has no effect on multiple ? or ?? commands. For example, if you issue the command ?? <exp> twice, the second instance of <exp> will be printed adjacent to the first, even if SET SPACE is ON. However, if SET SPACE is ON and you issue ?? <exp>, <exp> as a single command, there will be a space between the two instances of <exp>.

SET SPACE example

This example displays a first and a last name using SET SPACE ON and then SET SPACE OFF:

```
Firstname="Rachel"
Lastname ="Jayes"
set space on                          // the default
? Firstname,Lastname
// Rachel Jayes
set space off
? Firstname,Lastname
// RachelJayes
// The two variables are not separated
```

_alignment

Topic group Related topics Example

Left-aligns, right-aligns, or centers ? and ?? command output within margins specified by _lmargin and _rmargin when _wrap is true.

Syntax

_alignment = <expC>

<expC>

The character expression "LEFT", "CENTER", or "RIGHT". You can enter <expC> in any combination of uppercase and lowercase letters.

Default

The default for _alignment is "LEFT".

Description

Use _alignment to left-align, right-align, or center output from the ? and ?? commands between the margins you set with _lmargin and _rmargin. The _alignment setting is effective only when _wrap is true (*true*).

To control the alignment of text within a field, use the "B," "I," and "J" format options with the PICTURE or FUNCTION options.

_alignment example

The following example sets wrap on and then prints in the three different alignments: left, center, and right:

```
savewrap=_wrap       // save last wrap setting
_wrap=true            // must be true for alignment
savealign=_alignment // save last alignment setting
_alignment="left"
? "Hello left"
_alignment="right"
? "Hello right"
_alignment="center"
? "Hello center"
_alignment=savealign // reset
_wrap=savewrap       // reset
```

_indent

Topic group Related topics Example

Specifies the number of columns to indent the first line of a paragraph of ? command output when _wrap is true.

Syntax

_indent = <expN>

<expN>

The column number, relative to the left margin, where the first line of a new paragraph begins. You can specify a fractional number for <expN> to position output accurately with a proportional font.

Default

The default for _indent is 0.

Description

Use _indent to specify where the first line of a new paragraph begins relative to the left margin. (Specify the left margin with _lmargin.) The _indent setting is effective only when _wrap is *true*.

When you direct ? output to the printer, dBASE maps each character according to the coordinate plane, a two-dimensional grid. The coordinate plane is divided into character cells whose widths depend on the value of _ppitch. See the table in the description of _ppitch, which lists _ppitch values. The height of each character cell is determined by the size of the font.

If you change the value of _indent, dBASE takes the current value of _ppitch into consideration when calculating the cell width of the coordinate plane. This happens regardless of whether you're printing with proportional or monospaced fonts.

To indent the first line of a paragraph, use a value greater than 0. For example, to begin the line five columns to the right of the left margin, set _indent to 5. To create a hanging indent (sometimes called an outdent), use a negative value. For example, to begin the first line five columns to the left of the left margin, set _indent to -5. Using the default value of 0 (no indent or outdent) aligns all lines in a paragraph to the left margin. The sum of _lmargin and _indent must be greater than 0 and less than _rmargin.

_indent example

The following example sets wrap on and indents the first line of a text that wraps around:

```
_indent=3               // set the indentation
savewrap=_wrap          // save last wrap setting
_wrap=true               // must be true for alignment
savelmargin=_lmargin    // save last alignment setting
_lmargin=5
savermargin=_rmargin    // save last alignment setting
_rmargin=20
? "New York, Chicago and Boston are "+;
  "cold in wintertime."
// Now the text wraps around between columns 5 and 20
//
//        New York,
//     Chicago and
//     Boston are cold
//     in wintertime.
//
_rmargin=savermargin    // restore the previous margin
_lmargin=savelmargin    // restore the previous margin
_wrap=savewrap          // reset wrap
```

_lmargin

Topic group Related topics Example

Defines the left margin for ? and ?? command output when _wrap is true.

Syntax

_lmargin = <expN>

<expN>

The column number of the left margin. The valid range is 0 to 254, inclusive. You can specify a fractional number for <expN> to position output accurately with a proportional font.

Default

The default for _lmargin is 0.

Description

Use _lmargin to set the left margin for ? and ?? command output. If you're sending output to a printer, _lmargin sets the left margin from the _ploffset (page left offset) column. For example, if _ploffset is 10 and _lmargin is 5, output prints from the 15th column. The _lmargin setting is effective only when _wrap is *true*.

When you direct output to the printer, dBASE maps each character according to the coordinate plane, a two-dimensional grid. The coordinate plane is divided into character cells whose widths depend on the value of _ppitch. See the table in the description of _ppitch, which lists _ppitch values. The height of each character cell is determined by the size of the font.

If you change the value of _lmargin, dBASE takes the current value of _ppitch into consideration when calculating the cell width of the coordinate plane. This happens regardless of whether you're printing with proportional or monospaced fonts.

If you use _indent to specify the indentation of the first line of each paragraph, the combined values of _lmargin and _indent must be less than the value of _rmargin.

_lmargin example

The following example uses _lmargin. It sets wrap on and then changes the left margin and displays text:

```
_wrap=true              // must be true for _lmargin
_lmargin=0
? "01234567890"
_lmargin=5
? "Changing the margin"
// produces:
// 01234567890
//      Changing the margin
```

_padvance

Topic group Related topics Example

Determines whether the printer advances the paper of a print job with a formfeed or with linefeeds.

Syntax

_padvance = <expC>

<expC>

The character expression "FORMFEED" or "LINEFEEDS".

Default

The default for _padvance is "FORMFEED".

Description

Use _padvance to specify whether dBASE advances the paper to the top of the next sheet one sheet at a time using a formfeed character, or one line at a time using linefeed characters. If you use the default "FORMFEED" setting, the paper advances according to the printer's default form length setting.

Tractor-feed printers (such as dot matrix printers) generally use a "LINEFEEDS" setting, while form feed printers (such as laser printers) generally use a "FORMFEED" setting.

Note: Sending CHR(12) to the printer always issues a formfeed, even if you set _padvance to "LINEFEEDS".

Use the "LINEFEEDS" setting if you change the length of the paper or want to print a different number of lines than the default form length of the printer without adjusting its setting. For example, to print short pages, such as checks that are 20 lines long, set _plength to the length of the output (20 in this example) and _padvance to "LINEFEEDS."

The number of linefeeds dBASE uses to reach the top of the next page depends on whether you issue an eject during streaming or non-streaming output mode.

An eject occurs during streaming output mode when you issue:

- EJECT PAGE without an ON PAGE handler
- EJECT PAGE with an ON PAGE handler when the current line position is past the ON PAGE line
- PRINTJOB or ENDPRINTJOB and _peject causes an eject

In these cases, dBASE calculates the number of linefeeds to send to the print device using the formula _plength - _plineno.

An eject occurs in nonstreaming output mode when you issue:

- EJECT
- SET DEVICE TO PRINTER and force a page eject with the @ command

In these cases, dBASE calculates the number of linefeeds to send to the print device using the formula _plength - MOD(PROW(), _plength).

_padvance example

There are two _padvance settings:

```
_padvance="formfeed"
_padvance="linefeeds"
```

_pageno

Topic group | Related topics | Example

Determines or sets the current page number.

Syntax

_pageno = <expN>

<expN>

An integer from 1 to 32,767, inclusive.

Description

Use _pageno to number pages of streaming output from commands such as ?, ??, and LIST.

With _pageno, you can determine the current page number or set the page number to a specific value. Use it to print page numbers in a report or, when combining documents, to assign an incremented number to the first page of the second document.

A page break occurs when the value of _plineno (the line number count) becomes greater than the value of _plength (the currently defined printed page length in lines). At each page break of streaming output, dBASE automatically increments the value of _pageno.

_pageno example

This example prints 100 lines of output and prints a heading on line 1 of each page:

```
set talk off
set printer on
_pageno=1
for i=1 TO 100
  if _plineno=1  // At first line of page
    ? "Top of Page ",_pageno
  endif
  ? "Line",i
endfor
set printer to
close printer
set talk on
```

_pbpage

Topic group Related topics Example

Specifies the page number of the first page PRINTJOB prints.

Syntax

_pbpage = <expN>

<expN>

The page number at which to begin printing. The valid range is 1 to 32,767, inclusive. Specify a positive integer for <expN>.

Default

The default for _pbpage is 1.

Description

Use _pbpage to begin printing a print job at a specific page number. Pages with numbers less than _pbpage don't print. To stop printing at a specific page number, use _pepage.

If you set _pbpage to a value greater than _pepage, dBASE returns an error.

_pbpage example

This example uses _pbpage to omit a page of a report. It outputs 100 lines and prints the page and line number on each line as in the example for _plineno. Here, the beginning page number is set to 2 so that page 1 does not print:

```
_pageno=1
_pbpage=2       // begin on page 2
set printer on
printjob
for i=1 TO 100
  ?? "Page",_pageno," Line",_plineno
  ?                     // now force a linefeed
endfor
endprintjob
set printer off
close printer           // start printing
```

_pcolno

Topic group | Related topics | Example

Identifies or sets the current column number of streaming output.

Syntax

_pcolno = <expN>

<expN>

The column number at which to begin printing. The valid range is 0 to 255, inclusive. You can specify a fractional number for <expN> to position output accurately with a proportional font.

Default

The default for _pcolno is 0.

Description

Use _pcolno to position printing streaming output from commands such as ?, ??, and LIST.

When you direct output to the printer, dBASE maps each character according to the coordinate plane, a two-dimensional grid. The coordinate plane is divided into character cells whose widths depend on the value of _ppitch. See the table in the description of _ppitch, which lists _ppitch values. The height of each character cell is determined by the size of the font.

If you change the value of _pcolno, dBASE takes the current value of _ppitch into consideration when calculating the cell width of the coordinate plane. This happens regardless of whether you're printing with proportional or monospaced fonts.

The PCOL() function also returns the current printhead position of the printer, but if SET PRINTER is OFF, the PCOL() value doesn't change. _pcolno, on the other hand, returns or assigns the current position in the streaming output regardless of the SET PRINTER setting.

_pcolno example

This example displays the numbers 1 through 5. It uses _pcolno to position the numbers so that each number begins at its own position:

```
set talk off
for i=1 to 5
  _pcolno=i      // set the column position
  string=ltrim(str(i))
  // convert i to a single character
  ?? string
  ?
endfor
set talk on
// the output looks like this
// 1
//  2
//   3
//    4
//     5
```

_pcopies

Topic group | Related topics | Example

Specifies the number of copies to print for a PRINTJOB.

Syntax

_pcopies = <expN>

<expN>

The number of copies to print. The valid range is 1 to 32,767, inclusive. Specify a positive integer for <expN>.

Default

The default for _pcopies is 1.

Description

Use _pcopies to print a specific number of copies of a print job. You can assign a value to _pcopies in the Command window or in a program. The value of _pcopies has an effect only when you send a print job to the printer by issuing PRINTJOB. In a program, assign a value to _pcopies before issuing PRINTJOB.

_pcopies example

This example uses _pcopies to print the print job three times:

```
_pcopies=3          // Three copies
set printer on
printjob
? "Very Small Report"
endprintjob
set printer off
close printer
```

_pdriver

Topic group Related topics Example

Identifies the current printer driver or activates a new driver.

Syntax

_pdriver = <expC>

<expC>

The name of the printer driver to activate.

Default

The default for _pdriver is the printer driver you specify with the Windows Control Panel. If you haven't specified a printer driver with the Control Panel, the value of _pdriver is an empty string ("").

Description

Use _pdriver to identify the current printer driver or to activate an installed driver. (To install a new printer driver, use the Windows Control Panel.)

The _pdriver value contains two elements separated by a comma: the base file name of the Windows driver file and the name of the printer as it appears in WIN.INI. The current driver might not identify a printer name, in which case, _pdriver contains only the driver file name. For example, if the current printer driver is for the HP Laserjet IIISi PostScript printer, _pdriver may contain the value "pscript,HP LaserJet IIISi PostScript". To activate this driver, issue the command _pdriver = "pscript,HP LaserJet IIISi PostScript".

To activate a driver from within dBASE, it may be easier to use CHOOSEPRINTER() than to assign a value to _pdriver. To activate a driver in Windows, use the Printers program of the Windows Control Panel. CHOOSEPRINTER() opens the Print Setup dialog box, in which you can also select options such as paper size, source, and orientation (portrait or landscape). In the Windows Control Panel, you can choose Setup to select these options.

_pdriver example

Use _pdriver to determine the current print driver:

```
? _pdriver
// With an Epson FX 80, the response is:
//       EPSON9,Epson FX-80
// With an HP Laserjet running postscript, the
// response is:
//       pscript,HP LaserJet IIISi PostScript
```

You can set the print driver with _pdriver:

```
_pdriver="pscript"
```

_peject

Topic group Related topics Example

Determines whether dBASE ejects a sheet of paper before and after a PRINTJOB.

Syntax

_peject = <expC>

<expC>

The character expression "before", "after", "both", or "none".

Default

The default for _peject is "before", which tells the printer to eject a sheet of paper before starting the print job.

Description

Use _peject to specify if and when the printer should eject a sheet of paper. Assign a new value to _peject (and to any other system memory variable) before issuing PRINTJOB in a program to make the new value affect the print job.

The following table describes _peject options.

<expC>	**Result**
"before"	Eject sheet before printing the first page
"after"	Eject sheet after printing the last page
"both"	Eject sheet before and after the print job
"none"	Don't eject sheet before or after the print job

Note: The _peject system memory variable is distinct from the EJECT command, which tells the printer to advance the paper to the top of the next page.

_peject example

This example shows the four possible _peject setting. The last setting is operational in the PRINTJOB:

```
_peject="before"
_peject="after"
_peject="both"
_peject="none"
// _peject must be set before printjob
printjob
 ? "Hello World"
endprintjob
```

_pepage

Topic group Related topics Example

Specifies the page number of the last page of a print job.

Syntax

_pepage = <expN>

<expN>

The page number of the last page to print. The valid range is 1 to 32,767, inclusive. You must specify a positive integer for <expN>.

Default

The default for _pepage is 32,767.

Description

Use _pepage to stop printing a print job at a specific page number. Pages with numbers greater than _pepage don't print. To begin printing at a specific page number, use _pbpage.

If you set _pepage to a value less than _pbpage, dBASE returns an error.

_pepage example

This example selects two pages from a PRINTJOB. The program prints 500 lines of output and prints the page and line number on each line as in the example for _plineno. Here, the ending page number is set to 2 so that only pages 1 and 2 print:

```
_pageno=1
_pbpage=1       // reset the default pbpage
_pepage=2       // end on page 2
set printer on
printjob
for i=1 TO 500
  ?? "Page",_pageno," Line",_plineno
  ?                     // now force a linefeed
endfor
endprintjob
set printer off
close printer           // begin printing
```

The ? command issues a linefeed before processing consequently in this case, the correct line number is obtained by using ??.

_pform

Topic group | Related topics | Example

Identifies the current print form file or activates another one.

Syntax

_pform = <filename>

<filename>

The name of a print form file (.PRF).

Default

The default for _pform is an empty string ("").

Description

Use _pform to determine the name of the current print form file or to activate another one. A print form file (.PRF) is a binary file that contains print settings for printing a print job. The print form file contains the following system memory variables:

Variable	Action
_padvance	Determines whether the printer advances the paper with a formfeed or linefeeds.
_pageno	Determines or sets the current page number.
_pbpage	Specifies the page number at which PRINTJOB begins printing.
_pcopies	Specifies the number of copies to print in a printjob.
_pdriver	Activates a specified printer driver. (If the print form file is from dBASE IV, *Visual* dBASE ignores this value.)
_peject	Controls page ejects before and after PRINTJOB.
_pepage	Specifies the number of the last page that PRINTJOB prints.
_plength	Specifies the number of lines per page for streaming output.
_ploffset	Determines the width of the left border on a printed page.
_ppitch	Sets the printer pitch, the number of characters per inch that the printer prints.
_pquality	Specifies if the printer prints in letter-quality or draft mode.
_pspacing	Sets the line spacing for streaming output.

When you specify a print form file by assigning its name to _pform, the values stored in the file are assigned to their respective variables. Jobs you send to the printer then behave in accordance with these variables.

_pform example

This example assumes there are two reports, Report1 and Report2. It uses Report1's print form file, Report1.PRF to print Report2:

```
_pform= "Report1"
report form Report2
```

_plength

Topic group Related topics Example

Specifies the number of lines per page for streaming output.

Syntax

_plength = <expN>

<expN>

The number of lines per page. The valid range is 1 to 32,767, inclusive. You can specify a fractional number for <expN> to position output accurately with a proportional font.

Default

The default page length is determined by the default page size of the current printer driver and the current page orientation (portrait or landscape).

Description

Use _plength to specify a page length that is different from the default of the current printer driver. For example, to print short pages, such as checks that are 20 lines long, set _plength to the length of the output (20 in this example) and _padvance to "LINEFEEDS" to advance to the top of the next page.

When you change printer drivers or page orientation, dBASE changes the value of _plength automatically. You can change printer drivers in dBASE by issuing CHOOSEPRINTER() or by assigning a value to _pdriver. In Windows, you can change printer drivers with the Printers program of the Control Panel (however, it won't take effect until you quit dBASE and start a new dBASE session). You can change page orientation in any of these ways or, in dBASE, by changing the value of _porientation.

_plength example

This example sets the form length to 10 lines and prints 25 lines of output. Each line simply prints line number and count (1 through 25). A three-line heading prints "Top of Page" on each line 1:

```
_plength=10
_pageno=1
_plineno=0
set printer on
for i=1 TO 25
  if _plineno=0  // At first line of page
    ?
    ? "Top of Page ",_pageno
    ?
  endif
  ? "Line",_plineno,"i=",i
endfor
set printer off
close printer
// The first two pages are:
//
// Top of Page           1
//
// Line          3.00 i=          1
// Line          4.00 i=          2
// Line          5.00 i=          3
// Line          6.00 i=          4
// Line          7.00 i=          5
// Line          8.00 i=          6
// Line          9.00 i=          7
//
// Top of Page           2
//
// Line          3.00 i=          8
// Line          4.00 i=          9
// Line          5.00 i=         10
// Line          6.00 i=         11
// Line          7.00 i=         12
// Line          8.00 i=         13
// Line          9.00 i=         14
```

_plineno

Topic group | Related topics | Example

Identifies or sets the current line number of streaming output.

Syntax

_plineno = <expN>

<expN>

The line number at which to begin printing. The valid range is 0 to _plength - 1. You can specify a fractional number for <expN> to position output accurately with a proportional font.

Default

The default for _plineno is 0.

Description

Use _plineno to position printing streaming output from commands such as ?, ??, and LIST.

The PROW() function also returns the current printhead position of the printer, but if SET PRINTER is OFF, the PROW() value doesn't change. _plineno, on the other hand, returns or assigns the current position in the streaming output regardless of the SET PRINTER setting.

_plineno example

This example prints 32 lines of output on four pages. The page length is set at 10 lines per page, and the report prints the page and line number on each line using _pageno and _plineno:

```
_pbpage=1       // reset the default pbpage
_pepage=32767   // reset the default pepage
_plength=10     // set the page length to 10 lines
_pageno=1
set printer on
printjob        // printjob resets _plineno to 0
for i=1 TO 32
  if _plineno=0  // At first line of page
    //?
    ? "Top of Page ",_pageno
    ?
  endif
  ?? "Page",_pageno," Line",_plineno,i
  ?                    // now force a linefeed
endfor
endprintjob
set printer off
close printer
// The first two pages of output appear as follows:
//
// Top of Page           1
// Page          1  Line          2.00          1
// Page          1  Line          3.00          2
// Page          1  Line          4.00          3
// Page          1  Line          5.00          4
// Page          1  Line          6.00          5
// Page          1  Line          7.00          6
// Page          1  Line          8.00          7
// Page          1  Line          9.00          8
//
// Top of Page           2
// Page          2  Line          2.00          9
// Page          2  Line          3.00         10
// Page          2  Line          4.00         11
// Page          2  Line          5.00         12
// Page          2  Line          6.00         13
// Page          2  Line          7.00         14
// Page          2  Line          8.00         15
// Page          2  Line          9.00         16
```

_ploffset

Topic group Related topics Example

Displays or sets the width of the left border of a printed page.

Syntax

_ploffset = <expN>

<expN>

The column number at which to set the left margin. The valid range is 0 to 254, inclusive. You can specify a fractional number for <expN> to position output accurately with a proportional font.

Default

The default for _ploffset is 0. To change the default, set the MARGIN parameter in VDB.INI.

Description

Use _ploffset (page left offset) to specify the distance from the left edge of the paper to the left margin of the print area. Use _lmargin to set the left margin from the _ploffset column. For example, if _ploffset is 10 and _lmargin is 5, output prints from the 15th column.

The _ploffset system memory variable is equivalent to the SET MARGIN value. Changing the value of one changes the other. For more information, see SET MARGIN.

_porientation

Topic group Related topics Example

Determines whether the printer prints in portrait or landscape mode.

Syntax

_porientation = <expC>

<expC>

The character expression "PORTRAIT" or "LANDSCAPE".

Default

The default for _porientation is the orientation you specify with the Printers program of the Windows Control Panel or, in dBASE, with the CHOOSEPRINTER() function. By default, this orientation is portrait.

Description

Use _porientation to specify whether you want to print in portrait or landscape mode. When you print in portrait mode, each page is read vertically; a standard American letter-size piece of paper is 8.5 inches wide by 11 inches long. When you print in landscape mode, each page is read horizontally; a standard American letter-size piece of paper is 11 inches wide by 8.5 inches long.

Most printer drivers support landscape printing; however, if you specify landscape while using a printer driver that doesn't support it, the printer continues to print in portrait mode, possibly truncating text.

Changing page orientation automatically resets _plength.

_porientation example

_porientation has two settings:

```
_porientation="portrait"
_porientation="landscape"
```

It takes effect only on a page boundary.

_ppitch

Topic group | Related topics | Example

Sets the printer pitch, the number of characters per inch that the printer prints.

Syntax

_ppitch = <expC>

<expC>

The character expression "pica", "elite", "condensed", or "default".

Default

The default for _ppitch is "default", the pitch defined by your printer's settings or by setup codes or commands you sent to the printer before you started dBASE. "Default" means that dBASE hasn't sent any pitch control codes to the printer.

Description

Use _ppitch to set the pitch (characters per inch) on the printer. The _ppitch setting sends a control code appropriate to the current printer driver. Use the Windows Control Panel or CHOOSEPRINTER() to select the printer driver.

When you direct output to the printer, dBASE maps each character according to the coordinate plane, a two-dimensional grid. The coordinate plane is divided into character cells whose sizes depend on the value of _ppitch. The height of each character cell is determined by the size of the font.

The following table lists _ppitch values.

_ppitch value	Character cell width
"pica"	1/10" (10 characters/inch)
"elite"	1/12" (12 characters/inch)
"condensed"	1/17" (17 characters/inch)

If you change the value in other system memory variables such as _lmargin, _rmargin, and _ploffset, dBASE takes the current value of _ppitch into consideration when calculating the cell width of the coordinate plane. This happens regardless of whether you're printing with proportional or monospaced fonts.

_ppitch example

This example shows the three settings of _ppitch:

```
s_ppitch=_ppitch  // save current pitch
set printer on
_ppitch="pica"
? "John Brown's body: 10 characters per inch"
_ppitch="elite"
? "John Brown's body: 12 characters per inch"
_ppitch="condensed"
? "John Brown's body: 17 characters per inch"
_ppitch=s_ppitch        // restore original setting
close printer
```

_ppitch is not valid for all printers.

_pquality

Topic group Related topics Example

Specifies whether the printer prints in letter-quality or draft mode. Used primarily with dot-matrix printers; the _pquality value usually has no effect on printers that don't support draft mode, such as laser and Postscript printers.

Syntax

_pquality = <expL>

<expL>

The logical expression *true* for letter quality and *false* for draft quality.

Default

The default for _pquality is *false* for draft mode.

Description

Use _pquality to determine whether the printer prints in letter-quality or draft mode. Letter-quality mode produces printed copy of higher quality (finer resolution) than draft; however, draft mode usually prints more quickly than letter-quality, depending on the printer.

_pquality example

This example shows the two settings for print quality. Print quality cannot be changed in mid page and might or might not be available on your printer:

```
close printer
set printer on
_pquality= false     // draft quality
? "John Brown's body"
close printer
_pquality= true     // letter quality
? "John Brown's body"
close printer
```

_pspacing

Topic group | Related topics | Example

Sets the line spacing for streaming output.

Syntax

_pspacing = <expN>

<expN>

The amount of line spacing. The valid range is 1 to 3, inclusive:

- A value of 1 represents single spacing.
- A value of 2 represents double spacing. There is one blank line between printed lines.
- A value of 3 represents triple spacing. There are two blank lines between printed lines.

Paragraph spacing is in multiples of the height of the line just printed, which depends on the tallest font used in printing the line. You can specify a fractional number for <expN> to space text by partial line heights.

Default

The default for _pspacing is 1, which sets line spacing to single-line.

Description

Use _pspacing to set the line spacing of streaming output from commands such as ?, ??, and LIST. To insert a single blank line into output, use the ? command.

_pspacing example

This example uses _pspacing to set the spacing to 1 then 2 lines between lines of text and finally back to 1 line:

```
_pspacing=1
? "Jack 1"
? "Jill 1"
_pspacing=2
? "Jack 2"
? "Jill 2"
_pspacing=1
? "Jack 1"
? "Jill 1"
// produces:
//          Jack 1
//          Jill 1
//
//          Jack 2
//
//          Jill 2
//          Jack 1
//          Jill 1
```

Notice that _pspacing takes place immediately so that the double spacing occurs before Jack 2 and before Jill 2.

_rmargin

Topic group Related topics Example

Defines the right margin for ? and ?? command output when _wrap is true.

Syntax

_rmargin = <expN>

<expN>

The column number of the right margin. The valid range is 0 to 255, inclusive. You can specify a fractional number for <expN> to position output accurately with a proportional font.

Default

The default for _rmargin is 79.

Description

Use _rmargin to set the right margin for output from the ? and ?? commands. The value of _rmargin must be greater than the value of _lmargin or _lmargin + _indent. For example, if _lmargin and _indent are both set to 5, _rmargin must be greater than 10 to display at least one column of output.

When you direct output to the printer, dBASE maps each character according to the coordinate plane, a two-dimensional grid. The coordinate plane is divided into character cells whose widths depend on the value of _ppitch. See the table in the description of _ppitch, which lists _ppitch values. The height of each character cell is determined by the size of the font.

If you change the value of _rmargin, dBASE takes the current value of _ppitch into consideration when calculating the cell width of the coordinate plane. This happens regardless of whether you're printing with proportional or monospaced fonts.

_rmargin example

The following example sets wrap on and then changes the left margin and displays text:

```
savewrap=_wrap                          // save last wrap setting
_wrap=true                               // must be true for alignment
savelmargin=_lmargin                    // save last alignment setting
_lmargin=5
savermargin=_rmargin                    // save last alignment setting
_rmargin=20
? "New York, Chicago and Boston are cold in wintertime."
// Now the text wraps around between columns 5 and 20
_rmargin=savermargin                    // restore the previous margin
_lmargin=savelmargin                    // restore the previous margin
_wrap=savewrap                          // reset wrap
```

_tabs

Topic group Related topics Example

Sets one or more tab stops for output from the ? and ?? commands.

Syntax

_tabs = <expC>

<expC>

The list of column numbers for tab stops. If you set more than one tab stop, the numbers must be in ascending order and separated by commas. Enclose the entire list in quotation marks. You can specify fractional numbers for <expC> to position output accurately with a proportional font.

Default

The default for _tabs is an empty string ("").

Description

Use _tabs to define a series of tab stops. If _wrap is true, dBASE ignores tab stops equal to or greater than _rmargin.

When you direct output to the printer, dBASE maps each character according to the coordinate plane, a two-dimensional grid. The coordinate plane is divided into character cells whose widths depend on the value of _ppitch. See the table in the description of _ppitch, which lists _ppitch values. The height of each character cell is determined by the size of the font.

If you change the value of _tabs, dBASE takes the current value of _ppitch into consideration when calculating the cell width of the coordinate plane. This happens regardless of whether you're printing with proportional or monospaced fonts.

If you send a tab character, CHR(9), with ? or ??, dBASE expands it to the amount of space required to reach the next tab stop. If the tab character you send is past the last tab stop, dBASE ignores it, displaying output starting in the current column.

_tabs example

The following program makes two tab stops at columns 5 and 20 The array A is displayed beginning at the first tab stop, and its position in the array (i) is displayed at the second tab stop:

```
_tabs="5,20"   // tab stops at columns 5 and 20
a = { "One", "Two" }
for i=1 to 2
  ? chr(9),A[i],chr(9),ltrim(str(i))
endfor
// chr(9) is equivalent to the tab key
// produces:
//     One            1
//     Two            2
```

_wrap

Topic group Related topics Example

Determines if streaming output wraps between margins specified by _lmargin and _rmargin.

Syntax

_wrap = <expL>

<expL>

The logical expression *true* or *false*.

Default

The default for _wrap is *false*, which disables wrapping.

Description

Set _wrap to *true* to wrap streaming output from commands such as ?, ??, and LIST within the margins you specify with _lmargin and _rmargin.

When you enable wrapping, *Visual* dBASE wraps text onto the next line, breaking between words or numbers, when the output reaches the right margin. When you disable wrapping, *Visual* dBASE extends text beyond the right margin, moving to the next line only when a carriage return and linefeed combination (CR/LF) occurs in the text.

The print formatting commands _alignment, _indent, _lmargin, and _rmargin require _wrap to be *true.*

When _wrap is *true*, *Visual* dBASE stores streaming output in a buffer until it finishes displaying or printing the current line. If you generate output with the ? command, follow it with another ? command to force the last line of text to print.

_wrap example

```
_lmargin=5
_rmargin=15
string="Now is the time for all men and women to come to..."
_wrap=false
? string
// wrap false displays as:
// Now is the time for all men and women to come to...
_wrap=true
? string
// wrap true displays as:
//     Now is the
//     time for
//     all men and
//     women to
//       come to...
```

Extending *Visual* dBASE with DLLs, OLE and DDE

Topic group

The classes and elements described in this section of the Help file allow you to extend *Visual* dBASE to work with Dynamic Link Libraries (DLLs) and other Windows resources, as well as communicate directly with other Windows programs through both the Object Linking and Embedding (OLE) and Dynamic Data Exchange (DDE) mechanisms.

class DDELink

Topic group Related topics Example

Initiates and controls a DDE link between *Visual* dBASE and a server application, allowing *Visual* dBASE to send instructions and data-exchange requests to the server.

Properties

The following table lists the properties of the DDELink class.

Property	Default	Description
advise()	N/A	Requests that the server notify the client when an item in the server document changes
className	DDELINK	Identifies the DDELink class
execute()	N/A	Sends instructions to the server in its own language
initiate()	N/A	Starts a conversation with a DDE server application
onNewValue	N/A	Executes a subroutine when an item in the server application changes
peek()	N/A	Retrieves a data item stored in a server document
poke()	N/A	Inserts a data item into a server document
reconnect()	N/A	Restores a DDE link that was terminated with *terminate*()
release()	N/A	Removes the DDELink object definition from memory
server	N/A	Contains the name of the server you specified with the *initiate*() method
terminate()	N/A	Terminates the link with the server application
timeout	1000	Determines the amount of time *Visual* dBASE waits for a transaction before returning an error
topic	Empty string	Contains the name of the topic you specified with the *initiate*() method
unadvise()	N/A	Asks the server to stop notifying the DDELink object when an item in the server document changes

Description

Use a DDELink object to open a channel of communication (known as a DDE link) between *Visual* dBASE and an external Windows application (known as a server).

You can exchange data and instructions through this link, making the two applications work together. For example, you could use a DDELink object to open, send data to, format and print a document in your word processor, or open a spreadsheet and then exchange and update table data. You can also run separate *Visual* dBASE sessions and use one as a DDE client and the other as a server (as shown in the class DDELink and class DDETopic examples).

A DDE link is established with the *initiate*() property. If the server application isn't already running, *initiate*() attempts to start it. If the attempt is unsuccessful, *initiate*() returns *false*.

class DDELink example

This sample application uses a DDE link to send data to a DDE server and optionally receive notification updates. The server program, shown in the class DDETopic example, runs in a second instance of *Visual* dBASE. For a demonstration of multiple-client DDE interaction, create and run another form using this same code, but change the DDE topic from “TEST” to any other name. At the same time, try linking another DDE client to the *Visual* dBASE server program using some other Windows program, such as Microsoft Word (code for a Word 95 macro to do just that appears at the bottom of this topic).

```
** END HEADER -- do not remove this line
//
// Generated on 10/01/97
//
parameter bModal
local f
f = new stockclientForm()
if (bModal)
   f.mdi = false // ensure not MDI
   f.readModal()
else
   f.open()
endif
class stockclientForm of FORM
   with (this)
      onOpen = class::FORM_ONOPEN
      onClose = class::FORM_ONCLOSE
      scaleFontBold = false
      height = 6.0455
      left = 3.8571
      top = 1.3182
      width = 42
      text = "Stock Client 2000"
   endwith
   this.NOTIFYTEXT = new TEXT(this)
   with (this.NOTIFYTEXT)
      height = 1
      left = 2
      top = 2
      width = 38
      border = true
      metric = 0
      colorNormal = "BtnText"
      fontSize = 8
      text = "Welcome to Stock Client 2000"
      borderStyle = 7
   endwith
   this.SHARES = new SPINBOX(this)
   with (this.SHARES)
      height = 1
      left = 2
      top = 4
      width = 12
      metric = 0
      picture = "99999"
      step = 10
      rangeMax = 10000
      rangeMin = 1
```

```
   fontSize = 8
   value = 10
   rangeRequired = true
   borderStyle = 7
endwith
this.BUYBUTTON = new PUSHBUTTON(this)
with (this.BUYBUTTON)
   onClick = class::BUYBUTTON_ONCLICK
   height = 1
   left = 18
   top = 4
   width = 10
   text = "&Buy"
   metric = 0
   fontSize = 8
   group = true
endwith
this.SELLBUTTON = new PUSHBUTTON(this)
with (this.SELLBUTTON)
   onClick = class::SELLBUTTON_ONCLICK
   height = 1
   left = 30
   top = 4
   width = 10
   text = "&Sell"
   metric = 0
   fontSize = 8
   group = true
endwith
this.NOTIFYBUYCHECKBOX = new CHECKBOX(this)
with (this.NOTIFYBUYCHECKBOX)
   onChange = class::NOTIFYBUYCHECKBOX_ONCHANGE
   height = 0.8636
   left = 2
   top = 1
   width = 16
   text = "Notify on Buy"
   metric = 0
   colorNormal = "WindowText/BtnFace"
   fontSize = 8
   value = false
   group = true
endwith
this.NOTIFYSELLCHECKBOX = new CHECKBOX(this)
with (this.NOTIFYSELLCHECKBOX)
   onChange = class::NOTIFYSELLCHECKBOX_ONCHANGE
   height = 0.8636
   left = 24
   top = 1
   width = 16
   text = "Notify on Sell"
   metric = 0
   colorNormal = "WindowText/BtnFace"
   fontSize = 8
   value = false
   group = true
endwith
```

```
   // {Linked Method} form.buybutton.onClick
   function BUYBUTTON_onClick
      form.ddeClientObj.poke( "Buy", "" + form.shares.value  )
      return
   // {Linked Method} form.onClose
   function form_onClose
      form.ddeClientObj.terminate()
      form.ddeClientObj.release()
      return
   // {Linked Method} form.onOpen
   function form_onOpen
      this.ddeClientObj = new StockDDELink()
      with this.ddeClientObj
        parent = this
        timeout = 30
        initiate( "STOCKSERVER", "TEST" )
        msgbox( "Connecting to " + server ;
           + ". Account holder: " + topic ;
           + ". Current holdings: " + peek( "Buy" ),;
           "Stock Client 2000")
      endwith
   // {Linked Method} form.notifybuycheckbox.onChange
   function NOTIFYBUYCHECKBOX_onChange
      if this.value
        form.ddeClientObj.advise( "Buy" )
      else
        form.ddeClientObj.unAdvise( "Buy" )
      endif
      return
   // {Linked Method} form.notifysellcheckbox.onChange
   function NOTIFYSELLCHECKBOX_onChange
      if this.value
        form.ddeClientObj.advise( "Sell" )
      else
        form.ddeClientObj.unAdvise( "Sell" )
      endif
      return
   // {Linked Method} form.sellbutton.onClick
   function SELLBUTTON_onClick
      form.ddeClientObj.poke( "Sell", "" + form.shares.value  )
      return
endclass
class StockDDELink of DDELink
  this.parent = null
  function onNewValue( item, value )
  this.parent.notifyText.text := "Notified of changes in: " + item + " now: "
+ value
endclass
```

This Word for Windows 95 macro also lets you communicate with the *Visual* dBASE DDE stock server program described in the class DDETopic example. You can use this macro from within Word at the same time as you use the *Visual* dBASE DDE client application described above to communicate with the *Visual* dBASE server running in a separate instance.

```
'Word 95 macro to communicate with VdB Stock Server dde sample
Sub MAIN
   DDETerminateAll
   channel = DDEInitiate("STOCKSERVER", "w4w95")
```

```
   DDEExecute channel, "Execute"
   DDEPoke channel, "sell", "150"
   DDETerminate channel
End Sub
```

class DDETopic

Topic group Related topics Example

Determines the actions taken when *Visual* dBASE receives requests from a DDE client.

Properties

The following table lists the properties of the DDETopic class.

Property	Default	Description
className	DDETOPIC	Identifies the DDETopic class
notify()	N/A	Notifies all client applications that a *Visual* dBASE item was changed
onAdvise	N/A	Executes a subroutine when an external application creates a hot link
onExecute	N/A	Executes a subroutine when a client application sends a directive to *Visual* dBASE
onPeek	N/A	Executes a subroutine when the client requests a value from *Visual* dBASE
onPoke	N/A	Executes a subroutine when the client inserts a new value into a *Visual* dBASE item
onUnadvise	N/A	Executes a subroutine when a client removes a hot link from a particular item
release()	N/A	Removes the DDETopic object definition from memory
topic	N/A	The DDETopic object's topic

Description

Use a DDETopic object to determine what *Visual* dBASE does for a client application when *Visual* dBASE is the server in a DDE link.

As a server application, *Visual* dBASE accepts directives from a client application, accepts and sends data items to the server application, and performs whatever actions you specify with DDETopic object properties. For example, an *onPoke* subroutine might receive a field name and a field value from a client application, insert the value into the designated field, and notify the client application with the *notify*() method.

You usually create a DDETopic object in an initiation-handler routine, which you assign to the OnInitiate property of _app. An initiation-handler executes when a client application requests a DDE link with *Visual* dBASE.

For information on using *Visual* dBASE as a client application, see class DDELink.

When you create a DDETopic object with the *new* operator, specify the <topic> parameter. This value is automatically placed in the *topic* property of the new DDETopic object. External applications use this property to identify the object and establish a DDE link. For example, the following command creates a DDETopic object, and puts "MyTopic" in the *topic* property:

```
OurTopic = new ddetopic("MyTopic")
```

A Quattro Pro spreadsheet could then execute the following internal command to invoke the new object:

```
{initiate "VDB", "MyTopic"}
```

DDETopic example

The following program creates a DDE service in an instance of *Visual* dBASE. This server handles information passed to it from multiple DDE clients, including those set up in the *Visual* dBASE application (using a separate *Visual* dBASE instance) and Microsoft Word macro shown in the the class DDELink example.

```
set procedure to program(1) additive
_app.ddeServiceName = "STOCKSERVER"
_app.onInitiate = InitStockDDE
_app.framewin.text = "Stock Server 2000"
function InitStockDDE(newTopic)
  // DDETopic object not in memory, create it
  local x
  x = new StockDDETopic(newTopic)
  ? "server is initialized"
  return x  //  Must return requested topic
class StockDDETopic(t) of DDETopic(t)
  ? "Creating", this.className, "topic", t
  this.adviseList = new AssocArray()
  this.value      = 100
  function onAdvise(item)
    ? this.topic, "ADVISE on changes in:", item
    this.adviseList[ upper( item ) ] = null  // Create element with dummy
value
  function onExecute(cmd)
    ? this.topic, "EXECUTE: ", cmd
  function onPeek(item)
    ? this.topic, "PEEK: ", item
    return this.value
  function onPoke(item /* Buy or Sell */, value /* Shares */ )
    ? this.topic, "POKE: ", item, value
    if upper(item) = "SELL"
      this.value -= val( value )
    elseif upper(item) = "BUY"
      this.value += val( value )
    endif
    // Notify client if item in adviseList
    if this.adviseList.isKey( upper( item ))
      ? this.topic, "NOTIFY change in:", item
      this.notify( upper( item ) )
    endif
    ? this.value
  function onUnadvise(item)
    if this.adviseList.isKey( upper( item ))
      ? this.topic, "cancel ADVISE on changes in:", item
      this.adviseList.removeKey( upper( item ))
    endif
endclass
```

class OleAutoClient

Topic group Example

Creates an OLE2 controller that attaches to an OLE2 server.

Syntax

[<oRef> =] new OleAutoClient(<server expC>)

<oRef>

A variable or property in which you want to store a reference to the newly created OleAutoClient object.

<server expC>

The name of the OLE Automation server. The name is of the form, “app.object”; for example, “word.application”

Properties

The properties, events, and methods of each instance of the OleAutoClient class depend on the attached OLE automation server.

Description

OLE automation allows you to control another application, an OLE automation server, through an OLE automation client. For example, with a full-featured word processor as an OLE automation server, you could do the following all on the server machine:

- Start the word processor
- Open an order form
- Fill in data that was entered in a client browser
- Fax that order form to a customer
- Close the word processor

With *Visual* dBASE as the host for the OLE automation client, you could control the entire process from a browser. You don’t even need the word processor to be installed on the *Visual* dBASE client, just on the *Visual* dBASE server machine.

Visual dBASE’s dynamic object model is a natural host for OLE automation clients. Because there is no need to declare the capabilities of the OLE automation server as you would with a statically linked language, you can specify any OLE Automation server at run time, and use whatever capabilities it has.

Once you create the OleAutoClient object, the properties, events, and methods the OLE automation server provides are accessed through the OleAutoClient object, just as with stock *Visual* dBASE objects. You can also *inspect*() the OleAutoClient object’s properties.

class OleAutoClient example

These examples show how to use OleAutoClient to gather a list of Microsoft Word “Normal” template macros and run a Word macro from *Visual* dBASE. Examples are provided for both Word 95 and Word 97.

Word 95 example 1:

```
// Assign a new Word.Basic object.
// If Word is already running, the object uses the running instance.
// If Word is not running, an instance is created, but hidden.
// To make the instance visible, use the Word AppShow() command.
w = new OleAutoClient("word.basic")
w.AppShow()
// Clear the Command window,
// list all macros and descriptions in the Normal template
clear
for m = 1 to w.countmacros(0)
   n = w.macroname(m, 0)
   ? n
   ? w.macrodesc(n)
next count
// to run a macro named "Macro1"
w.toolsmacro("Macro1",true)
// Dismiss the object. If Word was already open when this routine was run, it
remains open but releases the object. If you opened Word with this routine,
the object is released and Word is removed from the task list. If you also
made Word visible with AppShow(), the app is closed.
w= ""
```

Word 95 example 2. Scenario: A form offers lists containing two corresponding associative arrays of Word documents and available printers. When the user selects a document and a printer, a single button opens the selected Word document, shows Word’s printer set up dialog, prints the document and then closes the document.

```
function printButton_onClick()
  local w
  w = new OleAutoClient( "word.basic" )
  w.FileOpen( this.form.aDocs[ this.form.docSelect.value ] )
  w.FilePrintSetup( this.form.aPrinter[ this.form.printerSelect.value ] )
  w.FilePrint()
  w.FileClose()
```

Word 97 example (equivalent to 95 example 1):

```
// Assign a new Word application object.
// If Word is already running, the object uses the running instance.
// If Word is not running, an instance is created, but hidden.
// To show it, you can use Word's Visible property.
w = new OleAutoClient("Word.Application.8")
w.Visible = true
// Clear the Command window,
// list the names of all macros (grouped into VBComponents in Word 97)
// in the Normal template.
clear
for i = 1 to w.NormalTemplate.VBProject.VBComponents.Count
? w.NormalTemplate.VBProject.VBComponents.Item(i).Name
next i
w.Application.Run("Macro1")
w.Application.Quit()
```

advise()

Topic group Related topics Example

Creates a DDE hot link to enable the passing of notification messages whenever a specified topic item changes in the server application.

Syntax

advise (<expC>)

<expC>

Name of the topic item you want to monitor.

Description

Use the *advise*() method to create a hot link to an item in a server topic. A hot link requires the server application to notify *Visual* dBASE when the value of a specified item changes.

A server topic can be anything that the server application understands, but it is most often a document, spreadsheet or database that you *initiate*d in the external application. If, for example, you use *initiate* to open a spreadsheet application as the server application and a worksheet as a topic, you could specify any item or range in the worksheet as the topic item you want monitored for changes.

When your client application is notified of a change, you can handle it in an *onNewValue* subroutine.

execute()

Topic group Related topics Example

Sends a command string to a DDE server application in its own language.

Syntax

execute (<expC>)

<expC>

Command or macro to send to the DDE server application.

Description

Use the *execute*() method to send commands to DDE server applications.

The command string must be in the language of the server application.

Be sure to enclose commands in the delimiters required by the server application. For example, Quattro Pro commands must be enclosed in braces ({}), while Word for Windows 95 commands are enclosed in brackets ([]). Some applications accept multiple commands separated by brackets. For information, consult your DDE server documentation.

Before you can send a command string to a server, you must open the server application, open the document, and establish a DDE link. For information on establishing DDE links, see *initiate*().

execute() example

This example opens a Word for Windows 95 document, prints it, and closes the connection.

```
w = new ddelink()
w.initiate("winword","c:\my documents\myletter.doc")
w.execute("[FILEPRINT]")
w.terminate()
w = ""
```

EXTERN

Topic group Related topics Example

Declares a prototype for a non-*Visual* dBASE function contained in a DLL file.

Syntax

EXTERN [CDECL | PASCAL | STDCALL] <return type> <function name>
([<parameter type> [, <parameter type> ...]])
<filename>

or

EXTERN [CDECL | PASCAL | STDCALL] <return type> <user-defined function name>
([<parameter type> [, <parameter type> ...]])
<filename>
FROM <export function name expC> | <ordinal number expN>

Because you create a function prototype with EXTERN, parentheses are required as with other functions.

CDECL | PASCAL | STDCALL

Sets the function calling convention. The default is STDCALL.

<function name>

The export name of the function. The export name of an external function is contained in the DEF file associated with the DLL file that holds the function, or explicitly exported in the source code.

Note

With STDCALL and CDECL, function names are case-sensitive.

<return type> and <parameter type>

A keyword representing the data type of the value returned by the function, and the data type of each argument you send to the function, respectively. The following tables list the keywords you can use.

Parameters or return values

Keyword	as pointer	*Visual* dBASE data type	Data type size
CINT	CPTR CINT	Numeric	4 bytes (32 bits)
CLONG	CPTR CLONG	Numeric	4 bytes (32 bits)
CSHORT	CPTR CSHORT	Numeric	2 bytes (16 bits)
CCHAR		Numeric	1 byte (8 bits)
	CSTRING	String	Null-terminated
CHANDLE		Numeric	4 bytes (32 bits)
CUINT	CPTR CUINT	Numeric	4 bytes (32 bits)
CLONG	CPTR CULONG	Numeric	4 bytes (32 bits)
CUSHORT	CPTR CUSHORT	Numeric	2 bytes (16 bits)
CUCHAR		Numeric	1 byte (8 bits)
CFLOAT	CPTR CFLOAT	Numeric	4 bytes (32 bits)
CDOUBLE	CPTR CDOUBLE	Numeric	8 bytes (64 bits)
CLDOUBLE	CPTR CLDOUBLE	Numeric	10 bytes (80 bits)
CLOGICAL	CPTR CLOGICAL	Logical	1 byte (8 bits)
CVOID		none	N/A

Parameters only

Keyword	as pointer	*Visual* dBASE data type	Data type size

CPTR	String
...	N/A

In most cases, if the function expects a pointer as a parameter, *Visual* dBASE will pass a pointer to the value. If a function returns a pointer, *Visual* dBASE will get the value at the pointer and convert it into the appropriate *Visual* dBASE data type.

CCHAR is actually a numeric data type, represeting a single-byte value. When passing a CCHAR parameter, you may pass a string; *Visual* dBASE sends the ASCII value of the first character in the string. The return value is always a number.

If the function has no parameters or returns no value, declare the data type as CVOID.

You may use the ... parameter declaration if the calling convention is STDCALL to designate a variable number of parameters.

Using strings

Visual dBASE is a Unicode application; using strings is more complicated in 32-bit programming than in 16-bit programming. Many Windows API functions have both an A (ANSI) and W (wide-character) version. The A functions use single-byte characters, and the W versions use double-byte characters. When calling the A version of a function, always use CSTRING. When calling the W version of a function, always use CPTR. When you use CSTRING, *Visual* dBASE will convert the Unicode string it uses into an ANSI string when passing it to the function. After the function call, it converts the ANSI string back into Unicode. With CPTR, no conversion takes place.

When strings (CSTRING or CPTR) are used as parameters, they are always passed and read back by length. You may include null characters in the string. When a return value is declared as CSTRING, it is read as null-terminated. You cannot use CPTR as a return value.

Using structures

If the function expects a pointer to a structure, declare the parameter as CPTR. Use a string to represent the structure contents. Because *Visual* dBASE strings are Unicode, you must use the String object's *getByte() and setByte() methods to read and write the structure, byte-by-byte.*

<filename>

The name of the DLL file in which the external function is stored. If the extension is omitted, the default is DLL. The file name of any DLL that you load in memory must be unique; for example, you can't load SCRIPT.DLL and SCRIPT.FON into memory concurrently, even though they have different file-name extensions.

If the DLL file is not already loaded into memory, EXTERN loads it automatically. If the DLL file is already in memory, EXTERN increments the reference counter. Therefore, it isn't necessary to execute LOAD DLL before using EXTERN.

The reference counter is incremented only the first time, regardless of how many times you execute the LOAD DLL and EXTERN statements.

You may include a path in <filename>. If you omit the path, *Visual* dBASE looks in the following directories for the DLL by default:

1. The current directory.
2. The Windows directory (for example, C:\WINDOWS).
3. The Windows SYSTEM subdirectory (for example, C:\WINDOWS\SYSTEM).
4. The directory containing VDB.EXE, or the directory in which the .EXE file of your compiled program is located.
5. The directories in the current OS path.
6. The directories mapped for search in a network.

The path specification is necessary only when the DLL file is not in one of these directories.

<user-defined function name>

The name you give to the external function instead of the export name. This is usually used to rename

the A or W version of a function to the generic name. When you specify <user-defined function name> (instead of <function name>), you must use the FROM clause to identify the function in the DLL file.

FROM <export function name expC> | <ordinal number expN>

Identifies the function in the DLL file specified by <filename>. <export function name expC> identifies the function by its name. <ordinal number expN> identifies the function with a number.

Description

Use EXTERN to declare a prototype for an external function written in a language other than *Visual* dBASE. A prototype tells *Visual* dBASE to convert its arguments to data types the external function can use, and to convert the value returned by the external function into a data type *Visual* dBASE can use.

To call an external DLL function, first prototype it with EXTERN. Then, using the name of the function you specified with EXTERN, call the function as you would any *Visual* dBASE function. You must prototype an external function before you can call that function in *Visual* dBASE.

The external function may be in any 32-bit DLL, such as the Windows API or a third-party DLL file. Although most library code is contained in files with extensions of DLL, such code can be held in EXE files, or even in DRV or FON files.

EXTERN example

Suppose you want to add the Cascade option to your menubar's Window menu. This ability is not built-in, but it can be done easily through the Windows API. To cascade the windows, you send a message to the MDI client window. To get the MDI client window, use the Windows GetParent() function. The SendMessage() function is used to send the message. You add the following to the Header of your .MNU file:

```
if type( "GetParent" ) # "FP"
  extern CHANDLE GetParent( CHANDLE ) User32
endif
if type( "SendMessage" ) # "FP"
  extern CLONG SendMessage( CHANDLE, CUINT, CWORD, CLONG ) User32 from
"SendMessageA"
endif
#define WM_MDICASCADE 0x0227
```

The .MNU file is executed when you assign the file to a form's *menuFile* property, which includes the code in the Header. The two functions are prototyped with EXTERN. First, the TYPE() function is used to see if the function has already been EXTERNed. If so, there's no need to do it again.

The GetParent() function is straightforward: it takes a window handle and returns the handle of the window's parent. A form's window handle is contained in its *hWnd* property. SendMessage() is a bit more complicated. It has both an A version and a W version. The W version does not work in Windows 95, so the A version is used. Note that the function name after the FROM is in quotes—it has to be a character or numeric expression—while the prototyped function name does not. SendMessage() takes a handle to the window, the message, and two parameters to the message. It returns a result value.

Finally, the #define preprocessor directive is used to define a manifest constant for the cascade message number. This #define may be found in the WINUSER.H file, one of the Windows header files in the \Include subdirectory.

Once all the setup is done, calling the function is easy. The *onClick* handler for the Cascade menu item is the codeblock:

```
{; SendMessage( GetParent( form.hWnd ), WM_MDICASCADE, 0, 0 )}
```

The manifest constant in the codeblock is replaced at compile-time. If you examine the codeblock, you will see the number, not the manifest constant.

initiate()

Topic group Related topics Example

Starts a conversation with an external application or aliased DDE server.

Syntax

initiate (<expC1>, <expC2>)

<expC1>

The executable filename of the server application (normally the .EXE extension isn't necessary) or the alias name of a running DDE server.

<expC2>

Name of a built-in DDE topic or topic alias.

Description

Use *initiate*() to open a channel of communication (known as a DDE link) between *Visual* dBASE and a running external Windows application or aliased DDE server.

If you call an external application with *initiate*(), *Visual* dBASE tries to open the application if it is not already running. If the attempt is unsuccessful, *initiate*() returns *false* .

To close the DDE link, use *terminate*().

LOAD DLL

Topic group Related topics Example

Initiates a DLL file.

Syntax

LOAD DLL [<path>] <DLL filename>

[<path>] <DLL name>

The name of the DLL file. <path> is the directory path to the DLL file in which the external function is stored.

Description

Use LOAD DLL to make the resources of a DLL file available to your application.

You can also use LOAD DLL to check for the existence of a DLL file. For example, you can use the ON ERROR command to execute an error trapping routine each time the LOAD DLL command can't find a specified DLL file.

LOAD DLL does not use the *Visual* dBASE path to find DLL files. Instead, it searches the following directories:

1 The current default directory

2 The Windows directory (the directory containing WIN.COM)

3 The Windows system directory (the directory containing GDI.EXE)

4 The directory containing VDB.EXE

5 The directories listed in the DOS environment variable PATH

6 The directories mapped in a network (if any)

A DLL file is a precompiled library of external routines written in non-*Visual* dBASE languages such as C and Pascal. A DLL file can have any extension, although most have extensions of .DLL.

When you initialize a DLL file with LOAD DLL, *Visual* dBASE can access its resources; however, it doesn't become resident in memory until your program or another Windows program uses its resources.

To access a DLL function, create a *Visual* dBASE function prototype with EXTERN. Then, using the name you specified with EXTERN, call the routine as you would any *Visual* dBASE function.

LOAD DLL also loads and registers VBX controls.

LOAD DLL example

The following example uses LOAD DLL to initialize an image resource from a .DLL file:

```
load dll MyPicts.dll
define form Pics from 2,2 TO 20,40
define image MyPict of Pics;
  property dataSource "resource MyPicts.dll 1001", top 5, left 5
open form Pics
```

notify()

Topic group Related topics Example

Notifies a client application that a *Visual* dBASE item was changed.

Syntax

notify(<expC>)

<expC>

Name of the topic item that has changed.

Description

Use *notify*() in a DDE server program to tell a client application that an item in the *Visual* dBASE server session was changed.

onPoke subroutines often execute *notify*() when an external application sends *Visual* dBASE a *poke* request. For example, a Quattro Pro data-exchange application might use its {POKE} command to send *Visual* dBASE a value, causing the *onPoke* subroutine to execute. The *onPoke* subroutine could insert the value into a field, then execute *notify*() to inform Quattro Pro that the field changed.

notify() accepts one parameter, <item>. Use this parameter to tell the client application which field, variable, or array element changed. For example, if an *onPoke* subroutine changed the value in a field named LASTNAME, the subroutine might execute the following command:

```
MyDDETopic.notify("LASTNAME")
```

The client application must establish a hot link before *notify*() has an effect. For information on hot links, see *onAdvise*().

onAdvise

Topic group Related topics Example

Executes a subroutine when an external application requests a DDE hot link to an item in a *Visual* dBASE server topic.

Description

Use *onAdvise* in a DDE server program to respond to a request for a hot link and to determine which *Visual* dBASE data item the link applies to. (A hot link lets you use the *notify*() method to tell the client when the item changes.)

onAdvise receives <item>, a parameter that identifies the *Visual* dBASE data item. Your server program can use this item for any purpose. For example, it might identify a *Visual* dBASE field, variable, or array element.

Item names are often held in tables or array objects when multiple hot links are established. For example, a client application might request a hot link to a field, passing the field name through the <item> parameter. Each time, the *onAdvise* subroutine could place the field name in an array object.

The *onPoke* subroutine could search this array object each time a field is changed; if the name of the changed field is found in the array object, the routine could execute *notify*().

onExecute

Topic group Related topics Example

Executes a subroutine when a client application sends a command string to a DDE server program.

Description

Use the *onExecute* property to perform an action when an external application (known as the client application) sends a directive to *Visual* dBASE. This directive can be any string of characters.

onExecute receives <cmd>, a parameter that contains the directive sent by the client application. If the directive is a *Visual* dBASE command, the subroutine can execute it. For example, the client application might send the character string "CLOSE DATABASES". The subroutine could execute the command using the macro substitution function, as with

```
&Cmd
```

In this case, the macro substitution function (&) makes *Visual* dBASE treat the contents of Cmd as a command instead of a character string.

If the directive is not a command, the subroutine can use it to make branching decisions. For example, a stock trading routine might receive either of two character strings, "BUY" or "SELL". The routine could use an IF...ELSE...endif statement to execute one procedure or another accordingly.

For more information on the DDETopic object class, see class DDETopic.

onNewValue

Topic group Related topics Example

Executes a subroutine when a hot-linked item in a DDE server document changes.

Description

Use *onNewValue* to perform an action when a hot-linked server item is changed. A hot link, which you create with the *advise*() method, tells the server to notify *Visual* dBASE when the item changes.

A server document is a file you open in an external application. For example, a data-exchange application might start a session in Quattro Pro for Windows and open one of its spreadsheet files (the server document). You can establish hot links to one or more cells in the spreadsheet with *advise*(), then use *onNewValue* to specify a codeblock that executes each time one of the cells is changed.

onNewValue receives two parameters:

- <item> identifies the server item written to. It can specify the hot-linked item, such as a field in a table or a cell in a spreadsheet. For example, "A:H3" specifies cell H3 of Page A in a Quattro Pro spreadsheet file.
- <value> is the new value of the hot-linked server item.

The codeblock can use these parameters to evaluate the change and make decisions accordingly.

onPeek

Topic group Related topics Example

Executes a subroutine when a client application tries to read an item from a DDE server application.

Description

Use the *onPeek* property to send a value to a client application when the client application makes a *peek* request.

onPeek receives <item>, a parameter that identifies the *Visual* dBASE data item that the client application wants to read.

Use the RETURN command to send the requested item to the client. For example, a Quattro Pro for Windows application might execute a {PEEK} command, sending a field name through <item>. The *onPoke* subroutine could use RETURN to send the field contents to the client, as with

```
return &Item
```

In this case, the macro substitution function (&) makes *Visual* dBASE treat the contents of Item as a field name instead of a character string, so the contents of the field are sent to the client.

For more information on the DDETopic object class, see class DDETopic.

onPoke

Topic group Related topics Example

Executes a subroutine when a client application attempts to insert a value into a DDE server item.

Description

Use the *onPoke* property to receive a value from a client application and insert it in a data element when the client application makes a *poke* request.

onPoke receives two parameters:

- <item> Identifies the data item in which the value is inserted. This item can be any string.
- <value> Identifies the value to insert in the data item.

For example, a client application might send a field name and a value to put in the field. The *onPoke* subroutine might insert the value in the field using the REPLACE command and the macro substitution function, as with:

```
replace &Item with Value
```

In this case, the macro substitution function (&) makes *Visual* dBASE treat the contents of Item as a field name instead of a character string.

For more information on the DDETopic object class, see class DDETopic.

Note: If a client established a hot link before sending the data, you can execute the *notify*() method from the *onPoke* subroutine, thus informing the client application that a change occurred. For information on hot links, see *onAdvise*().

onUnadvise

Topic group Related topics Example

Executes a subroutine when *Visual* dBASE is requested to stop notifying the client application when a *Visual* dBASE data item changes.

Description

Use the *onUnadvise* method to respond to the termination of a hot link. (A hot link lets you use the *notify*() method to notify the client when an item changes.)

onUnadvise receives the <item> parameter, the name of a *Visual* dBASE data item that the client application monitored. This item can be any *Visual* dBASE field, variable, or array element.

Item names are often held in tables or array objects when multiple hot links are established. For example, when a client application requests a hot link to a field, it passes the field name to the *onAdvise* subroutine. Each time, the *onAdvise* subroutine can place the field name in an array object.

An *onPoke* subroutine can search this array object each time a field is changed. If the name of the changed field is found in the array object, the routine can execute *notify*(). The *onUnadvise* property can remove the field name from the array, preventing further notifications for that field.

peek()

Topic group | Related topics | Example

Retrieves a data item from a DDE server.

Syntax

peek (<expC>)

<expC>

Name of the topic item you want to retrieve.

Description

Use the *peek*() method to read data from a DDE server topic.

peek() takes a data item in the server topic. This item can be any single element, such as a field in a table or a cell in a spreadsheet. For example, you can read cell C2 of Page A in a Quattro Pro spreadsheet file by passing the <item> parameter "A:C2".

PLAY SOUND

Topic group Related topics Example

Plays a sound stored in a .WAV file or a binary field.

Syntax

PLAY SOUND FILENAME <filename> | ? | <filename skeleton> |
or
PLAY SOUND BINARY <binary field>

FILENAME <filename> | ? | <filename skeleton> |
or BINARY <binary field>

Specifies the sound file or binary field. PLAY SOUND FILENAME ? and PLAY SOUND FILENAME <filename skeleton> display a search dialog to let you select a sound file (the .WAV extension is assumed, but you can specify otherwise). PLAY SOUND BINARY <binary field> plays the sound stored in a binary field.

Description

Use PLAY SOUND in your programs to run .WAV files or audio data stored in binary fields.

PLAY SOUND example

This example includes a button that lets the user play stored audio data:

```
local f
f = new pictures ()
f.Open()
class pictures of form
  with (this)
  escExit = true
  view = "pictures.sql"
  this.colorNormal = "BG/B"
  this.text = "Pictures Form"
  this.width =         76.00
  this.top =          0.00
  this.left =          0.00
  this.height =         30.00
  this.minimize = false
  this.maximize = false
  this.onOpen = {;create session}
  define pushbutton sound of this;
    property;
      onClick {;play sound binary pictures->sound},;
        text "Sound",;
        width         18.00,;
        top          5.00,;
        left          1.00,;
        height          3.00,;
        fontSize         16.00,;
        fontName "Courier"
 // Additional object definitions
endclass
```

poke()

Topic group | Related topics | Example

Sends data into a DDE server document.

Syntax

initiate (<expC1>, <expC2>)

<expC1>

Name of the topic item you want to send data to.

<expC2>

The value you want to send (string form only).

Description

Use the *poke*() method to write data to a DDE server application.

For example, a data-exchange program could start a session in Quattro Pro for Windows, open one of its spreadsheet files, and use *poke*() to write a value into one of its cells.

reconnect()

Topic group | Related topics | Example

Attempts to restart a terminated conversation with a DDE server application and returns *true* if successful.

Description

Use *reconnect*() to restore a DDE link that was terminated with the *terminate*() method.

When you terminate a DDE link with *terminate*(), you can restore it with *reconnect*(). When you terminate a link with the *release*() method, however, the link can't be restored and must be recreated using the DDELink object.

reconnect() example

public LinkObj

```
LinkObj = new ddelink()
LinkObj.initiate("STOCKSERVER","StockHolder")
// Subsequent program operations completed; link
// no longer required
LinkObj.terminate()
// Later in program, DDE link object again needed
LinkObj.reconnect()
```

RELEASE DLL

Topic group Related topics Example

Deactivates DLL files.

Syntax

RELEASE DLL <DLL filename list>

Description

Use RELEASE DLL when you debug a DLL file or a *Visual* dBASE application. For example, you must deactivate a DLL file and activate it again each time you change one of its routines.

A DLL file is a precompiled library of external routines written in non-*Visual* dBASE languages such as C and Pascal. A DLL file can have any extension, although most have extensions of .DLL. You activate a DLL file with the LOAD DLL command.

RELEASE DLL example

The following example demonstrates the command sequence for using RELEASE DLL as a trouble shooting tool:

```
load dll mydll.dll
// ... test DLL operation
release dll mydll.dll
// ... change .DLL or C program
load dll mydll.dll
// ... test again
release dll mydll.dll
```

RESOURCE()

Topic group | Related topics | Example

Returns a character string from a DLL file.

Syntax

RESOURCE(<resource id>, <DLL filename expC>)

<resource id>

A numeric value that identifies the character string resource.

<DLL filename expC>

The name of the DLL file.

Description

Use RESOURCE() to generate a character string from a resource in a DLL file. The character string must be less than 32K; a character string longer than this is truncated.

RESOURCE() is often useful for internationalizing applications without changing program code. For example, you can store in a DLL file all character strings that might need translation from one language to another, and your application can retrieve them at run time with the RESOURCE() function. To modify the application for another language, translate the strings and store them in a new DLL file, in the same order and with the same resource IDs as their counterparts in the original DLL file. Then substitute the new DLL for the original one.

RESOURCE example

This example shows how RESOURCE() can be used to change languages for international development:

```
#define ENGLISH 1
#define SPANISH 2
apLanguage = SPANISH
myGreeting = resource(SPANISH,"greeting.dll")
clear
? myGreeting
```

RESTORE IMAGE

Topic group Related topics Example

Displays an image stored in a file or a binary field.

Syntax

RESTORE IMAGE FROM
<filename> | ? | <filename skeleton> | BINARY <binary field>
[TIMEOUT <expN>]
[TO PRINTER]
[[TYPE] PCX | TIF[F] | ICO | WMF | EPS]

FROM <filename> | ? | <filename skeleton> | BINARY <binary field>

Identifies the file or binary field to restore the image from. RESTORE IMAGE FROM ? and RESTORE IMAGE FROM <filename skeleton> display the Open Source File dialog box, which lets the user select a file. <filename> is the name of an image file; RESTORE IMAGE assumes a .BMP extension and file type unless you specify otherwise. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the path you specify with SET PATH. RESTORE IMAGE FROM BINARY <binary field> displays the image stored in a binary field. You store an image in a binary field with the REPLACE BINARY command.

TIMEOUT <expN>

Specifies the number of seconds the image is displayed onscreen.

TO PRINTER

Sends the image to the printer as well as to the screen.

[TYPE] PCX

Specifies an image stored in PCX format, and assumes a .PCX file-name extension if none is given. The word TYPE is optional.

Description

Use RESTORE IMAGE to display a graphic image that was generated and saved in bitmap or PCX format. The image is displayed in a window.

Notes:

RESTORE IMAGE example

The following example defines a form and list box for selection of an aircraft model and uses RESTORE IMAGE to display a graphic from the memo field Image of the selected record:

```
close all
set talk off
use Aircrdb order Aircraft in select()
select Aircrdb
define form AC                ;
   property                   ;
      top 5,                  ;
      left 2,                 ;
      height 13,              ;
      width 30,               ;
      text "Aircraft",        ;
      sizeable true,           ;
      onSelection Photo
define listbox Model OF AC              ;
   property                             ;
      top 2,                            ;
      left 10,                          ;
      height 7,                         ;
      width 18,                         ;
      dataSource "field Aircrdb->Aircraft"
open form AC
function Photo
restore image from binary image
return true
```

DDE *server*

Topic group | Related topics | Example

Holds the name of a DDE server application.

Description

Use *server* to identify the server application that you established a DDE link to.

Create a DDE link with the *initiate*() method. For example, *initiate*() might establish a link to Quattro Pro for Windows, open one of its spreadsheet files, and copy data from its cells into a dBASE table.

server holds the value of the first parameter you passed to *initiate*(), which is the name of the main executable file of the server application.

terminate()

Topic group Related topics Example

Terminates a conversation with a DDE server application.

Description

Use *terminate*() to close a DDE link between *Visual* dBASE and a server application.

terminate() stops communication between *Visual* dBASE and the server application, but doesn't close the server application itself.

When you terminate a DDE link with *terminate*(), you can restore it with *reconnect*. When you terminate the link with the *release*() method, the link can't be restored and you need to create the DDELink object again.

timeout

Topic group | Related topics | Example

Specifies the amount of time in milliseconds that *Visual* dBASE waits on a transaction before returning an error.

Description

Use *timeout* to set a limit on the length of time *Visual* dBASE waits for a DDE transaction to complete successfully.

Errors sometimes occur when *Visual* dBASE tries to exchange data with a server application or send instructions to it. Each time an attempt is made, *Visual* dBASE waits for the amount of time you specify (in milliseconds) with *timeout*. When the transaction fails to complete in the allotted time, *Visual* dBASE generates an error message.

When using DDE over a network, you may need to set *timeout* to a larger value.

topic

Topic group Related topics Example

Holds the name of the server document accessed by a DDELink object or the topic of a DDETopic object.

Description

Use *topic* to

- Identify the topic passed to the *initiate*() method of a DDELink object
- Specify the topic of a DDETopic object

The *topic* property of a DDETopic object distinguishes the object from other DDETopic objects. For example, a *Visual* dBASE server application might create two DDETopic objects, one with a topic of NASDAQ and the other with a topic of AMEX:

```
xServer1 = new ddetopic("NASDAQ")
xServer2 = new ddetopic("AMEX")
```

unadvise()

Topic group | Related topics | Example

Asks the server to stop notifying the client when an item in the server document changes.

Syntax

unadvise (<expC>)

<expC>

Name of an item previously hot-linked using *advise*().

Description

Use the *unadvise*() method to disconnect a hot link to a DDE server item. A hot link, which you create with the *advise*() method, provides a way for the server to inform the client when a specified item, such as a field or a spreadsheet cell, has changed.

IDE overview

Topic group

This section of the *Language Reference* describes language elements that you use within the *Visual* dBASE integrated development environment (IDE) to programmatically create, modify, compile and build applications.

BUILD

Topic group Related topics

Creates a Windows executable file (.EXE) from your *Visual* dBASE object files and resources.

Syntax

BUILD FROM <*project or reponse file name*>

or

BUILD <*filename list*> [ICON <*icon filename*>] [SPLASH <*bitmap filename*>] [TO <*executable filename*>]

FROM <*project or response file name***>**

Name of a *Visual* dBASE project or response file that contains the names of all object files and resources that are to be linked into your executable. If no extension is provided, .PRJ is assumed.

<*filename list***>**

List of compiled program elements, separated by commas. If you provide a filename without an extension, .PRO (compiled program) is assumed.

ICON <*icon filename***>**

Optional icon (.ICO) file used to identify your program in the Windows environment (e.g., when minimized or listed in the Windows Explorer or a program group).

SPLASH <bmp format filename>

Optional bitmap (.BMP) file that displays while your program loads.

TO <*executable filename***>**

The name of the Windows executable file (.EXE) to create. If not specified, the base file name of the named project or response file (or the first file name in <*filename list*>) is used.

Description

Use the BUILD command to link compiled *Visual* dBASE program elements and supporting resources (such as bitmaps and icons) into a Windows executable (.EXE) file.

Though the new project file format is the default for build specifications, support for response (.RSP) files is offered for backward compatibility.

CLEAR ALL

Topic group Related topics

Releases all user-defined memory variables and closes all open files.

Syntax

CLEAR ALL

Description

CLEAR ALL combines the CLEAR MEMORY and CLOSE ALL commands, releasing all user-defined memory variables, closing all open tables in the current workset, and all other files. For more information, see CLEAR MEMORY and CLOSE ALL.

Note: CLEAR ALL does not explicitly release objects. However, if the only reference to an object is in a variable, releasing the variable with CLEAR ALL in turn releases the object.

Use CLEAR ALL during development to clear all variables (and any objects that rely on those references) and close all files to reset your working environment. Because of the event-driven nature of *Visual* dBASE, CLEAR ALL is generally not used in programs.

CLOSE ALL

Topic group Related topics

Closes (almost) all open files.

Syntax

CLOSE ALL

Description

CLOSE ALL closes almost all open files, including:

- All databases opened by the Navigator and with OPEN DATABASE
- All tables opened (with USE) in all work areas in the current workset
- All files opened with low-level file functions, or a File object
- All procedure and library files opened with SET PROCEDURE and SET LIBRARY
- Any text streaming file opened by SET ALTERNATE

It does not close:

- The printer file specified by the SET PRINTER TO command
- Tables or databases opened through the data access objects

Use CLOSE ALL during development to close all files, resetting your working environment, without affecting any variables. To close all files and release all variables, use CLEAR ALL. Because of the event-driven nature of *Visual* dBASE, CLOSE ALL is generally not used in programs.

COMPILE

Topic group Related topics

Compiles program files (.PRG, .WFM), creating object code files (.PRO, .WFO).

Syntax

COMPILE <filename 1> | <filename skeleton>
[AUTO]
[LOG <filename 2>]

<filename 1> | <filename skeleton>

The file(s) to compile. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory only. If you specify a file without including its extension, *Visual* dBASE assumes .PRG.

AUTO

The optional AUTO clause causes the compiler to detect automatically which files are called by your program, and to recompile those files.

LOG <filename 2>

Logs the files that were compiled, and any compiler errors or warning messages to <filename 2>. The default extension for the log file is .TXT.

Description

Use COMPILE to explicitly compile or recompile program files without loading or executing them. *Visual* dBASE automatically compiles program source files into object (bytecode) files when they are loaded (with SET PROCEDURE or SET LIBRARY) or executed (with DO or the call operator). The compiled object files are created in the same directory as the source code files.

The file is compiled with coverage information if SET COVERAGE is ON or the file contains the

```
#pragma coverage(on)
```

directive.

When you compile a program, *Visual* dBASE detects any syntax errors in the source file and either logs the error in the LOG file, or displays an error message corresponding to the error in a dialog box that contains three buttons:

- Cancel cancels compilation (equivalent to pressing Esc).
- Ignore cancels compilation of the program containing the syntax error but continues compilation of the rest of the files that match <filename skeleton> if you specified a skeleton.
- Fix lets you fix the error by opening the source code in an editing window, positioning the insertion point at the point where the error occurred.

CONVERT

Topic group Related topics Example

Adds a _dbaselock field to a table for storing multiuser lock information.

Syntax

CONVERT [TO <expN>]

TO <expN>

Specifies the length of the multiuser information field to add to the current table. The <expN> argument can be a number from 8 to 24, inclusive. The default is 16.

Description

Use CONVERT to add a special _dbaselock field to the structure of the current table. In general, CONVERT is a one-time operation required for each table that is shared in a multi-user environment.

Use the option TO <expN> to specify the length of the field. If you issue CONVERT without the TO <expN> option, the width of the field is 16. If you want to change the length of the _dbaselock field after using CONVERT, you can issue CONVERT again on the same table. To view the contents of the _dbaselock field, use LKSYS().

Note: You must use the table exclusively (USE...EXCLUSIVE) before issuing CONVERT. An records marked as deleted with be lost during the CONVERT.

The _dbaselock field contains the following values:

Count	A 2-byte hexadecimal number used by CHANGE()
Time	A 3-byte hexadecimal number that records the time a lock was placed
Date	A 3-byte hexadecimal number that records the date a lock was placed
Name	A 0- to 16-character representation of the login name of the user who placed a lock, if a lock is active

The count, time, and date portions of the _dbaselock field always make up its first 8 characters. If you accept the default 16-character width of the _dbaselock field, the login name is truncated to 8 characters. If you set the field width to fewer than 16 characters, the login name is truncated the necessary amount. If you set the width of <expN> to 8 characters, the login name doesn't appear at all.

Every time a record is updated, *Visual* dBASE rewrites the count portion of _dbaselock. If you issue CHANGE(), *Visual* dBASE reads the count portion from disk and compares it to the previous value it stored in memory when the record was initially read. If the values are different, another user has changed the record, and CHANGE() returns *true*. For more information, see CHANGE().

LKSYS() returns the login name, date, and time portions of the _dbaselock field. If you place a file lock on the table containing the _dbaselock field, the value in the _dbaselock field of the first record contains the information used by CHANGE() and LKSYS(). For more information, see LKSYS().

Note: CONVERT doesn't affect SQL databases or Paradox tables.

IDE example

After creating the DBF table Company, the CONVERT command is used in the Command window to add the _dbaselock field:

```
use COMPANY exclusive
display structure          // Note structure
convert to 24              // Include 16 bytes for user name
display structure          // Note added _dbaselock field with 24 byte size
```

CREATE

Topic group Related topics

Opens the Table designer to create or modify a table interactively.

Syntax

CREATE
[<filename> | ? | <filename skeleton>
[[TYPE] PARADOX | DBASE]
[WIZARD | EXPERT [PROMPT]]

<filename> | ? | <filename skeleton>

The name of the table you want to create. CREATE ? and CREATE <filename skeleton> display a dialog box, in which you can specify the name of a new table. The <filename> follows the standard Xbase DML table naming conventions.

If you don't specify a name, the table remains untitled until you save the file. If you specify an existing table name, *Visual* dBASE asks whether you want to overwrite it. If you reply no, nothing further happens.

[TYPE] PARADOX | DBASE

Overrides the default table type set by SET DBTYPE. The TYPE keyword is included for readability only; it has no effect on the operation of the command. Specifying PARADOX creates a Paradox table with a .DB extension. Specifying DBASE creates a DBF table with a .DBF extension.

WIZARD | EXPERT [PROMPT]

If the PROMPT clause is used, a dialog appears asking if you want to use the Table designer or the Table wizard. You can then invoke either the designer or the wizard. The WIZARD clause without PROMPT causes the Table wizard to be invoked. You may use the keyword EXPERT instead of WIZARD.

Description

CREATE opens the Table designer, an interactive environment in which you can create or modify the structure of a table, or the Table wizard, a tool that guides you through the process of creating tables. The type of table you create depends on the <filename> you specify, or the current database and the current setting of SET DBTYPE.

Create a table by defining the name, type, and size of each field. For more information on using the Table designer, see The Table designer window.

To modify an existing table, use the MODIFY STRUCTURE command.

CREATE COMMAND

Topic group Related topics

Displays a specified program file for editing, or displays an empty editing window.

Syntax

CREATE COMMAND [<filename> | ? | <filename skeleton>]

<filename> | ? | <filename skeleton>

The file to display and edit. The ? and <filename skeleton> options display a dialog box from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the path you specify with SET PATH. If you specify a file without including its extension, *Visual* dBASE assumes .PRG. If you issue CREATE COMMAND without an option, *Visual* dBASE displays an untitled empty editing window.

Description

Use CREATE COMMAND to create new or edit existing program files. Use DO to execute program files.

If you're creating a new program file, CREATE COMMAND displays an empty editing window. If you specify an existing file, *Visual* dBASE asks whether you want to modify it. If you reply no, nothing further happens. Use the MODIFY COMMAND command to edit an existing file without being asked whether you want to modify it.

By default, CREATE COMMAND launches the *Visual* dBASE Source Editor. You can specify an alternate editor by using the SET EDITOR command or by changing the EDITOR setting in VDB.INI. To do so, either use the SET command to specify the setting interactively, or enter the EDITOR parameter directly in VDB.INI.

Note: *Visual* dBASE compiles programs before running them, and assigns the compiled files the same name as the original, but with the letter "O" as the last letter in the filename extension. For example, the compiled version of SALESRPT.PRG would be SALESRPT.PRO. If SALESPRT.PRO already exists, it is overwritten. For this reason, avoid using filename extensions ending in "O" in directories containing compiled programs.

CREATE DATAMODULE

Topic group

Opens the Data Module designer.

Syntax

CREATE DATAMODULE
[<filename> | ? | <filename skeleton>]
[CUSTOM] | [WIZARD | EXPERT [PROMPT]]

<filename> | ? | <filename skeleton>

The file to display and edit. The default extension is .DMD. The ? and <filename skeleton> options display a dialog box from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory. If you issue CREATE DATAMODULE without an option, *Visual* dBASE creates an untitled empty data module.

CUSTOM

Invokes the Custom Data Module designer instead of the Data Module designer. The default extension is .CDM instead of .DMD.

WIZARD | EXPERT [PROMPT]

If the PROMPT clause is used, a dialog appears asking if you want to use the Data Module designer or the Data Module wizard. You can then invoke either the designer or the wizard. The WIZARD clause without PROMPT causes the Table wizard to be invoked. You may use the keyword EXPERT instead of WIZARD.

You cannot combine the CUSTOM and WIZARD options; there is no Custom Data Module wizard.

Description

Use CREATE DATAMODULE to open the Data Module designer and create new or edit existing data modules. The Data Module designer automatically generates *Visual* dBASE program code that defines the data in the data module, and stores this code in an editable source code file with a .DMD extension. Use a DataModRef object to use a data module.

If you're creating a new data module, CREATE DATAMODULE displays an empty design surface. If you specify an existing file, *Visual* dBASE asks whether you want to modify it. If you reply no, nothing further happens. Use the MODIFY DATAMODULE command to edit an existing file without being asked whether you want to modify it.

CREATE FILE

Topic group Related topics

Displays a specified text file for editing, or displays an empty editing window.

Syntax

CREATE FILE [<filename> | ? | <filename skeleton>]

Description

CREATE FILE is identical to CREATE COMMAND, except that it defaults to displaying and editing text files, which have a .TXT extension (instead of program files, which have a .PRG extension).

CREATE FORM

Topic group Related topics

Opens the Form designer to create or modify a form.

Syntax

CREATE FORM
[<filename> | ? | <filename skeleton>]
[CUSTOM] | [WIZARD | EXPERT [PROMPT]]

<filename> | ? | <filename skeleton>

The form to create or modify. The default extension is .WFM. The ? and <filename skeleton> options display a dialog box from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory. If you issue CREATE FORM without an option, *Visual* dBASE creates an untitled empty form.

CUSTOM

Invokes the Custom Form designer instead of the Form designer. The default extension is .CFM instead of .WFM.

WIZARD | EXPERT [PROMPT]

If the PROMPT clause is used, a dialog appears asking if you want to use the Form designer or the Form wizard. You can then invoke either the designer or the wizard. The WIZARD clause without PROMPT causes the Form wizard to be invoked. You may use the keyword EXPERT instead of WIZARD.

You cannot combine the CUSTOM and WIZARD options; there is no Custom Form wizard.

Description

Use CREATE FORM to open the Form designer or Form wizard and create or modify a form interactively. The Form designer automatically generates *Visual* dBASE program code that defines the contents and format of a form, and stores this code in an editable source code file with a .WFM extension. DO the .WFM file to run the form.

If you're creating a new form, CREATE FORM displays an empty design surface. If you specify an existing file, *Visual* dBASE asks whether you want to modify it. If you reply no, nothing further happens. Use the MODIFY FORM command to edit an existing file without being asked whether you want to modify it.

You may invoke the Custom Form designer by specifying the CUSTOM keyword. A custom form is stored in a .CFM file, and does not have the standard bootstrap code that instantiates and opens a form when the file is executed. It is intended to be used as a base class for other forms. A single .CFM file may contain more than one custom form class definition. If there is more than one form class in the .CFM file, *Visual* dBASE presents a list of classes to modify.

By default, the Form designer creates a class made up of the name of the file plus the word “Form”. For example, when creating STUDENT.WFM, the form class is named StudentForm. The Custom Form designer uses the word “CForm” instead; for example, in SCHOOL.CFM, the form class is named SchoolCForm.

See Using the Form and Report designers (overview) for instructions on using the Form designer.

CREATE LABEL

Topic group Related topics

Opens the Label designer to create or modify a label file.

Syntax

CREATE LABEL
[<filename> | ? | <filename skeleton>]
[WIZARD | EXPERT [PROMPT]]

<filename> | ? | <filename skeleton>

The label file to create or modify. The default extension is .LAB. The ? and <filename skeleton> options display a dialog box from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory. If you issue CREATE LABEL without an option, *Visual* dBASE creates an untitled label file.

WIZARD | EXPERT [PROMPT]

If the PROMPT clause is used, a dialog appears asking if you want to use the Label designer or the Label wizard. You can then invoke either the designer or the wizard. The WIZARD clause without PROMPT causes the Label wizard to be invoked. You may use the keyword EXPERT instead of WIZARD.

Description

Use CREATE LABEL to open the Label designer and create new or edit existing labels. The Label designer automatically generates *Visual* dBASE program code that defines the contents and format of the labels, and stores this code in an editable source code file with a .LAB extension. DO the .LAB file to print the labels.

If you're creating a new label file, CREATE LABEL displays an empty design surface. If you specify an existing file, *Visual* dBASE asks whether you want to modify it. If you reply no, nothing further happens. Use the MODIFY LABEL command to edit an existing file without being asked whether you want to modify it.

CREATE MENU

Topic group Related topics

Opens the Menu designer to create or modify a menu file.

Syntax

CREATE MENU [<filename> | ? | <filename skeleton>]

<filename> | ? | <filename skeleton>

The menu file to create or modify. The default extension is .MNU. The ? and <filename skeleton> options display a dialog box from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory. If you issue CREATE MENU without an option, *Visual* dBASE creates an untitled menu file.

Description

Use CREATE MENU to open the Menu designer and create new or edit existing menus. The Menu designer automatically generates *Visual* dBASE program code that defines the contents of a menu, and stores this code in an editable source code file with a .MNU extension. To use the menu, assign the .MNU file name as the *menuFile* property of a form, or

```
DO <.MNU file> WITH <form reference>
```

to assign the menu to the form. The Menu designer always creates a menu named “root”, so that when assigned to a form, it is referenced as form.root.

If you're creating a new menu file, CREATE MENU displays an empty design surface. If you specify an existing file, *Visual* dBASE asks whether you want to modify it. If you reply no, nothing further happens. Use the MODIFY MENU command to edit an existing file without being asked whether you want to modify it.

CREATE POPUP

Topic group Related topics

Opens the Popup Menu designer to create or modify a popup menu file.

Syntax

CREATE POPUP [<*filename*> | ? | <*filename skeleton*>]

<filename> | ? | <filename skeleton>

The popup menu file to create or modify. The default extension is .POP. The ? and <filename skeleton> options display a dialog box from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory. If you issue CREATE POPUP without an option, *Visual* dBASE creates an untitled popup menu file.

Description

Use CREATE POPUP to open the Popup Menu designer and create new or edit existing popup menus. The Popup Menu designer automatically generates *Visual* dBASE program code that defines the contents of a popup menu, and stores this code in an editable source code file with a .POP extension. To assign the popup menu to a form, create the popup as a property of the form with:

```
DO <.POP file> WITH <form reference>, <property name>
```

then assign the popup object to the form's *popupMenu* property.

If you're creating a new popup menu file, CREATE POPUP displays an empty design surface. If you specify an existing file, *Visual* dBASE asks whether you want to modify it. If you reply no, nothing further happens. Use the MODIFY POPUP command to edit an existing file without being asked whether you want to modify it.

CREATE PROJECT

Topic group Related topics

Syntax

CREATE PROJECT

Description

CREATE PROJECT displays the New Project dialog box, where you can name and locate a new project. The new project then becomes the current project in the Project Explorer.

Use MODIFY PROJECT to open existing project.

CREATE QUERY

Topic group Related topics

Opens a new or existing query in the SQL designer.

Syntax

CREATE QUERY [<filename> | ? | <*filename skeleton*>]

<filename> | ? | <filename skeleton>

The SQL query file to create or modify. The default extension is .SQL. The ? and <filename skeleton> options display a dialog box from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory. If you issue CREATE QUERY without an option, *Visual* dBASE creates an untitled SQL query file.

Description

Use CREATE QUERY to open the SQL designer and create new or edit existing SQL queries. The SQL designer automatically generates an SQL statement that defines the query, and stores this statement in an editable source code file with a .SQL extension. The .SQL file can be run directly from the Navigator or used as the *sql* property of a Query object.

If you're creating a new SQL query file, CREATE QUERY displays an empty design surface. If you specify an existing file, *Visual* dBASE asks whether you want to modify it. If you reply no, nothing further happens. Use the MODIFY QUERY command to edit an existing file without being asked whether you want to modify it.

CREATE REPORT

Topic group Related topics

Opens the Report designer to create or modify a report.

Syntax

CREATE REPORT
[<filename> | ? | <filename skeleton>]
[CUSTOM] | [WIZARD | EXPERT [PROMPT]]

<filename> | ? | <filename skeleton>

The report to create or modify. The default extension is .REP. The ? and <filename skeleton> options display a dialog box from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory. If you issue CREATE FORM without an option, *Visual* dBASE creates an untitled empty report.

CUSTOM

Invokes the Custom Report designer instead of the Report designer. The default extension is .CRP instead of .REP.

WIZARD | EXPERT [PROMPT]

If the PROMPT clause is used, a dialog appears asking if you want to use the Report designer or the Report wizard. You can then invoke either the designer or the wizard. The WIZARD clause without PROMPT causes the Report wizard to be invoked. You may use the keyword EXPERT instead of WIZARD.

You cannot combine the CUSTOM and WIZARD options; there is no Custom Report wizard.

Description

Use CREATE Report to open the Report designer or Report wizard and create or modify a report interactively. The Report designer automatically generates *Visual* dBASE program code that defines the contents and format of a report, and stores this code in an editable source code file with a .REP extension. DO the .REP file to run the report.

If you're creating a new report, CREATE REPORT displays an empty design surface. If you specify an existing file, *Visual* dBASE asks whether you want to modify it. If you reply no, nothing further happens. Use the MODIFY REPORT command to edit an existing file without being asked whether you want to modify it.

You may invoke the Custom Report designer by specifying the CUSTOM keyword. A custom report is stored in a .CRP file, and does not have the standard bootstrap code that instantiates and renders a report when the file is executed. It is intended to be used as a base class for other reports. A single .CRP file may contain more than one custom report class definition. If there is more than one report class in the .CRP file, *Visual* dBASE presents a list of classes to modify.

See Using the Report and Report designers (overview) for instructions on using the Report designer.

DEBUG

Topic group Related topics

Opens the *Visual* dBASE Debugger.

Syntax

DEBUG
[<filename> | ? | <filename skeleton> [WITH <parameter list>]]

<filename> | ? | <filename skeleton>

The program file to debug. DEBUG ? and DEBUG <filename skeleton> display the Open Source File dialog box, from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the path you specify with SET PATH. If you specify a file without including its extension, *Visual* dBASE assumes .PRG.

WITH <parameter list>

Specifies expressions to pass as parameters to a program. For information about parameter passing, see the description of PARAMETERS.

Description

Use DEBUG to open the Debugger and view or control program execution interactively. You must issue DEBUG in the Command window; the command has no effect in a program. If you issue DEBUG without any options, *Visual* dBASE opens the Debugger without loading a program file. (You can load a file to debug from the Debugger.)

To debug a function, open the program file that contains the function, and set a breakpoint at the FUNCTION or PROCEDURE line. When the function is called, the debugger will appear, at the breakpoint that you set.

If an unhandled exception or error occurs during program execution, the standard error dialog gives you the option of opening the Debugger at the line where the error occurred.

For more information, see Using the Debugger, which describes the Debugger in detail.

DISPLAY COVERAGE

Topic group Related topics

Displays the contents of a coverage file in the results pane of the Command window.

Syntax

DISPLAY COVERAGE <filename1> | ? | <filename skeleton 1>
[ALL]
[SUMMARY]
[TO FILE <filename2> | ? | <filename skeleton 2>]
[TO PRINTER]

<filename1> | ? | <filename skeleton 1>

The coverage file for the desired program. The ? and <filename skeleton 1> options display a dialog box from which you can select a coverage file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory, then in the path you specify with SET PATH. If you specify a file without including its extension, *Visual* dBASE assumes .COV.

ALL

Includes the coverage files, if any, for all other program files that could be called by the main program file, adding to the display:

- The total number of logical blocks exercised in all the program files combined
- The percentage of logical blocks exercised in all the program files combined

SUMMARY

Excludes the logical blocks that were exercised. Without SUMMARY, both the logical blocks that were exercised, and the logical blocks not exercised are displayed. Use the SUMMARY option to find code that still needs to be exercised.

TO FILE <filename2> | ? | <filename skeleton 2>

Directs output to <filename2> in addition to the results pane of the Command window. By default, *Visual* dBASE assigns a .TXT extension to <filename2> and saves the file in the current directory. The ? and <filename skeleton 2> options display a dialog box in which you specify the name of the target file and the directory to save it in.

TO PRINTER

Directs output to the printer in addition to the results pane of the Command window.

Description

A coverage file contains the results of the coverage analysis of a program file. You cause *Visual* dBASE to analyze the execution of any code in a program file by compiling the program file with coverage, either by having SET COVERAGE ON when the program is compiled, or with the #pragma coverage(on) directive in the program file. A coverage file is created whenever any code in the program file is executed.

The coverage file has the same name as the program file, and changes the last letter of the extension to the letter “V”; unless the file is a .PRG, in which case the coverage file has an extension of .COV. For example, the coverage file for GRADES.PRG is GRADES.COV, and the coverage file for STUDENTS.WFM is STUDENTS.WFV.

The coverage file accumulates statistics whenever any code in the program file is executed. You will usually want to make sure that all logical blocks in your code have been exercised. You may erase the coverage file to restart the coverage analysis totals.

DISPLAY COVERAGE displays the results of the coverage analysis:

- Each logical block, and how many times it was exercised
- The total number of blocks, and the number of blocks that were tested
- The percentage of blocks tested

DISPLAY COVERAGE pauses when the results pane is full and displays a dialog box prompting you to display another screenful of information. Use the TO FILE clause to send the information to a file. Use

the TO PRINTER clause to send the information to the printer. In either case, you can use SET CONSOLE OFF to suppress the display of the information in the results pane.

DISPLAY COVERAGE is the same as LIST COVERAGE, except that LIST COVERAGE does not pause with the first window of information but rather continuously lists the information until complete. This makes LIST COVERAGE more appropriate for outputting to a file or printer.

DISPLAY MEMORY

Topic group Related topics

Displays information about memory variables in the results pane of the Command window.

Syntax

DISPLAY MEMORY
[TO FILE <filename> | ? | <filename skeleton>]
[TO PRINTER]

TO FILE <filename> | ? | <filename skeleton>

Directs output to the text file <filename>, in addition to the results pane of the Command window. By default, *Visual* dBASE assigns a .TXT extension to <filename> and saves the file in the current directory. The ? and <filename skeleton> options display a dialog box in which you specify the name of the target file and the directory to save it in.

TO PRINTER

Directs output to the printer in addition to the results pane of the Command window.

Description

Use DISPLAY MEMORY to display the contents and size of a memory variable list. If you haven't used ON KEY or to reassign the F7 key, pressing F7 when the Command window has focus is a quick way to execute DISPLAY MEMORY.

DISPLAY MEMORY displays information about both user-defined and system memory variables. The following information on user-defined memory variables is displayed.

- Name
- Scope (public, private, local, static or hidden)
- Data type
- Value
- Number of active memory variables
- Number of memory variables still available for use
- Number of bytes of memory used by character variables
- Number of bytes of memory still available for user character variables
- Name of the program that initialized private memory variables

The following information on system memory variables is displayed.

- Name
- Scope (public, private, or hidden)
- Data type
- Current value

DISPLAY MEMORY pauses when the results pane is full and displays a dialog box prompting you to display another screenful of information. Use the TO FILE clause to send the information to a file. Use the TO PRINTER clause to send the information to the printer. In either case, you can use SET CONSOLE OFF to suppress the display of the information in the results pane.

DISPLAY MEMORY is the same as LIST MEMORY, except that LIST MEMORY does not pause with the first window of information but rather continuously lists the information until complete. This makes LIST MEMORY more appropriate for outputting to a file or printer.

DISPLAY STATUS

Topic group Related topics

Displays information about the current *Visual* dBASE environment in the results pane of the Command window.

Syntax

DISPLAY STATUS
[TO FILE <filename> | ? | <filename skeleton>]
[TO PRINTER]

TO FILE <filename> | ? | <filename skeleton>

Directs output to the text file <filename>, in addition to the results pane of the Command window. By default, *Visual* dBASE assigns a .TXT extension to <filename> and saves the file in the current directory. The ? and <filename skeleton> options display a dialog box in which you specify the name of the target file and the directory to save it in.

TO PRINTER

Directs output to the printer in addition to the results pane of the Command window.

Description

Use DISPLAY STATUS to identify open tables and index files and to check the status of the SET commands. DISPLAY STATUS shows information related to the current session only.

If you haven't used ON KEY, SET, or SET FUNCTION to reassign the F6 key, pressing F6 when the Command window has focus is a quick way to execute DISPLAY STATUS.

DISPLAY STATUS displays the following information:

- Name and alias of open tables in each work area, and for each table:
- Whether that table is the table in the currently selected work area
- The language driver and character set of each open table
- Names of all open indexes and their index key expressions in each work area
- Master index, if any, in each work area
- Locked records in each work area
- Database relations in each work area
- Filter conditions in each work area
- The name of the SET LIBRARY file, if any
- The name of all open SET PROCEDURE files
- SET PATH file search path
- SET DEFAULT drive setting
- Current work area
- SET PRINTER setting
- Current language driver and character set
- DBTYPE setting
- Numeric settings for SET MARGIN, SET DECIMALS, SET MEMOWIDTH, SET TYPEAHEAD, SET ODOMETER, SET REFRESH, and SET REPROCESS
- The current directory
- ON KEY, ON ESCAPE, and ON ERROR settings
- SET ON/OFF command settings
- Programmable function key and SET FUNCTION settings

DISPLAY STATUS pauses when the results pane is full and displays a dialog box prompting you to display another screenful of information. Use the TO FILE clause to send the information to a file. Use the TO PRINTER clause to send the information to the printer. In either case, you can use SET CONSOLE OFF to suppress the display of the information in the results pane.

DISPLAY STATUS is the same as LIST STATUS, except that LIST STATUS does not pause with the first window of information but rather continuously lists the information until complete. This makes LIST STATUS more appropriate for outputting to a file or printer.

DISPLAY STRUCTURE

Topic group Related topics Example

Displays the field definitions of the specified table.

Syntax

DISPLAY STRUCTURE
[IN <alias>]
[TO FILE <filename> | ? <filename skeleton>]
[TO PRINTER]

IN <alias>

Identifies the work area of the open table whose structure you want to display rather than that of the current table. For more information, see Aliases.

TO FILE <filename> | ? | <filename skeleton>

Directs output to the text file <filename>, in addition to the results pane of the Command window. By default, *Visual* dBASE assigns a .TXT extension to <filename> and saves the file in the current directory. The ? and <filename skeleton> options display a dialog box in which you specify the name of the target file and the directory to save it in.

TO PRINTER

Directs output to the printer in addition to the results pane of the Command window.

Description

Use DISPLAY STRUCTURE to view the structure of the current or a specified table in the results pane of the Command window. DISPLAY STRUCTURE displays the following information about the current or specified table:

- Name of the table
- Type of table (Paradox, dBASE, or SQL)
- Table type version number
- Number of records
- Date of last update (DBF only)
- Fields
- Field number
- Field name (if SET FIELDS is ON, the greater-than symbol (>) appears next to each field specified with the SET FIELDS TO command)
- Type
- Length
- Whether there is an index on that field
- Number of bytes per record (the sum of field lengths; for DBF includes one additional byte reserved for storing the asterisk that marks a record as deleted)

Multiply the total number of bytes per record by the number of records in the table to estimate the size of a DBF table (excluding the size of the table header).

DISPLAY STRUCTURE pauses when the results pane is full and displays a dialog box prompting you to display another screenful of information. Use the TO FILE clause to send the information to a file. Use the TO PRINTER clause to send the information to the printer. In either case, you can use SET CONSOLE OFF to suppress the display of the information in the results pane.

DISPLAY STRUCTURE is the same as LIST STRUCTURE, except that LIST STRUCTURE does not pause with the first window of information but rather continuously lists the information until complete. This makes LIST STRUCTURE more appropriate for outputting to a file or printer.

Neither DISPLAY STRUCTURE nor LIST STRUCTURE permit modification of an existing table structure. To alter the structure, use MODIFY STRUCTURE.

DISPLAY STRUCTURE example

To display the structure of the Fish table in the \Samples directory:

```
use FISH
display structure
```

The following is displayed in the results pane of the Command window:

```
Structure for table   C:\Program Files\Borland\Visual dBASE\Samples\fish.dbf
Table type            DBASE
Version               7
Number of rows        10
Last update           10/18/97
------------------------------------------------------------------------
Field  Field Name                       Type          Length  Dec  Index
    1  ID                               AUTOINCREMENT      4            Y
    2  Name                             CHARACTER         30            Y
    3  Species                          CHARACTER         40            Y
    4  Length CM                        NUMERIC           20    4       N
    5  Description                      MEMO              10            N
    6  OLE Graphic                      OLE               10            N
------------------------------------------------------------------------
** Total **                                              115
```

HELP

Topic group Example

Activates the *Visual* dBASE Help system.

Syntax

HELP [<help topic>]

<help topic>

The Help topic you access with HELP.

Description

Use the HELP command in the Command window to get information on *Visual* dBASE.

Visual dBASE locates the first Help topic in the index beginning with <help topic>. If only one topic with the index entry is found, that topic is displayed. If there are multiple matches, Help displays a dialog box to let you choose the topic. If there is no match, the Help index is opened with <help topic> as the current search value.

Pressing F1 gives you context-sensitive help based on the control or window that currently has focus, or text that is highlighted in the Command window or Source Editor.

HELP example

Here are some examples of using HELP in the command window.

```
help extern
help lockretryinterval
```

Note that the topic is not case-sensitive.

INSPECT()

Topic group Related topics

Opens the Inspector, a window that lists object properties and lets you change their settings.

Syntax

INSPECT(<oRef>)

<oRef>

A reference to the object that you want to inspect.

Description

Use INSPECT() to examine and change object properties directly. For example, during program development you can use INSPECT() to evaluate objects and experiment with different property settings.

The Inspector is modeless, and doesn't affect program execution.

Note: You can access the Inspector from the Form designer by pressing F11.

You can get help on any property in the Inspector by selecting the property and pressing F1.

LIST...

Topic group Related topics

Lists information in the results pane of the Command window without pausing.

Syntax

LIST COVERAGE <filename1> | ? | <filename skeleton 1>
[ALL]
[SUMMARY]
[TO FILE <filename2> | ? | <filename skeleton 2>]
[TO PRINTER]

LIST MEMORY
[TO FILE <filename> | ? | <filename skeleton>]
[TO PRINTER]

LIST STATUS
[TO FILE <filename> | ? | <filename skeleton>]
[TO PRINTER]

LIST STRUCTURE
[IN <alias>]
[TO FILE <filename> | ? <filename skeleton>]
[TO PRINTER]

Description

The LIST commands listed above are the same as their DISPLAY command counterparts, except that LIST commands do not pause with the first window of information but rather continuously list the information until complete. This makes the LIST versions more appropriate for outputting to a file or printer.

MODIFY...

Topic group Related topics

Modifies the corresponding file.

Syntax

MODIFY COMMAND [<*filename*> | ? | <*filename skeleton*>]

MODIFY DATAMODULE [<*filename*> | ? | <*filename skeleton*>]

MODIFY FILE [<*filename*> | ? | <*filename skeleton*>]

MODIFY FORM [<*filename*> | ? | <*filename skeleton*>]

MODIFY LABEL [<*filename*> | ? | <*filename skeleton*>]

MODIFY MENU [<*filename*> | ? | <*filename skeleton*>]

MODIFY POPUP [<*filename*> | ? | <*filename skeleton*>]

MODIFY QUERY [<*filename*> | ? | <*filename skeleton*>]

MODIFY REPORT [<*filename*> | ? | <*filename skeleton*>]

Description

The MODIFY commands listed above operate the same as their CREATE command counterparts, except that if the specified file exists it is modified without prompting. For more information, see the corresponding CREATE commands.

MODIFY PROJECT

Topic group Related topics

Opens an existing project in the Project Explorer.

Syntax

MODIFY PROJECT [<filename> | ? | <*filename skeleton*>]

<filename> | ? | <filename skeleton>

The project file to open. The default extension is .PRJ. The ? and <filename skeleton> options display a dialog box from which you can select a file. If you specify a file without including its path, *Visual* dBASE looks for the file in the current directory.

If you issue MODIFY PROJECT without an option, the New Project dialog is displayed, as if you issued CREATE PROJECT.

Description

MODIFY PROJECT opens the specified .PRJ file in the Project Explorer, making it the current project.

MODIFY STRUCTURE

Topic group Related topics Example

Allows you to modify the structure of the current table.

Syntax

MODIFY STRUCTURE

Description

Use MODIFY STRUCTURE to change the structure of the current table by adding or deleting fields, or changing a field name, width, or data type. Issuing the MODIFY STRUCTURE command opens the Table designer, an interactive environment in which you can create or modify the structure of a table.

Before allowing changes to the structure of a dBASE table, *Visual* dBASE makes a backup of the original table assigning the file a .DBK extension. *Visual* dBASE then creates a new table file with the .DBF extension and copies the modified table structure to that file. When you've finished modifying a table structure, *Visual* dBASE copies the content of the backup file into the new structure. If data is accidentally truncated or lost, you can recover the original data from the .DBK file. Before modifying the structure of a table, make sure that you have sufficient disk space to create the backup file plus any temporary storage required to copy records between the two tables (approximately twice the size of the original table).

If a table contains a memo field, MODIFY STRUCTURE also creates a backup memo file to store the original memo field data. This file has the same name as the table, but is given a .TBK extension.

You shouldn't change a field name and its width or type at the same time. If you do, *Visual* dBASE won't be able to append data from the old field, and your new field will be blank. Change the name of a field, save the file, and then use MODIFY STRUCTURE again to change the field width or data type.

Also, don't insert or delete fields from a table and change field names at the same time. If you change field names, MODIFY STRUCTURE appends data from the old file by using the field position in the file. If you insert or delete fields as well as change field names, you change field positions and could lose data. You can, however, change field widths or data types at the same time as you insert or delete fields. In those cases, since MODIFY STRUCTURE appends data by field name, the data will be appended correctly.

Visual dBASE successfully converts data between a number of field types. If you change field types, however, keep a backup copy of your original file, and check your new files to make sure the data has been converted correctly.

If you convert numeric fields to character fields, *Visual* dBASE converts numbers from the numeric fields to right-aligned character strings. If you convert a character field to a numeric field, *Visual* dBASE converts numeric characters in each record to digits until it encounters a non-numeric character. If the first character in a character field is a letter, the converted numeric field will contain zero.

You can convert logical fields to character fields, and vice versa. You can also convert character strings that are formatted as a date (for example, mm/dd/yy or mm-dd-yy) to a date field, or convert date fields to character fields. You can't convert logical fields to numeric fields.

In general, *Visual* dBASE attempts to make a conversion you request, but the conversion must be a sensible one or data may be lost. Numeric data can easily be handled as characters, but logical data, for example, cannot become numeric. To convert incompatible data types (such as logical to numeric), first add a new field to the file, use REPLACE to convert the data, then delete the old field.

If you modify the field name, length, or type of any fields that have an associated tag in the production (.MDX) file, the tag is rebuilt. If any indexes are open when you modify a table structure, *Visual* dBASE automatically closes those indexes when saving the modified table. You should re-index the table after you modify its structure.

MODIFY STRUCTURE example

The following example uses MODIFY STRUCTURE in the Command window to change the structure of a table:

```
use clients in select() exclusive
modify structure
close databases
```

The structure of a table can also be displayed but not changed by using the following commands in the Command window:

```
use clients in select() noupdate
display structure
close databases
```

SET

Topic group Related topics

Displays a dialog box for viewing and changing the values of many SET commands. The changed values are stored in the VDB.INI file.

Syntax

SET

Description

Use SET to view and change settings interactively, instead of typing individual SET commands such as SET TALK ON in the Command window.

Note: Any changes you make to settings by using SET are automatically saved to VDB.INI. This means that the settings will be in effect each time you start *Visual* dBASE. If you want to change the value of SET commands only temporarily, issue individual SET commands in the Command window or in a program.

Issuing SET is the same as choosing the Properties|Desktop menu option.

SET BELL

Topic group Related topics Example

Turns the computer bell on or off and sets the bell frequency and duration.

Syntax

SET BELL ON | off

SET BELL TO
[<frequency expN>, <duration expN>]

<frequency expN>

The frequency of the bell tone in cycles per second, which must be an integer from 37 to 32,767, inclusive.

<duration expN>

The duration of the bell tone in milliseconds, which must be an integer from 1 to 2000 (two seconds), inclusive.

Description

When SET BELL is ON, *Visual* dBASE produces a tone when you fill a data entry field or enter invalid data. SET BELL TO determines the frequency and duration of this tone, unless the computer is running Windows 95 and has a sound card. In that case, the Window Default sound is played (through the sound card) instead of the tone.

Displaying CHR(7) in the results pane of the Command window sounds the “bell” whether SET BELL is ON or OFF.

SET BELL TO with no arguments sets the frequency and duration to the default values of 512 Hertz (cycles per second) for 50 milliseconds.

SET BELL example

The following examples typed in the Command window set the bell to high and low pitch and short and long durations:

```
set bell to 50,1500     // A long, very low bell
? chr(7)                // Ring the bell (or Windows Default sound)
set bell to 10000,30    // Short, very high pitched
? chr(7)                // Ring the bell (or Windows Default sound)
```

SET BLOCKSIZE

Topic group Related topics Example

Changes the default block size of memo field and .MDX index files.

Syntax

SET BLOCKSIZE TO <expN>

<expN>

A number from 1 to 63 that sets the size of blocks used in memo and .MDX index files. (The actual size in bytes is the number you specify multiplied by 512.)

Default

The default for SET BLOCKSIZE is 1 (for compatibility with dBASE III PLUS). To change the default, update the BLOCKSIZE setting in VDB.INI.

Description

Use SET BLOCKSIZE to change the size of blocks in which *Visual* dBASE stores memo field files and .MDX index files on disk. The actual number of bytes used in blocks is <expN> multiplied by 512. Instead of using SET BLOCKSIZE, you can set the block size used for memo and .MDX index files individually, by using SET MBLOCK and SET IBLOCK commands.

After the block size is changed, memo fields created with the COPY, CREATE, and MODIFY STRUCTURE commands have the new block size. To change the block size of an existing memo field file, use the SET BLOCKSIZE command to change the block size and then copy the table containing the associated memo field to a new file. The new file then has the new block size.

SET BLOCKSIZE example

The following example uses SET BLOCKSIZE to create another table that is a copy of Clients but has a memo blocksize of 1024 bytes embedded in its structure instead of the default of 512 bytes:

```
use Clients
? set("blocksize")              // Returns 1, each memo block = 512 bytes
set blocksize to 2
copy to Clients2
use Clients2
? set("blocksize")              // Returns 2
list files like *.DBT           // Note file size larger than Clients.DBT
close databases
```

SET COVERAGE

Topic group Related topics

Determines whether program files are compiled with coverage.

Syntax

SET COVERAGE on | OFF

Description

A coverage file is a binary file containing cumulative information on how many times, if any, *Visual* dBASE enters and exits (and thus fully executes) each logical block of a program. Use SET COVERAGE as a program development tool to determine which program lines *Visual* dBASE executes and doesn't execute each time you run a program.

A program file is either compiled with coverage or not. To disable coverage analysis, the file must be recompiled with coverage off.

There are two ways to control compilation with coverage. The first way is with SET COVERAGE, which can be either ON or OFF. The second way is with the coverage #pragma in the program file. The #pragma directive overrides the SET COVERAGE setting.

If a file is compiled with coverage enabled, *Visual* dBASE creates a new coverage file or updates an existing one. When *Visual* dBASE creates a coverage file, it uses the name of the program file, and changes the last letter of the extension to the letter “V”; unless the file is a .PRG, in which case the coverage file has an extension of .COV. For example, the coverage file for GRADES.PRG is GRADES.COV, and the coverage file for STUDENTS.WFM is STUDENT.WFV.

To view the contents of a coverage file, use DISPLAY COVERAGE or LIST COVERAGE. If the coverage file reveals that some lines aren't executing, you can respond by changing the program or the input to the program to make the lines execute. In this way, you can make sure that you test all lines of code in the program.

Coverage analysis divides a program into logical blocks. A logical block doesn't include commented lines or programming construct command lines such as IF and ENDIF. It does, however, include command lines within programming construct command lines. If your program doesn't contain any programming constructs (like IF, DO WHILE, FOR...ENDFOR, SCAN...ENDSCAN, LOOP, DO CASE, DO...UNTIL), the program has only one logical block consisting of all uncommented command lines.

The coverage file identifies a logical block by its corresponding program line number(s):

```
Line 1   * UPDATES.PRG
Line 2   SET TALK OFF    Block 1 (Lines 2-3)
Line 3   USE Customer INDEX Salespers
Line 4   SCAN
Line 5      DO CASE
Line 6      CASE Salesper = "S-12"
Line 7         SELECT 2  Block 2 (Lines 7-8)
Line 8         USE S12
Line 9      CASE Salesper = "L-5"
Line 10        SELECT 2  Block 3 (Lines 10-11)
Line 11        USE L5
Line 12     CASE Salesper = "J-25"
Line 13        SELECT 2  Block 4 (Lines 13-14)
Line 14        USE J25
Line 15     ENDCASE
Line 16     DO Changes   Block 5 (Lines 16-17)
Line 17     SELECT 1
Line 18  ENDSCAN
Line 19  CLOSE ALL             Block 6 (Lines 19-20)
Line 20  SET TALK ON
```

Visual dBASE writes the coverage file to disk when the program is unloaded from memory or when you

issue a LIST COVERAGE or DISPLAY COVERAGE. To unload a program from memory, use CLEAR PROGRAM.

SET DESIGN

Topic group Related topics Example

Determines whether CREATE and MODIFY commands can be executed.

Syntax

SET DESIGN ON | off

Default

The default for SET DESIGN is ON. To change the default, set the DESIGN parameter in VDB.INI. To do so, either use the SET command to specify the setting interactively, or enter the DESIGN parameter directly in VDB.INI.

Description

When SET DESIGN is ON, *Visual* dBASE lets you use CREATE and MODIFY commands to create and modify tables, forms, labels, reports, text, and queries. To prevent users of your applications from creating and modifying these types of files, issue SET DESIGN OFF in your programs.

If you issue SET DESIGN ON or OFF in a subroutine, the setting is effective only during execution of that subroutine.

SET DESIGN example

The default setting of SET DESIGN is usually ON. In this example the default setting in VDB.INI is OFF so that a user cannot use CREATE and MODIFY:

```
// In vdb.ini
[OnOffCommandSettings]
design=OFF
```

SET DEVELOPMENT

Topic group Related topics

Determines whether *Visual* dBASE automatically compiles a program, procedure, or format file when you change the file and then execute it or open it for execution.

Syntax

SET DEVELOPMENT ON | off

Default

The default for SET DEVELOPMENT is ON. To change the default, set the DEVELOPMENT parameter in VDB.INI. To do so, either use the SET command to specify the "Ensure Compilation" setting interactively, or enter the DEVELOPMENT parameter directly in VDB.INI.

Description

When SET DEVELOPMENT is ON and you execute a program file with DO, or open a procedure or format file, *Visual* dBASE compares the time and date stamp of the source file and the compiled file. If the source file has a later time and date stamp than the compiled file, *Visual* dBASE recompiles the file.

When SET DEVELOPMENT is ON and you change a source program, procedure, or format file with MODIFY COMMAND, *Visual* dBASE erases the corresponding compiled file. When you then execute the program or open the procedure or format file, *Visual* dBASE recompiles it.

When SET DEVELOPMENT is OFF, *Visual* dBASE doesn't compare time and date stamps, and executes or opens existing compiled program, procedure, or format files. When you modify a source file and then open or execute it, *Visual* dBASE first looks for a compiled file in memory and executes it if found. If no compiled file is in memory, *Visual* dBASE looks for a compiled disk file and executes it if found. If no compiled file is found, *Visual* dBASE compiles the file.

When you DO a program, open a procedure file with SET PROCEDURE, or open a format file with SET FORMAT, *Visual* dBASE always looks for, opens, and executes a compiled file. Therefore, if *Visual* dBASE can't find a compiled version of a source file when you execute or open the source, *Visual* dBASE compiles the file regardless of the SET DEVELOPMENT setting.

During program development, when you're editing files often, you should turn SET DEVELOPMENT ON. This ensures that you're always executing an up-to-date compiled file.

Turn SET DEVELOPMENT OFF when you no longer plan to change any source code. Turning SET DEVELOPMENT OFF speeds up program execution because *Visual* dBASE doesn't have to check time and date stamps. You might want to set the DEVELOPMENT parameter to OFF in the VDB.INI file you distribute with your compiled code.

SET EDITOR

Topic group Related topics Example

Specifies the text editor to use when creating and editing programs and text files.

Syntax

SET EDITOR TO
[<expC>]

<expC>

The expression you would enter at the DOS prompt or as the Windows command line to start the editor, usually the name of the editor's executable file (.EXE) or a Windows .PIF file. If <expC> doesn't include the file's full path name, *Visual* dBASE looks for the file in the current directory, then in the DOS path.

Default

The default for SET EDITOR is the *Visual* dBASE internal Source editor. To specify a different default editor, set the EDITOR parameter in VDB.INI. To do so, either use the SET command to specify the setting interactively, or enter the EDITOR parameter directly in VDB.INI.

Description

Use SET EDITOR to specify an editor other than the default *Visual* dBASE Source editor to use when creating or editing text files. The file name you specify can be any text editor that produces standard ASCII text files. The specified editor opens when you issue CREATE/MODIFY FILE or CREATE/MODIFY COMMAND. If you issue SET EDITOR TO without a file name for <expC>, *Visual* dBASE returns to the default editor.

You can use SET EDITOR to specify a .PIF file, which is a Windows file that controls the Windows environment for a DOS application, or a Windows .EXE file. Start the DOS editor by running the .PIF file rather than the .EXE. When you issue commands that run in a DOS window, *Visual* dBASE loads COMMAND.COM using VDB.PIF in the _dbwinhome directory. You can use the Windows PIF Editor to customize the settings in VDB.PIF. For more information about .PIF files, see your Windows documentation. If there is not enough memory available to access an external editor, *Visual* dBASE returns an "Unable to execute DOS" error message.

If the text editor you specify is already in use when you open a memo or file for editing, a second instance of the editor starts.

SET EDITOR example

The following example changes the default editor to Brief, to Write, the Windows editor and back to the *Visual* dBASE editor:

```
set editor to "c:\brief\b"
// now c:\brief does not need to be in the path statements
// modify command now accesses Brief.
modify command temp.prg
set editor to
modify command temp
// Reverts to Visual dBASE editor
```

You might not have sufficient RAM to access an external editor in which case *Visual* dBASE gives an "Unable to execute DOS" error message.

SET IBLOCK

Topic group Related topics Example

Changes the default block size used for new .MDX files.

Syntax

SET IBLOCK TO <expN>

<expN>

A number from 1 to 63 that sets the size of index blocks allocated to new .MDX files. The default value is 1. (The actual size in bytes is the number you specify multiplied by 512 bytes; however, the minimum size of a block is 1024 bytes.) To change the default, update the IBLOCK setting in VDB.INI. To do so, either use the SET command to specify the setting interactively, or enter the IBLOCK parameter directly in VDB.INI.

Description

Use SET IBLOCK to change the size of blocks in which *Visual* dBASE stores .MDX files on disk to improve the performance and efficiency of indexes. You can specify a block size from 1024 bytes to approximately 32K. The IBLOCK setting overrides any previous block size defined by the SET BLOCKSIZE command or specified in the VDB.INI file. After the block size has been changed, new .MDX index files are created with the new block size.

Multiple index (.MDX) files are composed of individual index blocks (or nodes). Nodes contain the value of keys corresponding to individual records and provide the information to locate the appropriate record for each key value. Since the IBLOCK setting determines the size of nodes, the setting also determines the number of key values that can fit into each node. When a single node can't contain all the key values in an index, *Visual* dBASE creates one or more parent nodes. These intermediate nodes also contain key values. Instead of pointing to record numbers, however, intermediate nodes point to leaf nodes or other lower-level intermediate nodes. If you increase the size of index blocks and create a new .MDX file, the new and larger leaf nodes contain more key values.

Whether you can improve performance by storing key values in larger or smaller nodes depends on several factors: the distribution of data, if tables are linked together, the length of key values, the value of INDEXBYTES, and the type of operation requested. Typically, every .MDX file contains more than one index tag. Finding the best setting for a given .MDX file requires experimentation because the best size for one index tag might not be the best size for another.

The following is a list of basic principles governing index performance.

- Since nodes might not be sequential, *Visual* dBASE reads only one node at a time from the disk. Reading more than one node is usually inefficient, because typically the second node is not the next node in the sequential list.
- Once a node is read into memory, *Visual* dBASE attempts to store it there for later use. The amount of space devoted to caching the index nodes is determined by the setting of INDEXBYTES.
- When users link several tables together, for example, with SET RELATION, performance is better if all the relevant nodes for the tables are in memory simultaneously. For example, if a large node for table B pushes out the previously read node for table A, *Visual* dBASE must find and read the table A node again from disk when the node for table A needs to be used again. If both nodes remain in memory, performance can be improved.
- When tables have many identical key values, *Visual* dBASE might have to store them in many nodes. In this situation, performance might be improved by increasing the node size so that *Visual* dBASE reads fewer nodes from disk to load the same number of key values into memory.
- Small node sizes can cause performance degradation. This occurs because as nodes are read in and out, *Visual* dBASE attempts to cache them all. When the small nodes are removed from memory by more recently read nodes, they leave unused spaces in memory that are too small to contain larger nodes. Over time, memory can become fragmented, resulting in slower performance.

SET IBLOCK example

This example creates two .MDXs containing identical data but with different IBLOCK settings and consequently, different file sizes:

```
close data
delete file Co1.mdx
delete file Co2.mdx
// remove any previous .mdx
// create the MDXs
use Company exclusive
set iblock to 2
index on CompCode tag CompCode of Co1
index on Company  tag Company  of Co1
index on City tag City         of Co1
set iblock to 20
index on CompCode tag CompCode of Co2
index on Company tag Company  of Co2
index on City tag City         of Co2
dir co?.mdx
```

Two .MDXs, Co1.MDX and Co2.MDX are created with different IBLOCK settings. CO1 and CO2 will have different file sizes because their block lengths are different.

SET MBLOCK

Topic group Related topics Example

Changes the default block size of new memo field (.DBT) files.

Syntax

SET MBLOCK TO <expN>

<expN>

A number from 1 to 512 that sets the size of blocks used to store new memo (.DBT) files. (The actual size in bytes is the number you specify multiplied by 64.)

Default

The default value for SET MBLOCK is 8 (or 512 bytes). To change the default, update the MBLOCK setting in VDB.INI. To do so, either use the SET command to specify the setting interactively, or enter the MBLOCK parameter directly in VDB.INI.

Description

Use SET MBLOCK to change the size of blocks in which *Visual* dBASE stores new memo field (.DBT) files on disk. You can specify a block size from 64 bytes to approximately 32K. The MBLOCK setting overrides any previous block size defined by the SET BLOCKSIZE command or specified in the VDB.INI file. After the block size has been changed, new memo .DBT files are created with the new block size. *Visual* dBASE stores data in each memo field in a group made up of as many blocks as needed.

After the block size is changed, memo fields created with the COPY, CREATE, and MODIFY STRUCTURE commands have the new block size. To change the block size of an existing memo field file, use the SET BLOCKSIZE command to change the block size and then copy the table containing the associated memo field to a new file. The new file then has the new block size.

When the block sizes are large and the memo contents are small, memo (.DBT) files contain unused space and become larger than necessary. If you expect the contents of the memo fields to occupy less than 512 bytes (the default size allocated), set the block size to a smaller size to reduce wasted space. If you expect to store larger pieces of information in memo fields, increase the size of the block.

SET MBLOCK is similar to the older SET BLOCKSIZE command except for two advantages:

- You can allocate different block sizes for memo field and index data, whereas SET BLOCKSIZE requires the same block size for both. To allocate block sizes for index data, use SET IBLOCK.
- You can specify smaller blocks with SET MBLOCK than with SET BLOCKSIZE. SET BLOCKSIZE creates blocks in increments of 512 bytes, compared to 64 bytes with SET MBLOCK.

SET MBLOCK example

The following example uses SET MBLOCK to create another table that is a copy of Clients but has a memo blocksize of 256 bytes embedded in its structure versus the default of 512 bytes. This technique applies if memo entries are normally less than 256 bytes and you want to minimize wasted space in the .DBT file:

```
use Clients
? set("mblock")
// Returns default of 8;each memo block = 512 bytes
set mblock to 4
copy to Clients2
use Clients2
? set("mblock")
// Returns 4
list files like Clients*.dbt
// Note that Clients2.dbt is smaller than Clients.dbt
close databases
```

SET TALK

Topic group Related topics Example

Determines whether *Visual* dBASE displays messages in the status bar, or displays memory variable assignments in the results pane of the Command window.

Syntax

SET TALK ON | off

Default

The default for SET TALK is ON. To change the default, set the TALK parameter in VDB.INI. To do so, either use the SET command to specify the setting interactively, or enter the TALK parameter directly in VDB.INI.

Description

When SET TALK is ON, *Visual* dBASE uses the current SET ODOMETER setting to indicate when operations such as COUNT and SORT are in progress in the status bar. It also displays the results of memory variable assignments (using STORE or =) in the results pane of the Command window.

Depending on the amount of memory your system has and the amount of memory particular operations require, issuing SET TALK OFF might improve the performance of some operations.

Use SET TALK with SET ALTERNATE to send SET TALK output to a file or printer rather than to the results pane of the Command window.

When SET TALK is ON, *Visual* dBASE reports the results of the BUILD command in a dialog box. If SET TALK is OFF, nothing happens when BUILD is successful.

SET TALK example

This example shows the effect of SET TALK ON and SET TALK OFF while creating a memory variable:

```
Oldtalk=SET("TALK")
set talk on
First="Susan"                              // Susan
Last="O'Shenko"                            // O'Shenko
Name=Last+", "+First
set talk off
First="Tom"
Last="Frost"
Name=Last+", "+First
? Name
// Name will be set to "Frost, Tom" but this will not
// be displayed in the status bar
set talk &Oldtalk
```

When TALK is OFF, the assignment of "Tom" to First and "Frost" to Last and "Frost, Tom" to Name are not displayed.

In the following example Count displays to the status bar when TALK is ON:

```
close all
use company
set talk on                        // Talk on
count to Recs                      // Count displays in status bar
set talk off                       // Talk off
count to Recs                      // No display
```

Everything else (except Preprocessor)

Topic group

This section includes *Visual* dBASE language elements that pertain to errors, security, and locale.

ACCESS()

Topic group Related topics

Returns the access level of the current user for DBF table security.

Syntax

ACCESS()

Description

In DBF table security, an access level is assigned to each user. The access level is a number from 1 to 8, with 1 being the highest level of access. Use ACCESS() to build security into an application. The access level returned can be used to test privileges assigned with PROTECT. If a user is not logged in to the application, ACCESS() returns 0 (zero).

If you write programs that use encrypted files, check the user's access level early in the program. If ACCESS() returns zero, your program might prompt the user to log in, or to contact the system administrator for assistance.

For more information, see PROTECT.

ANSI()

Topic group Related topics Example

Returns a character string that is the American National Standards Institute (ANSI) value of a specified Original Equipment Manufacturer (OEM) character expression.

Syntax

ANSI(<expC>)

<expC>

The OEM character expression to convert to ANSI characters.

Description

Use ANSI() and OEM() to convert characters between an ANSI character set and an OEM character set. ANSI() accepts an OEM character expression and converts its characters to ones in the current ANSI character set, while OEM() accepts an ANSI character expression and converts its characters to ones in the current OEM character set.

dBASE uses an OEM character set, while other Windows applications use an ANSI character set. OEM character sets match the ANSI set for most alphabetic and numeric characters but usually differ for high-order characters, those with ASCII values from 128 to 255. You might need to use ANSI() before sending a character string from dBASE to another Windows application, for example, if you are using the EXTERN command.

If you need to export a string with different ANSI and OEM values, use ANSI(). Similarly, if you receive a string from a Windows application, use OEM() to convert it into the format used by dBASE.

The following example shows how you can determine if two characters have the same or different ANSI and OEM values.

ANSI() example

The following example displays the 255 characters that are possible with ASCII, ANSI, and OEM formats:

```
FOR i=1 to 255
  ASCII=CHR(i)
  ? i,ASCII,ANSI(ASCII),OEM(ASCII)
  * The next 3 commands cause a pause every 10 lines
  IF MOD(i,10)=0
    WAIT
  ENDIF
NEXT i
```

CANCEL

Topic group Related topics

Halts program execution.

Syntax

CANCEL

Description

Use CANCEL to cancel program execution in the midst of a process. You can also issue CANCEL in the Command window when a program is suspended (with SUSPEND) to cancel execution of the suspended program.

While procedural applications are characterized by deeply nested subroutines that wait for user actions, applications in *Visual* dBASE are event-driven; objects sit on-screen, waiting for something to happen. While waiting for an event, no programs are being executed. When an event occurs, the event handler is fired, and when that's done, *Visual* dBASE goes back to waiting for events. Issuing CANCEL will halt the current event handler thread, but does cause *Visual* dBASE to stop responding to events. To do that the object itself must be removed from the screen or destroyed.

A process that is halted simply stops; no message or exception is generated. In the main routine of a process, issuing CANCEL has the same effect as issuing RETURN: the process is terminated. A program or thread halted by CANCEL performs the standard cleanup for a completed process. All local and private memory variables are cleared. Control returns to the object that started the process, if it's still available; usually a form, menu, or the Command window.

CERROR()

Topic group | Related topics | Example

Returns the number of the last compiler error.

Syntax

CERROR()

Description

Use CERROR() before executing a new program to test whether the source code compiles successfully. If no compiler error occurs, CERROR() returns 0. CERROR() is updated each time you or dBASE compile a program or format file. CERROR() isn't affected by warning messages generated by compiling.

Use CERROR() in a program file. If you issue ? CERROR() in the Command window, it returns 0. (This is because dBASE is compiling the "? CERROR()" command itself, which does not cause a compiler error.)

See the table in the description of ERROR() that compares ERROR(), MESSAGE(), DBERROR(), DBMESSAGE(), SQLERROR(), SQLMESSAGE(), and CERROR().

CERROR() example

The following program segment uses CERROR() in a DO WHILE loop to make the user edit the program until it compiles successfully:

```
DO WHILE .T.
  Clear
    MODIFY COMMAND USER.PRG
    ON ERROR ? ERROR(), MESSAGE(), CERROR()
    COMPILE USER.PRG
    IF CERROR()>0
      ?
      WAIT "Your program didn't compile. Press a key to edit your .PRG."
      LOOP
    ELSE
      EXIT
    ENDIF
ENDDO
```

CHARSET()

Topic group Related topics Example

Returns the name of the character set the current table or a specified table is using. If no table is open and you issue CHARSET() without an argument, it returns the global character set in use.

Syntax

CHARSET([<alias>])

<alias>

A work area number (1 through 225), letter (A through J), or alias name. The work area letter or alias name must be enclosed in quotes.

Description

Use CHARSET() to learn which character set the current table or a specified table is using. If you don't pass CHARSET() an argument, it returns the name of the character set of the current table or, if no tables are open, the global character set in use. CHARSET() also returns information on Paradox and SQL databases.

The character set a table's data is stored in depends on the language driver setting that was in effect when the table was created. With *Visual* dBASE, you can choose the language driver that applies to your dBASE data in the [CommandSettings] section in the VDB.INI file.

The value CHRSET() returns is a subset of the value LDRIVER() returns. For more information, see LDRIVER().

CHARSET() example

This example shows the CHARSET() function and a sample response:

```
? CHARSET()               && Returns DOS:437
```

DBERROR()

Topic group | Related topics | Example

Returns the number of the last BDE error.

Syntax

DBERROR()

Description

DBERROR() returns the BDE error number of the last BDE error generated by the current table. To learn the BDE error message itself, use DBMESSAGE().

See the table in the description of ERROR() that compares ERROR(), MESSAGE(), DBERROR(), DBMESSAGE(), SQLERROR(), SQLMESSAGE(), and CERROR().

DBERROR() example

The following example uses ON ERROR to branch to an error procedure that uses DBERROR() to return what BDE error has occurred during the BROWSE and DBMESSAGE() to return what it means:

```
USE Clients
ON ERROR DO Recovery
COPY TO TEMP
USE TEMP
BROWSE
PROCEDURE Recovery
CLOSE DATABASES
CLEAR
IF ERROR()=239
  ? "The BDE error was error number: " + STR(DBERROR())
  ? "Which means: " + DBMESSAGE()
ELSE
  ? "No BDE error encountered"
ENDIF
RETURN
```

DBMESSAGE()

Topic group Related topics Example

Returns the error message of the last BDE error.

Syntax

DBMESSAGE()

Description

DBMESSAGE() returns the error message of the most recent BDE error.

See the table in the description of ERROR() that compares ERROR(), MESSAGE(), DBERROR(), DBMESSAGE(), CERROR(), SQLERROR(), and SQLMESSAGE().

ERROR()

Topic group Related topics Example

Returns the number of the most recent dBASE error.

Syntax

ERROR()

Description

Use ERROR() to determine the error number when an error occurs. ERROR() is initially set to 0. ERROR() returns an error number when an error occurs, and remains set to that number until one of the following happens:

- Another error occurs
- RETRY is issued
- The subroutine in which the error occurs completes execution

The following table compares the functionality of CERROR(), DBERROR(), DBMESSAGE(), ERROR(), MESSAGE(), SQLERROR(), and SQLMESSAGE().

Function	**Returns**
CERROR()	Compiler error number
DBERROR()	BDE error number
DBMESSAGE()	BDE error message
ERROR()	dBASE error number
MESSAGE()	dBASE error message
SQLERROR()	Server error number
SQLMESSAGE()	Server error message

ID()

Topic group | Related topics | Example

Returns the name of the current user on a local area network (LAN) or other multiuser system.

Syntax

ID()

Description

ID() accepts no arguments and returns the name of the current user as a character string. ID() returns an empty string when you call it on a single-user system or when a user name isn't registered on a multiuser system.

ID() example

The following example keeps track of the last network user to update a record. It updates a network database and puts ID(), the current user, into a field called USER:

```
PROCEDURE OkToChange     && Updates a network database and logs user name
IF ID() <> ""
   REPLACE NAME WITH cName, USER with ID()
ELSE
   CLEAR
   ? "You have lost your network connection. Data not saved."
   WAIT
ENDIF
RETURN
```

LDRIVER()

Topic group Related topics Example

Returns the name of the language driver the current table or a specified table is using. If no table is open and you issue LDRIVER() without an argument, it returns the global language driver in use.

Syntax

LDRIVER([<alias>])

<alias>

A work area number (1 through 225), letter (A through J), or alias name. The work area letter or alias name must be enclosed in quotes.

Description

Use LDRIVER() to learn which language driver the current table or a specified table is using. If you don't pass LDRIVER() an argument, it returns the name of the language driver of the current table or, if no tables are open, the global language driver in use. LDRIVER() also returns information on Paradox and SQL databases.

The language driver associated with a table depends on the DOS code page or the BDE language driver setting that was in effect when the table was created. With *Visual* dBASE, you can choose the language driver that applies to your dBASE data in the [CommandSettings] section in the VDB.INI file. For example, you can load a German language driver to work with a table created while that driver was active.

LDRIVER() example

This example shows the LDRIVER() function and a sample response:

```
? LDRIVER()  && DB437US0
```

This example first closes all tables and obtains the global language driver. Then it opens a table and checks whether the table was created with the global language driver. If not, a warning is displayed:

```
CLOSE ALL
SET LDCHECK OFF
* this program replaces the LDCHECK alert message
GlobalDriver=LDRIVER()
USE Customer
TableLangDriver=LDRIVER()
SET EXACT ON
IF GlobalDriver<>TableLangDriver
  ? "Warning: this table was created"+ "with a different language driver"
  ? "Global Language Driver: "+GlobalDriver
  ? DBF()+" Language Driver: "+TableLangDriver
  WAIT
ENDIF
SET EXACT OFF
```

LINENO()

Topic group Related topics Example

Returns the number of the current program line in the current program, procedure, or user-defined function (UDF).

Syntax

LINENO()

Description

Use LINENO() to track program flow. Use it in conjunction with PROGRAM() to learn when a program executes a given line of code. You can also use LINENO() with ON ERROR to find out which line produces an error.

LINENO() is meaningful only when issued from within a program, procedure, or UDF. When issued in the Command window, LINENO() returns 0.

LINENO() always returns the actual program line number; the number doesn't reflect the order in which the line executes within the program.

LOGOUT()

Topic group Related topics

LOGOUT logs out the current user and sets up a new log-in dialog.

Syntax

LOGOUT

Description

LOGOUT logs out the current user from the current session and sets up a new log-in dialog when used with PROTECT. The LOGOUT command enables you to control user sign-in and sign-out procedures. The command forces a logout and prompts for a login.

When the command is processed, a log-in dialog appears. The user can enter a group name, log-in name, and password. The PROTECT command establishes log-in verification functions and sets the user access level.

LOGOUT closes all open tables, their associated files, and program files.

If PROTECT has not been used, and no DBSYSTEM.DB file exists, the LOGOUT command is ignored.

MEMORY()

Topic group Related topics Example

Returns the amount of currently available memory.

Syntax

MEMORY([<expN>])

<expN>

Any number, which causes MEMORY() to return the amount of available physical memory.

Description

Use MEMORY() to determine how much memory is available in the system. It returns the amount in kilobytes (1024 bytes).

In Windows, available memory is a combination of physical memory (RAM installed in the computer) and virtual memory (disk space used to simulate memory).

When called with no parameters, MEMORY() returns the total amount of available memory: the amount of unused physical memory plus the amount of disk space available for virtual memory. By default, Windows 95 sets no maximum for virtual memory, so MEMORY() will return free physical memory plus free disk space on the hard drive used for virtual memory. On Windows NT, the size of the paging file used for virtual memory is set to a reasonable size.

When called with any numeric parameter, MEMORY() returns the amount of free physical memory. The amount of free physical memory can vary greatly, depending on what the system is doing or has just finished doing. For example, you may have more free physical memory right after viewing and dismissing a dialog box, since the memory that was used to display the dialog box is momentarily unallocated.

Visual dBASE's About dialog box displays the amount of free physical memory (in bytes) and percentage of free GDI and User resources. There is no built-in method that returns free resources, although you can use *extern* to call the appropriate Windows API function from *Visual* dBASE.

MEMORY() example

The following example warns if the user has less than a megabyte of RAM available:

```
IF MEMORY()>=1000
  ? "You have at least a megabyte of RAM"
ELSE
 ?? "Warning: You have less than a megabyte of RAM:"
 ? MEMORY(),"Kb"
ENDIF
```

MESSAGE()

Topic group Related topics Example

Returns the error message of the most recent dBASE error.

Syntax

MESSAGE()

Description

Use MESSAGE() with other error-trapping commands and functions, such as ON ERROR, RETRY, and ERROR(), to substitute specific responses and actions for dBASE default responses to errors.

MESSAGE() is initially set to an empty string. MESSAGE() returns an error message when an error occurs, and remains set to that error message until one of the following happens:

- Another error occurs
- RETRY is issued
- The subroutine in which the error occurs completes execution

To learn the BDE error message of the last BDE error generated by the current table, use DBMESSAGE().

See the table in the description of ERROR() that compares CERROR(), ERROR(), MESSAGE(), DBERROR(), DBMESSAGE(), SQLERROR(), and SQLMESSAGE().

NETWORK()

Topic group Related topics Example

Returns .T. if *Visual* dBASE is running on a system in which a local area network (LAN) card or other multiuser system card has been installed.

Syntax

NETWORK()

Description

Use NETWORK() to determine if a program might be running in a network environment. For example, your program might need to do something in a network environment that it doesn't need to do in a single-user environment, such as issue USE with the EXCLUSIVE option.

NETWORK() returns .T. if a network card is installed; it doesn't determine whether a user is currently running *Visual* dBASE in a network environment. To determine whether a user is actually working in a network environment, use ID().

NETWORK() example

This example uses NETWORK() to test if the user has a network card installed. The user will SET EXCLUSIVE ON only when it might be needed. Without a network card, SET EXCLUSIVE can be ON permanently:

```
IF NETWORK()
  SET EXCLUSIVE OFF && set ON as needed
ELSE
  SET EXCLUSIVE ON  && No network
ENDIF
```

OEM()

Topic group Related topics Example

Returns a character string that is the Original Equipment Manufacturer (OEM) value of a specified American National Standards Institute (ANSI) character expression.

Syntax

OEM(<expC>)

OEM() is the inverse of ANSI(). For more information, see ANSI().

OEM() example

The following example displays the 255 characters that are possible with ASCII, ANSI, and OEM formats:

```
FOR i=1 to 255
  ASCII=CHR(i)
  ? i,ASCII,ANSI(ASCII),OEM(ASCII)
  * The next 3 commands cause a pause
  * every 10 lines
  IF MOD(i,10)=0
    WAIT
  ENDIF
NEXT i
```

ON ERROR

Topic group Related topics Example

Executes a specified command when an error occurs.

Syntax

ON ERROR
[<command>]

<command>

The command to execute when an error occurs in the program, procedure, or UDF. To execute more than one command when an error occurs, issue ON ERROR DO <filename>, where <filename> is a program or procedure file containing the sequence of commands to execute. ON ERROR without a <command> option disables any previous ON ERROR <command>.

Description

Use ON ERROR to control a program's response to run-time errors. For example, <command> can specify a new message in place of a standard error message. When ON ERROR is active, dBASE doesn't display its default run-time error messages.

While dBASE is executing an ON ERROR command, that particular ON ERROR <command> statement is disabled. Thus, if another error occurs during the execution of <command>, dBASE responds with its default error messages. You can, however, set another ON ERROR condition inside a subroutine called with ON ERROR.

ON ERROR <command> has no effect during the following commands:

- APPEND
- CREATE/MODIFY APPLICATION/LABEL/REPORT/SCREEN/STRUCTURE/VIEW
- MODIFY COMMAND/FILE

ON ERROR is similar to ON ESCAPE and ON KEY. ON ESCAPE specifies a command for dBASE to execute when SET ESCAPE is ON and Esc is pressed. ON KEY specifies a command for dBASE to execute when a specified key is pressed.

Avoid using a dBASE command recursively with ON ERROR.

See the table in the description of ERROR() that compares CERROR(), ERROR(), MESSAGE(), DBERROR(), DBMESSAGE(), SQLERROR(), and SQLMESSAGE().

ON ERROR example

The following example uses ON ERROR to open a user defined window when a run-time error occurs. In the example, the command ? Company() will cause an error because Company function does not exist:

```
ON ERROR DO ErrHndlr WITH ERROR(), MESSAGE(),  PROGRAM(), LINENO()
USE Clients
? Company()
RETURN
PROCEDURE ErrHndlr
PARAMETERS nERRORno, cErrMessage, cProgram, nLineNo
DEFINE FORM HeadsUp from 10,25 TO 20,50
DEFINE TEXT Line1 OF HeadsUp AT 2,2 ;
  PROPERTY Text "An Error has occurred", Width 22
DEFINE TEXT Line2 OF HeadsUp AT 4,2;
  PROPERTY Text "Error: " + cErrMessage, Width 22
DEFINE TEXT Line3 OF HeadsUp AT 5,2;
  PROPERTY Text "Number: " + STR(nErrorno), Width 22
DEFINE TEXT Line4 OF HeadsUp AT 6,2;
  PROPERTY Text "Program: "+ cProgram, Width 22
DEFINE TEXT Line5 OF HeadsUp AT 7,2;
  PROPERTY Text "Line #: " + STR(nLineno), Width 22
OPEN FORM HeadsUp
```

ON NETERROR

Topic group | Related topics | Example

Executes a specified command when a multiuser-specific error occurs.

Syntax

ON NETERROR [<command>]

<command>

The command to execute when a multiuser-specific error occurs. To execute more than one command when such an error occurs, issue ON NETERROR DO <filename>, where <filename> is a program or procedure file containing the sequence of commands to execute. ON NETERROR without a <command> option disables any previous ON NETERROR <command> statement.

Description

Use ON NETERROR to control a program's response to multiuser-specific errors. For example, in a multiuser environment on a local area network (LAN), an error can occur when two users attempt to alter the same record in a shared table at the same time, or when one user attempts to open a shared table that another user already has open for exclusive use.

ON NETERROR is similar to ON ERROR, except that ON ERROR responds to all run-time errors regardless of whether they're multiuser-specific. You can use ON ERROR to handle both single-user and multiuser errors, or you can use ON NETERROR to handle just multiuser errors. If you issue both ON ERROR and ON NETERROR, then ON ERROR responds to just single-user errors, leaving ON NETERROR to respond to multiuser errors.

While dBASE is executing an ON NETERROR command, that particular ON NETERROR <command> statement is disabled. Thus, if another multiuser-specific error occurs during the execution of <command>, dBASE responds with its default error messages. You can, however, set another ON NETERROR condition inside a subroutine called with ON NETERROR.

You should avoid using a dBASE command recursively with ON NETERROR.

ON NETERROR example

The following example uses ON NETERROR in case the Clients table cannot be opened exclusively:

```
SET PROCEDURE TO PROGRAM(1) ADDITIVE
ON NETERROR Do NetErr
USE Clients EXCLUSIVE
* If Clients cannot be opened exclusively then
* the subroutine NetErr will be called.
PROCEDURE NETERR
WAIT "Multi-user problem"
```

PROGRAM()

Topic group Related topics Example

Returns the name of the currently executing program, procedure, or user-defined function (UDF).

Syntax

PROGRAM([<expN>])

<expN>

Any number.

Description

PROGRAM() returns the name of the lowest level executing subroutine—program, procedure, or UDF. PROGRAM() returns an empty string ("") when no program or subroutine is executing.

PROGRAM(expN) returns the full path name of the program that is currently running, which may be different from the name of the lowest level executing subroutine. This is shown in the following example.

```
SET PROCEDURE TO program1
** Inside PROGRAM1.PRG is PROCEDURE procedure1
** If procedure1 is running, note the following:
? PROGRAM() returns PROCEDURE1
? PROGRAM(expN) returns C:\VISUALDB\PROGRAM1.PRG.
```

You can issue PROGRAM() in the Command window if a program is suspended with SUSPEND. For example, if Program A calls Procedure B, and Procedure B is suspended, issuing PROGRAM() in the Command window returns the name of Procedure B; issuing PROGRAM(expN) in the Command window returns the full path name of the file containing Procedure B.

You can also use PROGRAM() with ON ERROR and LINENO() to identify the subroutine that was executing and the exact program line number at which the error occurred.

PROGRAM() returns the name of the subroutine in uppercase letters. PROGRAM() doesn't include a file-name extension even if the subroutine is a separate file, while PROGRAM(expN) always includes a file-name extension.

PROTECT

Topic group Related topics

Creates and maintains DBF table security.

Syntax

PROTECT

Description

This command is issued within *Visual* dBASE by the database administrator, who is responsible for data security. PROTECT works in a single user or multiuser environment.

PROTECT is optional. Once you create table security, you may force all users to login when *Visual* dBASE or your *Visual* dBASE .EXE is started, or require login only when attempting to open an encrypted table.

This command displays a multi-page dialog. This dialog is the same dialog that is displayed when choosing dBASE table security in the File | Database Administration dialog box. The first time you use PROTECT, the system prompts you to enter and confirm an administrator password.

Warning: Remembering the administrator password is essential. You can access the security system only if you can supply the password. Once established, the security system can be changed only if you enter the administrator password when you call PROTECT. Keep a hard copy of the database administrator password in a secured area. There is no way to retrieve a password from the system.

Once you enter the administrator password, you may setup and modify DBF table security.

The DBSYSTEM.DB file

PROTECT builds and maintains a password system file called DBSYSTEM.DB, which contains a record for each user who accesses a PROTECTed system. Each record, called a user profile, contains the user's log-in name, account name, password, group name, and access level. When a user attempts to start *Visual* dBASE (if *Visual* dBASE is configured to require a log-in to start the program), or attempts to access an encrypted table (if *Visual* dBASE is configured to require a log-in when an encrypted table is accessed), *Visual* dBASE looks for a DBSYSTEM.DB file. You can specify a location for this file in the [CommandSettings] section of VDB.INI:

```
DBSYSTEM=C:\VISUALDB\BIN
```

If there is no DBSYSTEM entry in VDB.INI, *Visual* dBASE looks for the file in the same directory in which VDB.EXE is located. If it finds the file, it initiates the log-in process. If it does not find the file, there is no log-in process.

DBSYSTEM.DB is maintained as an encrypted file. Keep a record of the information contained in DBSYSTEM.DB, as well as a current backup copy of the file. If the DBSYSTEM.DB file is deleted or damaged and no backup is available, the database administrator will need to reinitialize PROTECT using the same administrator password and group names as before, or the data will be unrecoverable.

RESUME

Topic group Related topics

Restarts program execution at the command line following the one at which program execution was suspended.

Syntax

RESUME

Description

RESUME causes dBASE to resume execution of a program that is suspended. You can suspend program execution by issuing SUSPEND. If you have not assigned a value to ON ERROR, you can also choose to suspend a program when an error occurs.

To restart program execution, enter RESUME in the Command window. The program file resumes execution at the line immediately following the line that caused it to become suspended. If you want to re-execute the line that caused an error, perhaps because you fixed the condition that caused the error, retype the program line at the command line before issuing RESUME.

RETRY

Topic group Related topics Example

Returns control from a subroutine to the command line of the calling routine or Command window that called the subroutine.

Syntax

RETRY

Description

Use RETRY to re-execute a command—for example, one that resulted in an error. RETRY returns program control to the calling command. RETRY clears the memory variables created by the subroutine.

RETRY is valid only in program files.

You can use RETRY with ON ERROR to give the user more chances to resolve an error condition. Using RETRY with ON ERROR resets ERROR() to zero.

RETRY example

The following example uses the Recover procedure when an error is detected with ON ERROR. If the Clients table is already open in another work area when the USE command is executed, an error is returned. The Recover procedure uses CLOSE DATABASES to insure that all tables are closed and RETRY returns program flow to the USE command:

```
ON ERROR DO Recover
USE Clients EXCLUSIVE
BROWSE
ON ERROR
CLOSE DATABASES
PROCEDURE Recover
WAIT "An error has occurred.;
  Press any key to retry.."
CLOSE DATABASES
RETRY
```

SET ENCRYPTION

Topic group Related topics

Establishes whether a newly created dBASE table is encrypted if PROTECT is used.

Syntax

SET ENCRYPTION ON | off

Default

The default for SET ENCRYPTION is ON.

Description

This command determines whether copied dBASE tables (that is, tables created through the COPY, JOIN, and TOTAL commands) are created as encrypted tables. An encrypted table contains data encrypted into another form to hide the contents of the original table. An encrypted table can only be read after the encryption has been deciphered or copied to another table in decrypted form.

To access an encrypted table, you must enter a valid user name, group name, and password after the login screen prompts. Your authorization and access level determine whether you can or cannot copy an encrypted table. After you access the table, SET ENCRYPTION OFF to copy the table to a decrypted form. You need to do this if you wish to use EXPORT, COPY STRUCTURE EXTENDED, MODIFY STRUCTURE, or options of the COPY TO command.

Note: Encryption works only with dBASE (.DBF) tables. Encryption works only with PROTECT. If you do not enter dBASE or access the table through the log-in screen, you will not be able to use encrypted tables.

All encrypted tables used concurrently in an application must have the same group name.

Encrypted tables cannot be JOINed with unencrypted tables. Make both tables either encrypted or unencrypted before JOINing them.

You can encrypt any newly created table by assigning the table an access level through PROTECT.

SET ERROR

Topic group Related topics Example

Specifies one character expression to precede error messages and another one to follow them.

Syntax

SET ERROR TO
[<preceding expC> [, <following expC>]]

<preceding expC>

An expression of up to 33 characters to precede error messages. dBASE ignores any characters after 33.

<following expC>

An expression of up to 33 characters to follow error messages. dBASE ignores any characters after 33. If you want to specify a value for <following expC>, you must also specify a value or empty string ("") for <preceding expC>.

Default

The default for the message that precedes error messages is "Error: ". The default for the message that follows error messages is an empty string. To change the default, set the ERROR parameter in VDB.INI, using the following format:

```
ERROR = <preceding expC> [, <following expC>]
```

Description

Use SET ERROR to customize the beginnings and endings of run-time error messages. SET ERROR TO without an argument resets the beginnings and endings to the default values.

SET ERROR is similar to ON ERROR; both can be used to customize error messages. SET ERROR, however, can only specify expressions to precede and follow a standard dBASE error message, while ON ERROR can specify the message itself. Also unlike ON ERROR, SET ERROR can't call a procedure that carries out a series of commands.

SET ERROR example

Use SET ERROR to customize error messages.

```
SET ERROR TO "Oops! - ", " - Please fix this."
? "a" = 1                                        && generate a runtime error
SET ERROR TO
```

SET LDCHECK

Topic group | Related topics | Example

Enables or disables language driver ID checking.

Syntax

SET LDCHECK ON | off

Default

The default for SET LDCHECK is ON. To change the default, set the LDCHECK parameter in VDB.INI.

Description

Use SET LDCHECK to disable or enable dBASE's capability to check for language driver compatibility. This capability is important if you work with dBASE tables created with different dBASE configurations or different international versions of dBASE because it warns you of conflicting language drivers.

Language drivers determine the character set and sorting rules that dBASE uses, so if you create a dBASE table with one language driver and then use that file with a different language driver, some of the characters will appear incorrectly and you may get incorrect results when querying data.

SET LDCONVERT

Topic group Related topics

Determines whether data read from and written to character and memo fields is transliterated when the table character set does not match the global language driver.

Syntax

SET LDCONVERT ON | off

Default

The default for SET LDCONVERT is ON. To change the default, set the LDCONVERT parameter in VDB.INI.

Description

Use SET LDCONVERT to determine whether the contents of character and memo fields in tables created with a given language driver in effect, are converted to match the language driver in effect at the time the fields are read or written to.

Language drivers determine the character set and sorting rules that dBASE uses, so if you create a dBASE table with one language driver and then use that file with a different language driver, some of the characters will appear incorrectly and you may get incorrect results when querying data.

In general, SET LDCONVERT should be ON to insure that dBASE behaves as expected when using data created under disparate language drivers.

SQLERROR()

Topic group | Related topics | Example

Returns the number of the last server error.

Syntax

SQLERROR()

Description

Use SQLERROR() to determine the error number of the last server error. To learn the text of the error message itself, use SQLMESSAGE().

See the table in the description of ERROR() that compares ERROR(), MESSAGE(), DBERROR(), DBMESSAGE(), SQLERROR(), SQLMESSAGE(), and CERROR().

SQLERROR() example

The following example uses SQLERROR() and SQLMESSAGE() to return an SQL error number and SQL error message to an ON ERROR routine that displays a MDI form with an error report:

```
ON ERROR DO ErrHndlr WITH ERROR(), MESSAGE(), ;
  SQLERROR(), SQLMESSAGE(), PROGRAM(), LINENO()
SET DBTYPE TO DBASE
OPEN DATABASE CAClients
SET DATABASE TO CAClients
errorCode = SQLEXEC("SELECT Company, City ;
  FROM Company WHERE State_Prov='CA'", "StateCA.DBF")
IF errorCode = 0
  SET DATABASE TO
  USE StateCa
  LIST
ENDIF
RETURN
PROCEDURE ErrHndlr
PARAMETERS nErrorNo, cErrMess, nSQLErrorNo, cSQLErrMess, cProgram, nLineNo
DEFINE FORM HeadsUp FROM 10,20 TO 20,55;
  PROPERTY Text "Heads Up"
DEFINE TEXT Line1 OF HeadsUp AT 2,10 ;
  PROPERTY Text "An Error has occurred", Width 24, ColorNormal "R+/W"
DEFINE TEXT Line2 OF HeadsUp AT 4,2;
  PROPERTY Text ;
  IIF(ERROR()=240,cSqlErrMess,cErrMess), Width 33
DEFINE TEXT Line3 OF HeadsUp AT 5,2;
  PROPERTY Text "Number: " + ;
  IIF(ERROR()=240,STR(nSQLErrorNo),STR(nErrorno)), Width 24
DEFINE TEXT Line4 OF HeadsUp AT 6,2;
  PROPERTY Text "Program: "+ cProgram, Width 22
DEFINE TEXT Line5 OF HeadsUp AT 7,2;
  PROPERTY Text "Line #: " + STR(nLineno), Width 22
OPEN FORM HeadsUp
```

SQLEXEC()

Topic group Example

Executes an SQL statement in the current database or on specified dBASE or Paradox tables.

Syntax

SQLEXEC(<SQL statement expC> [,<Answer table expC>])

<SQL statement expC>

A character string that contains an SQL statement. The SQL statement must follow server-specific dialect rules for the current database and must be enclosed in quotes. For Paradox and *Visual* dBASE tables, the dialect is the same as that used by the Borland InterBase database server, which is ANSI-compliant. Character strings and SQL or BDE reserved words contained within the SQL statement must also be enclosed in either single or double quotation marks. (Single quotation marks are normally used.).

<Answer table expC>

Paradox or DBF table that stores the data returned by an SQL SELECT statement; must also be in quotes. If you specify a file without including its path, *Visual* dBASE creates the file in the current directory, then in the path you specify with SET PATH. If you specify a file without including its extension, *Visual* dBASE assumes the default table type specified with the SET DBTYPE command. If you don't specify a table name, *Visual* dBASE creates a table named Answer with the extension defined by the current DBTYPE setting.

You can also specify the name of an already open database (defined for a file directory location only) as a prefix (enclosed in colons) to the name of the answer table, that is, :database name:table name. You cannot specify the location of an answer table on a database server.

Description

SQLEXEC() executes a SQL statement in the current database set by SET DATABASE, or if a database is not set, on tables in the current or a specified directory. (You can preface the name of a table with its directory location or specify an already open database by enclosing the database name in colons, for example, :database name:table name. If you're using Borland SQL Link to connect to a database server, *Visual* dBASE passes the SQL statement you specify directly to the database server where the database selected by SET DATABASE resides.

When an SQL statement contains SQL or BDE reserved words and you are executing the statement on DBF or Paradox tables, you need to enclose the reserved words in single(‘) or double (“) quotation marks and use SQL table aliases (different than the aliases associated with dBASE tables) to identify fields, for example:

```
SELECT * FROM company.dbf b WHERE b."CHAR" = 'element'
```

You can use table aliases to qualify fields specified in the SELECT, WHERE, GROUP BY, or ORDER BY clauses of SELECT statements. This is particularly useful when querying data from more than one table.

SQLEXEC() returns error codes with the same values as those returned by ERROR() and MESSAGE(); a value of zero indicates that no error occurred as a result of the statement's execution. If an error occurs, you can use DBERROR() and DBMESSAGE() functions to return BDE errors or use the SQLERROR() and SQLMESSAGE() functions to obtain information directly from the database server about the cause of an error. (Also, the ERROR() function returns an error code of 240 if a server error occurs.)

SQLEXEC() example

The following example executes an SQL SELECT statement on the server table Company:

```
SET DBTYPE TO DBASE
OPEN DATABASE CAClients
SET DATABASE TO CAClients
errorCode = SQLEXEC("SELECT Company, City  ;
  FROM Company WHERE State_Prov='CA'", "StateCA.DBF")
IF errorCode = 0
  SET DATABASE TO
  USE StateCa
  LIST
ENDIF
RETURN
```

SQLMESSAGE()

Topic group | Related topics | Example

Returns the most recent server error message.

Syntax

SQLMESSAGE()

Description

Use SQLMESSAGE() to determine the error message of the last server error. To learn the error code, use SQLERROR().

SUSPEND

Topic group Related topics Example

Suspends program execution, temporarily returning control to the Command window.

Syntax

SUSPEND

Description

SUSPEND lets you interrupt program execution at a specific point, a break point. The program remains suspended until you issue RESUME or CANCEL, or until you exit *Visual* dBASE. If you issue RESUME, the program resumes from the break point. If you issue CANCEL, *Visual* dBASE cancels program execution.

While a program is suspended, you can enter commands in the Command window. For example, you can check and change the status of files, memory variables, SET commands, and so on; however, *Visual* dBASE ignores any changes you make to the program while it is suspended. If you want to correct a suspended program, issue CANCEL, edit the program, and then run it again.

If you initialize memory variables in the Command window while a program is suspended, *Visual* dBASE makes them private at the program level that suspension occurred.

You should not return to a suspended program by issuing DO <filename> in the Command window. If you do so, you will end up with "nested" SUSPEND statements, and may not know that a program is still suspended. If you want to run a suspended program from the beginning, issue CANCEL and then DO <filename>.

The *Visual* dBASE Debugger allows for more complex break points than using SUSPEND.

SUSPEND example

USER()

Topic group Related topics

Returns the login name of the user currently logged in to a protected system.

Syntax

USER( )

Description

The USER( ) function returns the log-in name used by an operator currently logged in to a system that uses PROTECT to encrypt files. On a system that does not use PROTECT, USER( ) returns a null string.

VERSION()

Topic group Related topics

Returns the name and version number of the currently running copy of *Visual* dBASE.

Syntax

VERSION([<expN>])

<expN>

Any number, which causes VERSION() to return extended version information.

Description

Although you may be able to use VERSION() in programs to take advantage of version-specific features, the most common use of VERSION() is to get the exact build number of your copy of *Visual* dBASE to see if you have the latest build. When called with no parameters, VERSION() returns a string like:

```
Visual dBASE 7.0
```

with the product name and the version number. If you pass a number, for example VERSION(1), you will get extended build information, like:

```
Visual dBASE 7.0  b1298 (09/30/97-US970930)
```

which adds the build number after the “b”, the date of the build, and the identifier and date of the language resource for that copy of *Visual* dBASE. If you pass the number .89, you will get the build information for the Borland Database Engine used, for example,

```
BDE version: 09/17/97
```

Preprocessor

Topic group

When *Visual* dBASE compiles a program file, that file is run through the preprocessor before it is actually compiled. The preprocessor is a separate built-in utility that processes the text of the program file to prepare it for compilation. Its duties include

- Stripping out comments from the program file
- Joins lines separated by the line continuation character
- Substituting macro-identifiers and macro-functions with the corresponding replacement text
- Including the text of other files in the program file
- Conditionally excluding parts of the program file so they are not compiled

The preprocessor generates an intermediate file; this is the file that is compiled by *Visual* dBASE's compiler.

While those are the mechanics of the preprocessor, the usage of the preprocessor allows you to

- Replace constants and "magic numbers" in your code with easy-to-read and easy-to-change identifiers
- Create macro-functions to replace complex expressions with parameters
- Use collections of constant identifiers and macro-functions in multiple program files
- Maintain separate versions of your programs, for example debug and production versions, in the same program files through conditional compilation

Visual dBASE's preprocessor is similar to the preprocessor used in the C language. It uses a handful of preprocessor directives to control its activities. All preprocessor directives start with the # character and each one must be on its own, single line in the script file.

#define

Topic group Related topics Example

Defines an identifier (name) for use in controlling program compilation, defining constants, or creating macro-functions.

Syntax

#define <identifier> [<replacement text>]

#define <identifier>(<parameter list>) <replacement text with parameters>

<identifier>

A name. It identifies the text to replace if <replacement text> is supplied. The name must start with an alphabetic character and can contain any combination of alphabetic or numeric characters, uppercase or lowercase letters. The identifier is not case-sensitive.

(<parameter list>)

Parameter names that correspond to arguments passed to a macro-function that you create with #define <identifier>(<parameter list>) <replacement text>. If you specify multiple parameters, separate each with a comma. There cannot be any spaces between the <identifier> and the opening parenthesis of (<parameter list>), or after any of the parameter names in the <parameter list>.

<replacement text>

The text you want to use to replace all occurrences of <identifier>. If you specify <replacement text>, the preprocessor scans each source code line for identifiers and replaces each one it encounters with the specified replacement text. <replacement text> can be any text that is part of a dBASE program, such as a string, numeric expression, or series of commands.

Description

The #define directive defines an identifier and optionally lets you replace text in a program before compilation. Each #define definition must begin on a new line and is limited to 4096 characters.

Identifiers are available only to the program in which they are defined. To define identifiers for use in multiple programs, place them in a separate file and use #include to include that file as needed.

You must define an identifier in a file with the #define directive before you can use it. Once it has been defined, you cannot #define it again; you must undefine it first with the #undef preprocessor directive.

Use the #define directive for the following purposes:

- To declare an identifier and assign replacement text to represent a constant value or a complex expression.
- To create a macro-function.
- To declare an identifier with no replacement text, so you can use it with the #ifdef or #ifndef directive.
- To declare an identifier with replacement text, so you can use it with the #if directive.

The effect of #define is similar to a word processor's search-and-replace feature. When the preprocessor encounters a #define identifier in the text of a script, it replaces that identifier with the <replacement text>. If there is no <replacement text> for that identifier, the identifier is simply removed. For example:

```
#define test 4                          // Create identifier with value
? test - 3                              // ( 4 - 3 ) = 1
#undef test                             // #undef to change definition
#define test                            // Create identifier with no value
? test - 3                              // ( - 3 ) = -3
Because the preprocessor runs before a program is compiled and performs
simple text substitution, the use of #define statements can in effect
override memory variables, built-in commands and functions, and any other
element having the same name as <identifier>. This is shown in the following
examples.
// Overiding a variable
```

```
somevar = 25;                       // Creates variable
#define somevar 10;                 // Until further notice, "somevar" will be
replaced
? somevar                           // Compiles argument as "10". Displays 10
#undef somevar                      // "somevar" no longer replaced
? somevar                           // Displays 25
// Overriding a function
#define cos(x) (42 + x)                 // Function adds 42
? cos(3)                                // Compiles argument as "(42 + 3)".
Displays 45
To use #define directives in WFM and REP files generated by the Form and
Report designers, place the directives in the Header section of the file so
that the definitions will not be erased by the designer.
```

Declaring identifiers to represent constants

Assign an identifier to represent a constant value or expression when you want the preprocessor to search for and replace all instances of the identifier with the specified value or expression before compilation. When used in this manner, the identifier is known as a manifest constant. It's common practice to make the name of the manifest constant all uppercase, with underscores between words so that it stands out in code. For example:

```
#define SECS_PER_HOUR 3600                      // Number of seconds per hour
#define MSECS_PER_DAY (1000*24*SECS_PER_HOUR)  // Number of milliseconds per
day
```

Note that when using a manifest constant to represent a numeric expression, you should place the entire expression inside parentheses. This prevents possible errors due to the precedence of operators used to evaluate expressions. For example, consider the following calculation:

```
nDays = nTimeElapsed / MSECS_PER_DAY
```

Without parentheses, this statement would compile as:

```
nDays = nTimeElapsed / 1000*24*3600
```

That's incorrect—it divides by 1000 then multiplies by 24 and 3600. (The multiplication and division operators are at the same level of precedence, so the expression is evaluated from left to right.). By placing parentheses around the manifest constant definition as shown, the statement would compile as:

```
nDays = nTimeElapsed / (1000*24*3600)
```

Because of the parentheses, the expression is evaluated correctly: the value of the constant is evaluated first, then used as the divisor.

Manifest constants streamline your code and improve its readability because you can use a single identifier to represent a frequently used constant or a complex expression. In addition, if you need to change the value of a constant in your program, you need to change only the constant definition and not every occurrence of the constant.

To replace an identifier only in parts of a program, insert #undef <identifier> into your program where you want the search-and-replace process to stop.

Creating macro-functions

When the preprocessor encounters a function call that matches a defined macro-function, it replaces the function call with the replacement text, inserting the arguments of the function call into the replacement text. This is shown in the following example.

```
#define avg(num1,num2) (((num1)+(num2))/2)  // Average two numbers
...
n1=20
n2=40
? avg( n1, n2 )  // Displays 30
```

The arguments in the macro-function call are substituted exactly as they are shown in the macro-function definition. In this example, the last statement compiles as:

```
? (((n1)+(n2))/2)
```

```
When using a macro-function to perform calculations, always use parentheses
to enclose each parameter and the entire expression in the macro-function
definition as shown. If you leave them out, errors may result due to the
precedence of operators, as shown in these (somewhat contrived) examples:
#define avg(num1,num2) (((num1)+(num2))/2)
#define badAvg(num1,num2) (num1+num2)/2
? 12 /    avg( 2, 4 )  // 12/(6/2)     --> displays 4
? 12 / badavg( 2, 4 )  // 12/6/2       --> displays 1
```

Unlike functions in dBASE, the number of arguments passed from a macro-function call must match the number of parameters defined in your #define statement.

Declaring identifiers for conditional compilation

In addition to using identifiers for constants and macro-functions in dBASE code, they are used for conditional compilation with the #if, #ifdef, and #ifndef directives.

Defining an identifier without replacement text lets you use it with the #ifdef or #ifndef directive to test if the identifier exists. When used in this manner, the existence of the identifier acts as a logical flag to either include or exclude code for compilation.

When an identifier is defined with replacement text, you can use comparison operators to check the value of the identifier in an #if directive, and conditionally compile code based on the result. And you can still use #ifdef and #ifndef.

Nesting preprocessor identifiers

You can nest preprocessor identifiers; that is, the replacement text for one identifier may contain other identifiers, as long as those identifiers are already defined, as shown in the following example:

```
#define SECS_PER_HOUR 3600                      // Number of seconds per hour
#define MSECS_PER_DAY (1000*24*SECS_PER_HOUR)  // Number of milliseconds per
day
```

You cannot use the identifier being defined in its replacement text, however.

#define example

The first example uses a manifest constant to represent a “magic number.” Suppose your application is doing metric conversions. Instead of sprinkling the conversion factor around in your code, which would just be a cryptic number, you can #define it as a manifest constant, which eliminates the possibility that you might get the number wrong in some places and makes your code self-documenting:

```
#define LB_PER_KG 2.2046   // Number of pounds per kilogram
...
nPounds = form.kg.value * LB_PER_KG
```

The second example uses a manifest constant to represent a simple constant in your application. Suppose you’re testing several different techniques to see which one accomplishes the same task the fastest. You need to repeat the task many times to get measurable results, so you use a manifest constant to represent the number of times you want each test to be run. By using a single manifest constant, you can easily change the number of times each test is run and calculate the average time:

```
#define NUM_REPS 10000   // Number of times to repeat each test
...
for n = 1 to NUM_REPS
  // Test 1
endfor
for n = 1 to NUM_REPS
  // Test 2
endfor
...
? "Average time for test 1", time[1] / NUM_REPS
```

The following example uses a manifest constant for a file name that is used in different parts of an application:

```
#define QWK_FILE     "IMF.QWK"
#define MESSAGE_FILE "MESSAGES.DAT"
...
fMsg = new File()
fMsg.create( MESSAGE_FILE )
...
z = new ZipFile( QWK_FILE )      // Create compressed file
z.store( MESSAGE_FILE )          // Store the message file
...
class ZipFile( cFileName ) of File
  // Code to implement ZipFile class
endclass
This example demonstrates conditional compilation. Two preprocessor
identifiers are used: a DEBUG flag, and a BUILD number:
#define DEBUG     // Comment out if not debug version
#define BUILD 35  // Current build number
...
#if BUILD < 20
  // Older code
#else
  // Current code
  #ifdef DEBUG
    // Include DEBUG code
  #endif
#endif
```

#else

Topic group Related topics

Designates an alternate block of code to conditionally compile if the condition specified by an #if, #ifdef, or #ifndef directive is *false*.

#endif

Topic group Related topics

Designates the end of an #if, #ifdef, or #ifndef directive.

#if

Topic group Related topics Example

Controls conditional compilation of code based on the value of an identifier assigned with #define.

Syntax

#if <condition>
<statements 1>
[#else
<statements 2>]
#endif

<condition>

A logical expression, using an identifier you've defined, that evaluates to *true* or *false*.

<statements 1>

Any number of statements and preprocessor directives. These lines are compiled if <condition> evaluates to *true*.

#else <statements 2>

Specifies the lines you want to compile if <condition> evaluates to *false*.

Description

Use the #if directive to conditionally compile sections of source code based on the value of an identifier. Two other directives, #ifdef and #ifndef, are also used to conditionally include or exclude code for compilation. Unlike the #if directive, however, they test only for the existence of an identifier, not for its value.

The <condition> must be a simple logical condition; that is, a single test using one basic comparison operator (=, ==, <, >, <=, >=, <>). You may nest conditional compilation directives.

If the identifier is not defined, the <condition> always evaluates to *false*.

Conditional compilation is useful when maintaining different versions of the same program , for debugging, and for managing the use of #include files. Using #if for conditional compilation is different than conditionally executing code with an IF statement. With IF, the code still gets compiled into the resulting byte code file, even if it is never executed. By using #if to exclude code you don't want for a particular version of your program, the code is never compiled into byte code.

When *Visual* dBASE's preprocessor processes a file, it internally defines the preprocessor identifier __vdb__ (two underscores on both ends) with the current version number. Earlier versions of *Visual* dBASE used __dbasewin__. Use these two built-in identifiers to manage code that's intended to run on different versions of *Visual* dBASE.

#if example

The following example demonstrates how you would create code that runs on different versions of *Visual* dBASE, using the built-in identifiers __vdb__ and __dbasewin__:

```
#if __vdb__ >= 7
  // Version 7 code
#else
  #if __dbasewin__ > 5
    && Version 5.5 or 5.6 code
  #else
    && Version 5.0 code
  #endif
#endif
```

Because code that is excluded by #if is never compiled, you can safely use new syntax that might be introduced in a new version. When compiled with an older version of *Visual* dBASE, the new code is ignored. This is different than testing the version returned by the VERSION() function at run time. New syntax would not compile under an older version.

Note that for the pre-version 7 code, the older comment style is used.

#ifdef

Topic group Related topics Example

Controls conditional compilation of code based on the existence of an identifier created with #define.

Syntax

#ifdef <identifier>
<statements 1>
[#else
<statements 2>]
#endif

<identifier>

The identifier you want to test for. <identifier> is defined with the #define directive.

<statements 1>

Any number of statements and preprocessor directives. These lines are compiled if <identifier> has been defined.

#else <statements 2>

Specifies the lines to compile if <identifier> has not been defined.

Description

Use the #ifdef directive to conditionally compile sections of source code. If you've defined <identifier> with #define, the code you specify with <statements 1> is compiled; otherwise, the code following #else, if any, is compiled.

You may nest conditional compilation directives.

Conditional compilation is useful when maintaining different versions of the same program, for debugging purposes, and for managing the use of #include files. Using #ifdef for conditional compilation is different than not executing code with an IF statement. With IF, the code still gets compiled into the resulting byte code file, even if it is never executed. By using #ifdef to exclude code you don't want for a particular version of your program, the code is never compiled into byte code.

#ifdef example

The following example uses #ifdef to check for a identifier named DEBUG to determine if extra code should be included to display trace information in the results pane of the Command window:

```
#define DEBUG     // Comment out if not debug version
#ifdef DEBUG
  #define TRACE(m) _sys.scriptOut.writeln(m)
  #define TRACE(m) ? (m)
#else
  #define TRACE(m)
#endif
...
// Process names in list
if form.rowset.first()
  do
    TRACE( form.rowset.fields[ "Last name" ].value )  // Display name as we
go
    // Do whatever
  until not form.rowset.next()
endif
```

The macro-function TRACE() is defined so that if the DEBUG identifier is not defined, all calls to TRACE() are replaced with nothing—they are removed from the code and not compiled. This allows you to use TRACE() as much as you want, and with a simple change in the DEBUG identifier, remove all the code from the compiled byte code, resulting in better performance.

#ifndef

Topic group Related topics Example

Controls conditional compilation of code based on the existence of an identifier assigned with #define.

Syntax

#ifndef <identifier>
<statements 1>
[#else
<statements 2>]
#endif

<identifier>

The identifier you want to test for. <identifier> is defined with the #define directive.

<statements 1>

Any number of statements and preprocessor directives. These lines are compiled if <identifier> has not been defined.

#else <statements 2>

Specifies the lines to compile if <identifier> has been defined.

Description

Use the #ifndef directive to conditionally compile sections of source code. If you haven't defined <identifier> with #define, the code you specify with <statements 1> is compiled; otherwise, the code following #else, if any, is compiled.

Use #ifndef if you want to include code only if the identifier is not defined. Otherwise, you can use #ifdef to include code only if the identifier is defined, and #ifdef with its #else option to include different sets of code depending on the existence of the identifier.

You may nest conditional compilation directives.

Conditional compilation is useful when maintaining different versions of the same program, for debugging purposes, and for managing the use of #include files. Using #ifndef for conditional compilation is different than not executing code with an IF statement. With IF, the code still gets compiled into the resulting byte code file, even if it is never executed. By using #ifndef to exclude code you don't want for a particular version of your program, the code is never compiled into byte code.

#ifndef example

When creating a set of #define directives in an #include file, enclose the entire set inside an #ifndef block and #define a special identifier for that block. For example, here are some lines from the VDBASE.H file that includes #define directives for many of the enumerated values used in *Visual* dBASE:

```
#ifndef VDBASE_H
#define VDBASE_H
// Constants for MSGBOX()
#define OK_BUTTON                   0
#define OK_CANCEL_BUTTONS           1
#define ABORT_RETRY_IGNORE_BUTTONS  2
#define YES_NO_CANCEL_BUTTONS       3
#define YES_NO_BUTTONS              4
#define RETRY_CANCEL_BUTTONS        5
#endif
```

If you #include the same file twice in the same program file (which often happens because some #include files #include other files), the #ifndef directive will make sure that #define directives are processed only once. Attempting to #define the same identifier twice causes an error.

#include

Topic group Related topics Example

Inserts the contents of the specified source file (known as an include or header file) into the current program file at the location of the #include statement.

Syntax

#include <filename> | "<filename>"

<filename> | “<filename>”

The name of the file, optionally including a full or partial path, whose contents are to be inserted into the current program file. You can specify the file name within or without quotes. An include file typically has an .h file-name extension.

If you specify <filename> without a path, the preprocessor uses the following search order:

1. It searches the current directory for the file exactly as you’ve specified it.
2. If you omitted the .h file-name extension, it adds the extension and searches the current directory.
3. If it can’t find the file in the current directory, it looks in <home directory>\ INCLUDE. (The home directory is the one in the _DBWINHOME system memory variable.**)**
4. If it can’t find the file in the current directory or <home directory>\INCLUDE, it looks in the directory you specify with the DOS environment variable INCLUDE.

Description

The effect of #include is as if the contents of the specified file were typed into the current program file at the location of the #include statement. The specified file is called an include file. #include is used primarily for files which have #define directives.

Identifiers are available only to the program in which they are defined. To use a single set of identifiers in multipleprograms, save the #define statements in a file, then use the #include directive to define the identifiers in additional programs.

An advantage of having all the #define statements in one file is the ease of maintenance. If you need to modify any of the #define statements, you need only change the include file; the program files that use the #define statements remain unchanged. After you modify the include file, recompile your program file for the changes to take effect.

To use #include directives in WFM and REP files generated by the Form and Report designers, place the directives in the Header section of the file so that the definitions will not be erased by the designer.

#include example

You may want to set up a standard include file that you use in all your script files that contains manifest constants and macro-functions that you use through your application. For example:

```
// Std.h
#include "VDBASE.H"                        // Contains #defines for enums
#define CONFIRM(m,t) (msgbox(m,t,4+32)==BUTTON_YES)
```

Place the STD.H file in *Visual* dBASE's INCLUDE subdirectory so that it's easily accessible. Then at the top of every program, #include that file:

```
#include "STD.H"
...
if CONFIRM( "This record will be lost forever! You sure?", "Delete" )
```

#pragma

Related topics Example

Sets compiler options.

Syntax

#pragma <compiler option>

<compiler option>

The compiler option to set.

Description

Use the #pragma to set compiler options. The only option supported in this version of *Visual* dBASE is:

coverage(ON | OFF)

Enables or disables the inclusion of coverage analysis information in the resulting byte code file.

Coverage analysis provides information about which program lines are executed. To provide coverage analysis, a program file must be compiled to include the extra coverage analysis information.

SET COVERAGE controls whether programs are compiled with coverage information. Use #pragma coverage() in your program file to override the SET COVERAGE setting for that particular file.

Note: Do not specify both #pragma coverage(ON) and #pragma coverage(OFF) in the same program file. The last #pragma takes effect; all others are ignored.

For more information about coverage files, see SET COVERAGE.

#pragma example

The following example uses #pragma to enable coverage analysis if the DEBUG constant has been #defined:

```
#ifdef DEBUG
  #pragma coverage(on)
#else
  #pragma coverage(off)
#endif
```

#undef

Topic group Related topics Example

Removes the current definition of the specified identifier previously defined with #define.

Syntax

#undef <identifier>

<identifier>

The identifier whose definition you want to remove.

Description

The #undef directive removes the definition of an identifier previously defined with the #define directive. If you use #define with <replacement text>, the preprocessor replaces all instances of the identifier with the replacement text from the point it encounters that #define until it encounters an #undef specifying the same identifier. Therefore, to replace an identifier only in parts
of a program, insert #undef <identifier> into your program where you want the search-and-replace process to stop.

#undef is also required if you want to change the <replacement text> for an identifier. You cannot use #define for an identifier that is already defined. You must #undef the identifier first, then specify a new #define directive.

Attempting to #undef an identifier that is not defined has no effect; no error is generated.

#undef example

In this example, the script file has numerous #ifdef DEBUG statements to conditionally compile debug code. You want to use the debug code for only one section in the file, so you #define DEBUG at the beginning of the section, and #undef DEBUG at the end:

```
...
#define DEBUG
// Some code
#ifdef DEBUG
  // Debug code
#endif
// More code
#undef DEBUG
...
// Some more code
#ifdef DEBUG
  // More debug code
#endif
```

__vdb__

Topic group Related topics Example

Identifies the current *Visual* dBASE version number.

Description

When *Visual* dBASE's preprocessor processes a file, it internally defines the preprocessor identifier __vdb__ (two underscores on both ends) with the current version number. Earlier versions of *Visual* dBASE used __dbasewin__. Use these two built-in identifiers to manage code that's intended to run on different versions of *Visual* dBASE.

__vdb__ example

The following example demonstrates how you would create code that runs on different versions of *Visual* dBASE, using the built-in identifiers __vdb__ and __dbasewin__:

```
#if __vdb__ >= 7
  // Version 7 code
#else
  #if __dbasewin__ > 5
    && Version 5.5 or 5.6 code
  #else
    && Version 5.0 code
  #endif
#endif
```

Because code that is excluded by #if is never compiled, you can safely use new syntax that might be introduced in a new version. When compiled with an older version of *Visual* dBASE, the new code is ignored. This is different than testing the version returned by the VERSION() function at run time. New syntax would not compile under an older version.

Note that for the pre-version 7 code, the older comment style is used.

Command window

Use the Command window to directly execute one-line Visual dBASE commands. It is also handy for testing short code and formulas and immediately seeing the results in the bottom (results) pane after you press Enter. To type more than one line of code, do not press Enter at the end of each line (this will execute what you have typed so far. Instead, press the Down arrow to begin a new line.To run a line or section of code anywhere in your test sequence, select the line or section and press Enter.

To use your own functions in the Command window, you must first load them:

```
set procedure to <filename> additive
```

Learning tool

- As you work in the visual design environment, the corresponding dBASE commands are automatically displayed in the upper pane of the window. So the Command window is a good tool for learning basic commands in the Visual dBASE language.
- You can get help on a Visual dBASE language element or feature by typing a word or phrase in the Command window, highlighting it, and pressing F1.

Note: The Command window is for temporary work only; you cannot save your work. However, you can copy the contents of the window or drag and drop to a source file. You can also print the contents (select what you want to print, and choose File|Print).

Source editor

The Source editor lets you view or edit code for any *Visual* dBASE form, report, menu, query, data module, program, or any other type of text file.

Code for each open text file appears on a separate tabbed page of the editor. (If you want, you can choose not to have tabbed pages in the editor, but instead, have *Visual* dBASE open a separate instance of the editor each time you open a text file. To set this preference, choose Properties|Editor Properties, Display page.)

The left pane

The editor’s left pane shows the hierarchy of the current file. To enlarge or hide the pane, move the split bar to the left or right, using the mouse. The tree view is dynamically updated when you edit code.

Expand the nodes in the tree view pane by clicking the plus signs and collapse the nodes by clicking the minus signs.

The right pane

The right pane contains the code. Click an item in the tree view to highlight the first line of that object in code. Double-click an item in the tree view (or select it and press Tab) to jump to the start of that object in the code.

Note: In the Project Explorer's source view, the code is read-only.

Form designer

The form design window is a visual design surface on which you position the components you need for your form, then set their properties in the Inspector and code their event handlers and other methods.

Note: To read about a component, select it with the mouse, and then click the Question Mark button in the toolbar. Or, after a component is on the design surface, select it and press F1 for help in working with that component.

You can change the size and position of the design window either by dragging the edges of the window or, if you need to be precise, by changing the values of the form's *height*, *left*, *top*, and *width* properties in the Inspector.

By default, a grid appears when you start the Form designer, and objects are constrained to line up along the grids (Snap To Grid). In addition, vertical and horizontal rulers appear. To set your preferences for this behavior, choose Properties|Form Designer Properties.

Both the Form and Report designers have the following tools:

- Component palette for dragging user-interface elements and data-access objects to the design surface
- Field palette for dragging linked fields to the design surface
- Inspector for setting properties and writing event handlers and other methods
- Format toolbar for formatting Text objects
- Alignment toolbar for aligning objects
- Layout, Format, and Method menus
- Status bar to show you your location on the design surface, show you what object is selected, and to give you instructions and other information

To display a tool window that's not open, choose View|Tool Windows.

Design and Run modes

You can view forms in Design mode and Run mode.

- Use Design mode to design the appearance and behavior of the form and the components you put on it.
- Use Run mode to see how a form or report looks when running. In Run mode, the components become active. For example, you can enter data into an EntryField control and edit data that's already there.

To switch between Design and Run modes, click their toolbar buttons, or choose the appropriate command from the View menu.

Report designer

The report window is a visual design surface to which you drag and drop the components you need for your report, then set their properties in the Inspector.

Note: To read about a component, select it with the mouse, and then click the Question Mark button in the toolbar. Or, after a component is on the design surface, select it and press F1 for help in working with that component.

You can change the size and position of the design window either by dragging the edges of the window or, if you need to be precise, by changing the values of the report's *height*, *left*, *top*, and *width* properties in the Inspector.

By default, a grid appears when you start the Report designer, and objects are constrained to line up along the grids (Snap To Grid). In addition, vertical and horizontal rulers appear. To set your preferences for this behavior, choose Properties|Report Designer Properties.

Both the Form and Report designers have the following tools:

- Component palette for dragging user-interface elements and data-access objects to the design surface
- Field palette for dragging linked fields to the design surface
- Inspector for setting properties and writing event handlers and other methods
- Format toolbar for formatting Text objects
- Alignment toolbar for aligning objects
- Layout, Format, and Method menus
- Status bar to show you your location on the design surface, show you what object is selected, and to give you instructions and other information

To display a tool window that’s not open, choose View|Tool Windows.

Design and Run modes

You can view reports in Design mode and Run mode.

- Use Design mode to design the appearance and behavior of the form or report and the components you put on it.
- Use Run mode to see how a form or report looks when running. In Run mode, the components become active. For example, you can enter data into an EntryField control and edit data that’s already there.

To switch between Design and Run modes, click their toolbar buttons, or choose the appropriate command from the View menu.

Label designer

Related topics

Use the Label designer to create labels and other reports that use more than one streamFrame.

By default, label outlines and vertical and horizontal rulers appear. If you don't want either one of these, choose Properties|Report Designer Properties. To select a label type (size and number of labels on the page), choose Layout|Set Label Type.

The Label designer has the following tools:

- Component palette for dragging user-interface elements, data-access objects, and other components to the design surface
- Field palette for dragging linked fields to the design surface
- Inspector for setting properties and writing event handlers and other methods
- Format toolbar for formatting Text objects
- Alignment toolbar for aligning objects
- Layout, Format, and Method menus
- Status bar to show you your location on the design surface, show you what object is selected, and tell you what page you're on.

To display a tool window that’s not open, choose View|Tool Windows.

Design and Run modes

You can view labels in Design mode and Run mode. To switch between the modes, click the appropriate toolbar buttons, or choose the appropriate command from the View menu.

Labels are saved with an .LAB extension. Label files in the current directory are listed on the Report page of the Navigator.

Data Module designer

Related topics

The Data Module design window is a visual design surface for designing data modules that you can use in your forms, reports, and labels. Drag and drop the data access components you need for your data module, then set their properties in the Inspector.

Note: To read about a Data Access component, select it with the mouse, and then click the Question Mark button in the toolbar.

Tools available in this designer are

- Component palette (with a Data Access page)
- Inspector for setting properties and writing event handlers and other methods
- Alignment toolbar for aligning objects
- Method menu
- Status bar to show you your location on the design surface and the selected object in the order in which you added it.

To switch between the Source editor and the Design window, press F12.

Data modules are saved with a .DMD extension. They are not runnable by themselves.

Table designer

Related topics

Use the Table designer to design or restructure a table. If you're creating a new table,

1. Set the table type in the Inspector. You can select a BDE-standard table type or the table types of those databases for which you have created BDE aliases.
2. In the Table design surface, type a name (no spaces for dBASE files) in the Name field. (You have to name a field before you can specify any of its other characteristics.)
3. Specify values for the remaining attributes (Type, Width, Decimal, Index) by typing what you want, or by selecting a value from the drop-down list, or by clicking the spinbox arrows. You can tab through these to select the default values.
4. To create additional fields, press Return when you have finished specifying a field. Or press the Down arrow key. Or right-click and choose Add Field from the context menu.

Inserting and deleting fields

To insert a field between others or delete a field, right-click in the Table designer window, and choose the appropriate command from the context menu.

Reordering a field

To reorder the sequence of fields, place the insertion point in the field number box—it becomes a hand —and move the field to the desired position in the list.

Warning:

Later on in your work, do not use functions such as CHR(), LTRIM(), RTRIM(), TRIM(), or IIF() that vary the field width in the key expression.

Table designer fields

Related topics

- **Field** contains a number that identifies the field in the table. Field numbers are consecutive, automatic, and read-only. They determine the default order in which fields appear in the Table window.
- **Name** is the name of the field (up to 31 characters for Visual dBASE). You can enter letters, numbers, and underscores, but no other characters. The first character must be a letter. Paradox and most SQL tables allow spaces; Visual dBASE tables do not.
- **Type** is the field type. Select the type you want from the list. The type you select determines what kind of data the field will contain. It also determines whether you can set the width, decimals, and index options for this field.
- **Width** is the field size. In the case of dBASE tables you can change field size for character, numeric, and float fields only (all others have fixed width). Never use functions that vary field widths.
- **Decimal** is the number of digits allowed to the right of the decimal point (for float and numeric fields only). In the case of dBASE tables, float and numeric fields, by default, have no decimals selected. You can set decimals to a maximum of 2 less than the width value you define. The total width must be 20 characters or less. This includes decimal settings, the decimal point, and an optional minus sign.
- **Index** determines whether to index rows using the values in this field (you can set an index on character, date, float, and numeric fields in dBASE tables). Select Ascend to index this field in ascending order (for character fields, this is ASCII order, or the order determined by your language driver). Selecting Descend indexes this field in descending order, and None (the default) omits this field from indexing (or removes an existing index associated with this field).

  If you select Ascend or Descend for a dBASE table, the Table designer creates an index for the field in the multiple index file (.MDX) associated with the table.

  To set a primary key on a dBASE 7 or Paradox table, choose Structure|Define Primary Key. Some SQL types also support this.

Menu/Popup designers

Two designers are available for creating menus—one for pulldown menus and one for popup menus.

The only difference in appearance between the two designers is that the pulldown Menu designer contains a horizontal rule. This rule is the top-level menu border.

When you use either designer, a number of shortcuts are available through the main Visual dBASE menu.

If you're designing a pulldown menu, two preset menus are available for insertion anywhere on your menu bar with the Insert "Edit" Menu (Alt+ME) and Insert "Window" Menu (Alt+MW) choices. Also see:

An overview of the process of creating menus

Adding, editing, and navigating in the Menu designer

A demonstration of features

The Navigator

The Navigator provides a visual way to locate, access, and open individual files. It also lets you establish your working directories and search paths.

Look In box

The Look In box shows the current directory and search path.

You can have only one current directory at a time. You can change the current directory in these ways:

- Select from any previously specified paths by clicking the drop-down arrow.
  Note: To be able to select a database to which you have assigned an alias in the BDE Administrator, you must be on the Tables page of the Navigator.
- Type in a new path and press Enter
- Click the folder button and use the directory search dialog box.
- From the Command window, use the SET DIRECTORY TO or CD commands.

Supplemental search path

An Also Look In box is available for specifying additional search paths. To use it, choose Properties| Navigator Properties and check the Use Supplemental Search Path option.

You can specify multiple search paths in the Also Look In box by separating each path with a semicolon, space or comma. You can also append to the search specification by clicking the folder button and choosing additional directories—each one you choose is appended with a semicolon separator.

Note: Press Enter after adding paths to the Also Look In box.

File group tabs

Each page of the Navigator lists the files of a particular type that exist in the current working directory and any specified supplemental search directories. (At the top of each page is a horizontal list of all possible file types for that page.)

You can run or view any listed file directly from the Navigator by double-clicking it or selecting it and pressing F2. (You have additional choices from the file's right-click menu.) You can create new files by double-clicking Untitled icons. For example, to create a new form, choose the Forms page and double-click the Untitled icon (or press Shift+F2 with the icon selected). (The yellow Untitled icons are for creating custom classes.)

To view non-standard file types (types not normally associated with Visual dBASE programs), choose the Other tab and type the file-name skeleton for the file types you want listed. To view .RTF files in the current directory, for example, append *.RTF to the search string in the Other page.

Display files in different ways

Use the buttons in the toolbar to display your files with large icons, small icons, or details.

How to get there: To open the Navigator, choose View|Navigator.

Rectangle component

Related topics

The Rectangle component is a graphic element for boxing other objects into appropriate groupings. Rectangle properties include *patternStyle* and *borderStyle*, each of which give you several choices. Change the Rectangle's label in the *text* property. If the Rectangle component groups controls, you can allow the user to jump to the first control in the group by assigning a mnemonic to the Rectangle's *text* property. For this to work, the Rectangle component must immediately precede the control in the z order.

The Rectangle component can respond to mouse clicks and other events.

You cannot link a rectangle component to data.

Line component

Related topics

The Line component is a divider that may be extended vertically, horizontally, or diagonally to visually divide a form or report into sections. Users cannot edit or manipulate it.

To change the thickness of the line, change its *width* property.

As an alternative to the Line component you can use an Image object to import a GIF graphic file.

You cannot link a line component to data.

Text component

Related topics

Use to display text that is read-only. The text can be any alphanumeric characters allowed in a character expression. Use for a field label, heading, instruction, prompt, or any other non-editable display text. You cannot link a Text component to data.

Format the text using the Format menu or Format toolbar.

Edit the text either in the *name* property or in-place on the design surface. To edit on the design surface, double-click to get an insertion point. Then you can select text and use the Format toolbar, Format menu, or Font Property Builder (from the Inspector , click the *fontName* tool).

HTML tags are applied to the text.

If the Text component is a label for a control, you can assign a mnemonic. For this to work, the Text component must immediately precede the control in the z order.

PushButton component

Related topics

A control that a user can click to execute code that you attach. To attach code, on the Inspector's Events page click the tool button beside the *onClick* event. This opens the Source editor with a skeleton function format. Enter the code for the task you want performed when the user clicks the button

Buttons are often used for navigating among rows, filtering, sorting, or to open other forms and reports. Several such buttons are are installed with the *Visual* dBASE samples and appear on the Custom page of the Component palette. You may find one there that you can use.

Use the *text* property to give a button a name. You can include an & before the letter you want to be a mnemonic.

Entryfield component

Related topics

Entryfield components create data-entry fields that accept any type of text input, including numeric values.You can link Entryfield components to any field type in a table, as long as you have on the form a Query object (or acceptable substitute) that includes the appropriate table. If you used the Form wizard to create the form, the data link is defined automatically.

Labels (that are Text components) are added along with the Entryfield (in the correct z order), unless you turned this feature off. You can assign a mnemonic to the Text component that will jump the user to the Entryfield component. (If you add your own labels using the Text component, the Text component must immediately precede the Entryfield in the z order.)

To link an Entryfield component to a field in a table,

1 Click the wrench tool beside the Entryfield's *dataLink* property.

2 From the DataLink Property Builder, select a Query object from the Type drop-down list and use the tool to select a field (which will then appear in the DataLink text box).

3 Click OK, and this field will be linked to your Entryfield component on the form.

You can constrain the types of data a user may enter into this field by setting the *picture* property.

HScrollBar component

Related topics

The HScrollBar component allows users to horizontally scroll a grouping of controls or a large control that has no integrated scroll bars.

Example: A custom dialog box containing an area filled with many file icons.

OLE component

Related topics

Use an OLE component to create an object linking and embedding (OLE) client area in a form, in which you can embed, or link to, a document from another application, for example, a sound file from a sound recorder application. The server application can be opened from your *Visual* dBASE application.

VScrollBar component

Related topics

Use a VScrollBar component to allow users to vertically scroll a grouping of controls, or a large control that has no integrated scroll bars.

Example: A custom dialog box containing an area filled with many file icons.

ListBox component

Related topics

Use the ListBox component to display choices for the user in a fixed-size box. The values in a list can be file names, records, array elements, table names, or field names.

If you're trying to decide whether to use a ListBox component (fixed-size, multiple selection) or a ComboBox component (drop-down list), use the following guidelines:

- If you have room to show the open list, or want to let users select more than one item from a list, use a ListBox. A ListBox displays only existing field values; users cannot change those values.
- If you do not have room, or you wan the user to be able to type a value, use a ComboBox control. A ComboBox drop-down list allows the selection of only one item.

By default, the designers allow one selection per ListBox control. To permit multiple selections in a list, set the *multiple* property to true.

To specify list items to appear in a ListBox control,

1 Click the wrench tool beside the ListBox's *options* property.

2 In the DataSource Property Builder, select a dataSource option in the drop-down Type box.

3 Complete the information in the dialog box, and click OK.

SpinBox component

Related topics

The SpinBox component provides up-and-down arrows to assist changing a numeric value. A user can type a number into the numeric entry field or can increment or decrement the number by clicking the up and down arrows.

Editor component

Related topics

The Editor component displays the contents of a text file or memo field. Text exceeding the size of the box causes a scrollbar to appear. You can allow users to edit this text or not by setting its *readOnly* property.

Link the Editor component to a character or memo field in a table so that users can display and change field data when they run the form. You can also link an Editor control to an external text file to display and change its contents.

To link an Editor control to data,

1 Click the wrench tool beside the *dataLink* property.

2 In the DataLink Property Builder, select Field from the Type list, or for a text file, select File from the Type list.

3 Click the Tool button in the DataLink box.

4 Select a field or file, and click OK.

The name of the field or file appears in the *dataLink* property text box, and the linked data appears in the Editor control.

Image component

Related topics

The easiest way to add a picture to the design surface is to drag and drop the graphic file from the Navigator. This creates an Image object that imports the graphic file to the form, and the image appears on the form.

However, to establish an image location before you have obtained or selected the image that will appear there, drag an Image object from the Component palette. The Image object is a blank placeholder until you link the Image object to an image stored in a binary field, resource file, or graphic file.

To link an Image object to a graphic file,

1 Click the wrench tool beside its *dataSource* property.

2 In the DataSource Property Builder, do one of the following:

If you're linking to a graphic image file,

A Select Filename from the Location list box.

B Click the tool button beside the Image text box.

C Select an image file from the Choose Image dialog box, and click Open.

If you're linking to a binary field image (such as an image in a linked table or database),

A Select Binary from the Location list box.

B Click the tool button beside the Image text box. The Choose Field dialog box appears.

C Select a field from the Fields: Binary list, and choose OK.

Note: To see a listing of binary fields, the form must have an active Query object that's linked to the table or database that contains the images you want.

3 Choose OK to close the DataSource Property Builder. The image appears in the designer.You can move or resize it, as you wish.

You can import images (binary files) from image tables or picture galleries and you can place color image bitmaps, including artwork, photographs, or screen shots, of any size on a form or report.

You can also use graphics as dividers (an alternative to the Line component) and as custom buttons that, when clicked, provide any functionality that you might otherwise assign to a standard PushButton.

Browse component

Related topics

The Browse component is a data-editing tool that displays multiple records in row-and-column format. It is suitable only for viewing and editing tables open in work areas. For forms that use data access objects, use a Grid component instead.

To specify which table you want to display in the Browse object,

1. Set the *view* property of the form.
2. Set the *alias* property of the browse object.

Then you can specify individual fields to display with the *fields* property.

Shape component

Related topics

A Shape component creates a geometric shape on the design surface. You can use it to contain other components, for example, related radio buttons.

To specify the shape, set the component's *shapeStyle* property. Set *penWidth* to set the thickness of the perimeter.

TabBox component

Related topics

Use a TabBox to display multiple pages the full size of the form. A user selects a tab to display the items on the TabBox.

The TabBox is similar to the Notebook component, except for the full form size.

Use the DataSource Property Builder (click the wrench tool beside the *dataSource* property) to name the tabbed pages and add additional pages to the window. Then drag the components you want to each tabbed page.

PaintBox component

Related topics

The PaintBox component provides a rectangular region that you can use to create custom form controls using the Windows API. Users never interact with it directly.

The *onPaint* and *onFormSize* events let you modify the appearance of the object based on user interaction.

Slider component

Related topics

Use to define the extent or range of values. By moving the slider along the trackbar, the user can change the current value for the control.

You can set the trackbar orientation as vertical or horizontal, define the length and height of the slide indicator and the slide bar component, define the increments of the trackbar, and whether to display tick marks for the control.

Examples: A volume control to play back sound files, or a color saturation adjuster for an image viewer.

Progress component

Related topics

A rectangular bar that fills from left to right, like that shown when you copy files in the Windows Explorer. Use to provide visual feedback to the user about the progress of long operations or background processes.

Use *rangeMax* and *rangeMin* to set the range of movement. For example to display percentage completed, set the *rangeMin* to 0 and the *rangeMax* to 100. Then as the process progresses, set the *value* to the approximate percentage completed.

Notebook component

Related topics

Use to make a multipage dialog box, with labeled tabs to display sections of information or groups of controls within the same window. See TabBox for full-size tabbed forms.

You might use the Notebook control to create a tabbed dialog box with different groups of controls on each tabbed page. The *Visual* dBASE Desktop Properties dialog box is a good example of this.

Use the DataSource Property Builder (click the wrench tool beside the *dataSource* property) to name the tabbed pages and add additional pages to the window. Then drag the components you want to each tabbed page.

Container component

Related topics

Use the Container component to create moveable panels that can contain other components on a form. Components in a container object become child objects of the Container. Design-time operations you perform on the Container, such as moving, copying, or deleting, also affect any components grouped within them.

See Placing components on a form or report for rules about placing components in Container objects.

TreeView component

Related topics

Use to display and control a set of objects as an indented outline based on their logical hierarchical relationships. The control includes buttons that allow the outline to be expanded and collapsed.

Use a TreeView component to display the relationship between a set of containers or other hierarchical elements. You might use the TreeView as a way to select items from nested lists, much like the hierarchical view in the left pane of the Windows Explorer.

Query component

Related topics

Lets you run an SQL query on any table, including local .DBF and .DB tables. Query objects enable components to display data from tables on forms and reports.

Set the Query object's *SQL* property to a SQL statement that selects a rowset. This links a table to a form or report and populates the Field palette. (If you dragged a table from the Navigator to the design surface, the *SQL* property is set automatically.)

Database component

Related topics

Gives Visual dBASE forms and reports access to SQL databases or another group of tables identified by an alias. (You must have first created a BDE alias for the database by using the BDE Administrator.)

- Assign the BDE alias to the *databaseName* property.
- Set its *active* property to true.

Session component

Related topics

Session objects enable basic record-locking, so that multiple users do not modify the same record at the same time. Session objects also help to maintain security logins for local .DBF or .DB tables.

Use only if you are creating a multithreaded database application. When you open a form, a default session is created, linking the form to the BDE and connected tables. If you need separate threads for each user (to ensure record-locking), add a Session object to your form. A unique session number is assigned to track each user's connection to the table.

ActiveX component

Related topics

An ActiveX component is a placeholder for an ActiveX control. After you have the placeholder on the design surface, do the following:

1 Set the *width* and *height* properties to match the width and height definitions in the ActiveX code.

2 Click the wrench tool beside the *classId* property, select an ActiveX from those installed on your machine, and choose OK. This enters the ID of the ActiveX into the *classId* property text box.

Group component

Related topics

The Group component groups the display of rowsets by the value of a selected field. For example, in a “Sales by District” report, you might have a Group object for each District to display sales rowsets for that district.

By dropping a Group object on a report’s streamFrame, a Headerband and Footerband are created, with editable placeholder text for the group’s heading.

A streamFrame may contain several Group objects.

StoredProc component

Related topics

Use a StoredProc component to run a stored procedure on an SQL server. This capability is available only when accessing tables on a server that supports stored procedures.

Link the component to a stored procedure by setting its *procedureName* property. If the Stored Procedure returns a rowset, it may be used in place of a Query object in the form or report.

ComboBox component

Related topics

Use a ComboBox component to combine an entry field and a drop-down list box. A user clicks the down-arrow button to display the list. A ComboBox accepts a value typed into the entry field or selected from the drop-down list box. In a running form, the value a user selects or types into a ComboBox is added to the appropriate linked table.

You can use ComboBox controls for string, numeric, date, and Boolean fields.

To link a ComboBox component to a table field,

1. You must have a Query object on the form or report that contains the field you need.
2. Click the wrench tool beside the ComboBox's *dataLink* property, and use the Choose Field dialog box to choose the field you want to link to.

To display choices in the ComboBox,

1 Click the wrench tool beside the ComboBox's *dataSource* property.

2 In the DataSource Property Builder, select a dataSource option in the drop-down Type box.

3 Complete the information in the dialog box, and click OK.

If you will need to often change the selection options listed in the drop-down list, it may be more convenient to keep the items in a separate table rather than an array built into the application. In this way, when you want to change the items in the drop-down menu you just need to update the linked table. To implement this approach requires writing a few lines of code in the Source editor.

RadioButton component

Related topics

Radio buttons allow users to select a single choice from among a group of mutually-exclusive possible values.

Radio buttons by definition are part of a group of at least two or more. If you select one radio button in the group, all other radio buttons are unselected. The selected option becomes the value that applies to the linked field.

To create a group of radio buttons, you must add each Radio Button control in the group consecutively. After you add the first Radio Button control of a group, set its *groupName* property. For all subsequent Radio Button controls in the group, set their *groupName* property to match. To start a second group, set a new *groupName* property of the first Radio Button control in the next group.

To group a set of radio buttons, for each button,

1 Select the Radio Button control.

2 On the Inspector's Properties page, expand the Identification Properties heading.

3 Type a value in the groupName field (such as "Terms").

To link a group of radio buttons to a table field

You must link all the radio buttons in a group to the same table field so that when the user chooses a radio button, its value is inserted into the field. To do so,

1 Select all the Radio Button controls.

2 In the Inspector, click the wrench tool beside the *dataLink* property.

3 From the Choose Field dialog box, select a field from those available in the table of the selected active query. Or, enter an expression in the text box next to the *dataLink* property.

Specifying values to enter in the table field

When the user chooses a radio button, its value is entered into the linked table field. You specify the value to enter by setting the *Text* property. Unlike the *Text* property in other controls, the *Text* value you set for a RadioButton control has two purposes—it is the descriptive label and the actual value entered in the table field.

Note: The *value* property of a RadioButton control is true or false to indicate if it is selected. The *value* property is not equal to the value of the linked field.

CheckBox component

Related topics

Let a user toggle between two choices of a logical value. Or choose a number of options that are not mutually exclusive. Check boxes often are arranged in groups to present choices or options a user can turn on or off. Check boxes function independently of one another. RadioBottons, on the other hand, operate as a group; that is, when one is selected, all others in the group are unselected.

To link a check box,

1 Click the tool button beside the CheckBox's *dataLink* property.

2 In the Choose Fields dialog box, select a field to connect to the CheckBox control, or enter an expression in the text box next to the *dataLink* property, such as:

```
parent.query1.rowset.fields["CREDIT_OK"]
```

When you complete the link, the field value in the current record (true or false) appears in the check box.

StreamFrame component

Related topics

The StreamFrame object receives and displays rowset data streamed from linked tables (specified in its *streamSource* property). One or more streamFrame objects may be contained within the pageTemplate object.

Dropping a component, such as a check box, into the streamFrame area of a report will cause that object to be printed as part of the report's row data.

ReportViewer component

Related topics

Displays a picture of a report in a sizeable frame. Useful for displaying a short summary report that shows subtotals for grouped fields.

Grid component

Related topics

The Grid component is similar to the Browse component, but it offers a greater degree of programming control.

When the user first enters the Grid, it is in navigation mode, where all navigation keys provide movement among cells. When any other key is pressed, the Grid enters edit mode.

The Grid responds to built-in *Visual* dBASE Table Run controls like the navigation buttons, Add Row, and so on, and their keyboard equivalents, but the Grid component itself has no keyboard interface to move to the first or last row. The keyboard method that is implemented in the Grid component for adding a new row is to press the Down arrow while positioned on the last row. It is important to understand which keys are implemented in the built-in *Visual* dBASE menus and which keys are implemented in the Grid component itself, so there is no confusion when working with menus you create yourself. See Related Topics.

Property categories

Properties are organized into categories in the default Inspector view. You can expand or collapse any category by clicking the plus or minus sign. To expand or collapse all categories at once, right-click anywhere on the Inspector and choose your preference from the popup menu.

To see properties listed in straight alphabetical order, uncheck Category View in the popup menu.

Obsolete properties

Properties that are listed in the Obsolete category have no effect. They are present for compatibility with previous versions of *Visual* dBASE. They are listed so that you do not attempt to create custom properties with these names. Most classes do not have any obsolete properties.

Specifying mnemonics for labels

If you use a text object as a label for a control, you can assign a mnemonic to the label so the user can easily move to the associated control when the form runs. The user would press Alt plus the letter you defined to jump to the control.

To assign a mnemonic, precede the letter you want to define as the shortcut with an ampersand (&). The letter gets underscored. In general, the mnemonic is usually the first letter in the label, or the letter that's easiest to remember (for example, E<u>x</u>it).

Important: In order for the mnemonic to work, the label must immediately precede the control in the form's z-order. To check this, choose Layout|Set Component Order. If your label doesn't immediately precede the control, change its order in the Set Component Order dialog box. (Select the component, and use the Up and Down buttons to move its position.)

Table properties

Constraints

Data entry constraints are rules that govern the values you can enter in a field. If you want to make sure that the values users enter in a field meet certain conditions, specify a data entry constraint for that field.

You can specify data entry constraints in the Inspector when you create or modify a table that supports them, such as Paradox tables or the new DBF7 format. Old .DBF tables do not support data entry constraints. IMPORTANT: Do not set the constraints property unless you are creating a new DBF7 table or you wish to update an older table to the new DBF7 format.

Language

Language drivers are special files that determine the character set available on your computer and how characters sort. This property lets you change the driver, but only when you start and before you save a new table.

lastUpdate

Displays the date when the table was last updated.

primaryKey

Displays the primary key field.

recordCount

Displays the number of records in the table.

tableType

Displays the current table type and lets you switch between DBASE and PARADOX types. Note that if you switch types, a new table is opened.

version

Displays the current version for the selected table type, as set in the BDE Administrator.

Converting between OEM and ANSI Text

The Source Editor Properties dialog box lets you specify whether to view the text in an editor in the DOS (also called OEM or ASCII) character set or the Windows (also called ANSI) character set. The actual code points in your source do not change; only the way that you view the source changes.

You can also convert between character sets. For example, you may want to convert from the OEM character set to the ANSI character set if you are changing to an ANSI language driver, and your program uses extended characters.

Warning: Converting your program to a different character set changes the code points of values in your program. You may lose information if a character you convert does not exist in both character sets.

You should carefully review extended characters in your code if you convert between character sets.

Converting from OEM to ANSI

The numeric value of characters is changed when you convert between character sets. For example, if your program was written in the OEM character set and it uses the Ä character (OEM 142), the actual numeric value of the character is changed to 0196 when you convert the program to ANSI, because 0196 is the numeric value of Ä in the ANSI character set.

Alphanumeric characters usually do not cause problems when you convert from an OEM character set to the ANSI character set. Characters that typically do not convert include:

- Greek characters other than ß (ANSI 0223) and µ (ANSI 0181)
- Line-drawing and box characters

Converting from ANSI to OEM

Lowercase alphanumeric characters in the ANSI character set exist in all OEM character sets and are converted without problems. Uppercase extended alphabetic characters exist in some OEM character sets (such as OEM code page 850) but not in others (such as OEM code page 437). Following are the rules *Visual* dBASE uses for conversion:

- Extended characters in the ANSI set that do not exist in the OEM character set are converted to "similar" characters. For example, the accented À (ANSI 0192) is converted to the capital A in OEM code page 437.

How to convert and view your source code

To convert between character sets:

1. Open your program or text file in the editor.
2. Select the section you want to convert or Select|All.
3. Choose Edit|Convert|To DOS Text to convert your source to OEM, or Edit|Convert|To Windows Text to convert your source to ANSI.

Note: Converting between character sets does not change the character set you are using to view your text or program.

To change the way you view your text or program:

1. Choose Properties|Source Editor Properties.
2. Specify either DOS Text or Windows Text for Interpret text as.

New Project dialog box

Create a new project by entering a name for the project and a path name to the directory in which you want to store it.

Dialog box options

Project Name

Type a name for the new project.

Project Location

The directory where the files in the project are stored. By default, this is a subdirectory with the name of the project off the My Projects directory. If you do not want to use the default directory, enter a path name to the directory in which you want to store the new project.

Project File

The .PRJ file that describes the project. By default, this file is given the same name as the project and is stored in the directory specified in the Project Location text box.

Reset button

Choose to reset the location to the original <Visual dBASE root>\My Projects\ directory.

How to get there: Choose File|New Project.

Insert From File dialog box

Locate and open a program file to insert into the Command window.

How to get there: With the Command window in focus, choose Edit|Insert from File

Save As Custom dialog box

In this dialog box, you can save

- A component setup (one or more components, with their properties, methods, and events) as a custom component that you can reuse.
- A form, report, or data module as a custom class. You can then specify that file as the base class for forms, reports, and data modules that you create.

Note: You cannot run a custom class.

Dialog Box Options

Click the appropriate radio button in the Save As Custom panel:

- **Selected Components t**o create a class for a single component or a base class for a type of component.
- **Form, Report, or Data Module** (your selection depends on which designer you're working in) to create a custom form, report, or data module class.

Class name

Enter a class name for a single component or for the base class you are creating.

Custom component file name

Enter the name of the file that you want to contain the custom component (.CC) or custom form (.CFM), report (.CRP), or data module (.CDM) file. Or click  to display a list of existing custom component files. You can save more than one component in the same file.

Place in Component palette

If you're saving a custom component, this box is available. Check it to add the component to the Component palette's Custom page.

How to get there: From an appropriate designer, choose File|Save As Custom

Set Custom Form Class dialog box

The Form designer uses the Form class as the base form for all new forms, unless you have specified a custom form class. Here is where you can specify a custom form class to be applied to the current and future forms.

Custom form class files have a .CFM extension.

Dialog box options

File name containing class

Enter the name of the file that contains the class you want to use. Or click  to display a list of existing class files. One file can contain more than one class.

Class name

Select the name of the class to use as the new base form. The list displays all the classes in the class file you selected.

Clear custom form class

Clear the current custom form class and restore the default *Visual* dBASE form as the base form class.

How to get there: From the Form designer, choose File|Set Custom Form Class

Set Custom Report Class dialog box

The Report designer uses the Report class as the base for all new reports, unless you have specified a custom report class. Here is where you can specify a custom report class to be applied to the current and future reports.

Custom report class files have a .CRP extension.

Dialog box options

File name containing class

Enter the name of the file that contains the class you want to use. Or click  to display a list of existing class files. One file can contain more than one class.

Class name

Select the name of the class to use as the new base report. The list displays all the classes in the class file you selected.

Clear custom form class

Clear the current custom report class and restore the default *Visual* dBASE report as the base report class.

How to get there: From the Report designer, choose File|Set Custom Report Class

Set Custom Data Module Class dialog box

The Data Module designer uses the DataModule class as the base class for all new data modules, unless you have specified a custom data module class. Here is where you can specify a custom data module class to be applied to the current and future data modules.

Custom data module class files have a .CDM extension.

Dialog box options

File name containing class

Enter the name of the file that contains the class you want to use. Or click  to display a list of existing class files. One file can contain more than one class.

Class name

Select the name of the class to use as the new base data module. The list displays all the classes in the class file you selected.

Clear custom data module class

Clear the current custom data module class and restore the default *Visual* dBASE data module as the base data module class.

How to get there: From the Data Module designer, choose File|Set Custom Data Module Class

Set Up Custom Components dialog box

Use this dialog box to add or remove custom components from the Component palette.

Dialog box options

If you have a choice of tabs, select the appropriate tab.

Add

Click Add to display the Choose Custom Component dialog box from which you can choose the custom component file (.CC extension) that contains your custom component. Click Open.

The path name to the file now appears in the Set Up Custom Components dialog box. Click OK. The custom components you have saved in your .CC file appear on the Custom page of the Component palette.

Note: You could also type the LOAD DLL and SET PROCEDURE commands in the Command window to load the components into memory before opening the Form or Report designer.

Delete

Click Delete to remove the selected file from the Component palette's Custom page. This command does not delete the custom component file from your hard disk.

How to get there: From a designer, choose File|Set Up Custom Components

Set Up ActiveX Components dialog box

Use this dialog box to add ActiveX components to the ActiveX page of the Component palette.

Dialog box options

Available Components

A list of OCX components currently installed in the Windows\System directory or the Borland\Common Files\Borland\ActiveX directory.

Selected Components

ActiveX components that are currently on the ActiveX page of the Component palette.

Arrows

To add an ActiveX component to the component palette, find it in the Available Components list and double-click it. It moves to the Selected Components list. Click the >> arrow to move all the available ActiveX components to the Selected list.

To remove an ActiveX component from the palette, find it in the Selected Components list and double-click it. It moves to the Available Components list and is removed from the palette. Click the << arrow to move all the selected ActiveX components to the Available Components list (leaving the ActiveX page of the Component palette empty).

How to get there: From the Form or Report designers, choose File|Set Up ActiveX Components

Database Administration dialog box

Set security passwords, group names, and user names for the current database, specified table types, or the *Visual* dBASE system. You can also create referential integrity rules for tables that support them.

Dialog box options

Current database

Displays the database (its BDE alias) currently selected in the the Navigator Look In box.

Table type

Choose a table type. The table type determines whether security and referential integrity are available. dBASE tables support both.

Security

Access the Security setup dialog boxes. Click to display the Administrator Password dialog box (for DBF tables) or the Master Password dialog box (for DB tables).

Referential integrity

Click to display the Referential Integrity Rules dialog box, for those table types (such as DBF and DB) that support it.

How to get there: Choose File|Database Administration.

Administrator Password dialog box

Enter your database administrator password to set up login security that may apply to databases or tables or *Visual* dBASE itself. This area is protected by an administrator login dialog box.

The first time you use this dialog box, you are establishing an administrator password and you are prompted to confirm the password. Asterisks appear in the text-entry field as you type. Click OK.

Thereafter, when you enter the password the Security dialog box appears enabling you to set access levels for users and tables.

Once established, the security system can be changed only if the administrator password is supplied. Keep a hard copy of this password in a secure place. There is no way to retrieve this password from the system.

WARNING: Make sure the option When Loading *Visual* dBASE (on the Enforcement page of the Security dialog box) is *unchecked*; otherwise on restart, you will be required to enter a user name and group name, even if you have set none, effectively locking you out of *Visual* dBASE.)

How to get there: Choose File|Database Administration, then choose Security in the Database Administration dialog box or run the PROTECT command from the Command Window.

Visual dBASE login

Specify your group name, user login name, and password to access a protected table or to access the *Visual* dBASE system if that enforcement option is set.

If you do not have this information, contact you system administrator. These fields are not defined by *Visual* dBASE, but by the person in your group that is responsible for system and database security.

Dialog box options

Group

Enter the group name assigned to the individual user by the database administrator in the New or Edit User dialog box.

User

Enter the user login name assigned by the database administrator in the New or Edit User dialog box.

Password

Enter the password assigned to the user by the database administrator in the New or Edit User dialog box. (Only asterisks appear.)

Visual dBASE displays this dialog box in the following situations:

- When you attempt to access a protected dBASE system.
- When you attempt to load an encrypted table.
- When you issue the LOGOUT command.

Password dialog box

Enter your password to access security for DB-type tables. Asterisks appear in the text-entry field as you type. Click OK.

Security dialog box, Users page

The Users page displays current authorized user profiles with their associated group (department) entries. Click the New or Modify buttons to display dialog boxes that let you authorize new users, set their group and access level, or edit user access information, or deauthorize users.

Dialog box options

New

Displays the New User dialog box where you can authorize new users, giving them a user name, password, and access level.

Modify

Displays the Edit User dialog box where you can edit the user information for the user name currently selected on the Users page.

Delete

Deletes the currently selected user name from the list of authorized users. The deleted user will no longer be able to open the current database.

WARNING: Do not delete all users from a group before you decrypt all the tables associated with the group—if you do this, no one can access the tables.

How to get there: Choose File|Database Administration. Click Security. Enter the administrator password. In the Security dialog box, click the Users tab.

Security dialog box, Tables page

Set user groups' access-level privileges for a selected dBASE (DBF) table and specific fields within the selected table.

Dialog box options

Directory

Click the Down arrow or the folder button to find the directory that contains the DBF table whose security you want to set.

Table

Select from the list the table for which you want to set access privileges. Only DBF tables are listed.

Modify table

Click to open the Edit Table Privileges dialog box to set a group's table access privileges (Read, Update, Extend, or Delete) for the selected table and to set individual field access privileges (Full, Read-Only, or None) for that table.

How to get there: Choose File|Database Administration. Click Security. Enter the administrator password. In the Security dialog box, click the Tables tab.

Security dialog box, Enforcement page

Choose one of two security enforcement options:

When loading *Visual* dBASE

When a user attempts to start *Visual* dBASE itself, a login (including Group and User names as well as Password) is required. WARNING: If you choose this enforcement option, make sure you have set a Group and User name for your administrator password and memorized all three; otherwise you will be permanently locked out of *Visual* dBASE.

When opening an encrypted table

By default. whenever a user tries to view a form linked to an encrypted dBASE (DBF) table, a login (User login name, Group name, and Password) is required. This permits anyone to use *Visual* dBASE and to access unencrypted dBASE tables or non-dBASE tables, but prevents unauthorized users from accessing protected dBASE tables. DEFAULT.

How to get there: Choose File|Database Administration. Click Security. Enter the administrator password. In the Security dialog box, click the Enforcement tab.

Define User dialog box

Create a user security profile for each user including the individual's login information (login name, group name, and password) and a user access level for tables that support it (such as dBASE). Use the same dialog box to edit the security profile for a currently authorized user.

After you have entered all these settings, click OK to save the new user profile.

Dialog box options

User

Enter the user login name, according to your system conventions. REQUIRED.

Group

Enter the user's group name, such as "Marketing." You will probably assign each group access privileges to specific tables. The user may belong to more than one group but must use a separate, non-simultaneous login for each group. REQUIRED.

Password

Enter the user's password. REQUIRED.

Access level

Enter a number from 1 to 8 to set the user's access levels for dBASE tables for which you have setup a table-access and field-access privilege scheme. 1 provides the greatest access; 8 is the most restrictive. REQUIRED.

Full name

Enter the new user's full name. The full name is not used in the login procedure. Alphabetic characters you enter in the Full Name field are not converted to uppercase. OPTIONAL.

How to get there: Choose File|Database Administration. Click Security. Enter the administrator password. In the Security dialog box, click the User tab. Click New.

Edit Table Privileges dialog box

For the selected dBASE (DBF) table, define various table-access and field-access privileges for each user group.

Dialog box options

Group

Assign the current table to a group. A DBF table can be assigned to only one group. Only users associated with the assigned group can access the table. Click the down arrow to display a list of the available groups from the Group list (you created these groups when you added users and associated them with groups in the New User dialog box).

Table access levels

For each type of table operation, specify the most restricted access level that you want to allow to perform that operation:

- Read—View the table contents
- Update—Edit existing rows in the table
- Extend—Add rows to the table
- Delete—Delete rows from the table

To set table privileges, select a value (1–8) for each operation. 1 indicates the greatest access; 8 indicates the most restriction. If you set a level of 3, for example, users with user access levels of 1, 2, and 3 can perform the operation, but those with levels 4 through 8 cannot.

Field privileges

For each field, set one of three access privileges granted to each access level.

- **Full**. View and modify the field (default)
- **Read Only**. Only view the field; no editing allowed.
- **None**. No access. (This prevents the user from seeing the field altogether.)

You cannot specify access levels that are logically incompatible. For example, you cannot prohibit level 6 from having read access, but also permit level 6 to have update access. To have update access, level 6 also needs read access.

How to get there: Choose File|Database Administration. Click Security. Enter the administrator password. In the Security dialog box, click the Tables tab. Click Modify Table.

Security (Paradox) dialog box

Choose an encrypted Paradox (DB) table for which you wish to establish password protection . To see Paradox tables in the Table listbox, you must first select Paradox in the Table Type box of the Database Administration dialog box. Then select a Paradox table in the Table list box and click Modify Table.

Dialog box options

Directory

Click the folder button locate the directory containing the Paradox tables you want.

Table

From the Paradox (DB) tables in the selected directory, choose the table for which you want to create a password.

Modify table

Click to create or modify the password for the selected table:

- If the selected table does not have a password, or if you have already entered the password during this session, the Master Password dialog box appears.
- If the selected table has a password and you have not already entered it during this session, the Paradox Password dialog box prompts you for a password before the Master Password dialog box appears.

How to get there: Choose File|Database Administration. Choose Paradox as the table type. Click Security.

Master Password (Paradox) dialog box

Set the master password required to access the encrypted Paradox (DB) table selected in the Security (Paradox) dialog box.

Dialog box options

Password

Type the password you intend to require for access to the selected Paradox table. Only asterisks appear as you type.

Confirm

Retype the password exactly as you did in the first text-entry field. Only asterisks appear as you type.

Set

Associate the master password with the selected table.

Delete

Remove the master password from the selected table.

How to get there: Choose File|Database Administration. Choose Paradox as the table type. Click Security. Locate and select a Paradox table. Click Modify Table.

Referential Integrity Rules dialog box

Add, edit, or delete referential integrity rules for the currently selected table. To use this dialog box you must first either login to a database or, in *Visual* dBASE Navigator, select a directory containing tables (such as DBF and DB) that support referential integrity.

Referential integrity means that a field or group of fields in one table (the child table) must refer to the key of another table (the parent table). Only values that exist in the parent table's key are valid values for the specified fields of the child table.

You can establish referential integrity only between like fields that contain matching values. For example, you can establish referential integrity between the sample Customer.db and Orders.db tables on their Customer No fields. The field names don't matter as long as the field types and sizes are identical.

Dialog box options

New

Displays the Define Referential Integrity Rule dialog box for constructing relationships between fields of related tables in the current database.

Modify

Displays the Define Referential Integrity Rule dialog box for modifying existing relationships between fields of related tables. You must be able to obtain exclusive access to all tables involved in the referential integrity when you modify it.

Drop

Remove the highlighted referential integrity rule.

How to get there: Choose File|Database Administration and in the Database Administration dialog box click Referential Integrity.

Define Referential Integrity Rule dialog box

Establish referential integrity between tables in the current database (selected in the Navigator's Look In box). If no database is specified, you can establish referential integrity between tables in the current directory.

For the selected database login or directory of tables, establish the relationship between parent and child tables. From the available child fields, specify a child field related to the primary key field.

If you attempt to define referential integrity on a table that already contains data, some existing values may not match a value in the parent's key field. When this happens, the operation fails to complete and you receive an error message.

You can establish referential integrity with a composite key. If the parent table has a composite key, add fields from the Fields list to match all of the parent's key fields.

Dialog box options

Rule name

The name of the referential integrity rule between a parent and child table. The default name is a concatenation of the names of the parent and child tables.

Parent table

Choose a parent table from the list box. (All tables in the current database or directory appear in the Parent Table list.) When you choose a parent table, its key fields are displayed in the Primary Key Fields column in the References area of the dialog box.

Child table

Choose a child table from the list box. (All tables in the current database or directory appear in the Child Table list.) When you choose a child table, its fields available for referential integrity appear in the Available Child Fields column in the References area of the dialog box.

References panel

Displays the field choices available for the choices made in the Parent Table and Child Table list boxes.

- **Primary Key Fields.** Lists the key fields in the specified parent table. Select a field to create or change a referential integrity relationship.
- **Related Child Fields.** Lists the fields in the child table that are in a referential integrity relationship with the fields listed in the Primary Key Fields list.
- **Available Child Fields.** Lists the fields available for referential integrity in the child table. Select a field to create or change a referential integrity relationship.
- **Add Field (<).** Establishes the referential integrity relationship between the selected child field and the selected parent field. Choose the child table's field in the Available Child Fields list and click the Add Field arrow. The field name appears in the Related Child Fields area of the referential integrity diagram.

Update/delete behavior

Choose the rule to use when updating or deleting data in a parent table that has dependent rows in a child table:

- **Restrict.** You cannot change or delete a value in the parent's key if there are rows that match the value in the child table.
- **Cascade.** Any change you make to the value in the key of the parent table is automatically made in the child table. If you delete a value in the key of the parent table, dependent rows in the child table are also deleted. Check your DBMS documentation to see if it supports cascading updates.

Relationship

Specify whether the tables are in a one-to-one or one-to-many relationship. The relationship you choose

changes the available child fields.

- **One-to-one.** Defines relationship between the parent's primary key field and the child's primary key field or any field in the child that has a unique index.
- **One-to-many.** Defines relationship between the parent's primary key field and an indexed field that is not the primary key in the child.

How to get there: Choose File|Database Administration and in the Database Administration dialog box click Referential Integrity. In the Referential Integrity Rules dialog box, click New.

Edit Event dialog box

Select or create a method linked to the selected event. This dialog box lists the form, its components, and all their events.

Dialog box options

Objects

The objects on the form or report and the form or report itself

Events

The events associated with the selected object

Select an object, then an event. (Some objects don't have any associated events.) Click OK. The selected event appears in the Source editor, where you can edit it.

When you select an event linked to an existing method and then press OK, that method becomes current, and you can edit the code in the Source editor.

When you select an event not linked to a method, a new method is created. A linked method statement is placed in the Source editor, followed by a suggested name for the procedure.

How to get there: In the Form or Report designer, choose Method|Edit Event.

Link Event dialog box

Set up a link between the method currently in the Source editor and an event.

This dialog box establishes links between events and methods. If you want a given event to trigger a method, you can link that method to multiple events. The Link Event dialog box displays the name of the method currently displayed in the Source editor, all the objects on the report in a pane on the left, and each object's events in a pane on the right.

Dialog box options

Objects

The objects currently available on the form

Events

The events associated with the currently selected object

While editing a method in the Source editor, select Link Event from the Method Menu, then select an object in the left pane, and an event in the right pane, and the method will be linked to that event.

How to get there: In the Source editor, choose Method|Link Event.

Unlink dialog box

Choose an event to unlink from the events associated with the available objects.

This dialog box lets you break a link between a method and a specified event. It displays the method that has focus at the top of the box and the events linked to that method in the pane below.

Dialog box options

Current Links

The events associated with the currently selected object

Select the event that you want to unlink from the method and click OK.

How to get there: From the Source editor, choose Method|Unlink.

Set Scheme dialog box

Choose a predefined scheme (visual appearance) for the form, including title and label fonts, foreground and background colors for the form background, titles, labels, editable components, shapes, and pushbuttons. Or create a new (reusable) scheme by setting these options yourself in the tabbed pages at the bottom of the dialog box.

When you have finished selecting fonts and colors,

- Choose OK to use the scheme for your current form or report; or
- Choose Apply to specify that the scheme be used as the default for this and all future forms and reports (until you specify otherwise).

Dialog box options

Sample

The color and font settings you make in this dialog box are reflected in the sample form shown in the top left corner, so you can see how each setting contributes to the new scheme.

To set the font or color of one of the elements shown in the Sample box, click that element in the Sample box. The page for that element is then selected from the tabbed settings pages in the lower part of the dialog box.

Scheme

Choose a preset scheme from the Scheme list box. If you save your own scheme (see below), its name is added to the list box.

- **Delete.** Delete the selected scheme from the list.
- **Reset.** List only the schemes that shipped with Visual dBASE. **Important:** When you choose Reset, any schemes you've saved are deleted from the list.
- **Save As.** Save the current color and font settings. A Scheme Name dialog box appears, allowing you to enter a name for your new scheme. It will then be available from the listbox.

Title page

Select a font and foreground (font) color for titles.

Non-editing components page

Select a font, foreground color for non-editing components, including text labels, checkboxes, radio buttons, pushbuttons, rectangles, shapes, lines, and tab box components.

Editing components page

Select a foreground (text that appears within the component) and background (box and drop-down list area) color for data-entry components, such as entry fields, spin boxes, combo boxes, list boxes, browse, and editor components.

Pushbuttons page

Select a foreground (font) and background (button area) color for Pushbutton components.

Shapes page

Select a foreground (outline) and background (fill) color for Shape components. You might use shapes to create colored areas on a form to help group options.

Form page

Select a background color for the form or report surface.

Note: Use the arrows beside the tabbed pages to see more tabbed pages.

How to get there: In the Form designer, choose Format|Set Scheme. Also available in the Form wizard.

Scheme Name dialog box

Enter a name for the color/font scheme you designed in the Set Scheme dialog box or the Form wizard. This name will appear in the Set Scheme dialog box's drop-down selection list so that you can quickly find and reuse the scheme.

Type any character string up to 30 characters. You can use letters, numbers, and spaces.

How to get there: In the Form designer, choose Format|Set Scheme. Save a new scheme.

Manage Indexes dialog box

Select an index to edit, or choose the New button to create an index. The Define Index dialog box will open, where you can create, modify, or delete index tags and indexes.

You can also specify the index to use as the master index. The master index determines the order of the rows in the table you are viewing. The Manage Indexes dialog box displays a list of tags already defined for your table.

Dialog box options

Index name

The name of the index. If the name is Primary, that index is the table's primary index. Its name is assigned automatically.

Index key

The field(s) on which the index is created. The key expression specifies the sort order of the rows. Click or use the arrow keys to choose the index that you want to use as the master index.

New

Click the New button to create a new index tag with the Define Index dialog box.

Modify

Click the Modify button to modify the selected index tag with the Define Index dialog box.

Delete

Click the Delete button to delete the selected index tag from the index file (.MDX).

How to get there: In the Table designer, choose Structure|Manage Indexes.

Define Index dialog box

Create a new index tag for a table or modify an index tag. An index tag makes the table appear in a sorted order.

To create an index tag, you must be the only person using the table. Unless you opened the table for exclusive use, when you use this command, *Visual* dBASE asks if you want to reopen the table exclusively. If the table reopens successfully, the Define Index dialog box appears. If it does not reopen, a message box appears, and you must coordinate with other users so you can gain exclusive access to the table.

After you create the index, if you want to share the table and index with other users, you must reopen the table nonexclusively.

To create a primary index, choose Structure|Define Primary Key.

The options in this dialog box vary, depending on the table type.

Dialog box options

Options

Choose a sort order for this index:

- **Ascending order.** (A-Z, 1-3) or
- **Descending order.** (Z-A, 3-1). Note: This option is unavailable for Paradox tables.

Then choose an indexing method:

- **Distinct.** Prevents multiple records with the same key value from being included in the table. Records marked as deleted are never included in a distinct index. Distinct indexes may be created for DBF tables only.
- **Unique.** Restricts the row included in the index to those with unique key values. If two or more rows have the same key value, only the first row with the key value is included. The "first" row is determined by row number (the order in which you entered rows). This field does not apply to secondary indexes on Paradox tables. A primary index in a Paradox table requires keys to be unique.
- **Allow duplicates.** Permits rows with duplicate values to appear in the index.

You can also use the **For Expression** option to specify which rows in the specified set are included in the index. Enter a condition that restricts the operation to certain rows. For example, the FOR clause `COMPANY = "Santa Cruz Dry Goods"` restricts the index to rows for which the COMPANY field evaluates to the string "Santa Cruz Dry Goods".

Index key

When defining a DBF index, you can

- **Specify from field list**. Select this option when you want to specify an index by moving a field or fields from the Available Fields list to the Fields Of Index list.
- **Specify with expression**. Select this option when you want to specify an index using an expression, then type an expression in the Index Key Expression text box.
- **Index key expression**. Specifies the field or fields on which to order the table.

For dBASE tables, the key expression can be a field name in the table, such as CITY, LASTNAME, or BALANCE. You can index on character, numeric, float, or date fields. The key expression can also be a combination of fields, values, and functions, such as UPPER(City), LastName+FirstName, or Balance>10000. The Key Expression can be up to 220 characters; the key it evaluates to must be 100 characters or less.

For Paradox tables, the primary index (.PX) must be the first field name in the table structure, or the first and following consecutive field names separated with commas. You can index on alpha, number, money, date, and short fields. Secondary indexes (.Xnn) can be any field in the table or a comma-separated list of fields in the table.

Available fields

Table fields that you can index. Click the fields you want to include in the index;

Fields of index key

Displays the list of table fields on which the index is based.

Index name

A name you give to a complex or composite index (an index made up of more than one field or also, in the case of DBF tables, an index made up of an expression that includes functions and operators). You can enter a name of up to 10 characters without spaces.

If you're creating a one-field index, the field name becomes the name of the index, and this text box is unavailable. If you are creating or modifying a Paradox index, this option is unavailable

More...

For a more detailed discussion of indexing methods, see the INDEX Xbase language element.

How to get there: In Table designer, choose Structure|Manage Indexes, then choose the New button.

Define Primary Key dialog box

Define a primary index for a table that supports this feature. A primary index, or key, is made up of a field or group of fields. The fields of a primary index must be consecutive fields, starting with the first field in the table structure. The primary index establishes the physical sort order for the table.

Dialog box options

Available fields

Displays the list of table fields that can be used in the index. Select the fields that you want to use and move them to the Fields of Primary Key list by using the arrow buttons.

Fields of index key

Displays the list of table fields on which the index is based. To remove a field from the list, select it and use the arrow buttons.

Arrows

Click the > arrow to add the selected field in the Available Fields list to the bottom of the list of fields in the Fields of Primary Key list.. Click the >> arrow to move all the available fields to the Fields of Primary Key list..

Click the < arrow to remove the selected field from the Fields of Primary Key list to the bottom of the Available Fields list Click the << arrow to remove all the selected fields from the Fields of Primary Key list to the bottom of the Available Fields list.

How to get there: In the Table designer, choose Structure|Define Primary Key.

New Table dialog box

Create a new table of any type.

Dialog box options

Wizard

Choose Wizard to have *Visual* dBASE build a table structure for you from pre-defined fields that you select. Later you can modify the table in the *Visual* dBASE Table designer.

Designer

Choose Designer to build the table structure yourself, from scratch, using *Visual* dBASE's Table designer.

Want to bypass this dialog box? To go straight to the Table designer every time you want to design a table, choose Properties|Desktop Properties, and on the Application page, uncheck Table in the Prompt For Wizards panel.

How to get there: From the Navigator, double-click a New Table icon or choose File|New|Table.

Table wizard, step one

Build a new table structure by selecting fields previously defined for other tables:

1. Choose a sample table structure from the Tables list. The wizard displays the fields from the selected table in the Available Fields list.
2. Choose a field you want to add to your new table structure. When you select a field, its type and width are displayed below the field list. Double-click the field or use the arrow buttons to add the selected field to the Selected list. To add all the fields in the sample table structure to your new table structure, click the >> button.
3. To add fields from more than one sample table to build the new table, select another table when you're finished with the first one. The fields you have already chosen remain in the Selected Fields list and you can add to them.
4. To rearrange the order of fields in the Selected Fields list, drag them up or down.
5. When you are satisfied with the fields and their order in the Selected Fields list, click Next.

Note: Your new table cannot have more than one field with the same name.

Dialog box options

Tables

Choose a sample table structure. The selected table's pre-defined fields then appear in the Available Fields list.

Available fields

Choose one or several or all of the fields to be used in your new table structure. Double-click each field in the order you want it to appear in your new table. Or click the >> button to choose all the fields in the sample table structure.

Selected fields

Displays the fields you selected in the Available Fields list, and in the order you selected them.

Type

The field type (such as character, numeric, logical, and so on) of the field selected in the above list.

Width

The width of the field selected in the above list.

Arrows

Click the > arrow to add the selected field in the Available Fields list to the bottom of the list of fields in the Selected Fields list.. Click the >> arrow to move all the available fields to the Selected Fields list..

Click the < arrow to remove the selected field from the Selected Fields list to the bottom of the Available Fields list Click the << arrow to remove all the selected fields from the Selected Fields list to the bottom of the Available Fields list.

Table wizard, step two

Select the table type. Then, either run the table to start adding records, or modify the table structure with the Table designer. Choosing either option ends the Table wizard process.

Dialog box options

Table type

Choose the table type for the appropriate database management software. If you're creating this table on an SQL database server for which a BDE alias exists, the name of the server appears in the text box. If you're creating a table locally, choose either dBASE or Paradox.

Run Table

Choose Run Table to see your new table in *Visual* dBASE. But first, the Save dialog box opens, asking you to name the table file. Unless you specify otherwise, the file is saved in the current directory. It is given a .DB extension if it is a Paradox table or a .DBF extension if it is a dBASE table.

To modify the table after viewing it in Run mode, click the Design button on the toolbar to open the Table designer.

Design Table

Choose Design Table to view or modify the structure of the table. When you want to run the table, click the Run button on the toolbar.

New Form dialog box

Create a new form.

Dialog box options

Wizard

Choose Wizard to have *Visual* dBASE create a new form. The Form Wizard creates a data-entry form to your specifications, based on one table or query. You can choose navigation, edit, and query functionality, and you can link the form to other reports or forms. Later you can modify the form in the Form designer or the Source editor.

Designer

Choose Designer to build the table yourself, from scratch, using *Visual* dBASE's Form designer.

Want to bypass this dialog box? To go straight to the Form designer (skipping the Form wizard) every time you want to design a form, choose Properties|Desktop Properties, and on the Application page, uncheck Form in the Prompt For Wizards panel.

Form wizard, step one

Select the table or query whose data you want the form to use. If the file you want isn't listed in the Table and Query Files list, click the folder button next to the Look In box and locate a table or query file.

Dialog box options

Look in

The Look In drop-down box lists the last several directories you've had open. You can select one of these, or choose the folder button to browse to the directory that contains the table or query you need.

Table and query file

When you select a directory, its tables are listed in the Table and Query File list box.

Form wizard, step two

Select the table fields you want to display in the form. The Form wizard lists all the fields in the table or query that you selected in the previous step.

Select fields in the order in which you want them to appear on the form. To proceed to the next step, you need to select at least one field. To select individual fields or all fields, double-click or use the arrow buttons. When you have the fields you want in the correct order in the Selected Fields list, click the Next button.

Dialog box options

Available fields

The list of fields in the table you selected in the previous step. Select the fields that you want to use and move them to the Selected Fields list by double-clicking or using the arrow buttons.

Selected fields

The list of fields you are selecting to appear as linked components in the form. To remove a field from the list, double-click it or use the arrow buttons.

Arrows

Click the > arrow to add the selected field in the Available Fields list to the bottom of the list of fields in the Selected Fields list.. Click the >> arrow to move all the available fields to the Selected Fields list..

Click the < arrow to remove the selected field from the Selected Fields list to the bottom of the Available Fields list Click the << arrow to remove all the selected fields from the Selected Fields list to the bottom of the Available Fields list.

Form wizard, step three

Choose a layout for the fields on your new form.

Dialog box options

Layout style

The fields in a row are displayed on separate lines, for example,

- **Columnar.** One field per line, resulting in a single column of labeled components. Default.
- **Form.** More than one field per line, the components strung horizontally across the page with each component's label positioned above, flush left to the leftmost edge of the component.
- **Grid.** Fields laid out as columns, records as rows, spreadsheet style. Useful for displaying many rows per page. This option disables the When Many Fields option.

When many fields

Choose either of two multipage form layouts for cases where you have more fields than could practically be displayed on a single page:

- **Page.** Each page of the form identified by a tab. Useful for creating a multipage dialog box.
- **Scrollbar.** Adds a vertical scrollbar, like a Windows window.

Associate Component Types

Click this button to display the Associate Component Types dialog box where you can associate numeric, date, logical, memo, binary, and OLE field types with the component type you prefer.

Associate component types

Use this dialog box to associate certain field types (numeric, date, logical, memo, binary, OLE) with the component type you prefer. You have two choices for each field type. Select the one you want for each field type.

Form wizard, step four

Choose a predefined visual scheme or create your own. You can define these items separately:

- Title font
- Label font
- Foreground and background colors for
- Form background
- Titles
- Labels
- Editable components
- Shapes
- Pushbuttons.

Use the tabbed pages for each element. In each page, select preset fonts or colors from the selection list boxes or click the tool buttons to display font and color builders. The font and color settings you make in this dialog box are reflected in the Sample box.

To save the scheme for future reuse, click the Save As button in the Scheme pane.

Dialog box options

Sample

The Sample box shows the current scheme. To set the font or color of one of the elements shown in the Sample, click that element. The page for that element is then selected from the tabbed settings pages in the lower part of the dialog box.

Scheme

Choose a preset scheme from the Scheme list box. If you save your own scheme (see below), its name is added to the list box.

- **Delete.** Delete the selected scheme from the list.
- **Reset.** List only the schemes that shipped with Visual dBASE. Important: When you choose Reset, any schemes you've saved are deleted from the list.
- **Save As.** Save the current color and font settings. A Scheme Name dialog box appears, allowing you to enter a name for your new scheme. It will then be available from the Scheme listbox.

Title page

Select a font and foreground (font) color for titles.

Non-editing components page

Select a font, foreground color for non-editing components, including text labels, checkboxes, radio buttons, pushbuttons, rectangles, shapes, lines, and tab box components.

Editing components page

Select a foreground (text that appears within the component) and background (box and drop-down list area) color for data-entry components, such as entry fields, spin boxes, combo boxes, list boxes, browse, and editor components.

Pushbuttons page

Select a foreground (font) and background (button area) color for Pushbutton components.

Shapes page

Select a foreground (outline) and background (fill) color for Shape components. You might use shapes to create colored areas on a form to help group options.

Form page

Select a background color for the form surface.

Form wizard, step five

Run the form, or continue designing it with the Form designer. Choosing either option ends the Form wizard process. You can modify the form at any time.

Dialog box options

Run Form

Choose Run Form to see what your new form looks like in *Visual* dBASE. But first, the Save dialog box opens, asking you to name the form file. Unless you specify otherwise, the file is saved in the current directory and given a WFM extension.

To modify the form after viewing it, click the Design button on the toolbar to open the Form designer..

Design Form

Choose Design Form, you don't have to name the form file right away. You can continue working on it first. When you're ready to run the form, click the Run button on the toolbar.

New Report dialog box

The Report wizard helps you design and create a report. It presents you with a series of data and design options and creates a report based on your selections. Once created, you can modify the report with the Report designer.

Dialog box options

Wizard

Choose Wizard to have the Report wizard help you create a report to your specifications. The report can be based on only one table or one query file joining multiple tables. The Report wizard lets you choose:

- Groups
- Aggregate operations
- Sort order
- Whether to create a report where summary information appears first as a hypertext link, and a user clicking on that link is taken to the detail information in that category.

Later you can make changes to the report in the Report designer.

Designer

Choose Designer to build a report yourself, from scratch, by using the Report designer. To create master-detail reports, you'll need to use the Report designer.

Want to bypass this dialog box? To go straight to the Report designer (skipping the Report wizard) every time you want to design a report, choose Properties|Desktop Properties, and on the Application page, uncheck Report in the Prompt For Wizards panel.

Report wizard, step one

Choose the table or query file you will use to generate a report. The Report Wizard produces a report on one table or query. The query can draw its information from multiple tables. After generating a report with the Report Wizard, you can modify it, adjust its page layout, or add rowsets from other tables by using the Report designer.

To choose a table or query file,

1. Choose the folder icon to locate the directory that contains the table or query you want to use. If you've recently had the directory open, it may be listed in the drop-down list box. (Click the arrow beside the Look In box to see.)
2. When you've selected a directory, its tables and queries are listed in the Selected Table Or Query File list box. Highlight the source table or query you need, and click the Next button. Or, double-click the table or query.

Dialog box options

Look in

The Look In drop-down box lists the last several directories you've had open. You can select one of these, or choose the Folder button to browse to the directory that contains the table or query file you need.

Select table or query file

When you select a directory, its tables and query files are listed in the Select Table and Query File list box.

Report wizard, step two

Choose one of two basic report styles.

Dialog box options

Detail rows included

Displays detail information in the report. In subsequent steps of the wizard you can choose fields on which to group the information and you can choose summary operations on those groups. Default.

Summary only

Displays summary (aggregate) information for each group in the report, but no details.

Report wizard, step three

Select the fields you want to appear in the report. The Available list shows all the fields in the source table or query that you selected in the first step, displayed in the table's natural order. To proceed to the next step, you must select at least one field.

To select fields,

1. Select fields in the order in which you want them to appear on the report. Select individual fields to move to or from the Selected Field lists by double-clicking or using the arrow buttons. (Double-arrow buttons move all fields.)
2. To rearrange the order of fields in the Selected Fields list, drag them up or down.
3. When you are satisfied with the fields and their order in the Selected Fields list, click Next.

Note: Your new report cannot have more than one field with the same name.

Dialog box options

Available fields

The list of fields in the source table or query file that you selected in the previous step. Select the fields that you want to use and move them to the Selected Fields list by double-clicking or using the arrow buttons.

Selected fields

The list of fields you are selecting to appear in the report. To remove a field from the list, double-click it or use the arrow buttons.

Arrows

Click the > arrow to add the selected field in the Available Fields list to the bottom of the list of fields in the Selected Fields list.. Click the >> arrow to move all the available fields to the Selected Fields list..

Click the < arrow to remove the selected field from the Selected Fields list to the bottom of the Available Fields list Click the << arrow to remove all the selected fields from the Selected Fields list to the bottom of the Available Fields list.

Grouping

Specify if and how you want the fields grouped in your report.

You can group by more than one field. For example, in a report on sales, you might sort on quarter first and then under each quarter, by salesperson.

To select fields for grouping,

1. Select fields you want to group for display or summary (aggregate) operations. Select individual fields to move to or from the Selected Field lists by double-clicking or using the arrow buttons. (Double-arrow buttons move all fields.)
2. To rearrange the order of fields in the Selected Fields list, drag them up or down.
3. Select a sort order for each field added to the Selected Fields list.
4. When you are satisfied with the fields, their order in the Selected Fields list, and each field's sort order, click Next.

Dialog box options

Available fields

The Available Fields list shows those fields on which you can group your report. (You cannot group on BLOB fields, such as graphic or memo fields.)

You don't have to group your report on any field, if you don't want to. In that case, rows will be displayed in the same order as the source table. Also, you can use a field for grouping without including that field's information in the report.

Select the fields that you want to use and move them to the Selected Fields list by double-clicking or using the arrow buttons.

Selected fields

The list of fields you are selecting to appear in the report. To remove a field from the list, double-click it or use the arrow buttons.

Field sort direction

For each field, choose a sort direction. To do this, highlight the field, and then click a radio button:

- **Ascending.** 1, 2, 3... and a, b, c....and so on
- **Descending.** 3, 2, 1 and z, y, x... and so on

Arrows

Click the > arrow to add the selected field in the Available Fields list to the bottom of the list of fields in the Selected Fields list.. Click the >> arrow to move all the available fields to the Selected Fields list..

Click the < arrow to remove the selected field from the Selected Fields list to the bottom of the Available Fields list Click the << arrow to remove all the selected fields from the Selected Fields list to the bottom of the Available Fields list.

Summary information

Specify what summary information, if any, you want in your report. Summary information is presented in the report immediately after each specified group (or at the end of the report in the case of a grand summary).

How to specify summary information

1 Select a group from the Group drop-down list box.The Group box lists the fields that were selected as groups in the previous step. It also lists <Grand Summary> for summarizing the seleced field not just for groups, but across the entire report, like the Grand Total on a bill.

2 From the Available Fields list select a field on which you want to perform a summary operation within this group.The Available Fields list shows all the fields in the source table that are appropriate for summary information. A field does not have to be included on the report to be used for a summary field. And a field does not have to be specified for grouping to be used as a summary field.

3 From the Available Aggregates drop-down list box, select the summary operation you want performed on this field.

4 Double-click the field or click the > button to move the field name and specified operation over to the Selected Summary list box.

5 If you want summary operations performed on other fields within the selected group, repeat steps 2–4.

6 To specify summary operations for other groups, select another group from the Group drop-down list, and repeat steps 2–4.

You can change the summary operation you already specified for a field by selecting the field in the Summary list and choosing a different operation from the Selected Summary Aggregate box below it.

Dialog box options

Group Available fields

The Available Fields list shows those fields on which you can group your report. (You cannot group on BLOB fields, such as graphic or memo fields.)

You don’t have to group your report on any field, if you don’t want to. In that case, rows will be displayed in the same order as the source table. Also, you can use a field for grouping without including that field’s information in the report.

Select the fields that you want to use and move them to the Selected Fields list by double-clicking or using the arrow buttons.

Available aggregates

Select the summary operation you want performed on the field highlighted in the Available Fields list:

- **Maximum.** Display the maximum value of those in the grouped field.
- **Minimum.** Display the minimum value of those in the grouped field.
- **Count.** Display the number of fields in this group.

Summary

The list of fields you are selecting to appear in the report. To remove a field from the list, double-click it or use the arrow buttons.

Selected summary aggregate

Use this selection box to change the summary operation on a field already added to the Summary list. First highlight the field in the Summary list to change its summary operation.

Arrows

Click the > arrow to add the selected field in the Available Fields list to the Summary list. Click the >> arrow to move all the available fields to the Summary list..

Click the < arrow to remove the selected field from the Summary list to the bottom of the Available Fields list. Click the << arrow to remove all the selected fields from the Summary list to the bottom of the Available Fields list.

Report wizard, step six

Choose report layout style, enter a title, and choose other page layout options.

Dialog box options

Layout style

Choose either of two styles for displaying rows:

- **Tabular.** Displays selected fields of records in a grid of rows (records) and columns (fields).
- **Columnar.** Displays selected fields of each record in a single column. Useful in combination with the One Row Per Page option below.

Report title

Type a title for this report

Date

Prints the date on the report

Page number

Prints page numbers on the report

Next page button

Adds a navigational pushbutton to the report

Row display

Choose either of two options for fitting rows on pages:

- **Continuous.** Prints the rows (records) one after another, multiple rows per page.
- **One row per page.** Prints only one row (record) on a given page, regardless of the row length.

Orientation

Choose either **Portrait** (default) or **Landscape** mode.

Report wizard, step seven

The Report wizard creates the report you specified.

Dialog box options

Run Report

Choose Run Form to see what your new report looks like in *Visual* dBASE. But first, the Save dialog box opens, asking you to name the report file. Unless you specify otherwise, the file is saved in the current directory and given an .RPT extension.

To modify the form after viewing it, click the Design button on the toolbar to open the Report designer..

Design Report

If you choose Design Report, you don't have to name or save the report file right away. You can continue working on it first. When you're ready to run the report, click the Run button on the toolbar.

New Labels dialog box

Create a specialized report for printed labels, such as address labels or name tags that can be printed on specialty adhesive label papers. The wizard presents you with a series of data and design options and creates a labels report based on your selections from preset label formats. The designer enables you to modify the preset label format options or create your own from scratch.

Dialog box options

Wizard

Choose Wizard to have the Labels wizard help you create a labels report to your specifications. The labels can be based on only one table or one query file joining multiple tables. The Labels wizard lets you combine text fields and calculated fields:

Later you can make modifications to the labels design in the Labels designer.

Designer

Choose Designer to build a labels report yourself, from scratch, by using the Labels designer.

Want to bypass this dialog box? To go straight to the Labels designer (skipping the Labels wizard) every time you want to design a labels report, choose Properties|Desktop Properties, and on the Application page, uncheck Label in the Prompt For Wizards panel.

Labels wizard, step one

Choose the table or query file you will use to generate printed labels. The Labels Wizard produces a report on one table or query, formatted for print output on specialty adhesive label papers. The query can draw its information from multiple tables. After generating a labels file with the Labels wizard, you can modify it, adjust its page layout, adjust the size or orientation of the labels, or add rowsets from other tables by using the Labels designer.

To choose a table or query file,

1. Choose the folder icon to locate the directory that contains the table or query you want to use. If you've recently had the directory open, it may be listed in the drop-down list box. (Click the arrow beside the Look In box to see.)
2. When you've selected a directory, its tables and queries are listed in the Selected Table Or Query File list box. Highlight the source table or query you need, and click the Next button. Or, double-click the table or query.

Dialog box options

Look in

The Look In drop-down box lists the last several directories you've had open. You can select one of these, or choose the Folder button to browse to the directory that contains the table or query file you need.

Select table or query file

When you select a directory, its tables and query files are listed in the Select Table Or Query File list box.

Labels wizard, step two

Choose the fields you want to appear on printed labels and position them on the sameor separate lines along with text, spaces, punctuation marks, and calculated fields.

To create a label,

1. Decide how you want each label to appear: Which table fields, in which order? Will you have the same text recurring on each label, such as a greeting, a mailing code, or a country designation?
2. Double-click each table field in the order in which you want them to appear on each label. Each field appears on the same line as the preceding field, unless you specify otherwise.
3. Click a punctuation or space button to separate or connect fields.
4. To put a field on a new line, click the New Line> button, or simply click in the Label Contents panel.
5. Click the Calculated Field> button to display a dialog box in which you can create a new field that returns the value of an expression that you compose.

If you have selected a table of standard mailing addresses, you can quickly generate mailing labels by clicking the Quick Address button.

Dialog box options

Label Contents

This panel is the design surface on which you position table fields, text, spaces, punctuation marks, and calculated fields. You can add lines, select previous lines, and delete any or all entries.

Fields

Choose fields from the table or query file you selected in the previous step. Double-click to add the field to the selected line in the Label Contents panel. If you choose the wrong field or placement, select the item in the Label Contents panel and click the Delete button.

Field>

Click the Field> button to move the selected field onto the label design surface. Each field is added on the same line and to the right of the preceding field.

New Line>

Click the New Line> button to create a new line on the label. The fields, text, spaces, punctuation, or calculated fields you add will then appear on the new line.

Text

You can separate fields with punctuation marks and spaces, and you can add fixed text that will be printed identically on each form, such as a mailing code or country designation.

- **Punctuation buttons.** Click these buttons to insert puctuation marks into into the selected line. From left to right, the four buttons insert a comma, a period, a hyphen, or a colon.
- **Space.** Click the Space button to insert a space into the selected line to the right of the last item inserted.
- **Text.** Enter text that you want to appear on every label. Click the Space button to separate words.
- **Text>.** Click the Text> button to add the text you just entered in the Text field to the current line in the label design surface.

Calculated Field>

Click the Calculated Field> button to display the Calculated Field dialog box where you can name the field and write an expression that performs a calculation and returns a value.

Quick Address

Click the Quick Address button to quickly generate a label layout if you have selected a table of standard mailing addresses.

Labels wizard, step three

Specify how you want to sort the labels on your printed sheets.

You can group labels by more than one field. For example, you might group address labels by state, and in each state, by city.

To select fields for grouping,

1. Select the fields by which you want to group labels. Select individual fields to move to or from the Selected Field lists by double-clicking or using the arrow buttons. (Double-arrow buttons move all fields.)
2. To rearrange the order of fields in the Selected Fields list, drag them up or down.
3. Select a sort order for each field added to the Selected Fields list.
4. When you are satisfied with the fields, their order in the Selected Fields list, and each field's sort order, click Next.

Dialog box options

Available fields

The Available Fields list shows those fields on which you can group labels. (You cannot group on BLOB fields, such as graphic or memo fields.)

You don't have to group your labels on any field, if you don't want to. In that case, labels will be printed in the same order as the source table. Also, you can use a field for grouping labels without including that field's information in the label.

Select the fields that you want to use and move them to the Selected Fields list by double-clicking or using the arrow buttons.

Selected fields

The list of fields you are selecting to appear in the labels. To remove a field from the list, double-click it or use the arrow buttons.

Field sort direction

For each field, choose a sort direction. To do this, highlight the field, and then click a radio button:

- **Ascending.** 1, 2, 3... and a, b, c....and so on
- **Descending.** 3, 2, 1 and z, y, x... and so on

Arrows

Click the > arrow to add the selected field in the Available Fields list to the bottom of the list of fields in the Selected Fields list.. Click the >> arrow to move all the available fields to the Selected Fields list.

Click the < arrow to remove the selected field from the Selected Fields list to the bottom of the Available Fields list Click the << arrow to remove all the selected fields from the Selected Fields list to the bottom of the Available Fields list.

Labels wizard, step four

Choose a predefined label type.

The table fields, text, punctuation, and calculated fields that you may have selected in the previous steps will appear in the predefined label layout you choose here.

Dialog box options

Label type

Click the selection box to choose a label type from the drop-down list.

Page Layout

This panel shows the format specifications for the selected label type, including the size and margin measurements for the label.

Labels wizard, step five

Choose to preview your labels report now or make further modifications in the Labels designer.

Dialog box options

Run Labels

Choose Run Labels to see what your new labels look like in *Visual* dBASE. But first, the Create Label dialog box opens, asking you to name and save the labels file. Unless you specify otherwise, the file is saved in the current directory and given an .LAB extension.

To modify the labels design or layout after viewing it, click the Design button on the toolbar to open the Labels designer..

Design Labels

If you choose Design Labels, you don't have to name or save the labels file right away. You can continue working on it first. When you're ready, save and print the labels file.

Set Label Type dialog box

Choose one of a full range of predefined label types, each types offered with several variations in layout. The available preformatted types include: Address, Mailing, File Folder, Diskette, Name Badge, Shipping, Audio Tape, Video Tape, Name Tag, and many more.

Dialog box options

Label type

Click the selection box to choose a label type from the drop-down list.

Page Layout

This panel shows the format specifications for the selected label type, including the size and margin measurements for the label.

New Data Module dialog box

Create a new data module.

Dialog box options

Wizard

Choose Wizard to have *Visual* dBASE create a new data module. The Data Module Wizard creates a data module to your specifications, based on one table or query. You can choose navigation, edit, and query functionality, and you can link the data module to reports or forms. Later you can modify the data module in the Data Module designer or the Source editor.

Designer

Choose Designer to build the table yourself, from scratch, using the Data Module designer.

Want to bypass this dialog box? To go straight to the Data Module designer (skipping the Data Module wizard) every time you want to design a data module, choose Properties|Desktop Properties, and on the Application page, uncheck Data Module in the Prompt For Wizards panel.

Data Module wizard, step one

Select the table or query whose data you want the data module to use. To proceed to the next step, you need to select a table or query file. To select a file,

1. Click ▪ to the right of the text box to select the directory where the file resides.
2. Select the table or query file from the list and choose the Next button (or double-click the table).

Dialog box options

Look in

The Look In drop-down box lists the last several directories you've had open. You can select one of these, or choose the Folder button to browse to the directory that contains the table or query you need.

Table and query file

When you select a directory, its tables are listed in the Table and Query File list box.

Data Module wizard, step two

Save the data module or continue building it with the Data Module designer. Choosing either option ends the Data Module wizard process. You can always modify the data module with the Data Module designer or start over with the Data Module wizard.

Dialog box options

Save Data Module

Choose Save Data Module to open the Save dialog box and name the data module file. Unless you specify otherwise, the file is saved in the current directory and given a .DMD extension.

To modify the data moduleafter viewing it, click the Design button on the toolbar to open the Data Module designer..

Design Data Module

Choose Design Form, you don't have to name the data module file right away. You can continue working on it first.

Find Rows dialog box

Find a specific row in the current rowset or table by specifying a value for one of the columns (fields) of the target row. If a match is found, the row pointer moves to the found row.

Dialog box options

Find What

Type the value you expect to find in that field of the target row. You can specify any printable character, including spaces. For example, you could search for rows where the LastName field equals `Johnson`.

For text and memo fields, you do not have to enter the precise value for which you are searching. You can enter the beginning of a phrase, such as Bank, to find all rows beginning with the word Bank.

To search for a value stored in another field, a memory variable, or an expression, use parentheses. *Visual* dBASE searches the field specified in Located In Field for the value that the expression returns.

- Field names. *Visual* dBASE searches for rows where the selected field matches the value of another field in the same row. For example, you could search for rows where the YTD_Sales field equals the Ord_Rev field by selecting YTD_Sales in the Located in Field list, and specifying `(Ord_Rev)` in the Find What text box.
- Memory variables. *Visual* dBASE searches for rows where the selected field matches the value in the memory variable. For example, you could search for rows where the YTD_Sales field equals the value of the TotSales memory variable by selecting YTD_Sales in the Located in Field list, and specifying `(TotSales)` in the Find What text box.
- Expressions. *Visual* dBASE searches for rows where the selected field matches the value that the expression returns. For example, you could search for rows where the Sell_Price field equals nine times the quantity by selecting Sell_Price in the Located in Field list, and specifying `(QTY*9)` in the Find What text box.

Located In Field

Select one of the rowset's fields (columns).

Search Rules

Click a radio button to choose either:

- **Partial Length**. The search string will be found within larger strings.
- **Exact Length**. The search string must match exactly (such as a whole word).
- **Match Case**. The case of the search string must be matched.

How to get there: In Table Run mode, choose Table|Find Rows.

Replace Rows dialog box

Find rows with specified data content in particular fields and replace those values with a new value. You can choose any type of field; however, the replacement value must have the same data type as the field you choose. The changes appear immediately in the Table window.

Dialog box options

Find What

Type the value you expect to find in that field of the target row. You can specify any printable character, including spaces. For example, you could search for rows where the LastName field equals `Johnson`.

For text and memo fields, you do not have to enter the precise value for which you are searching. You can enter the beginning of a phrase, such as Bank, to find all rows beginning with the word Bank.

To search for a value stored in another field, a memory variable, or an expression, use parentheses. *Visual* dBASE searches the field specified in Located in Field for the value that the expression returns.

- Field names. *Visual* dBASE searches for rows where the selected field matches the value of another field in the same row. For example, you could search for rows where the YTD_Sales field equals the Ord_Rev field by selecting YTD_Sales in the Located in Field list, and specifying `(Ord_Rev)` in the Find What text box.
- Memory variables. *Visual* dBASE searches for rows where the selected field matches the value in the memory variable. For example, you could search for rows where the YTD_Sales field equals the value of the TotSales memory variable by selecting YTD_Sales in the Located in Field list, and specifying `(TotSales)` in the Find What text box.
- Expressions. *Visual* dBASE searches for rows where the selected field matches the value that the expression returns. For example, you could search for rows where the Sell_Price field equals nine times the quantity by selecting Sell_Price in the Located in Field list, and specifying `(QTY*9)` in the Find What text box.

Located In Field (left)

Select one of the rowset's columns in which you expect to find the value you specify in the Find What box.

Replace With

Enter the new value or data content you want to place in the found row's field that you specify in the right Located In Field box.

- Memo fields. Replacement value must have a character data type.
- Non-memo fields. Replacement value must have the same data type as the field.
- Numeric fields. The length of the new value must not exceed the field width. Otherwise, the data in the field is replaced with an approximation to the new value in scientific notation, if it will fit. If scientific notation will not fit, the field is replaced with asterisks, which permanently removes stored data.
- Expressions. Like the Find What text box, you can specify a value stored in another field, memory variable, or an expression by surrounding the expression with parenthesis.

Located In Field (right)

Select one of the rowset's columns in which you want to place the new value you typed in the Replace With box.

Search Rules

Click a radio button to choose either:

- **Partial Length.** The search string will be found within larger strings.
- **Exact Length.** The search string must match exactly (such as a whole word).
- **Match Case.** The case of the search string must be matched.

Find Next

Find the next occurrence of the search value.

Replace

Replace the specified replacement field of the current row with the Replace With value.

Replace All

Replace all occurrences of the specified replacement field with the Replace With value.

How to get there: In Table Run mode, choose Table|Replace Rows.

Scientific notation

Scientific notation is a method of representing numbers as a decimal value multiplied by positive or negative 10 raised to a value.

For example, .6E+23 is `.6*(10^23)`.

Delete Rows dialog box

Delete rows (rows) of the current table or rowset. Click a radio button to choose the scope of the deletion.

Dialog box options

Current

Deletes only the current row (displayed on the form).

Specified

Deletes the row specified by the SQL statement you type in the box.

All

Deletes all rows in the current table or rowset.

How to get there: In Table Run mode, choose Table|Delete Rows.

Sort Rows dialog box

Sort rows (rows) in the current rowset or table and save the sorted rows into a new table.

Unlike using an index, the sorting operation actually copies the current table to a new table and arranges the rows in an order you specify. All fields are copied to the new table. To rearrange the rows in the current table without creating a new table, use an index.

When you use Sort Rows, *Visual* dBASE creates a temporary index file. During the sorting process, your hard disk must have room for this temporary index file and the new table file.

To copy rows to a new table while excluding some fields, use an index and the Export command.

Dialog box options

Target Table Name

Enter the name of the new sorted table. If you specify a file without including its path, *Visual* dBASE creates the file in the current directory.

Click ▪ to specify the name, path, and type of the file to use as the sort table. Enter a new name, or select it from the Save File dialog box.

Available Fields

Select from a list of the current table's fields, the first key field by which you want the rows to be sorted.

Order By

The key field you click appears in the Order By box. You can add more than one field to the Order By box, in cases where you may have more than one row with the same value in the key field. After grouping rows by the first key field, rows within that grouping are ordered by the second key field, and so on.

Select Key Field Sort Direction

Choose to sort the rows according the selected fields, in either ascending or descending order. The new table is sorted on the first field in the new fields list.

Limit Rows

Enter a SQL WHERE statement to limit the row selection. You can thereby exclude rows where a field has a certain value.

How to get there: In Table Run mode, choose Table|Sort Rows.

Count Rows dialog box

Count the number of rows (rows) in the current rowset or table and display the number in a dialog box.

Click OK to the count all the rows in the current table. A dialog box then appears with the row count.

To limit the count to a rowset within the table, enter a SQL WHERE statement in the Where box, then click OK.

Count Rows differs from the total number of rows displayed in the status bar. The status bar number represents both deleted and nondeleted rows in the table. If Deleted is checked in the Desktop Properties dialog box, Count Rows does not count deleted rows.

How to get there: In Table Run mode, choose Table|Count Rows.

Calculate Aggregates dialog box

Calculate the average, minimum, maximum, or sum values for specified numeric fields (columns) in the current table. Calculations may be performed on dBASE numeric and float fields, or Paradox number, money, or short fields, in the current table. If the current table does not have any numeric or float fields, a message box appears.

The result appears in the Calculation Results dialog box. Choose OK to close the window.

If the Deleted checkbox is not checked in the Desktop Properties dialog box deleted rows are included in the calculations.

Dialog box options

Calculation

Choose a calculation to be performed on specified fields:

- **Average**. calculates the average of the specified numeric or float expression and returns a float value.
- **Minimum**. calculates the minimum value of the specified field and returns the same data type as the field specified.
- **Maximum**. calculates the maximum value of the specified field and returns the same data type as the field specified.
- **Sum**. calculates the sum of the specified field and returns a float value.

Available fields

Choose a field of the current table for calculation. Only those numeric fields that *can* be calculated are shown.

Limit rows

Enter a SQL WHERE statement in the Where box to filter the rows of the current table, that is to create a more limited rowset for this calculation.

How to get there: In Table Run mode, choose Table|Calculate Aggregates.

Customize Tool Windows dialog box, Tool Windows page

Set your preferences for the display of tool windows, toolbars, and palettes.

Dialog box options

Tool Windows

Check the toolbars and palettes you want to appear by default whenever you open Form designer or Report designer.

Toolbar and Palette Options

Check to set appearance and behavior of all toolbars and palettes:

- **Large Buttons.** Enlarges the buttons on the toolbar. The palette icons are not affected.
- **Flat Buttons.** Gives tool bar and palette buttons a flat look. This feature is available only if you have Microsoft's newer version of COMCTL32.DLL. (The Internet Navigator and other Microsoft products install this DLL.)
- **Show Tooltips.** Displays brief pop-up explanations of each icon or button as the pointer is passed over it.

How to get there: Choose View|Tool Windows|Customize Tool Windows.

Customize Tool Windows dialog box, Component Palettes page

Set your preferences for the display of the Component palette.

Dialog box options

Display

Choose how you want *Visual* dBASE to display components on the Component palette:

- **Text**. No icon, just the component name
- **Image**. Just the icon appears
- **Image with text below**. Description appears below the icon
- **Image with text to the right**. Description appears to the right of the icon

Show tabs

Organizes palettes into tabbed pages.

Dockable

When checked, Component palettes may be fixed in position by dragging to the top, bottom or sides of the *Visual* dBASE environment. Useful on a large monitor.

Revert cursor to pointer

Automatically turns the mouse into a pointer after you've placed a component or field object. When unchecked, the component or field icon you select remains in effect until you select the pointer. This lets you place multiple instances of an object without having to return to the palette to select the object each time.

How to get there: Choose View|Tool Windows|Customize Tool Windows.

Customize Tool Windows dialog box, Field Palettes page

Set your preferences for the display of the Field palette.

Dialog box options

Display

Choose how you want *Visual* dBASE to display components on the Component palette:

- **Text.** No icon, just the component name
- **Image with text below.** Description appears below the icon.
- **Image with text to the right**. Description appears to the right of the icon.

Add field label

Adds a field label (a text component set to the field's name) adjacent to the field when you drag and drop the Field component on the design surface of a form.

- **Above field.** Places the field label directly above the field on the form.
- **Left of field.** Places the field label to the left of the field. The label is set at 18 characters.
- **None.** No label is added when you add a field to a form.

Show tabs

The Field palette displays a separate page for each active Query object.

Dockable

When checked, Field palettes may be fixed in position by dragging to the top, bottom or sides of the *Visual* dBASE environment. Useful on a large monitor; can be awkward on a smaller monitor.

Revert cursor to pointer

Automatically turns the mouse into a pointer after you've placed a component or field object. When unchecked, the component or field icon you select remains in effect until you select the pointer. This lets you place multiple instances of an object without having to return to the palette to select the object each time.

How to get there: Choose View|Tool Windows|Customize Tool Windows.

Customize Tool Windows dialog box, Inspector page

Set your preferences for how you want properties listed in the Inspector.

Dialog box options

Category View

Check this box to group related properties into preset categories that you can expand or collapse by clicking the plus or minus sign beside the category. You can also expand or collapse all at once from the Inspector's context menu.

Uncheck the box to list properties alphabetically.

Dockable

Check this box if you want to be able to dock the Inspector in a fixed position by dragging it to either side of the design window. Useful on a large monitor.

How to get there: Choose View|Tool Windows|Customize Tool Windows.

Desktop Properties dialog box, Country page

Customize settings for the *Visual* dBASE desktop environment. The Country page lets you set preferred formats for numbers, dates, currency, and a language driver alert option. The defaults for each of these options are set by the International option of the Windows Control Panel. For more information, see your Windows documentation or Windows Help.

Dialog box options

Numeric

Set attributes for how numbers are displayed. An example displays the results of your changes.

- **Separator.** Enter a character that will be used to separate each group of 3 digits (whole numbers) to the left of the decimal point in the display of numbers greater than or equal to 1000.
- **Point.** Enter the preferred symbol for the decimal point that separates decimal digits from integers. In some countries, a comma is used ather than a period.

Date

Set attributes for how dates are displayed. An example displays the results of your changes.

- **Date format.** Specify the format for the display and entry of dates. Below are the choices and formats:
- GERMANY DD.MM.YY
- JAPAN YY/MM/DD
- USA MM-DD-YY
- YMD YY/MM/DD
- MDY MM/DD/YY
- DMY DD/MM/YY
- **Mark.** Enter the character (such as hyphen, slash, or period) to be used to separate the month, day, and year when displaying dates.
- **Century.** If unchecked, displays only last two digits of the year. Check this box to display year as four digits.

Currency

Set attributes for how dollar amounts are displayed. An example displays the results of your changes.

- **Position.** Specify whether to place currency symbol(s) to the left or right of currency numbers.
- **Symbol.** Enter the character(s) to be used for the currency sign. The maximum length is six.

Language driver

Disable or enable checking for language-driver compatibility. The default is on (checked).

How to get there: Choose Properties|Desktop Properties.

Desktop Properties dialog box, Table page

Customize settings for the *Visual* dBASE desktop environment. The Table page lets you specify how tables, records, and fields are opened, compared, excluded, saved, searched, and locked.

Dialog box options

Multiuser

Set options for tables with more than one user.

- **Lock.** If checked, *Visual* dBASE attempts to lock a shared table during execution of commands that read the table but do not change its data. The default is on (checked).
- **Exclusive.** If checked, *Visual* dBASE opens tables and their associated index and memo files for exclusive or shared use. The default is off (unchecked).
- **Refresh.** Set how often (in seconds) the workstation screen is refreshed with table information from the server. The default is 0, meaning the screen is not updated.
- **Reprocess.** Specify the number of times *Visual* dBASE tries to lock a file or one or more records before generating an error or returning .F. (false). The default is 0, meaning *Visual* dBASE does not try to lock a file or one or more records more than once.

Default table types

Set the default table type used by commands that open or create a table. Choose either the dBASE (DBF) or the Paradox (DB) table file format. Default: dBASE.

System tables

Specify whether the Navigator displays SQL client/server system tables. If checked, system tables are displayed. If unchecked, only user tables are displayed. The default is off (unchecked).

Block sizes

Set the number of bytes allocated when creating index files and memo fields. Using these values, you can affect the size and efficiency of these files.

- **Index block.** Specify the size of blocks in which *Visual* dBASE stores .MDX index files on disk to improve the performance and efficiency of indexes. The default is 1. The size in bytes is the number you specify multiplied by 512. The minimum block size is 1024 bytes.
- **Memo block.** Specify the default block size of new memo field (.DBT) files. The size in bytes is the number you specify multiplied by 64. The default is 8, or 512 bytes. If your table will have a small amount of information in each memo field, use a smaller number.

Other

Set other options for working with tables.

- **Autosave.** If checked, data is written to disk each time a record is changed or added. The default is off (unchecked).
- **Exact.** Specify how character strings are compared. If checked, two character strings are equal when they are identical and are the same length. If unchecked, two character strings are equal if the characters in one string match the beginning characters in the other string. The default is off (unchecked).
- **Encryption.** Specify whether table encryption is copied when an encrypted table is copied. If checked, a table created by copying an encrypted table is also encrypted. If unchecked, a table created by copying an encrypted table does not contain encryption. The default is on (checked). For information on encrypting tables, see File|Database Administration or Table Security.
- **Deleted.** Specify whether Visual dBASE displays or hides records marked for deletion in a table. If unchecked, all records appear in a table. If checked, records marked for deletion are excluded from processing by subsequent commands. The default is on (checked).
- **Near.** Specify where to move the record pointer if a FIND, SEEK, or SEEK( ) operation fails to find an exact match. If checked, *Visual* dBASE finds the record nearest the search value. The default is off (unchecked).

How to get there: Choose Properties|Desktop Properties. Click the Table tab.

Desktop Properties dialog box, Data Entry page

Customize settings for the *Visual* dBASE desktop environment. The Table page lets you specify how you use the keyboard, view data entry fields, and use the bell.

Dialog box options

Keyboard

Set options for keyboard behavior.

- **Confirm**. If checked, the insertion point moves to the next input area only when you press Enter or a direction key, or when you click another field with the mouse. If unchecked, the insertion point moves immediately to the next input area when the current one is full. The default is on (checked).
- **CUA Enter**. Specify whether the Enter key behaves in Windows mode (checked) or DOS (unchecked) mode when a form is open. If checked, Enter submits the current form. If unchecked, Enter moves from object to object on a form. The default is on (checked).
- **Escape**. If checked, pressing Esc interrupts program execution. The default is on (checked).
- **Type-ahead**. Specify the size of the keyboard typeahead buffer. The range is 0 to 1600. The default size is 49 characters.

Bell

Turn the computer bell on or off.

- **Bell**. If checked, the computer bell rings when you reach the end of a field or variable while editing data, or when you enter invalid data. The default is on (checked).
- **Frequency**. Set the frequency of the bell tone in cycles per second. The range is 37 to 32,767, inclusive. The default is 512 Hertz (cycles per second).
- **Duration**. Set the duration of the bell tone in milliseconds. Must be an integer from 1 to 2000 (two seconds max), inclusive.Default is 50.
- **Play Bell**. Plays the bell with the frequency and duration you specify.

Epoch

Set the base year for interpreting two-digit years in dates. For example, if you set Epoch to 1930, two-digit dates from 00 to 29 will be interpreted as 2000 to 2029. See Set Epoch in the *Command Reference.*

How to get there: Choose Properties|Desktop Properties.

Desktop Properties dialog box, Files page

Customize settings for the *Visual* dBASE desktop environment. The Files page lets you specify the Navigator's current directory and search path, your preferred external editor, output log and other preferences.

Dialog box options

Current Directory

Click the folder button to display a Choose Directory dialog box. This sets the default current directory for the *Visual* dBASE Navigator.

Search Path

Click the folder button to display a Choose Directory dialog box. This sets the default search path for the *Visual* dBASE Navigator.

External source editor

Click the tool button to display the Choose Source editor dialog box. This sets the default text or program editor that is invoked when you open a script for editing.

Output Log

If checked, an output log file will be created, showing any error or warning messages generated during the compile and/or link process.

Output Log File Name

Create and name a log file in a directory of your choice. Click the tool button to display a Save As dialog box.

Overwrite

If checked, new log information overwrites the existing log file.

Append

If checked, new log information is appended to the existing log file.

Backup files

If checked, displays backup files in *Visual* dBASE Navigator.

Sessions

If checked, sessions are enabled; *Visual* dBASE issues a CREATE SESSION command when running or designing a form from the Navigator. Sessions affect how you can work with the same table open multiple times. Within a session, you can change environment settings, define a transaction, open tables and indexes, and navigate records, all without affecting the operation of other sessions open at the same time.

Sessions are intended for older forms that use tables in work areas, and are generally not needed for forms that use data access objects only. The Sessions setting is off by default.

How to get there: Choose Properties|Desktop Properties.

Desktop Properties dialog box, Application page

Customize settings for the *Visual* dBASE desktop environment. The Application page let you skip the prompt for a wizard when you create new forms, reports, labels, data modules, and tables. You can also set the number of remembered files and projects that will appear in theFile menu, viewer options, and skip the splash screen.

Dialog box options

Prompt For Wizards

When you double-click a new (Untitled) table, form, or report icon, a dialog box appears prompting you to choose either the Wizard or the Designer. By unchecking these boxes you can skip this dialog, causing the new form, report, label, data module, or table to open in Design mode.

File menu

Click the spinboxes to change the number of Most Recently Used files and projects that can be displayed in the File menu.

Database

Set options for use with client/server database applications:

- **Remember logins.** If checked, you don't have to type in a login string for frequently used databases.
- **SQL Trace.** If checked, echoes all SQL statements to the Command window's Results pane. Useful for debugging.

Viewers

Set options for image and OLE viewers:

- **Size window to content.** If checked, the viewer appears with just the right dimenions to display the OLE application or an image.
- **Play animation continuously.** If checked, any animations are looped, repeating endlessly.
- **Save objects as OLE 2.0.** If checked, OLE 1.0 objects in legacy code will not work. Check this option only if you do not have to support the older version of OLE.

Splash Screen

If checked, displays of the *Visual* dBASE logo at startup. Uncheck this to skip the splash scren and speed startup.

How to get there: Choose Properties|Desktop Properties.

Desktop Properties dialog box, Programming page

Customize settings for the *Visual* dBASE desktop environment. The Programming page let you set how data, test programs, and text appear, how numbers are calculated, and how programs are compiled and analyzed..

Dialog box options

Command output

Specify how data, test programs, and text appear, and how numbers are calculated.

- **Decimals**. Set the number of decimal places, from 0 to 18, to display for numeric and float numbers. The default is 2.
- **Precision**. Set the number of digits used when comparing numbers. The range is 10 to 19. The default is 16.
- **Margin**. Set the printer offset for the left margin for all printed output. The default is 0.
- **Space**. If checked, a space is inserted between expressions displayed or printed with a ? or ?? command and separated by commas. The default is on (checked).
- **Talk**. If checked, system messages are displayed in the Command window. The default is off (unchecked).
- **Headings**. If checked, the output of AVERAGE, DISPLAY, LIST, and SUM includes a heading identifying the fields of the table(s). If unchecked, the field-name headings do not appear. The default is on (checked).

Program development

Specifies how programs are compiled and analyzed.

- **Coverage**. If checked, coverage files are created or updated when you call a program, procedure, or user-defined function (UDF) in a separate program file. A coverage file is a binary file containing cumulative information on how many times *Visual* dBASE enters and exits each logical block of a program. The default is off (unchecked).
- **Ensure compilation**. If checked, a program, procedure, or format file is automatically compiled when you change the file and then execute it or open it for execution. The default is on (checked).

Design

If checked, CREATE and MODIFY commands can be executed. The default is on (checked).

Safety

If checked, you must confirm before overwriting a file or removing records from a table. The default is on (checked).

Full path

If checked, functions that return file names return the full path name. The default is off (unchecked).

How to get there: Choose Properties|Desktop Properties.

Table Designer Properties dialog box

Set display preferences for the Table designer, to show or hide grid lines.

Dialog box options

Horizontal Grid Lines

If checked, the Table designer separates rows with horizontal lines.

Vertical Grid Lines

If checked, the Table designer separates columns with vertical lines.

How to get there: In the Table designer, choose Properties|Table Designer.

Report Designer Properties dialog box

This dialog box allows you to set various properties of the Report designer.

Dialog box options

Visual Aids

- **Show Grid**. Check to show grid lines.
- **Snap to Grid**. Check to make components align automatically to nearest vertical and horizontal grid lines.
- **Show Ruler**. Check to display the horizontal and vertical rulers.
- **Show StreamFrames**. Check to show outlines around the streamFrames in your report while in the designer. (A report has at least one streamFrame, which takes up the whole designable area of the report.)

Rowset Display

- **One Row.** Select to display only one row from the source table.
- **All Rows.** Select to display all source-table rows that will fit on the report page.

Invisible Controls

- **Display.** Check to display invisible controls in the designer, but not when the label report runs.

How to get there: From the Report designer, choose Properties|Report Designer.

Label Designer Properties dialog box

Visual Aids

- **Show Ruler**. Check to display the horizontal and vertical rulers.
- **Show Labels**. Check to display an outline around each label in the designer, showing you its boundaries.

Rowset Display

- **One Row** Select to display only one row from the data source.
- **All Rows.** Select to display all rows from the data source that will fit on the report page.

Invisible Controls

- **Display**. Check to display invisible controls in the designer (but not when the label report runs).

How to get there: From the Label designer, choose Properties|Label Designer.

Navigator Properties dialog box

Choose options for the behavior of the *Visual* dBASE Navigator.

Dialog box options

Show Extensions

Shows file type extensions in *Visual* dBASE Navigator.

Use Supplemental Search Path

If checked, adds an additional search path text box (called “Also Look In:”) to the Navigator. When a path name appears in both Look In boxes, *Visual* dBASE displays files in all the directories specified in both Look In boxes.

How to get there: From the Navigator, choose Properties|Navigator Properties.

File Item Properties dialog box

Display file information about the item currently selected in the *Visual* dBASE Navigator.

Name

Name of the currently selected file.

Path

Path to the file (directory location)

Type

Type of the file (such as “table”)

Rows

Displays the number of rows in the table, if the selected file is a dBASE table. If the selected file has the file extension .DBF but is not a table, “Not a dBASE table” appears

Last Changed

Date the file was last modified

Size

Number of bytes in the file

(Not) Read Only

Whether the file is locked from editing

(Not) Archived

Whether an archive backup has been made with the DOS BACKUP or XCOPY commands.

How to get there: Select a file in the Navigator and choose Properties|Current File Item Properties or press *Alt+Enter*.

Debugger Properties dialog box

Related topics

Choose preferences for the *Visual* dBASE Debugger operations. Click Apply to apply your changes while leaving the dialog box open. Click the OK button to apply the changes and close the dialog box.

Dialog box options

General

Set general debugger behavior:

- **Show exceptions**. If checked, whenever an exception occurs in the code it will be displayed in a dialog box in the debugger.
- **Cancel when debugger closes**. If checked, when the debugger is closed, the program stops executing.

Variables

Choose which types of variable wil be displayed in the Variables tool window. Local variables are always displayed.

- **This**. If checked, the This object will be tracked.
- **Global**. If checked, the program's global variables will be tracked.
- **System**. If checked, system variables will be tracked. Default is off (unchecked) because the multitude of system variables could slow performance.

Source display

Options affecting how the debugger's Source window appears:

- **In tabbed window**. If checked, displays other open code modules in tabbed pages.
- **TreeView graphics**. If checked, displays bitmaps in the TreeView.

How to get there: With the debugger open, choose Properties|Debugger Properties.

Project Properties dialog box

Specify properties for the current project. The location of your project appears at the top of the dialog box.

Dialog box options

Project Page

- **Main file**. Choose the name of the main file for this project from the list of possibilities. A main file is a runnable source file—a form, report, label, or program.
- **Parameters to main file**. Type the parameters you want to pass to the main file whenever it is run via these choices from the Build menu: Execute <filename>, Run <filename>, or Debug <filename>.

There is one main file per project, and it appears in boldface in the tree pane of the Project Explorer.

- **Author**. When a new project is created, this is set to be the "Username" value in the .INI file. You can edit the name.
- **Description**. This area is for your documentation purposes.

Compile page

- **Preprocessor defines**. The #defines you type here are used when you compile a file from this project (either automatically of by choosing Compile or Build).
- **Log file name**. Type or choose the file name of the log file that will show any error or warning messages generated during the compilation.

Build page

- **Target build executable file name**. Enter a name and path for the .EXE file you intend to build from your source files. The default is the name and location of the project.
- **Icon file name**. Choose the icon file to be used as the file icon by the target .EXE file. Your choices are .ICO files that are in the current project.
- **Splash file name**. Choose the image file to be used as the splash screen (initial title graphic) when the executable file is run. Your choices are the .BMP files that are in the current project.

How to get there: From the Project Explorer, choose Properties|Project Properties.

File Properties dialog box (Project Explorer)

The name of the file you are inspecting appears at the top of the dialog box.

Dialog box options

Exclude from build

This option is available for souce-compilable files. Check it to exclude this file from the build process of compilation and inclusion in the target .EXE.

Include in target executable

Check this option to include this file in the .EXE. All object files go into the .EXE (except for those whose matching source files have Exclude From Build set). You may choose to put any file into the .EXE using this option.

Reset button

Clears the active check boxes.

Folder Properties dialog box

The folder type is listed at the top of the dialog box. It is either Standard or Custom.

Dialog box options

A Standard folder is automatically created with a project. For a Standard folder, the information in the dialog box is read-only.

A Custom folder is one you created yourself. You can change the folder name and the extensions of the files that may reside in that folder. The extensions need no period (.) before them. Separate extensions with a semicolon (;).

New Folder dialog box

The folder is identified at the top of the dialog box as a Custom folder.

Dialog box options

Folder name

Type the name you want to give the new folder.

File extensions

Type the extensions of files you want placed in this folder. Type a semicolon (;) between extensions. No period is needed before the extension. The extensions must be different from those in the Standard project folders, because only one folder may hold a file of a given extension.

Project Explorer

Related topics

The Project Explorer displays a tree view of your project file, which contains pointers to all your application files (tables, forms, queries, bitmaps, and so on) after you add them to the project. Several standard folders are provided, and you can create your own custom folders. Each folder is assigned certain file extensions and may contain only files with those extensions.

The Project Explorer looks and acts much like the Windows Explorer. Files have context (right-click) menus that let you open, run, compile, create something new, and so on.

When you have files in your project, the right-hand pane displays read-only views of a file you select. A file may have more than one view, in which case more than one tabbed page may appear. For example, one tab may show source code for a custom control, another, the visual object.

By dragging the split bar, you can vary the sizes of the panes and hide the view pane entirely.

From the Project Explorer, you can

- Compile and build a project.
- Set properties for the project as a whole; for example, you can set compile options, like preprocessor directives.
- Set properties for individual files; for example, you can specify which files you don't want to include in the build.
- Designate which file should be the first to open when your executable file is run (the *main* file).
- Open several files at once.

If you create a file while a project is open, the file is automatically added to the project.

Label Designer Properties dialog box

Choose options for the behavior of the Label designer:

Dialog box options

Visual aids

Settings for controlling appearance of the Labels designer:

- **Show ruler**. If checked, displays horizontal and vertical rulers. Default: on.
- **Show labels**. If checked, displays the outlines of each label. Default: on.

Rowset display

Choose to display either one row or all rows in the label. One row serves to show the locations of the fields within each label. All rows might slow performance.

Invisible components

If checked, displays the invisible data access components such as Query or Database objects. Default: off.

How to get there: With the Label designer open, choose Properties|Label Designer Properties.

Command Window Properties dialog box, Results Page

Lets you specify position and font preferences for the Command window's results pane.

Dialog box options

Position

Choose a position for the results pane relative to the input pane: Top, Bottom, Left, or Right.

Font

Shows the current font selected for the results pane. To choose a new typeface, type style, and typesize, click the adjacent tool button to display the Font dialog box.

Reset

Revert Font setting to the default: Courier 9.

In each page of the dialog box, click the Apply button to apply the new setting in the current page without closing the dialog box. Click OK to apply the changes in all pages and close the dialog box.

How to get there: From the Command window, choose Properties|Command Window Properties.

Editor Properties dialog box, Editor page

Set your editor preferences by checking the check boxes. What you set here affects both the Source editor and the Command window.

Dialog box options

Editor speed setting

Use this dropdown listbox to select either the *Visual* dBASE or BRIEF editor. There are minor differences—some keyboard shortcut mappings, for example—but in most major respects the two editors offer similar functionality. Default settings are chosen for you, but you can change these.

Reset

Revert editor preferences to default settings.

Auto indent

When you press Enter, the new line is indented to match the indent in the previous line. If Auto Indent is off (unchecked), the cursor moves to the left margin when you press Enter.

Backspace outdents

If checked, lets you skip over indenting by pressing the Backspace key.

Optimal fill

If checked, converts groups of spaces to tabs when you load a file. If unchecked, spaces are preserved.

Use tab character

Toggles the use of tab and the equivalent number of spaces.

Cursor through tabs

Determines what happens when an arrow key is pressed at a tab mark. If checked, the arrow key takes you through the tab one character at a time. If unchecked, the arrow keys move the insertion point across the whole tab. When you press the right or left arrow keys and you're at the beginning or end of a tab, this setting determines whether the arrow key moves you through the tab space by space or whether you skip to the end of the tab.

Smart tab

Determines whether the tab key positions the insertion point to the starting column position of the previous line when you press Tab and you are to the left of that point.

BRIEF cursor shapes

When checked, gives you the BRIEF style (horizontal) cursor shape. When unchecked, gives you a vertical cursor.

Group undo

If checked, all preceding editor commands and actions of the same type that have been executed since the last time you pressed Enter are undone when you choose Edit|Undo. If Group Undo is unchecked, then only the last keystroke or command is undone.

Keep undo after save

Normally, when a file is saved, the undo cache is cleared. That is, any edits you made before the save cannot be undone. This option lets you override that behavior, allowing you to undo your most recent actions even after saving a file.

Persistent blocks

If columnar mode is on and this option is checked, a highlighted block of text remains highlighted until you select a new block. If the option unchecked, or if columnar mode is off, a highlighted block is automatically deselected when you click an area outside of the block . As noted, the Persistent Blocks option is only available when columnar mode is on. To toggle columnar mode on or off, press Alt+C.

Overwrite blocks

Replaces a marked block of text with whatever is typed. If Persistent Blocks is also on, then typed text is added rather than substituted for the marked text.

Cursor beyond EOF

If checked, lets you place your cursor anywhere on the page. If unchecked, the cursor cannot be placed beyond the last entered line.

Use syntax highlighting

Determines whether syntax highlighting and formatting settings are applied to files with a DBF source file extension. Untitled files edited in the Source editor and text typed into the Command window all assume syntax highlighting when this option is checked. Existing files with non-DBF source extensions do not use syntax highlighting.

Visible right margin

Adds a vertical line in the editor window to mark the position of the right margin. To change the position of the marker, use the Right Margin spinbox. Default is 80 points from the left.

Interpret text as

Changes the way you view your text or program. The actual code points in your program do not change; the only things that change are the way you view the program and the way keystrokes are interpreted. DOS Text uses the OEM or ASCII character set. Windows Text applies the ANSI character set.

Mouse speed

Drag the pointer to increase or decrease the speed with which the pointer moves over text.

Line length

Specify the maximum line length in the text and program editors as well as the Command window. The setting is applied to new edit windows or a reopened Command window; it does not apply to the current window or any open editing windows). If you type beyond this line length or paste data into the window that contains any line that exceeds the maximum, an error message appears.

Tab size

Specify the tab width. This setting is applied immediately to all edit windows, including the Command window.

Block indent

Specify the indent of code blocks.

Undo limit

Specify maximum number of bytes in the temporary cache that contains all current data available for Undo operations in any edit window.

In each page of the dialog box, click the Apply button to apply the new setting in the current page without closing the dialog box. Click OK to apply the changes in all pages and close the dialog box.

How to get there: From the Source editor, choose Properties|Source editor Properties. Or from the

Command window, choose Properties|Command Window Properties.

Editor Properties dialog box, Display page

Choose a typeface and type size as your default font for the *Visual* dBASE Source editor and Command window. Changes are displayed in the Sample area at the middle of the dialog box. Additionally, you can choose to have each open file be a tabbed page in the editor, and you can have representative graphics displayed in the tree view.

Dialog box options

Name

Drop-down list shows all monospaced typefaces available on your system.

Size

Drop-down list shows all available sizes for each available typeface.

Reset

Restore the default typeface and typesize.

In Tabbed Window

Check this option if you want each open script or text file to be a tabbed page in the editor. You can then access each file via its tab. (Clicking on a tab updates the related views and tools.)

TreeView Graphics

Check this option if you want the editor to display bitmaps that represent standard components in the tree view pane.

In each page of the dialog box, click the Apply button to apply the new setting in the current page without closing the dialog box. Click OK to apply the changes in all pages and close the dialog box.

How to get there: From the Source editor, choose Properties|Source editor Properties. Or from the Command window, choose Properties|Command Window Properties.

Editor Properties dialog box, Colors page

Set color and text attributes for each type of code element for easy readability and faster editing. Changes are displayed in a sample viewer at the bottom of the dialog box. Colors you set here apply to both the Source editor and the Command window.

Dialog box options

Color Speed Setting

Drop-down list from which you can choose a preset color scheme. Selecting a scheme here overrides any custom settings you may have selected.

Reset

Restore all default color settings for the currently selected Appearance Speed Setting.

Elements

A scrolling list of code element types. Select a code element, then choose colors and text attributes for that element

Color

A palette from which you can apply color to a selected text element. First choose an element, then left-click for a foreground color and right-click for a background color.

Text Attributes

Chose Bold, Italic, or Underline for the selected code element.

System Color

Click these check boxes to use the default foreground or background colors for text elements.

Sample

Shows how the different colored code elements will appear in text editors, reflecting the settings on this page.

In each page of the dialog box, click the Apply button to apply the new setting in the current page without closing the dialog box. Click OK to apply the changes in all pages and close the dialog box.

How to get there: From the Source editor, choose Properties|Source editor Properties. Or from the Command window, choose Properties|Command Window Properties.

Form Designer Properties dialog box

Set display preferences for the Form designer's visual design surface, to show or hide grid lines and rulers, and to set grid line widths.

Dialog box options

Form settings

Grid and ruler options:

- **Show Grid**. Select to show grid lines.
- **Snap to Grid**. Select to make components align automatically to the nearest vertical and horizontal grid lines.
- **Show Ruler**. Display both vertical and horizontal rulers.

Grid settings

Set the widths between both vertical and horizontal grid lines: Fine, Medium, or Coarse. Or select Custom to set your own grid line widths.

Custom

Allows you to independently set the exact widths for horizontal and vertical grid lines by using the spin boxes.

- **X Grid**. Set the exact width of the horizontal grid lines.
- **Y Grid**. Set the exact width of the vertical grid lines.

How to get there: From the Form designer, choose Properties|Form Designer Properties.

Image Viewer Properties dialog box

Set the properties of the image viewer. When you open an image file in *Visual* dBASE the image appears in a special Image Viewer window.

Dialog box options

Size window to image

If checked, the image will be shown in a window that is the same size as the image. If not checked, the image will be contained in a standard size window. If the image is larger than the view window, scroll bars will appear. If you check Size Window to Image and then open an image, changing the size of the viewer window will distort the image.

Play continuosly if animated image

If the image is an animated GIF image, the Image Viewer will play the image. If this radiobutton is checked, the image will play continuously while the image is open in theviewer. If this radiobutton is not checked, the image will play only once and stop on the last frame.

How to get there: Select an image file and choose Properties|Image Viewer Properties.

Font Property Builder

Choose a typeface, color, style and effect for text.

Dialog box options

Font

Displays current font above a list of all fonts available on your system. TrueType fonts are indicated by the double-T icon.

Style

Displays current type style above a list of all available styles for the selected font.

Size

Displays current type size above a list of all available typesizes for the selected font.

Effects

Available effects are Strikeout and Underline. Check one or both to apply the effect.

Sample

Displays the selected font in the selected style and with any applied effects.

How to get there: From the Format menu, the format toolbar, or the Inspector (*fontName* property).

Choose Resource Image dialog box

Specify the resource and ID for a graphic associated with a property in the Form designer.

Dialog Box Options

Resource DLL file name

Enter the name of the .DLL file that contains the graphic you want to use. Use the current file, or select a file by clicking ▪ to display an Open dialog box.

ID

The identification string for the image in the .DLL file.

Image

The image named by the ID string in the ID field.

How to get there: In the Inspector, select an Image component with a *dataSource* property and click its wrench tool.

Icon Property Builder

Specify the resource and ID for a graphic associated with a property in the Form designer.

Dialog Box Options

Location

Specify the source from which the icon will be drawn:

- **Filename**. Choose this option for an icon in a standalone .ICO file. When you select this option and click
- , a Choose Image dialog box appears, from which you can choose a .ICO file.
- **Resource**. Choose this option for a bitmap stored in a .DLL file. When you select this option and click
- , the Choose Resource dialog box appears.

Image

The name or label of the icon. When you choose Filename from the Location list, this is a file name. When you choose Resource, this is a resource number. This field is automatically filled when you click ▪ and choose an icon from one of the dialog boxes.

How to get there: In the Inspector, select a component with an *icon* property and click the wrench tool beside the *icon* property.

DataLink Property Builder

Link specified table data to the Editor component on a form. Choose an option from the Type list to specify the source of the data. Then enter the appropriate information in the Data Source field:

Dialog box options

Type

Specify the type to be used, either:

- **Field**. Choose this option to link to data that is stored in a field in a table. Enter the name of the field (qualified with its table name if it is in a multitable query), or click
- to display the Choose Field dialog box, from which you can choose a field. This dialog box appears if you have already linked the form with the table through the form's View property. If you haven't set the form's View property, a message box prompts you to do so.
- **File**. Choose this option to link to a text file. Enter the name of the file, or click
- to display the Choose DataLink dialog box, which is a typical open file dialog box from which you can choose a file. By default, the .TXT files in the current directory will be displayed.

DataLink

The name or other reference to the data source, as explained for each type under Type, above.

How to get there: In the Inspector, select an Editor component and click the wrench tool beside the *dataLink* property.

DataSource/Image Property Builder

Link an image to a component. Image objects are linked to an image file by the object's *dataSource* property. To link a graphic image to an object,

1. Select Filename as the Location.
2. Click the tool button to the right of the Image box and the Choose Image dialog box appears.
3. Navigate to the directory that contains the image that you want to relate to the selected image object and click the Open button.

Dialog box options

Location

Specify the image file type to be used, either:

- **Resource**. Choose this option for a bitmap that is stored in a .DLL file. When you select this option and click
- , the Choose Resource dialog box appears.
- **Filename**. Choose this option for a bitmap that is a standalone BMP, ICO, GIF, JPG,IPE, XBN, or TIF file. Filename is the most common source. When you select this option and click
- , a Choose Image dialog box appears, from which you can choose an image file.
- **Binary**. Choose this option for a bitmap that is stored in a binary field of a table. Only a simple object like a radio button can use a binary location. A radio button is either on or off, so a binary location can be any Boolean field in a table. When you select this option and click
- , a Choose Field dialog box appears, from which you can choose a binary field from a table, if you have already linked the form to the table through the form's *View* property. If you haven't set the form's *View* property, a message box prompts you to do so.

Image

Click the tool button to display an Open dialog box to locate the particular file type.

How to get there: In the Inspector, select an Image component and click the wrench tool beside the *dataSource* property.

UpBitmap Property Builder

Link a bitmap image to a Pushbutton component in the up position. The Pushbutton's *upBitmap* property lets you assign a graphic to the Pushbutton component, rather than a simple text label.

Dialog box options

Location

Specify the image file type to be used, either:

- **Resource**. Choose this option for a bitmap that is stored in a .DLL file, a likely place for an icon for a pushbutton. When you select this option and click the Bitmap tool button, the Choose Resource dialog box appears.
- **Filename**. Choose this option for a bitmap that is a stand-alone file. When you select this option and click the Bitmap tool button, a Choose Image dialog box appears, from which you can choose a bitmap image file. See class Image for information on formats supported.

Bitmap

Click the tool button beside this text box to open the Choose Image dialog box to locate the particular image file.

Split bitmap

If you are using the same file for an upBitmap image and a downBitmap image (upBitmap image on the left and downBitmap image on the right), checking this box will display only the left half of the image, or the upBitmap half.

How to get there: In the Inspector, select a Pushbutton component and click the wrench tool beside the *upBitmap* property.

DataSource Property Builder

Related topics

Set *dataSource* property for the selected component. Because the data displayed in this component cannot be edited by the user, you connect it to the data by using *dataSource* rather than *dataLink*.

Dialog box options

Type

Specify the data source type to be used. Depending on which component you are working with, the Type drop-down list has one or all of the following choices.

- **Array**. Creates prompts from elements in an array object. After selecting Array from the Type box, click the tool icon to the right of the Data Source box to display the Build Array dialog box.
- **Field**. Creates prompts from all the values in a field in a table file. After selecting Field from the Type box, click the tool icon to the right of the Data Source box to display the Choose Field dialog box.
- **Structure**. Creates prompts from all the field names in the currently selected table.
- **Tables**. Creates prompts from the names of all tables in the currently selected database. For the default database, this is all the .DBF and .DB files in the current dirctory.
- **Filename**. Creates prompts from file names in the current default directory. To constrain files listed, specify a filename skeleton by typing it in the Data Source text box. For example, typing *.TXT constrains the displayed file names to only those that have an extentsion of .TXT.

Data source

Click the tool button beside this text box to display a builder to create an array or a list of fields, if applicable.

How to get there: In the Inspector, select a ComboBox component. Then click the wrench button beside the *dataSource* property (in the Data Linkage category).

String Builder

Enter text for the selected property.

How to get there: In the Inspector, click the wrench tool beside a property that takes a text string.

Custom Field Property Builder

To create a custom property for a field, type a name for the property and a default value for the property.

How to get there: Choose a field in a table, right-click on the Inspector and choose New Custom Field Property.

Calculated Field dialog box

Create a calculated field.

Dialog box options

Name

Enter a name for the calculated field. This name will appear in the form, report, or label. The maximum length of the name is 32 characters.

Expression

Enter a valid expression to perform the calculation. The expression usually includes the name of at least one field in the table The value returned by this expression will appear next to the name.

How to get there: From the Labels wizard, step two, click the Calculated Field button.

Fields Property Builder

Lets you specify which fields from the currently aliased table or query (as specified in the form's View property) to link to the selected component.

Dialog box options

Available fields

Lists deselected fields from the currently aliased table or query. Empty unless you move fields from the Selected Fields column. To restore deselected field, choose the field and click >. To restore all, click >>.

Selected fields

Defaults to a list of all fields in the currently aliased table or query. To deselect a field—one you don't want linked to your component—choose it and click <. To deselect all, click <<.

Current selected field

To view the properties of any available or selected field, choose the field name and click the Properties button to open the Field Properties dialog.

How to get there: Select a Browse object, then click the tool button in the *fields* property.

Choose Alias dialog box

Links a table to the current Browse control on a form. This property builder appears when you click in the Inspector for the Alias property of a Browse.

Dialog box options

Aliases

Lists the tables in the query specified in the form's View property (or lists the single table if the View property is a .DBF file). When you choose a table from this list, that table appears in the Browse control on the form. You can choose only one table.

View

Displays the View Property Builder from which you can choose a different query or table to use for the Browse control.

Choose Field dialog box

Related topics

Link a field from a table or query to a component such as an entry field. This dialog box appears when you click the tool button in the Inspector for a property that references a table field. For example, it appears when you click ▪ in the Inspector for the *dataLink* property.

Dialog box options

Queries	Lists the table (or tables if a query) currently active on the form. This table or query is the one referenced as the form's View property. Choose the query or table that contains the field that you want to link to the selected text object.
Fields	Lists the fields in the table selected in the Queries list. Select one of these fields to link it to the component.

How to get there: In the Inspector, click a property tool that takes a text string. For example, lick the tool button of the Entry component's *dataLink* property.

Field Properties dialog box

Sets properties for the field selected in the Selected Fields list of the Fields Property Builder.

Dialog Box Options

Heading

Enter a heading for the field column. If you leave this blank, the heading is the field name. The maximum width of the heading is 127 characters.

Template

Specifies one or more symbols that format data entered into this field. For example, you can convert to uppercase. Click ▪ to choose symbols with the Choose Template dialog box.

When

Enter a condition that allows the field to be edited. The condition should be an expression that, when it evaluates to True, allows editing of the field. (This often depends on the value of another field.)

Width

Enter the display width of the selected field. If you leave this blank, the full width of the field appears.

Read-Only

Creates a field that cannot be edited.

Color

Specifies a color for the selected field on the Fields page of the Table Records Window Properties dialog box. Click ▪ to choose a color in the Color Property Builder.

Valid Expression

Enter an expression that determines whether an entry in the field is valid.

Valid Error Message

Enter an error message to display if the data entered in the field is invalid because the Valid Expression evaluated to False.

Required

Turn on the Required option to prevent users from leaving the field until valid data is entered.

Lower Limit

Enter an expression that represents the lowest of a valid range of values.

Upper Limit

Enter an expression that represents the highest of a valid range of values.

Required

Turn on the Required option to prevent users from leaving the field until valid data is entered. To choose a range of values that are valid, use the Lower Limit and Upper Limit boxes.

How to get there: From the Properties button in the Fields Property Builder.

Columns Property Builder

The list on the left displays the fields available for use in your Browse or Grid control. The list on the right displays the fields you've chosen. To select a single field, click the field name and click > to add it to the control or < to remove it. To select all fields at once, use the >> and << buttons.

How to get there: Choose the tool button in the columns property of a Browse or Grid component.

Class ID Property Builder

Choose an ActiveX application to be placed into an ActiveX component on a form. The Instaled ActiveX Components panel lists the available ActiveX objects and applications. When you select one, it is previewed on the right side of the dialog box. Click OK to add it to the *classID* property of ActiveX component on the form. Your selection appears on the form, contained in the ActiveX component.

How to get there: In the Inspector, select an ActiveX component on a form and click the wrench tool beside the *classID* property.

Template Property Builder dialog box, Character page

Build a template that will constrain the characters allowed in the selected text component. Build the template in the box labeled Template and choose one of the three tabs: Character, Numeric, or Date.

The Character page lists symbols for formatting character data in the selected field.

Template Symbols and Format Functions

Displays the symbols you can enter in the Template box that apply to characters.

Symbol	Description
@!	Converts any letter to uppercase.
@A	Allows the input of letters only.
@R	Causes literal placeholders not to be stored as data.
@T	Trims leading and trailing blanks for display.

! Converts input and display of characters to uppercase.

Allows input of a number, space, +, or -.

9 Allows input of a number for a character value, or a number, +, or - for numeric value.

A Allows input of a letter.

L Allows input and display of T, t, F, f, Y, y, or N, n.

Y Allows input of Y, y, N, and n. Displays .T., T, t, and y as Y; .F., F, f, and n as N.

X Leaves the character unchanged. Use X as a placeholder with other picture templates.

How to get there: In the Inspector click the wrench tool beside the *function* property (in the Edit category).

Template Property Builder dialog box, Numeric page

Build a template that will constrain the characters allowed in the selected text component. Choose one of the three tabs: Character, Numeric, or Date.

The Numeric page lists symbols for formatting numeric data in the selected field.

For example, if you want the text to be limited to 3 digits, a decimal, and 2 digits to the right of the decimal (nnn.nn):

1. Click the Numeric tab
2. Double-click 9 three times
3. Double-click the period once
4. Double-click the 99 twice more (999.99).

Characters typed in the text component are constrained such that typing 456789 displays 456.78.

Template Symbols and Format Functions

Displays the symbols you can enter in the Template box that apply to numbers.

Symbol	Description
@$	Displays the currency character before or after the value.
@Z	Displays spaces rather than zeros if the value is 0.
@^	Displays the value in scientific notation.

$ Displays the currency character before or after the value.

***** Displays an asterisk in all blank positions before the value.

, Inserts a comma in the thousands place.

. Inserts a decimal point in this position.

9 Allows input of a number for a character value, or a number, +, or - for a numeric value.

The currency character and the position of it (left or right) are set by the Currency Symbol and Currency Position options on the Country page of the Desktop Properties dialog box.

How to get there: In the Inspector click the wrench tool beside the *function* property (in the Edit category).

Template Property Builder dialog box, Date page

Lists symbols for formatting date data in the selected field.

Template Symbols and Format Functions

Displays the symbols you can enter in the Template box that apply to dates.

Symbol	Description
@D	Displays the date in the current date format.
@E	Displays the date in the European format - dd/mm/yy.

The date format is set on the Country page of the Desktop Properties dialog box.

How to get there: In the Inspector click the wrench tool beside the *function* property (in the Edit category).

Find Text dialog box

To find text, type the text string to find, and choose Find Next. (By default, the word located by the insertion point or the currently selected text appears in the Find What text box.) If the text string is found, it is highlighted. Choosing Find Next again highlights the next occurrence of the text.

Note: You can close the dialog box and choose Edit|Search|Find Next Text or press Ctrl+K to repeat the last Find Text command.

Dialog box options

Match whole words

Check this option if you want to search for the text as an independent group of characters, not a string included in other words. Otherwise, the search finds the text both as an independent group of characters *and* within longer words. For example, if you're searching for "tool," Visual dBASE will highlight the word "toolbar" as well as "tool."

Match case

Differentiates between uppercase and lowercase letters when searching. For example, "Toolbar" is different from "toolbar" when Match Case is on.

Direction

- **Up** searches from the cursor location to the beginning of the file.
- **Down** searches from the cursor location to the end of the file

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How to get there: Choose Edit|Search|Find Text.

Replace Text dialog box

To search and replace text,

1. Enter the text to find in the Find What text box. By default, the word located by the insertion point or the currently selected text appears in this box.
2. Enter the replacement text in the Replace With text box.
3. Set the search options.
4. Choose Find Next. If the text is found, it is selected. Do one of the following:

   Choose **Replace** to replace the text and find the next occurrence of the text.

   Choose **Find Next** to skip to the next occurrence of the text.

   Choose **Replace All** to replace all occurrences of the text.

Dialog box options

Match whole words

Check this option if you want to search for the text as an independent group of characters, not a string included in other words. Otherwise, the search finds the text both as an independent group of characters *and* within longer words. For example, if you're searching for "tool," Visual dBASE will highlight the word "toolbar" as well as "tool."

Match case

Differentiates between uppercase and lowercase letters when searching. For example, "Company Name" is different from "company name" when Match Case is on.

Direction

- **Up** searches from the cursor location to the beginning of the file.
- **Down** searches from the cursor location to the end of the file

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How to get there: Choose Edit|Search|Replace Text.

GoTo Line dialog box

The line number the cursor is currently in appears in the dialog box.

Type the number of the line you want to move to, or use the Up and Down arrows to specify a line.

GoTo Form Page dialog box

The current page number appears in the dialog box.

Type the number of the page you want to move to, or use the Up and Down arrows to specify a page.

Color Property Builder dialog box

Choose and set the color or colors for the form or for the current object on the form. You can set both foreground and background colors for those objects that have both. This dialog box appears when you click ▪ in the Inspector for a property that references a color.

Some objects have a normal color and a highlight color. For example, an entry field can have one foreground/background color combination when it is not selected (normal) and a different foreground/background color combination when it is selected (highlighted). The normal foreground/background color is one property of the object. The highlight foreground/background color is another property.

Choose a color for the selected object by one of several methods:

- Click one of the Basic Colors (in the box on the left) then click OK.
- Construct a custom color by using the selectors.
- Construct a custom color by typing the color component numbers.

To construct a custom color by using the selectors:

1. Click in the color matrix (the multicolored box) on the right to pick the combination of Red, Green, and Blue.
2. Move the crosshairs up and down to select the Saturation.
3. Move the crosshairs left and right to select the Hue.
4. The vertical bar on the right determines the Luminance (brightness/darkness) of the color by the position of the triangular pointer on the right of the bar. The result of your choices is displayed in the Color/Solid box.
5. When you get the color you want, click the Add to Custom Colors button. The new color appears in one of the previously white boxes directly above the Add to Custom Colors button. Then click the OK button.

To create a custom color by typing the color component numbers:

1. Type the numbers for Saturation, Hue, Luminance, and Red/Green/Blue directly into the respective boxes. The result of your choices is displayed in the Color/Solid box.
2. When you get the color you want, click the Add to Custom Colors button. The new color will appear in one of the previously white boxes directly above the Add to Custom Colors button. Then click the OK button.

Dialog box options

Foreground/Background

Select a radio button to set the colors for the foreground or background color of the object. The selected button applies to everything else you set in the dialog box.

The fields to the right of the radio buttons show the currently selected color for that option (either a common name text string or a hexadecimal code). These settings are automatically entered when you choose a color from the samples in the dialog box. You can also enter these settings directly if you know the number or the code to use. Non-standard colors are expressed as hexadecimal values (for example, 0x8000ff for a deep pink).

Basic Colors

A selection of standard colors. Click a color to apply it to the foreground or background of the current object (depending on whether the Foreground or Background radio button is selected)

Custom Colors/Add to Custom Colors

Custom colors that you can set by selecting a color from the color field on the right side of the dialog box and then by clicking Add to Custom Colors. Custom color information is stored in the [CustomColors] section of VDB.INI. Click one of these colors to apply it to the foreground or background color of the

current object.

Sample

A text sample showing the currently selected foreground and background colors.

Color Field

This box shows the spectrum of available colors. The crosshairs indicate the current color. Click anywhere in the color field to select a color. When you select a color here and then click Add to Custom Color, the selected color is added to one of the Custom Color boxes so you can use it again.

Color|Solid

The patch of color in the left half of this box shows the currently selected color. The patch in the right half shows the closest solid color. Double-click the solid color to make it the current color.

Hue

Hue is the "actual" color, for example, red, yellow-green, or purple. Hue refers to the color without regard to saturation or brightness (luminosity).

Sat(uration)

Saturation affects how clear the color is and refers to how much gray is in the color. The Sat(uration) field shows the saturation from 0 (medium gray) to 240 (pure color).

Lum(inosity) and Luminance Slider

Luminosity is the brightness of a color. The Lum(inosity) field shows the luminosity from 0 (black) to 240 (white). The column to the right of the color field shows the range of luminosity for the current color. Slide the arrow to the right of the column up or down to adjust the luminosity. When you change the luminosity, the Red/Green/Blue color values also change.

Red/Green/Blue

The values in these fields show the balance of red, green, and blue in the current color. This is sometimes called the RGB color.

How to get there: In the Inspector, click the wrench tool beside the *colorNormal* property (in the Visual category).

SQL Property Builder dialog box

Inspect a Query object on a form, click the SQL property.

Dialog box options

SQL statement

Click here and type a SQL statement or statements in the SQL Statement pane in the middle of the dialog box.

SQL statement file

Type a file name containing the desired SQL statements or click the tool button to display an Open dialog box for locating and opening files.

How to get there: In the Inspector, select a Query object and click the wrench tool beside the *sql* property (in the Miscellaneous category).

PaperSize Property Builder dialog box

Select a paper size to be used to print the report.

Most printers can use letter size (8.5 x 11 inch) and many can use legal size (8.5 x 14 inch). If your printer can print on envelopes or on labels, then some of the other selections on the listbox will be useful.

The *PaperSize* property itself is a number from 1 to 7 corresponding to the following list of paper sizes:

- Letter
- Legal
- Executive
- A4
- Comm #10 Envelope
- Monarch Envelope
- DL Envelope

How to get there: From the Report designer, select the Printer object in the Inspector. Then click the wrench tool beside the *paperSize* property.

PaperSource Property Builder dialog box

When designing reports, you can select the source of the paper that your printer will use (for a printer with more than one method of loading paper). The PaperSource property options vary depending on the type of printer installed.

For different printers, the PaperSource Property Builder displays the number and corresponding paper source. For example, the PaperSource Property Builder will display the following list for a typical printer:

AutoSelect Tray

Lets the printer decide which tray to load

Upper

Loads paper from the upper tray on printers with two trays

Lower

Loads paper from the lower tray on printers with two trays

Envelope

Envelopes require a special loading mechanism

Manual Feed

Loads from the manual feed mechanism

When you make a selection its corresponding number appears in the property box.

How to get there: From the Report designer, select the Printer object in the Inspector. Then click the wrench tool beside the *paperSource* property.

Query Parameter Property Builder dialog box

Build and maintain parameters used in queries.

Dialog box options

Parameter name

Lists all the parameters used with a specific query object. Click on a parameter name to display the parameter value's data type and value in the Parameter Value box.

Data type

Displays the type of the parameter entered in the Parameter Name box.

Value

Displays the value of the parameter entered in the Parameter Name box.

How to get there: In the Inspector, select the Query object. Then click the wrench tool beside the *params* property.

ReportViewer Params Property Builder

Build and maintain parameters used in the ReportViewer component.

Dialog box options

Parameter

Lists all the parameters used with the ReportViewer. Click on a parameter name to display the parameter value's data type and value in the Parameter Value box.

Value

Displays the value of the parameter entered in the Parameter Name box.

New/Modify

Click these buttons to display the Define ReportViewer Params dialog box to add a new parameter or modify an existing one.

How to get there: In the Inspector, select the ReportViewer component. Then click the wrench tool beside the *params* property.

Define ReportViewer Params dialog box

Add a new parameter (name-value pair) to the ReportViewer component's array or edit an existing one.

Dialog box options

Name

Enter a name for the new parameter.

Value

Enter a value for the new parameter.

How to get there: In the Inspector, select the ReportViewer component. Then click thewrench tool beside the *params* property. In the ReportViewer Params Property Builder, click New or Modify.

Stored Procedure Parameter Property Builder dialog box

Build and maintain the parameters used in stored procedures.

The Parameter Name box lists all the parameters used with a specific stored procedure object. Click on a parameter name to display the parameter's type (in the Parameter Type field) and the parameter value's data type and value (in the Parameter Value field).

Dialog box options

Parameter name

Lists all the parameters used with a specific stored procedure object. Click on a parameter name to display the parameter value's data type and value in the Parameter Value box.

Data type

Displays the type of the parameter entered in the Parameter Name box. The parameter can be one of four types:

- Input
- Output
- Input/Output
- Result

Value

Displays the value of the parameter entered in the Parameter Name box.

How to get there: In the Inspector, select the StoredProc object. Then, click the wrench tool beside the *params* property.

Build Array dialog box

Add elements to the array that is used by the selected Select object. You can add two types of elements to the array: Strings and Expressions. Type strings and expressions in the text boxes at the left. Then click the Add> buttons to move them into the Array Elements panel

Dialog box options

String

Type a string in the String box and press the Add button; the new string will move to the box labeled Array Elements. The string box checks to make sure that the entered characters fit the definition of a string (almost any characters including spaces).

Expression

Enter a *Visual* dBASE expressionsThe Expression box checks that the characters entered fit the definition of a valid expression.

Array elements

Your strings and expressions are listed here as you add them by clicking the Add> button. Each string or expression is an element in the array.

How to get there: In the Inspector, click the wrench tool beside the *options* property tool (in the Data Linkage category) to open the Options Property Builder. Set the Type to Array, and click the Data Source tool.

Build Codeblock dialog box

Specify what happens when an event occurs by linking a codeblock.

A codeblock is a logical grouping of one or more *Visual* dBASE statements, or a *Visual* dBASE expression. Like a function pointer, it is a means of executing statements, and is particularly useful when used with an object's event property.

A codeblock is an alternative to a function pointer, but there are differences. For example, unlike the function pointer, codeblocks are literal statements that you assign to the event property. A codeblock is a data type that *contains Visual* dBASE code. And like other data types, you can assign a codeblock to a memory variable or pass it as a parameter.

Dialog box options

Parameters

Enter parameters.

Type

The codeblock can be one of two types. Choose either:

- **Command**. Can contain one or more *Visual* dBASE statements
- **Expression.** Can contain only *Visual* dBASE expressions

Commands or Expression

Type the code statements or expression here.

How to get there: In the Inspector, click the Type button beside an event. Choose Codeblock. Then click the wrench tool.

Statement Codeblock Syntax

The syntax for a statement codeblock is:

{[|<parameters>|];<statement>[;<statement>...]}

Comments:

- Opening and closing curly braces ({ }) are required.
- If you pass parameters, delimit them with vertical bars (| |).
- Place a semicolon (;) in front of each statement.

For example, to execute the QUIT command when a user clicks a pushbutton, type this codeblock in the text box next to the pushbutton's OnClick event:

{;QUIT}

Expression Codeblock Syntax

The syntax for an expression codeblock is:

{[|<parameters>|]<expression>}

Comments:

- Opening and closing curly braces ({ }) are required.
- If you pass parameters, delimit them with vertical bars (| |).

For example, to specify the following VALID condition for an entry field, type this codeblock in the text box next to the entry field's Valid event:

{||Salary<= 10000}

Add Table dialog box

Add tables to the SQL designer. Each added table appears in the Table View pane at the top of the SQL designer. You can then create relations between the fields of different tables by clicking and dragging between them, and build SQL join and other statements using the controls at the bottom of the dialog box.

The Parameter Name box lists all the parameters used with a specific stored procedure object. Click on a parameter name to display the parameter's type (in the Parameter Type field) and the parameter value's data type and value (in the Parameter Value field).

Dialog box options

Look in

The Look In drop-down box lists the last several directories you've had open. You can select one of these, or choose the Folder button to browse to the directory that contains the tables or queries you want to join with SQL statements. Click the folder button to add other directories to the selection list.

Tables

Displays the tables in the directory currently selected in the Look In box. Choose a table to be added to the SQL designer.

How to get there: In the SQL designer, choose SQL|Add Table.

Breakpoints dialog box

Related topics

View, add, or delete breakpoints to all open source code modules in the debugger. A breakpoint stops program execution so you can evaluate variables, fields, arrays, objects, and expressions, change the values of variables, arrays, and objects, and investigate subroutines. Breakpoints give you a convenient alternative to stepping through the entire program.

- To go to a particular breakpoint, select the breakpoint in the List pane and click the Go To button. The text in the Source window scrolls to the selected breakpoint.
- To delete a breakpoint, select a breakpoint and click the Delete button.
- To clear all breakpoints from the current file, click Delete All.
- To set a breakpoint, place the pointer to the left of a line of code in the Source window. When the pointer changes to a Stop sign, double-click. The line is highlighted in red. To remove the breakpoint, double-click the red line.

Dialog box options

List pane

List all breakpoints currently set in the program file open and in focus in the debugger:

- **Line**. The line number at which the breakpoint has been set
- **File**. The file name of the code module or subroutine in which the breakpoint occurs.
- **Condition**. An expression setting a condition that must be satisfied for this breakpoint to be activated.

Save on Exit

If checked, the breakpoint settings for this file will be saved when you exit the debugger.

Condition

Click to display the Breakpoint Condition dialog box where you enter a conditional expression controlling when breakpoints will be active for the currently selected line or for the entire program.

How to get there: In the debugger, choose Debug|Breakpoints.

Breakpoint Condition dialog box

Related topics

For the line selected in the preceding Breakpoints dialog box, set conditions that must be satisfied for the breakpoint to be effective while debugging. If the condition is not met, the breakpoint ill be ignored.

- To set a condition for activating all breakpoints in the current program, click the Global radio button.
- To replace the current condition of the selected line, click Replace.
- To add a new conditional expression to the selected line, click New. Will not replace an existing conditional expression.
- The conditional expression could be the value of a variable, a global condition, or any conditional expression that defines a condition in which the current breakpoints should be active.

Dialog box options

Condition

Type an expression for the line currently selected in the Breakpoints dialog box.

Line

The conditional expression will apply only to the line currently selected in the Breakpoints dialog box.

Global

The conditional expression will apply to the entire program. You might use this if you want to activate all breakpoints when a global variable reaches a certain value.

How to get there: In the debugger, choose Debugger|Breakpoints. In the Breakpoints dialog box, click the Conditions button.

Set Component Order dialog box

Related topics

Set the z-order (and thereby the tabbing order) of the components on the form design surface.

By default, the z-order is the same as the order in which you added components to the form. However, the order you want is usually different.

Dialog Box Options

Components In Order

Specify the z-order of components on the form. The higher an item appears in the list, the lower it is in the z-order. Select a component and use the buttons to change its order. Or, drag an item to a new position in the list.

List By Name

Choose to view components in the list by their *Visual* dBASE name.

List By Value

Choose to display components in the list by their current values on the form.

By Row

Choose to set the z-order of the form by row, starting from the top left of the form.

By Column

Choose to set the z-order of the form by column, starting from the top left of the form.

Up

Choose to move a component higher in the list, and thereby lower in the z-order.

Down

Choose to move a component lower in the list, and thereby higher in the z-order.

How to get there: From the Form designer, choose Layout|Set Component Order.

Open dialog box

Locate and choose a file.

Note: If you want to open an SQL database, you must first set up a BDE alias to that database. Run the BDE Administrator to set up a BDE alias.

Save dialog box

Save your file in the current directory (or click the browse icon to navigate to another directory).

Edit Text dialog box

Enter the string you want to appear on the label, then press Enter.

Print dialog box

Displays and lets you change settings for the current print job. To accept the settings and continue with the print job, press OK. To abort the print job, choose Cancel. For help on individual components and features in the Print dialog, click your right mouse button on a component, then click the "What's This" pop-up item.

Error dialog box

The error dialog appears when *Visual* dBASE encounters a problem in your code.

To go to the location of the problem so you can attempt to correct it, click **Fix**.

To stop code execution and return to your editor or *Visual* dBASE Navigator, click **Cancel**.

To ignore the problem and continue with code execution, click **Ignore**.

To open the Debugger to find the problem, click **Debug**.

Define Image dialog box

This dialog box lets you merge and control the placement of images and text.

You can choose an image (to browse for one, use the tool button), add text to the image, change the size and border of the image and position the image in relation to the text using the alignment and spacing controls.

To view the effects of your changes, position the dialog box and your form so you can see the text control you're modifying, then click the Apply button as you try each modification. When you're satisfied with the results, click OK.

How to get there: In the Form designer, choose Layout|Set Component Order.

Constraints Property Builder

Displays the names and values of any data entry constraints defined in the current table. To delete or modify a previously defined constraints, select it and press the appropriate button. To define a new constraint, click New.

How to get there: Choose the table root level in the Inspector, then click the tool button in the constraints property.

Define Constraints dialog box

Lets you define or redefine a data entry constraint for a table.

Name is a read-only identifier, and is automatically generated when you create a new constraint.

Value is a dBASE expression that evaluates to true or false, providing record-level constraints on data entry. For example, you could enter a simple constraint

```
sold<=bought
```

or create a more complex constraint that uses other features of the new DBF7 format:

```
isblank( :last name:) or upper( :last name:) == :last name:
```

How to get there: Click New or Modify in the Constraints Property Builder.

Text editing shortcuts

Related topics

- Visual dBASE Classic keyboard mappings
- Visual dBASE Brief keyboard mappings

Visual dBASE Classic keyboard mappings

Related topics

Visual dBASE Classic keyboard shortcuts: Source editor

Key or combination	Action
F1	Opens Visual dBASE Help and displays topic (or topics found) for selected word or phrase. If no help is available, the Help index dialog is displayed.
Ctrl+C or Ctrl+Shift+C	Copies selected string to clipboard.
Ctrl+F or Ctrl+Shift+F	Opens Find dialog.
Ctrl+G or Ctrl+Shift+G	Opens GoTo Line dialog.
Ctrl+K or Ctrl+Shift+K	Repeats the last text search, as specified in Find dialog.
Ctrl+O or Ctrl+Shift+O	Opens the Open File dialog.
Ctrl+P or Ctrl+Shift+P	Opens the Print dialog.
Ctrl+R or Ctrl+Shift+R	Opens the Replace Text dialog.
Ctrl+T or Ctrl+Shift+T	Deletes the word or remainder of the word to the right of the cursor.
Ctrl+V or Ctrl+Shift+V	Pastes most recently cut or copied text at cursor position.
Ctrl+X or Ctrl+Shift+X	Cuts selected text.
Ctrl+Y or Ctrl+Shift+Y	Deletes current line.
Ctrl+Z Ctrl+Shift+Z	Reverses the last edit. You can also reverse earlier edits up to the limit of the Undo buffer (buffer holds 32K of text, but you can change the buffer size in the Source Editor Properties dialog).
Ctrl+Backspace	Deletes word or remainder of the word to the left of the cursor.
Ctrl+LeftArrow	Moves cursor to the beginning of the current word or the end of the previous word. If you have a selection, extends the selection one character left.
Ctrl+RightArrow	Moves cursor to the beginning of the next word.
Ctrl+PageDown	Moves cursor to the end of the file.
Ctrl+PageUp	Moves cursor to the beginning of the file.
Ctrl+F4	Closes the editor. Allows save or cancel if you have any unsaved work.
Alt+F4	Quits Visual dBASE. Allows save or cancel if you have any unsaved work.
BackSpace	Deletes character to the right of the cursor.
Left Arrow	Moves cursor left one character.
Right Arrow	Moves cursor right one character.
Up Arrow	Moves cursor up one line.
Down Arrow	Moves cursor down one line.
Page Up	Moves cursor down one page. A page is defined as the number of lines visible in the window.
Page Down	Moves cursor up one page. A page is defined as the number of lines visible in the window.
End	Moves cursor to the end of the current line.
Home	Moves cursor to the start of the current line.
Enter or Shift+Enter	Inserts a carriage return (ASCII code 13)
Insert	Toggles insert mode on or off.
Delete or Shift+Delete	Deletes selected text or character to the right of the cursor.
Tab	Inserts a tab (ASCII code 9)
Space or Shift+Space	Inserts a space (ASCII code 32)
Shift+Tab	Moves the cursor left by the number of characters defined as a Tab (default 3 characters; tab length can be changed in Source Editor Properties dialog).
Shift+Backspace	Deletes character to the left of the cursor. If you have a selection, deletes

	the selected text.
Shift+LeftArrow	Selects or extends selection left one character.
Shift+RightArrow	Selects or extends selection right one character.
Shift+UpArrow	Selects or extends selection up one line to the same character position in the destination line.
Shift+DownArrow	Selects or extends selection down one line to the same character position in the destination line.
Shift+PageUp	Selects or extends selection down one page to the same character position in the destination line. A page is defined as the number of lines visible in the window.
Shift+PageDown	Selects or extends selection down one page to the same character position in the destination line. A page is defined as the number of lines visible in the window.
Shift+End	Selects or extends selection to the end of the current line (not including paragraph return).
Shift+Home	Selects or extends selection to the beginning of the current line
Ctrl+Shift+LeftArrow	Selects remainder of word to the left of the cursor position. If cursor is at the beginning of a word, selects the beginning of the previous word, including any separating spaces.
Ctrl+Shift+RightArrow	Selects remainder of word to the right of the cursor position, including any trailing spaces.
Ctrl+Shift+Home	Selects all text from the cursor position to the beginning of the file.
Ctrl+Shift+End	Selects all text from the cursor position to the end of the file.
Ctrl+Shift+PageUp	Selects all text from the cursor position to the beginning of the file.
Ctrl+Shift+PageDown	Selects all text from the cursor position to the end of the file.
Ctrl+W or Ctrl+Shift+W	Saves the file and closes the editor (if the file is new, opens Save dialog).
Ctrl+F7	Begins and ends recording of keystrokes.
Ctrl+F8	Inserts the string stored in the most recent keystroke recording.

Brief keyboard mappings

Related topics

Brief keyboard mappings: Source editor

Key or combination	Action
F1	Opens Visual dBASE Help and displays topic (or topics found) for selected word or phrase. If no help is available, the Help index dialog is displayed.
F5	Opens the Find Text dialog.
F6	Opens the Replace Text dialog.
F7	Begins and ends recording of keystrokes.
F8	Inserts the string stored in the most recent keystroke recording.
Shift+F5	Repeats the last text search, as specified in Find dialog.
Ctrl+C or Ctrl+Shift+C	Copies selected string to clipboard.
Ctrl+K or Ctrl+Shift+K	Deletes text from cursor position to beginning of line.
Ctrl+O or Ctrl+Shift+O	Opens the Open File dialog.
Ctrl+P or Ctrl+Shift+P	Opens the Print dialog.
Ctrl+T or Ctrl+Shift+T	Scrolls the current line to the top of the window.
Ctrl+U or Ctrl+Shift+U	Redo
Ctrl+V or Ctrl+Shift+V	ClipPaste; HideBlock
Ctrl+W or Ctrl+Shift+W	CloseWithSave
Ctrl+X or Ctrl+Shift+X	CutBlock
Ctrl+Z or Ctrl+Shift+Z	Restores last cut or deleted text. You can also restore earlier cut or deleted text up to the limit of the Undo buffer (32K default can be modified in the Source Editor Properties dialog).
Ctrl+F4	Closes the editor. Allows save or cancel if you have any unsaved work.
Ctrl+Backspace	Deletes the previous word.
Ctrl+Enter	Inserts a blank line below the current line.
Ctrl+LeftArrow	Moves the cursor or selection to the beginning of the previous word.
Ctrl+RightArrow	Moves the cursor or selection to the first character of the next word.
Ctrl+PageDown	Moves the cursor to the end of the file.
Ctrl+PgUp	Moves the cursor to the top of the file.
Ctrl+Home	Moves the cursor to the top of the editing window.
Ctrl+End	Moves the cursor to the bottom of the editing window.
Alt+A or Alt+Shift+A	Cancels current selection.
Alt+C or Alt+Shift+C	Toggles column selection mode.
Ctrl+Z Ctrl+Shift+Z or Alt+U or Alt+Shift+U or * (star) on numeric keypad	Reverses the last edit. You can also reverse earlier edits up to the limit of the Undo buffer (buffer holds 32K of text, but you can change the buffer size in the Source Editor Properties dialog).
Alt+D or Alt+Shift+D	Deletes the current line.
Ctrl+G or Ctrl+Shift+G Alt+G or Alt+Shift+G	Opens the GoTo Line dialog.
Alt+I or Alt+Shift+I	Toggles insert mode on or off.
Alt+J+*n* or Alt+Shift+J+*n*	Jumps to marked position *n* as defined with Alt+*n* and fixes the line containing the mark at the top of the editing window.
Alt+K or Alt+Shift+K	Deletes text from the cursor position to the end of the current line.
Alt+L or Alt+Shift+L	Mark line. Line selection remains in effect until you define another mark.
Alt+M Alt+Shift+M	Mark selection point. You can extend the selection in any direction from this point using navigation keys, or select another mark point using the mouse.
Alt+S Alt+Shift+S	Opens the Find Text dialog.

Alt+X Alt+Shift+X	Closes the current page. Allows saving of unsaved data.
Alt+*n*	Lets you set up to 10 bookmarks (*n* = 0 to 9) for each open file. You can then jump to these marks using Alt+J+*n*. New marks automatically override old ones. Marks are not retained between editing sessions.
Alt+Backspace	Deletes the word or partial word to the right of the cursor.
Alt+F4	Closes Visual dBASE. Allows saving of unsaved data.
Delete	Deletes selection or character to the right of the cursor.
Page Up	Moves cursor down one page. A page is defined as the number of lines visible in the window.
Page Down	Moves cursor up one page. A page is defined as the number of lines visible in the window.
Left Arrow	Moves cursor left one character.
Right Arrow	Moves cursor right one character.
Up Arrow	Moves cursor up one line.
Down Arrow	Moves cursor down one line.
End	Moves cursor to the end of the current line.
Home	Moves cursor to the start of the current line.
Backspace	Deletes character to the right of the cursor.
Tab	Inserts a tab (ASCII code 9)
Enter or Shift+Enter	Inserts a carriage return (ASCII code 13)
Insert	Pastes a block.
Plus	Copies a marked block.
Minus or Shift+Minus	Cuts a marked block.
Shift+Backspace	Moves the cursor left by the number of characters defined as a Tab (default 3 characters; tab length can be changed in Source Editor Properties dialog).
Shift+End	Moves the cursor to the rightmost window position on the current line.
Shift+Home	Moves the cursor to the leftmost window position on the current line.
Shift+Tab	Moves the cursor left by the number of characters defined as a Tab (default 3 characters; tab length can be changed in Source Editor Properties dialog).

The term or object reference you want is not associated with a Help topic. The information you want may be described elsewhere in Help, however. To look for it, type the word, phrase or object name into the Help Index search dialog or use the full text search (Find) feature from the Contents dialog.

The topic you want is already displayed. To find a different term or object name, use the Help Index search dialog or Help's full text search feature (Find) from the Contents dialog.

The term or object reference you want is not associated with a Help topic. The information you want may be described elsewhere in Help, however. To look for it, type the word, phrase or object name into the Help Index search dialog or use the full text search (Find) feature from the Contents dialog.

Click here to open the Visual dBASE Help Topics dialog box (Contents/Index/Find).

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- editUndoMenu
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- GETFONT()
- INKEY()
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- onInitiate
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- A simple report example
- How a report is rendered
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- agMax()
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- agVariance()
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- marginBottom
- marginHorizontal
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- marginVertical
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- **Text streaming**

- Text streaming overview
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- PRINTJOB...ENDPRINTJOB

- PRINTSTATUS()
- PROW()
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- SET CONSOLE
- SET MARGIN;MARGIN:SET
- SET PCOL
- SET PRINTER
- SET PROW
- SET SPACE;SPACE:SET
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- _indent
- _lmargin
- _padvance
- _pageno
- _pbpage
- _pcolno
- _pcopies
- _pdriver
- _peject
- _pepage
- _pform
- _plength
- _plineno
- _ploffset
- _porientation
- _ppitch
- _pquality
- _pspacing
- _rmargin
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- _wrap

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- class OleAutoClient
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- onExecute
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- PLAY SOUND
- poke()

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- **IDE elements**

- IDE overview
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- CLOSE ALL
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- Everything else (except Preprocessor) overview
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- LOGOUT
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- NETWORK()
- OEM()
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- PROGRAM()
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- RESUME
- RETRY
- SET ENCRYPTION
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- SQLERROR()
- SQLEXEC()
- SQLMESSAGE()
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- **Preprocessor**

- Preprocessor overview
- #define
- #else
- #endif
- #if
- #ifdef
- #ifndef
- #include
- #undef
- __vdb__
- Converting between OEM and ANSI Text

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- CT_CUSTOM_TAGS

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- DB_DEPLOYAPP

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- DB_SAVETABLE

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- EB_VARIABLE_TYPELIST

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- PROP_NOPROPS

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- EB_FUNCTION_TYPELIST

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- EB_VARIABLE_USERLIST

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- COMPONENT_LISTVIEW

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- COMPONENT_JTEXTFIELD

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- DB_OPENTABLE

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- DB_SELECTSOUND

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- DB_URL_EDITOR

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- EB_CONSTANT_CHAR

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- EB_CONSTANT_DATE

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- COMPONENT_OCX

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- COMPONENT_VBX

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- DB_OPENFILE

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- DB_DIR

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- DB_EXP

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- DB_SET

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- DB_EXPERT_HOME_PAGE_FINISH

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- DB_WINDOW

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- DB_DEFLINK

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- EB_GROUP

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- DB_OLEVIEWER

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- DB_TBLPROPS

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- DB_TEXT_PROPERTY_BUILDER

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- COMPONENT_RICHEDIT

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- EB_CONSTANT_LOGICAL

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- EB_CONSTANT_ALL

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- FUNC_NOFUNC

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- DB_PRINTTO

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- EB_EVALUATE

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- COMPONENT_ANCHOR

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- EB_CAT_FIELD

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- DB_TRANSACTION

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- EB_EXPRWINDOW

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- COMPONENT_JCHECKBOX

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- DB_TEMPLATETOOL

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- COMPONENT_JBUTTON

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- DB_COMPILESTAT

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- DB_PARAMETERS_PROPERTY_BUILDER

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- EB_CONSTANT_NUMERIC

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- LG_ES_OPS_LOGICAL

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- COMPONENT_JAVAAPPLET

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- COMPONENT_PASSWORD

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- COMPONENT_JTEXTAREA

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- EB_CAT_OPERATOR

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- DB_COMPPROG

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- COMPONENT_ANIMATE

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- COMPONENT_HIDDEN

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- EB_CAT_FUNCTION

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- LG_ES_OPS_NUMERIC

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- DB_COMMITCHANGE

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- COMPONENT_RESET

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- COMPONENT_JLISTBOX

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- DB_EXPERT_HOME_PAGE_SCHEME

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- DB_CHOOSEIMAGE

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- DB_COPYFILE

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- DB_GENRECS

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- COMPONENT_JIMAGE

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- COMPONENT_JLABEL

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- DB_EMPTYBINARY

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- COMPONENT_JPANEL

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- COMPONENT_JRADIO

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- LG_ES_OPS_RELATIONAL

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- COMPONENT_STREAMSOURCE

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- COMPONENT_POINTER

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- EB_FIELD_PASTELIST

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- DB_SELECTDATABASE

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- LG_ES_OPS_CHARACTER

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- DB_CHOOSECUSTOM

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- DB_IMPORT

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- DB_APPENDALIAS

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- DB_MANAGE_CUSTOM_TAGS

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- DB_LINK_TAG_BUILDER

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- DB_EXPERT_HOME_PAGE_LINKS

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- DB_ADDRECS

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- DB_EXPERT_HOME_PAGE_START

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- COMPONENT_MEMOENTRY

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- DB_PROGRAMEDITOR

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- CT_DEF_CUSTOM_TAGS

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- LG_ES_OPS_ALL

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- DB_RECORDS

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- DB_SAVEFILE

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- EB_UNDO

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- WIN_FV

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- DB_OPENDATABASE

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- FE_BUTTONS

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- DB_CALCRESULTS

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- EB_FIELD_TABLELIST

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- EB_CAT_VARIABLE

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- EB_CAT_CONSTANT

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- PROP_NOPROP

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- OI_COMBOBOX

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- DB_GOREC

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- DB_EXPERT_HOME_PAGE_ORG

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- COMPONENT_JCOMBOBOX

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- EB_SAFETYNET

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- DB_PSETUP

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- DB_GOFIELD

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- DB_TBLFROMDB