Viewing Advanced Information

The Discover window contains seven tabs of summary information. You can also view advanced information for the *active* tab (the tab at the front) as described in these help topics:

- Viewing Advanced System Information
- Viewing Advanced Memory Information
- Viewing Advanced Software Information
- Viewing Advanced Drives Information
- Viewing Advanced I/O Devices Information
- Viewing Advanced Benchmarks Information

Common Elements in Discover's Advanced Windows
All the Advanced windows have these elements in common:

- **Icon Panel**-Click any of the icons in the panel at the left to view that type of information in the panel at the right.
- **Detail Information Panel**-The detail information shown in the panel at the right is for the category indicated by the currently selected icon. The detail information is mostly self-explanatory with scrolling lists and buttons you can click to obtain additional information or perform related tasks, such as running or stopping benchmark tests.

Tip In several of the detail information panels, you'll see legends with small color boxes showing the kind of information that is graphically represented in that color. If you click a color box, the Color Change dialog box appears where you can select a different color to use for that legend item.

To work with advanced information:

1. Click a tab to bring it to the front.
2. Click the Advanced button.

Related Topics

Redisplaying Summary Information

Using Discover

Discover is a unique utility that lets you view a wealth of system information, as well as perform benchmark tests. Discover is your complete system analysis tool. It can help you understand PC hardware and software configurations, and is designed to help you use, analyze, and configure your PC. It provides all the information you need to make optimum use of all available memory.

Unlike other system information tools, Discover doesn't simply display information that it obtained from Windows. Discover actually tests and measures the hardware and software in your system.

Note You should have general knowledge of DOS and Windows memory architectures and terminology. See Understanding Windows Memory.

These topics describe how to use Discover:

- Starting Discover
- Manipulating the Discover Window
- Getting Pop-up Help

Printing Information

Editing a Text File

Viewing Advanced Information

Exiting Discover

Starting Discover

You can start Discover at any time.

To start Discover in Windows 95:

1. Click the Start button on the taskbar, point to Programs, 2000 Toolbox, and then choose Discover.
   The Discover window appears.

Manipulating the Discover Window

The Discover window provides several tabs of information that you can view. You can manipulate these tabs as explained in this help topic:

 Bringing a Tab to the Front

Bringing a Tab to the Front

When you start Discover, the System tab is initially at the front in the Discover window.

Click a different tab to bring it to the front (making it the active tab) and view the information it contains. While a tab is active, you can click the Advanced button to view more detailed information about the active tab.

Note The other buttons in the Discover window, such as the Print and Exit buttons, let you perform general tasks. That is, they are not dependent upon which tab is active.

Printing Information

Discover lets you select exactly the screens of information you want to print. It also lets you print to a printer or to a file.

To print Discover information:

1. Click the Print button.

   The Print dialog box appears.

2. Do one of the following to add screen names to the Output list for printing:

 Select the screens containing information you want to print (click each screen name once) and click the Add >> button.

 Click the Select All >> button to print all the screens of information in Discover.

 Click the T.S. Info >> button to print technical support information.

You can also select screen names in the Output list and remove them by doing one of the following:

 Select the screens containing information you no longer want to print (click each screen name once) and click the<< Remove button.

 Click the << Deselect All button to move all the screen names from the Output list back to the Don't Output list.

Editing a Text File

Discover may provide information that indicates you should edit one of the text files (such as an .INI file) to improve the performance of your computer system.

For example, you might notice, when examining the I/O Devices, that one of the ports (such as COM1 or COM4) is not set to the capabilities of the peripheral device physically connected to it. Let's say you're using a 14.4/28.8 mbps fax/modem, and the COM port it uses is set to 9600 bps. If you want to change this setting in the WIN.INI file, you can easily edit the .INI text file in Discover.

To edit a text file in Discover:

1. Click the Edit button.

   The File Name dialog box appears.

2. Select the filename to edit in the File list at the left and click OK.

   You can also type the pathname to the file in the Filename text box, or select a different drive or directory (called a folder in Windows 95) to find the filename to edit.

   After you click OK, Discover opens the text file you specified in a Notepad window where you can view or edit its contents.

Tip Be sure you save files as text-only documents.

Viewing Advanced System Information

To view Advanced System information:

1. Verify that the System Tab is at the front.
2. Click the Advanced button.

   Discover displays the Advanced System window with the CPU Info panel at the front.
3. Click any of the System icons in the scrolling box at the left to examine that category of System information.

   You can print information by clicking the Print button. For information about printing, see Printing Information.

   You can return to the Discover window by clicking the Summary button.

Related Topics

Working With CPU Information
Working With Video Information
Working With Hard Drive Information
Working With PCI Bus Information
Working With DMA/IRQ Information
Working With BIOS/CMOS Information
Working With Plug and Play Information

Working With CPU Information

When you open the Advanced System window, the CPU Info icon is initially selected, and the CPU Information panel appears.

To work with CPU information:

 Point at the bits (the ones or zeros) in the CR4 through CR0 lines to see the name of that bit in the Bit Name box.

A *bit* (a contraction of the term, Binary digIT) is the smallest unit of information (or data) that a computer can process. A bit can represent a one or zero, yes or no, or high or low, and it can have a value of one or zero.

 Drag the horizontal or vertical scrolling boxes in the CPU Features list box left and right, or up and down, respectively, to see which of the other features are offered by your computer's CPU.

 Drag the vertical scrolling box up and down to see the complete list of TSS information for your CPU, covering the port traps and owners of virtual device drivers. A port trap is used by the CPU for polling virtual devices.

Working With Video Information

Click the Video Info icon in the Discover Advanced System window and the Video Information panel appears.

To work with Video information:

 Drag the vertical scrolling box in the Display Device - Basic Capabilities list box up and down to see the features offered by your monitor (also called a display device), video tab, and system settings.

 Click the Additional Capabilities button and the Display Device - Basic Capabilities list above the button changes to show you the additional graphics capabilities of your computer's video. You can drag the horizontal or vertical scrolling boxes to view the entire list.

 Drag the vertical scrolling box in the "graphics standard" list up and down to see the features offered by your computer's video hardware and software. Video standards include: VESA (commonly called super VGA), standard VGA, and Laptop Display Panel.

Working With Hard Drive Information

Click the HD icon in the Discover Advanced System window and the Hard Drive Information panel appears.

To work with Hard Drive information:
Click the Drive icon that you want to see information about and then do any of the following:

 Drag the horizontal scrolling box in the Partitions list box left and right to see the features offered by the selected drive. A partition is a section created on a drive. You can divide a drive's storage space in up to four partitions.

 Drag the vertical scroll box in the "drive interface standard" list box up and down to see all the features offered by the selected drive.

The drive interface standard is IDE (which stands for Integrated Drive Electronics). IDE drives are very commonly used with PCs. Another drive interface standard is called SCSI (which is regrettably pronounced "scuzzy" and stands for Small Computer System Interface). SCSI drives permit chaining up to 7 devices and have increased in popularity with PCs.

Working With PCI Bus Information

Click the PCI Bus icon in the Discover Advanced System window and the PCI Bus panel appears.

To work with PCI Bus information:
Select a device in the Devices list that you want to see information about. Devices are boards inside your computer seated in a connector in the Bus.

Working With DMA/IRQ Information

DMA (Direct Memory Access) is a high-speed method for moving information from a storage device or LAN (local area network) interface card directly to RAM (physical memory).

IRQ (Interrupt ReQuests) are also called hardware interrupts. Devices use IRQs to request attention from the CPU and data bus.

Click the DMA/IRQ icon in the Discover Advanced System window and the DMA/IRQ panel appears.

To work with DMA/IRQ information:

 Click the Quick Detect button and Discover checks the DMA channels and interrupt requests on your computer system.

 Click the Refresh button to have Discover recheck the DMA/IRQ information.

 Drag the vertical scrolling boxes in the DMA Channels or Int ReQuests list boxes left and right to see the full list of information available.

Working With BIOS/CMOS Information

The BIOS (Basic Input/Output System) contains buffers for sending information from software programs to the hardware devices that should receive the data.

CMOS (Complementary Metal Oxide Semiconductor) is a method of building computer chips (also called integrated circuits or ICs) that require very little electricity.

Scroll down in the System list and click the BIOS/CMOS icon in the Discover Advanced System window. The BIOS/CMOS panel appears.

To work with BIOS/CMOS information:

 Drag the vertical scrolling box in the CMOS Data list box left and right to see the complete list of CMOS data available for your computer.

Working With Plug and Play Information

Scroll down in the System list and click the Plug and Play icon in the Discover Advanced System window. The Plug and Play panel appears.

To work with Plug and Play information:

 Click an entry in the Device Node List to view information for that Plug and Play device in the Device Data list.

 Drag the vertical or horizontal scrolling box in the Device Node List box up and down, or left and right, respectively to view the full list.

 Drag the vertical or horizontal scrolling boxes in the Device Data list box up and down, or left and right, respectively, to see all the information available about the selected Plug and Play device.

Working With the Memory Tab

Click the Memory Tab to bring it to the front of the Discover window.

To work with information about memory:

 Click the Program list's heading buttons (Program, RAM, or Resources) to sort the listed programs in that order.

 Click the Left mouse button to instantly view pop-up help offering memory information for the program you point to. You can also point to a program and wait a moment, and Discover will provide the same pop-up help information.

 Click one of the color boxes in the Legend to display the Color Change dialog box for that legend item.

Viewing Advanced Memory Information

Discover can show you exactly how memory is being used in your PC. For a complete discussion of memory, see Understanding Windows Memory.

To view Advanced Memory information:

1. Verify that the Memory tab is at the front.
2. Click the Advanced button.

   Discover displays the Advanced Memory window with the Program Memory panel active.
3. Click any of the Memory icons in the scrolling box at the left to examine that category of Memory information.

   You can print information by clicking the Print button. For information about printing, see Printing Information.

   You can return to the Discover window by clicking the Summary button.

Related Topics

Working With Program Memory Information
Working With Physical Memory Information
Working With Private Memory Information
Working With System Memory Information
Working With Shared Memory Information
Working With Global DOS Memory Information
Working With First Megabyte Memory Information

Working With Program Memory Information

Click the Program Memory icon in the Discover Advanced Memory window and the Program Memory panel appears.

To work with Program Memory information:

 Drag the vertical or horizontal scrolling boxes in the Program List box up and down, or left and right, respectively to view the full list of programs that are currently using memory.

 Click one of the color boxes in the Legend to display the Color Change dialog box for that legend item.

Working With Physical Memory Information

Physical memory, also called RAM (random access memory), is the primary memory in your computer. RAM is comprised of computer chips installed on SIMMs (single in-line memory modules) or DIMMs (dual in-line memory modules) inside your computer. RAM, a very fast but volatile storage area, is used by the CPU, Windows and applications for processing information.

Click the Physical Memory icon in the Discover Advanced Memory window and the Physical Memory panel appears.

To work with Physical Memory information:

 Select the Hex or Megs radio button to view the Overall RAM and Detail RAM bar charts using that measurement unit.

If you select Hex, the values that appear in the bar charts are hexadecimal numbers associated with locations in RAM (or physical memory).

If you select Megs, the values that appear in the bar charts are shown in megabytes of RAM (from zero through the total amount of RAM installed as SIMMs or DIMMs inside your computer).

 Drag the horizontal scrolling box below the Detail Memory Usage bar chart left and right to see how the RAM in your computer is being used at particular locations.

As you drag, the Zoom Perspective lines shift to show you the place in overall RAM that you are viewing detail information about.

 Click one of the color boxes in the Legend to display the Color Change dialog box for that legend item.

Working With Private Memory Information

Click the Private Memory icon in the Discover Advanced Memory window and the Private Memory panel appears.

To work with Private Memory information:

 Click a thread entry in the Threads list to view overall and detail private memory usage for the selected program's thread.

 Select the Hex or Megs radio button to view the Overall Private Memory Usage and Detail Private Memory Usage bar charts using that measurement unit.

If you select Hex, the values that appear in the bar charts are hexadecimal numbers associated with the selected program thread's private memory.

If you select Megs, the values that appear in the bar charts are shown in megabytes of private memory (from zero through the total amount of private memory assigned to the selected program).

 Drag the horizontal scrolling box below the Detail Private Memory Usage bar chart left and right to see how the private memory for the selected thread is being used at particular locations.

As you drag, the Zoom Perspective lines shift to show you the place in overall private memory for the selected thread that you are viewing detail information about.

 Click one of the color boxes in the Legend to display the Color Change dialog box for that legend item.

Working With System Memory Information

Click the System Memory icon in the Discover Advanced Memory window and the System Memory panel appears.

To work with System Memory information:

 Click a virtual device driver entry in the VxDs (Virtual Device Drivers) list to view overall and detail system memory usage for the selected virtual device driver.

 Select the Hex or Megs radio button to view the Overall System Memory Usage and Detail System Memory Usage bar charts using that measurement unit.

If you select Hex, the values that appear in the bar charts are hexadecimal numbers associated with the selected virtual device driver's private memory.

If you select Megs, the values that appear in the bar charts are shown in megabytes of system memory (from zero through the total amount of system memory assigned to the selected virtual device driver).

 Drag the horizontal scrolling box below the Detail System Memory Usage bar chart left and right to see how the system memory for the selected virtual device driver is being used at particular locations.

As you drag, the Zoom Perspective lines shift to show you the place in overall system memory for the selected virtual device driver that you are viewing detail information about.

 Click one of the color boxes in the Legend to display the Color Change dialog box for that legend item.

Working With Shared Memory Information

Click the Shared Memory icon in the Discover Advanced Memory window and the Shared Memory panel appears.

To work with Shared Memory information:

 Click a thread entry in the Threads list to view overall and detail private memory usage for the selected program's thread.

 Select the Hex or Megs radio button to view the Overall Shared Memory Usage and Detail Shared Memory Usage bar charts using that measurement unit.

If you select Hex, the values that appear in the bar charts are hexadecimal numbers associated with the selected program thread's shared memory.

If you select Megs, the values that appear in the bar charts are shown in megabytes of shared memory (from zero through the total amount of shared memory assigned to the selected program).

 Drag the horizontal scrolling box below the Detail Shared Memory Usage bar chart left and right to see how the shared memory for the selected thread is being used at particular locations.

As you drag, the Zoom Perspective lines shift to show you the place in overall shared memory for the selected thread that you are viewing detail information about.

 Click one of the color boxes in the Legend to display the Color Change dialog box for that legend item.

Working With Global DOS Memory Information

Scroll down in the Memory list and click the Global DOS icon in the Discover Advanced Memory window. The Global DOS Memory panel appears.

To work with Global DOS Memory information:

 Click a module entry in the Modules list to view overall and detail global DOS memory usage for the selected module.

 Select the Hex or Megs radio button to view the Overall Global DOS Memory Usage and Detail Global DOS Memory Usage bar charts using that measurement unit.

If you select Hex, the values that appear in the bar charts are hexadecimal numbers associated with the selected module's global DOS memory.

If you select Megs, the values that appear in the bar charts are shown in megabytes of global DOS memory (from zero through the total amount of memory assigned to the selected module).

 Drag the horizontal scrolling box below the Detail Global DOS Memory Usage bar chart left and right to see how the memory for the selected module is being used at particular locations.

As you drag, the Zoom Perspective lines shift to show you the place in overall global DOS memory for the selected module that you are viewing detail information about.

 Click one of the color boxes in the Legend to display the Color Change dialog box for that legend item.

Working With First Megabyte Memory Information

Scroll down in the Memory list and click the First Meg icon in the Discover Advanced Memory window. The First Megabyte Memory panel appears.

To work with First Megabyte Memory information:

 Click one of the color boxes in the Legend to display the Color Change dialog box for that legend item.

Viewing Advanced Software Information

To view Advanced Software information:

1. Verify that the Software Tab is at the front.
2. Click the Advanced button.

   Discover displays the Advanced Software window with the System Resources panel at the front.
3. Click any of the Software icons in the scrolling box at the left to examine that category of Software information.

   You can print information by clicking the Print button. For information about printing, see Printing Information.

   You can return to the Discover window by clicking the Summary button.

Related Topics

Working With System Resources Information
Working With Virtual Machines Information
Working With Application Resources Information
Working With Tasks Information
Working With Threads Information
Working With Virtual Device Drivers Information
Working With Windows Modules Information
Working With Interrupts Information
Working With DOS Information
Working With Descriptors Information

Working With System Resources Information

Click the System Resources icon in the Discover Advanced Software window and the System Resources panel appears.

To work with System Resources information:

 Drag the vertical scrolling box in the User Objects or GDI Objects lists up and down to see the complete list of object information.

 Click one of the color boxes in the Legend to display the Color Change dialog box for that legend item.

Working With Virtual Machines Information

Click the Windows VMs icon in the Discover Advanced Software window and the Windows Virtual Machine panel appears.

To work with Windows Virtual Machine information:

 Click a virtual machine entry in the Virtual Machines list to view Windows System virtual machine information for the entry you selected.

 Click anywhere inside the Preview window to zoom in. You can zoom in by clicking three times. When you click a fourth time, Discover zooms back out to the original size of the Preview window.

Working With Application Resources Information

Click the App Resources icon in the Discover Advanced Software window and the Application Resources panel appears.

To work with Application Resources information:

 Select the radio button for the kind of modules you want to view (All, Apps, DLLs or Fonts).

 Select a module entry in the Modules list whose resources you want to view.

 Drag the vertical scrolling box in the Modules list up and down to see the complete list of modules.

 Select a resource entry in the Resources list and Discover changes the string table to show information for the selected resource.

 Drag the horizontal scrolling box in the String Table left or right to examine all the information in this table.

 Click the Extract Resource to File button if you want to save the resource information for the selected module to a text file. The File Name dialog box appears. Enter a filename, select the location where you want to store the file, and click OK.

Working With Tasks Information

Click the Tasks icon in the Discover Advanced Software window and the Tasks panel appears.

To work with Tasks information:
Select a task entry in the Windows Task List to view information for the selected task.

Working With Threads Information

Click the Threads icon in the Discover Advanced Software window and the Threads panel appears.

To work with Threads information:

 Select a thread entry in the Thread List to view information for the selected thread.

 Drag the vertical scrolling box in the Thread List or Thread Data list up or down to examine all the information in these tables.

Working With Virtual Device Drivers Information

Scroll down in the Software list and click the Windows VxDs icon in the Discover Advanced Software window. The Windows Virtual Device Drivers panel appears.

To work with Virtual Device Drivers information:

 Drag the vertical scrolling box in the VXDs list up or down to examine all the information in the VXDs list.

Working With Windows Modules Information

Scroll down in the Software list and click the Windows Modules icon in the Discover Advanced Software window. The Windows Modules panel appears.

To work with Windows Modules information:

 Select a module entry in the Modules list whose stats, exports, and imports you want to view.

 Drag the vertical scrolling box in the Modules list up and down to see the complete list of modules.

Working With Interrupts Information

Scroll down in the Software list and click the Interrupts icon in the Discover Advanced Software window. The Interrupts panel appears.

To work with Interrupts information:

 Drag the vertical scrolling boxes in the DOS Ints, Ring 3 Ints, or Ring 0 Ints lists up and down to see the complete list of interrupt information in each list.

Working With DOS Information

Scroll down in the Software list and click the DOS Info icon the Discover Advanced Software window. The DOS Information panel appears.

Working With Descriptors Information

Scroll down in the Software list and click the Descriptors icon in the Discover Advanced Software window. The Descriptors panel appears.

To work with Descriptors information:

 Select the radio button for the kind of modules you want to view (All, Apps, DLLs or Fonts).

 Drag the vertical scrolling boxes in the Modules, LDT, or GDT lists up and down to see the complete list of information for each list.

Viewing Advanced Drives Information

To view Advanced Drives information:

1. Verify that the Drives Tab is at the front.
2. Click the Advanced button.

   Discover displays the Advanced Drives window with the C: Drive panel active.
3. Click any of the Drives icons in the scrolling box at the left to examine that category of Drives information.

   You can print information by clicking the Print button. For information about printing, see Printing Information.

   You can return to the Discover window by clicking the Summary button.

Related Topics

Working With Drive Information

Working With Drive Information

Click the <drive letter> icon and the corresponding Drive panel appears for the drive.

To work with Drive <letter> information:
Click one of the color boxes in the Legend to display the Color Change dialog box for that legend item.

Viewing Advanced I/O Devices Information

To view Advanced I/O Devices information:

1. Verify that the I/O Devices Tab is at the front.
2. Click the Advanced button.

   Discover displays the Advanced I/O Devices window with the Network panel active.
3. Click any of the I/O Devices icons in the scrolling box at the left to examine that category of I/O Devices information.

   You can print information by clicking the Print button. For information about printing, see Printing Information.

   You can return to the Discover window by clicking the Summary button.

Related Topics

Working With Network Information
Working With Sound Information
Working With Serial/Parallel Information
Working With Printer Information

Working With Network Information

Click the Network icon in the Discover Advanced I/O Devices window and the Network panel appears.

To work with Network information:

 Drag the vertical scrolling box in the Caps list up and down to see the complete list of information for the list.

 Click the Show Secondary Network button if your computer is connected to a second network and you want to view information about that network.

Working With Sound Information

Click the Sound icon in the Discover Advanced I/O Devices window and the Sound panel appears.

To work with Sound information:

 Select an entry in the Sound Devices list to view MCI information for that sound device.

 Drag the horizontal scrolling box in the System Sounds list left and right to see the complete information about the sounds available in your system.

 Select a sound in the System Sounds list and click the Test Sound button to play that sound.

Working With Serial/Parallel Information

Click the Serial/Parallel icon in the Discover Advanced I/O Devices window and the Serial/Parallel panel appears.

Working With Printer Information

Click the Printers icon in the Discover Advanced I/O Devices window and the Printers panel appears.

To work with Printer information:

 Select an entry in the Printers list to view Printer Device Capabilities and Escape Support information for that printer or fax.

 Drag the vertical scrolling box in the Printer Device Capabilities list up and down to see all the capabilities of the selected printer or fax.

 Drag the vertical scrolling box in the Escape Support list up and down to see all the escape features supported by the selected printer or fax.

Viewing Advanced Benchmarks Information

To view Advanced Benchmarks information:

1. Verify that the Benchmarks Tab is at the front.
2. Click the Advanced button.

   Discover displays the Advanced Benchmarks window with the CPU Benchmarks panel active.
3. Click any of the Benchmarks icons in the scrolling box at the left to examine that category of Benchmarks information.

   You can print information by clicking the Print button. For information about printing, see Printing Information.

   You can return to the Discover window by clicking the Summary button.

Related Topics

Working With CPU Benchmark Information
Working With Video Benchmark Information
Working With RAM Benchmark Information
Working With Hard Drive Benchmark Information
Working With CD-ROM Benchmark Information

Working With CPU Benchmark Information

Click the CPU Benchmark icon in the Discover Advanced Benchmarks window and the CPU Benchmarks panel appears.

To work with CPU Benchmark information:

 Click the Stop button to stop running the CPU benchmark tests. The Stop button changes to the Run button.

 Click the Run button to begin running CPU benchmarks. The Run button changes to the Stop button.

 Click one of the color boxes in the Legend to display the Color Change dialog box for that legend item.

Working With Video Benchmark Information

Click the Video Benchmark icon in the Discover Advanced Benchmarks window and the Video Benchmarks panel appears.

To work with Video Benchmark information:

 Click the Stop button to stop running the Video benchmark tests. The Stop button changes to the Run button. If you simply wait for the tests to complete, Discover makes two passes and then stops the Video benchmarks tests.

 Click the Run button to begin running Video benchmarks. The Run button changes to the Stop button.

Working With RAM Benchmark Information

Click the RAM Benchmark icon in the Discover Advanced Benchmarks window and the RAM Benchmarks panel appears.

To work with RAM Benchmark information:

 Click the Stop button to stop running the RAM benchmark tests. The Stop button changes to the Run button.

 Click the Run button to begin running RAM benchmarks. The Run button changes to the Stop button.

 Click the Zoom In button to zoom in on the MB/Sec (megabytes per second) scale used in the graphs. The Zoom In button changes to the Zoom Out button.

 Click the Zoom Out button to zoom out on the MB/Sec (megabytes per second) scale used in the graphs. The Zoom Out button changes to the Zoom In button.

 Click the 16 Bit Graphs button to perform 16-bit sequential and random read/write RAM benchmark tests. The button changes to the 32 Bit Graphs button.

Working With Hard Drive Benchmark Information

Click the HD Benchmark icon in the Discover Advanced Benchmarks window and the Hard Drive Benchmarks panel appears.

To work with Hard Drive Benchmark information:

 Click the Stop Benchmark button to stop running the hard drive benchmark tests. The Stop Benchmark button changes to the Run Benchmark button.

 Click the Run Benchmark button to begin running hard drive benchmarks. The Run Benchmark button changes to the Stop Benchmark button.

Working With CD-ROM Benchmark Information

Click the CD-ROM Benchmark icon in the Discover Advanced Benchmarks window and the CD-ROM Benchmarks panel appears.

To work with CD-ROM Benchmark information:

 Click the Stop Benchmark button to stop running the CD-ROM benchmark tests. The Stop Benchmark button changes to the Run Benchmark button.

 Click the Run Benchmark button to begin running CD-ROM benchmarks. The Run Benchmark button changes to the Stop Benchmark button.

Getting Pop-up Help

You can get pop-up Help in Discover for programs listed in the Memory tab.

To get pop-up help:
Point at an item you want to see pop-up Help for and wait until the pop-up Help appears at the pointer location.

Redisplaying Summary Information

After you view advanced information for a tab in the Discover window, you can redisplay the summary information.

To redisplay summary information:

Click the Summary button while viewing any one of the Advanced windows.

Exiting Discover

You can exit Discover in any one of the following ways.

Tip If you are viewing an advanced window, you need to click the Summary button to return to the Discover window before you can exit the utility.

To exit Discover in Windows 95:

Do one of the following to exit Discover:


Click the Exit button in the Discover window.


Click the Close box in the Discover window's titlebar.


Choose the Close command from the Discover menu (or press **Alt-F4**).

Understanding Windows Memory

This topic explains, in its entirety, the advanced subject of how Windows handles memory.

This topic is offered to help you learn about the more crucial details of how Windows handles memory. You may decide to learn about memory to better understand the real-time memory usage gauges that WinGauge shows you so you can squeeze every last ounce of performance out of your system. Or you might simply want to stay informed, or impress your friends and co-workers with all you've learned about the inner workings of your computer.

The Three Main Types of Memory
Windows memory is divided into three main types:

 Physical memory

 Virtual memory

 Linear memory

Physical Memory
Physical memory, also called Random Access Memory (RAM), is the total amount (typically measured in megabytes, or MB) of all the RAM chips that are installed on small SIMM or DIMM boards connected to sockets in the main board inside your computer.

WinGauge offers a Physical Memory gauge available in your choice of display types.

A SIMM, or Single In-line Memory Module, contains a single row of RAM chips. A DIMM, or Dual In-line Memory Module, contains a double row of RAM chips. If you want to increase your computer's physical memory, you purchase RAM as either SIMMs or DIMMs, depending upon the available expansion slots inside your PC. For more information, see your PC manual, or main board manual.

Tip RAM chips on SIMMs or DIMMs are rated at a timing speed in nanoseconds (ns), such as 60 ns or 70 ns. Likewise, the computer is designed to handle RAM at one or more timing speeds. Installing faster RAM than your computer is designed to handle might not harm your computer (the RAM may work fine), but it cannot increase performance beyond the computer's fastest RAM timing speed.

The random access part of RAM's name comes from the fact that the next bit of information can be located--no matter where it is in the RAM--in an equal amount of time.

This means that access of information to and from RAM memory is extraordinarily fast. On the other hand, RAM is volatile, which means that if you turn off the computer or experience a power interruption, the information stored temporarily in RAM is lost unless it is protected with a functional battery.

Physical memory is a fast, temporary active working place for your computer, its software, and your information. When you are ready to save information (or when Windows or an application determines it is time to do so), information in RAM is copied to a more permanent form of storage (a 3.5-inch disk, a hard drive, a ZIP drive, a tape cartridge, and so on).

How Windows Uses Physical Memory

Physical memory is the primary memory in your computer, where the computer temporarily places a copy of information so you can actively work with it. So, when you start Windows, portions of the Windows software is copied into physical memory so it can display information on your screen and respond to your actions with input devices like the keyboard and mouse.

Windows takes control of a portion of your computer's physical memory, offering memory management schemes for allocating pieces of memory to Windows applications as you run them. Applications need to be copied into physical memory while you work with them, as do the portions of their documents (spreadsheets, graphic images, sounds, and so on) that you're actively working with.

For example, if you open a spreadsheet document, Windows copies the spreadsheet application into

RAM, and the application then copies the document into RAM. If you recalculate values in your spreadsheet, the application performs the calculations and temporarily places the results in RAM. If you save the results, the application copies this information from RAM to a disk or hard drive you specify.

Unlike memory, disks are a more permanent storage media because the information they contain is preserved when power is interrupted to the drive.

Virtual Memory

When a Windows application requests memory, Windows allocates what is called linear memory to that application. We'll discuss linear memory later in Linear Memory.

Depending upon how much physical memory is available, Windows 'fills' an application's linear memory with physical memory or virtual memory. Virtual memory is actually hard disk storage space that Windows reserves in the form of a swap file on your system's hard drive.

Tip Virtual memory usage is important, no matter which version of Windows you're using. When your computer runs low on both RAM and virtual memory, Windows will attempt to supply applications that request memory by finding application segments that are discardable and discarding them, and then reallocating the freed up memory. Windows discards segments arbitrarily, rather than based on least recently used segments, which is a situation best to avoid, as explained in Discardable Memory.

Windows can move virtual memory 4 K at a time, which is more efficient than how it reallocates entire discardable segments (which is 64 K at a time).

Virtual Memory in Windows 3.1x

Windows creates virtual memory when you first install Windows, or when you modify the settings in the Control Panel's Virtual Memory dialog box. The reason this hard disk space is called virtual memory is that Windows uses the disk space to store parts of physical memory (RAM) that are not in active use. This allows Windows to, at any given time, run and store more information and applications than can fit in all of your computer's physical memory.

The advantage of this approach--of letting Windows temporarily and automatically remove parts of memory to disk--is that your applications can rely on Windows to provide them with as much memory as they need. Letting Windows take care of memory management issues, including virtual memory, gives you the best possible performance on your PC. Also, it makes life easier for application developers who can avoid developing their own memory management schemes that rely on the hard disk in some other, more complex, way.

Windows also provides a secondary memory management scheme for configurations that don't rely on a disk-based swap file. This is discussed in the 'Discardable Memory' section later in this topic.

Virtual Memory in Windows 95

In Windows 95, the virtual memory swap file is dynamic. That is, depending upon what you're doing with your computer, the swap file will get larger or smaller. If you use Windows 95, you probably don't need to select virtual memory settings as was required in Windows 3.1x. Instead, you can let Windows 95's 'intelligent system defaults' configure the virtual memory for you. If you're technically advanced, you can still configure virtual memory yourself in Windows 95 if you prefer.

Linear Memory

Of the three types of memory, linear memory is the hardest to understand. Linear memory is artificial memory that is only vaguely related to the other two memory types (physical and virtual memory).

WinGauge offers a Linear Memory gauge available in your choice of display types.

Linear Memory in Windows 3.1x

When you start Windows, it determines the linear memory by multiplying the free physical memory (RAM) available to it by 4 (or by whatever value is defined in your SYSTEM.INI file's PageOverCommit setting, such as multiplying free memory by 5 if this setting is: PageOverCommit=5).

linear memory = free RAM x 4 (or PageOverCommit=#)

The free physical memory that Windows uses in this calculation is most likely less than the total of your RAM because of DOS-based applications that are using conventional and extended memory.

For the duration of this Windows session, this number (4 times free RAM), is the maximum amount of linear memory available to all applications running under Windows, even to DOS applications running under Windows (in a MS-DOS Prompt window).

Note If you exceed the linear memory amount calculated by Windows 3.1x, no matter how large the virtual memory swap files are, Windows behaves as though your computer has run out of memory. So the Linear Memory gauge in WinGauge is important if you're using Windows 3.1x. WinGauge can alert you when linear memory is running low with the Linear Memory gauge.

Each time an application asks Windows for memory, Windows gives it a portion of this linear memory range. When Windows allocates linear memory to an application, no physical memory is initially associated with the linear memory range. Windows does this to intelligently allocate physical memory to applications as they actually need to use it. So, when an application tries to use its linear memory range, Windows detects an 'error condition,' because the application is trying to use a memory region with no RAM associated with it.

If RAM is available when an application needs to use it, Windows fills the application's linear memory range with RAM. If no RAM is available, Windows searches through all the other ranges of linear memory allocated to other applications that do have RAM associated with them.

Windows takes the least recently used range of linear memory that has some RAM assigned to it, and writes the contents of the RAM to the virtual memory swap file (in case it is needed later) and then reassigns the RAM to the new range, marking the older, less used range as empty.

Should the older information that's been placed in the virtual memory swap file on disk be needed, Windows goes through this whole procedure again, reassigning ranges of linear memory to disk.

This process even applies to your DOS applications. Each time you open a DOS Prompt window inside Windows, a (roughly) 640 K chunk of linear memory is assigned to it. However, if you run a DOS application that only uses 250 K of the 640 K, Windows need only assign 250 K of RAM to the DOS Prompt window.

So, physical memory is RAM, and you can think of linear memory as room. Linear memory is the space within which the RAM is put to use by Windows applications. RAM. Room.

Seeing is Understanding

The DiscoverPro Linear Memory pie chart shows what ranges of linear memory have been assigned to which applications. The DiscoverPro Physical Memory pie chart shows how much, and which parts of, your RAM are in use.

Take a look at the linear memory assigned to a DOS Prompt window in DiscoverPro. To do this, double-click the MS-DOS Prompt icon in the Main group of the Program Manager. Then, start DiscoverPro. Check how much linear memory is taken by the DOS Prompt window's purple region of the pie chart. You'll see this is somewhat more than 640K. This is the linear memory, or room where the DOS application will run.

If you look at your physical memory, before and after you create the DOS Prompt window, you'll see that only around 250K of physical memory (RAM) has been used. So your DOS Prompt window's room is less than half full of RAM. Windows won't fill the rest of the linear memory for the DOS Prompt window with RAM unless you run a program that actually needs more than the 250K to run.

Linear Memory Recap

So linear memory is the space or (room) where applications can run, and physical memory is the usable building materials allocated to the space when and where it's needed.

Or consider another analogy. When you go on vacation, you might make hotel reservations. When you do this, the hotel reserves a room in your name, but it does not actually give you the keys to the room until you arrive at their front desk. If you don't actually show up, the hotel may eventually make the room reserved for you available to another patron who has arrived.

So a hotel reservationist is like Windows--both are in the business of allocating 'rooms.' When you make a hotel reservation, it's like a Windows application requesting RAM before it actually needs to use it. And when you sign in at a hotel's front desk, it's comparable to a Windows application trying to access its assigned range of linear memory.

When you sign in, the hotel selects a room, from those available, for you to stay in. When a Windows application tries to access its linear memory, Windows is alerted and attempts to provide physical memory to the application (that is, hand it the keys to RAM room) for the tasks at hand.

Linear Memory in Windows 95

Windows' linear memory model in Windows 95 consists of three regions rather than one. The original linear memory region found in Windows 3.1xx is now called the system region. Two additional linear memory ranges have been added:

 The private memory region where Windows 32-bit applications run

 The shared memory region where memory mapped files reside and where Windows 32-bit applications share information with each other and with Windows 16-bit applications

Don't be concerned that Windows 95 offers three ranges of linear memory rather than just one. Linear memory is still just room--there's simply more room in Windows 95, and there's no need for a PageOverCommit setting because Windows 95 can grow its linear memory address range dynamically, almost to the full 4 GB (gigabyte) capacity of the 386 processor's architecture. This means that Windows 95 should never run out of linear memory. So if you use Windows 95, you won't need to be concerned about linear memory usage.

It's still just room, which is only useful once Windows allocates physical memory (RAM) to a range of linear memory. If you run out of RAM, you still need to save something that is in RAM to disk (that is, you should save documents that you have made changes to since the last time you saved). Once you save these changes, Windows can use that RAM to fill some other room.

In Windows 95, 16-bit applications still operate exactly as they did in Windows 3.1x, discardable regions and all. For 32-bit applications, however, the discardable memory concept has been discarded. Windows 32-bit application files are accessed as memory mapped files and therefore do not need to be paged out to disk as often. Otherwise, they operate in much the same way as their 16-bit counterparts.

Memory Mapped Files

The Memory Mapped Files concept is simple and elegant. A memory mapped file is simply a file whose entire length has been assigned linear memory (room). When an application accesses any part of the linear memory assigned to the file, the corresponding part of the file is read into RAM, and the RAM is placed at the linear address that was accessed by the application.

If the RAM is needed, Windows can tell if the file region has been modified, and if not, it can simply throw away the contents of the RAM, knowing that the information is still stored on disk. If the file has been modified, the contents of the RAM are written to the file before the RAM can be reused.

For application files, this makes life simple. Windows merely assigns linear memory to the whole application and then starts executing it. As various parts of the application are needed, they are loaded into RAM. When a part of the application has not been used for a while, it can be discarded and reloaded as needed.

This, however, is not as straightforward for data files, where it is frequently more possible to design the application accessing the file so that it is more efficient than the memory mapped file mechanism, which relies on the caching mechanism of the operating system and the (relatively slow) faulting mechanism of the CPU (central processing unit).

What is Free Memory?

The Windows 3.1x Program Manager, and its various counterparts display a value they call free memory. To see this value, you can choose About Windows from the Help menu in the Program Manager.

Unfortunately, this free memory amount does not directly relate to any of the above we've discussed. Free memory is actually the approximate sum of the:

 Usable physical memory (we'll discuss what makes some physical memory unusable later in the 'Locked Memory' section)

 Unused part of the virtual memory swap file

 Discardable memory, which we'll discuss in a moment

Note Windows 95 does not display a free memory value, as Windows 3.1x does. Instead, Windows 95 shows the actual physical memory (RAM) in the About Windows 95 dialog box.

Some Windows applications require that the linear memory (or room) they allocate (or reserve) be associated with physical memory immediately. They may also require that the physical memory they are given never be swapped out to the virtual memory swap file.

This is usually for performance reasons, and sometimes because the contents of the memory must be instantly available to handle some external events.

For example, if you are connected via your modem to an on-line service such as to your Internet Service Provider (ISP) or to CompuServe or America Online, you wouldn't want the part of the application that actually handles the communications swapped out to disk. If this happened, it might take a long time for the disk to be read back into physical memory and some information might get lost in the interim.

Locked Memory

To prevent problems such as those described above, like time-sensitive information being accidentally lost or delayed, Windows allows applications to lock ranges of linear memory. This forces physical memory (RAM) to be associated with the linear memory range immediately, and prevents the linear memory range from being swapped to the virtual memory swap file (the room is locked so RAM can't get out), even if the physical memory is not used for some period of time.

When you exit an application that has locked a range of linear memory, or at any time that the application considers it appropriate, the application can unlock the linear memory.

Since the physical memory that is locked in this fashion cannot be swapped out to the virtual memory swap file, Windows does not consider it usable. Windows does included locked physical memory when calculating the current Free Memory on your computer.

We'll get back to free memory in a moment, but first, you need to understand discardable memory.

Discardable Memory

Both Windows 3.1x and Windows 95 applications are all divided into multiple small parts called segments. The size and contents of the various segments that make up a Windows application vary, and are dictated primarily by the programmers who developed that application.

In order to provide memory management for 286 systems, and in order to handle situations where there is not enough disk space for a large virtual memory swap file, Windows uses this secondary memory management scheme:

When Windows applications are developed, the programmers must indicate, as part of the development process, whether each of the segments that make up a Windows application, is discardable.

When Windows runs out of both physical memory, and available virtual memory in the swap file, Windows searches linear memory for segments of applications that are marked as discardable. The linear memory range occupied by these discardable segments is then simply freed and the contents of that linear memory segment are thrown away (discarded).

Windows does not consider whether a segment is the 'least recently used' (or LRU) when deciding what segment to discard. Furthermore, it discards an entire segment (which might be as much as 64 K), even though Windows may only need an additional 4 K of memory.

When the contents of a discardable segment are needed again, they are reloaded from the original .EXE or .DLL file that contains the entire application. Since Windows doesn't consider how likely a discardable segment will be needed again (by checking for a LRU segment), the odds increase that a discarded segment will be needed again soon.

No matter which version of Windows you use, you'll want to avoid this situation. That is, it's better if Windows does not need to obtain more physical or virtual memory by discarding segments and reallocating their memory.

For example, let's say that the part of an application (segment) that handles the About dialog box for an application is marked as discardable in the application file. When Windows runs out of other types of memory, it simply throws this segment away.

If you then try to access the About dialog box, Windows tries to recreate the segment by allocating some new linear memory, and reading the segment back into the linear memory from the application's file on disk.

Of course, reading the segment back in requires that physical memory, which can store the information, be associated with the linear memory range that has been allocated to hold the segment. If there isn't enough available physical memory, some other segment will need to be discarded first. And round and round we go...

So, the Program Manager's free memory value is, roughly speaking, the total of:

 The usable physical memory

 The available virtual memory swap file space

 The sum of all the discardable segments loaded in memory

It's actually even more complicated than this, but for the purposes of this Help topic, it's as much as we need to consider. This method of calculating free memory makes the resulting Windows 3.1x free memory value irrelevant for all practical purposes.

Your Windows system would become unusable long before you run your free memory down to a dangerously low level. (That being the point where there are not enough discardable segments around to allow Windows to load a needed segment). Your system will have been so slowed down by the loading and unloading of segments and the swapping and unswapping of virtual memory, that it would be spending all its processing time accessing the disk, and shuffling memory.

What's worse is that the free memory value might never hit zero because the system will lock up, unable to load a needed segment long before then. If you've ever seen the error message, Segment Load Failure, you've probably hit this barrier, and free memory was of no help.

Discardable Memory in Windows 3.1x

If you're using Windows 3.1x, the linear memory is more likely to run out, causing Windows to discard segments and reallocate memory. If it happens, you can increase the virtual memory swap file size and increase the PageOverCommit=# setting in the SYSTEM.INI file above it's current size, or if the setting doesn't appear, make it larger than the default of 4.

Tip It's a good idea to keep your Virtual Memory gauge at less than 50 percent full to ensure that Windows does not need to discard segments of applications that are marked as discardable.

Discardable Memory in Windows 95

If you're using Windows 95, the linear memory shouldn't run out, so you may never encounter this situation. If Windows 95 does begin discarding segments, you should free space on the Windows hard drive (the hard drive where the Windows folder is located, and where the virtual memory swap file is created).

WinGauge and Memory

The foregoing is why you won't see a free memory value in WinGauge. Instead, WinGauge shows you the key components of free memory so you can decide when to start saving or providing more memory by:

 Closing Windows applications

 Adding more physical memory (RAM)

 Increasing the size of your virtual memory swap file

The most important type of memory is, of course, your physical memory (RAM). As soon as you run out of free (completely unused) physical memory, Windows has to start manipulating your various other memories (linear, virtual, or discardable) to get your applications the physical memory that they need. In other words, your system will slow down slightly as soon as you run out of physical memory.

At that point, Windows will start using your virtual memory. You'll be able to see the virtual memory gauge in WinGauge start creeping upwards. You won't notice a serious performance degradation though, until Windows starts relying more heavily on the virtual memory swap file. The time it takes to access information in the virtual memory swap file (the hard disk's access time) is slower than the speed at which your computer can access physical memory.

WinGauge can show you both how much of your virtual memory swap file is in use, in the Swap File in Use gauge, and how heavy a use Windows is making of this swap file, in the Swap File Requests gauge. If the Swap File Requests gauge is moving upwards constantly, your system is relying heavily on virtual memory and you should consider closing some of your applications, or in the longer term, adding more physical memory (RAM) in the form of SIMMs or DIMMs that contain RAM chips.

WinGauge also shows how much memory you have in your discardable reserves with the Discardable Memory gauge. You're in real trouble when this value drops below 10%, and your physical memory and virtual memory are also heavily used up. Save your work, close some applications, and exit Windows.

Other WinGauge Gauges

Here are some other, more obscure parts of the Windows architecture that you can monitor using the gauges available to you in WinGauge.

The LDT Gauge

Note Windows 95 32-bit applications are designed to share a Local Descriptor Table (LDT), so this is an issue only affecting 16-bit applications that run in Windows 3.1x or Windows 95.

The application segments mentioned above, some of which may be discardable, are used and accessed through a special table called the Local Descriptor Table. This table, called the LDT for short, contains a descriptor that describes the position in linear memory of each segment (which is like a room number).

The LDT's format is fixed and defined by the architecture of the CPU, and although the CPU can have up to 8192 LDTs, each with 8192 descriptors for a maximum of 67,108,864 segments, Windows (by design), can only use one LDT, or 8192 segment. Thus, Windows creates the possibility of running out of room in the LDT.

WinGauge's LDT gauge indicates this, and if you see the LDT warning light activate, which it does when you exceed 90% usage of the LDT, you should immediately close some applications and save your work. If you find that a single application frequently uses up a big chunk of the LDT, you may want to let the developers of this application know that you are encountering this situation.

The CPU Gauge

WinGauge's CPU gauge measures CPU activity by monitoring how frequently the CPU is idle.

The Heap Gauges

The Heap gauges measure how much of the linear memory that has been allocated by Windows applications (not by DOS Prompt windows) is actually in use. A low reading (below 50 percent) indicates

that some application is grabbing much more than it actually needs, or that you have memory leaks--portions of unused memory that are being left around by an application.

Global DOS Memory
One last aspect of Windows memory that is of concern is the region known in Windows-speak as 'global DOS memory.' Formerly this was known as conventional memory, and is actually and simply the first megabyte of memory in your system.

This memory is crucial because of the backwards compatibility (the ability to run older DOS programs and drivers) that is designed into Windows. In order to remain compatible with DOS and DOS programs, Windows uses the first megabyte as a DOS communications region, placing critical structures needed by DOS in the first megabyte, along with various buffers needed to communicate with DOS based drivers and the system BIOS (Basic Input/Output System). The BIOS is the built-in firmware that starts up your PC. BIOS contains buffers for sending information from a program to the hardware device where that information should go and vice versa, such as to and from the keyboard.

Unfortunately, the global DOS memory (the first megabyte) gets pretty crowded, particularly because Windows has a tendency to put in the first megabyte things that don't really need to be there.

The Global DOS gauge shows how much global DOS memory you've got left. If you get much above 90% you may start getting Out of Memory errors from Windows.

The Global Heap and Local Heaps
To understand the rest of what follows you'll need a little background about heaps.

Windows consists of three components:


Kernel is the program responsible for the multitasking of Windows programs


User is the program responsible for managing windows, buttons, controls and menus


GDI is the program responsible for drawing graphics on your screen or printer

One of the many jobs of the Windows Kernel is that of allocating linear memory. The Kernel is in charge of carving off chunks of linear memory and doling them out to applications on request. The Kernel actually gets linear memory from a Virtual Device (VxD) called the Virtual Memory Manager (VMM) which is the part of Windows that created the linear memory room. The Kernel takes big pieces of linear memory as it needs them, and then doles them out to applications when requested.

All the linear memory that has been allocated by the Kernel is called the global heap. Heap simply means a pile of linear memory--that is, a big room. Simply put, the global heap is that region of linear memory that is managed by the Windows Kernel. Applications call the Kernel to allocate parts of the global heap for their own use.

All Windows 16-bit applications, when they start in Windows 3.1x or Windows 95, are automatically allocated 64 K segments of the global heap. These segments are 64 K because that is the maximum amount of memory that a 16-bit application can access conveniently. These smaller 64 K segments, and other similar 64 K memory segments that are allocated by Windows applications, are known as local heaps.

The Kernel has built-in routines that help Windows applications manage these local heaps to make it easy for programmers to keep track of various program information.

To summarize, the global heap is, as far as Windows applications are concerned, all of linear memory. Local heaps are small 64 K segments of the global heap allocated for use by individual Windows applications.

Resources
You've heard a lot about resources, but what are they? And what are system resources and application resources?

Resources are simply objects you (or in this case, the Windows system and its applications) can use. In order to manage the various objects that appear on your screen, the User and GDI programs each maintain various information about those objects. For instance, for each button on your screen the Windows User program has to know:

 Where the button should be located on the screen

 What application owns the button

 Which part of that application must be notified when you click the button.

The GDI program must maintain information about input devices, such as pens used to draw lines on screen, and so on.

The information about the various objects managed by the User and GDI programs is kept in six 64 K segments of memory known as resource heaps. These regions are actually 64K local heaps. Again, these regions are 64 K because that is the maximum size a 16-bit application can deal with efficiently. User and GDI are 16-bit programs because Windows was originally designed to run on the Intel 8088 and 80286, 16-bit processors.

User Resource Heaps

The User Resource Heaps are divided into:

 The Window heap that contains information on windows and controls

 The Menu heap that contains information on drop-down menus

 The Menu String heap that contains the text messages that appear in the menus

 The User Atom heap that contains mostly Window titles

GDI Resource Heaps

WinGauge offers two GDI Heap gauges for tracking GDI resource usage for 16-bit and 32-bit applications.

The GDI Resource heaps are divided into:

 The main GDI Resource heap that contains pens, brushes, fonts and various other information related to displaying graphics

 The GDI Atom heap that contains some font-related information, including font names

The GDI and User Atom heaps are usually discounted because the information in them is subsidiary to the other local resource heaps. So, the other heaps would always fill up before the Atom heaps.

Free System Resources

When you choose the About command from the Help menu in Windows' Program Manager, it displays a Free System Resources number. The number displayed is the lowest free percentage of the resource heaps, not counting the Atom heaps. The percentage free is computed as the available space in the particular heap divided by 64 K.

Applications that show User and GDI numbers are actually displaying the percentage free space in the main GDI Resource Heap, and the lowest percentage free of the three main User Resource Heaps (the User and GDI Atom heaps are not included because the other heaps would necessarily run out first).

You can set WinGauge to display the lowest of the six (or in our case the highest, since WinGauge displays the percentage used rather than the free memory), or to track an individual heap so you can see

how that particular one is affected by your applications.

Application Resources

Finally there are application resources. These are completely unrelated to system resources. Application resources are simply static, unchanging data items that are kept as part of the application's .EXE image. Typically icons, bitmaps, strings and fonts are kept as application resources and are loaded into memory as needed.

If an application resource must be used by the system, it changes from an application resource to a system resource when it is loaded into memory. For example an application's icon is an application resource until it is loaded into memory, when it needs to be displayed on the desktop, the icon becomes a system resource. Other application resources are unique to the application and always remain application resources, such as menus or bitmaps.

You can use Discover to peek into application resources for any application that is currently running. You can see what is loaded in memory and what is on hand in the application's disk file.

The Discover Window

This window contains the following options:

Tabs
Discover lets you view information about your hardware and software. Each tab in the Discover window covers a specific aspect of your PC, ranging from a general overview of your system configuration through software to benchmark tests. You can click the Advanced button at any time to obtain a far more detailed analysis of the current tab's topic.

 System Tab-shows information about the most critical hardware components of your system, including your CPU, RAM, video, hard drives, BIOS ROM and PCI Bus. You can confirm that your CPU conforms to the manufacturer's specifications; check your physical, used and free RAM; and confirm your video board type, resolution and installed video memory.

 Memory Tab-gives you information on Window's usage of your PC's memory, via easy-to-understand charts and tables. You can identify RAM and resource usage for each application and task; view your physical RAM, User and GDI Resources free; and so on. Note that Discover reports on the actual physical memory (RAM) used by programs.

 Software Tab-provides you with information about the software you are currently running, and the software components of Windows, such as the numbers of virtual machines, threads, tasks, virtual device drivers and modules. The Software tab also gives details on your DOS program segments and bytes used.

 Drives Tab-gives you a complete summary of any drive installed on your system and of all the directories, folders and files on that drive. You can immediately see the total size of each drive, the amount of free space, fragmentation levels and the size of your drive's free slack. An easy-to-understand chart gives you a visual overview of your drive, its contents and free space.

 I/O Devices Tab-shows information on the secondary and optional hardware devices installed on your PC, such as sound devices, serial and parallel ports, printers (including fax/modems) and network data including network type, driver, specification, version and user name.

 Benchmarks Tab-an easy-to-use method to benchmark the performance of your CPU and compare it to average benchmarks for three other "commonly configured" PCs.

Help
DiscoverPro is easy to use and most windows are self-explanatory. Click the Help button for context-sensitive help from any window.

Print
Click Print to display the Print dialog box where you can print information in selected Discover windows. For details, see Printing Information.

Edit
Click the Edit button if you want to edit a text file from within Discover. For details, see Editing a Text File.

Advanced
Click the Advanced button to view the Advanced window for the active tab. The Advanced windows are:

 Advanced System window

 Advanced Memory window

 Advanced Software window

 Advanced Drives window

 Advanced I/O Devices window

 Advanced Benchmarks window

Exit
Click the Exit button to close Discover and return to the desktop.

Related Topics

Manipulating the Discover Window
Printing Information
Editing a Text File
Viewing Advanced Information
Exiting Discover

The System Tab

The System tab displays summary information about your computer system. If you want to see details about the system, click the Advanced button to view the Advanced System window. The Advanced System window offers information about:

 CPU Info

 Video Info

 HD Info

 PCI Bus

 DMA/IRQ

 BIOS/CMOS

 Plug and Play

The Advanced System Window

The Advanced System window lets you examine detail information about your system. Click an icon at the left side of this window to view each of these panels at the right:

 The CPU Info Panel

 The Video Info Panel

 The HD Info Panel

 The PCI Bus Panel

 The DMA/IRQ Panel

 The BIOS/CMOS Panel

 The Plug and Play Panel

The CPU Info Panel

The CPU Info panel displays detailed information about your computer's CPU (central processing unit). Contains information on the CPU type, the CPU control registers and various other CPU features.

The static list box at the top of the window includes a bitmap of the CPU, the CPU name as best as it can be ascertained, a readout of the CPU's speed as measured by Discover, and a list of CPU cache sizes. The L1 and L2 Cache are being determined through a variety of timing and non-timing methods. The L2 cache in particular may not display correctly on some CPUs.

The Control Register window in the center of the window shows the state of the control registers when the CPU Info panel was selected. To refresh these values, reselect the CPU Info panel by clicking on the CPU Info icon in the System panel at the left. You can place the Arrow pointer over any of the fields in the Control Register window to find out the name of the field.

The CPU Features list box contains various other features supported by the CPU.

The TSS info list box contains a list of CPU-level I/O port traps placed by Windows Virtual Devices. These are used by Windows Virtual Devices to monitor activity on the various I/O ports. Scroll to the end of the list to see how many I/O traps are in use.

Note The number of available I/O port traps under Windows is fixed at 255 and can potentially overflow if too many Virtual Devices implement I/O port traps. If the used total is over 220, you may encounter problems. In this case check the list to see which VxD is using the most traps and try removing or re-configuring it.

Related Topics

Working With CPU Information

The Video Info Panel

The Video Info panel displays detailed information about your computer's video. It provides detailed information on your video graphics adapter, your video BIOS, your Windows display driver and your current video mode.

The Additional Capabilities button tests your Windows display driver for optional capabilities by calling the driver to ascertain its capabilities and to test them. Unfortunately we have found that many drivers do not process these calls correctly and thus cause General Protection Faults in Discover. If this is the case, you simply cannot use the Additional Capabilities button--you should contact your video adapter manufacturer about obtaining an updated driver.

If a question mark (?) appears in the top list box, this means that Discover is unable to identify the brand of your Video Adapter.

Related Topics

Working With Video Information

The HD Info Panel

The HD Info panel displays detailed information about your computer's hard drives. It provides information on the mass storage devices (hard drives, CD-ROMs, optical and removable drives, tape drives, and so on) in your system. Information is only provided for IDE, ESDI, and SCSI devices.

This panel contains a scrolling icon box at the top. Click a drive's icon to find out information about the drive. This panel queries the actual hardware to determine the low-level capabilities of the device, and thus may not correspond exactly with the DOS/Windows disk drives you are familiar with. For information on DOS/Windows drives, see the Drives tab.

The static box in the middle left contains information about the hard drive, such as the capacity, manufacturer and ID. It also includes the cylinder, head and sector information from the BIOS (Int 13) and from the Drive Parameter Table (DPT).

The Partitions list box (middle right) contains information on the disk's DOS partitions. The bottom list box contains miscellaneous information gathered from the drive itself.

If a question mark (?) appears in the top list box, this means Discover is unable to identify the brand of your hard drive controller or the hard drive itself.

Related Topics

Working With Hard Drive Information

The PCI Bus Panel

The PCI Bus panel displays information about your computer's PCI (Peripheral Interconnect) bus. The PCI bus is a local motherboard specification developed by Intel that offers a high performance component-level connection for peripheral devices to interconnect with the CPU bus.

Related Topics

Working With PCI Bus Information

The DMA/IRQ Panel

The DMA/IRQ panel displays information about your computer's direct memory access and interrupt requests.

This panel provides information on DMA (Direct Memory Access) channels, IRQ (Interrupt ReQuest) lines, and I/O ports currently in use. DMA channels which are a high-speed method for moving information from a storage device or LAN (local area network) interface card directly to RAM (physical memory). IRQ (Interrupt ReQuest) lines are also called hardware interrupts. Devices use IRQs to request attention from the CPU and data bus.

When this panel is active it continuously monitors the DMA, IRQ and I/O ports. Clicking the Refresh button updates the information.

The best way to determine what DMA channels and IRQ lines are in use is to start Discover, select the DMA/IRQ screen, and minimize Discover with this panel active. Then, run the programs that access your various devices, such as your scanner, fax/modem, SCSI adapter, CD-ROM and so on. Then go back to the Discover DMA/IRQ panel and click the Refresh button.

As a shortcut to this method you may click the Quick Detect button which attempts to activate all of the devices in your system.

The static information at the top of the panel describes the Interrupt and DMA controllers in the system along with some of the Windows settings related to the DMA Controller.

The DMA Channel list box contains the following information for each DMA Channel:

 **Chan** is the channel number.

 **Avail** displays the word No if the channel is definitely assigned to some device. Avail displays a question mark (?) if no activity has been detected on the channel. A question mark indicates that the channel may be available for use.

 **Active** displays the word Yes if Discover has detected activity on the DMA channel, and No otherwise.

 **Mask** indicates whether the channel is currently masked off (temporarily disabled).

 **Xlat** indicates whether automatic DMA translation is active for the channel for compatibility with DOS devices.

 **Owner** indicates the name of the Virtual Device that has asserted ownership over the DMA channel. If this field displays the acronym VDMAD (which stands for virtual DMA device), the channel is unowned.

The Interrupt Request list box contains the following information for each IRQ:

 **IRQ** is the Interrupt Request line number.

 **Avail** displays the word No if the IRQ is definitely assigned to some device. It displays a question mark (?) if no activity has been detected on the IRQ and the IRQ is not assigned to anyone that Discover can detect. A question mark indicates that the channel may be available for use.

 **Active** displays the word Yes if Discover has detected activity on the IRQ, and No otherwise.

 **Owner** indicates the name of the Virtual Device that has asserted ownership over the IRQ.

Description contains the standard use assigned to the IRQ.

Note This *does not* indicate the actual use of the IRQ, but rather the standard device which normally uses the particular IRQ.

The I/O Port Use list box contains all I/O ports that have been detected as being used, and the VxD which has asserted ownership over the I/O port, if any.

Related Topics

Working With DMA/IRQ Information

The BIOS/CMOS Panel

The BIOS/CMOS panel displays information about the installed ROM BIOS devices in the system along with information on your current CMOS settings.

The BIOS (Basic Input/Output System) contains buffers for sending information from software programs to the hardware devices that should receive the data.

CMOS (Complementary Metal Oxide Semiconductor) is a method of building computer chips (also called integrated circuits or ICs) that require very little electricity.

The list box at the top of the panel, BIOS Blocks, identifies each ROM BIOS region found in your system. The first section, BIOS Blocks in Memory, contains a list of your active BIOS blocks, and their size and shadowing state. The second section, BIOS Blocks in ROM, contains a list of all ROM BIOSs in your system, some of which may be mapped over by your DOS Memory Manager.

Related Topics

Working With BIOS/CMOS Information

The Plug and Play Panel

The Plug and Play panel displays information about your computer's Plug and Play compliant devices in the system.

The list box at the top of this panel describes the Plug and Play (PnP) BIOS (or Basic Input/Output System). The Device Node List in the middle lists the devices, showing their handle, product ID, and description. Select a device in the Device Node List, and the Device Data list at the bottom provides information about the device you selected.

Related Topics

Working With Plug and Play Information

The Memory Tab

The Memory tab displays summary information about your computer's memory. If you want to see more details about memory, click the Advanced button to view the Advanced Memory window.

The Advanced Memory window offers information about:

 Program Memory

 Physical Memory

 Private Memory

 System Memory

 Shared Memory

 Global DOS Memory

 First Megabyte Memory

Related Topics

Working With the Memory Tab

The Color Change Dialog Box

In Discover, you'll often see a Legend displaying color boxes that indicate the meaning of colors used graphically in the active window. You can click any of these color boxes to change the color used for the corresponding legend item. When you click a color box, the Color Change dialog box appears.

Drag the horizontal scroll boxes left or right to change the amounts of red, green, or blue used to create the legend color.

As you drag, the preview color at the left changes to show you the new color that will be used if you click OK now.

Click OK when you've blended a color you want to use.

The Advanced Memory Window

The Advanced Memory window lets you examine detail information about your computer's memory. Click an icon at the left side of this window to view each of these panels at the right:

 The Program Memory Panel

 The Physical Memory Panel

 The Private Memory Panel

 The System Memory Panel

 The Shared Memory Panel

 The Global DOS Memory Panel

 The First Megabyte Memory Panel

Related Topics

Understanding Windows Memory

The Program Memory Panel

The Program Memory panel displays information about the memory used by programs, including Windows. Program Memory is similar to the Memory tab, but provides linear memory as well as RAM, and breaks down resources into User and GDI categories. Linear memory is the total amount of memory allocated, but not necessarily in use by the program.

Related Topics

- Working With Program Memory Information
- Understanding Windows Memory

The Physical Memory Panel

The Physical Memory panel displays information about your computer's physical memory, or RAM.

Physical memory, also called RAM (random access memory), is the primary memory in your computer. RAM is comprised of computer chips installed on SIMMs (single in-line memory modules) or DIMMs (dual in-line memory modules) inside your computer. RAM, a very fast but volatile storage area, is used by the CPU, Windows and applications for processing information.

The static information box at the top of the panel contains general information on your Physical Memory:

 **Physical Address** space is how much Physical memory Windows can access.

 **Total Memory from CMOS** is how much memory is installed in the system, based on the value set in your CMOS.

 **Total Windows Memory** is how much of the system's physical memory is actually being used by Windows.

 **Free Physical Memory** is how much physical memory has not been assigned to any linear address range.

Below are two horizontal 3D bar graphs. The topmost of the two shows the entire range of physical memory in condensed form, while the lower is an exploded view, showing in detail a section of the upper graph.

The scroll bar below the lower graph lets you scroll the exploded view through all of memory to examine each section in detail.

At the bottom right, you can select the Hex or Megs radio button to change the measurement units used with the 3D bar graphs.

Related Topics

Working With Physical Memory Information

Understanding Windows Memory

The Private Memory Panel

The Private Memory panel displays information about the memory used privately by applications. Private Memory shows each 32-bit Windows application task's use of its own private memory region. Click an item in the Threads list to graph that item's private memory usage.

About Windows 95 Memory
Windows 95 memory ranges are divided in three groups:

 **Private Memory**-memory that is allocated to a specific 32-bit Windows program. This memory cannot be accessed by any other 32-bit Windows program and, thus, is "private" to that particular Windows program.

 **System Memory**-memory that belongs exclusively to system devices and VxDs (Virtual Device Drivers).

 **Shared Memory**-memory that is shared among 32-bit Windows programs, 16-bit Windows programs and the system--shared memory contains all shared 32-bit DLLs, all 16-bit Windows programs and certain VxD data. This memory is accessible to all.

Related Topics

Working With Private Memory Information
Understanding Windows Memory

The System Memory Panel

The System Memory panel displays information about the system memory. System Memory shows usage of all system memory ranges and highlights the memory of individual system components. Click a virtual device or driver in the VxDs list to show its position and use in the system memory range.

About Windows 95 Memory
Windows 95 memory ranges are divided in three groups:

 **Private Memory**-memory that is allocated to a specific 32-bit Windows program. This memory cannot be accessed by any other 32-bit Windows program and, thus, is "private" to that particular Windows program.

 **System Memory**-memory that belongs exclusively to system devices and VxDs (Virtual Device Drivers).

 **Shared Memory**-memory that is shared among 32-bit Windows programs, 16-bit Windows programs and the system--shared memory contains all shared 32-bit DLLs, all 16-bit Windows programs and certain VxD data. This memory is accessible to all.

Related Topics

Working With System Memory Information
Understanding Windows Memory

The Shared Memory Panel

The Shared Memory panel displays information about memory that is shared by Windows and its applications. Shared Memory shows the usage of shared memory. Click a program or DLL using shared memory regions in the Threads list to highlight its shared memory regions.

About Windows 95 Memory

Windows 95 memory ranges are divided in three groups:


Private Memory-memory that is allocated to a specific 32-bit Windows program. This memory cannot be accessed by any other 32-bit Windows program and, thus, is "private" to that particular Windows program.


System Memory-memory that belongs exclusively to system devices and VxDs (Virtual Device Drivers).


Shared Memory-memory that is shared among 32-bit Windows programs, 16-bit Windows programs and the system--shared memory contains all shared 32-bit DLLs, all 16-bit Windows programs and certain VxD data. This memory is accessible to all.

Related Topics

Working With Shared Memory Information
Understanding Windows Memory

The Global DOS Memory Panel

The Global DOS Memory panel displays information about Global DOS memory, how much is being used and by whom, and how much is "locked" and thus not moveable out of the first megabyte.

Windows and Windows applications use global DOS memory to communicate and maintain compatibility with DOS (the Disk Operating System).

The static information box at the top of the panel contains general information on Global DOS Memory:

 **Global DOS Total** is the amount of memory below the 1Mb line that Windows can potentially use as Global DOS Memory.

 **Global DOS Free** is the amount of the Global DOS Total that is not in use by any Windows programs.

 **Global DOS Locked** is the amount of Global DOS Memory that has been locked by various Windows programs. When a program needs Global DOS Memory, and there isn't enough Free Global DOS memory, Windows will attempt to relocate memory regions that are not Locked out of the Global DOS region to accommodate the program that needs the Global DOS Memory.
The Modules list contains various items loaded in Global DOS Memory. You can select an item in the list to show that item's use of memory in the bar graphs. Each item lists the Locked and Unlocked use of Global DOS Memory by the item.

Below the Modules list are two horizontal 3D bar graphs. The topmost of the two shows the entire range of Global DOS Memory in condensed form, while the lower is an exploded view, showing in detail a section of the upper graph.

The scroll bar below the lower graph lets you scroll the exploded view through all of memory to examine each section in detail.

Related Topics

Working With Global DOS Memory Information
Understanding Windows Memory

The Software Tab

The Software tab displays summary information about your computer system. If you want to see more details about your computer's software, click the Advanced button to view the Advanced Software window.

The Advanced Software window offers information about:

 System Resources

 Windows Virtual Machine

 Application Resources

 Tasks

 Threads

 Windows VxD (Virtual Device Drivers)

 Windows Modules

 Interrupts

 DOS Information

 Descriptors

The Advanced Software Window

The Advanced Software window lets you examine detail information about your computer's software. Click an icon at the left side of this window to view each of these panels at the right:

 The System Resources Panel

 The Windows Virtual Machine Panel

 The Application Resources Panel

 The Tasks Panel

 The Threads Panel

 The Windows VxD (Virtual Device Drivers) Panel

 The Windows Modules Panel

 The Interrupts Panel

 The DOS Information Panel

 The Descriptors Panel

The System Resources Panel

The System Resources panel displays information about the system resources currently available on your system. System resources are the local heaps maintained by the Windows User and GDI.

On the left are the resources maintained by Windows' User module, on the right are GDI resources.

Scroll the lists to see which resources are in use, and how much space each kind occupies. The various user heaps are listed in sections in the User Objects list.

In both lists, **count** is the number of objects of a particular type, and **size** is the total size of all such objects in bytes.

Tip Keep an eye on the True Type Fonts value--loading fonts you don't use wastes valuable memory.

Related Topics

Working With System Resources Information

The Windows Virtual Machine Panel

The Windows Virtual Machine panel displays information about the virtual machines that Windows is currently running. Windows VMs are virtual machines, more commonly known as DOS boxes. Keep in mind that all Windows programs run in a single VM called the System VM.

The list box at the top of the panel lists all VMs currently active. Click a VM and the Windows System VM Info list displays specific information regarding the VM. It also displays a thumbnail of the VM's window in the lower left portion of the panel.

When you point to the VM window thumbnail, the Arrow pointer changes to a magnifying glass. Click to zoom in on the thumbnail. Click again to zoom in closer, click once more to zoom in to 400 percent (or 4x) magnification, and click again to return to the original thumbnail which shows the full window.

Note If you see VMs you can't identify, select the VM and check the VM command line at the top of the VM Info (lower right) list.

Related Topics

Working With Virtual Machines Information

The Application Resources Panel

The Application Resources panel displays information about the application resources currently in use on your system.

Application resources are simply static, unchanging data items that are kept as part of the application's .EXE or DLL file. Typically icons, bitmaps, strings and fonts are kept as application resources and are loaded into memory as needed.

Note Application resources are completely unrelated to system resources.

This panel shows what App Resources an application has loaded, and what it has available on Disk.

The Modules list at the top of the panel shows all loaded applications. The radio buttons above the list allow you to narrow the selection to only applications, or only DLLs, only Fonts, or all. Click an item in the Modules to view its resources.

Click a resource listed in the Resources list to view the resource itself.

The Extract Resource to a File button allows you to export the specific resource to a file. For example, if you wanted to export the WinGauge icon to a file which could be imported into a paint program, you would select WinGauge from the Modules list, scroll down and select resource number 1 (icon). Then click Extract Resource to a File and specify the filename.

Note Look for the resource type called Version Info or check the Windows Modules list to identify the modules loaded in your system. If something is loaded that you don't think should be, check the WIN.INI "load=" and "run=" lines and your Start Up group.

Related Topics

Working With Application Resources Information

The Tasks Panel

The Tasks panel displays information about tasks currently being performed on your system. It identifies all active Windows processes.

The Windows Task List at the top of the panel contains a list of all tasks. Click a task to display information about the task at the bottom of the panel.

Note Windows is a "cooperative" multitasking system. This means that tasks will get some processing time even if they are not active, so having multiple inactive tasks open will slow your system somewhat.

Related Topics

Working With Tasks Information

The Threads Panel

The Threads panel displays the selected program's *threads*, which are sub-processes within a program or driver. The Threads panel shows information about all such sub-processes that are active in the system. Click a thread in the Threads List at the left and information about that thread appears in the Threads Data list at the right.

The pie charts show the relative execution time of currently loaded threads, and the counter at the bottom lets you specify how often (in seconds) the window should periodically update, or refresh, the information it displays.

Related Topics

Working With Threads Information

The Windows VxD (Virtual Device Drivers) Panel

The Windows VxD panel displays information about the virtual device drivers (VxDs) currently running on your system.

Virtual devices are 32-bit system components that operate "behind the scenes" to control all aspects of Windows' operation.

The VXDs list shows all installed Virtual Devices, including their name, ID, version, V86 API, PM API and count.

Related Topics

Working With Virtual Device Drivers Information

The Windows Modules Panel

The Windows Modules panel displays information about Windows modules, which are software components that make up a program. A typical program (application) consists of a main module along with various helper Dynamic Link Libraries (.DLLs).

The Modules list at the top of the screen shows all loaded Windows Modules. Click a module to display additional information about that module in the Stats, Exports, and Imports lists.

The Stats list displays general information about the module.

The Exports and Imports lists provide information about exports, or what functionality the module provides to others; and imports, or what other modules the selected module relies on for additional services or information.

Note If a module is loaded that you don't think should be, check the WIN.INI "load=" and "run=" lines and your Start Up group and remove any commands that aren't needed.

Related Topics

Working With Windows Modules Information

The Interrupts Panel

The Interrupts panel displays information about each software interrupt at each of the three "Rings," and who has each interrupt hooked.

Related Topics

Working With Interrupts Information

The DOS Information Panel

The DOS Information panel displays general information about DOS (and DOS parameters) running on your system.

The DOS Programs list shows all loaded DOS drivers and resident programs, how much memory they occupy, and in which region they are loaded.

The Open Files list displays all open files, along with information about who opened them.

Related Topics

Working With DOS Information

The Descriptors Panel

The Descriptors panel displays global and local descriptor table information for the selected Windows module.

The radio buttons at the top of the panel let you decide whether to only show modules for applications, DLLs, fonts, or for all three.

Select a module in the Modules list and the Descriptors panel displays that module's LDT and GDT information in the Local Descriptor Table (LDT) list and Global Descriptor Table (GDT) list, respectively.

Related Topics

Working With Descriptors Information

The Drives Tab

The Drives tab displays summary information about your computer's storage devices. This includes hard drives, CD-ROM drives, ZIP drives, cartridge tape drives, and so on. If you want to see more details about the drives, click the Advanced button to view the Advanced Drives window.

The Advanced Drives Window

The Advanced Drives window lets you examine detail information about the storage devices installed on your PC.

Click an icon at the left side of this window to view each of these panels at the right:

 The Drives Panels

The Drives Panels

Drive A: describes the high density 3.5-inch drive. The information you see depends upon the kind of drive assigned to each drive letter, and whether you have inserted a disk, cartridge or CD-ROM disc into a drive that uses some form of removable media.

For example, without a CD-ROM disc inserted into the CD-ROM drive at Drive E:, no information would be available if you select the E: icon.

Related Topics

Working With Drive Information

The I/O Devices Tab

The I/O Devices tab displays summary information about your computer's I/O (Input/Output) devices.

Input devices are pieces of hardware that you use to send information to your computer, such as a keyboard, mouse, trackball, or microphone.

Output devices are pieces of hardware that you can send information to from your computer, such as a printer, plotter, or speakers.

If you want to see more details about the I/O devices, click the Advanced button to view the Advanced I/O Devices window.

The Advanced I/O Devices window offers information about:


Network


Sound


Serial/Parallel


Printers

The Advanced I/O Devices Window

The Advanced I/O Devices window lets you examine detail information about your computer's I/O devices.

Click an icon at the left side of this window to view each of these panels at the right:


The Network Panel


The Sound Panel


The Serial/Parallel Panel


The Printers Panel

The Network Panel

The Network panel displays information about your network devices, if any network is present.

Related Topics

Working With Network Information

The Sound Panel

The Sound panel displays information about your computer's installed sound devices.

The Sound Devices list displays all installed sound devices in your system. Select any of these devices and the Features list at the lower left displays information specific to the selected sound device.

The System Sounds list shows your currently defined system sounds as found in the Sounds control panel, along with the .WAV file associated with each sound. Select a sound and click the Test Sound button, or simply double-click a sound in the System Sounds list to listen to it. You must have the Enable System Sounds option set (in the Sound control panel) for Discover to be able to test a sound.

Related Topics

Working With Sound Information

The Serial/Parallel Panel

The Serial/Parallel panel displays information about all the installed serial and parallel ports on your computer.

Related Topics

Working With Serial/Parallel Information

The Printers Panel

The Printers panel displays information about the printers (or other printer-like devices, such as fax/modems) connected to your computer.

The Printers list displays all installed printers. Select a printer in this list to view information about that printer in the Printer Device Capabilities and Escape Support lists.

Related Topics

Working With Printers Information

The Benchmarks Tab

The Benchmarks tab displays summary information about benchmarks. A benchmark is a standardized task that tests the performance, such as the speed, of various devices. Benchmarks are used to compare devices of the same type to each other to determine which ones offer optimum performance.

Discover also lets you view advanced Benchmarks information about your computer's CPU, video, RAM, hard drives, and CD-ROM drive. You can also run benchmarks yourself in each of these areas. If you want to view or run benchmark tests, click the Advanced button to view the Advanced Benchmarks window.

The Advanced Benchmarks window offers information about:

 CPU Benchmarks

 Video Benchmarks

 RAM Benchmarks

 Hard Drive Benchmarks

 CD-ROM Benchmarks

The Advanced Benchmarks Window

The Advanced Benchmarks window lets you examine detail information about benchmark tests. Click an icon at the left side of this window to view each of these panels at the right:


The CPU Benchmarks Panel


The Video Benchmarks Panel


The RAM Benchmarks Panel


The Hard Drive Benchmarks Panel


The CD-ROM Benchmarks Panel

The CPU Benchmarks Panel

The CPU Benchmarks panel lets you view or run benchmark tests on your computer's CPU.

Discover uses four different standard sets of benchmark tests to test the CPU performance of your system. When you select CPU Benchmarks all tests are performed automatically, you can stop these tests, by clicking the Stop button, or let them run to completion. At any time you can rerun the test by clicking the Run button.

The four standard tests are: Sieve, DhryStone, ModeSwitch and WhetStone. The fifth number, Discover Mark, is essentially a summary of all tests, in the form of an easy to understand number format that provides a relative CPU performance ratio, relative to a 386sx/16 (which is the slowest processor that can run Enhanced mode Windows.) It is important to note that different tests use different ranges, each bar chart shows the performance of your system relative to the "average" systems (see next) and compares it accordingly.

The bar charts provide a basis for comparison, showing "average" numbers derived from testing of ten different systems at each performance level. Next to the system type (486/33, 486/100 and Pentium/100) is the average Discover Mark for that type of system. The Discover Mark for the current system appears in the Discover Mark LED at the top of the panel. The higher the Discover Mark the faster your system.

Related Topics

Working With CPU Benchmark Information

The Video Benchmarks Panel

The Video Benchmarks panel lets you view or run benchmark tests on your computer's video.

The Video Benchmark tests your video adapter using standard video characteristics. The panel is broken into three main sections: Stats, Video Tests and a test window. Stats provides details on your specific video display adapter and its performance relative to standard VGA adapters. Wherever possible, details about the actual driver name, features supported and vendor are listed. The Video Tests list records the results of the Video Benchmark tests as they are performed. If not interrupted, the Video Benchmark will perform two passes of video tests and end with Tests Completed. You may stop these tests at any time by clicking the Stop button. Or you can click Run to rerun them.

The Video Tests list shows all the video display characteristics tested by Video Benchmark. A Graphics and a Text/Raster overall performance mark is displayed as an LED reading. This is an indication of how much faster your video adapter operates than a standard VGA adapter would if it was connected to your current system.

Related Topics

Working With Video Benchmark Information

The RAM Benchmarks Panel

The RAM Benchmarks panel lets you view or run benchmark tests on your computer's RAM, or physical memory. RAM Benchmark performs a series of tests to measure the access speed of your system's RAM using both a 16-bit and 32-bit instruction set. The panel is essentially divided into two sections: test section (tests being performed) and the tests dynamically represented as bar graphs.

There are four standard RAM benchmarks performed: Sequential Read and Write and Random Read and Write. Tests start automatically with their results shown in the corresponding bar graph. You can stop the tests (some tests will take some time) at any time by clicking the Stop button, or you can restart them by clicking Run. You can find out which tests were run to completion by examining the two columns at the top of the panel. If the Mb/Sec (megabytes per second) is a zero, the test was not run.

The tests are in two series: 16-bit and 32-bit instructions. By default, RAM benchmark runs the 16-bit tests first. Once the tests are run, they represent a "snapshot" of your RAM performance and remain available until you leave the RAM benchmark panel.

The bar graphs all use a range of 8K to 1MB to display test data. The left side of each graph displays the MBs per second in a range appropriate to your system. If the results, in a particular test, appear uniform click the Zoom In button. Zoom In changes the MBs per second range to much finer increments so you can see actual differences. Zoom Out returns you to the original view.

Once all tests have been run to completion, you may toggle between the 16 bit and 32 bit graphs using the "16/32 Bit Graph" button.

Related Topics

Working With RAM Benchmark Information
Understanding Windows Memory

The Hard Drive Benchmarks Panel

The Hard Drive Benchmarks panel lets you view or run benchmark tests on your computer's storage devices.

The Hard Drives list at the top of this panel displays all the local hard drives connected to your PC. Select a drive in the list and click the Run Benchmark button to begin testing the drive. You can click the Stop Benchmark button to stop the tests at any time.

Hard Drive Benchmark tests the transfer rate, the speed at which your computer and hard drive can exchange information (shown in megabytes per second). It also shows the average seek time, which is the length of time in milliseconds that it takes to find information on the drive. Average seek time is a critical measure of the speed of a drive.

Related Topics

Working With Hard Drive Benchmark Information

The CD-ROM Benchmarks Panel

The CD-ROM Benchmarks panel lets you view or run benchmark tests on your computer's CD-ROM drive.

The CD-ROMs list at the top of this panel displays all the local CD-ROM drives connected to your PC. Select a drive in the list and click the Run Benchmark button to begin testing the drive. You can click the Stop Benchmark button to stop the tests at any time.

CD-ROM Benchmark tests the transfer rate, the speed at which your computer can transfer information from the CD-ROM drive (shown in megabytes per second). It also shows the average seek time, which is the length of time in milliseconds that it takes to find information on the drive. Average seek time is a critical measure of the speed of a drive.

Related Topics

Working With CD-ROM Benchmark Information

The First Megabyte Memory Panel

The First Megabyte Memory panel provides information on the layout of the crucial first megabyte (MB) of memory. The static information box at the top of the panel provides some general information about the makeup of the First Megabyte of memory under Windows:

 **Total Upper Memory** is how much physical memory has been mapped into the region between 640K and 1Mb (1024K).

 **Local Upper Memory** is how much memory is reserved by Windows as unique per Virtual Machine.

 **Video Memory** is how much of the 640K to 1MB region is reserved for use as Video RAM.

 **BIOS Memory** is how much of the 640K to 1MB region is occupied by BIOS ROMs.

The left graph shows the layout of the first megabyte of memory, as it is seen by Windows and Windows programs. This view includes upper memory created by a DOS memory manager such as Helix Software's NETROOM, or DOS's EMM386, along with information about which ranges of memory are considered global, and thus appear in all Virtual Machines.

Information is also included on how the system's BIOS regions appear to programs. The BIOS regions may be mapped over by the DOS memory manager, or may be significantly truncated as when Helix Software's NETROOM "Cloaks" the BIOS.

The right graph shows the upper memory region as it appeared when the system was first booted, before any memory manager or Windows loaded. This includes the full view of all BIOSs along with information about which regions may be in use as adapter RAM, which has been mapped over with upper memory.

 **Global Lower** memory is memory that is the same in all VMs.

 **Local Lower** memory is memory that is private to each VM and not useable as EMS memory.

 **Potential UMB** memory may be mapped by a DOS memory manager as additional upper memory using an include= or XMS= parameter.

Note You can click a Legend color box and the Change Color dialog box appears where you can change that legend item's color.

Related Topics

Working With First Megabyte Memory Information
Understanding Windows Memory

Address Space

The sum total of all possible memory addresses available at a given time. This is 4 GB (gigabytes) on a 386 or later PC in protected mode.

Launch Pad

The Launch Pad is a window where you can place application and document icons so you can conveniently access them.

Benchmarks

A benchmark is a standardized task that tests various devices for measurements, such as speed.

BIOS

The BIOS (or Basic Input/Output System) contains buffers for sending information from an application to the hardware device, such as a printer, where the information should go.

Buffers

A buffer is a temporary storage location for information being sent or received.

Bytes

A byte is eight bits of information composed of zeros and ones, one of which may be a parity bit. Most character sets, such as ASCII, use one byte to represent each character (letter, number, or special symbol).

Cache

A cache is part of the computers memory used to temporarily store recently accessed information. A cache is designed on the premise that recently used information may be needed again soon. Keeping information available in cache reduces the time it takes for an application to obtain the information again.

Cluster

A cluster is a unit of storage allocation usually consisting of four or more 512-byte sectors.

Conventional Memory

Conventional memory is the first 640 K (kilobytes) of RAM (random access memory).

CPU (Central Processing Unit)

The brain of your computer. This is main computer chip that controls all activity that takes place on a computer.

Directories

Directories are locations within a volume on a drive where you can store files or subdirectories. In Windows 95, directories are equivalent to folders that appear on the desktop in a drive window.

Discardable Memory

Discardable memory is memory used by an application that it has marked as discardable. Windows can reallocate the discardable memory to a different application if it needs to.

DLLs (Dynamic Link Libraries)

A DLL is an executable code module that can be loaded on demand and linked at run time. DLLs can be shared among multiple applications and independently updated, transparent to the applications. DLLs can also be unloaded when they are no longer needed.

DMA (Direct Memory Access)

DMA is a fast method of moving information from a storage device or LAN interface card directly to RAM which speeds processing time. DMA is direct memory access by a peripheral device that by-passes the CPU to save time.

Expanded Memory

DOS running on the Intel 80286, 80386, or 80486 family of computers can only address one megabyte of memory at one time. Expanded memory is the memory located between the base memory (either 512 K or 640 K) and one megabyte. Expanded memory is reserved by DOS for housekeeping tasks, such as managing information that appears on the screen.

Extended Memory

Memory above one megabyte in 80286 and higher PCs. Extended memory can be used for RAM disks, disk caches, or Windows, but it requires the CPU to run in a special mode (protected mode or virtual real mode).

FAT (File Allocation Table)

The FAT is a roadmap, or index, that points to the location where all the information in files is stored on a floppy disk or hard drive. The FAT is extremely important because the system uses it to store and retrieve files containing information.

When you save a file in Windows, it is stored in multiple pieces (in clusters made up of multiple sectors) on the disk. Windows also saves the roadmap, or index, that points to these clusters in two copies of the FAT (File Allocation Table). The FAT contains the directions to all the pieces of your files, so that applications can find them again later.

GDT (Global Description Table)

The GDT is a table that is basic to the operation of protected mode. This table contains data structures (descriptors) that describe various regions of memory and how they may be accessed. Windows uses the GDT for system devices. See LDT.

Global Heap

The Global Heap is the general pool of memory available to Windows applications.

GPF (General Protection Fault)

An error condition caused by an application when it attempts to perform an operation not allowed by the operating system. Windows uses GPFs to determine and control the state of the currently executing application. GPFs that are unexpected by Windows cause a system error message to appear.

HMA (High Memory Area)

The HMA is the first 64 K of extended memory. If you use DOS 5.0, you can save memory by loading DOS into the HMA. Do this by adding the DOS=HIGH setting to your CONFIG.SYS file and restarting your PC.

Interrupt

A temporary suspension of a process caused by an event outside that process. More specifically, an interrupt is a signal or call to a specific routine. Interrupts allow peripheral devices, such as printers or modems, to send a call to the CPU requesting attention.

I/O (Input/Output) Device

An I/O device is any piece of computer hardware that can exchange information with the CPU. Examples of I/O devices include network cards, printers, speakers or other sound devices, or devices connected to the serial or parallel ports of your PC such as external modems.

Kernel

The Kernel is the part of a computer operating system that performs basic functions such as switching between tasks.

LDT (Local Descriptor Table)

The LDT is a secondary data structure table that contains additional information about various regions of memory and how they can be accessed. Windows uses the LDT for programs.

Linear Memory

Linear memory is the currently defined address space of the system that Windows uses to allocate memory to Windows applications.

Local Heap

The Local Heap is a region of memory allocated for local use by an application.

Locked Memory

Locked memory is memory used by an application that cannot be relocated or discarded by Windows.

Mapping

Mapping is the process of assigning physical memory (RAM) to a particular linear address range.

Mode Switch

A mode switch is a transition made by the CPU when changing from one mode of operation to another. For example, switching from real or protected mode, or a transition between different levels of protection. See Ring 0, 1, 2, 3.

Modules

A module is a device driver loaded by Windows.

Paging

The process of saving information stored in RAM to the swap file on the system hard drive so Windows can make the RAM available at a different linear address.

Parallel Port

The parallel port is a connector on the back of your PC and on some peripheral devices. With the appropriate driver software installed and a parallel cable connected to the parallel ports on your PC and a peripheral device, the two can communicate with each other. Parallel transmissions have no EIA standard, but most equipment follows a quasi-standard called the Centronics Parallel Standard.

PCI (Peripheral Component Interconnect) Bus

The PCI Bus is a local motherboard specification (that provides connector slots on the motherboard for installing peripheral cards). The PCI Bus, designed by Intel, offers a high performance, peripheral component level interface to the CPU bus.

Physical Memory

Physical memory is the RAM (Random Access Memory) installed in your PC. See Random Access Memory (RAM).

Protected Mode

A mode of operation of 80286 or later CPUs which allows access to more than 1 MB of memory.

RAM (Random Access Memory)

RAM (Random Access Memory) is also called physical memory. It is installed in your PC on SIMMs (Single Inline Memory Modules) or DIMMs (Dual Inline Memory Modules). RAM is volatile, extremely high-speed storage used by your computer for processing information.

Real Mode

A mode of 80286 or later CPUs, where the CPU operates substantially like an older 8086 CPU and can address directly only 1 MB of memory.

Resources

Resources are objects that Windows and its applications can use, such as the buttons on the screen that you can click.

Ring 0, 1, 2, 3

Different levels of protection in protected mode, where programs having varying degrees of freedom of operation. Ring 0 (zero) is least protected and has direct access to all hardware in the system.

Sector

A sector is a pie-shaped portion of a hard disk. A disk is divided into tracks and sectors. Tracks are complete circuits and are divided into sectors. Under DOS, a sector is 512 bytes.

Serial Port

A serial port is an input/output port (connector) that allows the transmission of information out at one bit at a time, as opposed to parallel which transmits eight bits, or one byte at a time.

Swap File

The swap file is created by Windows on the system hard disk. It uses the swap file to copy information stored in part of the linear address space so it can reallocate the RAM used at that location to another linear address space.

Swapping

Swapping is the process of saving to disk or restoring from disk the contents of RAM so that the RAM can be used elsewhere in linear memory.

System Resources

System resources are a series of data structures kept by Windows. System resources are managed by the Windows User and GDI programs and maintain information about objects that appear on your screen. For instance, for each button on your screen the User program has to know where it is supposed to be located, what program owns it, and which part of the program needs to be notified when you click the button. GDI must maintain information about pens used to draw lines on screen, fonts used to draw characters, and so on.

The information about the various objects managed by the User and GDI programs is kept in six 64K regions of memory known as resource heaps. These regions are actually 64K local heaps. These regions are 64K because 64K is the maximum size a 16-bit program can deal with efficiently. User and GDI are 16-bit programs because Windows was originally designed to run on the Intel 8088 and 80286, 16-bit processors.

The User Resource Heaps are divided into:

 The Window Heap, which contains information on windows and controls

 The Menu Heap, which contains information on drop-down menus

 The Menu String Heap, which contains the text messages that appear in the menus

 The User Atom Heap, which contains mostly Window titles

The GDI Resource Heaps are:

 The main GDI Resource Heap, which contains pens, brushes, fonts and various other information related to displaying Graphics

 The GDI Atom Heap, which contains some font related information including font names.

The GDI and User Atom Heaps are usually discounted because the information in them is subsidiary to the other Local Resource Heaps. So, the other Heaps would always fill up before the Atom Heaps.

32BDA (32-Bit Disk Access)

32BDA is a process in Windows where the device driver that accesses the disk runs entirely as a 32-bit program at Ring 0 (zero).

32BFA (32-Bit File Access)

32BFA is a process in Windows where the DOS file operations are controlled by a program, or set of devices, that operate entirely as 32-bit programs at Ring 0 (zero).

Unlocked Memory

Unlocked memory is physical memory that Windows can copy to the swap file on disk, and whose linear address can be changed whenever Windows chooses.

UMB (Upper Memory Block)

The UMB is the area in memory between 640 K and 1 MB that have RAM mapped into them by memory managers, such as Helixs Netroom or MemMaker. *See* Expanded memory.

V86 Mode (Virtual 8086 Mode)

V86 mode is a mode of operation of 80386 or later CPUs where programs, originally designed to run in real mode, can run as sub-programs to a protected mode control program or operating system.

Video Memory

Video memory, called VRAM, is physical memory installed on your PCs video card that is used for displaying information on the screen.

Virtual Memory

Virtual memory is the amount of memory that exists either as physical memory (RAM) or on the hard drive (in the swap file). When a part of memory that is located in the swap file is accessed by an application, Windows reads the information into RAM.

VMs (Virtual Machines)

Virtual machines (also called Virtual DOS machines or VDMs) are created in Windows 95 when you open a MS-DOS Prompt window. The VDM is a software emulation of a separate computer, offering all the services that the DOS application expects of a PC.

VxDs (Virtual Device Drivers)

VxDs are used in Windows 95 to communicate with all physical hardware in the system. This prevents any application from having direct access to a piece of hardware. Instead, it communicates only through the VxD for that hardware.

Windows 95 Registry

The Windows 95 Registry file contains user, application, and computer-specific configuration information in a central location that was kept in various .INI files in Windows 3.1. The Registry contains settings that determine how your computer runs.

Hidden Files

A hidden file is any file that does not show up in a regular directory listing. Typically, hidden files have one of the following file extensions:

 DLL-(Dynamic Link Library)

 SYS-System file

 VXD-Virtual Device Driver

 386-Virtual Device Driver

 DRV-Device Driver

In Windows, a programmer can set any file with the hidden file attribute.

Tip In Windows Explorer or My Computer, you can select to show or hide hidden files. To do this, choose the Options command from the View menu, click the View tab, select the Show or the Hide radio button, and click OK.

System Files

A system file is a file used exclusively by the operating system, or Windows.