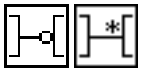
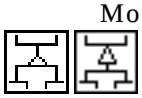
Introduction to the Object Plant....3
Registration....3
Introduction to Object-Oriented Analysis and Design....4
Starting a small software project....4
Reference Manual....7
Views....7
Cursors....9
Document info....10
General....10
Data types....10
Exporting diagram pictures....11
General Preferences....11
Code Generation Preferences....12
Copy and Paste....13
Undo....13
Drag-and-Drop....14
Non-obvious keyboard shortcuts....15
Joining line segments....15
Object Model Diagrams (Class Diagrams)....16
Pages 16
Adding a new toplevel page....16
Changing the name of a toplevel page....16
Adding a sublevel page....17
Changing the name of a subpage....17
Elements in an Object Model....17

Classes....17
The class dialog window....18
Add an attribute....18
Add an operation....20
Adding a parameter to an operation....21
Changing a parameter....21
Delete a parameter....21
The Operation dialog....22
Delete an attribute or operation....22
Moving a class box....23
"Nudging"....23
Resizing a classbox....23
Several copies of a single class....23

Interfaces....24

Associations....24
The association dialog window....24
Qualifiers....26
Moving associations....26

Aggregations....26
The aggregation dialog window....26
Creating multibranch aggregations....27
Moving aggregations....27

Generalizations....28
The generalization dialog window....28
Creating multibranch generalization....28
Moving generalizations....29

 Suppliers....29
 Packages....29
 Cut Tool....29
 Notes....29
 Inspect Tool....30
Event Trace Diagrams (Message Trace Diagrams)....31
Pages 31
Elements in an Event Trace diagram....31
 Threads....31
Resizing a thread....32
 Boxes....32
Moving a box....32
Resizing a box....32
 Events....33
The event dialog window....33
State Diagrams....35
Pages 35
Changing the name of a State Diagram page....35
Elements in a State Diagram....35
 States....36
The state dialog window....36
Add an event....37
Delete an event....38
Moving a state box....38
Resizing a state box....38


Events....39
The event dialog window....39
 Initial state....40
 Final state....40
Use Case Diagrams....41
Elements in a Use Case Diagram....41
 Use Case....41
The use case dialog window....41
 Actors....42
 Communicate association....42
The communicates dialog window....42
Document name and page names....43
Code Generation....44
The template files....45
Top-level tags....46

{CLASS}-level tags.....47
{INTERFACE}-level tags.....50
{OPERATION}-level tags.....50
{PARAMETER}, {INPARAMETER},.....51
{ATTRIBUTE}-level tags.....51
{INITIAL VALUE}-level tags.....52
{FILENAME}-level tags.....52

OBJECT PLANT

User's Manual

A Macintosh tool for Object Oriented Analysis and Design

by Mikael Arctædius

I apologize for any out of date information and incomplete areas in this documentation. It is a constant battle keeping it in synch with the development of Object Plant itself. I know that the Use Case diagram section is a bit thin. It will be expanded when I extend the tool's Use Case functionality.

Object Plant is a tool for object-oriented analysis and design. It is based on the Object Modeling Technique development methodology by Rumbaugh, Blaha, Premerlani, Eddy and Lorensen but it also supports a subset of the Unified Modeling Language (UML) developed by Booch, Rumbaugh and Jacobson.

With the Object Plant you can…

- make Object Model diagrams (Class Diagrams in UML notation)
- make Event Trace diagrams (Message Trace diagrams in UML notation)
- make State diagrams
- make Use Case diagrams
- create data dictionaries
- generate C++ code or Java code

To use the Object Plant it may help to have at least a passing familiarity with…

- object-oriented analysis / design / programming, especially the OMT method
- or the Unified Modeling Language (by Booch, Rumbaugh and Jacobson)

In this manual I usually stick to the OMT notation. When there are differences in the notation, e.g. different tool icons, I will show them both but not all dialogs are shown in both versions of notations.

Acknowledgements and References

Thanks to the active beta testers and registered users.

The Object Plant is written in C++ and some plain old C. No class library is used. It was modeled in the oldfashioned style using a pen and paper.

The floating windows are created with the Infinity Windoid 2.6 by Troy Gaul and some modified code from Apple's Develop issue 15.

The menu shortcut extensions (e.g. shift-command-A) are created with Mercutio MDEF by Ramon M. Felciano.

(Mercutio MDEF from Digital Alchemy Copyright ” Ramon M. Felciano 1992-1995, All Rights Reserved)

Some of the lists are handled with The A List:

The A List © 1997 Kyle Hammond

The splash-screen picture is rendered with Persistence of Vision.

Pictures in this document uses buttons of the "Greg's Buttons" type. Some pictures have been created in System 7.5 and others with MacOS 8.

Information about Object Plant (known bugs, new releases etc) can be found at:

http://www.softsys.se/ObjectPlant/

Introduction to the Object Plant

Why ObjectPlant?

In OOA/OOD diagrams of different kinds are a very important part. Much of the modeling of a system is described in diagrams and shorter text paragraphs. One could of course use a general purpose drawing tool like for example the picture editor in Word.

The OMT notation includes

- Object Model diagrams (called Class Diagram in the Unified Modeling Language)
- State diagrams and Event Trace diagram in the Dynamic Model in OMT (called State diagrams and Message Trace diagrams in the Unified Modeling Language)

Registration

The Object Plant is distributed as shareware. You are permitted to use it on a trial basis for up to 30 days. If you wish to continue using the product beyond that period, you are expected to pay a registration fee to obtain a license to use Object Plant.

Entering the license code into the program will remove shareware popups and "Not registered" texts in printouts and exported pictures.

To register use the Register program to create a register form which then shall be sent to Kagi Shareware using mail, email or fax.

The price for a single license is 25 USD, there are also site and world licenses available for 500 USD resp. 2000 USD.

http://www.kagi.com
Email: sales@kagi.com (1 to 3 day processing time delay)
FAX: +1 510 652 6589 (4 to 8 day processing time delay)
Postal address: (4 to 8 day delay plus transit time to Kagi)
Kagi
1442-A Walnut Street #392-MU
Berkeley, California, 94709-1405
USA

Note: a non-registered copy of Object Plant cannot create documents with more than 20 classes and 20 interfaces.

Introduction to Object-Oriented Analysis and Design

This will not be a text book on OOA / OOD. You are supposed to be familiar with terms like object, class, instance, event, state, association etc.

I will however, describe how you are supposed to work with the Object Plant using parts of Object Plant itself as an example.

NB! This section is not yet ready and will be revised and extended in later versions.

Starting a small software project

You should normally start doing Object Model diagrams. Try to find classes that you need and how they relate to each other. The design will be better if you think at a high (abstract) level of your program to be.

When I started designing the Object Plant, I was just thinking about what the program should do (or what I expected it to do). I wanted to draw Object Models. I assumed that I would need a window where I could draw the classes and associations. In my mind it took the shape of a drawing program like FreeHand or Illustrator. A floating window (palette) should hold a set of tools that could be used when drawing the Object Model.

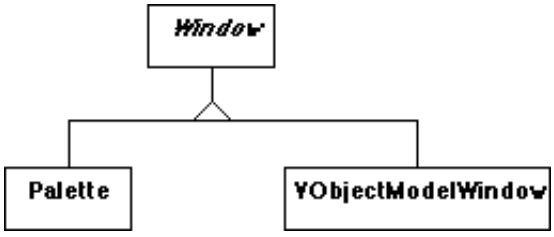
I then created the following classes (in the order they appeared in my mind):

- Window
- VPartOfDrawing
- VAssociation
- MPartOfModel
- MAssociation
- Toolbox
- VObjectModelWindow
- VClass
- MObjectModel
- MClass
- Palette
- WindowManager

I had also decided that I should partition the functionality into View (V) classes and Model (M) classes according to the MVC-model (model-view-controller).

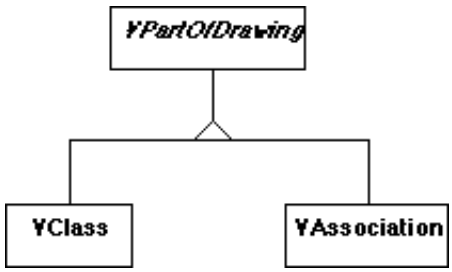
At this analysis stage try not to think of the classes' members such as attributes and operations. Now create all these classes in the Object Model window. If you have the "Open info window on create" option enabled (Edit->Preferences... General) you just click once with the class tool inside the Object Model window and then the created class' info window is displayed and you can start entering the name of the class. Close then the info window and go on creating the other classes.

The Object Plant application will use windows of different kinds. They do have some common appearance and behaviour hence I added the Window class which is an abstract class containing all the common behaviour of all kinds of windows. I also found two types of windows: palettes (floating windows) and the main window containing the Object Model diagram. Position the three classes something like this:

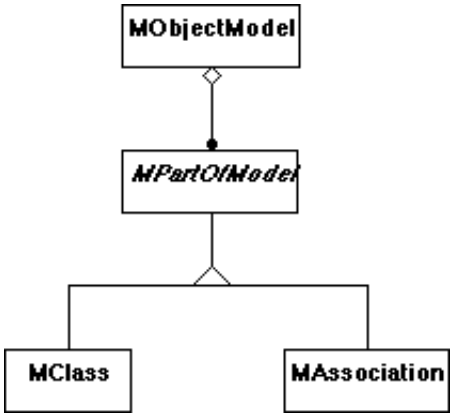


Make a generalization line with the generalization tool from the base class (superclass) Window to the ancestor Palette. Then make another branch with the generalization tool. This is a good start. There are two kinds of windows, palettes and Object Model windows. This is called generalization or inheritance, the Palette and VObjectModelWindow classes inherits behaviour from the abstract class Window. Their common behaviour is defined in the Window class. (The V prefix of the Object Model Window stands for View. Later on I will add an MObjectModel where M stands for Model.)

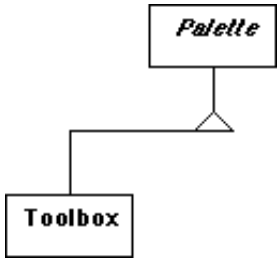
Then I thought that the VObjectModelWindow will contain items of different kinds such as classes, associations etc. They most certainly have something in common (e.g. belonging to the VObjectModelWindow) hence I added the VPartOfDrawing class which is an abstract class containing the behaviour common to all items in an object model diagram.



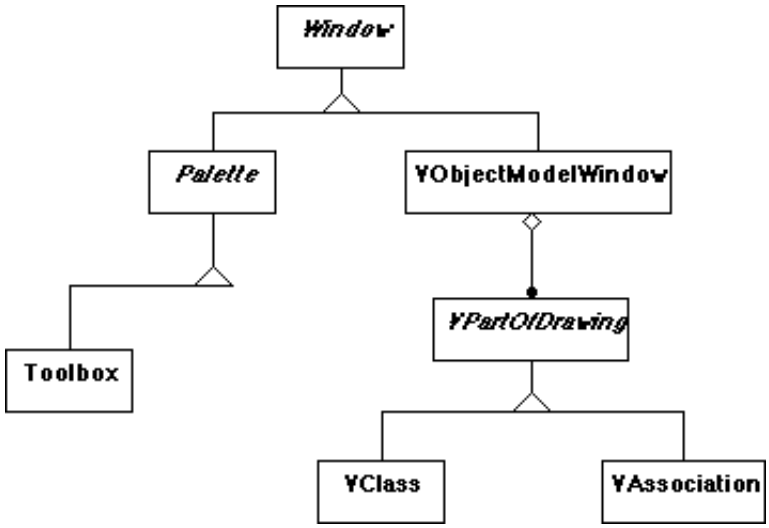
These V (View) classes only control the look of the Object Model diagram. The M (Model) classes hold the model information such as class names, associations between classes etc. Hence there is a similar structure for the model.



Since I would use more than one type of palette I also added the Toolbox class which is a kind of palette, a specialization of the palette class.



At this point an object model diagram could look like this:



Here I have moved the two groups to suitable positions and then connected them with the aggregation tool. I make an aggregation line from the VObjectModelWindow to the VPartOfDrawing class. This means that a VObjectModelWindow object contains (consists of) one or several VPartOfDrawings. The filled circle at the end of the line tells us that there is zero or more parts inside the window. When making the aggregation line it doesn't come with that filled circle but you have to add this info in the aggregation dialog window.

Views

When doing Object Oriented Analysis and Design one often starts with dealing with a small amount of detail information, e.g. only class names are defined in the analysis phase and decisions on class attributes and operations are left until the Design phase. And it is normally first in the implementation phase that data types are introduced.

To support these different levels of abstraction, the Object Plant lets the user define a set of different Views. A View defines what information that shall be visible in the three main windows but also in the dialog windows.

For the different views you have different settings for the Object Model diagrams, Event Trace diagrams, State Diagrams and Use Case diagrams. In the Object Model you can control:

- if the attribute type shall be visible
- if the operation return type shall be visible
- if the operation arguments shall be visible
- if the visibility (public, protected, private) shall be visible
- if the static checkbox shall be visible in dialog windows
- if the notes shall be visible
- if all, none or a selected set of the attributes shall be visible
- if all, none or a selected set of the operations shall be visible
- if all, none or a selected set of the rolenames shall be visible
- if all, none or a selected set of the qualifiers shall be visible

Attributes, operations, rolenames and qualifiers all have a "Show" checkbox in their dialog windows which controls if they belong to the selected set or not.

For example, an attribute is visible if either

- the current view specifies that all attributes shall be visible or
- the current view specifies that selected attributes shall be visible and the attribute's show checkbox (in the class dialog window) is checked.

In the Event Trace diagrams you can control:

- if notes shall be visible
- if all or none of the event names shall be visible

In the State Diagrams you can control:

- if notes shall be visible
- if all, none or a selected set of the entry and exit actions shall be visible
- if all, none or a selected set of the event actions and do activities shall be visible
- if all, none or a selected set of the event extras shall be visible

In the Use Case diagrams you can control:

- if notes shall be visible

Please note that if you choose that notes shall not be visible, the Notes tool is still available and you can create Notes but you can't see them or select them.

An analysis view could for example have the following settings for the Object Model:

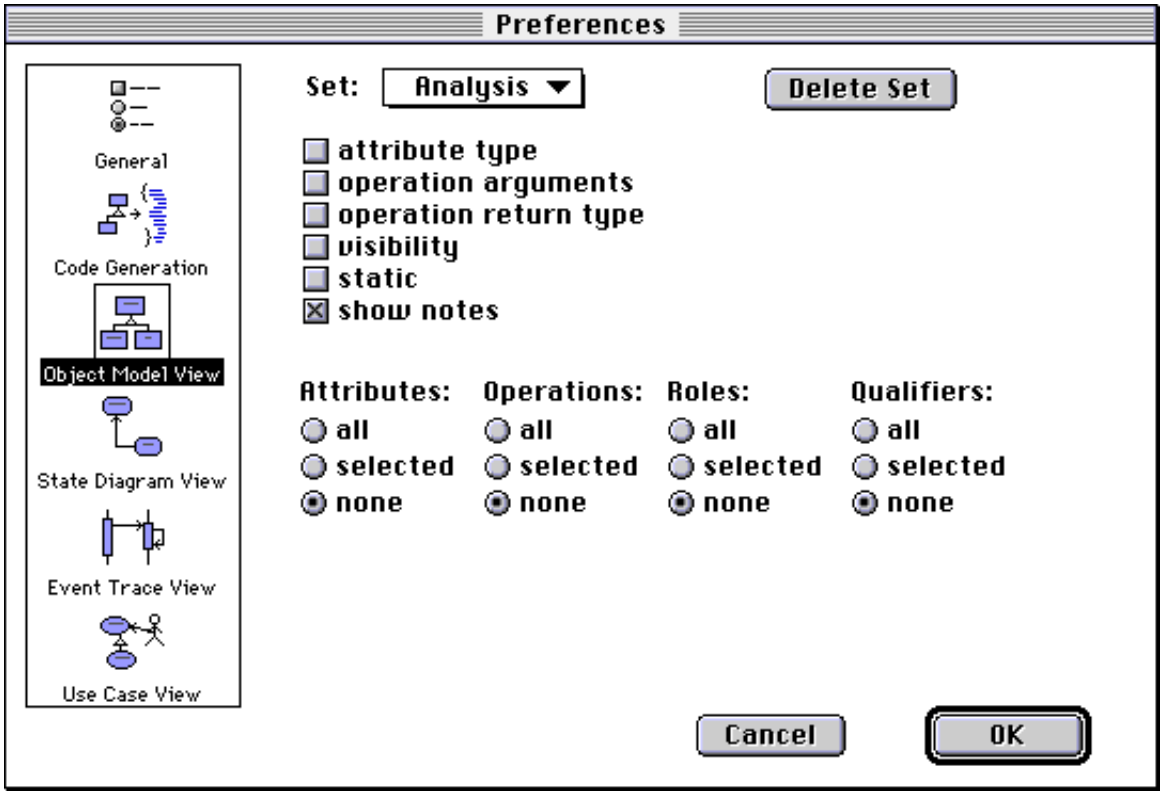


Figure 1. An example of an Analysis Object Model view setting

Then only empty classboxes and associations would be visible and no attributes, operations, rolenames or qualifiers would be displayed.

And a design view could have the following settings for the Object Model:

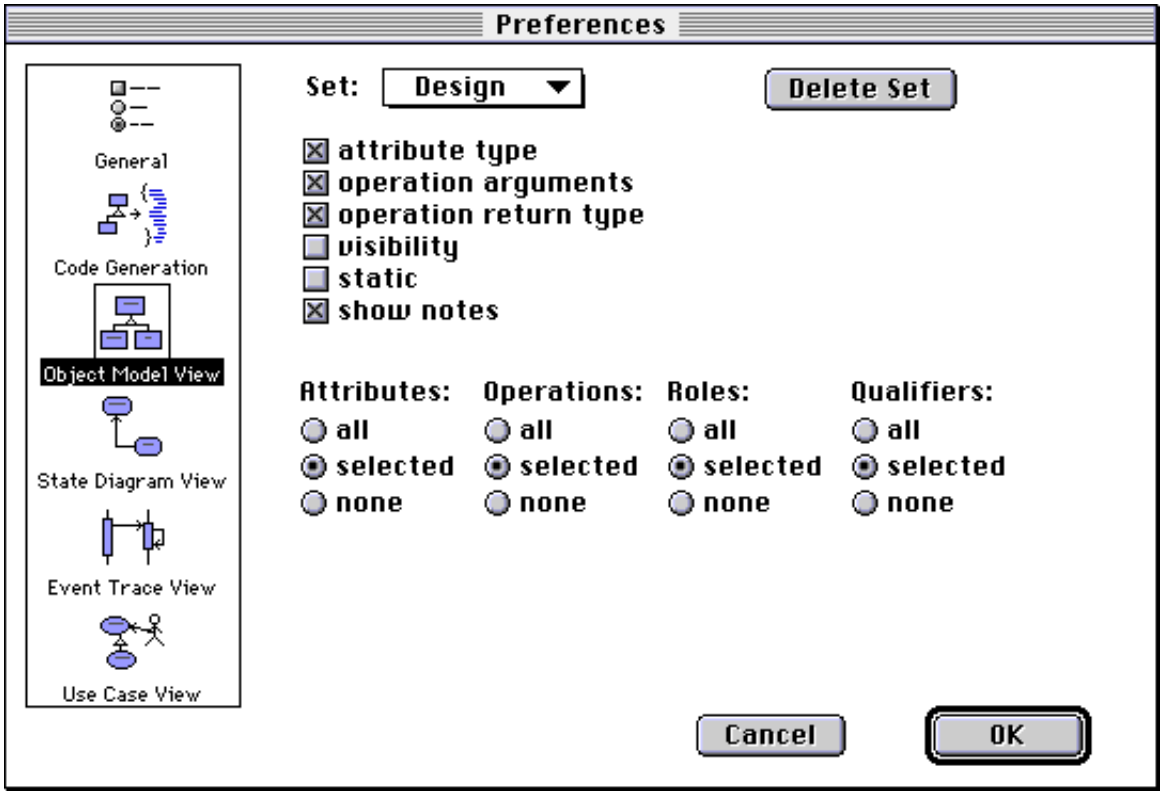


Figure 2. An example of a Design Object Model view setting

Cursors

The Object Plant uses different cursors to indicate different states of the toolbox. When the select tool is active, the cursor can either be an ordinary arrow, a move cursor or a resize cursor (shown below).

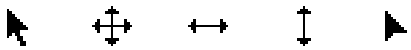


Figure 3. Different select tool cursors
(select, move, horizontal move, vertical move, resize)

Document info

General

The File->Document Info->General... can be used to select the notation to be used with the document.

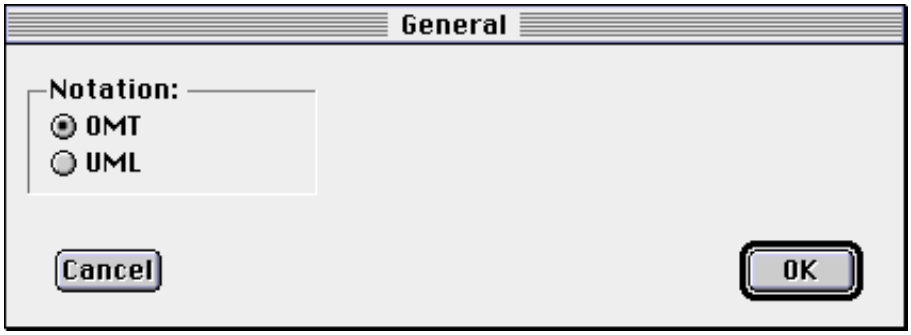


Figure 4. The Document Info->General dialog

If you change the notation, this will not show immediately. You have to close the document and open it again.

Data types

You can define a number of data types that is used within the document. This can be useful when starting to decide upon attribute and operation types. The predefined datatypes will then be included in popup menus to allow easy access to them.

You can also save a set of datatypes which can be used in several documents.

To define a document's data types use the File->Document Info->Data Types... command. In the data types dialog, you can add and remove single datatypes but also load datatype files and create datatype files.

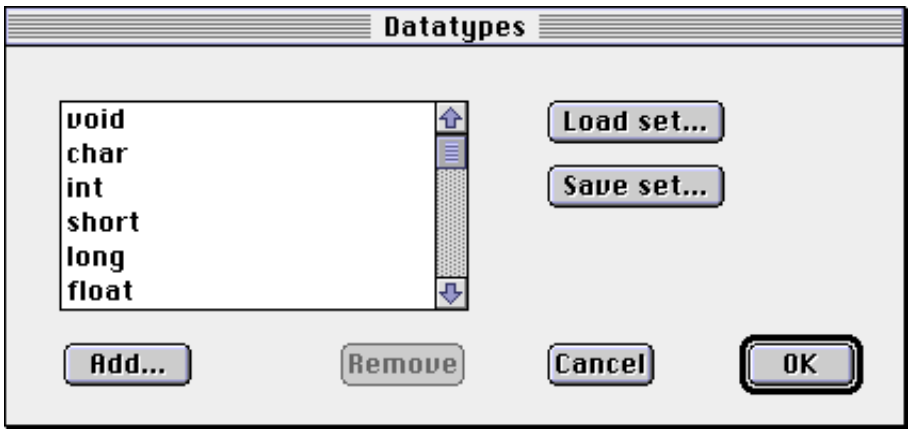


Figure 5. The Document info->Data Types dialog

Exporting diagram pictures

You can export any diagram page in your model. The page will be exported in either PICT or EPS (Encapsulated PostScript) format. Select the File->Export Page as... command and the following dialog box will show up. (Note that this menu is enabled only when one of the four main windows, Object Model, Event Trace, State Diagram or Use Case, is frontmost.)

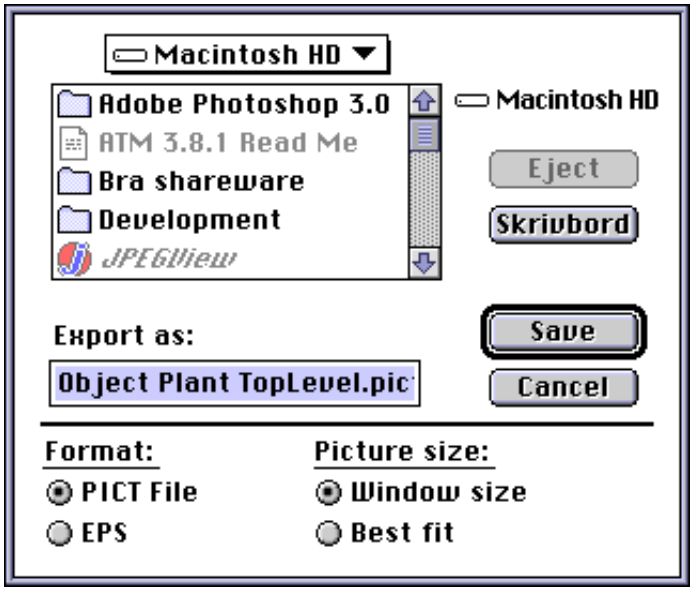


Figure 6. The Export Page dialog

The name of the exported file will default to the name of exported page with a .pict or .eps extension dependent upon the current setting of the format radio buttons.

General Preferences

In the General Preferences dialog you can select:

- if the selected tool will stay active after first use. If this checkbox is not checked, the tool will automatically revert to the Select tool after using any other tool.
- if you want a dialog window to automatically be opened when you create a new item in a diagram, e.g. when you create a new class, the class dialog window will automatically open up if this option is checked.
- if you want to be able to move items immediately when selecting them. If this option is not checked, you will have to wait for a while with the mouse button pressed before the move cursor appears and you are allowed to move the item.
- if you want items to snap to an invisible grid (6x6) (N.B. This is only implemented in the Use Case diagram!)
- if you want a dashed line in the main windows indicating the size of a page
- the size of the black select squares
- the default notation used when creating new documents
- if class boxes shall contain an empty attribute compartment if the class does not have any attributes.
- if information about input/output operation parameters shall be displayed in the parameter info dialog (necessary for IDL code generation).

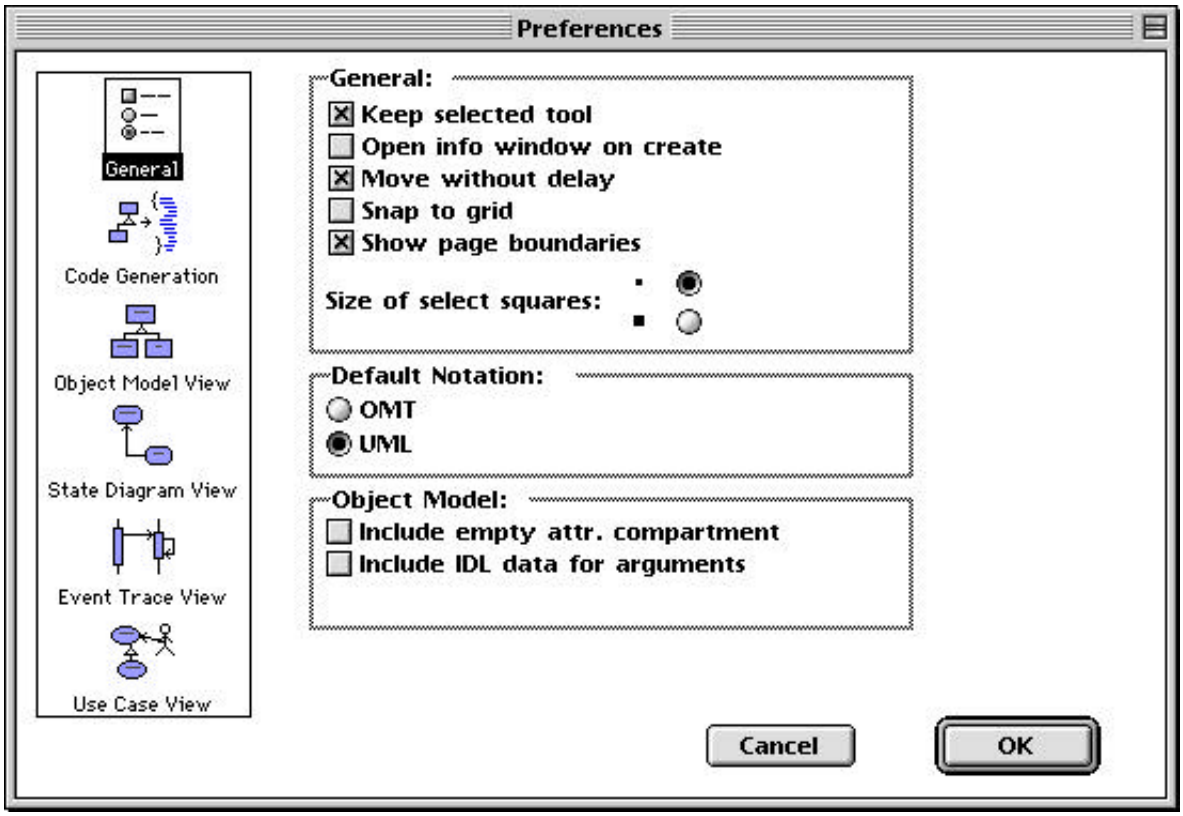


Figure 7. The General Preferences

Code Generation Preferences

If you want to generate C ++ code, there is no need to modify the settings in this preferences dialog. If you, however, want to generate any other kind of code (for which you have specified your own templates) you can select your templates file and also specify how to enclose comments in the generated code. The stop comment field can be left empty if the start comment "tag" works till the end of the line, e.g. the start comment could be set to "/ /" and the stop field left blank for C++.

You can also select the format of date-information output by the code generator. There are only two possible formats: MM/DD/YY or YYMMDD.

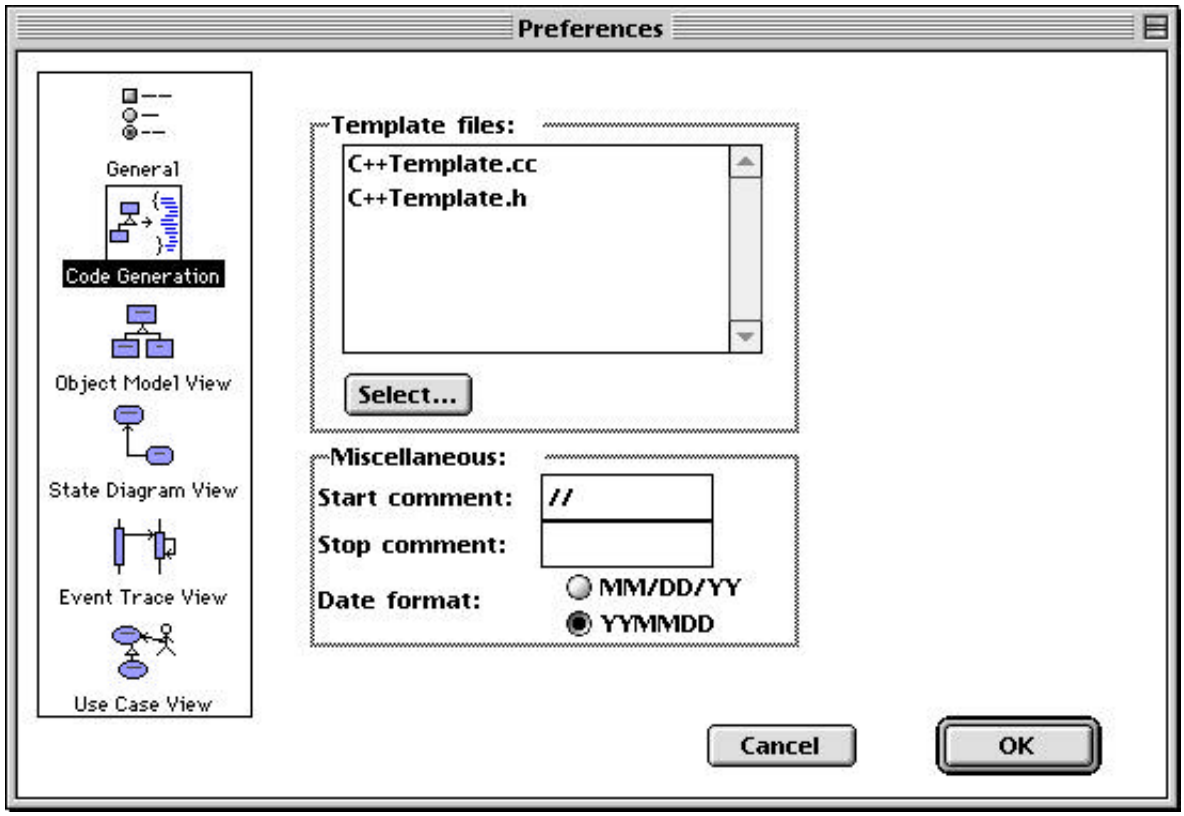


Figure 8. The Code Generation Preferences

Copy and Paste

Copy, Cut and Paste is implemeted in the Object Plant for all textfields. Copy and Paste is also implemented for the following diagram items:

- Classes (Object Model)
- Interfaces (Object Model)
- Attributes (Object Model)
- Operations (Object Model)
- States (State Diagram)
- State Events (State Diagram)
- Threads (Event Trace Diagram)
- Actors (Use Case diagrams)
- Use Cases (Use Case diagram)

As you can see, references, associations, events and packages cannot be copied. This will be implemented in later versions of the Object Plant.

Undo

Undo is only implemented for most delete operations. The exceptions are:

- no undo for delete in text fields.
- no undo when deleting packages or classes with subsystems

Drag-and-Drop

Drag-and-Drop is partly implemeted in the Object Plant. It can be used in the Class, Interface and State info windows. It can also be used in the datatypes dialog and the operation dialog.

In the Class and Interface info windows, drag-and-drop can be used to re-order the attributes and operations.

In the State info window, drag-and-drop can be used to re-order the events.

An example: If you have a list of three attributes, height, width, length and you want to change the order to width, height, length, select the height attribute by clicking to the left of the attribute's disclosure triangle, drag the height attribute without releasing the button and drop it on the width attribute. Voilá, the attributes have been re-ordered.

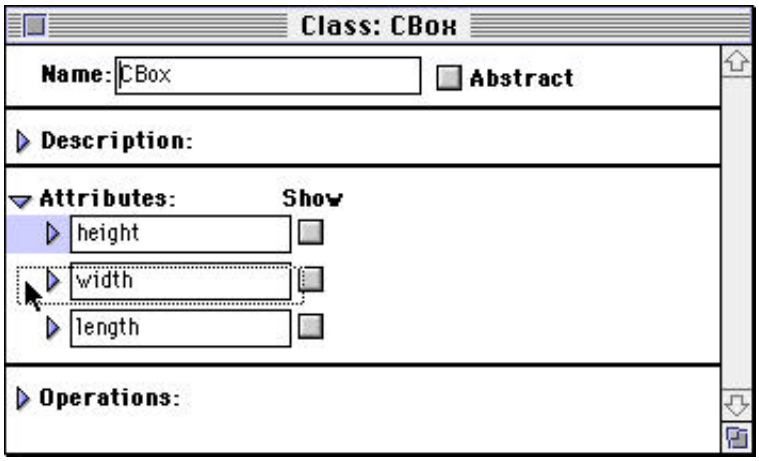


Figure 9. Drag-and-Drop in a class dialog window

It is only possible to drag within a window and not between two different windows.

In the datatypes dialog , drag-and-drop can be used to re-order the data types. In the operation dialog, drag-and-drop can be used to re-order the list of parameters.

Non-obvious keyboard shortcuts

The following keyboard shortcuts are available.

When any of the three main windows is active:

- TAB-key steps through the tools of the toolbox
- Shift-TAB steps through the toolbox in the reverse order
- escape-key selects the Select tool
- command-option-left arrow: align left
- command-option-right arrow: align right
- command-option-top arrow: align top
- command-option-bottom arrow: align bottom
- command-option-A: select association tool
- command-option-C: select class tool
- command-option-G: select generalization tool
- command-option-H: select aggregation (has a) tool
- command-option-I: select interface tool

When the textcursor is in a textfield that has a show checkbox, ctrl-S can be used to toggle the checkbox.

In the Class, Interface and State info windows, the delete key can be used to delete selected attributes, operations or events. If there aren't any selected items, the delete key will be applied to the active textfield in the info window. The backspace is always applied to the active textfield.

Joining line segments

Lines are used by the Object Plant in associations between classes (and interfaces) and events between states. A line can consist of one or several segments. When a line is selected the endpoints of all segments are marked with a filled square. A segment can be divided into two smaller segments using the cut tool and two segments can be joined into one segment by using the select tool and moving the filled square that links the two segments and drop it on the end of either of the two segments. You have to move the middle point to (almost) the exact position of either endpoint. I know that this can be tricky but at least there is a way of joining line segments.

Pages

An Object Model can consist of one or several pages. The page metaphor is close to how one works with a pen and paper, you cannot simply draw a complete Object Model diagram in one single sheet of paper, you must normally have several pages, each page describing a subsystem of the complete system being modeled. Or sometimes having several pages describing parallel systems.

For each Object Model page you can specify if you want that page to generate code when using the "Generate Code..." command. If the "Generate Code" checkbox in the Page dialog window is checked, code will be generated for that particular page.

Adding a new toplevel page

Adding a new page at the toplevel can be done with the Special->New Page menu command. New pages at the toplevel will always be put last in the list of pages and there is no way to change the order that the pages appear in the page palette.

Changing the name of a toplevel page

If you doubleclick on a page name in the page palette you will get a dialog window where you can change the name of the page and also enter a short description of the page's content. There are no controls that the name you select is properly chosen. You can even enter the same name as another page.

Note:

Do not start the name of a toplevel page with any space characters! That will make it look like a subpage and then you cannot alter the name of the page.

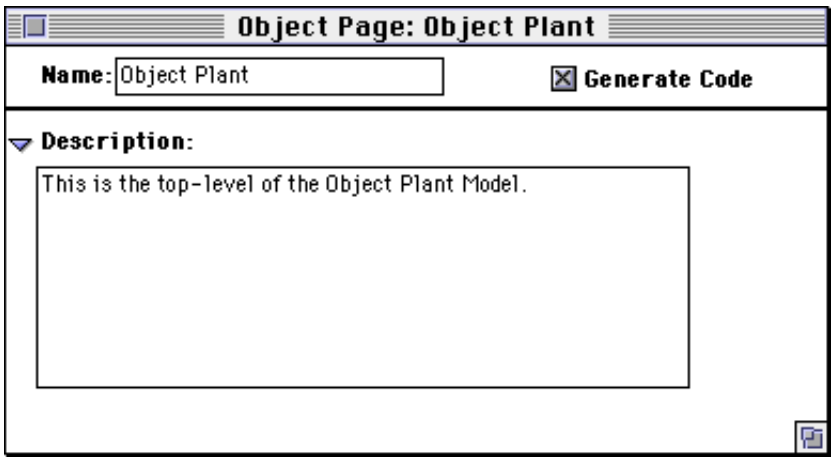


Figure 10. Object Model Page Dialog Window

Adding a sublevel page

When drawing Object Model diagrams on ordinary paper it's quite common to link two pages by adding a box with the subsystem's name inside it on the main page and then put that name as the header of the linked page. You can almost do the same way when using Object Plant. To add a new subsystem to the current page, use the class tool and create a class box by clicking somewhere in the Object Model window. Then option-doubleclick the class box and a new page will be created. The name of that new page will be identical to the name of the class box. A subsystem is treated exactly as an ordinary class. The new page will automatically be added to the page palette beneath the current page's entry. The name of the subpage will be indented relative its parent to indicate that it is a subpage.

Changing the name of a subpage

If you want to change the name of a subpage you cannot doubleclick inside the page palette like you do with toplevel pages, but you have to change the name of the class box by bringing up the class dialog window for the subsystem class box. Doubleclick on the subsystem's class box and in the dialog window enter the new name of the subsystem. The name of the subsystem page will change automatically.

Elements in an Object Model

In an Object Model page you can have the following kinds of elements:

- classes
- interfaces
- supplier associations
- associations
- aggregations
- generalizations
- packages
- notes

The Object Model toolbox contains eleven different tools:

- select tool
- class tool
- interface tool
- supplier tool
- association tool
- aggregation tool
- generalization tool
- package tool
- cut tool
- note tool
- inspect tool

Classes

The class tool is used to create classes. Select the class tool and click in the Object Model diagram page where you want the upper left corner of the class box to be positioned. A class box is drawn and the name of the new class is [Untitled]. If you have selected the "Open info window on create" option in Edit->Preferences... General, the dialog window will automatically be displayed when a class is created. The class dialog window can also be displayed by doubleclicking inside the class box or selecting the class box and then use the Special->Info... menu command.

The class dialog window

The class dialog window is divided into four sections:

- Name
- Description
- Attributes
- Operations

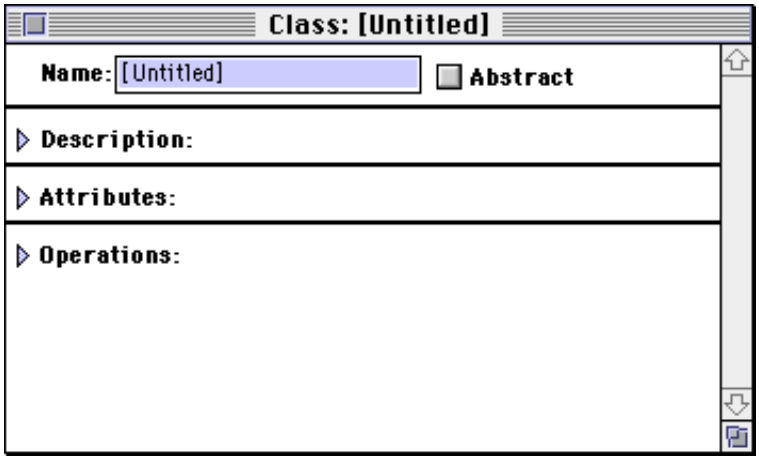


Figure 11. The dialog window of a new class

In the Name section, you can enter the name of the class. There is also a checkbox where you can select if the class is abstract or not. Abstract classes have all text written in italics. (This is not standard OMT notation, but has been adopted by the Unified Modeling Language.)

Description contains a text field where you can enter a short description of the class. The attributes and operations sections are empty in a newly created class.

Add an attribute

To add an attribute to a class you must have the class dialog window as the front window. Then a new menu called Class becomes active. In this menu there are two items: New attribute and New operation. Select the "New attribute" command to add a new attribute. Then the attribute section opens up and the new attribute is displayed with the name of the attribute set to "New".

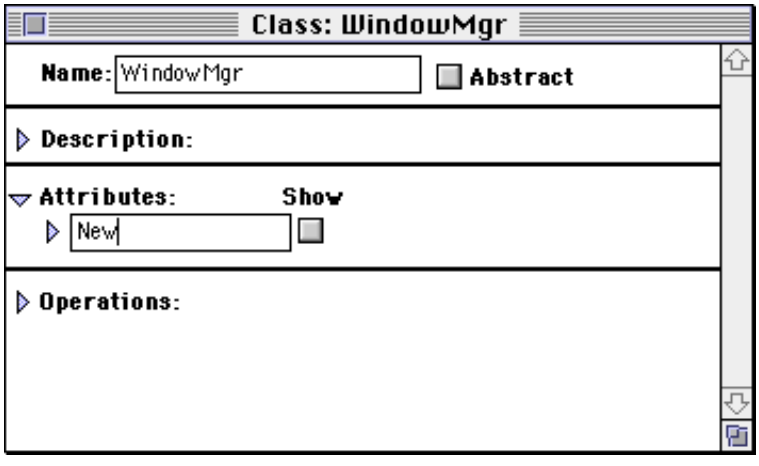


Figure 12. A class dialog window when adding a new attribute

If you have the "attribute type" option in the current View enabled you will also see a popup menu to the left of the name of the attribute. This popup menu contains a list of all the datatypes that have been specified for this document in the File->Document Info->Datatypes dialog. If you created a new document, no data types are defined hence the popup menu is very short. A new attribute has a type called "[empty]". If you need a datatype that is not listed in the popup menu you can enter the data type directly in the textfield to the left of the popup menu.

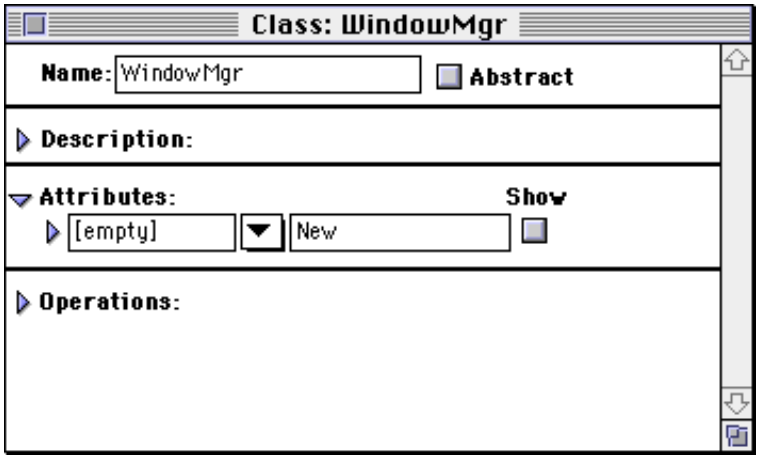


Figure 13. A class dialog window with new attribute and the type is shown

To the right of the attribute's Name text field, there is a checkbox labeled "Show". Refer to the Different Views section for an explanation.

An attribute line in the attribute section can also be opened to reveal a description text field.

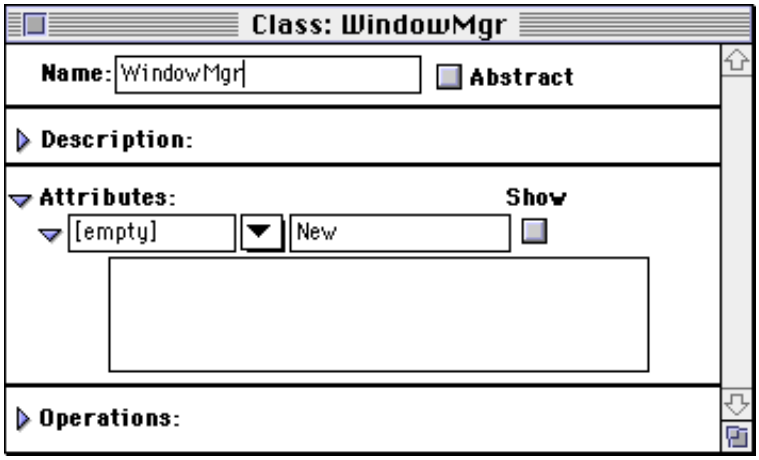


Figure 14. The attribute description field opened

If you have the "visibility" option in the current View enabled you will also see three radio buttons to the right of the show checkbox. The radio buttons are used to select a "visibility level", public (+), protected (#) or private (-), for the attribute.

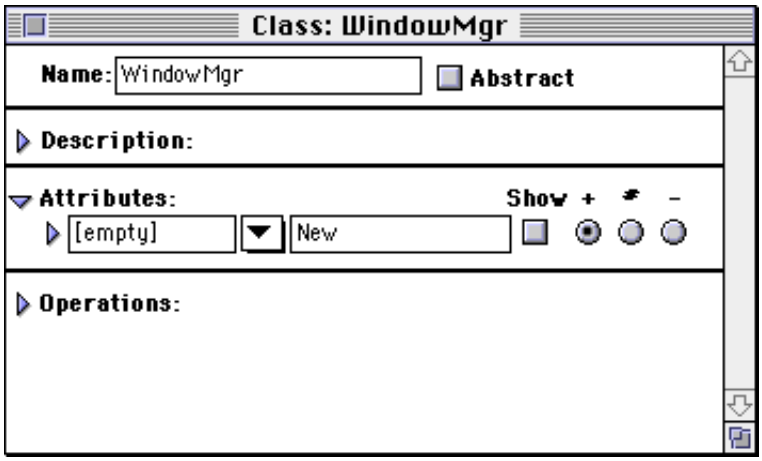


Figure 15. A class dialog window with attribute and the visibility is shown

Add an operation

Adding a operation is as simple as adding an attribute. Be sure that the class' dialog window is in front and then select Class->New operation. The rest is very much like adding an attribute.

The popup menu (with its associated text field) to the left of the name (only displayed if the "operation return type" option in the current View is enabled) of the operation specifies the return type of the operation.

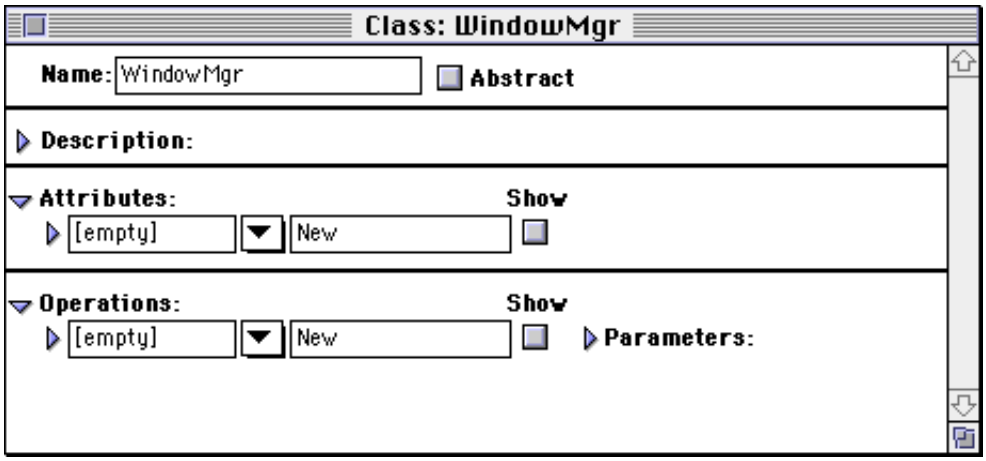


Figure 16. A class dialog window with new operation

A new operation has a return type called "[empty]". The parameters section is only displayed if the "operation arguments" option in the current View is enabled. Clicking the disclosure triangle will show a small list with the operation parameters, their types and names.

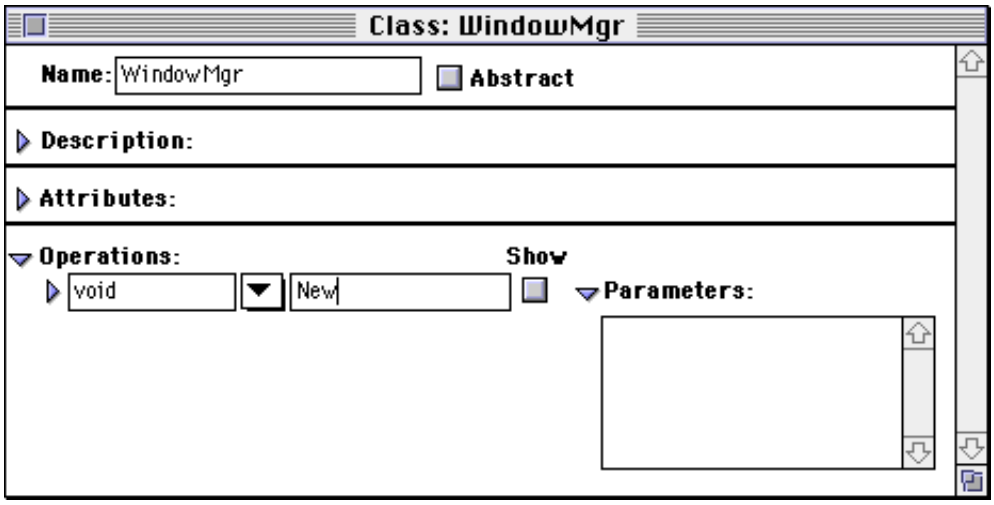


Figure 17. A class dialog window with an operation and its parameters

In the picture above the operation does not have any parameters.

Adding a parameter to an operation

Adding a parameter to an operation can be done if the textcursor is positioned within any of the operation's text fields (operation name or description field) and the Class->New Parameter command is selected. Then a dialog window will appear where you have to specify the type of the parameter and the parameter's name. In the picture below a parameter with type 'int' and name 'height' has been added.

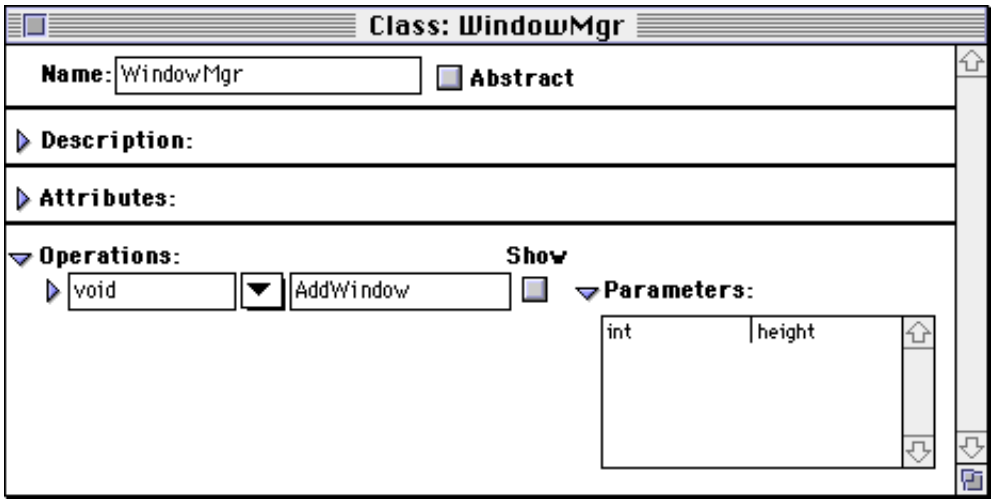


Figure 18. A class dialog window with an operation and its parameter

Changing a parameter

To change a parameter doubleclick on the parameter in the parameter list and the parameter dialog window will show up where you can change the type and the name of the parameter.

Delete a parameter

To delete a parameter select the parameter in the parameter list and then choose the Edit->Clear (or the keyboard shortcut: the delete key) menu command.

The Operation dialog

To be able to specify more details about an operation, you can double-click to the left of the operation's disclosure triangle to open a dialog window for the operation. This dialog window contains more code generation specific data, e.g. const, static, final data.

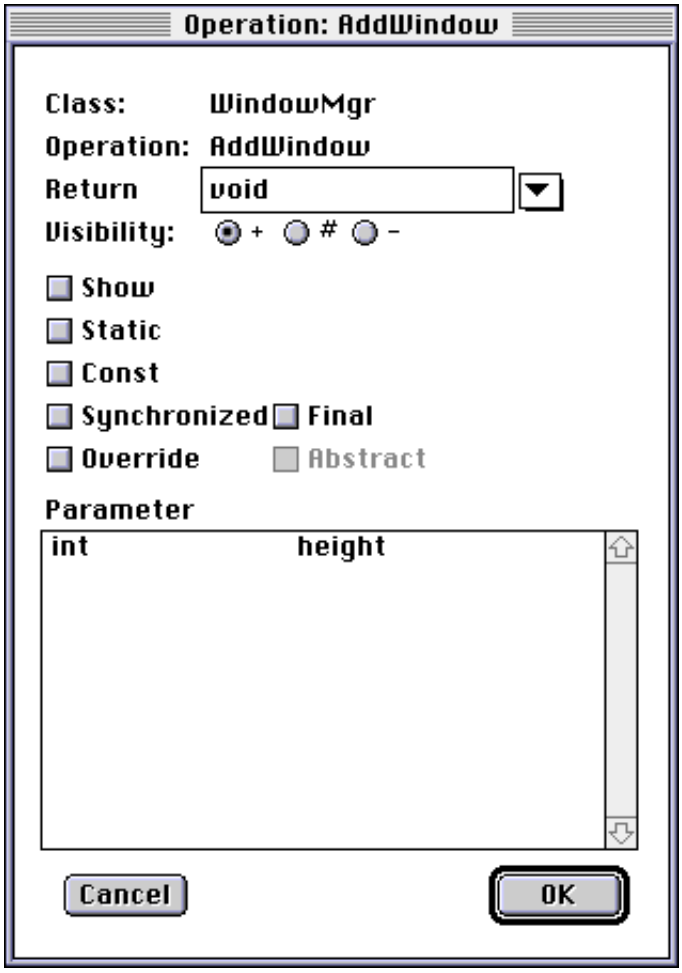


Figure 19. An operation dialog window

If the Static checkbox is checked, the {STATIC} tag in the code generation template files will be used. The same goes for the Const, Synchronized, Final, Override and Abstract checkboxes. Refer to the section describing the code generation.

Delete an attribute or operation

To delete an attribute (or operation) select the attribute you want to delete by clicking at the left side of the attribute line (right below the "disclosure triangle" of the attribute section in the class dialog window). The attribute line then gets selected. If you then choose Edit->Clear (or the keyboard shortcut: the delete key) the attribute is deleted. You can select more than one attribute at a time by shift clicking. To deselect an attribute just click once more in the left side of the attribute line.

Moving a class box

To move a classbox, use the Select tool. Click and hold the mouse inside the classbox. The box can then be moved.

Note:

If you have the "Move without delay" option disabled, you must hold the mouse down a while before the cursor changes into the move cursor and the classbox can be moved.

"Nudging"

All items in the drawings can be moved by using the arrow keys. They will then move one pixel for each key press. Using option-arrow key gives a coarser move.

Resizing a classbox

The size of a classbox is automatically computed by Object Plant. Hence you cannot change the size of a classbox.

Several copies of a single class

Sometimes it is necessary to have a class displayed in several pages of an Object Model, but they all refer to one and the same class in the model, i.e. there are several class box icons in the Object Model diagrams but only one class storing the information. For example if you have a kind of a base class CPersistence that all other objects that need to be be persistent shall inherit from, you want to define the CPersistence class once and then have several references to that class, possibly one reference in every single page in your model.

Creating several CPersistence classes would not give the desired result if you consider code generation. In that case several CPersistence class files would be generated and maybe you have to merge them manually to get a single CPersistence class file.

The solution to this is to create a class reference, ie. a class box that refers to an already existing class. A class reference is created by using the class tool but holding down the shift key when clicking in the Object Model diagram. If you do that a dialog will appear where you will have a popupmenu listing all existing classes to choose from. Select the class that you what this class reference to refer to.

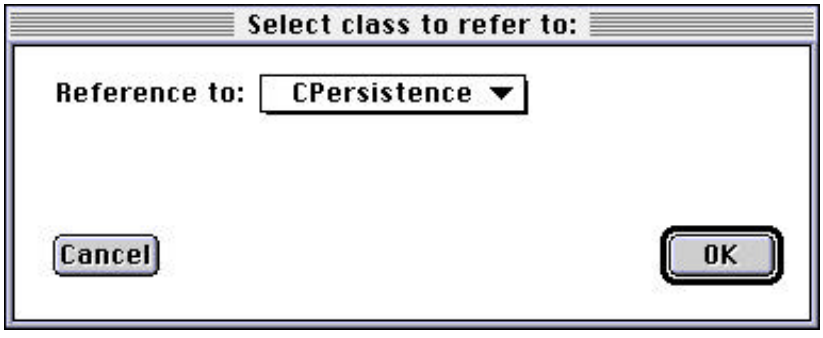


Figure 20. Class reference dialog

A class reference box looks much like an ordinary class, but attributes and operations are never displayed, only the class name preceeded name of the page where the original class is located.

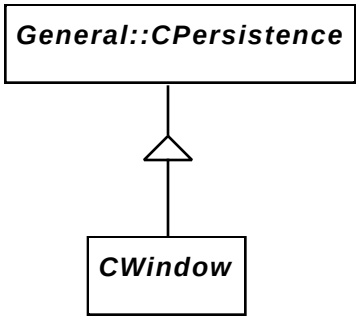


Figure 21. A class reference

If you delete a class reference box, only that reference is deleted and the main class and all other references are unaffected. If you try to delete an ordinary class which have reference classes you will get an popup confirming the delete operation. If you confirm the main class and all of the references will be deleted.

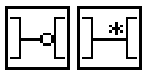
Interfaces

The interface tool is used to create interfaces. Select the interface tool and click in the Object Model diagram page where you want the upper left corner of the interface box to be positioned. An interface box is drawn and the name of the new interface is [Untitled].

An interface is very much the same as a class. It will behave almost identically in the Object Plant. There are, however, some differencies:

In the interface dialog window, the attributes and operations never have any visibility radio buttons since an interface (and its attributes and operations) by default is public.

As with classes, an interface may have references, ie. several interface box icons representing the same interface model item. Using the interface tool while holding down the shift key creates an interface reference box.



Associations

The association tool is used to create associations between classes. Select the association tool and click and hold the mouse inside a class that shall be linked to another (or the same) class with an association. Drag the mouse to point at the other class and then release the mouse button. An association is now drawn between the two classes. It is either a single straight line or any combination or horizontal and vertical lines that connect the classes.

If you have selected the "Open info window on create" option in Edit->Preferences... General, the dialog window will automatically be displayed when an association is created. The association dialog window can also be displayed by doubleclicking on the association line or selecting the association and then use the Special->Info... menu command.

The association dialog window

The association dialog window is divided into three sections:

- Name
- Description
- Role, Qualifiers & Multiplicity

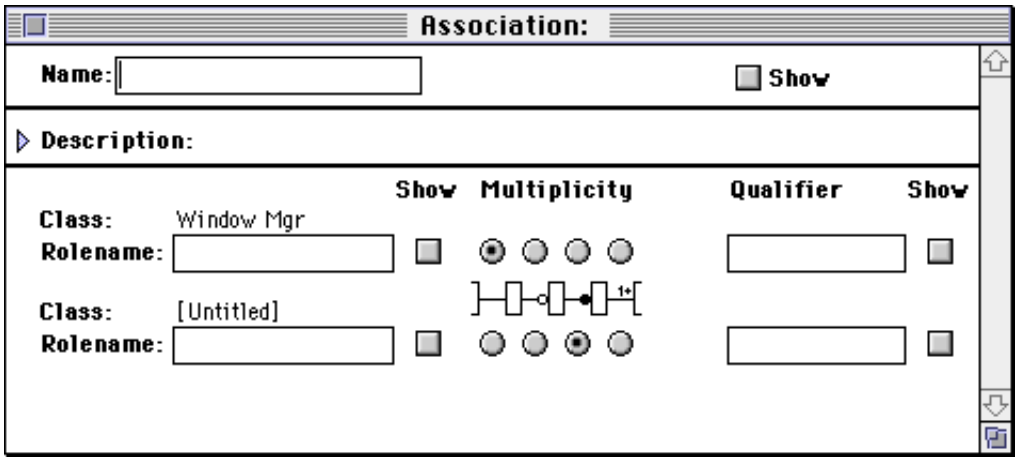


Figure 22. The association dialog window

The name of an association in never shown in the current version of the Object Plant, hence the Show checkbox to the right of the name is not used.

In the Role, Multiplicity and Qualifiers section we find the names of the two (or one if it is a selfreferencing association) classes that are connected by the association. Each end of an association can have a rolename that can be specified in the Rolename text fields. You can also specify the multiplicity of each end of the association. A line with an empty ring means that zero or one of the closest class is connected to the other class. A filled ring means zero or more. No ring means exactly one. In the picture above, there is exactly one WindowMgr object connected to zero or many objects of the [Untitled] class.

The last of the four radiobuttons gives you the possibility to specify any range in an extra text field, e.g. a car has three or four wheels (shown in the picture below).

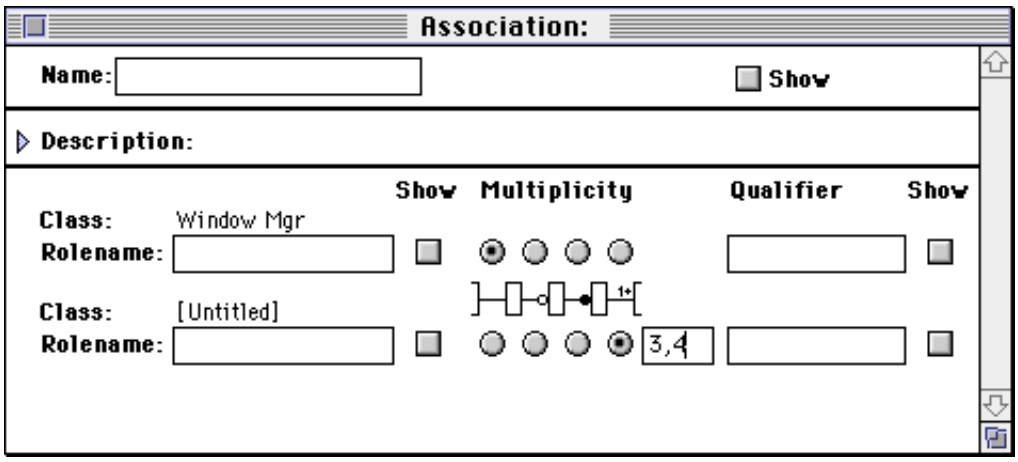


Figure 23. The association dialog window with specified multiplicity

Qualifiers

Furthermore you can specify a qualifier for each end of an association. A qualifier is shown only if either:

- the current view specifies that all qualifiers shall be visible or
- the current view specifies that selected qualifiers shall be visible and the qualifier's show checkbox (to the right of the qualifier's textbox) is checked.

Moving associations

You can move endpoints of a linesegment, but only one point at the time. To move a line segment you need to do two move operations, one for each endpoint. The Select tool is used to move an endpoint. Click and hold the mouse on the black square at the endpoint and when the cursor changes into the move cursor you can move the endpoint. If the endpoint is connected to a class, the move will be constrained to the classbox. Other endpoints can be moved freely.

Note:

If you have the "Move without delay" option disabled, you must hold the mouse down a while before the cursor changes into the move cursor and the endpoint can be moved.

Aggregations

The aggregation tool is used to create aggregations between classes. Select the aggregation tool and click and hold the mouse inside a class that shall be linked to another (or the same) class with an aggregation . Drag the mouse to point inside the other class box and then release the mouse button. An aggregation is now drawn between the two classes. It is either a single straight line or any combination or horizontal and vertical lines that connect the classes.

If you have selected the "Open info window on create" option in Edit->Preferences... General, the dialog window will automatically be displayed when an aggregation is created. The aggregation dialog window can also be displayed by doubleclicking on the aggregation line or selecting the aggregation and then use the Special->Info... menu command.

The aggregation dialog window

The aggregation dialog window is divided into three sections:

- Name
- Description
- Role, Multiplicity & Qualifiers

Below is an example of a dialog window for a multibranch aggregation.

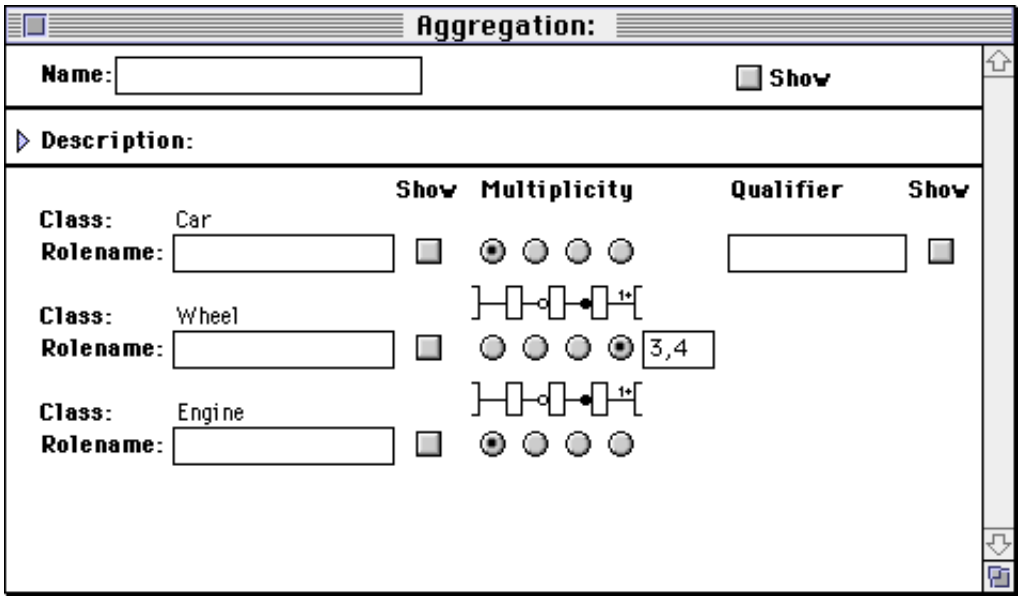


Figure 24. The aggregation dialog window with specified multiplicity

The name of an association in never shown in the current version of the Object Plant, hence the Show checkbox to the right of the name is not used.

In the Role, Multiplicity & Qualifier section we find the names of the classes that are connected with the aggregation. The first class listed is always the top class which "consists of" the other classes.

Each aggregation branch can have a rolename that can be specified in the Rolename text fields. Furthermore you can specify the multiplicity of each branch.

Creating multibranch aggregations

It is possible to make multibranch aggregations by first making an ordinary aggregation and then when the second branch is to be created, click and hold the mouse inside the diamond of the first aggregation, drag the mouse and release it inside the class of the second of the second branch.

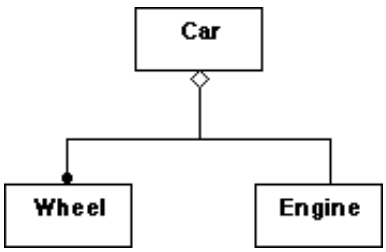
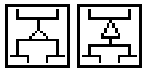


Figure 25. A multibranch aggregation

Moving aggregations

Aggregations are moved in the same way as associations are moved but with one exception, the endpoint of the stem of a multibranch aggregation can only be moved if the stem itself is selected, i.e. you cannot move the "branchpoint" if you select a branch and then tries to move the branchpoint.



Generalizations

The generalization tool is used to create generalization between classes. Select the generalization tool and click and hold the mouse inside a class that shall be the superclass (ancestor). Drag the mouse to point inside the generalized class box and then release the mouse button. A generalization is now drawn between the two classes. It is either a single straight line or any combination or horizontal and vertical lines that connect the classes.

If you have selected the "Open info window on create" option in Edit->Preferences... General, the generalization dialog window will automatically be displayed when a generalization is created. The generalization dialog window can also be displayed by doubleclicking on the generalization line or selecting the generalization and then use the Special->Info... menu command.

The generalization dialog window

The generalization dialog window is divided into two sections:

- Name
- Description

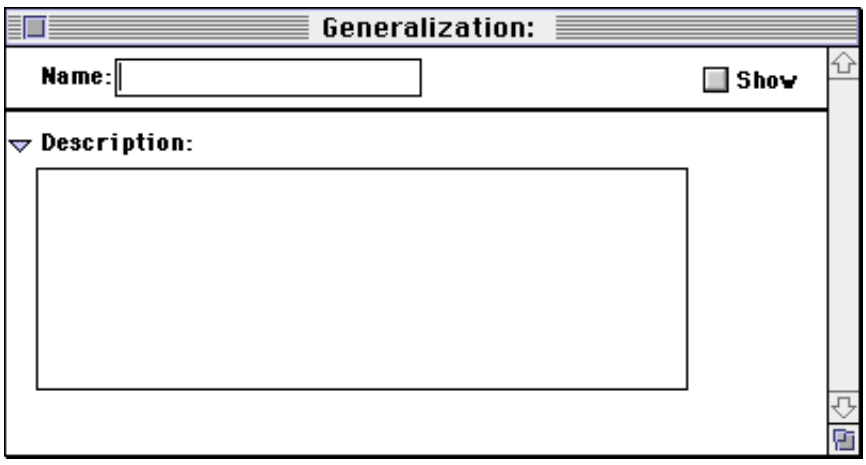


Figure 26. The generalization dialog window

Creating multibranch generalization

It is possible to make multibranch generalization by first making an ordinary generalization and then when the second branch is to be created, click and hold the mouse inside the pyramid of the first generalization, drag the mouse and release it inside the class of the second of the second branch.

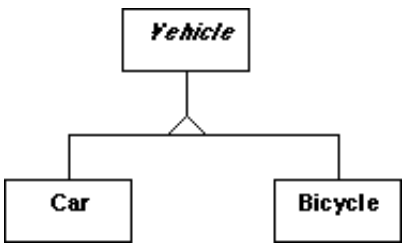


Figure 27. A multibranch generalization

Moving generalizations

Generalizations are moved in the same way as aggregations are moved.

Suppliers

The supplier tool is used to create supplier relations between a class and an interface. Select the supplier tool and click and hold the mouse inside a class that shall be the supplier . Drag the mouse to point inside the interface box and then release the mouse button. A supplier line is now drawn between the class and the interface. It is either a single straight line or any combination or horizontal and vertical lines .

If you have selected the "Open info window on create" option in Edit->Preferences... General, the supplier dialog window will automatically be displayed when a supplier relation is created. The supplier dialog window can also be displayed by doubleclicking on the supplier relation line or selecting the supplier relation and then use the Special->Info... menu command.

Packages

The package tool is used to create a package. A package is a group of model items and every package is associated with an own page which name is the same as the package's name.

When you create a package a new page will automatically be created and the new (and empty) page will be displayed right after creating the new package.

If you have selected the "Open info window on create" option in Edit->Preferences... General, the package dialog window will automatically be displayed when a package is created. In the package dialog you can name the package and also enter a textual description of the package.

Cut Tool

With the cut tool a line segment can be split into two segments. Just click on the line where you want the line segment to be split. You can join two segments by dragging their connect point and drop it at either end point of the two segments.

Notes

A note is general text field. Notes are supported by the Unified notation but not in OMT. The note dialog window only includes one section, the description, which is the text that is displayed inside the note. The size of a note will not be computed automatically like the class box. You can change the size of the note box by clicking the mouse in one of the corners, wait for the cursor to change into the resize cursor and stretch the box by moving the mouse.

Note:

If you have the "Move without delay" option disabled, you must hold the mouse down a while before the cursor changes into the resize cursor.

Inspect Tool

The inspect tool can be used to read the description of any item (class, association, generalization or aggregation) without opening a dialog window. Select the inspect tool and position the magnifier glass above an item and the description text will be displayed.

If you double-click on any item in the Object Model diagram, the item's dialog window will be displayed with the Description box opened.

Pages

An Event Trace diagram normally describes a scenario that has been chosen for some reason. Perhaps because the scenario involves parallel activities which is easily described in an Event Trace diagram.

For a complete system a set of Event Trace diagrams can be drawn. How many Event Trace diagrams that is drawn depends on the nature of the system being described.

As with the Object Model diagram the page metaphor is close to how one works with Event Trace diagrams. The difference to Object Model diagrams is that you normally don't nest Event Trace diagrams. Or at least you can't nest them in Object Plant. You can always use the package tool to group event trace diagrams into logical units.

Elements in an Event Trace diagram

In an Event Trace diagram page you can have the following kinds of elements:

- threads
- boxes
- events
- packages
- notes

Threads

When drawing Event Trace diagrams a thread is a specific object instance or any instance of a specific class. To guide the user towards this use of thread-class "cohesion", the dialog window for a thread looks a bit different from other dialog windows. Instead of a free text field for the name of the thread, a popup menu is displayed containing a list of the classes that the complete system contains.

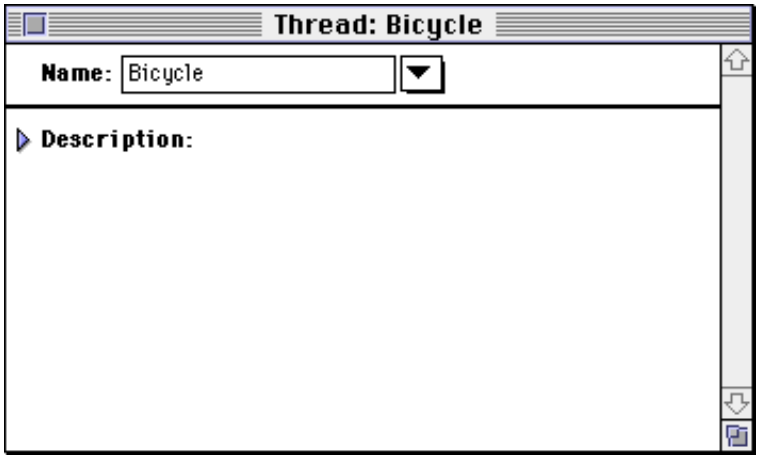


Figure 28. The thread dialog window

If you want to name your thread to something else you can enter any name in the textfield to the left of the popup menu.

If you don't start with the Object Model and define the classes but rather start with the Event Trace diagram you will get an almost empty list when selecting the popup menu. This is one good reason for starting with the Object Model.

Resizing a thread

To change the length (or height) of a thread use the select tool and position the cursor above either the top end of the thread or the lower end of thread. Click and hold the mouse on the black square (if the thread is already selected) at the endpoint and when the cursor changes into the resize cursor you can move the endpoint.

All the threads in a page must have the same length, hence if you modify the length of one thread, all the others will also change length.

Note:

If you have the "Move without delay" option disabled, you must hold the mouse down a while before the cursor changes into the resize cursor and the endpoint can be moved.

Boxes

With box tool you can place frames on threads that indicates when a thread is active. The definition of "active" is a bit vague, in a multiprocess system it may indicate that a process is running, in a single-process system it can indicate that code belonging to the thread is executed, or waiting for other threads to complete a task.

When the box tool is active and you move th cursor above a thread, there will be a box hanging from the cursor ready to be placed on the thread. Click once to create a box where the mouse is positioned.

A box does not have a dialog window since no information is needed for a box.

Moving a box

To be filled in.

Resizing a box

To change the height of a box use the select tool and position the cursor above either the top end of the box or the lower end of the box. Click and hold the mouse on the black square (if the box is already selected) at either endpoint and when the cursor changes into the resize cursor you can move the endpoint. The move of an endpoint will be constrained by event lines, thread limits and other boxes.

Note:

If you have the "Move without delay" option disabled, you must hold the mouse down a while before the cursor changes into the resize cursor

Events

The event tool is used to create interactions between threads. Select the event tool and click and hold the mouse inside a box that shall interact with another (or the same) box. Drag the mouse to point at the other box and then release the mouse button. An event is now drawn between the two boxes. Note that you can only make "horizontal" events, i.e. it must be possible to connect the two boxes with a horizontal line.

If you have selected the "Open info window on create" option in Edit->Preferences... General, the dialog window will automatically be displayed when an event is created.

The event dialog window

The event dialog window is divided into three sections:

- name
- description

The event dialog window looks different depending upon if the receiving thread is a class thread or some other kind of thread.

If the receiving thread is a class, the dialog window looks like this:

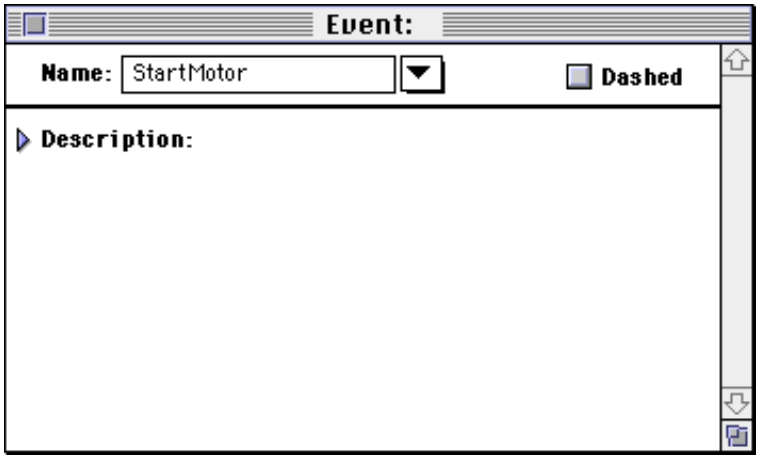


Figure 29. The event dialog window

Where the Name section has a popup menu containing a list of operations that the receiving thread (class) has.

If the receiving thread is not a class, the Name section contains an ordinary text field without the popup menu for the name. To the right of the name, there is a checkbox labeled "Dashed". If you check it, the event line will be dashed. This is not standard OMT, but is sometimes used to indicate creation of the receiving thread object.

Below the name field there is an ordinary text field for a description of the event.

Moving an event

The Select tool is used to move an event. It can only be moved up and down within the limits of the sender and receiver thread boxes. Click and hold the mouse on the event line and when the cursor changes into the move cursor you can move it.

Note:

If you have the "Move without delay" option disabled, you must hold the mouse down a while before the cursor changes into the move cursor and the event can be moved.

Pages

A State Diagram normally describes the different states that an object instance of a specific class can take. Not all objects have internal states, but the classes that do have internal state handling can be described with a State Diagram each.

As with the Object Model and Event Trace diagrams the page metaphor is close to how one draws State Diagrams on paper. You describe the behaviour of a class in a separate State Diagram (a diagram / page). Sometimes State Diagrams are used to described complex behaviour and then nested State Diagrams is useful. The Object Plant does not support nested State Diagrams. You can use the package tool to create subpages.

Changing the name of a State Diagram page

If you doubleclick on the page in the page palette you will get a dialog window where you can change the name of the page and also enter a short description of the page's content. Instead of a free text field for the name of the page, a popup menu is displayed containing a list of the classes that the system contains. This will guide you into using a State Diagram page for each class you will describe the states for.

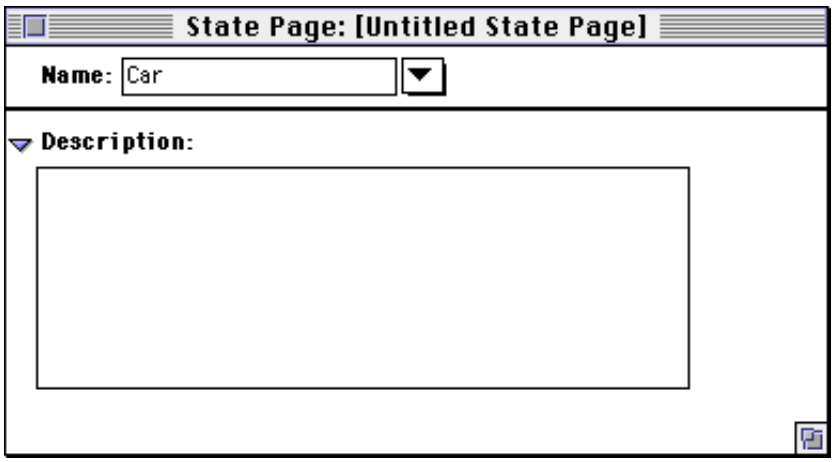


Figure 30. The state page dialog window

If you want to name your State Diagram page to something else there is an "Other..." alternative in the popup menu. If you select the "Other..." alternative, you will get a dialog where you can enter any name you want for the page.

If you don't start with the Object Model and define the classes but rather start with State Diagrams you will get an almost empty list when selecting the popup menu. This is another good reason for starting with the Object Model.

Elements in a State Diagram

In a State Diagram page you can have the following kinds of elements:

- states
- events
- packages
- notes

States

The state tool lets you create states. A state specifies the response of an object to input events. The response can include an action or a change of state. A change of state caused by an event is called a transistion.

To create a state place the cursor where you want the upper left corner of the state box to be positioned. A state box is drawn and the name of the new state is [Untitled]. If you have selected the "Open info window on create" option in Edit->Preferences... General, the state dialog window will automatically be displayed when a state is created.

The state dialog window

In the state dialog window there are four sections:

- Name
- Description
- Entry and exit actions and do activities
- Events and their actions

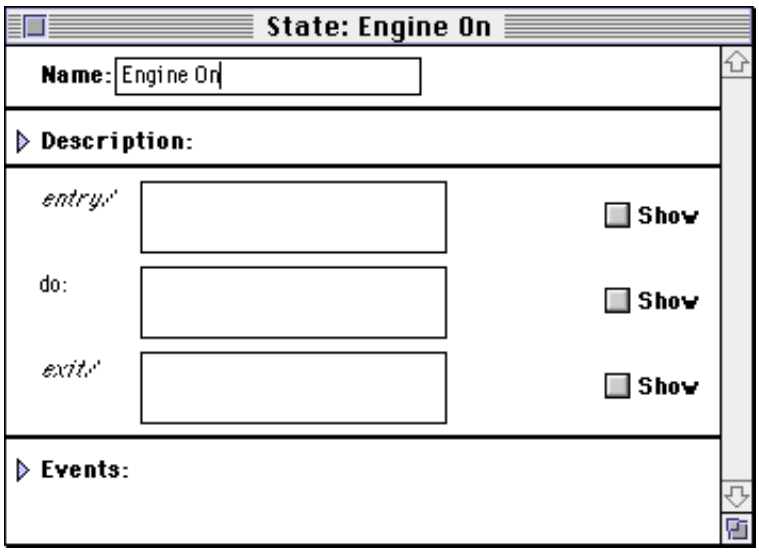


Figure 31. The state dialog window

In the Name section, you can enter the name of the state. Description contains a text field where you can enter a short description of the state. The events section is empty in a newly created state.

The third section contains three textfields corresponding to:

- entry action:
  the action taken when entering the state.
- do activity:
  the activity (an activity takes time to complete while an action is (almost) an instantaneous operation.) that takes place while being in the state.
- exit action:
  the action that is performed when leaving the state.

Add an event

To add an event to a state you must have the state dialog window as the front window. Then a new menu called State becomes active. In this menu there is only one item: New event. Select the "New event" command to add a new event. Then the event section opens up and the new event is displayed with the name of the event set to "New".

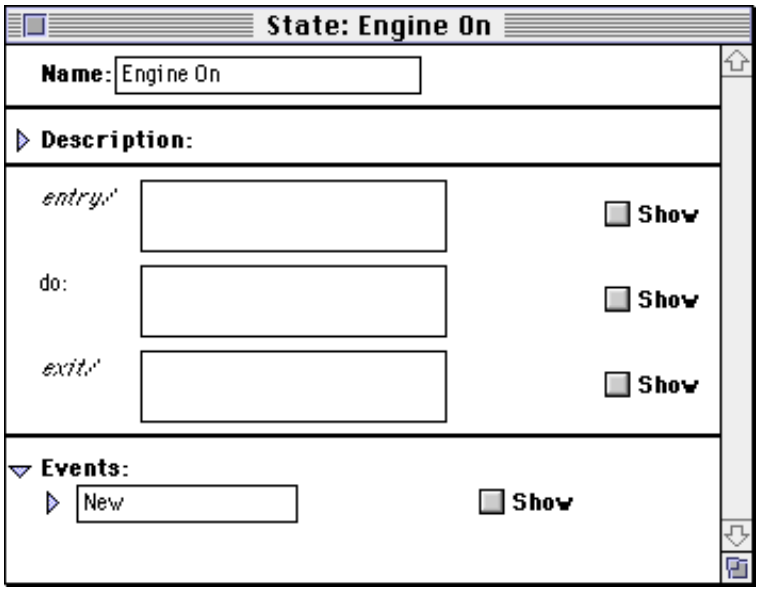


Figure 32. The state dialog window with a new event

To the right of the event name text field, there is a checkbox labeled "Show". Refer to the Views section for an explanation.

An event line in the event section can also be opened to reveal an action text field. This is where you can describe the actions taken when receiving the event.

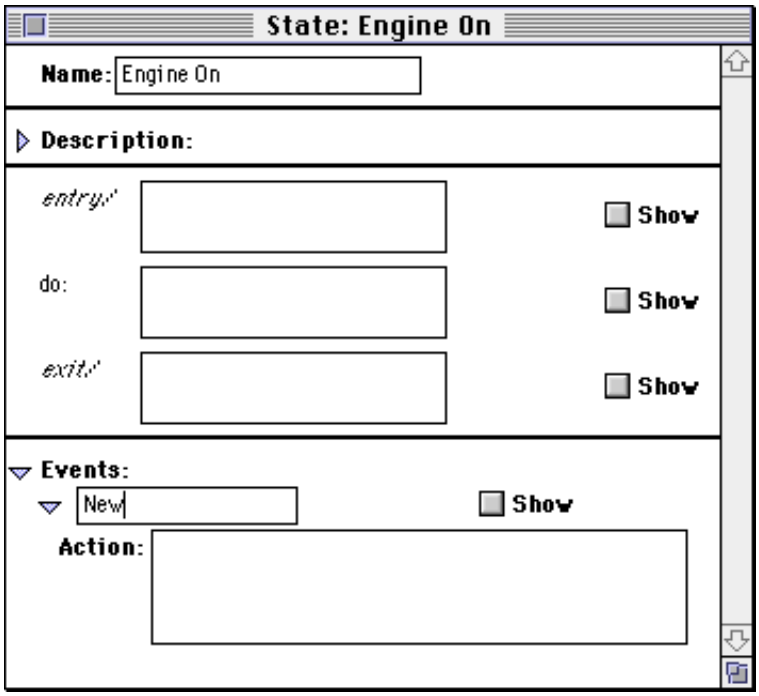


Figure 33. The event description field opened

Delete an event

To delete an event select the event you want to delete by clicking at the left side of the event line (right below the "disclosure triangle" of the events section). The event line then gets selected. If you then choose Edit->Clear (or the keyboard shortcut: the delete key) the event is deleted. You can select more than one event at a time. To deselect an event just click once more in the left side of the event line.

Moving a state box

To move a state box, use the Select tool. Click and hold the mouse inside the state box. Then box can then be moved.

Note:

If you have the "Move without delay" option disabled, you must hold the mouse down a while before the cursor changes into the move cursor and the state box can be moved.

Resizing a state box

The size of a state box is automatically computed by Object Plant. Hence you cannot change the size of a state box.

Events

The event tool is used to create transitions between states. Select the event tool and click and hold the mouse inside a state that shall be linked to another (or the same) state with an event transition. Drag the mouse to point at the other state and then release the mouse button. An event is now drawn between the two states. It is either a single straight line or any combination or horizontal and vertical lines that connect the states.

If you have selected the "Open info window on create" option in Edit->Preferences... General, the dialog window will automatically be displayed when an event is created.

The event dialog window

The event dialog window is divided into three sections:

- name
- description
- event characteristics

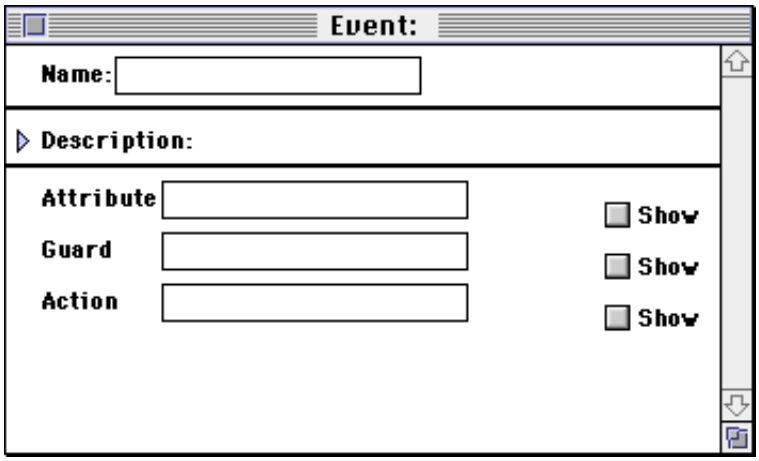


Figure 34. The event dialog window

An event can have an attribute, e.g. if the event is keypress the attribute could for example be key value=<cr>. This means that the transition would only take place if the event keypress with value <cr> is received by the state.

A guard is another type of condition, e.g. if the event is keypress, the attribute is <cr> and then lets say that the transition shall take place only if no modifier keys are used. This could then be entered into the Guard text field.

The action field is used when the transition itself causes an action to take place. This could often also be put into either the exit actions of the state we came from or the entry actions of the state that we're going to.

Initial state

The initial state tool is used to place an initial state symbol in a state diagram. There can can only be one initial state symbol in a state diagram. Events can be drawn only from an initial state to other states.

An initial state does not have a dialog window since no information is needed for an initial state.

Final state

The final state tool is used to place a final state "bulls-eye" symbol in a state diagram. There can be several final states in a diagram. Events can be drawn only to a final state from other states.

A final state does not have a dialog window since no information is needed for a final state.

Elements in a Use Case Diagram

In a Use Case Diagram page you can have the following kinds of elements:

- use cases
- actors
- communications
- packages
- notes

Use Case

The use case tool lets you create use cases. "A use case is a set of sequences of actions a system performs to yield an observable result of value to an actor."

The use case dialog window

In the use case dialog window there are two sections:

- Name
- Description

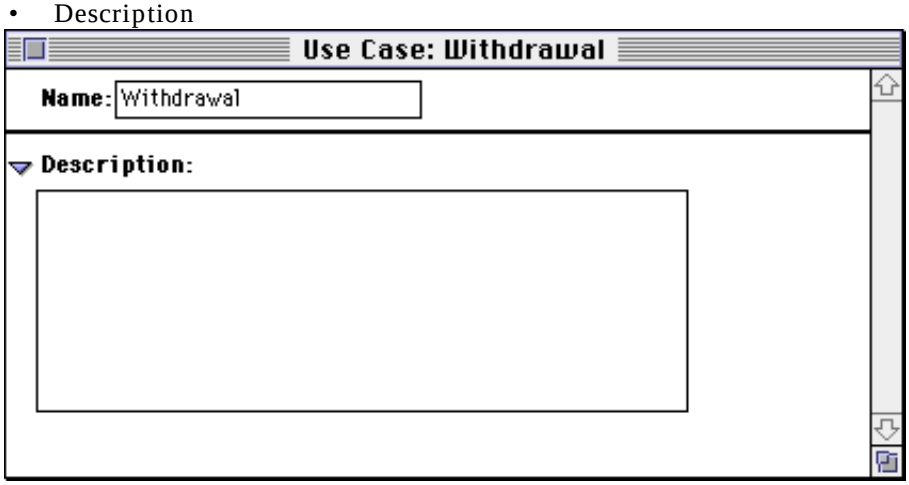


Figure 35. The use case dialog window

In the Name section, you can enter the name of the use case. Description contains a text field.

Actors

The actor tool is used to create actors. An actor is not necessarily a person but can also be other systems or equipment connected to the target system.

The actor dialog window

In the actor dialog window there are two sections:

- Name
- Description

In the Name section, you can enter the name of the actor. Description contains am ordinary text field

Communicate association

The communicate tool lets you create a communication association between an actor and a use case. A communication association shows the participation of an actor in a use case. The actor communicates with the use case.

Select the communicates tool and clock and hold the mouse inside a use case or an actor. Drag the mouse to point at the other part (actor or use case) and then release the mouse button. A communication association is now drawn between the actor and the use case.

The communicates dialog window

In the communicates dialog window there are two sections:

- Name
- Description

In the Name section, you can enter the name of the communication association. Description contains a text field.

In the current version of Object Plant, the name of a communication association is never shown.

Document name and page names

Please note the difference between the name of the document and the name of pages within the document. The name of the document is shown in the title bar of the Page Palette window and the name of pages is shown in the title bar of the four main windows (Object Model, State Diagram, Event Trace and Use Case).

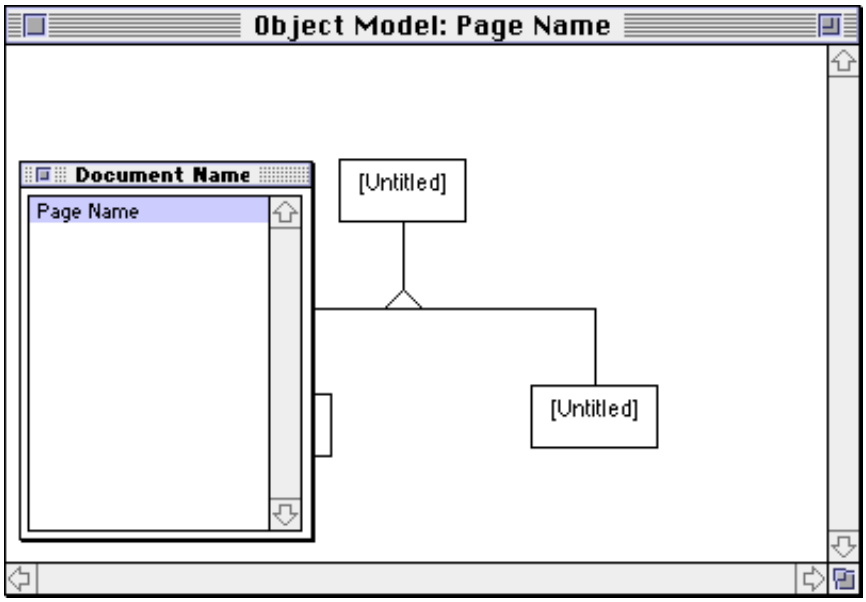


Figure 36. The document and page names

Code Generation

The Object Plant can generate C++ or Java code based on the information in the Object Model diagrams. If C++ is selected each class will generate two files, a source code file (.cp) and an include file (*.h). The format of the generated files' format is based on two template files, C++template.cc and C++template.h. The name of the generated files will be "class name.cp" and "class name.h".

The Java templates, provided by Jeff Moore, will generate one file for each class or interface. Two template files are used for Java generation a 'Class.java' file which generates code for classes and an 'Interface.java' file which generates code for interfaces.

If the generated class name is longer than 31 characters, the name of the created files will be truncated. The first 25 characters of the file name will always be equal to the first 25 characters in the class name.

When generating code, by selecting the File->Generate code... command, the following dialog appears where you are expected to select the folder where the generated files are to be stored.

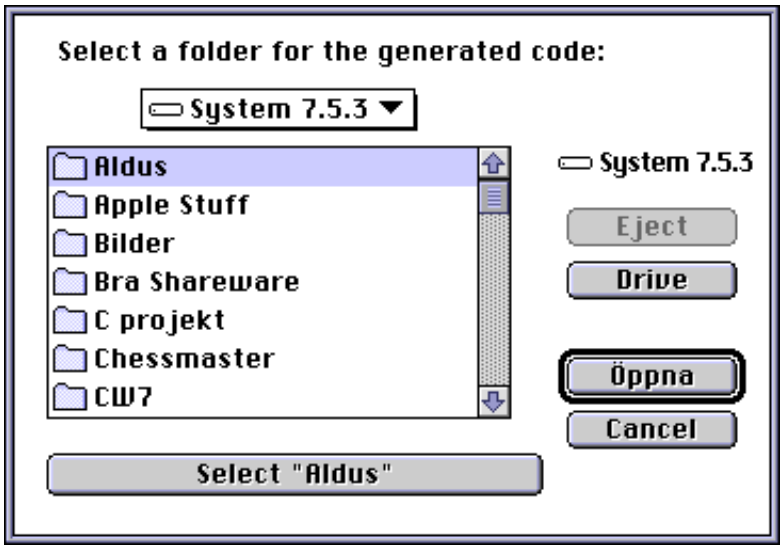


Figure 37. The "generate code" dialog

The generated files will be stored in the folder you select in the dialog. For each page included in your model a folder will be created within the folder selected in the dialog. Subsystem pages will create hierarchical folders. For example, if you have an Object Model with pages (and subsystems) looking like this in the page palette:

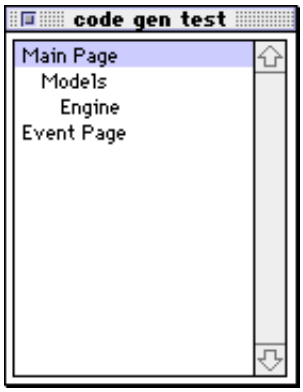


Figure 38. The Object Model of a code generation example

the generated structure will look like this (if C++ code is generated):

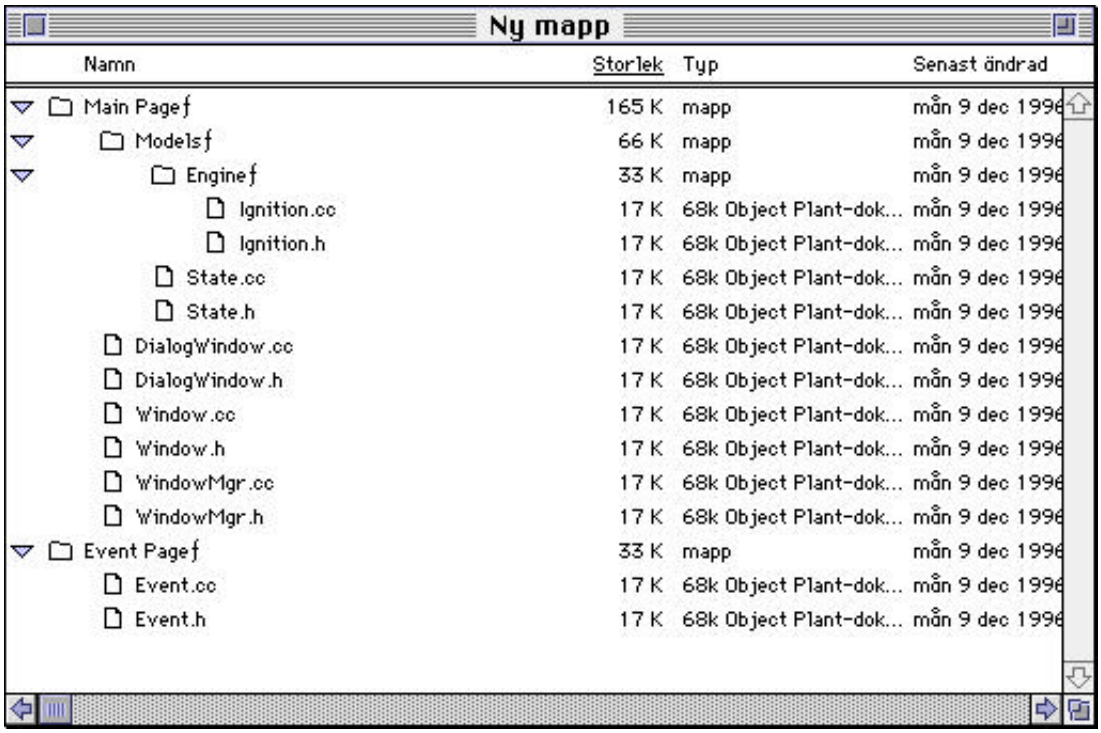


Figure 39. The generated folders and files

If this doesn't suit your needs you will have to modify the template files.

The template files

You can create an own set of template files if you like and use them by selecting your files in the "Preferences:Code generation" dialog.

The template files contains tags and plain text. Tags are always enclosed by curly braces, e.g. {CLASS}. Just like in HTML-code, some tags are only applicable in certain contexts, and they may have different meanings in different contexts.

Some tags have both a starttag and an endtag. The endtag looks like the starttag but the name starts with a '/' character, e.g. {CLASS}, {/CLASS}. Some tags don't have an endtag.

If you want to specify a string that shall be output you can just write the text without quotes unless the string contains any special character such as "". You can also enclose string with quote-characters ("") if you encounter any problem with formatting of tabs etc.

The generated file will have the same creator type as the template file. The included template files all have 'ttxt' (SimpleText) as creator. You can change the creator type of the template files using ResEdit or by copying the content of the template file into a file with the correct creator type. CodeWarrior, for example, has creator type 'CWIE'.

At the top-level of a template file, the following tags are applicable:

Top-level tags

Tag	Meaning
{DOCUMENTNAME}	Is replaced by the Object Plant document name.
{USERCODE}	Puts a start- and an end-mark in the generated code. Anything within these marks will remain when regenerating code.
{PROGRAMMER}	Is replaced by the text you entered in the registration dialog (also visible in the about dialog).
{TIMESTAMP}	Is replaced by the current time (HH:MM).
{DATESTAMP}	Is replaced by the current date. Two formats are available MM/DD/YY or YYMMDD. This is selected in the code generation preferences dialog.
{CLASS} {/CLASS}	Text (and by other tags generated text) is written to the generated file for all classes in the Object Model. If no classes exist none of the text between the start and the endtag is written to the file. Valid tags within the CLASS tag: {DOCUMENTNAME}, {SUBSYSTEM}, {USERCODE}, {CLASSNAME}, {DESCRIPTION}, {FILENAME}, {TPUBLIC}, {TPROTECTED}, {TPRIVATE}, {OPERATION}, {ATTRIBUTE}, {ABSTRACT}, {INTERFACELIST}, {ANCESTORLIST}, {HEIRLIST}, {CONSISTOFLIST}, {PARTOFLIST}, {ASSOCLIST}, {PROGRAMMER}, (TIMESTAMP}, {DATESTAMP}, {DATECREATED}, {DATEMODIFIED}
{INTERFACE} {/INTERFACE}	Text (and by other tags generated text) is written to the generated file for all interfaces in the Object Model. If no interfaces exist none of the text between the start and the endtag is written to the file. Valid tags within the INTERFACE tag: {DOCUMENTNAME}, {SUBSYSTEM}, {USERCODE}, {INTERFACENAME}, {ANCESTORLIST}, {HEIRLIST}, {DESCRIPTION}, {FILENAME}, {OPERATION}, {ATTRIBUTE}, {PROGRAMMER}, (TIMESTAMP}, {DATESTAMP}, {DATECREATED}, {DATEMODIFIED}

{FILENAME} {/FILENAME}	Text (and by other tags generated text) is used to create the generated file's name (and path). Valid tags within the FILENAME tag: {DOCUMENTNAME}, {SUBSYSTEM}, {CLASSNAME}, {INTERFACENAME}, {USERCODE} ({CLASSNAME} is valid only if {CLASS}{/CLASS} encloses {FILENAME}{/FILENAME} and {INTERFACENAME} is valid only if {INTERFACE}{/INTERFACE} encloses {FILENAME}{/FILENAME})
{SUBSYSTEM} {/SUBSYSTEM}	This tag can be used to get information about nested Object Models. For example, in Java you can make the file belong to a certain package which is the actual Object Model page. The text between the start and the endtag is used as a separator , e.g. package {SUBSYSTEM}.{/SUBSYSTEM}; makes all classed belong to a package named after the object model page name.

{CLASS}-level tags

Tag	Meaning
{CLASSNAME}	Is replaced by the class' name, e.g. WindowMgr.
{DESCRIPTION}	Is replaced by the class' description.
{OPERATION} {/OPERATION}	Text (and by other tags generated text) is written to the generated file for all operations of the class. If no operations exist none of the text between the start and the endtag is written to the file. Valid tags within the OPERATION tag: {USERCODE}, {NAME}, {DESCRIPTION}, {RETURNTYPE}, {CLASSNAME}, {PARAMETER}, {INPARAMETER}, {OUTPARAMETER}, {INOUTPARAMETER}, {OVERRIDE}, {ABSTRACT}, {STATIC}, {SIGNATURE}, {FINAL}
{ATTRIBUTE} {/ATTRIBUTE}	Text (and by other tags generated text) is written to the generated file for all attributes of the class. If no attributes exist none of the text between the start and the endtag is written to the file. Valid tags within the ATTRIBUTE tag: {USERCODE}, {NAME}, {DESCRIPTION}, {TYPE}, {CLASSNAME}, {OVERRIDE}, {STATIC}, {FINAL}, {INITIAL VALUE}
{ABSTRACT} {/ABSTRACT}	Text (and by other tags generated text) is written to the generated file if the class is abstract. Valid tags within the ABSTRACT tag: {ANCESTORLIST}, {HEIRLIST}, {CONSISTOFLIST}, {PARTOFLIST}, {ASSOCLIST}
{TPUBLIC} {/TPUBLIC}	Text (and by other tags generated text) is written to the generated file for the enclosed operation and attribute tags if the corresponding operation / attribute has a "public" visibility. Valid tags within the TPUBLIC tag: {OPERATION}, {ATTRIBUTE}

{TPROTECTED}
{/TPROTECTED}

Text (and by other tags generated text) is written to the generated file for the enclosed operation and attribute tags if the corresponding operation / attribute has a "protected" visibility.
Valid tags within the TPROTECTED tag: {OPERATION}, {ATTRIBUTE}

{TPRIVATE}
{/TPRIVATE}

Text (and by other tags generated text) is written to the generated file for the enclosed operation and attribute tags if the corresponding operation / attribute has a "private" visibility.
Valid tags within the TPRIVATE tag: {OPERATION}, {ATTRIBUTE}

{ANCESTORLIST}
{/ANCESTORLIST}

Text (and by other tags generated text) is written to the generated file for all superclasses of the class. The ANCESTORNAME tag shall be used to get the ancestor's name.
Any string before the ANCESTORNAME tag will be written once to the generated file. Any string after the ANCESTORNAME will be used as a separator if the class has several ancestors.
The END tag can be used to specify text that shall follow the list of ancestors. The string written between the END tag and the /ANCESTORLIST tag will be output at the end of the ancestor list.
If no ancestors exist none of the text between the start and the endtag is written to the file. C++ examples:

```
{ANCESTORLIST}"#include \""{ANCESTORNAME}".h\""
"#include \""{END}".h\""{/ANCESTORLIST}
```

This will create a set of include directives, one for each inherited class.

```
class {CLASSNAME} {ANCESTORLIST}: public {ANCESTORNAME}, {/ANCESTORLIST}
```

Valid tags within the ANCESTORLIST tag: {ANCESTORNAME}, {USERCODE}, {END}

{HEIRLIST}
{/HEIRLIST}

Text (and by other tags generated text) is written to the generated file for all subclasses of the class. The HEIRNAME tag shall be used to get the heir's name.
Any string before the HEIRNAME tag will be written once to the generated file. Any string after the HEIRNAME will be used as a separator if the class has several heirs.
The END tag can be used to specify text that shall follow the list of heirs. The string written between the END tag and the /HEIRLIST tag will be output at the end of the heir list.
If no heirs exist none of the text between the start and the endtag is written to the file.
Valid tags within the HEIRLIST tag: {HEIRNAME}, {USERCODE}, {END}

{CONSISTOFLIST}
{/CONSISTOFLIST}

Text (and by other tags generated text) is written to the generated file for all aggregates of the class (i.e. other classes connected to the class with aggregations). The AGGREGATENAME tag shall be used to get the other class' name.
Any string before the AGGREGATENAME tag will be written once to the generated file. Any string after the AGGREGATENAME will be used as a separator if the class has several aggregate classes.
The END tag can be used to specify text that shall follow the list of aggregates. The string written between the END tag and the

/CONSISTOFLIST tag will be output at the end of the aggregate list. If no aggregates exist none of the text between the start and the endtag is written to the file.
Valid tags within the CONSISTOFLISTtag: {AGGREGATENAME }, {USERCODE}, {END}

{PARTOFLIST}
{/PARTOFLIST}

Text (and by other tags generated text) is written to the generated file for all class that the current class is an aggregrate of (i.e. other classes connected to the class with aggregations). The AGGREGATENAME tag shall be used to get the other class' name. Any string before the AGGREGATENAME tag will be written once to the generated file. Any string after the AGGREGATENAME will be used as a separator if the class is a part of several other classes. The END tag can be used to specify text that shall follow the list of classes. The string written between the END tag and the /PARTOFLIST tag will be output at the end of the class list. If the class is not a part of any other class none of the text between the start and the endtag is written to the file.
Valid tags within the PARTOFLIST tag: {AGGREGATENAME }, {USERCODE}, {END}

{ASSOCLIST}
{/ASSOCLIST}

Text (and by other tags generated text) is written to the generated file for all classes that the current class is associated with (i.e. other classes connected to this class with association). The ASSOCCLASSNAME tag shall be used to get the other class' name. Any string before the ASSOCCLASSNAME tag will be written once to the generated file. Any string after the ASSOCCLASSNAME will be used as a separator if the class is a associated with several other classes. The END tag can be used to specify text that shall follow the list of classes. The string written between the END tag and the /ASSOCLIST tag will be output at the end of the class list. If the class is not associated with any other class none of the text between the start and the endtag is written to the file.
Valid tags within the ASSOCLIST tag: {ASSOCCLASSNAME}, {USERCODE}, {END}

{INTERFACELIST}
{/INTERFACELIST}

Text (and by other tags generated text) is written to the generated file for all interfaces that the class supplies. The INTERFACENAME tag shall be used to get the interfaces' name. Any string before the INTERFACENAME tag will be written once to the generated file. Any string after the INTERFACENAME will be used as a separator if several interfaces are supplied by the class. If no interfaces exist none of the text between the start and the endtag is written to the file. Java example:
{INTERFACELIST}implements {INTERFACENAME}, {/INTERFACELIST}
Valid tags within the INTERFACELIST tag: {INTERFACENAME}, {DESCRIPTION}, {USERCODE}, {END}

{DATECREATED}

Is replaced by the creation date of the class (MM/DD/YY HH:MM or YYMMDD HH:MM).

{DATEMODIFIED}

Is replaced by the date when the class was last modified (MM/DD/YY HH:MM or YYMMDD HH:MM).

{INTERFACE}-level tags

Tag	Meaning
{INTERFACENAME}	Is replaced by the interface's name, e.g. Storing.
{DESCRIPTION}	Is replaced by the interface's description.
{OPERATION} {/OPERATION}	Text (and by other tags generated text) is written to the generated file for all operations of the interface. If no operations exist none of the text between the start and the endtag is written to the file. Valid tags within the OPERATION tag: {USERCODE}, {NAME}, {RETURNTYPE}, {INTERFACENAME}, {PARAMETER}, {OVERRIDE}, {STATIC}, {SIGNATURE}, {FINAL}
{ATTRIBUTE} {/ATTRIBUTE}	Text (and by other tags generated text) is written to the generated file for all attributes of the interface. If no attributes exist none of the text between the start and the endtag is written to the file. Valid tags within the ATTRIBUTE tag: {USERCODE}, {NAME}, {TYPE}, {INTERFACENAME}, {OVERRIDE}, {STATIC}, {FINAL}, {INITIAL VALUE}
{ANCESTORLIST} {/ANCESTORLIST}	As described in the {CLASS} tag section.
{HEIRLIST} {/HEIRLIST}	As described in the {CLASS} tag section.

{OPERATION}-level tags

Tag	Meaning
{RETURNTYPE}	Inserts the operation's return type, e.g. long.
{NAME}	Inserts the operation's name, e.g. HideWindow.
{DESCRIPTION}	Is replaced by the operation's description.
{PARAMETER} {/PARAMETER}	Text (and by other tags generated text) is written to the generated file for all parameters of the operation. If no parameters exist none of the text between the start and the endtag is written to the file. Valid tags within the PARAMETER tag: {TYPE}, {NAME}
{INPARAMETER} {/INPARAMETER}	Text (and by other tags generated text) is written to the generated file for all input parameters of the operation. If no input parameters exist none of the text between the start and the endtag is written to the file. Valid tags within the INPARAMETER tag: {TYPE}, {NAME}
{OUTPARAMETER} {/OUTPARAMETER}	Text (and by other tags generated text) is written to the generated file for all output parameters of the operation. If no output parameters exist none of the text between the start and the endtag is written to the file. Valid tags within the OUTPARAMETER tag: {TYPE}, {NAME}

{INOUTPARAMETER} {/INOUTPARAMETER}	Text (and by other tags generated text) is written to the generated file for all input/output parameters of the operation. If no input/output parameters exist none of the text between the start and the endtag is written to the file. Valid tags within the INOUTPARAMETER tag: {TYPE}, {NAME}
{OVERRIDE} {/OVERRIDE}	Text enclosed by these tags is written to the generated file if the operation has its "override" checkbox checked.
{ABSTRACT} {/ABSTRACT}	Text (and by other tags generated text) is written to the generated file if the operation is abstract.
{!ABSTRACT} {/!ABSTRACT}	Text (and by other tags generated text) is written to the generated file if the operation isn't abstract.
{SIGNATURE}	Inserts the operation's signature which is necessary for the regeneration of code to work properly.
{STATIC} {/STATIC}	Text enclosed by these tags is written to the generated file if the operation has its "static" checkbox checked.
{FINAL} {/FINAL}	Text enclosed by these tags is written to the generated file if the operation has its "Final" checkbox checked.

{PARAMETER}, {INPARAMETER}, {OUTPARAMETER}, {INOUTPARAMETER}-level tags

Tag	Meaning
{TYPE}	Inserts the type of the parameter, e.g. short.
{NAME}	Inserts the parameter's name, e.g. length. Any string after the first of either NAME or TYPE will be used as a separator if several parameters are used by the operation. If the operation has no parameters none of the text between the start and the endtag is written to the file.
{END}	Any string following this tag will be output at the end of all parameters and their associated output.

{ATTRIBUTE}-level tags

Tag	Meaning
{TYPE}	Inserts the type of the attribute, e.g. float.
{NAME}	Inserts the name of the attribute, e.g. Visible.
{DESCRIPTION}	Is replaced by the attribute's description.
{OVERRIDE} {/OVERRIDE}	Text enclosed by these tags is written to the generated file if the attribute has its "override" checkbox checked.
{FINAL} {/FINAL}	Text enclosed by these tags is written to the generated file if the attribute has its "Final" checkbox checked.

{INITIAL VALUE} {/INITIAL VALUE}	Text enclosed by these tags is written to the generated file if the attribute has an "Initial value" specified. Valid tags within the INITIAL VALUE tag: {VALUE}
{STATIC} {/STATIC}	Text enclosed by these tags is written to the generated file if the attribute has its "static" checkbox checked. Valid tags within the STATIC tag: {NAME}, {TYPE}, {CLASSNAME}, {INTERFACENAME}

{INITIAL VALUE}-level tags

Tag	Meaning
{VALUE}	Inserts the value of the attribute initial value, e.g. 3.4.

{FILENAME}-level tags

Tag	Meaning
{SUBSYSTEM} {/SUBSYSTEM}	This tag can be used to get information about nested Object Models. For example, you can give the generated file a name which makes subfolders to be created for each nested diagram. The text between the start and the endtag is used as a separator between the folder levels, e.g. {FILENAME}{SUBSYSTEM}*ƒ*:{/SUBSYSTEM}{CLASSNAME}.cc{/FILENAME} puts all .cc files in own folders named after the object model page name. The folders will have a '*ƒ*' character at the end of the name. This is useful to avoid name conflicts between folders and files.