ModelSim®

Advanced Verification and Debugging

SE

Graphical Interface Reference

Version 6.0b

Published: 15/Nov/04

Mentor Graphics®

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Contractor/manufacturer is:

Mentor Graphics Corporation

8005 S.W. Boeckman Road, Wilsonville, Oregon 97070-7777.

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Contacting ModelSim Support

Telephone: 503.685.0820

Toll-Free Telephone: 877-744-6699

Website: www.model.com

Support: www.model.com/support

Technical support and updates

Support

Model Technology online and email technical support options, maintenance renewal, and links to international support contacts:
www.model.com/support/default.asp

Mentor Graphics support:
www.mentor.com/supportnet

Updates

Access to the most current version of ModelSim:
www.model.com/downloads/default.asp

Latest version email

Place your name on our list for email notification of news and updates:
www.model.com/products/informant.asp

Where to find our documentation

ModelSim documentation is available from our website at www.model.com/support or in the following formats and locations:

Document	Format	How to get it
ModelSim Installation & Licensing Guide	paper	shipped with Model*Sim*
	PDF	select **Help > Documentation**; also available from the Support page of our web site: www.model.com
ModelSim Quick Guide (command and feature quick-reference)	paper	shipped with Model*Sim*
	PDF	select **Help > Documentation**, also available from the Support page of our web site: www.model.com
ModelSim Tutorial	PDF, HTML	select **Help > Documentation**; also available from the Support page of our web site: www.model.com
ModelSim User's Manual	PDF, HTML	select **Help > Documentation**
ModelSim Command Reference	PDF, HTML	select **Help > Documentation**
ModelSim GUI Reference	PDF, HTML	select **Help > Documentation**
Foreign Language Interface Reference	PDF, HTML	select **Help > Documentation**
Std_DevelopersKit User's Manual	PDF	www.model.com/support/documentation/BOOK/sdk_um.pdf The Standard Developer's Kit is for use with Mentor Graphics QuickHDL.
Command Help	ASCII	type `help [command name]` at the prompt in the Transcript pane
Error message help	ASCII	type `verror <msgNum>` at the Transcript or shell prompt
Tcl Man Pages (Tcl manual)	HTML	select **Help > Tcl Man Pages**, or find *contents.htm* in *\modeltech\docs\tcl_help_html*
Technotes	HTML	select Technotes dropdown on www.model.com/support

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1 - Simulator windows

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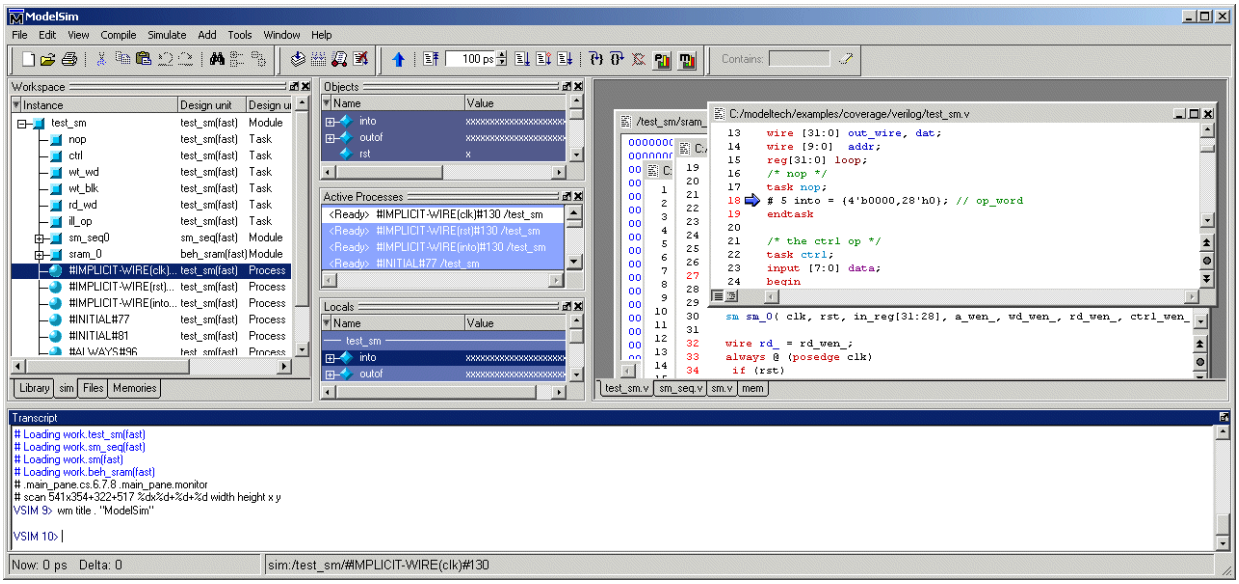
This chapter describes the various windows, menus, and commands that comprise the ModelSim Graphical User Interface (GUI). Chapters earlier in the User's Manual also discuss the GUI but are organized more in a task-based format as opposed to the reference structure of this appendix.

Introduction

ModelSim's graphical user interface (GUI) consists of various windows that give access to parts of your design and numerous debugging tools. Some of the windows display as panes within the ModelSim Main window, some display as windows in the Multiple Document Interface (MDI) frame, and some display as standalone windows.



The following table summarizes all of the available windows and panes.

Window/pane name	Description	More details
Main	central GUI access point	"Main window" (GR-14)
Active Processes	displays all processes that are scheduled to run during the current simulation cycle	"Active Processes pane" (GR-108)
Assertions	manages PSL assertions	"Assertions pane" (GR-110)
Code coverage	a collection of panes that display code coverage data	"Code coverage panes" (GR-116)
Dataflow	displays "physical" connectivity and lets you trace events (causality)	"Dataflow window" (GR-128)
Functional Coverage	manages PSL cover directives	"Functional Coverage pane" (GR-143)
List	shows waveform data in a tabular format	"List window" (GR-153)
Locals	displays data objects that are immediately visible at the current PC of the selected process	"Locals pane" (GR-166)

Window/pane name	Description	More details
Memory	a Workspace tab and MDI windows that show memories and their contents	"Memory windows" (GR-169)
Watch	displays signal or variable values at the current simulation time	"Watch pane" (GR-208)
Objects	displays all declared data objects in the current scope	"Objects pane" (GR-184)
Profile	two panes that display performance and memory profiling data	"Profile panes" (GR-192)
Source	a text editor for viewing and editing HDL, SystemC, DO, etc. files	"Source window" (GR-199)
Transcript	keeps a running history of commands and messages and provides a command-line interface	"Transcript" (GR-16)
Wave	displays waveforms	"Wave window" (GR-211)
Workspace	provides easy access to projects, libraries, compiled design units, etc.	"Workspace" (GR-15)

The windows and panes are customizable in that you can position and size them as you see fit, and ModelSim will remember your settings upon subsequent invocations. See "Customizing the GUI layout" (GR-258) for more details.

Design object icons and their meaning

The color and shape of icons convey information about the language and type of a design object. Here is a list of icon colors and the languages they indicate:

icon color	language
light blue	Verilog
dark blue	VHDL
green	SystemC
magenta	PSL
orange	virtual object

Here is a list of icon shapes and the design object types they indicate:

icon shape	example	design object type
square		blocks (entity/architecture, module, SC module, etc.)

icon shape	example	design object type
circle		process
diamond		valued object (signals, nets, registers, SystemC channel, PSL endpoint, etc.)
caution sign		comparison object
triangle		PSL assertion
up arrow		PSL cover directive
diamond with red dot		an editable waveform created with the waveform editor

Setting fonts

You may need to adjust font settings to accommodate the aspect ratios of wide screen and double screen displays or to handle launching ModelSim from an X-session.

Font scaling

To change font scaling, select **Tools > Options > Adjust Font Scaling**. You'll need a ruler to complete the instructions in the lower right corner of the dialog. When you have entered the pixel and inches information, click OK to close the dialog. Then, restart ModelSim to see the change. This is a one time setting; you shouldn't have to set it again unless you change display resolution or the hardware (monitor or video card). The font scaling applies to Windows and UNIX operating systems. On UNIX systems, the font scaling is stored based on the $DISPLAY environment variable.

Controlling fonts in an X-session

When executed via an X-session (e.g., Exceed, VNC), ModelSim uses font definitions from the .Xdefaults file. To ensure that the fonts look correct, create a .Xdefaults file with the following lines:

```
vsim*Font: -adobe-courier-medium-r-normal--*-120-*-*-*-*-*
vsim*SystemFont: -adobe-courier-medium-r-normal--*-120-*-*-*-*-*
vsim*StandardFont: -adobe-courier-medium-r-normal--*-120-*-*-*-*-*
vsim*MenuFont: -adobe-courier-medium-r-normal--*-120-*-*-*-*-*
```

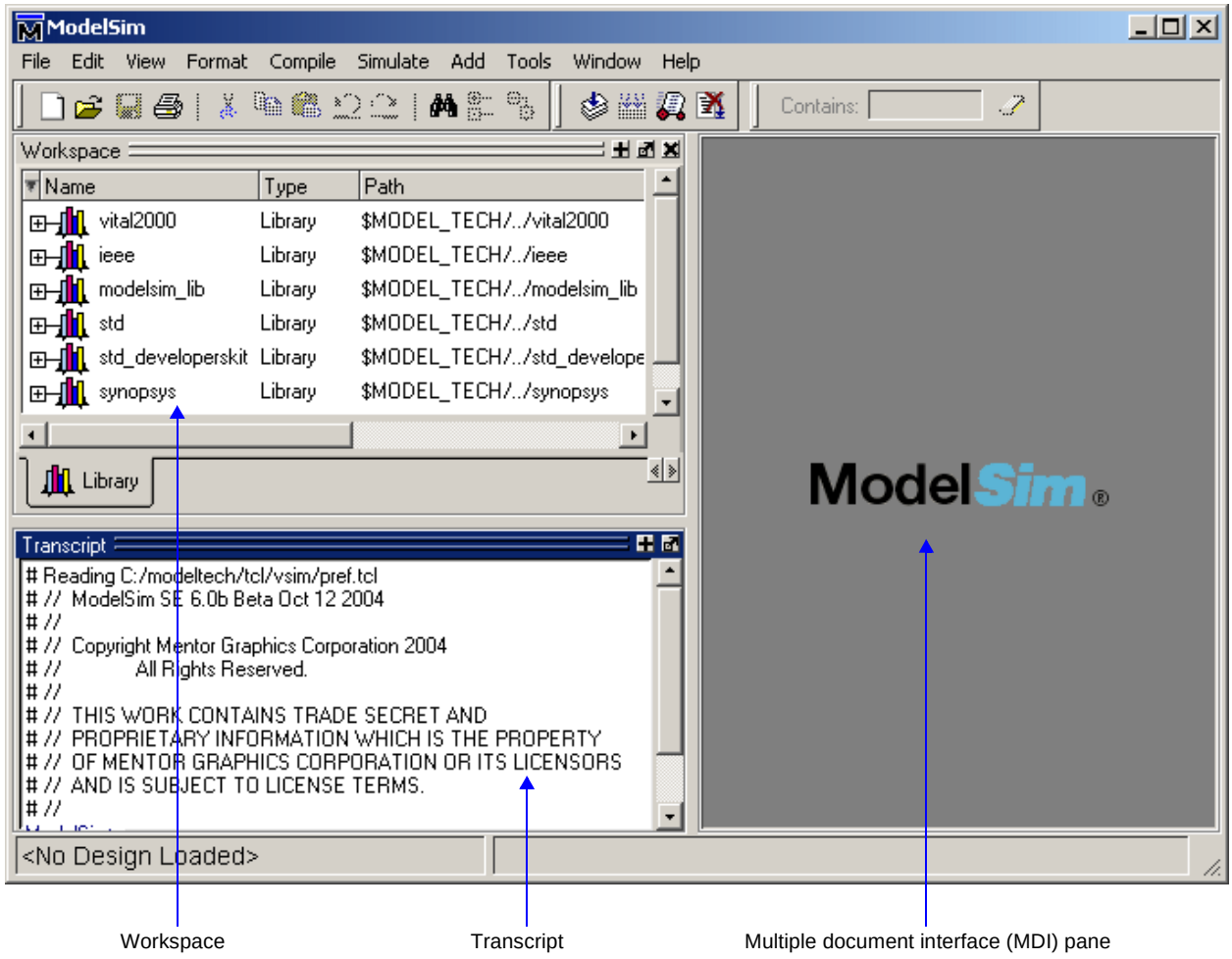
Alternatively, you can choose a different font. Use the program "xlsfonts" to identify which fonts are available on your system.

Also, the following command can be used to update the X resources if you make changes to the .Xdefaults and wish to use those changes on a UNIX machine:

```
xrdb -merge .Xdefaults
```

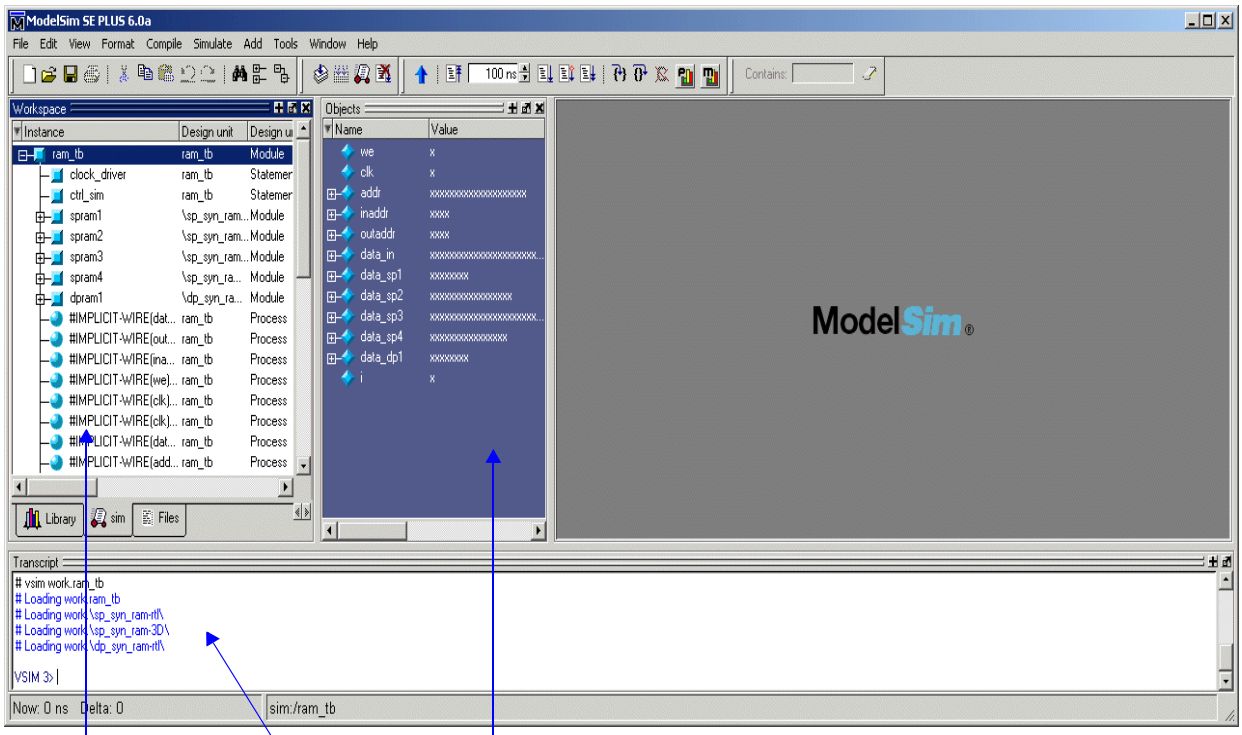
Main window

The primary access point in the ModelSim GUI is called the Main window. Here is what the Main window looks like the very first time you start the tool:



The Main window provides convenient access to design libraries and objects, source files, debugging commands, simulation status messages, etc.

When you load a design, or bring up debugging tools, ModelSim adds additional panes or opens new windows. For example, here is the Main window after loading a simple design.



Workspace tabs organize design elements in a hierarchical tree structure

The Transcript pane reports status and provides a command-line interface

The Objects pane displays data objects in the current scope

Notice some of the elements that appear:

- Workspace tabs organize and display design objects in a hierarchical tree format
- The Transcript pane tracks command history and messages and provides a command-line interface where you can enter ModelSim commands
- The Objects pane displays design objects such as signals, nets, generics, etc. in the current design scope

Workspace

The Workspace provides convenient access to projects, libraries, design files, compiled design units, simulation/dataset structures, and Waveform Comparison objects. It can be hidden or displayed by selecting **View > Workspace** (Main window).

The Workspace can display the types of tabs listed below.

- **Project tab**
  Shows all files that are included in the open project. See *Chapter 2 - Projects* in the *ModelSim User's Manual* for details.

- **Library tab**
  Shows design libraries and compiled design units. See "Managing library contents" (UM-61) for details.
- **Structure tabs**
  Shows a hierarchical view of the active simulation and any open datasets. There is one tab for the current simulation (named "sim") and one tab for each open dataset. See "Viewing dataset structure" (UM-228) for details.

  An entry is created by each object within the design. When you select a region in a structure tab, it becomes the *current region* and is highlighted. The Source window (GR-199) and Objects pane (GR-184) change dynamically to reflect the information for that region. This feature provides a useful method for finding the source code for a selected region because the system keeps track of the pathname where the source is located and displays it automatically, without the need for you to provide the pathname.

  Also, when you select a region in the structure pane, the "Active Processes pane" (GR-108) is updated. The Active Processes window will in turn update the Locals pane (GR-166).
- **Files tab**
  Shows the source files for the loaded design.
- **Memories tab**
  Shows a hierarchical list of all memories in the design. To display this tab, select **View > Debug Windows > Memory**. When you select a memory on the tab, a memory contents page opens in the MDI frame. See "Memory windows" (GR-169).
- **Compare tab**
  Shows comparison objects that were created by doing a waveform comparison. See *Chapter 9 - Waveform analysis* for details.

Transcript

The Transcript portion of the Main window maintains a running history of commands that are invoked and messages that occur as you work with ModelSim. When a simulation is running, the Transcript displays a VSIM prompt, allowing you to enter command-line commands from within the graphic interface.

You can scroll backward and forward through the current work history by using the vertical scrollbar. You can also use arrow keys to recall previous commands, or copy and paste using the mouse within the window (see "Main and Source window mouse and keyboard shortcuts" (UM-605) for details).

Saving the transcript file

Variable settings determine the filename used for saving the transcript. If either **PrefMain(file)** in the *modelsim.tcl* file or **TranscriptFile** in the *modelsim.ini* file is set, then the transcript output is logged to the specified file. By default the **TranscriptFile** variable in *modelsim.ini* is set to *transcript*. If either variable is set, the transcript contents are always saved and no explicit saving is necessary.

If you would like to save an additional copy of the transcript with a different filename, click in the Transcript pane and then select **File > Save As**, or **File > Save**. The initial save must be made with the **Save As** selection, which stores the filename in the Tcl variable **PrefMain(saveFile)**. Subsequent saves can be made with the **Save** selection. Since no

automatic saves are performed for this file, it is written only when you invoke a **Save** command. The file is written to the specified directory and records the contents of the transcript at the time of the save.

Using the saved transcript as a macro (DO file)

Saved transcript files can be used as macros (DO files). See the **do** command (CR-151) for more information.

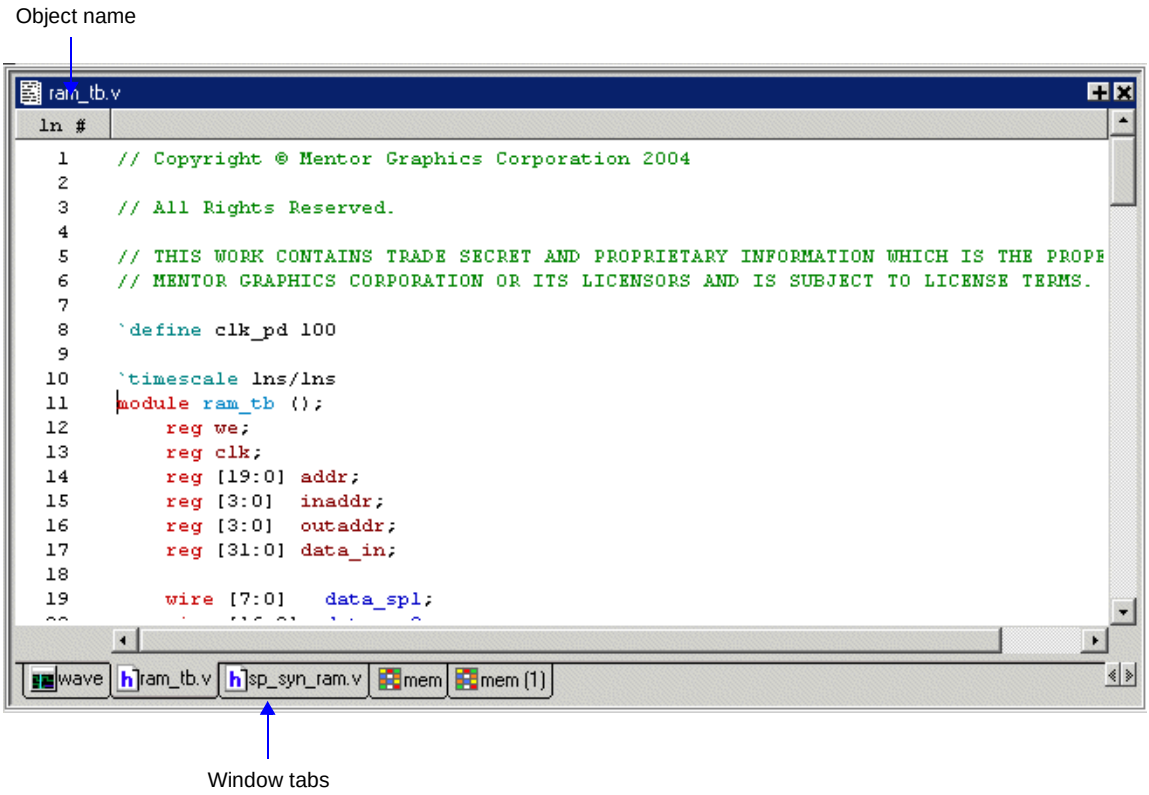
Disabling creation of the transcript file

You can disable the creation of the transcript file by using the following ModelSim command immediately after ModelSim starts:

```
transcript file ""
```

Multiple document interface (MDI) frame

The MDI frame is an area in the Main window where source editor, memory content, and wave windows display. The frame allows multiple windows to be displayed simultaneously, as shown below. A tab appears for each window.

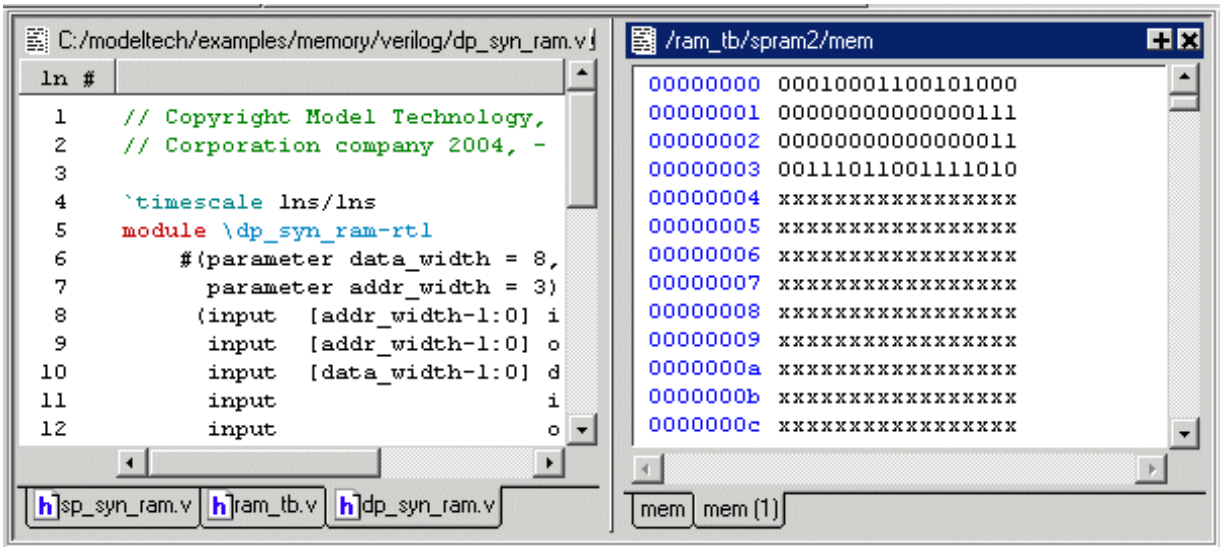


The object name is displayed in the title bar at the top of the window. You can switch between the windows by clicking on a tab.

Organizing windows with tab groups

The MDI can quickly become unwieldy if many windows are open. You can create "tab groups" to help organize the windows. A tab group is a collection of tabs that are separated from other groups of tabs.

The graphic below shows how the collection of files in the picture above could be organized into two tab groups.



The commands for creating and organizing tab groups are accessed by right-clicking on any window tab. The table below describes the commands associated with tab groups:

Command	Description
New Tab Group	Creates a new tab group containing the selected tab
Move Next Group	Moves the selected tab to the next group in the MDI
Move Prev Group	Moves the selected tab to the previous group in the MDI
View > Vertical / Horizontal	Arranges tab groups top-to-bottom (vertical) or right-to-left (horizontal)

Note that you can also move the tabs within a tab group by dragging them with the middle mouse button.

Main window status bar

Fields at the bottom of the Main window provide the following information about the current simulation:

Field	Description
Project	name of the current project
Now	the current simulation time
Delta	the current simulation iteration number
Profile Samples	the number of profile samples collected during the current simulation
Memory	the total memory used during the current simulation
environment	name of the current context (object selected in the active Structure tab of the Workspace)
line/column	line and column numbers of the cursor in the active Source window

Main window menu bar

The following commands are available from the Main window menu bar. Many of the commands become enabled/disabled depending upon which pane of the window is currently active.

Some commands behave differently depending upon which window pane is active. For example, if a Source window is active, the **File > Open** command opens a standard Open dialog. However, if a memory list is active, the command opens the Load Memory dialog.

File menu

New	provides these options: Folder – create a new folder in the current directory Source – create a VHDL, Verilog, or Other source file Project – create a new project Library – create a new design library and mapping; see "Create a New Library dialog" (GR-38) Window – create a new window of the specified type
Open	open a file; specify type by clicking Files of Type drop-down list
Load	executes or loads a previously saved format file (e.g. wave.do, waveedit.do, watch.do) in the Wave or Watch windows
Close	close a file or simulation
Import	provides these options: Library – import FPGA libraries; see "Importing FPGA libraries" (UM-69) EVCD – import a previously saved extended EVCD file; see "Signal mapping and importing EVCD files" (GR-295); this item is enabled only when a Wave window is active in the MDI frame of the Main window
Export	provides these options: Waveform – export a created waveform; see "Exporting waveforms to a stimulus file" (GR-294); Image – saves a bitmap image of the Wave window. These items are enabled only when a Wave window is active in the MDI frame of the Main window
Save	saves datasets, waveform formats, or waveform edits – depending upon which pane is active. If the Wave window is active in the MDI frame, this command will open the Save Format dialog, which will allow the user to save waveform formats, waveform edits, or both. If the Workspace pane is active and the sim tab selected, this command allows the user to save the current dataset as a .wlf file.
Save As	save a file with a new name; the file to be saved depends upon which pane is active (e.g., if the Transcript pane is active, this command saves the transcript)

Report	produce a textual report from the active pane
Change Directory	change to a different working directory; disabled if you have a project or dataset open or a simulation running
Use Source	specify an alternative file to use for the current source file; this alternative source mapping exists for the current simulation only
Source Directory	add to a list of directories to search for source files; you can set this permanently using the **SourceDir** variable in the *modelsim.tcl* file
Environment	provides different options depending upon which pane is selected: Follow Current Dataset – update the Objects pane based on the current dataset Fix to dataset <name> – fix the Objects pane content to a specific dataset Follow Process Selection – update the Locals pane content based on the selection in the "Active Processes pane" (GR-108) Fix to Current Process – fix the Locals pane content to the current process; do not update Follow Context Selection – update the pane contents based upon the selection in the structure tab of the Workspace Fix to Current Context – maintain the current view; do not update
Add to Project	provides these options: New File – add new files to the open Project; see "Step 2 — Adding items to the project" (UM-41) Existing File – add existing files to the open Project; see "Step 2 — Adding items to the project" (UM-41) Simulation Configuration – add an object representing a design unit(s) and its associated simulation options; see "Creating a Simulation Configuration" (UM-48) Folder – add an organization folder to the current project; see "Organizing projects with folders" (UM-50)
Page Setup	configure page settings for printing waveforms; this item is enabled only when a wave window is active in the MDI frame of the Main window (Windows only)
Print	print the contents of the Transcript pane, a Source window, or an embedded wave window
Print Postscript	save or print the active Source file or wave window as a Postscript file (Windows only)
Recent Directories	displays a list of the most recent working directories
Recent Projects	displays a list of the most recent projects
Quit	quit ModelSim

Edit menu

Undo	undo the last edit
Redo	redo the previously undone edit
Cut	cut the selected text
Copy	copy the selected text
Paste	paste the previously cut or copied text
Delete	deletes an object from the active Wave window in the MDI frame
Clear	clear the Transcript pane
Select All	select all text in the active window
Unselect All	deselect all text in the active window
Expand	provides these options: Expand Selected – expand the hierarchy of the selected instance Collapse Selected – collapse the hierarchy of the selected instance Expand All – expand the hierarchy of all instances in the active window Collapse All – collapse the hierarchy of all instances in the active window
Advanced	provides these options: Force – force a value on the item selected in the Objects pane; see "Force Selected Signal dialog" (GR-186) Noforce – cancel a previous force command Clock – define a clock; see "Define Clock dialog" (GR-188) Change – change the value of the selected object Comment/Uncomment Selected – add or remove comment characters from the lines selected in the active Source window Examine – display the current value of the object selected in the active Source window; same as the **examine** (CR-162) command Describe – display information about the object selected in the active Source window; same as the **describe** command (CR-147) Drivers – list the names of all drivers of the object selected in the active Source window Readers – list the names of all readers of the object selected in the active Source window
Wave	this menu is enabled only when a wave window is active in the MDI frame of the Main window; most of the options on this menu relate to Waveform Editor (see "Editing waveforms" (GR-290); Edit Cursor – edit the name or time of the selected cursor Delete Cursor – delete the selected cursor Wave Signal Search – search the wave window for a signal name or value, or an expression

Find	search the active window for the specified text string
Replace	find and replace text in the active window
Find in Files	search for text in saved files
Previous Coverage Miss	find the previous line with missed coverage in the active Source window; see "Viewing coverage data in the Source window" (UM-341)
Next Coverage Miss	find the next line with missed coverage in the active Source window; see "Viewing coverage data in the Source window" (UM-341)

View menu

Debug Windows	open various debugging windows/panes
Sort	sort the Objects or Locals pane
Filter	select the type of objects displayed in the Objects, Locals, or Memory list panes
Justify	justify left or right the object names in the Locals window
Split screen	split the active memory contents window; see "Splitting the memory contents window" (GR-172)
Datasets	open the Dataset Browser to open, close, rename, or activate a dataset
Wave	this menu is enabled only when a wave window is active in the MDI frame of the Main window provides these options: Object Declaration – open the source file in the Source window and highlight the declaration for the currently selected object Refresh Display – clear the Wave window, empty the file cache, and rebuild the window from scratch Zoom – choose various zoom commands Mouse Mode – toggle mouse pointer between Select Mode (click left mouse button to select, drag with middle mouse button to zoom) and Zoom Mode (drag with left mouse button to zoom, click middle mouse button to select) Cursors – choose a cursor to go to from a list of available cursors Bookmarks – choose a bookmark to go to from a list of available bookmarks See "Code coverage panes" (GR-116) for details on these panes.

Code Coverage	provides these options: Current Exclusions – hide or show the Exclusions pane Missed Coverage – hide or show the Missed Coverage pane Instance Coverage – hide or show the Instance Coverage pane Details – hide or show the Details pane See "Code coverage panes" (GR-116) for details on these panes.
Profile	provides these options: View – hide or show Profile pane View Details – hide or show Profile Details pane
Source	provides these options: Show line numbers–toggle display of line numbers Show language templates–toggle display of the Language templates (GR-201) pane Read Only–toggles read only status of selected source file
Workspace	hide or show the Workspace (GR-15) pane
Show Tabs	toggle display of window tabs in MDI frame
Tabbed MDI	toggle MDI frame mode from tab-based mode to floating window mode; see "Multiple document interface (MDI) frame" (GR-17) for more information
Goto	jump to the specified line number or memory address
Encoding	select from alphabetical list of encoding names that enable proper display of character representations used by various operating systems or file systems, such as Unicode, ASCII, or Shift-JIS.
Project Settings	show information about the open project
Properties	show information about the object selected in the Workspace

Format menu

The options on this menu are enabled only when a wave window is active in the MDI frame of the Main window. To view a wave window in the MDI frame, use the **view mdiwave** command.

Radix	set the selected objects' radix
Format	set the waveform format for the selected objects – Literal, Logic, Event, Analog
Color	set the color for the selected objects from a color palette
Height	set the waveform height in pixels for the selected objects

Compile menu

Compile	compile source files; not enabled if you have a project open
Compile Options	set various compile options; see "Compiler Options dialog" (GR-60); disabled if you have a project open
SystemC Link	collects the object files created in the different design libraries, and uses them to build a shared library (.so) in the current work library
Compile All	compile all files in the open project; see "Step 3 — Compiling the files" (UM-43) for details; disabled if you don't have a project open
Compile Selected	compile the files selected in the project tab; disabled if you don't have a project open
Compile Order	set the compile order of the files in the open project; see "Changing compile order" (UM-46) for details; disabled if you don't have a project open
Compile Report	report on the compilation history of the selected file(s) in the project; disabled if you don't have a project open
Compile Summary	report on the compilation history of all files in the project; disabled if you don't have a project open

Simulate menu

Design Optimization	open the Design Optimization dialog to configure simulation optimizations
Start Simulation	load the selected design unit; see "Start Simulation dialog" (GR-76)
Runtime Options	set various simulation runtime options; see "Runtime Options dialog" (GR-85)
Run	provides these options: Run <default> – run simulation for one default run length; change the run length with **Simulate > Runtime Options**, or use the Run Length text box on the toolbar Run -All – run simulation until you stop it; see also the **run** command (CR-252) Continue – continue the simulation; see also the **run** command (CR-252) and the **-continue** option Run -Next – run to the next event time Step – single-step the simulator; see also the **step** command (CR-272) Step -Over – execute without single-stepping through a subprogram call Restart – reload the design elements and reset the simulation time to zero; only design elements that have changed are reloaded; you specify whether to maintain the following after restart–List and Wave window environment, breakpoints, logged signals, virtual definitions, and assertion and functional coverage settings; see also the **restart** command (CR-246)
Break	stop the current simulation run
End Simulation	quit the current simulation run

Add menu

Wave	add objects from the selected pane to the Wave window; objects vary depending on which pane is active–for example, if the Assertions pane is selected, you can add assertions, whereas if the Objects pane is selected, you can add signals
List	add objects from the selected pane to the List window; objects vary depending on which pane is active–for example, if the Assertions pane is selected, you can add assertions, whereas if the Objects pane is selected, you can add signals

Log	add objects from the selected pane to the active log file; objects vary depending on which pane is active–for example, if the Assertions pane is selected, you can add assertions, whereas if the Objects pane is selected, you can add signals
Divider	insert a divider in the Wave window; this item is enabled only when a Wave window is active in the MDI frame of the Main window
Breakpoint	add a breakpoint on the selected signal; see "Signal breakpoints" (GR-264); this item is enabled only when a wave window is active in the MDI frame of the Main window
Bookmark	add a bookmark with the current zoom range and scroll location; see "Saving zoom range and scroll position with bookmarks" (UM-250); this item is enabled only when a wave window is active in the MDI frame of the Main window
Cursor	add a cursor to the Wave window; "Saving zoom range and scroll position with bookmarks" (UM-250); this item is enabled only when a wave window is active in the MDI frame of the Main window
Window Pane	split the pathname, values and waveform window panes to provide room for a new waveset; this item is enabled only when a wave window is active in the MDI frame of the Main window

Tools menu

Waveform Compare	see "Waveform Compare sub-menu" (GR-29)
Code Coverage	see "Code Coverage sub-menu" (GR-30)
Functional Coverage	see "Functional Coverage sub-menu" (GR-30)
Toggle Coverage	add toggle coverage tracking to the Objects pane; see "Enabling Toggle coverage" (UM-343)
Profile	see "Profile sub-menu" (GR-31)
Breakpoints	open the Breakpoints dialog box; see "Setting file-line breakpoints" (GR-203) for details
Bookmarks	add, edit, delete, and goto bookmarks; see "Saving zoom range and scroll position with bookmarks" (UM-250)
Dataset Snapshot	enable periodic saving of simulation data to a WLF file; see "Saving at intervals with Dataset Snapshot" (UM-231)

Combine Signals	combine the selected objects into a user-defined bus; see "Combining objects/creating busses" (UM-264)
C Debug	see "C Debug sub-menu" (GR-31)
Execute Macro	call and execute a .do or .tcl macro file
Macro Helper	**UNIX only** - invoke the Macro Helper tool; see "Macro helper" (UM-492)
Tcl Debugger	invoke the Tcl debugger, TDebug; see "The Tcl Debugger" (UM-493)
TclPro Debugger	invoke TclPro Debugger by Scriptics®, if installed; see "TclPro Debugger" (UM-497)
Options (all options are set for the current session only)	provides these options: Adjust Font Scaling – set font scaling factor when using dual monitors; you must restart ModelSim after setting the font scaling Transcript File – set a transcript file to save for this session only Command History – set a file for saving command history only, no comments Save File – set filename for Save Transcript, and Save Transcript As Saved Lines – limit the number of lines saved in the transcript (default is 5000) Line Prefix – specify the comment prefix for the transcript Update Rate – specify the update frequency for the Main window status bar ModelSim Prompt – change the title of the ModelSim prompt VSIM Prompt – change the title of the VSIM prompt Paused Prompt – change the title of the Paused prompt HTML Viewer – specify the path to your browser; used for displaying online help PDF Viewer – specify the path to your PDF viewer; used for displaying documentation Examine Now – sets the examine command to read values at the current simulation time Examine Current Cursor – sets the examine command to read values at the active cursor time Wave Preferences – format the Wave window; see "Window Preferences dialog" (GR-255) Drag and Drop Preferences – set the action to be performed when a file is dragged and dropped into the Project, Transcript or Wave windows
Edit Preferences	set various preference variables; see "Preference variables located in Tcl files" (UM-540) for more information
Save Preferences	save current ModelSim settings to a Tcl preference file; see "Preference variables located in Tcl files" (UM-540) for more information

Waveform Compare sub-menu

Start Comparison	start a comparison; see "Start Comparison dialog" (GR-243)
Comparison Wizard	use the Comparison Wizard to configure a comparison; see "Comparison Wizard" (UM-271)
Run Comparison	compute the number of differences from time zero to the end of the simulation run, from time zero until the maximum total number of differences per signal limit is reached, or from time zero until the maximum total number of differences for all signals compared is reached
Add	provides these options: Compare by Signal – designate signals for the comparison; see "Add Signal Options dialog" (GR-244) Compare by Region – designate a reference region for the comparison; see "Add Comparison by Region dialog" (GR-245) Clocks – Define clocks for a clocked comparison; see "Add Clocks dialog" (GR-246)
Options	define waveform comparison options; see "Comparison Options dialog" (GR-247)
Differences	provides these options: Clear – clear all differences and reset the comparison Show – display differences in the Main window transcript Save – save differences to a file that can be reloaded later
Rules	provides these options: Show – display rules used to set up the comparison Save – save rules to a file so you can recreate the comparison later
Reload	open previously saved differences and rules files; see "Saving and reloading comparison results" (UM-282)

Code Coverage sub-menu

Load	load a previously saved code coverage analysis; see "Saving and reloading coverage data" (UM-354)
Save	save current code coverage data; see "Saving and reloading coverage data" (UM-354)
Reports	produce textual output of code coverage statistics; see "Reporting coverage data" (UM-350)
Clear	clear code coverage data from the active database
Hide coverage data	hide/show the statement coverage column in a Source window
Hide branch coverage	hide/show the branch coverage column in a Source window
Show coverage numbers	display numbers rather than graphics in the coverage columns of a Source window
Show coverage by Instance	display counts only for the instance selected in the Workspace structure tab

Functional Coverage sub-menu

Design Unit Mode	when selected, the functional coverage pane is organized by design unit
Save	save current functional coverage data; see "Saving functional coverage data" (UM-395)
Reload	reload a previously saved functional coverage data file; see "Reloading/merging functional coverage data" (UM-396)
Reports	create reports on functional coverage data; see "Reporting functional coverage statistics" (UM-391)
Configure	configure coverage directives; see "Configuring functional coverage directives" (UM-386)
Filter	filter directives from the Functional Coverage pane; see "Filtering data in the pane" (UM-388)
Comment	add a comment to the selected directive(s)
Clear	clear data from the active functional coverage database; see "Clearing functional coverage data" (UM-397)

Profile sub-menu

Performance	enable statistical performance sampling; see A statistical sampling profiler (UM-318)
Memory	enable memory allocation profiling; see A memory allocation profiler (UM-318)
Collapse Sections	report collapsed processes and functions
Clear Profile Data	clear all statistical performance and memory allocation data; see Collecting memory allocation and performance data (UM-321)
Profile Report	enable the Profile Report dialog; see Reporting profiler results (UM-331)

C Debug sub-menu

Start C Debug	turn on C Debug so you can set breakpoints and step through C code
C Debug setup	specify the location of your gdb installation; see "C Debug setup dialog" (GR-99)
Enable auto step	configure C Debug to run in auto-step mode; see "Identifying all registered function calls" (UM-407)
Run	provide access to step, step-over, run-continue, and run-finish commands
Quit C Debug	turn off C Debug; do this before exiting ModelSim
Init mode	configure C Debug to run in initialization mode; see "Debugging functions during elaboration" (UM-410)
Complete load	cancel initialization mode and complete loading the rest of your design
Auto find bp	set breakpoints at all the FLI/PLI/VPI function entry points that are known (registered) when you make this menu selection
Info bp	list all currently set breakpoints including the source file names, line numbers, and breakpoint ids
Show	show the values of the local variables and arguments of the current C function

Traceback	identify the HDL source line from which the C function was called, if known; when running in initialization mode, no HDL information is available, and this command will list only the gdb traceback stack
C Interrupt	"re-activate" the C debugger when you are stopped in HDL code
Command entry	open a command prompt dialog so you can enter commands even if the CDBG> prompt is inaccessible;
Refresh	reopen a C source file if you close the Source window inadvertently while stopped in the C debugger

Window menu

Initial Layout	restore all windows to the size and placement of the initial full-screen layout
Cascade	cascade all open windows
Tile Horizontally	tile all open windows horizontally
Tile Vertically	tile all open windows vertically
Icon Children	icon all but the Main window
Icon All	icon all windows
Deicon All	restore all windows
Customize	add a button to either the tool or status bar of the specified window; see "Customize Toolbar dialog" (GR-106)
<window_name>	list of up to nine open windows including one for each file opened in the Source window; use the Windows menu item to see a complete list
Windows	open a dialog with a complete list of open windows

Help menu

About ModelSim	display ModelSim application information (e.g., software version)
Release Notes	view current release notes
Welcome Menu	open the Welcome screen
HTML/PDF Documentation	open and read ModelSim documentation in PDF or HTML format; PDF files can be read with a free Adobe Acrobat reader available on the ModelSim installation CD or from www.adobe.com
Tcl Help	open the Tcl command reference (man pages) in Windows help format
Tcl Syntax	open Tcl syntax documentation in a browser
Tcl Man Pages	open the Tcl /Tk 8.3 manual in HTML format
Technotes	select a technical note to view from the drop-down list

Main window toolbar

Buttons on the Main window toolbar give you quick access to various ModelSim commands and functions.

Main window toolbar buttons		
Button	**Menu equivalent**	**Command equivalents**
New File create a new source file	File > New > Source	
Open open the Open File dialog	File > Open	
Save save the contents of the active pane	File > Save	
Print open the Print dialog	File > Print	
Cut cut the selected text to the clipboard	Edit > Cut	
Copy copy the selected text to the clipboard	Edit > Copy	
Paste paste the clipboard text	Edit > Paste	
Undo undo the last edit	Edit > Undo	
Redo redo the last undone edit	Edit > Redo	

Main window toolbar buttons		
Button	**Menu equivalent**	**Command equivalents**
Find find text in the active window	Edit > Find	
Collapse All collapse all instances in the active window	Edit > Expand > Collapse All	
Expand All expand all instance in the active window	Edit > Expand > Expand All	
Compile open the Compile Source Files dialog to select files for compilation	Compile > Compile	**vcom** (CR-311) or **vlog** (CR-358)
Compile All compile all files in the open project	Compile > Compile All	**vcom** (CR-311) or **vlog** (CR-358)
Simulate load the selected design unit or simulation configuration object	Simulate > Start Simulation	**vsim** (CR-373)
Break stop the current simulation run	Simulate > Break	
Environment up move up one level in the design hierarchy		
Restart reload the design elements and reset the simulation time to zero, with the option of maintaining various settings and objects	Simulate > Run > Restart	**restart** (CR-246)
Run Length specify the run length for the current simulation	Simulate > Runtime Options	**run** (CR-252)

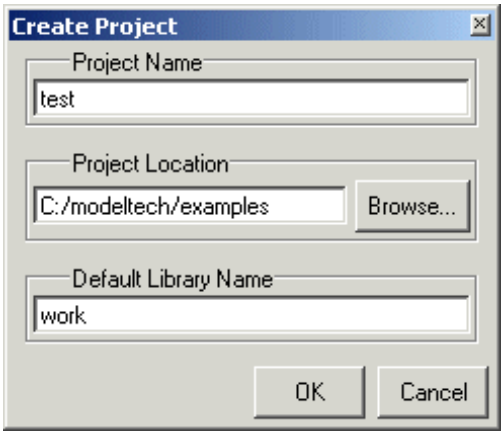
Main window toolbar buttons		
Button	**Menu equivalent**	**Command equivalents**
Run run the current simulation for the specified run length	Simulate > Run > Run <default_run_length>	**run** (CR-252)
Continue Run continue the current simulation run until the end of the specified run length or until it hits a breakpoint or specified break event	Simulate > Run > Continue	**run -continue**
Run -All run the current simulation forever, or until it hits a breakpoint or specified break event	Simulate > Run > Run -All	**run** (CR-252) **-all**
Step step the current simulation to the next statement	Simulate > Run > Step	**step** (CR-272)
Step Over HDL statements are executed but treated as simple statements instead of entered and traced line by line	Simulate > Run > Step -Over	**step** (CR-272) **-over**
C Interrupt reactivates the C debugger when stopped in HDL code	Tools > C Debug > C Interrupt	**cdbg** (CR-79) **interrupt**
Memory Profiling enable collection of memory usage data	Tools > Profile > Memory	
Performance Profiling enable collection of statistical performance data	Tools > Profile > Performance	
Contains filter items in Objects pane		

Main window dialogs

This section describes the dialogs that are accessed via the Main window menu bar. The dialogs are listed in the order in which they appear on the menus, top-to-bottom and left-to-right (i.e., starting with the File menu and progressing across the menu bar). Not all dialogs are documented (e.g., Change Directory dialog).

Create Project dialog

Purpose	Menu command	Additional information
Create a new project	**File** > **New** > **Project**	"Getting started with projects" (UM-40)

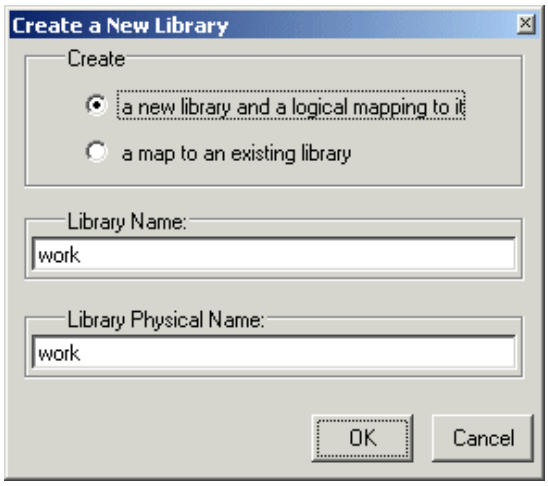


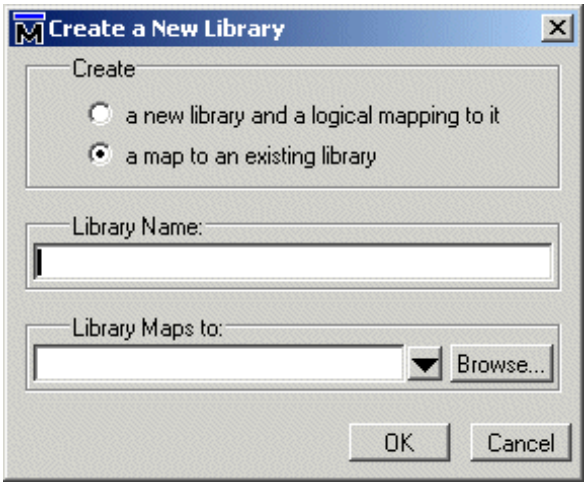
The Create Project dialog includes these options:

- **Project Name**
  The name of the new project.
- **Project Location**
  The directory in which the project *.mpf* file will be created.
- **Default Library Name**
  The name of the working library. See "Working library versus resource libraries" (UM-58) for more details on work libraries. You can generally leave the **Default Library Name** set to "work." The name you specify will be used to create a working library subdirectory within the Project Location.

Create a New Library dialog

Purpose	Menu command	Additional information
Create a new library	**File > New > Library**	"Working with design libraries" (UM-60)



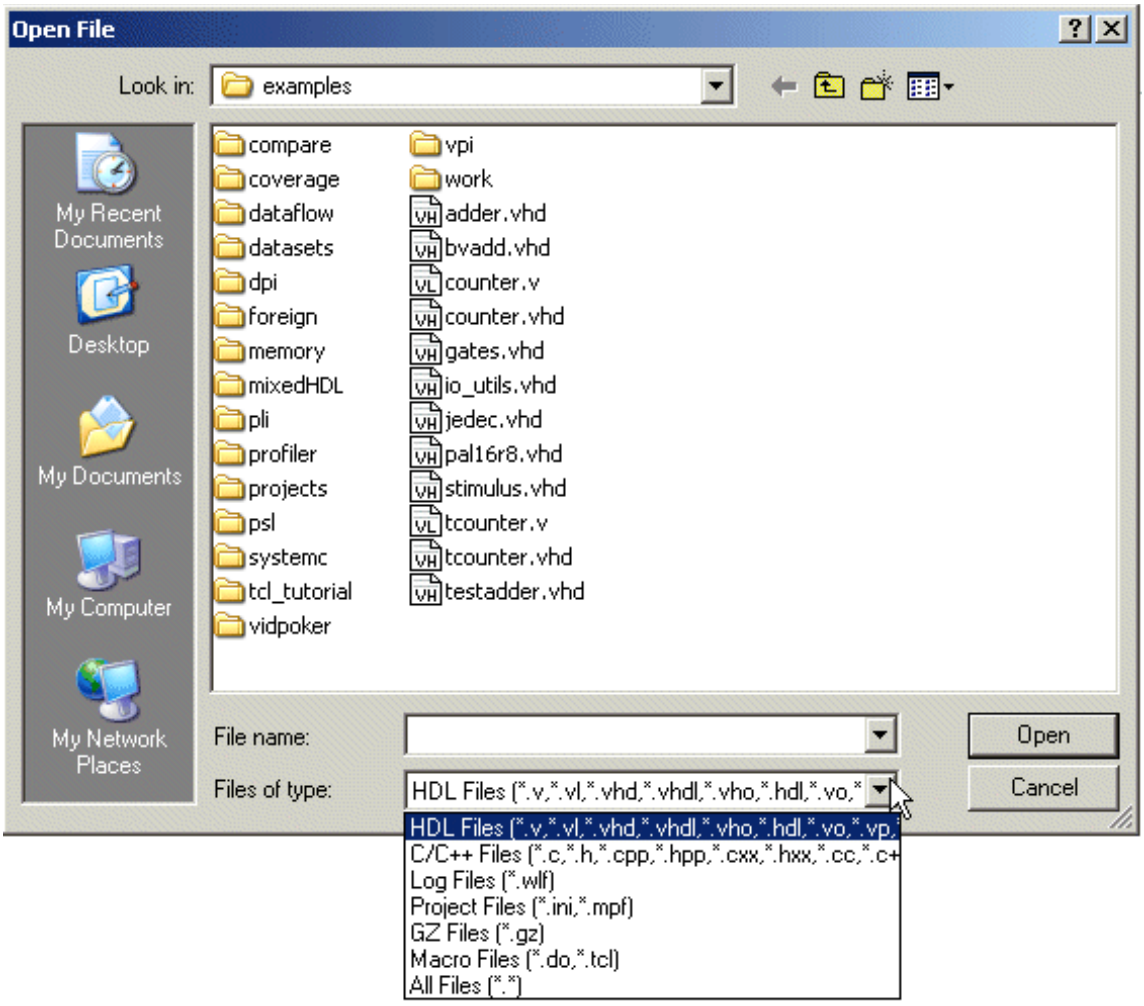


The Create a New Library dialog includes these options:

- **Create a new library and a logical mapping to it**
  Type the new library name into the **Library Name** field. This creates a library sub-directory in your current working directory, initially mapped to itself. Once created, the mapped library is easily remapped to a different library.
- **Create a map to an existing library**
  Type the new library name into the **Library Name** field, then type into the **Library Maps to** field or **Browse** to select a library for the mapping.
- **Library Name**
  The name of the new library.
- **Library Physical Name**
  The physical path to the library. Visible only when **Create a new library and a logical mapping to it** is selected.
- **Library Maps to**
  Type or **Browse** for a mapping for the specified library. This field is visible and can be changed only when the **Create a map to an existing library** option is selected.

Open File dialog

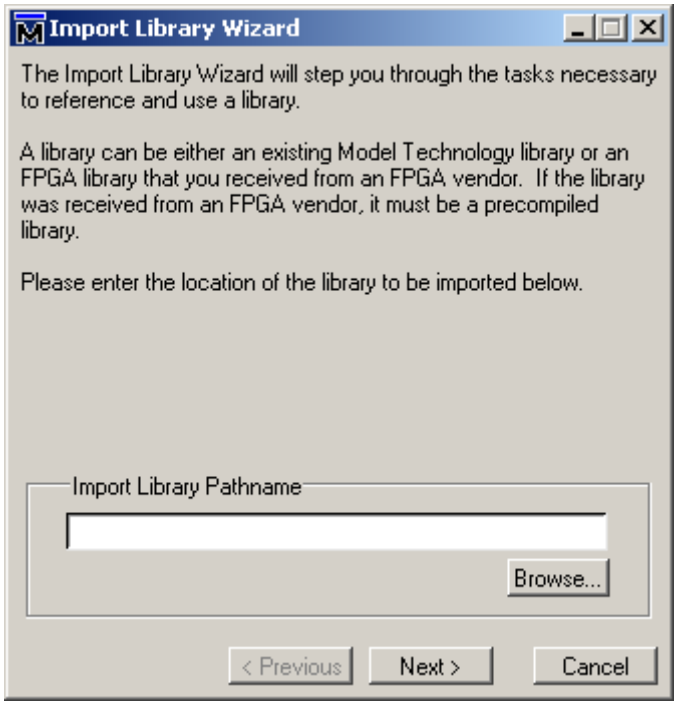
Purpose	Menu command	Additional information
Open a previously saved file	**File > Open**	



The Open File dialog is the standard Open dialog used by your operating system, and it may look slightly different on your system than the one above. The key field in this dialog is **Files of Type**. Select an item here to show the file type you want to open.

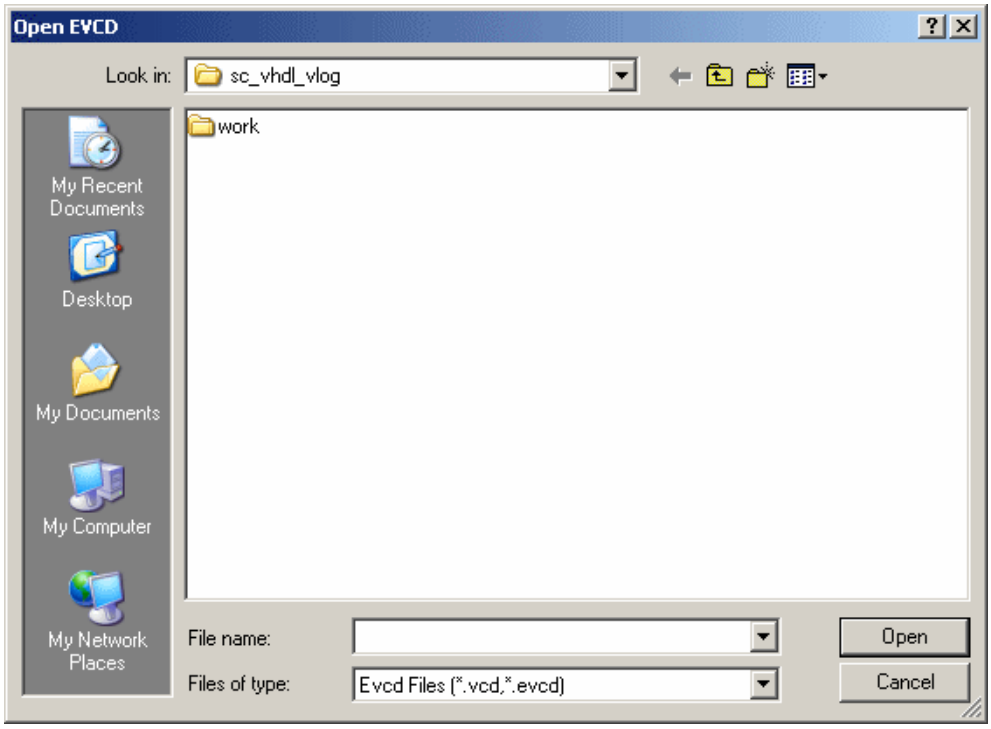
Import Library Wizard dialog

Purpose	Menu command	Additional information
Map to a vendor-supplied library	**File > Import > Library**	"Importing FPGA libraries" (UM-69)



Evcd Import dialog

Purpose	Menu command	Additional information
Import a previously saved EVCD file as stimulus	**File > Import > EVCD**	"Signal mapping and importing EVCD files" (GR-295)

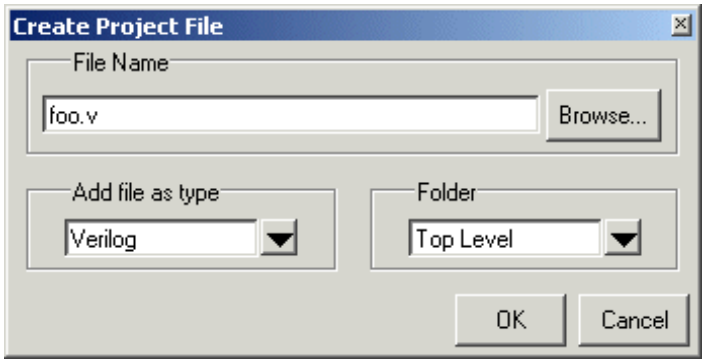


Save As dialog

Purpose	Menu command	Additional information
Save a file for the first time	**File > Save As**	

Create Project File dialog

Purpose	Menu command	Additional information
Add a new file to the open project	**File > Add to Project> New File**	"Create New File" (UM-42)

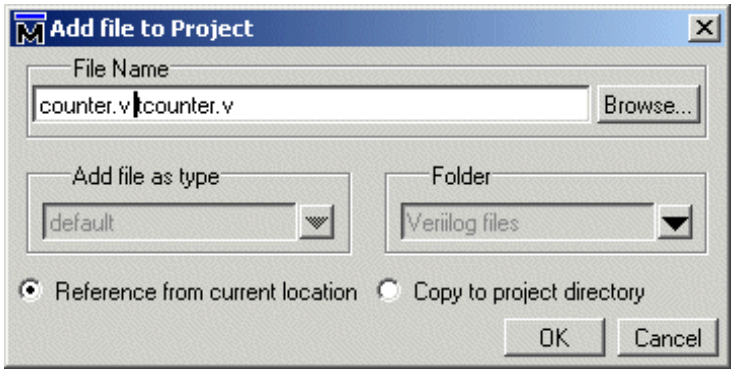


The Create Project File dialog includes these options:

- **File Name**
  The name of the new file.
- **Add file as type**
  Select from a variety of types (e.g., Tcl, Verilog, SDF, etc.).
- **Folder**
  The organization folder in which you want the new file placed. You must first create folders in order to access them here. See "Organizing projects with folders" (UM-50) for details.

Add file to Project dialog

Purpose	Menu command	Additional information
Add an existing file to the open project	**File > Add to Project> Existing File**	"Add Existing File" (UM-42)

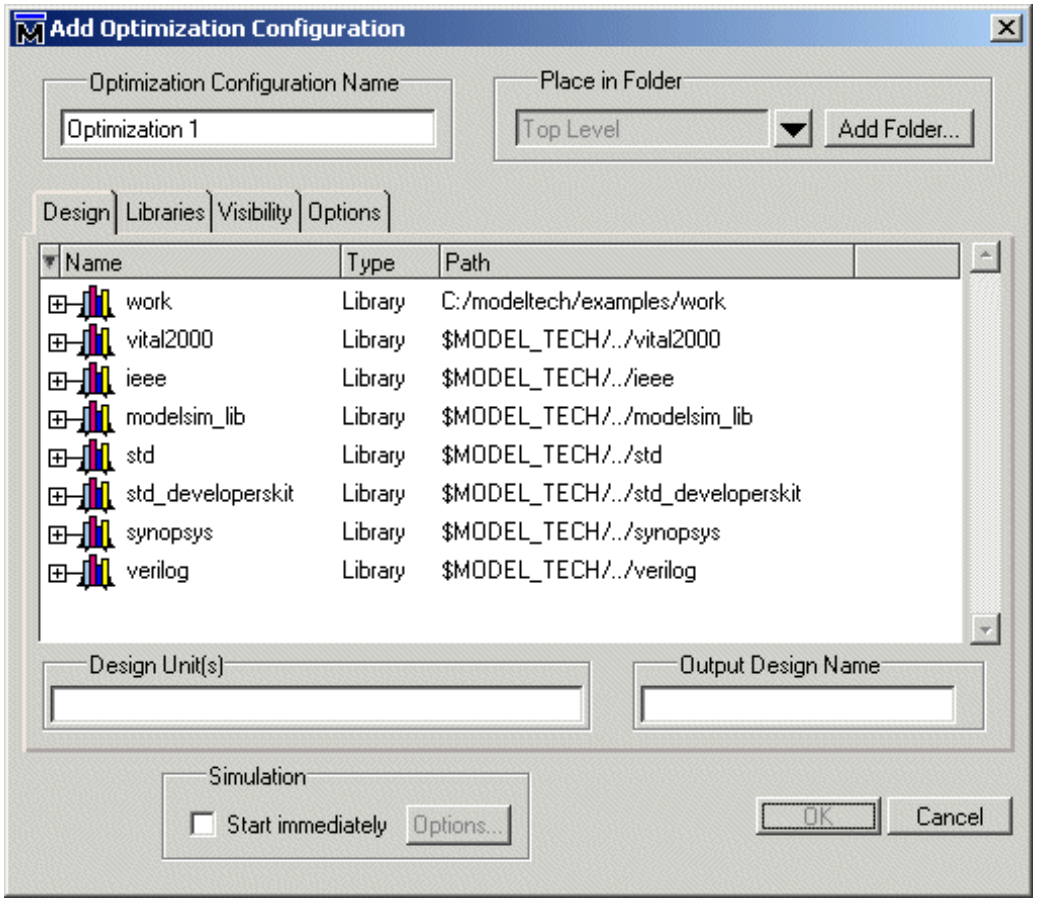


The Add file to Project dialog includes these options:

- **File Name**
  The name of the file to add. You can add multiple files at one time.
- **Add file as type**
  The type of the file. "Default" assigns type based on the file extension (e.g., *.v* is type Verilog).
- **Folder**
  The organization folder in which you want the file placed. You must first create folders in order to access them here. See "Organizing projects with folders" (UM-50) for details.
- **Reference from current location/Copy to project directory**
  Choose whether to reference the file from its current location or to copy it into the project directory.

Optimization Configuration dialog

Purpose	Menu command	Additional information
Add an optimization configuration to the open project	**File > Add to Project> Optimization Configuration**	"Optimization Configurations" (UM-49), "Design Optimization dialog" (GR-70)

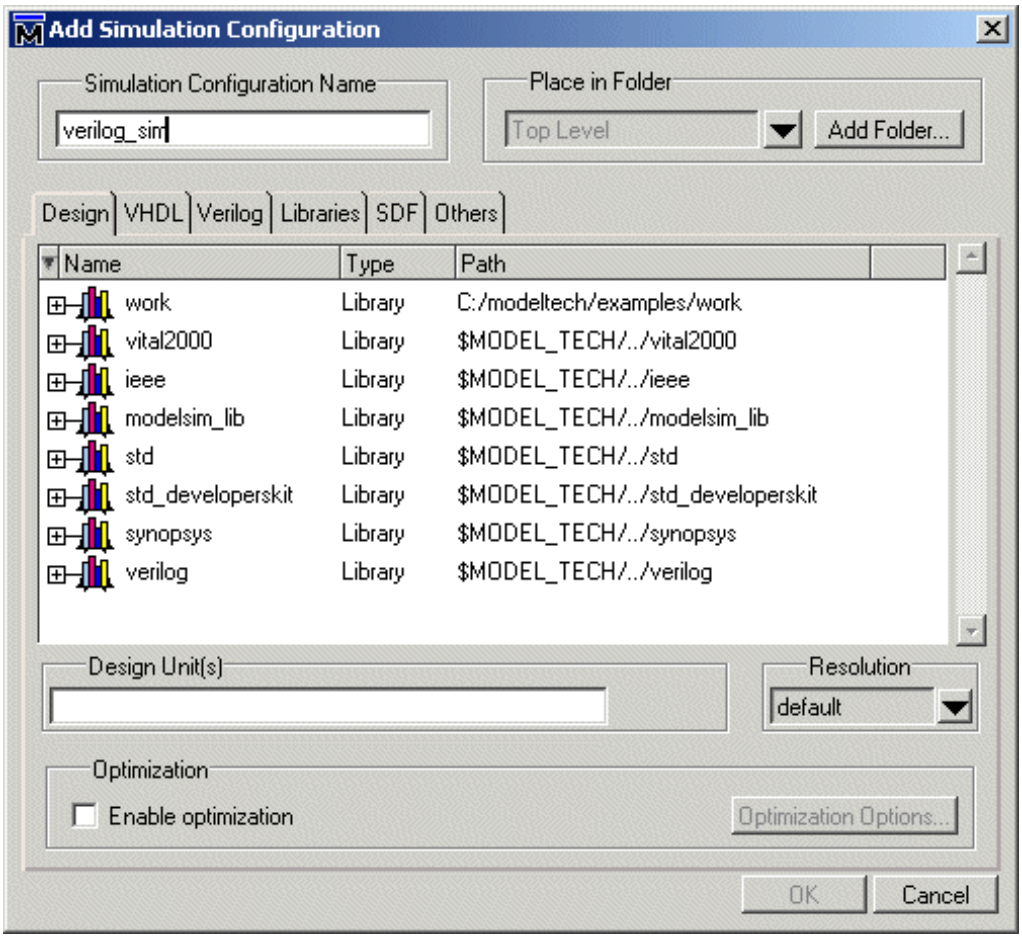


When adding an optimization configuration, you are presented with a modified version of the "Design Optimization dialog" (GR-70) that includes two additional options:

- **Optimization Configuration Name**
  The name you want for the Optimization Configuration.
- **Place in Folder**
  The organization folder in which you want the Optimization Configuration placed. Click Add Folder to create a new folder. See "Organizing projects with folders" (UM-50) for details.

Simulation Configuration dialog

Purpose	Menu command	Additional information
Add a simulation configuration to the open project	**File > Add to Project> Simulation Configuration**	"Creating a Simulation Configuration" (UM-48), "Start Simulation dialog" (GR-76)

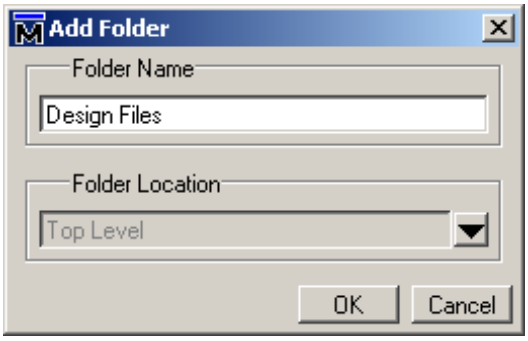


When adding a simulation configuration, you are presented with a modified version of the "Start Simulation dialog" (GR-76) that includes two additional options:

- **Simulation Configuration Name**
  The name you want for the Simulation Configuration.
- **Place in Folder**
  The organization folder in which you want the Simulation Configuration placed. Click Add Folder to create a new folder. See "Organizing projects with folders" (UM-50) for details.

Add Folder dialog

Purpose	Menu command	Additional information
Add a folder to the open project	**File > Add to Project> Folder**	"Organizing projects with folders" (UM-50)

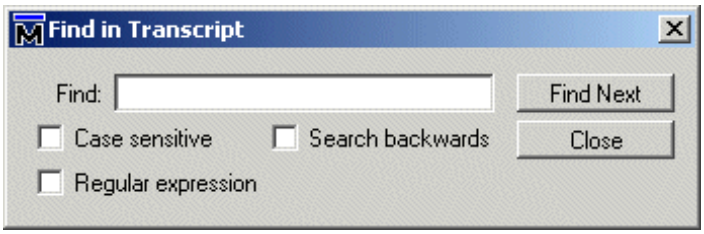


The Add Folder dialog includes these options:

- **Folder Name**
  The name you want for the new folder.
- **Folder Location**
  The organization folder in which you want the new folder placed. The first folder you create can be placed only in "Top Level."

Find in Transcript dialog

Purpose	Menu command	Additional information
Search for text in the current transcript	**Edit > Find**	NA



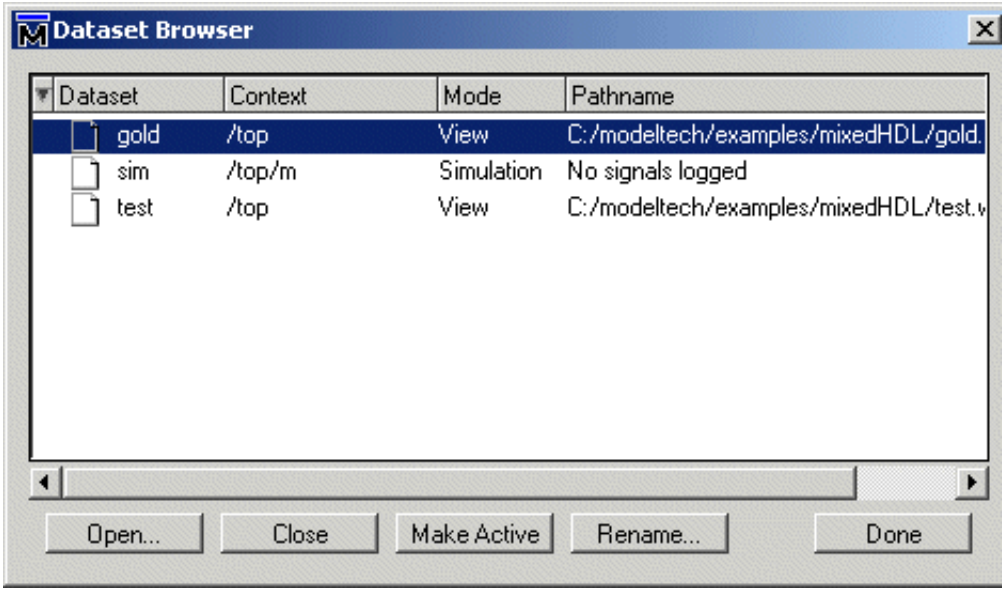
You must activate the Transcript pane by clicking in it before this dialog will be available.

The Find in Transcript dialog includes these options:

- **Find**
  The text string you want to search for in the transcript. Backslashes are used to escape special interpretation of basic regular expression characters. To search explicitly for a backslash character, it is necessary to escape the character. For example, to match \Arch Signal 1\, the pattern \\Arch... is required.
- **Case sensitive**
  If checked, the search will be case sensitive.
- **Regular expression**
  Check this box if you are using regular expression in the search string.
- **Search backwards**
  Search progresses backwards from the current cursor location in the transcript pane.

Dataset Browser dialog

Purpose	Menu command	Additional information
Manage datasets	**View > Datasets**	"Managing multiple datasets" (UM-229)



The Dataset Browser dialog includes these options.

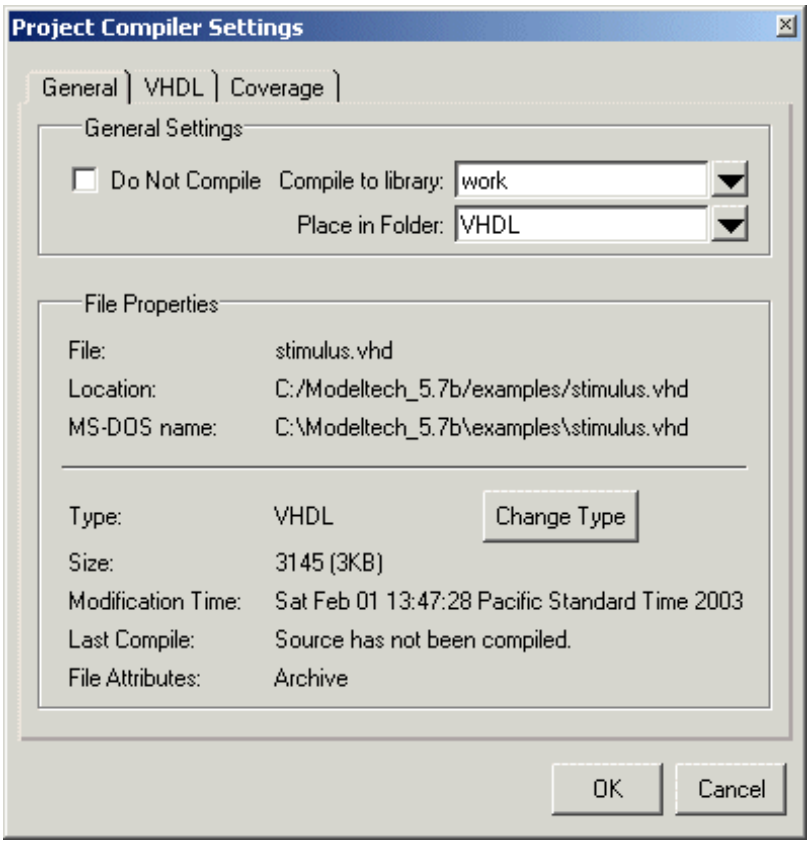
- **Open**
  Opens the Open Dataset dialog (see "Open File dialog" (GR-39)) so you can open additional datasets.
- **Close**
  Closes the selected dataset. This will also remove the dataset's Structure tab in the Main window workspace.
- **Make Active**
  Makes the selected dataset "active." You can also effect this change by double-clicking the dataset name. "Active" dataset means that if you type a region path as part of a command and omit the dataset prefix, the active dataset will be assumed. It is equivalent to typing `env <dataset>:` at the VSIM prompt. The active dataset is displayed at the bottom of the Main window.
- **Rename**
  Allows you to assign a new logical name to the selected dataset.

Project Compiler Settings

Purpose	Menu command	Additional information
Configure settings for project files	**View > Properties**	"Specifying file properties and project settings" (UM-52)

This dialog is accessible only if you have a project open. In addition to selecting **View > Properties**, you can open this dialog by right-clicking a file in the Project tab and selecting **Properties**, or by selecting **Compile > Compile Properties.** The tabs that are displayed will depend on the type of file(s) you select. When you select a SystemC file, only the General tab will be displayed.

General tab

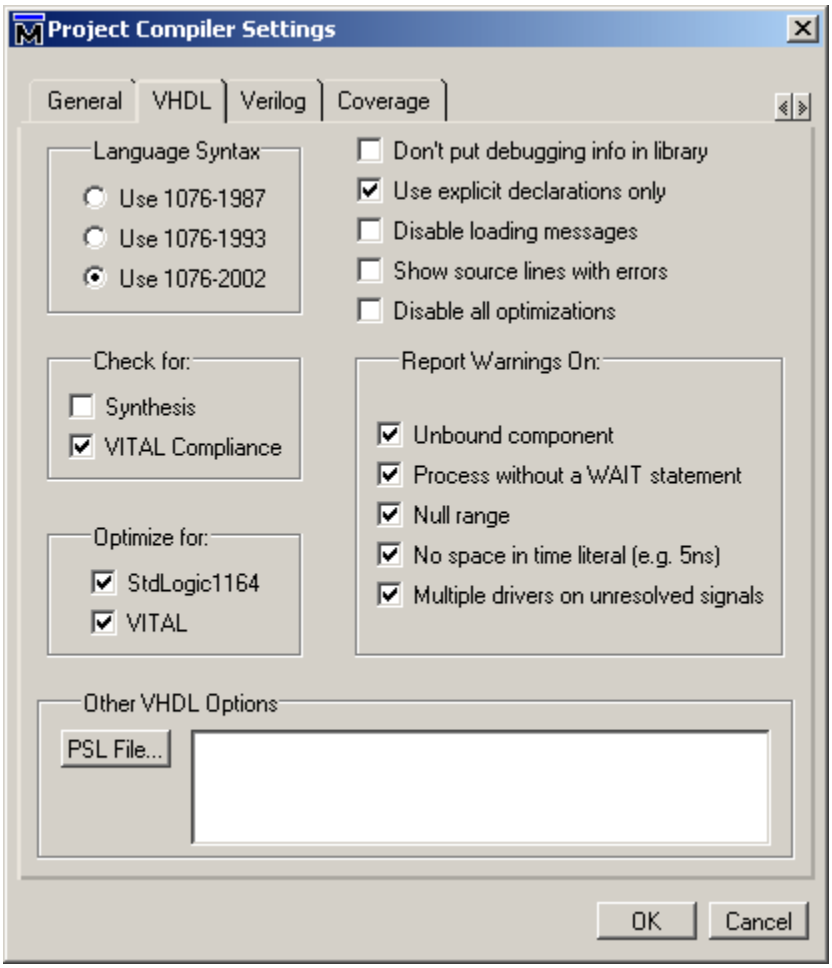


The General tab includes these options:

- **Do Not Compile**
  Determines whether the file is excluded from the compile.
- **Compile to library**
  Specifies to which library you want to compile the file; defaults to the working library.

- **Place in Folder**
  Specifies the folder in which to place the selected file(s). See "Organizing projects with folders" (UM-50) for details on folders.
- **File Properties**
  A variety of information about the selected file (e.g, type, size, path). Displays only if a single file is selected in the Project tab.
- **Change Type**
  Change the type that ModelSim assigns the file. ModelSim uses file extensions (e.g., .v or .vhd) to assign file types.

VHDL tab



- **Language Syntax**
  Specifies which version of the 1076 standard to use when compiling. The default for versions 5.8 and later is 2002. Changing the VHDL standard (UM-539) variable in the *modelsim.ini* file will make the setting permanent.
- **Don't put debugging info in library**
  Models compiled with this option do not use any of the ModelSim debugging features.

Consequently, your user will not be able to see into the model. This also means that you cannot set breakpoints or single step within this code. Don't compile with this option until you are done debugging. Same as the **-nodebug** argument to the **vcom** command (CR-311). See "Protecting source code using -nodebug" (UM-70) for more details. Edit the NoDebug (UM-527) variable in the *modelsim.ini* file to set a permanent default.

- **Use explicit declarations only**
  Used to ignore an error in packages supplied by some other EDA vendors; directs the compiler to resolve ambiguous function overloading in favor of the explicit function definition. Same as the **-explicit** argument to the **vcom** command (CR-311). Edit the Explicit (UM-527) variable in the *modelsim.ini* file to set a permanent default.

  Although it is not intuitively obvious, the = operator is overloaded in the **std_logic_1164** package. All enumeration data types in VHDL get an "implicit" definition for the = operator. So while there is no explicit = operator, there is an implicit one. This implicit declaration can be hidden by an explicit declaration of = in the same package (LRM Section 10.3). However, if another version of the = operator is declared in a different package than that containing the enumeration declaration, and both operators become visible through **use** clauses, neither can be used without explicit naming, for example:

  ```
  ARITHMETIC."="(left, right)
  ```

  This option allows the explicit = operator to hide the implicit one.

- **Disable loading messages**
  Disables loading messages in the Transcript pane. Same as the **-quiet** argument for the **vcom** command (CR-311). Edit the Quiet (UM-527) variable in the *modelsim.ini* file to set a permanent default.

- **Show source lines with errors**
  Causes the compiler to display the relevant lines of code in the transcript. Same as the **-source** argument to the **vcom** command (CR-311). Edit the Show_source (UM-528) variable in the *modelsim.ini* file to set a permanent default.

- **Disable all optimizations**
  Instructs the compiler to remove all optimizations. Same as the **-O0** argument to the **vcom** command (CR-311). Useful when "Measuring code coverage" (UM-333), where optimizations can skew results.

Check for:

- **Synthesis**
  Turns on limited synthesis-rule compliance checking. The checks apply only to signals used (read) by a process; also, the checks understand only combinational logic, not clocked logic. Edit the CheckSynthesis (UM-527) variable in the *modelsim.ini* file to set a permanent default.

- **VITAL Compliance**
  Toggle Vital compliance checking. Edit the NoVitalCheck (UM-527) variable in the *modelsim.ini* file to set a permanent default.

Report Warnings on:

- **Unbound component**
  Flags any component instantiation in the VHDL source code that has no matching entity in a library that is referenced in the source code, either directly or indirectly. Edit the Show_Warning1 (UM-528) variable in the *modelsim.ini* file to set a permanent default.
- **Process without a WAIT statement**
  Flags any process that does not contain a wait statement or a sensitivity list. Edit the Show_Warning2 (UM-528) variable in the *modelsim.ini* file to set a permanent default.
- **Null range**
  Flags any null range, such as 0 down to 4. Edit the Show_Warning3 (UM-528) variable in the *modelsim.ini* file to set a permanent default.
- **No space in time literal (e.g. 5ns)**
  Flags any time literal that is missing a space between the number and the time unit. Edit the Show_Warning4 (UM-528) variable in the *modelsim.ini* file to set a permanent default.
- **Multiple drivers on unresolved signals**
  Flags any unresolved signals that have multiple drivers. Edit the Show_Warning5 (UM-528) variable in the *modelsim.ini* file to set a permanent default.

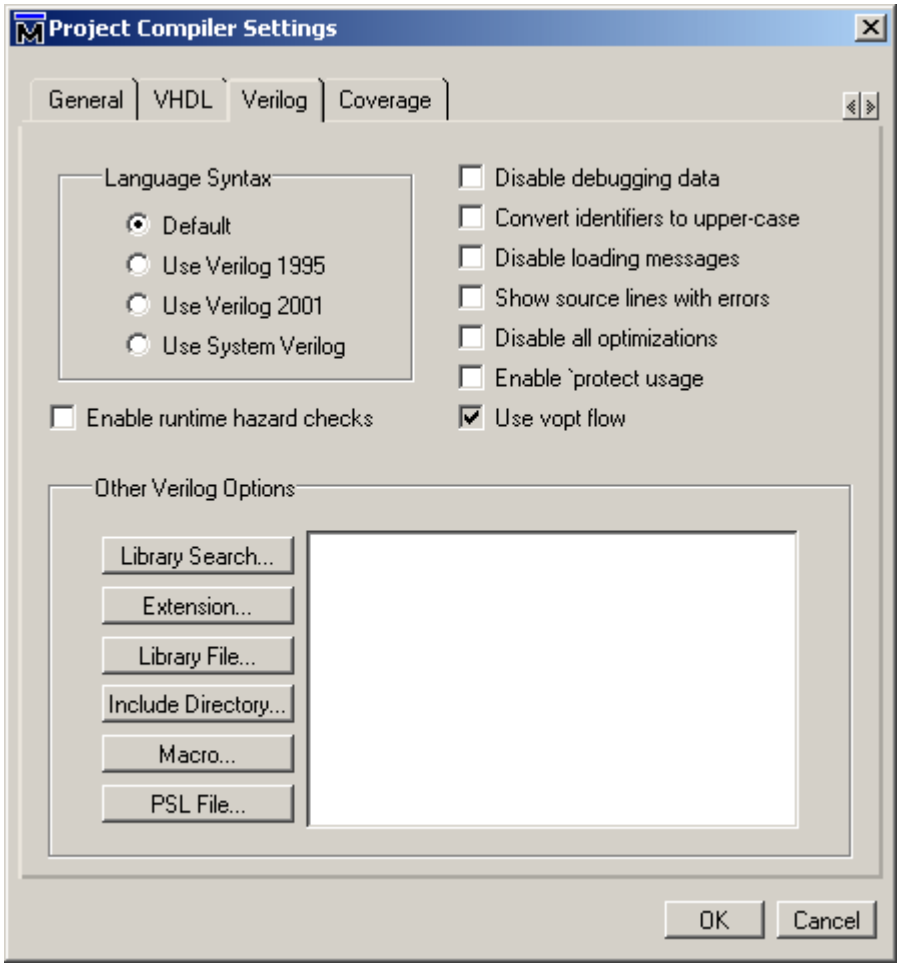
Optimize for:

- **StdLogic1164**
  Causes the compiler to perform special optimizations for speeding up simulation when the multi-value logic package std_logic_1164 is used. Unless you have modified the std_logic_1164 package, this option should always be checked. Edit the Optimize_1164 (UM-527) variable in the *modelsim.ini* file to set a permanent default.
- **VITAL**
  Toggle acceleration of the VITAL packages. Edit the NoVital (UM-527) variable in the *modelsim.ini* file to set a permanent default.

Other VHDL options:

- **PSL File**
  Click this button to add a PSL file. See *Chapter 14 - PSL Assertions* for additional information about using assertions.
- Enter any other valid **vcom** arguments. See the **vcom** command (CR-311) in the *ModelSim Command Reference* for a complete list.

Verilog tab



The Verilog tab includes the following options:

- **Language Syntax**
  Specify which version of the standard should be used to compile the selected file(s). The default is Verilog 2001. Selecting **Use Verilog 1995** simply disables 2001 keywords. Similarly, selecting **Use SystemVerilog** simply enables SystemVerilog keywords.
- **Enable runtime hazard checks**
  Enables the run-time hazard checking code. Same as the **-hazards** argument to the **vlog** command (CR-358). Edit the Hazard (UM-525) variable in the *modelsim.ini* file to set a permanent default.
- **Disable debugging data**
  Models compiled with this option do not use any of the ModelSim debugging features. Consequently, your user will not be able to see into the model. This also means that you cannot set breakpoints or single step within this code. Don't compile with this option until you are done debugging. Same as the **-nodebug** argument for the **vlog** command (CR-358). See "Protecting source code using -nodebug" (UM-70) for more details. Edit the NoDebug (UM-527) variable in the *modelsim.ini* file to set a permanent default.

- **Convert identifiers to upper-case**
  Converts regular Verilog identifiers to uppercase. Allows case insensitivity for module names. Same as the **-u** argument to the **vlog** command (CR-358). Edit the UpCase (UM-526) variable in the *modelsim.ini* file to set a permanent default.
- **Disable loading messages**
  Disables loading messages in the Transcript pane. Same as the **-quiet** argument for the **vlog** command (CR-358). Edit the Quiet (UM-527) variable in the *modelsim.ini* file to set a permanent default.
- **Show source lines with errors**
  Causes the compiler to display the relevant lines of code in the transcript. Same as the **-source** argument to the **vlog** command (CR-358). Edit the Show_source (UM-528) variable in the *modelsim.ini* file to set a permanent default.
- **Disable all optimizations**
  Instructs the compiler to remove all optimizations. Same as the **-O0** argument to the **vlog** command (CR-358). Useful when running "Measuring code coverage" (UM-333), where optimizations can skew results.
- **Enable `protect usage**
  Enables encryption of regions of your Verilog source code. See "ModelSim compiler directives" (UM-155) for more details. Same as the **+protect** argument for the **vlog** command (CR-358). Edit the Protect (UM-526) variable in the *modelsim.ini* file to set a permanent default.
- **Use vopt flow**
  Instructs ModelSim that you will be optimizing the design (see "Optimizing Verilog designs" (UM-124) for more information). This prevents the compiler from producing code. Same as the **-vopt** argument to the **vlog** command (CR-358).

Other Verilog Options:

Specify any valid **vlog** command (CR-358) arguments.

- **Library Search**
  Specifies the Verilog source library directory to search for undefined modules. Same as the **-y <library_directory>** argument for the **vlog** command (CR-358).
- **Extension**
  Specifies the suffix of files in the library directory. Multiple suffixes can be used. Same as the **+libext+<suffix>** argument for the **vlog** command (CR-358).
- **Library File**
  Specifies the Verilog source library file to search for undefined modules. Same as the **-v <library_file>** argument for the **vlog** command (CR-358).
- **Include Directory**
  Specifies a directory for files included with the **‘include filename** compiler directive. Same as the **+incdir+<directory>** argument for the **vlog** command (CR-358).
- **Macro**
  Defines a macro equivalent to one created with the **‘define macro_name macro_text** compiler directive. Same as the **+define+<macro_name> [=<macro_text>]** argument for the **vlog** command (CR-358).

- PSL File
  Add a PSL file. See *Chapter 14 - PSL Assertions* for additional information about using assertions.

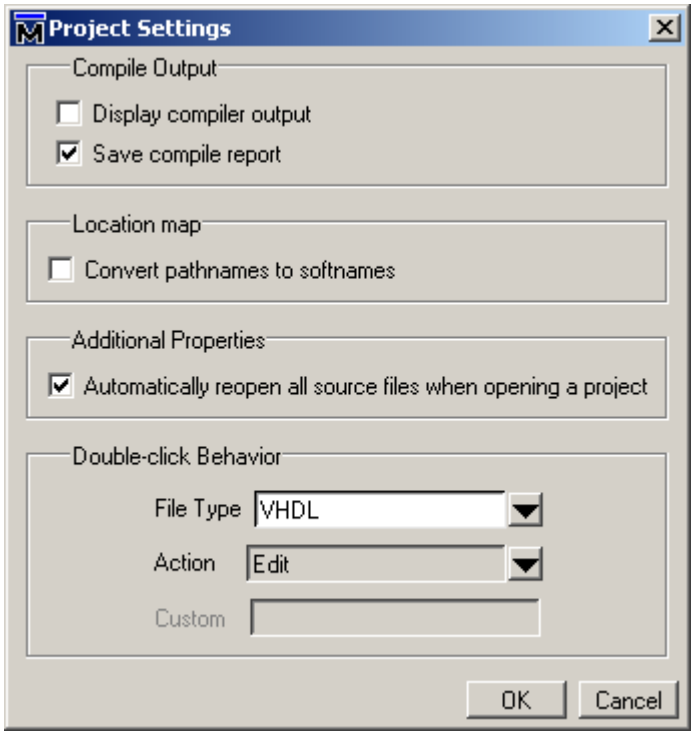
Note: When you specify Other Verilog Options, they are saved into a file called *vlog.opt*. If you do this while a project is open, an OptionFile entry is written into your project file. If you do this when a project is not open, an OptionFile entry is written into the *modelsim.ini* file that you are currently using.

Coverage tab

The definitions for the options on the Coverage tab can be found in "Enabling code coverage" (UM-337).

Project Settings dialog

Purpose	Menu command	Additional information
Configure default project properties	**View > Project Settings**	"Specifying file properties and project settings" (UM-52)



The Project Settings dialog includes these options:

- **Display compiler output**
  Prints verbose compile output to the Transcript. By default verbose output is produced in the Compile Report only.
- **Save compile report**
  Saves verbose compile output to disk. You can access the report by right-clicking a file and selecting **Compile > Compile Report**.
- **Location map**
  Specifies whether physical paths for the project files should be saved as soft paths if they are present in the location map. See "Referencing source files with location maps" (UM-67) for more details on using location maps.
- **Additional Properties**
  Specifies whether all previously opened project source files will be reopened when a project is reopened. Default: "Automatically reopen all source files..." is enabled.

- **Double-click Behavior**
  Specifies the action to take when you double-click a type of file. If you select Custom, you can specify a Tcl command in the text box below the file type.

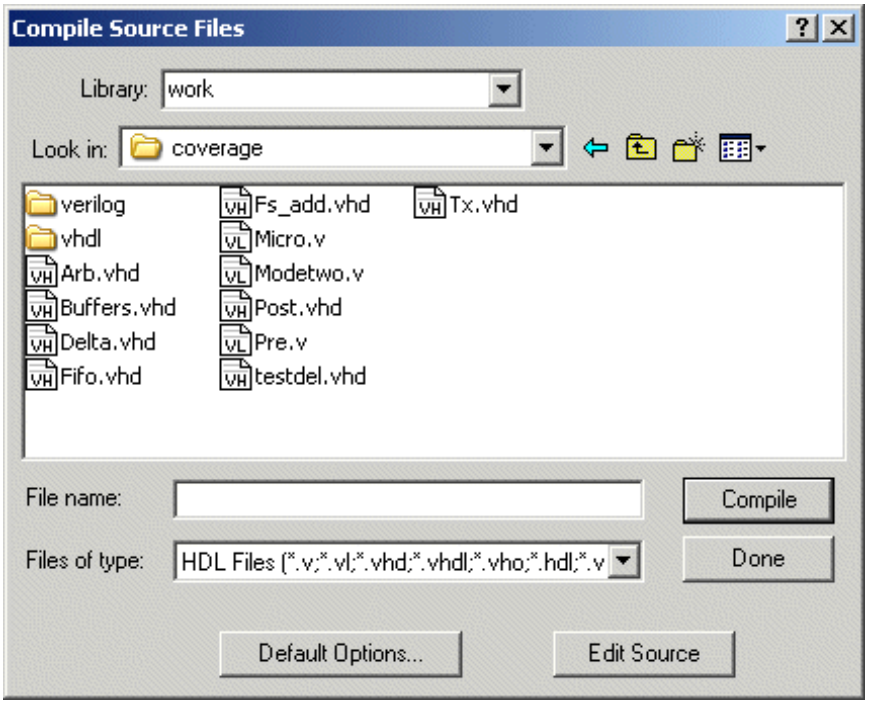
  You can use *%f* for filename substitution. For example, if you want double click on a Tcl file to open the file with Notepad, you would insert the following in the text box:

  ```
  notepad %f
  ```

  ModelSim will substitute the *%f* with the filename that was clicked on, then execute the string.

Compile Source Files dialog

Purpose	Menu command	Additional information
Compile Verilog or VHDL source files	**Compile > Compile** (disabled when a project is open)	"Compiling Verilog files" (UM-114), "Compiling VHDL files" (UM-73), "Compiling SystemC files" (UM-164)



The Compile Source Files dialog includes these options:

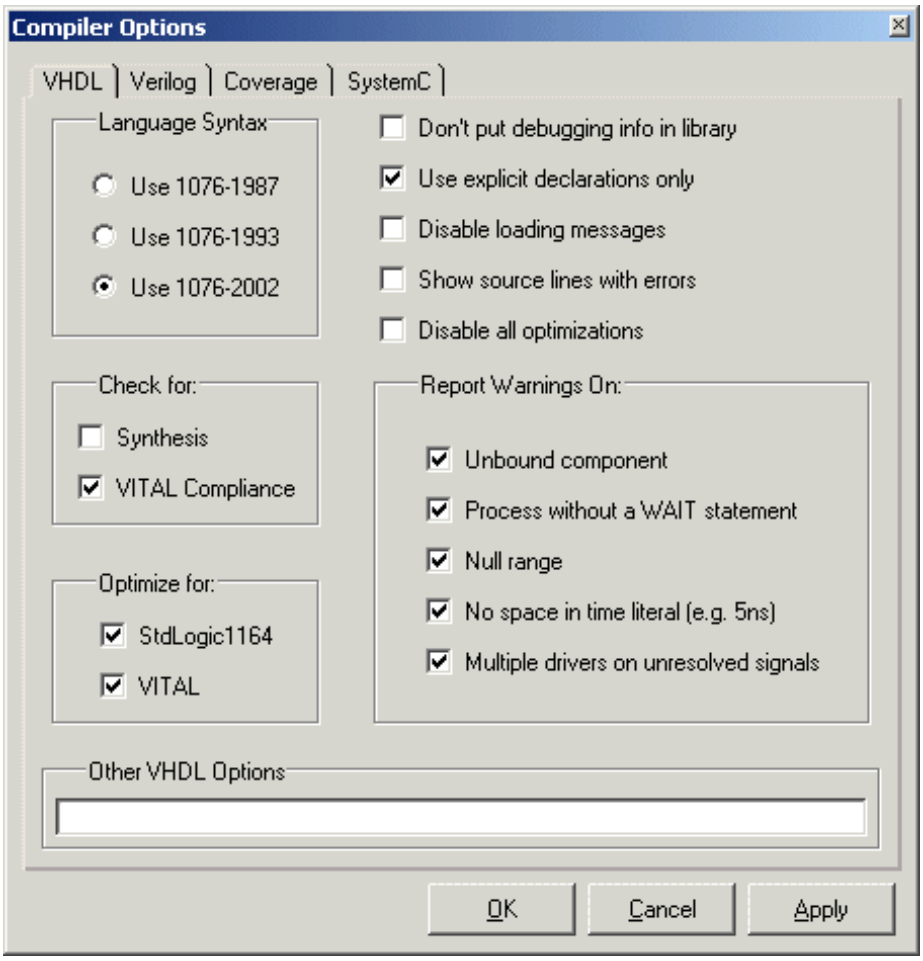
- **Library**
  The library into which you want the source code compiled.
- **Look in**
  The directory you want to look in for source files.
- **File name**
  The name of the file(s) you want to compile. Specify the file name and then click the Compile button. Alternatively, double-click a file in the list to compile it.
- **File of type**
  Filter the list to show only files of a certain type (e.g., HDL files, Verilog files, etc.).
- **Default Options**
  Configure compiler options for the Verilog, VHDL, and SystemC compilers and Code Coverage. See "Compiler Options dialog" (GR-60) for details.
- **Edit Source**
  View or edit the selected file in the Source window.

Compiler Options dialog

Purpose	Menu command	Additional information
Configure compiler options	**Compile** > **Compile Options (**disabled when a project is open)	**vlog** command (CR-358), **vcom** command (CR-311), **sccom** command (CR-254)

Important: Note that changes made in the **Compiler Options** dialog become the default for all future simulations.

VHDL tab



The VHDL tab includes the following options:

- **Language Syntax**
  Specifies which version of the 1076 standard to use when compiling. The default for versions 5.8 and later is 2002. Changing the VHDL standard (UM-539) variable in the *modelsim.ini* file will make the setting permanent.

- **Don’t put debugging info in library**
  Models compiled with this option do not use any of the ModelSim debugging features. Consequently, your user will not be able to see into the model. This also means that you cannot set breakpoints or single step within this code. Don’t compile with this option until you are done debugging. Same as the **-nodebug** argument to the **vcom** command (CR-311). See "Protecting source code using -nodebug" (UM-70) for more details. Edit the NoDebug (UM-527) variable in the *modelsim.ini* file to set a permanent default.
- **Use explicit declarations only**
  Used to ignore an error in packages supplied by some other EDA vendors; directs the compiler to resolve ambiguous function overloading in favor of the explicit function definition. Same as the **-explicit** argument to the **vcom** command (CR-311). Edit the Explicit (UM-527) variable in the *modelsim.ini* file to set a permanent default.

  Although it is not intuitively obvious, the = operator is overloaded in the **std_logic_1164** package. All enumeration data types in VHDL get an “implicit” definition for the = operator. So while there is no explicit = operator, there is an implicit one. This implicit declaration can be hidden by an explicit declaration of = in the same package (LRM Section 10.3). However, if another version of the = operator is declared in a different package than that containing the enumeration declaration, and both operators become visible through **use** clauses, neither can be used without explicit naming, for example:

  ```
  ARITHMETIC.”=”(left, right)
  ```

  This option allows the explicit = operator to hide the implicit one.
- **Disable loading messages**
  Disables loading messages in the Transcript pane. Same as the **-quiet** argument for the **vcom** command (CR-311). Edit the Quiet (UM-527) variable in the *modelsim.ini* file to set a permanent default.
- **Show source lines with errors**
  Causes the compiler to display the relevant lines of code in the transcript. Same as the **-source** argument to the **vcom** command (CR-311). Edit the Show_source (UM-528) variable in the *modelsim.ini* file to set a permanent default.
- **Disable all optimizations**
  Instructs the compiler to remove all optimizations. Same as the **-O0** argument to the **vcom** command (CR-311). Useful when "Measuring code coverage" (UM-333), where optimizations can skew results.

Check for:

- **Synthesis**
  Turns on limited synthesis-rule compliance checking. The checks apply only to signals used (read) by a process; also, the checks understand only combinational logic, not clocked logic. Edit the CheckSynthesis (UM-527) variable in the *modelsim.ini* file to set a permanent default.
- **VITAL Compliance**
  Toggle Vital compliance checking. Edit the NoVitalCheck (UM-527) variable in the *modelsim.ini* file to set a permanent default.

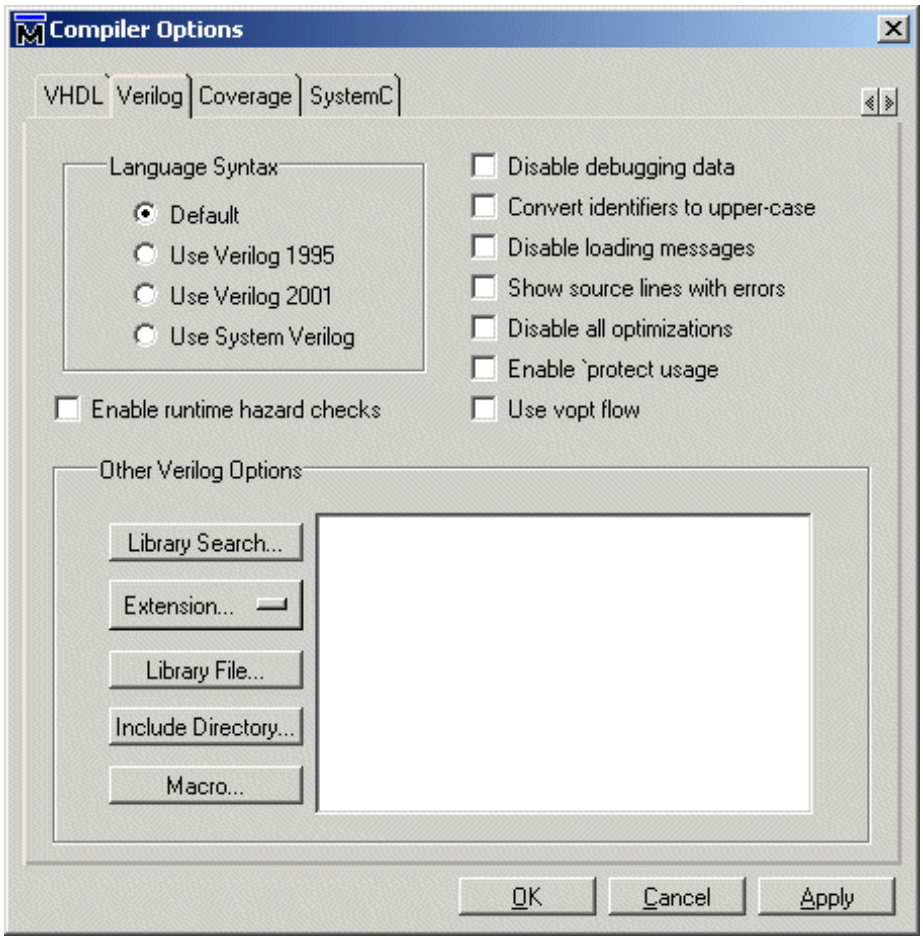
Report Warnings on:

- **Unbound component**
  Flags any component instantiation in the VHDL source code that has no matching entity in a library that is referenced in the source code, either directly or indirectly. Edit the Show_Warning1 (UM-528) variable in the *modelsim.ini* file to set a permanent default.
- **Process without a WAIT statement**
  Flags any process that does not contain a wait statement or a sensitivity list. Edit the Show_Warning2 (UM-528) variable in the *modelsim.ini* file to set a permanent default.
- **Null range**
  Flags any null range, such as 0 down to 4. Edit the Show_Warning3 (UM-528) variable in the *modelsim.ini* file to set a permanent default.
- **No space in time literal (e.g. 5ns)**
  Flags any time literal that is missing a space between the number and the time unit. Edit the Show_Warning4 (UM-528) variable in the *modelsim.ini* file to set a permanent default.
- **Multiple drivers on unresolved signals**
  Flags any unresolved signals that have multiple drivers. Edit the Show_Warning5 (UM-528) variable in the *modelsim.ini* file to set a permanent default.

Optimize for:

- **StdLogic1164**
  Causes the compiler to perform special optimizations for speeding up simulation when the multi-value logic package std_logic_1164 is used. Unless you have modified the std_logic_1164 package, this option should always be checked. Edit the Optimize_1164 (UM-527) variable in the *modelsim.ini* file to set a permanent default.
- **VITAL**
  Toggle acceleration of the VITAL packages. Edit the NoVital (UM-527) variable in the *modelsim.ini* file to set a permanent default.
- **Other VHDL options**
  Enter any other valid **vcom** arguments. See the **vcom** command (CR-311) in the *ModelSim Command Reference* for a complete list.

Verilog tab



The Verilog tab includes the following options:

- **Language Syntax**
  Specify which version of the standard should be used to compile the selected file(s). The default is Verilog 2001. Selecting **Use Verilog 1995** simply disables 2001 keywords. Similarly, selecting **Use SystemVerilog** simply enables SystemVerilog keywords.
- **Enable runtime hazard checks**
  Enables the run-time hazard checking code. Same as the **-hazards** argument to the **vlog** command (CR-358). Edit the Hazard (UM-525) variable in the *modelsim.ini* file to set a permanent default.
- **Disable debugging data**
  Models compiled with this option do not use any of the ModelSim debugging features. Consequently, your user will not be able to see into the model. This also means that you cannot set breakpoints or single step within this code. Don't compile with this option until you are done debugging. Same as the **-nodebug** argument for the **vlog** command (CR-358). See "Protecting source code using -nodebug" (UM-70) for more details. Edit the NoDebug (UM-527) variable in the *modelsim.ini* file to set a permanent default.

- **Convert identifiers to upper-case**
  Converts regular Verilog identifiers to uppercase. Allows case insensitivity for module names. Same as the **-u** argument to the **vlog** command (CR-358). Edit the UpCase (UM-526) variable in the *modelsim.ini* file to set a permanent default.
- **Disable loading messages**
  Disables loading messages in the Transcript pane. Same as the **-quiet** argument for the **vlog** command (CR-358). Edit the Quiet (UM-527) variable in the *modelsim.ini* file to set a permanent default.
- **Show source lines with errors**
  Causes the compiler to display the relevant lines of code in the transcript. Same as the **-source** argument to the **vlog** command (CR-358). Edit the Show_source (UM-528) variable in the *modelsim.ini* file to set a permanent default.
- **Disable all optimizations**
  Instructs the compiler to remove all optimizations. Same as the **-O0** argument to the **vlog** command (CR-358). Useful when running "Measuring code coverage" (UM-333), where optimizations can skew results.
- **Enable `protect usage**
  Enables encryption of regions of your Verilog source code. See "ModelSim compiler directives" (UM-155) for more details. Same as the **+protect** argument for the **vlog** command (CR-358). Edit the Protect (UM-526) variable in the *modelsim.ini* file to set a permanent default.
- **Use vopt flow**
  Instructs ModelSim that you will be optimizing the design (see "Optimizing Verilog designs" (UM-124) for more information). This prevents the compiler from producing code. Same as the **-vopt** argument to the **vlog** command (CR-358).

Other Verilog Options:

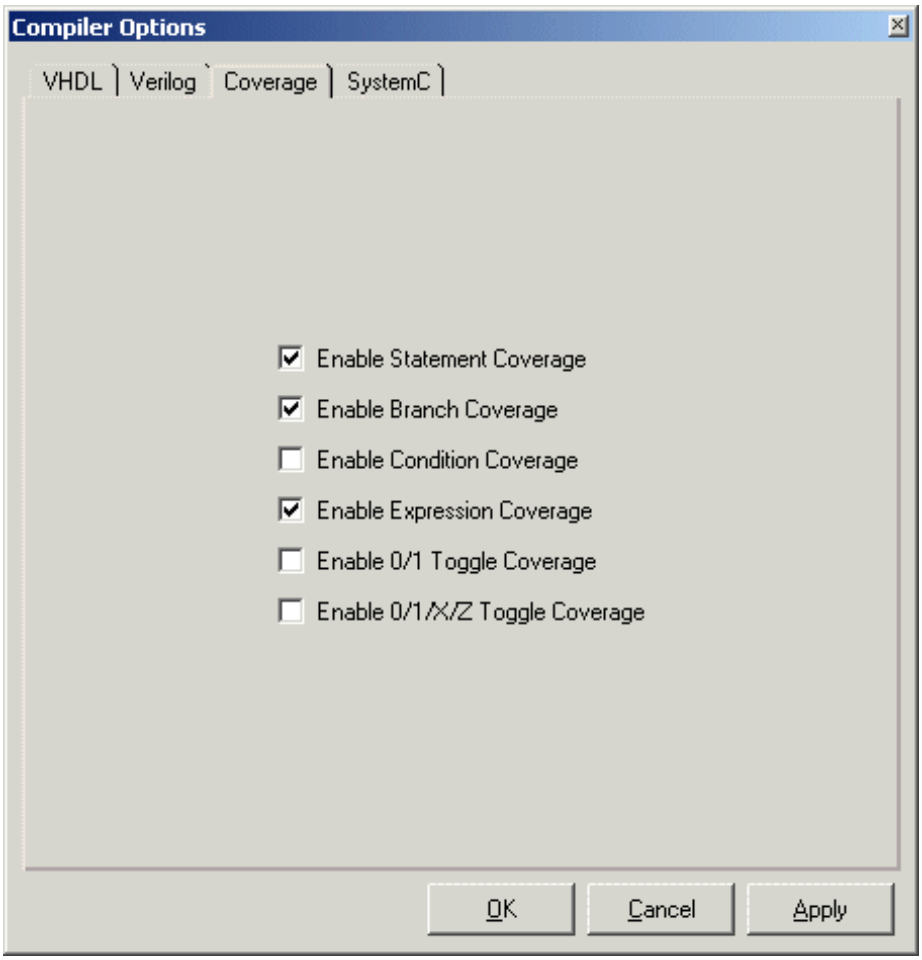
Specify any valid **vlog** command (CR-358) arguments.

- **Library Search**
  Specifies the Verilog source library directory to search for undefined modules. Same as the **-y <library_directory>** argument for the **vlog** command (CR-358).
- **Extension**
  Specifies the suffix of files in the library directory. Multiple suffixes can be used. Same as the **+libext+<suffix>** argument for the **vlog** command (CR-358).
- **Library File**
  Specifies the Verilog source library file to search for undefined modules. Same as the **-v <library_file>** argument for the **vlog** command (CR-358).
- **Include Directory**
  Specifies a directory for files included with the **‘include filename** compiler directive. Same as the **+incdir+<directory>** argument for the **vlog** command (CR-358).
- **Macro**
  Defines a macro equivalent to one created with the **‘define macro_name macro_text**

compiler directive. Same as the **+define+<macro_name> [=<macro_text>]** argument for the **vlog** command (CR-358).

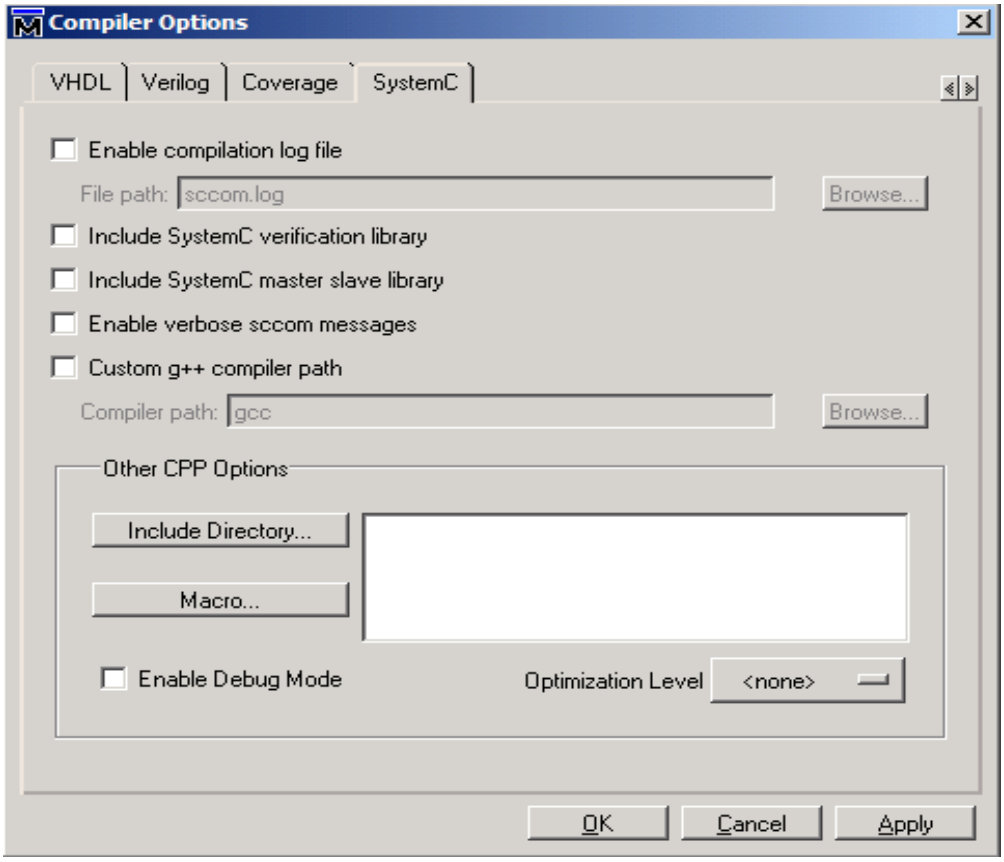
Note: When you specify Other Verilog Options, they are saved into a file called *vlog.opt*. If you do this while a project is open, an OptionFile entry is written into your project file. If you do this when a project is not open, an OptionFile entry is written into the *modelsim.ini* file that you are currently using.

Coverage tab



The Coverage tab lets you select which types of Code Coverage statistics will be collected during the simulation. See "Enabling code coverage" (UM-337) for details.

SystemC tab



The SystemC tab includes the following options:

- **Enable compilation log file**
  Writes the compilation output to a file name, specified in the **File path** field. Same as the **-log** argument to the **sccom** command (CR-254).
- **Include SystemC verification library**
  Includes the SystemC verification library. Same as the **-scv** argument to the **sccom** command (CR-254).
- **Include SystemC master slave library**
  Includes the SystemC master slave library. Same as the **-scms** argument to the **sccom** command (CR-254).
- **Enable verbose sccom messages**
  Echoes subprocess invocations with command arguments. Same as the **-verbose** argument to the **sccom** command (CR-254).
- **Custom g++ compiler path**
  Enables you to specify a path for your custom g++ installation.

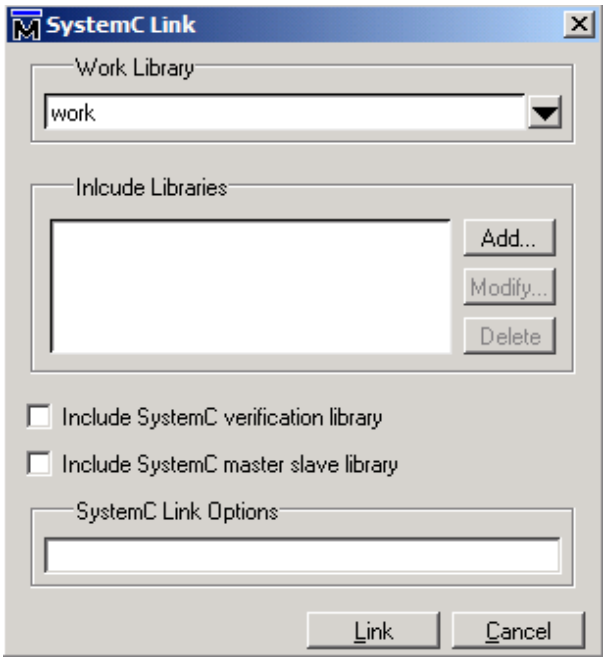
Other CPP Options

Specify any valid g++/aCC compiler options. All options are accepted, with the exception of the **-o** and **-c** options.

- **Include Directory**
  Includes a directory that contains source files. Same as the **-I** argument to g++/aCC.
- **Macro**
  Defines a macro. Same as the **-D** argument to g++/aCC.
- **Enable Debug Mode**
  Compiles SystemC code with debugging information. By default SystemC code is compiled without debugging information. Same as the **-g** argument to g++/aCC.
- **Optimization level**
  Specifies an optimization value you wish to use. By default, no optimization is performed. Same as the **-O#** argument to g++/aCC.

SystemC Link dialog

Purpose	Menu command	Additional information
Build a shared library (.so) in the current work library	**Compile > SystemC Link**	"Linking the compiled source" (UM-172)

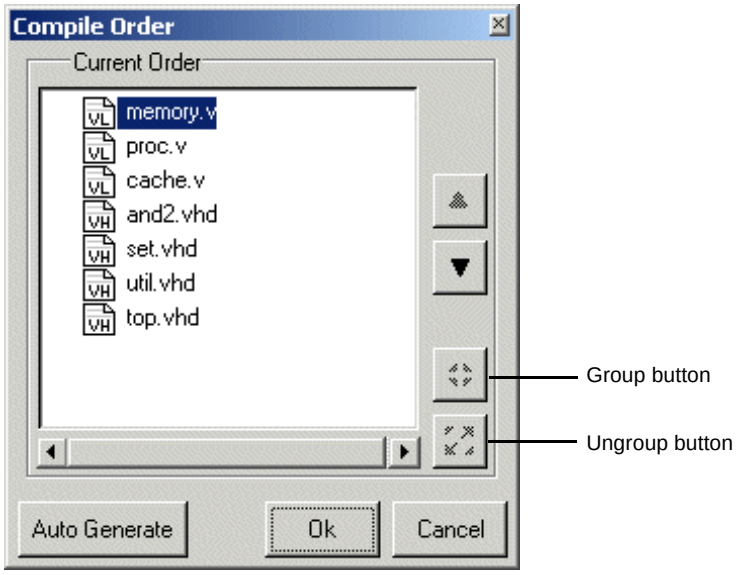


The SystemC Link dialog includes these options:

- **Work Library**
  Sets the work library for the **sccom -link** command. Same as the **-work** argument to the **sccom** command (CR-254).
- **Include Libraries**
  Includes any specified library. You can Add (browse for) a library, Modify the selection of a library, or Delete the library. Same as the **-lib** argument to the **sccom** command (CR-254).
- **Include SystemC verification library**
  Includes the SystemC verification library. Same as the **-scv** argument to the **sccom** command (CR-254).
- **Include SystemC master slave library**
  Includes the SystemC master slave library. Same as the **-scms** argument to the **sccom** command (CR-254).
- **SystemC Link Options**
  Specify any valid g++/aCC linking options. All options are accepted.

Compile Order dialog

Purpose	Menu command	Additional information
Set the order in which files in a project are compiled	**Compile** > **Compile Order** (disabled unless project is open)	"Changing compile order" (UM-46)

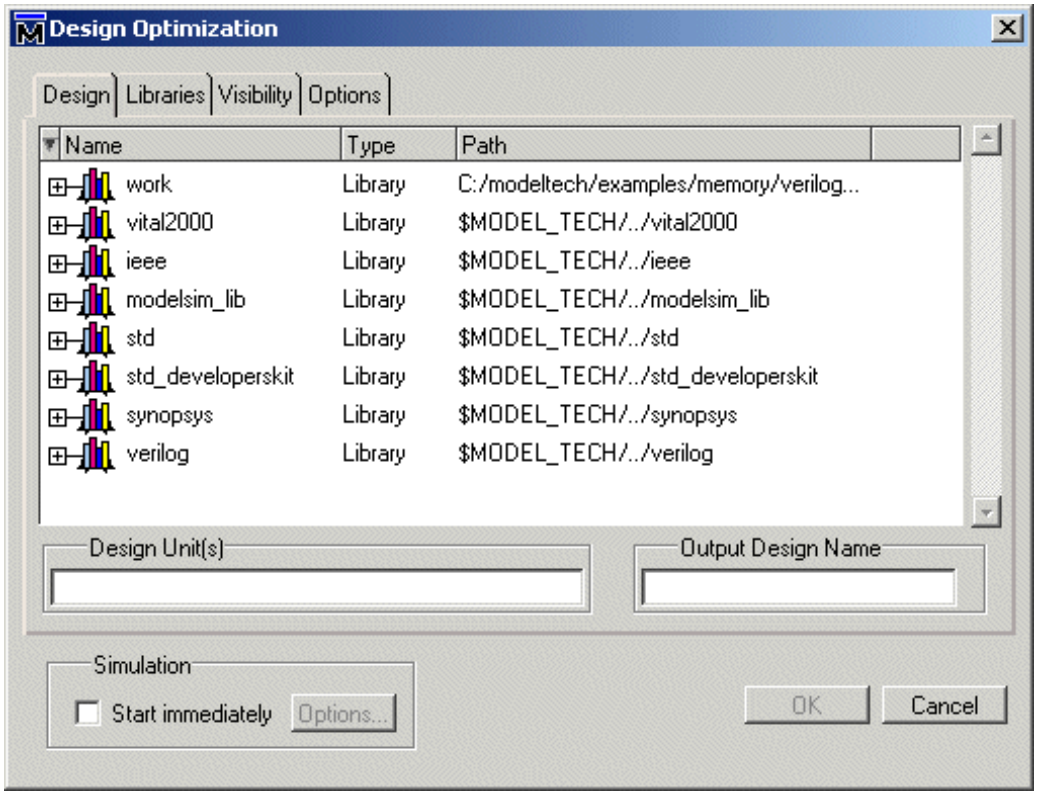


- **Up arrow**
  Move selected file(s) up in compile order.
- **Down arrow**
  Move selected file(s) down in order.
- **Group button**
  Groups several files together so they are sent to the compiler at the same time. See "Grouping files" (UM-47) for further details.
- **Ungroup button**
  Ungroups a previously created group.
- **Auto Generate**
  Determines the correct compile order by making multiple passes over the files. See "Auto-generating compile order" (UM-46) for further details.

Design Optimization dialog

Purpose	Menu command	Additional information
Optimize a design	**Simulate** > **Design Optimization**	"Optimizing Verilog designs" (UM-124), **vopt** command (CR-371)

Design tab



The Design tab includes these options:

- **Design Unit(s)**
  Specifies the top-level design unit to optimize. You can specify names one of two ways:

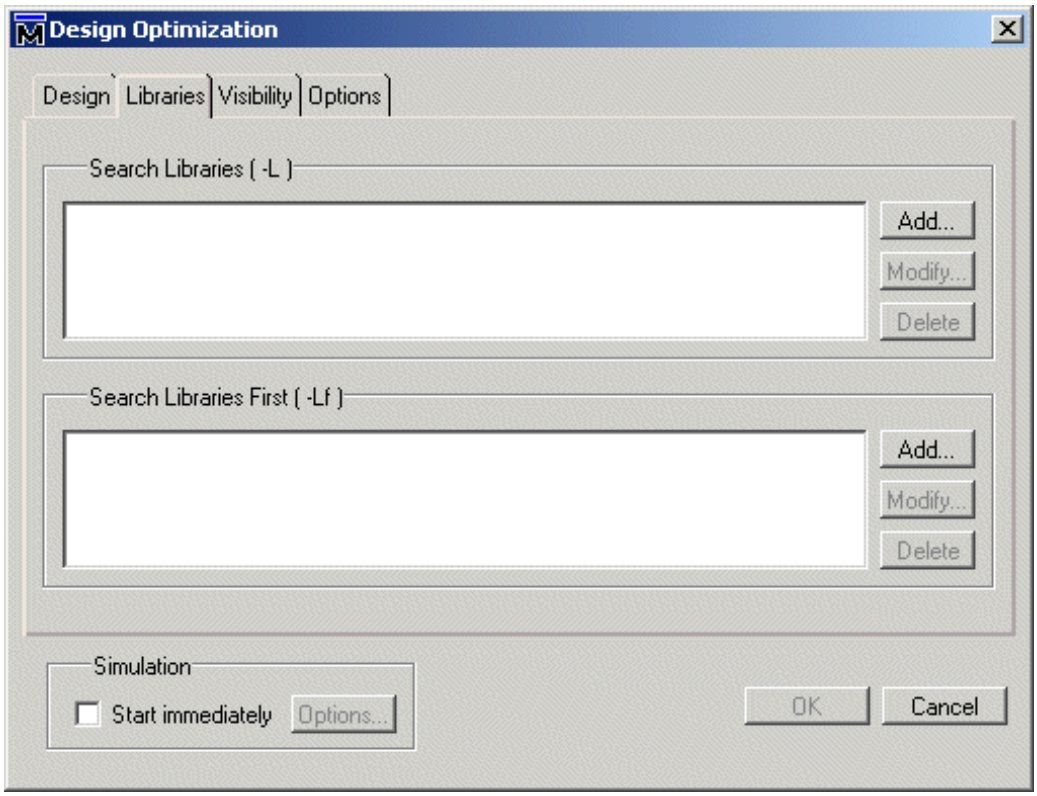
  - Type a design unit name (configuration, module, or entity) into the field, separate additional names with a space. Specify library/design units with the following syntax:

    ```
    [<library_name>.]<design_unit>
    ```

  - Select a design unit from the list. You can select multiple top level design units from the list by using the control key when you click.

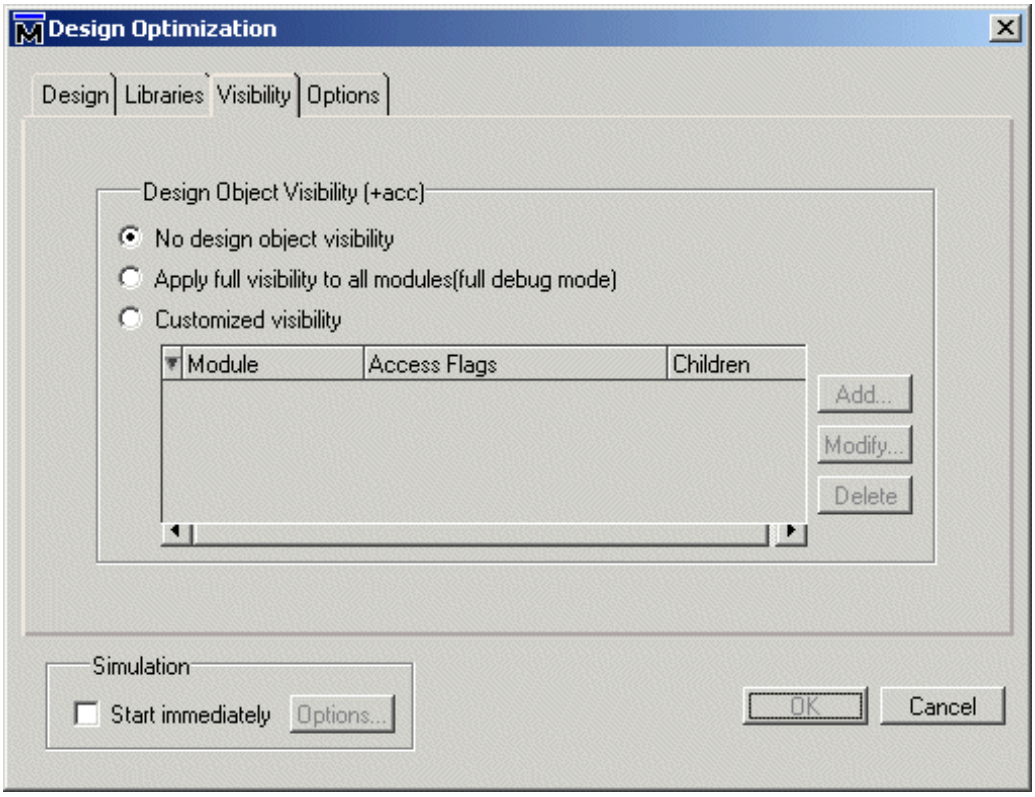
- **Output Design Name** (vopt -o <design_name>)
  Specify a name for the optimized design. This is a required option. See "Naming the optimized design" (UM-125) for more information.
- **Simulation Start Immediately**
  Automatically loads the design after optimization is complete. Click the Options button to specify Simulation options (see "Start Simulation dialog" (GR-76) for a description of the options).

Libraries tab



Use the Libraries tab to override any library search options you specified when you compiled the design. See the "Libraries tab" (GR-80) for further details.

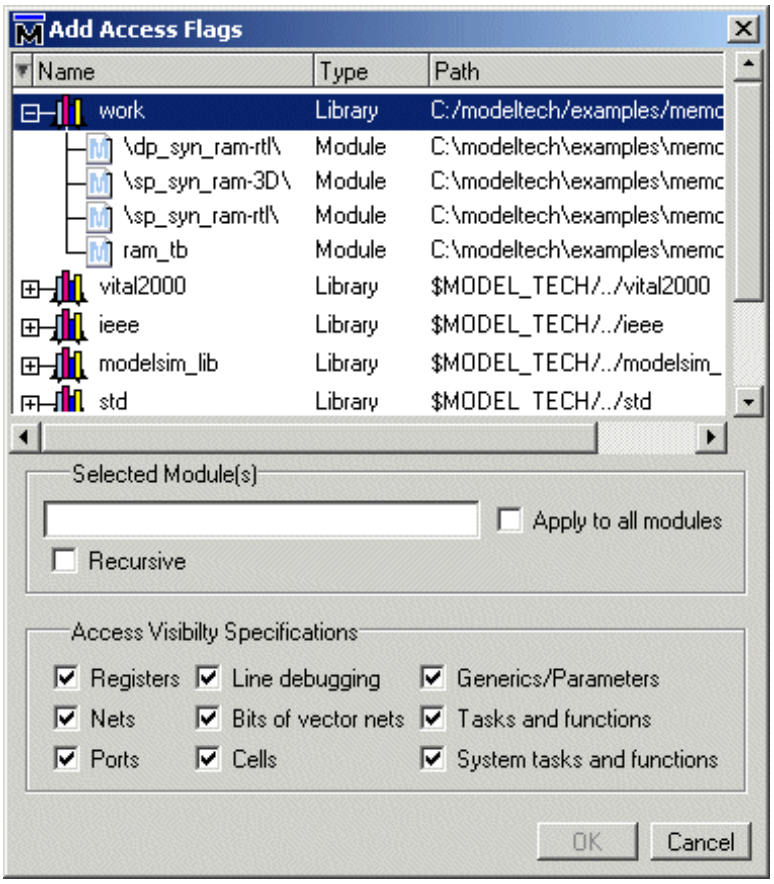
Visibility tab



Use the Visibility tab to selectively enable access to parts of your design. See "Enabling design object visibility with the +acc option" (UM-126) for additional information. The tab includes these options:

- **No design object visibility**
  vopt applies all possible optimizations with no concern for debugging visibility. Many of the nets, ports, and registers are unavailable by name in user interface commands and in the various graphic interface windows. In addition, many of these objects do not have PLI Access handles, potentially affecting the operation of PLI applications.
- **Apply full visibility...**(+acc)
  vopt maintains full access to all design objects. This may substantially reduce simulator performance.

- **Customized visibility**
  Click the **Add** button to open the Add Access Flags dialog.

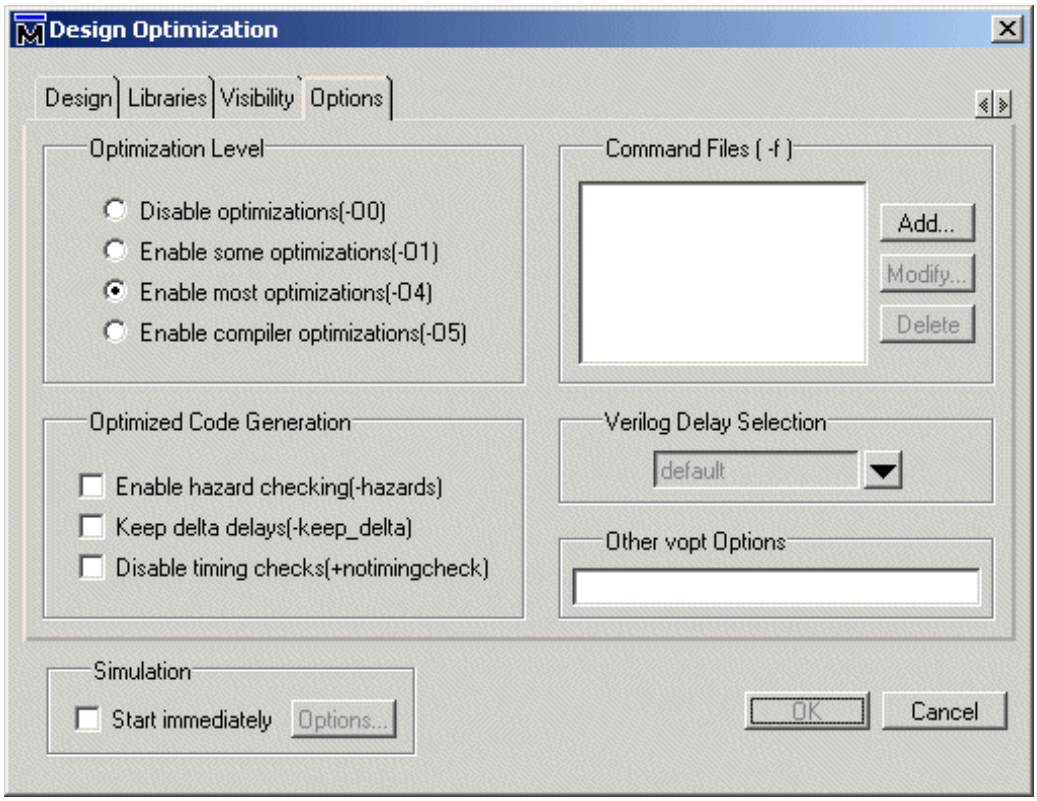


- **Selected Module(s)**
  Specify one or more module names for which you want to add access flags. You can type the names or use the library browser to select modules with the mouse.
- **Recursive**
  Applies flags recursively into sub-regions of the specified module(s).
- **Apply to all modules**
  Applies flags to all modules in the design.
- **Access Visibility Specifications**
  Specify to which design objects you need access. Options include:

Registers (+acc=r)	Enable access to registers (including memories, integer, time, and real types).
Nets (+acc=n)	Enable access to nets.
Ports (+acc=p)	Enable access to ports.

Line debugging (+acc=l)	Enable line number directives and process names for line debugging, profiling, and code coverage.
Bits of vector nets (+acc=b)	Enable access to individual bits of vector nets.
Cells (+acc=c)	Enable access to library cells.
Generics/Parameters (+acc=g)	Enable access to generics and parameters.
Tasks and functions (+acc=t)	Enable access to tasks and functions.
System tasks and functions (+acc=s)	Enable access to system tasks

Options tab



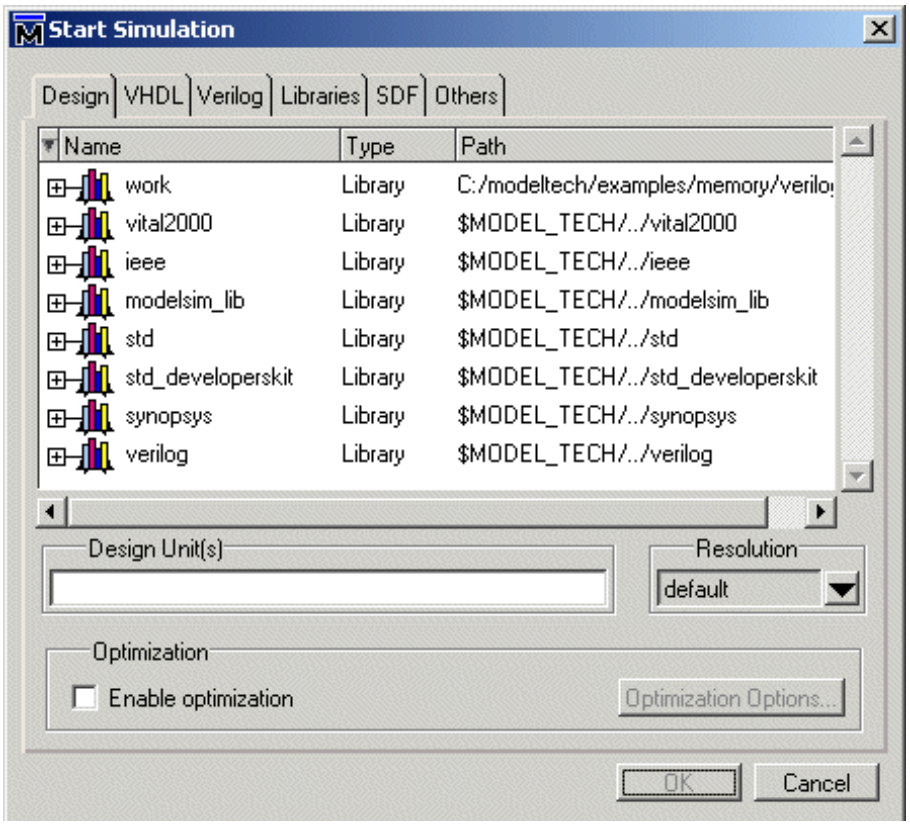
The Options tab includes these options:

- **Optimization Level** (-O)
  Specify the optimization level for the design. This option is ignored for VHDL and SystemC designs.
- **Command Files** (-f)
  Click Add to include one or more command files. A command file is a text file that includes additional command arguments.
- **Enable Hazard Checking** (-hazards)
  Enables hazard checking in Verilog modules. This overrides settings from your Verilog compiler invocation.
- **Keep delta delays** (-keep_delta)
  Disables optimizations that remove delta delays. This overrides settings from your Verilog compiler invocation.
- **Disable Timing Checks in Specify Blocks** (+notimingchecks)
  Disables the timing check system tasks ($setup, $hold,...) in specify blocks. This overrides settings from your Verilog compiler invocation.
- **Verilog Delay Selection** (+mindelays | +typdelays | +maxdelays)
  Use the drop-down menu to select timing for min:typ:max expressions.
- **Other Vopt Options**
  Specify any other **vopt** command (CR-371) arguments.

Start Simulation dialog

Purpose	Menu command	Additional information
Simulate a compiled design unit	**Simulate** > **Start Simulation**	"Verilog simulation" (UM-111), "VHDL simulation" (UM-71), "SystemC simulation" (UM-159), "Mixed-language simulation" (UM-187), **vsim** command (CR-373)

Design tab



The Design tab includes these options:

- **Design Unit(s)**
  Specifies the design unit(s) to simulate. You can specify the top-level design unit in one of two ways:

  - Type a design unit name (configuration, module, entity, optimized design) into the field, separating additional names with a space. Specify library/design units with the following syntax:

    ```
    [<library_name>.]<design_unit>
    ```

  - Select a design unit from the list. You can select multiple design units from the list by using the control key when you click.

- **Resolution**
  (-t [<multiplier>]<time_unit>)
  The drop-down menu sets the simulator time units.

  Simulator time units can be expressed as any of the following:

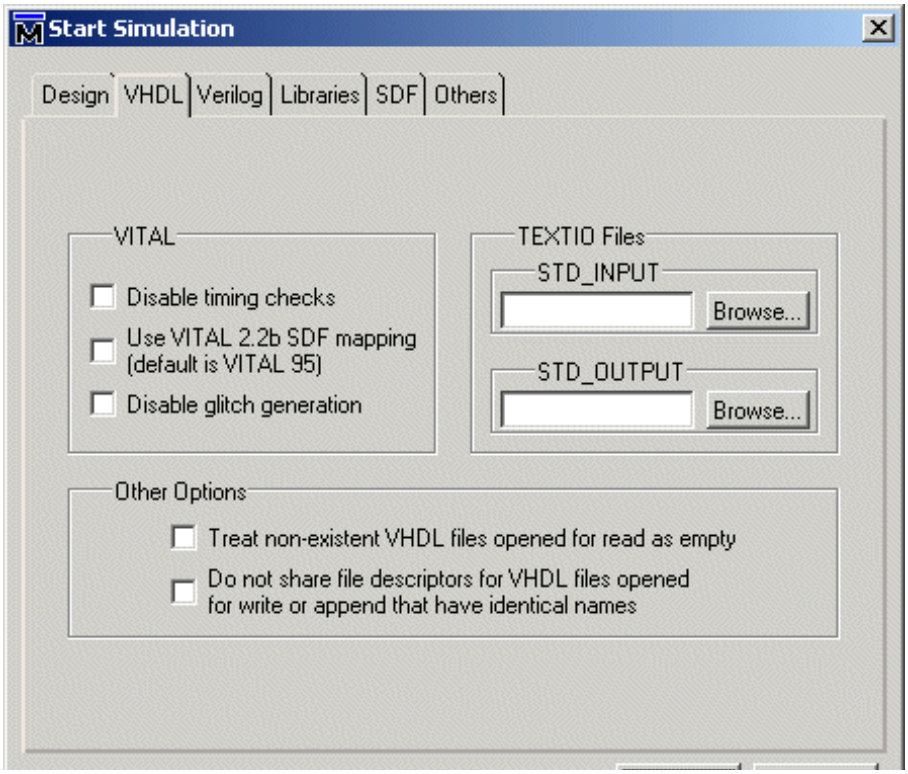
Simulation time units	
1fs, 10fs, or 100fs	femtoseconds
1ps, 10ps, or 100ps	picoseconds
1ns, 10ns, or 100ns	nanoseconds
1us, 10us, or 100us	microseconds
1ms, 10ms, or 100ms	milliseconds
1sec, 10sec, or 100sec	seconds

  See also, "Simulator resolution limit" (UM-78).

- **Enable Optimization**
  Invokes **vopt** on the design prior to loading. Please read "Optimizing Verilog designs" (UM-124) before using this option.

- **Optimization Options**
  Specify optimization options for **vopt**. See "Start Simulation dialog" (GR-76) for details on this dialog.

VHDL tab



The VHDL tab includes these options:

VITAL

- **Disable Timing Checks** (+notimingchecks)
  Disables timing checks generated by VITAL models.
- **Use Vital 2.2b SDF Mapping** (-vital2.2b)
  Selects SDF mapping for VITAL 2.2b (default is Vital95).
- **Disable Glitch Generation** (-noglitch)
  Disables VITAL glitch generation.

TEXTIO files

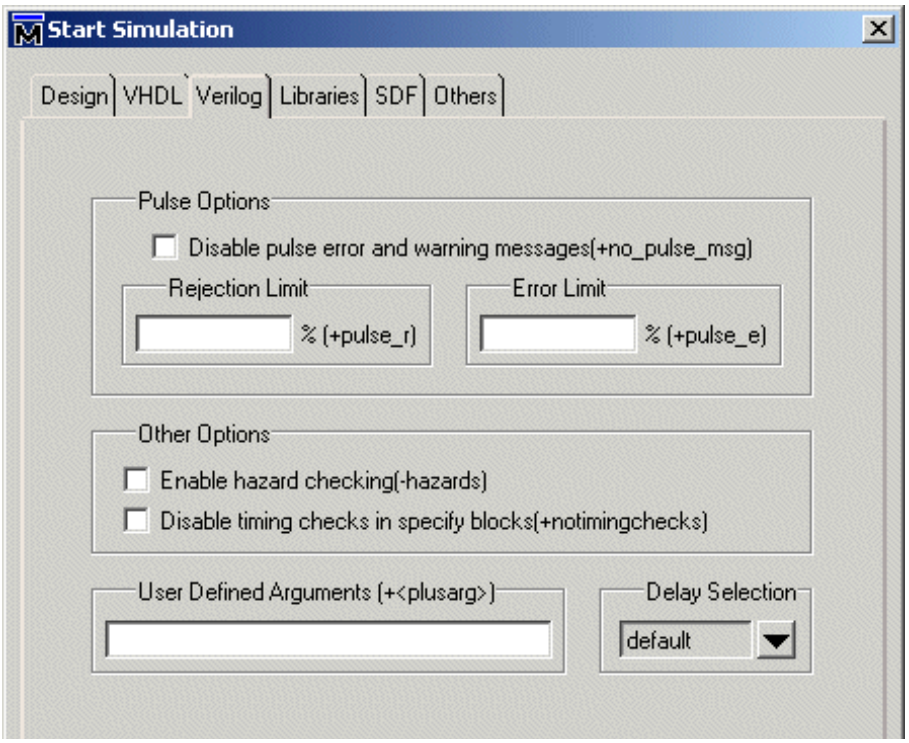
- **STD_INPUT** (-std_input <filename>)
  Specifies the file to use for the VHDL textio STD_INPUT file. Use the **Browse** button to locate a file within your directories.
- **STD_OUTPUT** (-std_output <filename>)
  Specifies the file to use for the VHDL textio STD_OUTPUT file. Use the **Browse** button to locate a file within your directories.

Other Options

- **Treat non-existent VHDL files...**(-absentisempty)
  Specifies that files opened for read that target non-existent files be treated as empty, rather than ModelSim issuing fatal error messages.

- **Do not share file descriptors...**(-nofileshare)
  Turns off file descriptor sharing. By default ModelSim shares a file descriptor for all VHDL files opened for write or append that have identical names.

Verilog tab



The Verilog tab includes these options:

Pulse Options

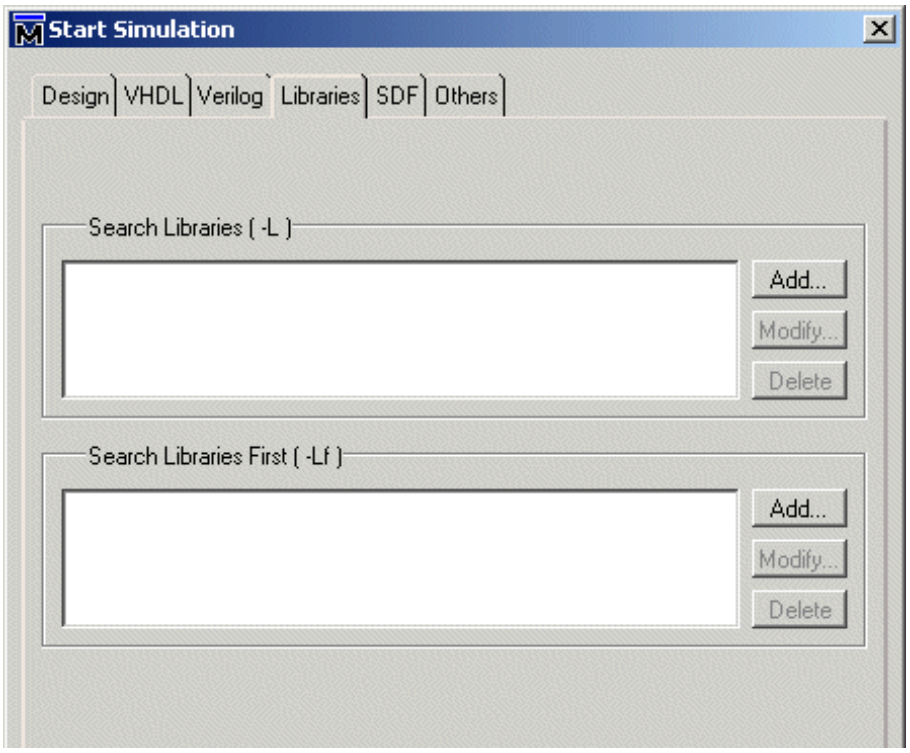
- **Disable pulse error and warning messages** (+no_pulse_msg)
  Disables path pulse error and warning messages.
- **Rejection Limit** (+pulse_r/<percent>)
  Sets the module path pulse rejection limit as a percentage of the path delay.
- **Error Limit** (+pulse_e/<percent>)
  Sets the module path pulse error limit as a percentage of the path delay.

Other Options

- **Enable Hazard Checking** (-hazards)
  Enables hazard checking in Verilog modules.
- **Disable Timing Checks in Specify Blocks** (+notimingchecks)
  Disables the timing check system tasks ($setup, $hold,...) in specify blocks.
- **User Defined Arguments** (+<plusarg>)
  Arguments are preceded with “+”, making them accessible through the Verilog PLI routine **mc_scan_plusargs**. The values specified in this field must have a "+" preceding them or ModelSim may parse them incorrectly.

- **Delay Selection** (+mindelays | +typdelays | +maxdelays)
  Use the drop-down menu to select timing for min:typ:max expressions.

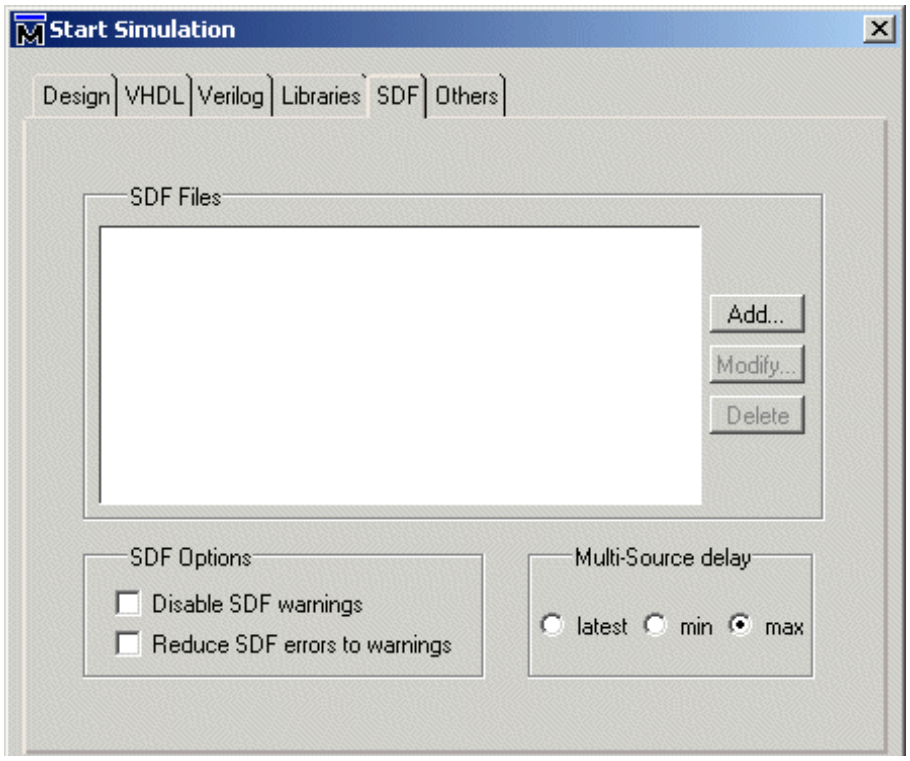
Libraries tab



The Libraries tab includes these options:

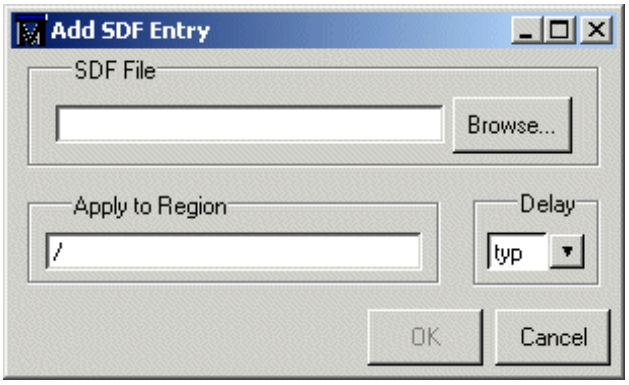
- **Search Libraries** (-L)
  Specifies the libraries to search for design units instantiated from Verilog.
- **Search Libraries First** (-Lf)
  Same as Search Libraries but these libraries are searched before ‘uselib.

SDF tab



The SDF (Standard Delay Format) tab includes these options:

SDF Files



Click the **Add** button to specify the SDF files to load for the current simulation. You may also select an existing file on the listing to **Delete** or **Modify**.

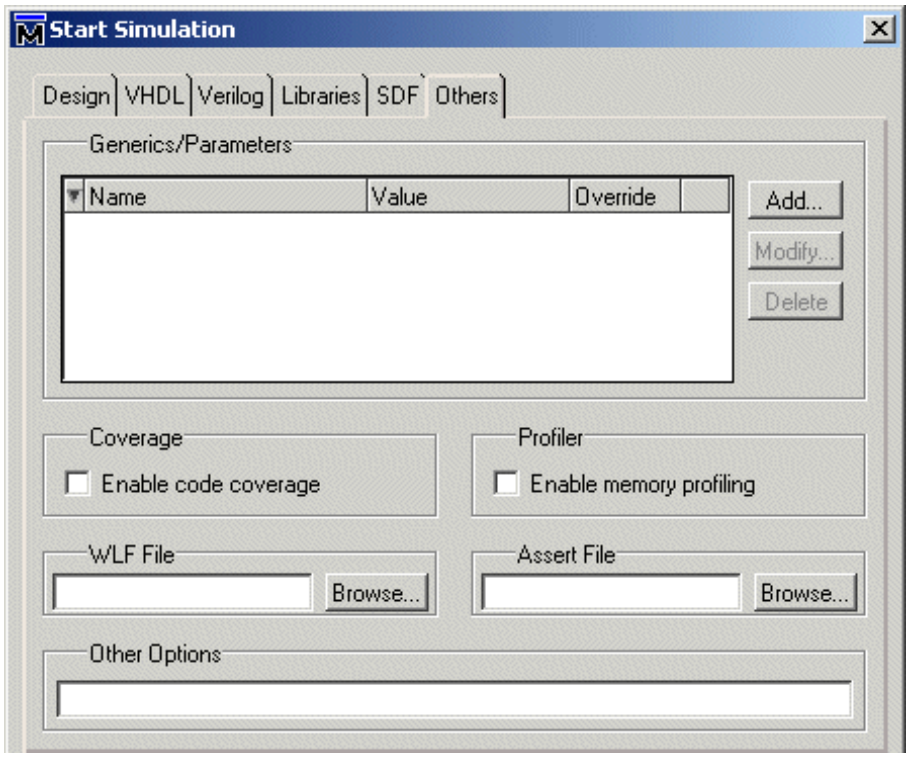
From the **Add SDF Entry** dialog you can set the following options:

- **SDF file** ([<region>] = <sdf_filename>)
  Specifies the SDF file to use for annotation. Use the **Browse** button to locate a file within your directories.
- **Apply to region** ([<region>] = <sdf_filename>)
  Specifies the design region to use with the selected SDF options.
- **Delay** (-sdfmin | -sdftyp | -sdfmax)
  The drop-down menu selects delay timing (min, typ, or max) to be used from the specified SDF file. See also, "Specifying SDF files for simulation" (UM-440).

SDF options

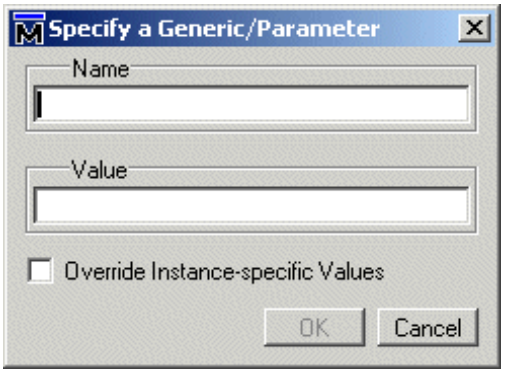
- **Disable SDF warnings** (-sdfnowarn)
  Select to disable warnings from the SDF reader.
- **Reduce SDF errors to warnings** (-sdfnoerror)
  Change SDF errors to warnings so the simulation can continue.
- **Multi-Source Delay** (-multisource_delay <sdf_option>)
  Select **max**, **min**, or **latest** delay. Controls how multiple PORT or INTERCONNECT constructs that terminate at the same port are handled. By default, the Module Input Port Delay (MIPD) is set to the **max** value encountered in the SDF file. Alternatively, you can choose the **min** or **latest** of the values.

Others tab



The Others tab includes these options:

Generics/Parameters



The **Add** button opens a dialog that allows you to specify the value of generics/parameters within the current simulation. You can also select an existing generic/parameter from the list to **Delete** or **Edit**.

From the **Specify a Generic/Parameter** dialog you can set the following options:

- **Name** (-g <Name>=<Value>)
  The name of the generic or parameter. Enter the name as it appears in your source code. Verilog parameters are case sensitive; VHDL generics are case insensitive.
- **Value**
  Specifies a value for all generics/parameters in the design with the given name (above) that have not received explicit values in generic maps (such as top-level generics and generics that would otherwise receive their default value). The value must be appropriate for the declared data type of the generic/parameter. No spaces are allowed in the specification (except within quotes) when specifying a string value.

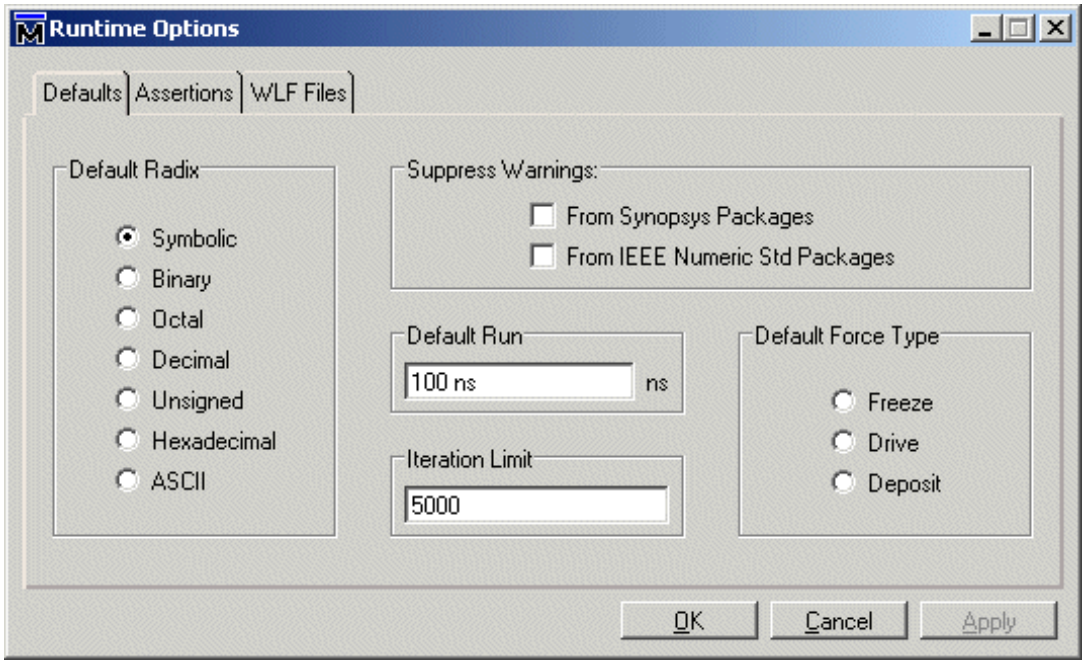
- **Override Instance - specific Values** (-G <Name>=<Value>)
  Select to override generics/parameters that received explicit values in generic maps. The name and value are specified as above. The use of this switch is indicated in the **Override** column of the **Generics/Parameters** list.
- **Enable code coverage** (-coverage)
  Turn on collection of Code Coverage statistics. You must also specify which type of statistics you want when you compile the design. See *Chapter 13 - Measuring code coverage* for more information.
- **Enable memory profiling** (-memprof)
  Causes memory allocation data to be collected during elaboration and simulation. See *Chapter 12 - Profiling performance and memory use* for more information.
- **WLF File** (-wlf <filename>)
  Specify the name of the wave log format (WLF) file to create. The default is vsim.wlf.
- **Assert File** (-assertfile <filename>)
  Designate an alternative file for recording assertion messages. By default assertion messages are output to the file specified by the TranscriptFile variable in the *modelsim.ini* file (see "Creating a transcript file" (UM-537)).
- **Other options**
  Specify any other **vsim** command (CR-373) argument.

Runtime Options dialog

Purpose	Menu command	Additional information
Configure simulation options	**Simulate** > **Runtime Options**	"[vsim] simulator control variables" (UM-529)

Changes made in the **Runtime Options** dialog are written to the active *modelsim.ini* file, if it is writable, and affect the current session as well as all future sessions. If the file is read-only, the changes affect only the current session.

Defaults tab



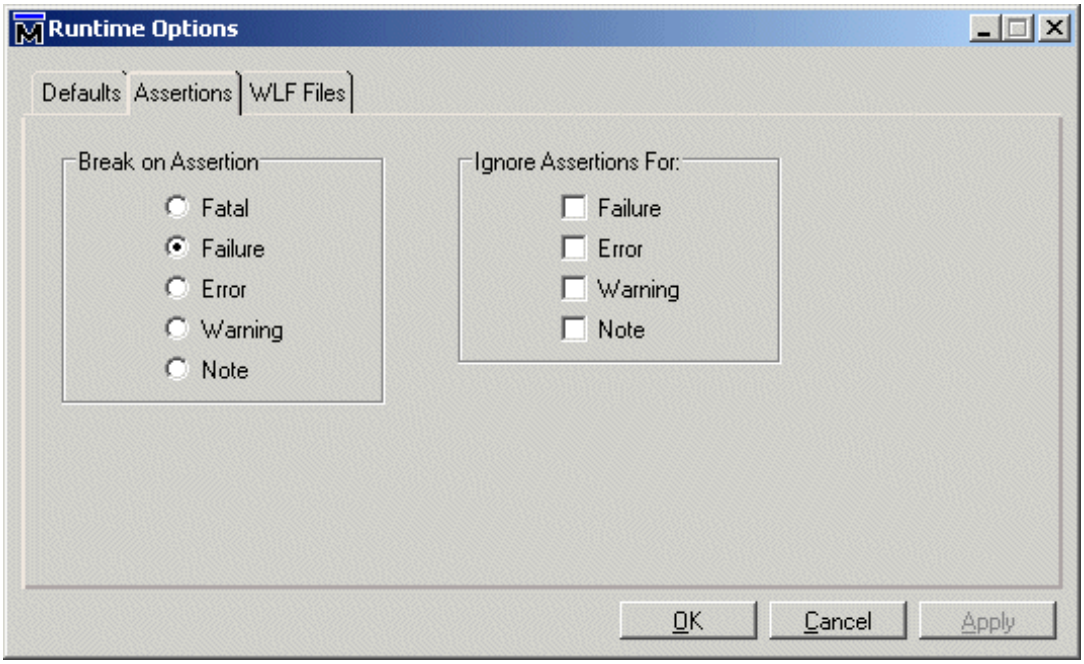
The Defaults tab includes these options:

- **Default Radix**
  Sets the default radix for the current simulation run. You can also use the **radix** (CR-241) command to set the same temporary default. The chosen radix is used for all commands (**force** (CR-180), **examine** (CR-162), **change** (CR-81) are examples) and for displayed values in the Objects, Locals, Dataflow, List, and Wave windows. Corresponding *modelsim.ini* variable is DefaultRadix (UM-531).
- **Suppress Warnings**
  Selecting **From Synopsys Packages** suppresses warnings generated within the accelerated Synopsys std_arith packages. Corresponding *modelsim.ini* variable is StdArithNoWarnings (UM-534).

  Selecting **From IEEE Numeric Std Packages** suppresses warnings generated within the accelerated numeric_std and numeric_bit packages. Corresponding *modelsim.ini* variable is NumericStdNoWarnings (UM-533).

- **Default Run**
  Sets the default run length for the current simulation. Corresponding *modelsim.ini* variable is RunLength (UM-533).
- **Iteration Limit**
  Sets a limit on the number of deltas within the same simulation time unit to prevent infinite looping. Corresponding *modelsim.ini* variable is IterationLimit (UM-532).
- **Default Force Type**
  Selects the default force type for the current simulation. Corresponding *modelsim.ini* variable is DefaultForceKind (UM-531).

Assertions tab



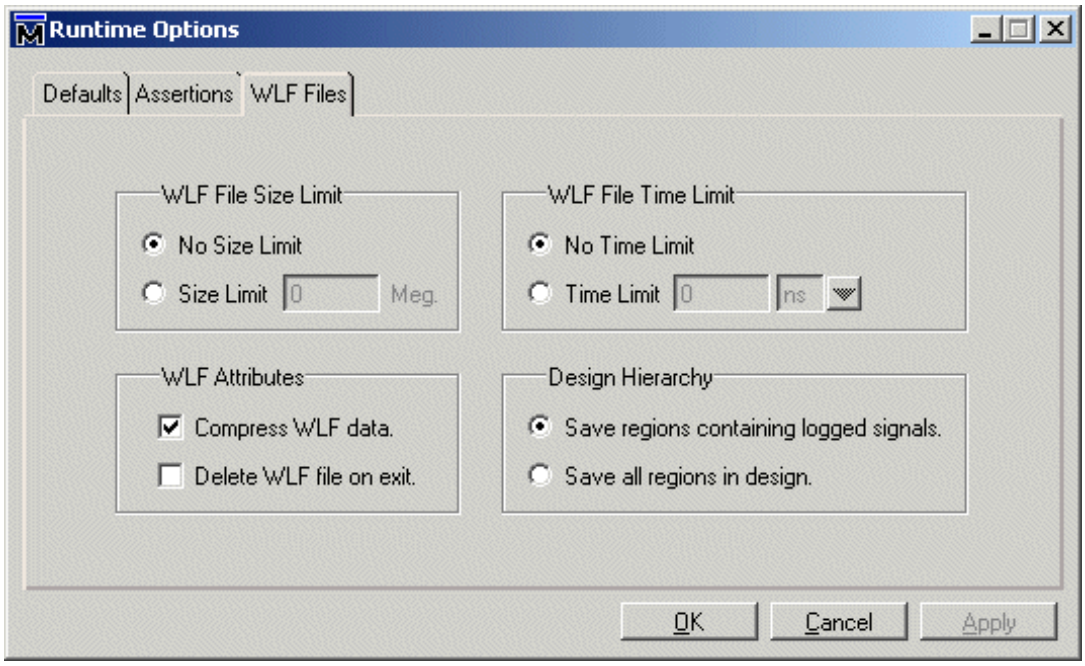
The Assertions tab includes these options:

- **Break on Assertion**
  Selects the assertion severity that will stop simulation. Corresponding *modelsim.ini* variable is BreakOnAssertion (UM-530).
- **Ignore Assertions For**
  Selects the assertion type to ignore for the current simulation. Multiple selections are possible. Corresponding *modelsim.ini* variables are IgnoreFailure, IgnoreError, IgnoreWarning, and IgnoreNote (UM-532).

  When an assertion type is ignored, no message will be printed, nor will the simulation halt (even if break on assertion is set for that type).

Note: Assertions that appear within an instantiation or configuration port map clause conversion function will not stop the simulation regardless of the severity level of the assertion.

WLF Files tab

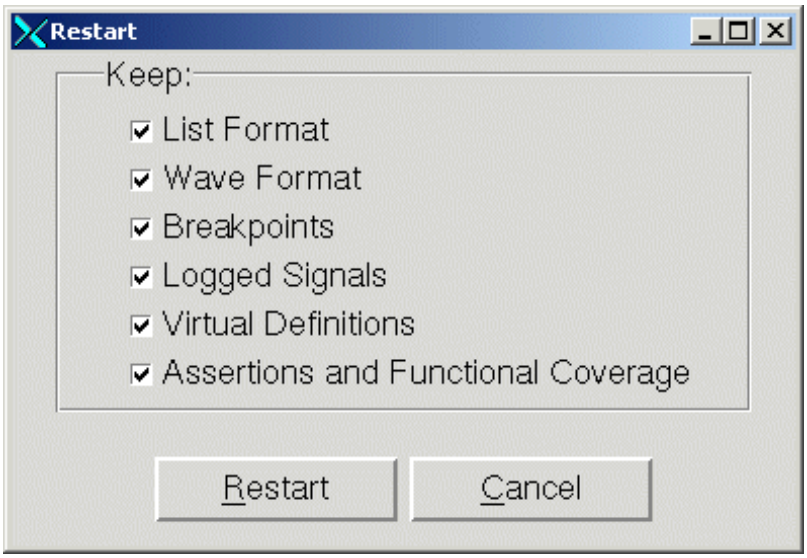


The WLF Files tab includes these options:

- **WLF File Size Limit**
  Limits the WLF file by size (as closely as possible) to the specified number of megabytes. If both size and time limits are specified, the most restrictive is used. Setting it to 0 results in no limit. Corresponding *modelsim.ini* variable is WLFSizeLimit (UM-535).
- **WLF File Time Limit**
  Limits the WLF file by size (as closely as possible) to the specified amount of time. If both time and size limits are specified, the most restrictive is used. Setting it to 0 results in no limit. Corresponding *modelsim.ini* variable is WLFTimeLimit (UM-535).
- **WLF Attributes**
  Specifies whether to compress WLF files and whether to delete the WLF file when the simulation ends. You would typically only disable compression for troubleshooting purposes. Corresponding *modelsim.ini* variables are WLFCompress (UM-535) for compression and WLFDeleteOnQuit (UM-535) for WLF file deletion.
- **Design Hierarchy**
  Specifies whether to save all design hierarchy in the WLF file or only regions containing logged signals. Corresponding *modelsim.ini* variable is WLFSaveAllRegions (UM-535).

Restart dialog

Purpose	Menu command	Additional information
Specify which settings are retained after a restart	**Simulate** > **Run** > **Restart**	**restart** command (CR-246)



The Restart dialog includes the following options:

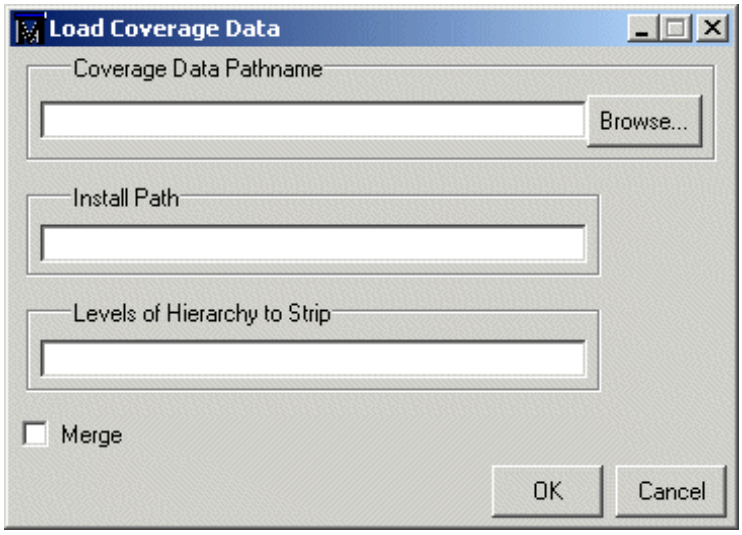
- **List Format**
  Retain all objects in the List window and their formats.
- **Wave Format**
  Retain all objects in the Wave window and their formats.
- **Breakpoints**
  Re-install all breakpoints after simulation is restarted.
- **Logged Signals**
  Retain logging of all currently logged objects.
- **Virtual Signals**
  Retain currently defined virtual definitions (e.g., virtual functions, virtual signals, etc.).
- **Assertions and Functional Coverage**
  Retain assertion and functional coverage settings.

Waveform Compare dialogs

These dialogs, accessed via the **Tools** > **Waveform Compare** menu, are documented in the "Wave window" (GR-211) section.

Load Coverage Data dialog

Purpose	Menu command	Additional information
Reload previously saved coverage data	**Tools > Code Coverage > Load**	"Saving and reloading coverage data" (UM-354)

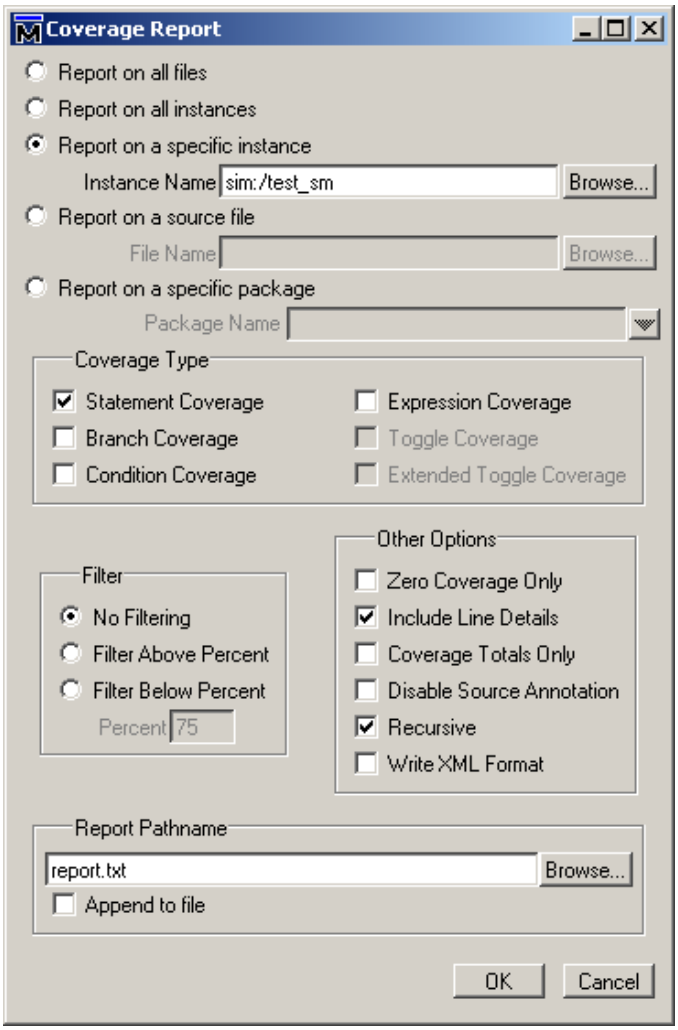


The Load Coverage Data dialog includes the following options:

- **Coverage Data Pathname**
  The pathname to the coverage data file you want to load.
- **Install Path**
  Adds whatever you specify as additional hierarchy on the front end of instance and signal names in the data file. This option allows you to merge coverage results from simulations that have different hierarchies.
- **Levels of Hierarchy to Strip**
  Removes the specified levels of hierarchy from instance and signal names in the data file. Enter an integer. This option allows you to merge coverage results from simulations that have different hierarchies.
- **Merge**
  Merges the saved coverage data with coverage data in the current simulation. If you don't check merge, ModelSim clears existing coverage data before loading the saved data.

Coverage Report dialog

Purpose	Menu command	Additional information
Save textual reports of Code Coverage data	**Tools > Code Coverage > Reports**	"Reporting coverage data" (UM-350)



The Coverage Report dialog includes these options:

- **Report on all files**
  Saves a textual summary for each file in the design.
- **Report on all instances**
  Saves a textual summary for each instance in the design.

- **Report on a specific instance**
  Saves a textual summary for the specified instance. The selected instance automatically appears in the *Instance Name* field. You can browse for other instances.
- **Report on a source file**
  Saves a textual summary for the specified source file. The selected file automatically appears in the *File Name* field. You can browse for other source files.
- **Report on a specific package**
  Saves a textual summary for the specified HDL package. The selected package automatically appears in the *Package Name* field. You can browse for other HDL packages.

Coverage Type

Select the type of coverage to be reported – statement, branch, condition, expression, toggle, and extended toggle coverage.

Filter

Specifies whether to filter the report based on coverage percentage. You can choose to filter objects with coverage above or below a certain percentage.

Other Options

- **Zero Coverage Only**
  Saves a textual summary of statement and branch coverage that includes columns for the number of statements and branches not executed.
- **Include Line Details**
  Saves a detailed textual report of the statement and branch coverage for every line of code.
- **Coverage Totals Only**
  Saves a text report of the coverage totals by files and by instances. Includes total hits and coverage percentages for all active statements and branches.
- **Disable Source Annotation**
  Removes source code from coverage reports.
- **Recursive**
  Reports on the specified instance, and all included instances, recursively.
- **Write XML format**
  Produces output in an XML-structured format. See "XML output" (UM-351) for an example.

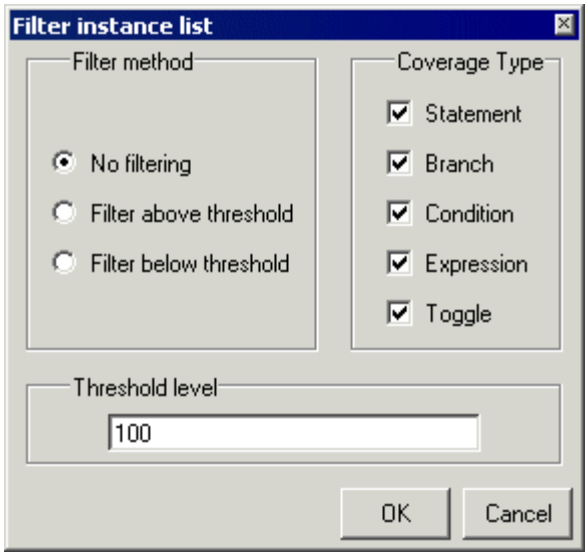
Report Pathname

Specify a pathname for the output file.

- **Append to file**
  Appends output to an existing file rather than overwriting the file.

Filter instance list dialog

Purpose	Menu command	Additional information
Filter coverage statistics	Right-click in Instance Coverage pane > Set Filter	"Filtering coverage data" (UM-346)

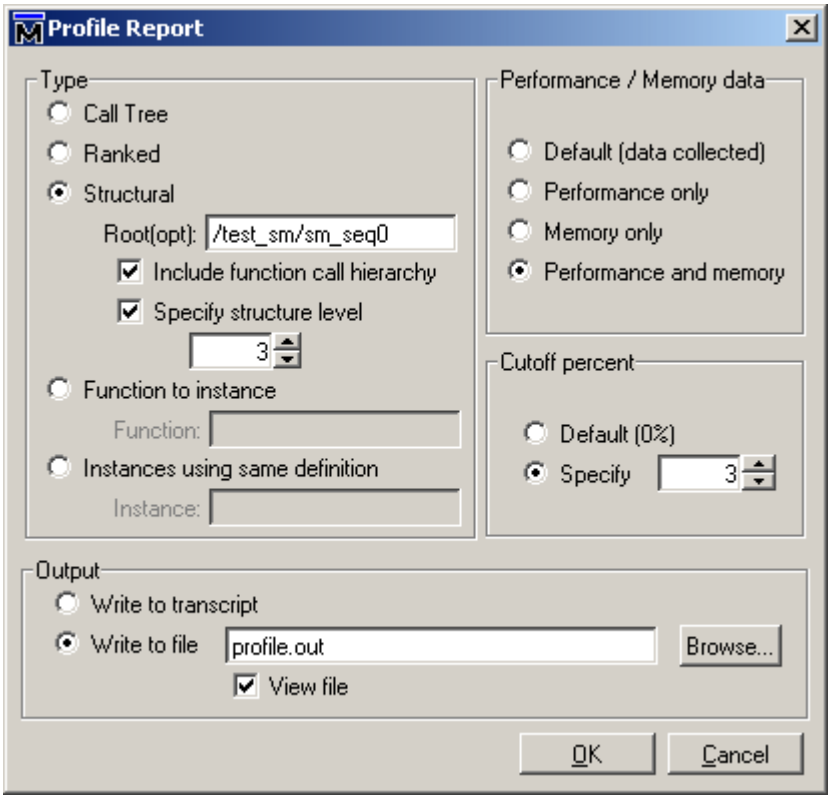


The Filter instance dialog includes these options:

- **Filter method**
  Specifies whether you want to filter objects that exceed the threshold or fall below the threshold.
- **Coverage Type**
  Determines which coverage statistics you want to filter.
- **Threshold level**
  Specifies the percentage above or below which objects are filtered.

Profile Report dialog

Purpose	Menu command	Additional information
Create textual reports from performance and memory profile results	**Tools > Profile > Profile Report**	Reporting profiler results (UM-331) or **profile report** command (CR-231)



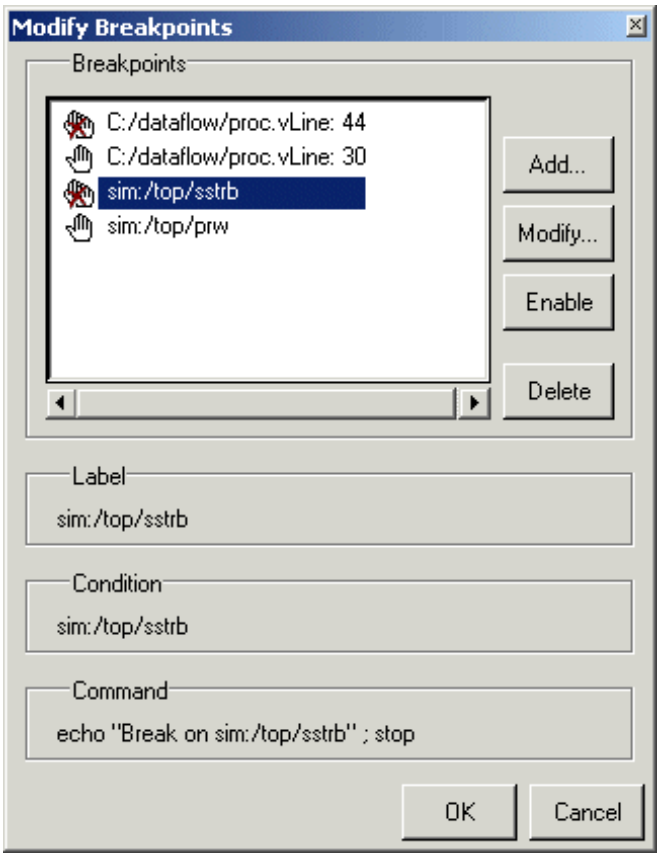
The Profile Report dialog includes the following options:

- **Type**
  Save a textual report from Call Tree, Ranked, and Structural profile data. The Structural option allows you to designate the root instance for the report, include the function call hierarchy, and specify the structure level. You can also create a Function to instance report for the designated function, and a report of Instances using the same definition as the designated instance.
- **Performance/Memory data**
  Elect to save performance profile data only, memory allocation data only, or both.
- **Cutoff percent**
  Report results including and above the designated or Default percentage.

- **Output**
  Writes the textual report directly to the transcript or to a file. Will also display the file immediately after it is created if "View file" is selected.

Modify Breakpoints dialog

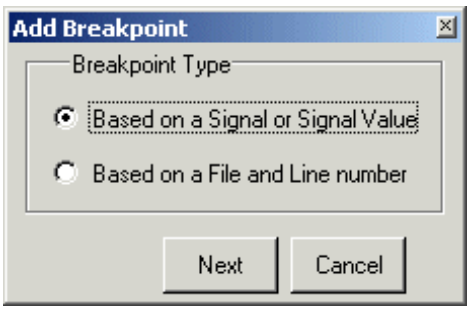
Purpose	Menu command	Additional information
Add or manage signal and file breakpoints	**Tools** > **Breakpoints**	"Creating and managing breakpoints" (GR-264)



The Breakpoints dialog includes these options:

- **Breakpoints**
  List of all existing breakpoints. Breakpoints set from anywhere in the GUI, or from the command line, are listed. A red 'X' through the hand icon means the breakpoint is currently disabled.

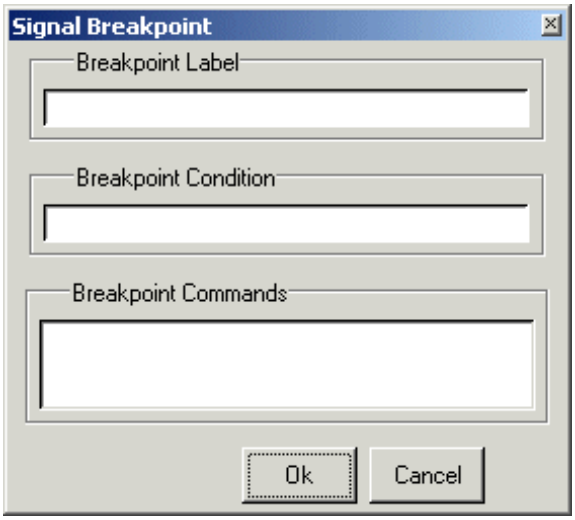
- **Add**
  Create a new signal or file-line breakpoint. When you click Add to add a new breakpoint, you will see the Add Breakpoint dialog. Choose whether to create a signal breakpoint or a file-line breakpoint and then select Next. Depending on which type of breakpoint you are creating, you will see one of the two dialogs described below.



- **Modify**
  Change properties of an existing breakpoint.
- **Disable/Enable**
  De-activate or activate the selected breakpoint.
- **Delete**
  Delete the selected breakpoint.
- **Label**
  Text label of the selected breakpoint. Entered in the Signal Breakpoint or File Breakpoint dialog (described below).
- **Condition**
  The condition under which the breakpoint will be hit. Entered in the Signal Breakpoint or File Breakpoint dialog (described below).
- **Command**
  The command that will be executed when the breakpoint is hit. Entered in the Signal Breakpoint or File Breakpoint dialog (described below).

Signal Breakpoint dialog

Purpose	Menu command	Additional information
Add/modify signal breakpoints	**Tools** > **Breakpoints**	"Creating and managing breakpoints" (UM-239)

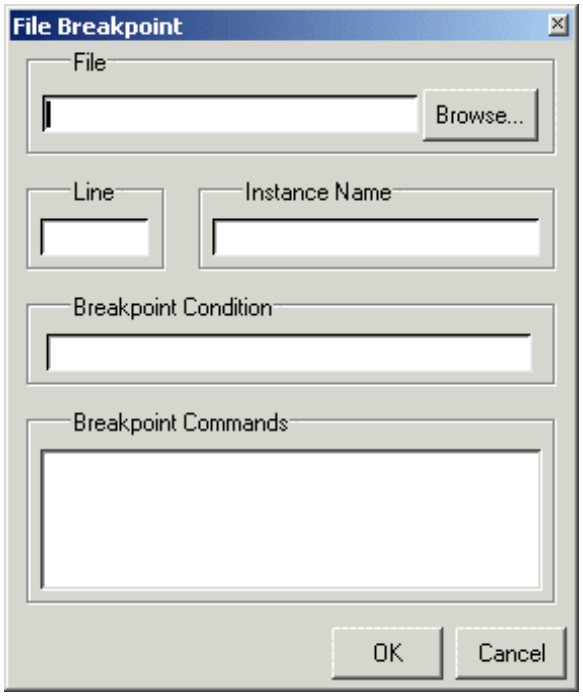


The Signal Breakpoint dialog includes these options:

- **Breakpoint Label**
  Specify an optional text label for the breakpoint.
- **Breakpoint Condition**
  Specify condition(s) to be met for the command(s) to be executed. See the **when** command (CR-407) for more information on creating the condition statement.
- **Breakpoint Commands**
  Specify command(s) to be executed when the condition is met. Any ModelSim or Tcl command or series of commands are valid, with one exception – the **run** command (CR-252) cannot be used.

File Breakpoint dialog

Purpose	Menu command	Additional information
Add/modify file breakpoints	**Tools** > **Breakpoints**	"Creating and managing breakpoints" (UM-239)

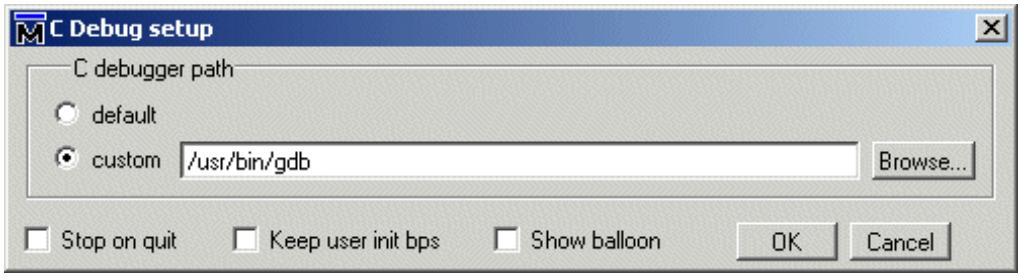


The File Breakpoint dialog includes these options:

- **File**
  Specify the file in which to set the breakpoint.
- **Line**
  Specify the line number on which to set the breakpoint. Note that breakpoints can be set only on executable lines.
- **Instance Name**
  Specify a region in which to apply the breakpoint. If left blank the breakpoint affects every instance in the design.
- **Breakpoint Condition**
  Specify a condition that determines whether the breakpoint is hit.
- **Breakpoint Commands**
  Specify command(s) to be executed when the breakpoint is hit. Any ModelSim or Tcl command or series of commands is valid, with one exception – the **run** command (CR-252) cannot be used.

C Debug setup dialog

Purpose	Menu command	Additional information
Configure C Debug	**Tools > C Debug > C Debug setup**	"Setting up C Debug" (UM-402)



The C Debug setup dialog includes these options:

- **C debugger path**
  Specifies the path to the installed copy of **gdb**. Select "default" to point at the Model Technology supplied gdb or "custom" to point at another installation of gdb. See "Supported platforms and gdb versions" (UM-401) for the supported versions.
- **Stop on quit**
  Allows you to debug functions that get called when the simulator is exiting. See "Debugging functions when quitting simulation" (UM-414) for details.
- **Keep user init bps**
  Leaves enabled any breakpoints you set while running in initialization mode (see "Debugging functions during elaboration" (UM-410)). Normally breakpoints set during initialization mode are disabled once the design is finished loading.
- **Show source balloon**
  Enables name/value popup in the Source window when you hover your mouse pointer over a variable name.

Command entry dialog

Purpose	Menu command	Additional information
Enter C Debug commands	**Tools > C Debug > Command entry**	NA

This dialog lets you enter C Debug commands even if the CDBG> prompt is inaccessible. The GUI prompt may become inaccessible in certain situations (e.g., when debugging FLI LoadDone callback functions)

The Command entry dialog includes this field:

- **Enter command**
  Specify the debugging command to execute.

Tcl debugger

TclDebugger and TclPro Debugger are third-party tools we make available through ModelSim. They are described briefly in the Tcl chapter. See "The Tcl Debugger" (UM-493) and "TclPro Debugger" (UM-497).

Macro dialog

Purpose	Menu command	Additional information
Record a series of mouse movements and key strokes	**Tools** > **Macro Helper**	"Macro helper" (UM-492)

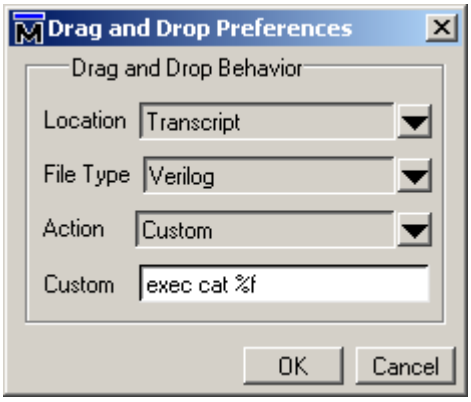
This tool is available for UNIX only (excluding Linux).

The macro dialog includes these options.

- **Macro name**
  Type a filename for the macro. The resulting file can be called from a more complex macro by using the **play** (CR-218) command.
- **Record/Stop**
  Record begins recording and toggles to Stop once a recording begins**.**
- **Insert Pause**
  Inserts a .5 second pause into the macro file. Press the button more than once to add more pause time.
- **Play**
  Play the macro specified in the file name field.

Drag and Drop Preferences dialog

Purpose	Menu command	Additional information
Set the action to be performed when a file is dragged and dropped into the Project, Transcript or Wave windows	**Tools > Options > Drag and Drop Preferences**	



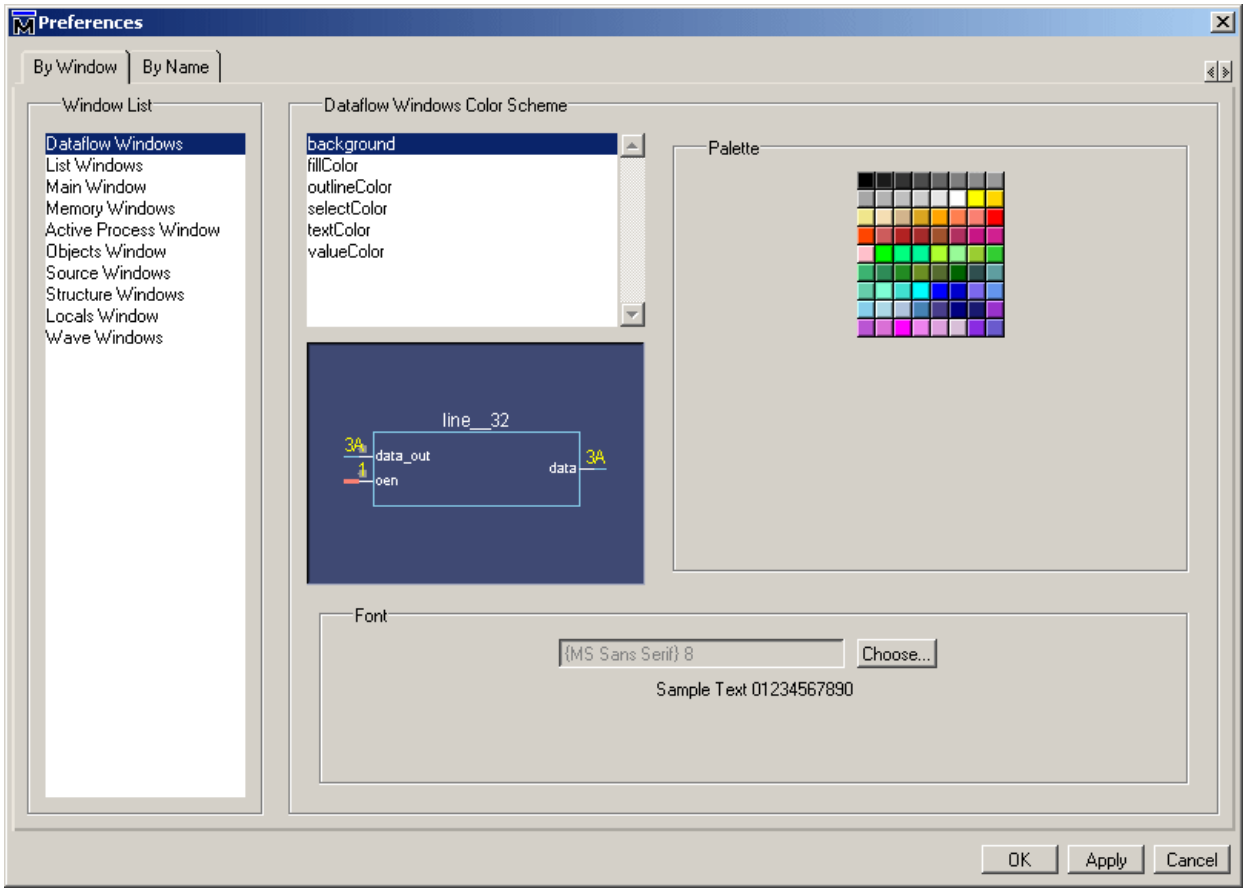
The dialog contains four fields:

- **Location**
  Select the Project pane, the Transcript pane or the Wave window. When a file of the type specified in the File Type field is dragged and dropped into the selected location, the specified action will be performed.
- **File Type**
  Select from a list of file types that includes: Verilog, VHDL, PSL, Text, SystemC, TCL, Macro, VCD, SDF, XML and Logfile. When a file of the type specified is dragged and dropped into the specified location, the specified action will be performed.
- **Action**
  Allows you to select the following actions: Open, Execute, Add to Project, and Custom. When Custom is selected, the Custom field becomes active.
- **Custom**
  Allows you to specify a custom action to be performed when the specified file type is dragged and dropped to the specified location. The action is defined with a Tcl command. If the command requires a pathname of an object, place "%f" in the command. ModelSim will substitute the appropriate pathname and execute the appropriate action.

Preferences dialog

Purpose	Menu command	Additional information
Edit ModelSim Tcl preference variables	**Tools > Edit Preferences**	"Preference variables located in Tcl files" (UM-540)

By Window tab

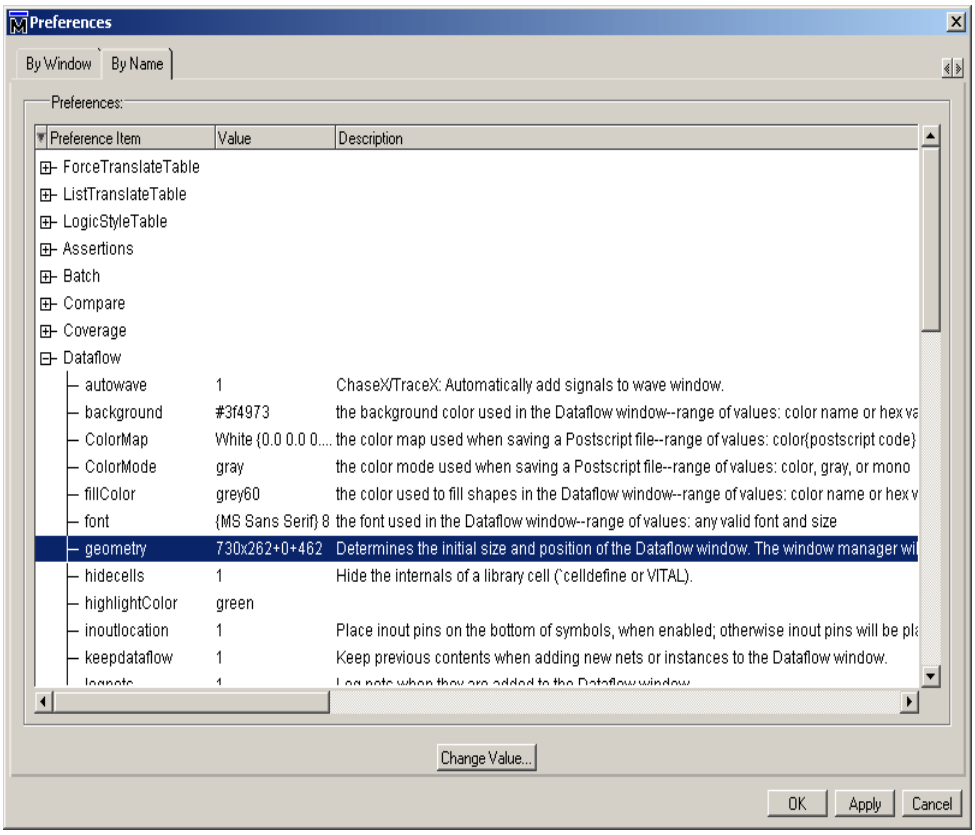


The By Window tab includes the following options:

- **Window List**
  Select a window type.
- **Color Scheme**
  Select a window component of which you want to change the color. Select a color from the Palette.
- **Font**
  Choose a font for text in the selected window type.
- **Apply**
  Apply the changes for the current ModelSim session only.

- **OK**
  Saves the current preference settings to a user preference file that is invoked each time ModelSim is invoked. See "ModelSim GUI preferences" (GR-266) for further details.

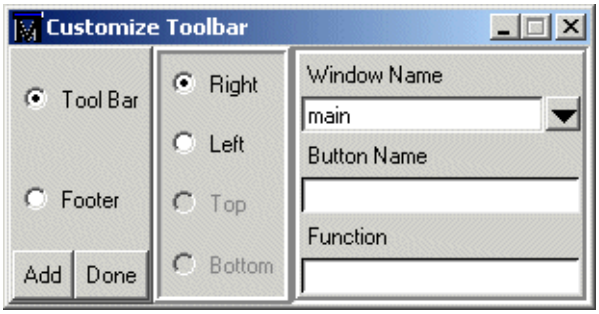
By Name tab



The By Name tab organizes Tcl preference variables by category rather than by window. Select a preference item then click Change Value to edit the variable.

Customize Toolbar dialog

Purpose	Menu command	Additional information
Add user-defined toolbar buttons	**Window > Customize**	NA



The Customize Toolbar dialog includes the following options:

- **Tool Bar**
  Adds the button to a new toolbar in the specified window.
- **Footer**
  Adds the button to the window's status bar.
- **Placement options**
  Justify the button on the right-side, left-side, top/center, or bottom/center of the toolbar or footer.
- **Window Name**
  The window to which you want to add the button.
- **Button Name**
  The text that will appear on the button.
- **Function**
  Any command or macro you might execute from the ModelSim command line. For example, you might want an **add wave** button in the Wave window.

Making the button persistent

User-defined buttons exist only until you close the window unless you add the button code to the window's user hook variable. When you create a button, the underlying commands are echoed in the transcript. You can use these commands to make the button appear every time you invoke the window. Follow these steps:

1. Create a button.
2. Copy the commands from the transcript into a Tcl procedure in the *modelsim.tcl* file. If you don't have a *modelsim.tcl* file already, create a new text file with that name and set the MODELSIM_TCL environment variable to the full path of the *modelsim.tcl* file.

3 Append the procedure name to the window's user_hook Tcl variable. See "Preference variables located in Tcl files" (UM-540) for more information on Tcl preference variables.

An example will help clarify. Say you create a button in the Wave window that adds all signals from the selected region to the Wave window. The button code will look something like this:

```
_add_menu .wave controls right SystemButtonFace black AddWaves {add wave *}
```

You would insert that code into a Tcl procedure in the *modelsim.tcl* file and then append the procedure to the PrefWave(user_hook) variable. The entire entry in the *modelsim.tcl* file would look as follows:

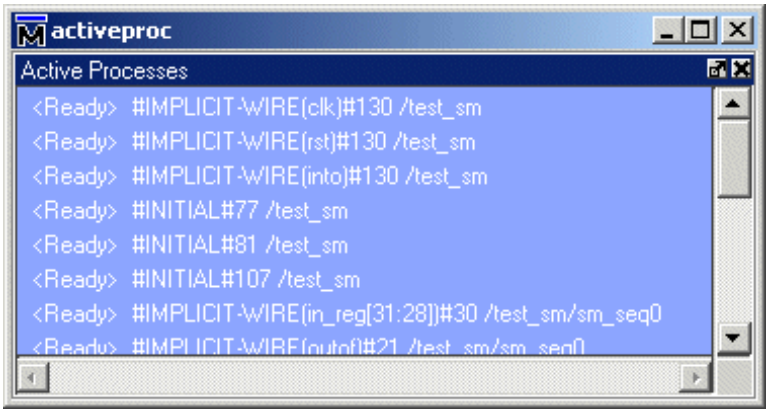
```
proc AddWaves winname {
_add_menu .wave controls right SystemButtonFace black AddWaves {add wave *}
}

lappend PrefWave(user_hook) AddWaves
```

Now, any time you start ModelSim and open the Wave window, it will have a button labeled "AddWaves" that executes the command "add wave *".

Active Processes pane

The Active Processes pane displays a list of HDL and SystemC processes.



Processes are also displayed in the structure tabs of the Main window Workspace. To filter displayed processes in the structure tabs, select **View** > **Filter** > **Processes**.

Process status

Each object in the scrollbox is preceded by one of the following indicators:

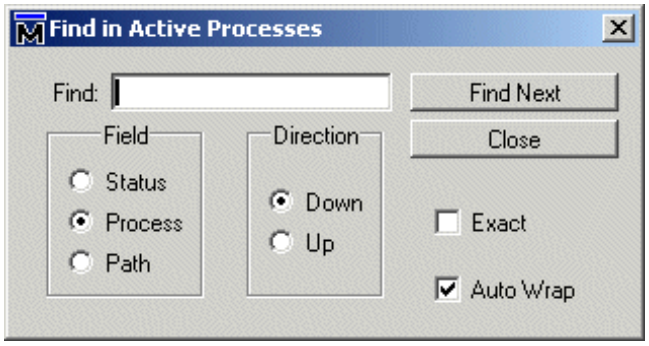
- **<Ready>**
  Indicates that the process is scheduled to be executed within the current delta time. If you select a "Ready" process, it will be executed next by the simulator.
- **<Wait>**
  Indicates that the process is waiting for a VHDL signal or Verilog net or variable to change or for a specified time-out period. SystemC objects cannot be in a Wait state.
- **<Done>**
  Indicates that the process has executed a VHDL wait statement without a time-out or a sensitivity list. The process will not restart during the current simulation run. SystemC objects cannot be in a Done state.

Active Processes dialogs

This section describes the processes-related dialogs that are accessed via the Main window menu bar. Not all dialogs are documented (e.g., File > Save).

Find in Active Processes dialog

Purpose	Menu command	Additional information
Locate object names	**Edit > Find**	NA



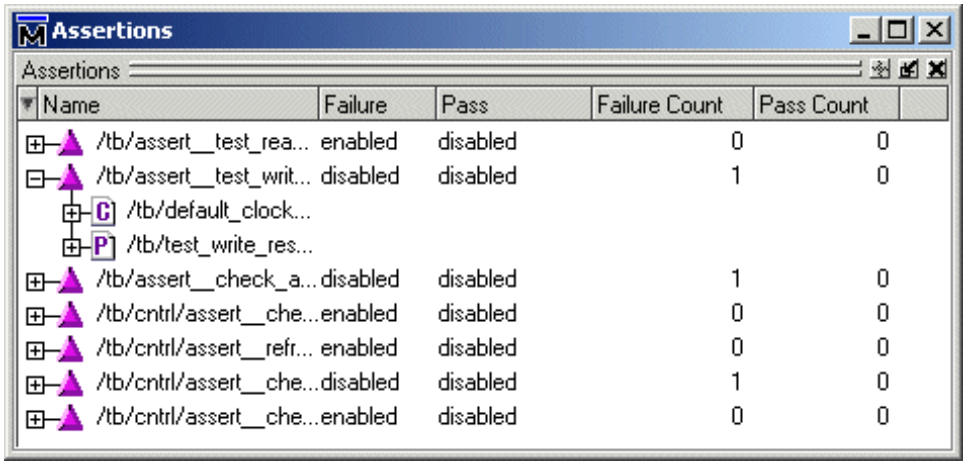
You must activate the Active Processes pane by clicking in it before this dialog will be available.

The Find in Active Processes dialog includes these options:

- **Find**
  Specify the text for which you want to search.
- **Field**
  Specify which column of the pane to search.
- **Direction**
  Specify which direction to start searching.
- **Exact**
  Check **Exact** if you only want to find objects that match your search exactly. For example, searching for "initial" without Exact will find *#INITIAL74#, #INITIAL104#, etc*.
- **Auto Wrap**
  Check **Auto Wrap** to continue the search at the top or bottom of the pane.

Assertions pane

The Assertions pane provides a convenient interface to PSL assertions in the current simulation. For more information on PSL assertions, see *Chapter 14 - PSL Assertions* in the *ModelSim User's Manual*.



The Assertions pane lists all embedded and external assertions that were successfully compiled and simulated during the current session. The plus sign ('+') to the left of the Name column lets you expand the assertion hierarchy to show its elements (properties, sequences, clocks, and HDL signals).

Assertions pane columns

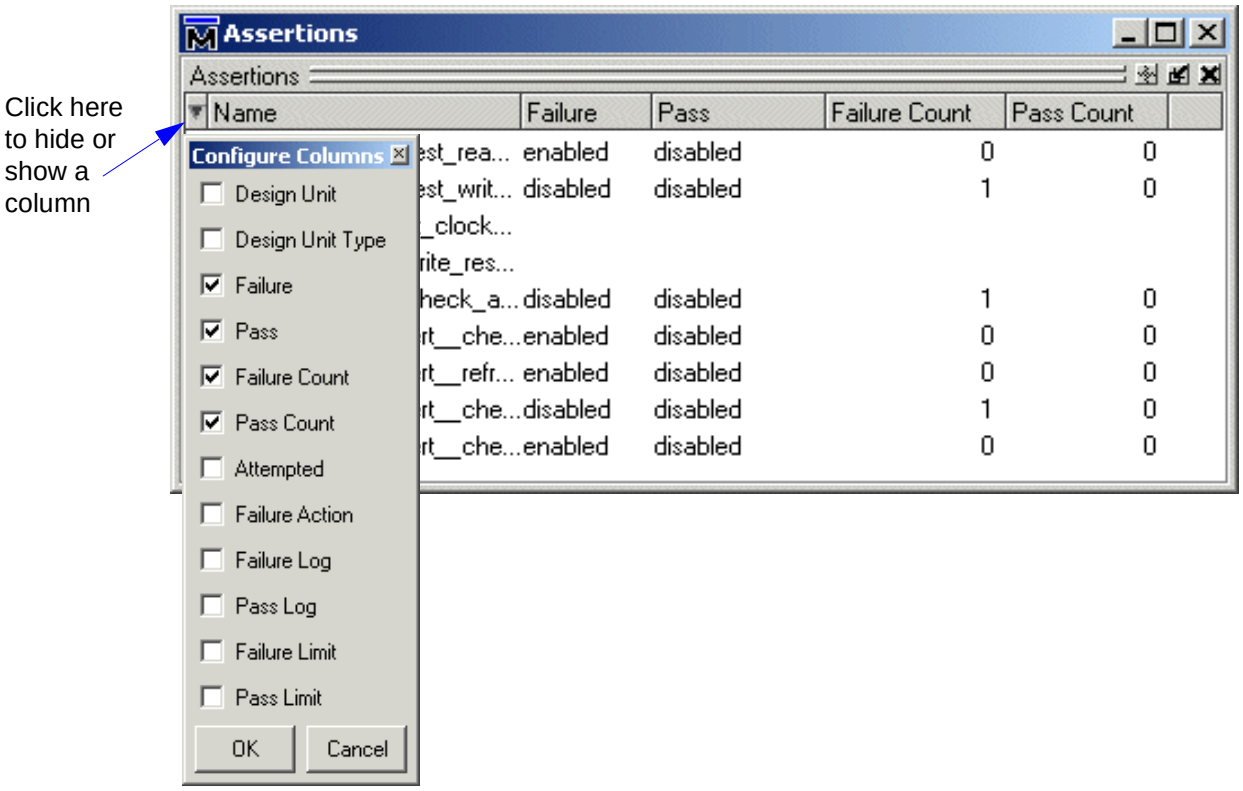
The Assertions pane includes the columns described below, though only five are displayed by default. See "Hiding/showing columns in the Assertions pane" (GR-112) for details on how to show or hide particular columns.

- The **Name** column lists the PSL statement or vunit name you specified in the assertion code. For vunits the individual assertion names are listed under the vunit name. Also, any signal referenced in an assertion will be part of the hierarchy as well. See "Understanding assertion names" (UM-370) for more details on assertion names.
- The **Design Unit** column identifies the design unit to which the assertion is bound. Not displayed by default.
- The **Design Unit Type** column lists the HDL type of the design unit. Not displayed by default.
- The **Failure** column shows "enabled" when failure checking is enabled on the assertion. If the column shows "disabled", ModelSim isn't currently checking that assertion's failures. Once ModelSim reaches the Failure limit, it disables failure checking (see "Setting failure and pass limits" (UM-379)).
- The **Pass** column shows "enabled" when pass checking is enabled on the assertion. If the column shows disabled, ModelSim isn't currently tracking that assertion's checking. Once ModelSim reaches the Pass limit, it disables pass checking (see "Setting failure and pass limits" (UM-379)).

- The **Failure Count** column counts the total number of times the assertion has failed in the current simulation. These counts are maintained between runs unless you reset the count for the assertion.
- The **Pass Count** column counts the total number of times the assertions has passed in the current simulation. These counts are maintained between runs unless you reset the count for the assertion.
- The **Attempted** column shows a green checkmark when an assertion has triggered and a red ’X’ when it has not triggered. Not displayed by default.
- The **Failure Action** column lists the action that ModelSim takes when the assertion passes or fails. Not displayed by default.
- The **Failure Log** column shows "enabled" when failure messages will be logged to the transcript. The column shows "disabled" when failure messages will not be logged to the transcript. Not displayed by default.
- The **Pass Log** column shows "enabled" when pass messages will be logged to the transcript. The column shows "disabled" when pass messages will not be logged to the transcript. Not displayed by default.
- The **Failure Limit** column shows the number of times ModelSim will respond to a failure event on an assertion. Not displayed by default.
- The **Pass Limit** column shows the number of times ModelSim will respond to a pass event on an assertion. Not displayed by default.

Hiding/showing columns in the Assertions pane

You can hide or show any of the columns in the Assertions pane. Click the drop-down arrow on the left-hand side of the dialog and select a column name.



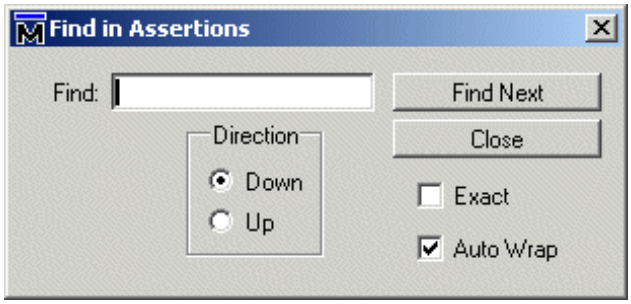
The selection acts as a toggle–select it once to hide a column; select it again to show the column.

Assertions pane dialogs

This section describes the assertions-related dialogs that are accessed via the Main window menu bar.

Find in Assertions dialog

Purpose	Menu command	Additional information
Locate text in the Assertions pane	**Edit > Find**	NA



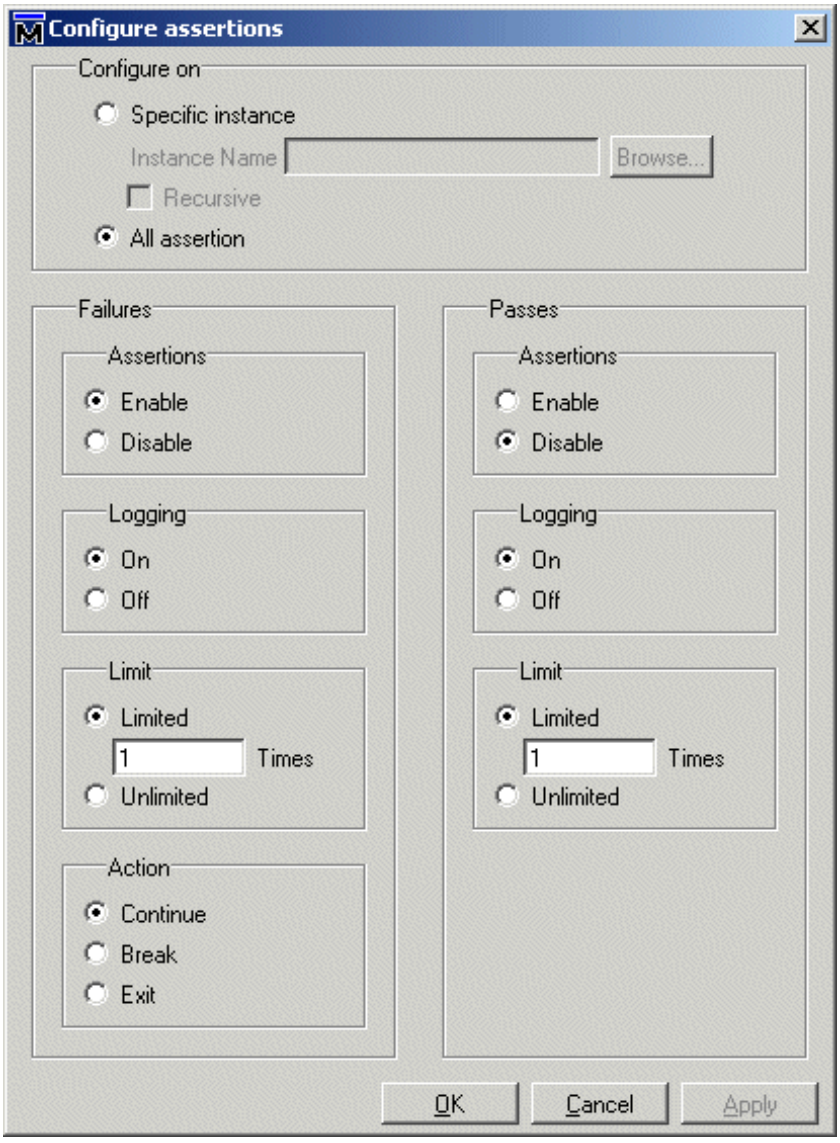
You must activate the Assertions pane by clicking in it before this dialog will be available.

The Find in Assertions dialog includes these options:

- **Find**
  The text you want to locate.
- **Direction**
  Specify the direction to begin searching.
- **Exact**
  Check Exact if you only want to find objects that match your search exactly. For example, searching for "read" without Exact will find *assert_check_read* and *test_read_response*.
- **Auto Wrap**
  Check Auto Wrap to continue the search at the top or bottom of the list.

Configure assertions dialog

Purpose	Menu command	Additional information
Configure assertion behavior	**Edit** > **Advanced** > **Change**	"Managing assertions" (UM-376)



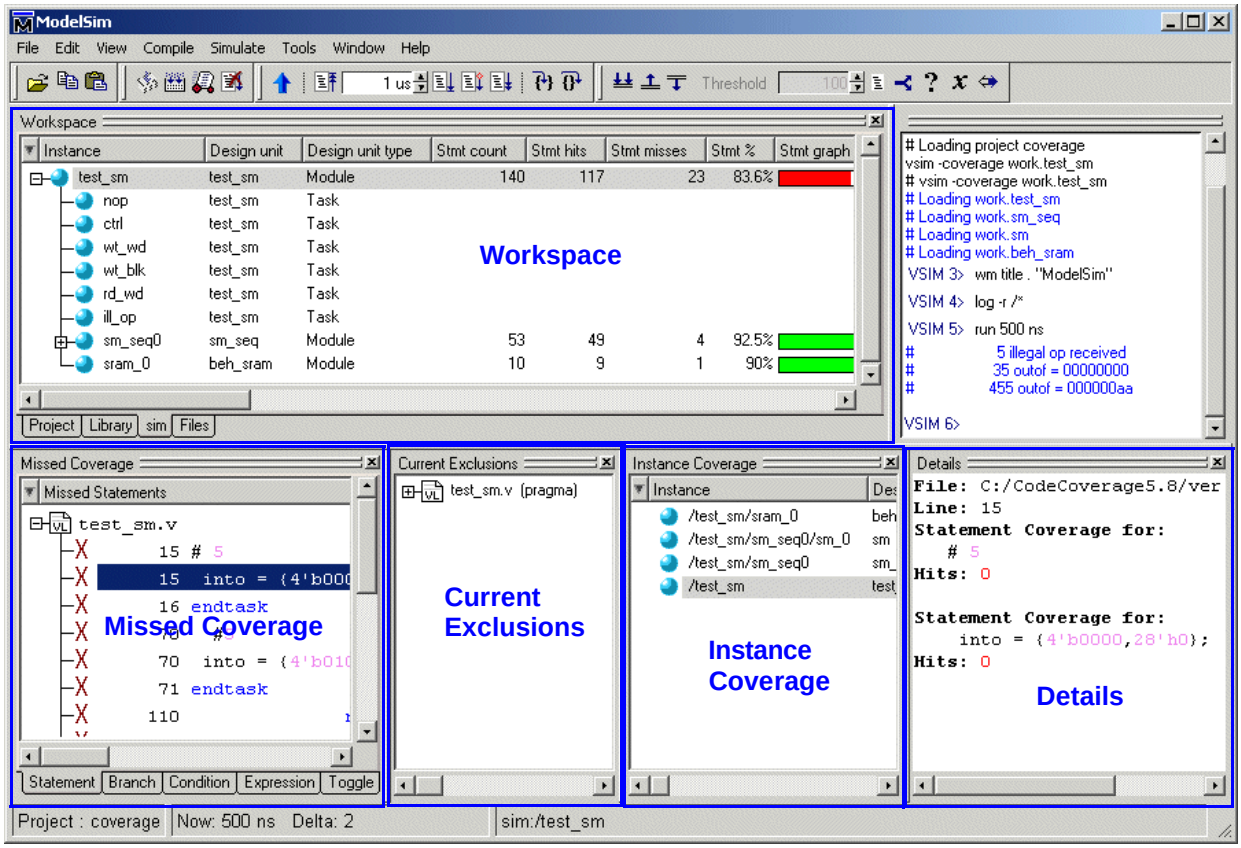
The Configure assertions dialog includes these options:

- **Specific instance**
  Specifies a particular instance whose assertions will be modified by the configuration settings.
- **Recursive**
  Searches for assertions in subregions of the specified instance.
- **All assertions**
  Specifies that all assertions will be modified by the configuration settings.
- **Assertions**
  Enables or disables failure and pass checking for the specified assertions.
- **Logging**
  Enables or disables failure and pass logging for the specified assertions.
- **Limit**
  Determines how many times ModelSim responds to an assertion pass or failure before disabling the assertion. If you select Limited, enter an integer in the Times field.
- **Action**
  Determines what action ModelSim takes when an assertion fails. ’Continue’ logs the assertion failure and proceeds with the simulation; ’Break’ pauses the simulation; ’Exit’ stops and then quits the simulation.

Code coverage panes

When you run simulations with code coverage enabled, a number of panes display in the Main window. These panes dissect and organize the data collected during coverage analysis. Each pane contains context menus (right-click in the pane to access the menus) with commands appropriate to that pane. You can hide and show the panes by selecting **View > Code Coverage**.

For details about using code coverage, see *Chapter 13 - Measuring code coverage* in the *ModelSim User's Manual*.



Workspace pane

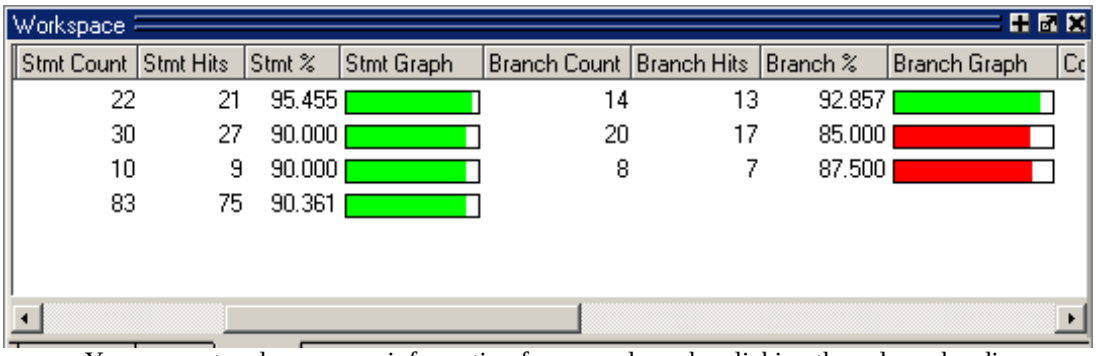
The Workspace pane displays code coverage information in the Files tab and in the structure tabs (e.g., the *sim* tab) that display structure for any datasets being simulated. When coverage is invoked, several columns for displaying coverage data are added to the Workspace pane. You can toggle columns on/off by right-clicking on a column name and

selecting from the context menu that appears. The following code coverage-related columns appear in the Workspace pane:

Column name	Description
Stmt count	in the Files tab, the number of executable statements in each file; in the sim tab, the number of executable statements in each level and all levels under that level
Stmt hits	the number of executable statements that have been executed in the current simulation
Stmt misses	the number of executable statements that were not executed in the current simulation
Stmt %	the current ratio of Stmt hits to Stmt count
Stmt graph	a bar chart displaying the Stmt %; if the percentage is below 90%, the bar is red; 90% or more, the bar is green; you can change this threshold percentage by editing the **PrefCoverage(cutoff)** preference variable
Branch count	in the Files tab, the number of executable branches in each file; in the sim tab, the number of executable branches in each level and all levels under that level
Branch hits	the number of executable branches that have been executed in the current simulation
Branch misses	the number of executable branches that were not executed in the current simulation
Branch %	the current ratio of Branch hits to Branch count
Branch graph	a bar chart displaying the Branch %; if the percentage is below 90%, the bar is red; 90% or more, the bar is green; you can change this threshold percentage by editing the **PrefCoverage(cutoff)** preference variable
Condition rows	in the Files tab, the number of conditions in each file; in the sim tab, the number of conditions in each level and all levels under that level
Condition hits	in the Files tab, the number of times the conditions in a file have been executed; in the sim tab, the number of times the conditions in a level, and all levels under that level, have been executed
Condition misses	in the Files tab, the number of conditions in a file that were not executed; in the sim tab, the number of conditions in a level, and all levels under that level, that were not executed
Condition %	the current ratio of Condition hits to Condition rows

Column name	Description
Condition graph	a bar chart displaying the Condition %; if the percentage is below 90%, the bar is red; 90% or more, the bar is green; you can change this threshold percentage by editing the **PrefCoverage(cutoff)** preference variable
Expression rows	in the Files tab, the number of executable expressions in each file; in the sim tab, the number of executable expressions in each level and all levels subsumed under that level
Expression hits	in the Files tab, the number of times expressions in a file have been executed; in the sim tab, the number of times expressions in a level, and each level under that level, have been executed
Expression misses	in the Files tab, the number of executable expressions in a file that were not executed; in the sim tab, the number of executable expressions in a level, and all levels under that level, that were not executed
Expression %	the current ratio of Expression hits to Expression rows
Expression graph	a bar chart displaying the Expression %; if the percentage is below 90%, the bar is red; 90% or more, the bar is green; you can change this threshold percentage by editing the **PrefCoverage(cutoff)** preference variable
Toggle nodes	the number of points in each instance where the logic will transition from one state to another
Toggle hits	the number of nodes in each instance that have transitioned at least once
Toggle misses	the number of nodes in each instance that have not transitioned at least once
Toggle %	the current ratio of Toggle hits to Toggle nodes
Toggle graph	a bar chart displaying the Toggle %; if the percentage is below 90%, the bar is red; 90% or more, the bar is green; you can change this threshold percentage by editing the **PrefCoverage(cutoff)** preference variable

The diagram below shows a portion of the Workspace window pane with code coverage data displayed.

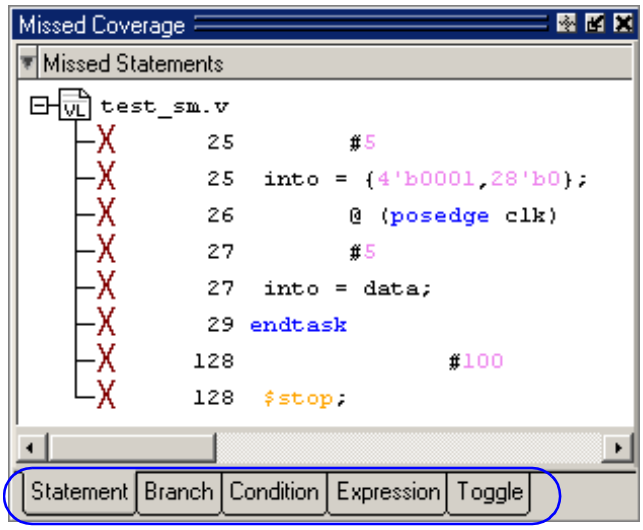


You can sort code coverage information for any column by clicking the column heading. Clicking the column heading again will reverse the order.

Coverage information in the Workspace pane is dynamically linked to the Missed Coverage pane and the Current Exclusions pane. Click the left mouse button on any file in the Workspace pane to display that file's un-executed statements, branches, conditions, expressions, and toggles in the Missed Coverage pane. Lines from the selected file that are excluded from coverage statistics are displayed in the Current Exclusions pane.

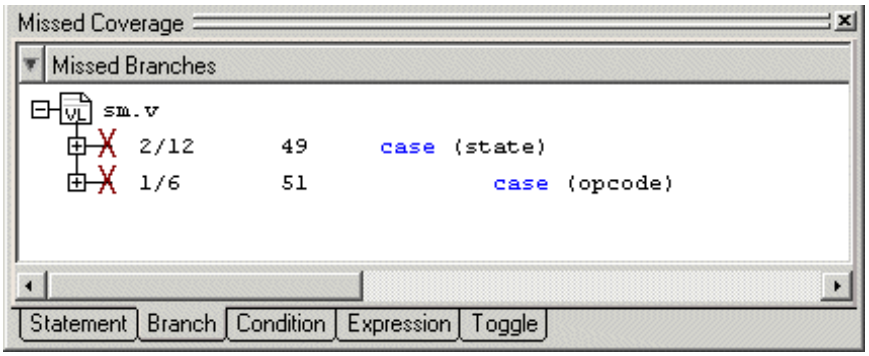
Missed Coverage pane

When you select a file in the Workspace pane, the Missed Coverage pane displays that file's un-executed statements, branches, conditions, and expressions and signals that haven't toggled. The pane includes a tab for each object, as shown below.



Each tab includes a column for the line number and a column for statement, branch, condition, expression, or toggle on that line. The "X" indicates the object was not executed.

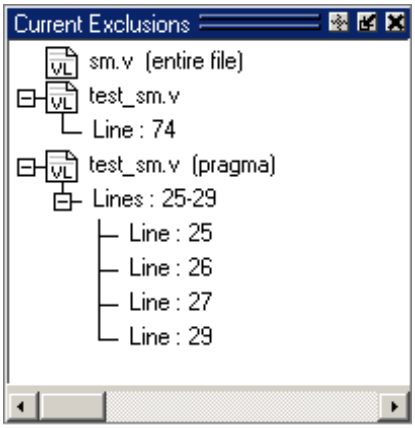
The Branch tab also includes a column for branch code (conditional "if/then/else" and "case" statements). "X_T" indicates that only the true condition of the branch was not executed. "X_F" indicates that only the false condition of the branch was not executed. Fractional numbers indicate how many case statement labels were not executed. For example, if only one of six case labels executed, the Branch tab would indicate "X 1/6."



When you right-click any object in the Statement, Branch, Condition, or Expression tabs you can select **Exclude Selection** or **Exclude Selection for Instance <name>** to exclude the object from coverage statistics and make it appear in the Current Exclusions pane.

Current Exclusions pane

The Current Exclusions pane lists all files and lines that are excluded from coverage statistics. See "Excluding objects from coverage" (UM-347) for more details.

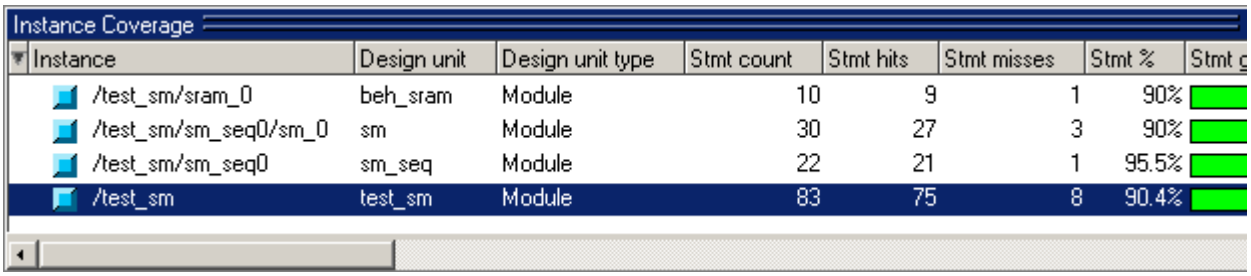


The pane does not display by default. Select **View > Code Coverage > Current Exclusions** to display the it.

Instance Coverage pane

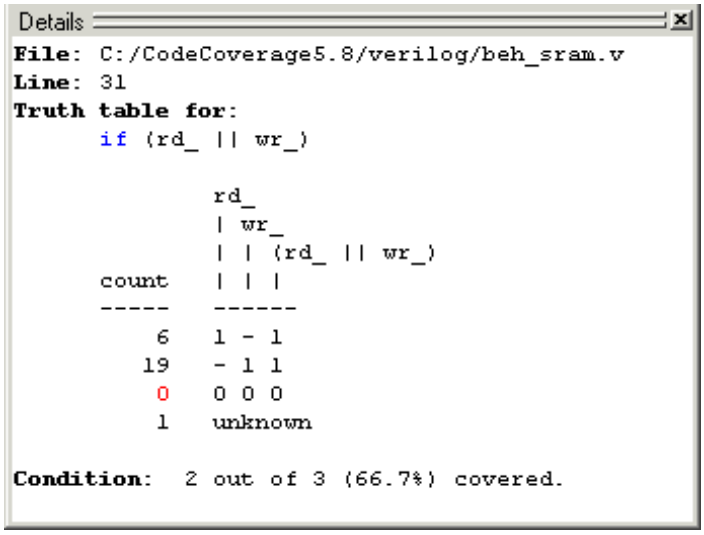
The Instance Coverage pane displays coverage statistics for each instance in a flat, non-hierarchical view. The Instance Coverage pane contains the same code coverage statistics columns as in the "Workspace" (GR-15) pane.

A partial view of the Instance Coverage pane is shown below.

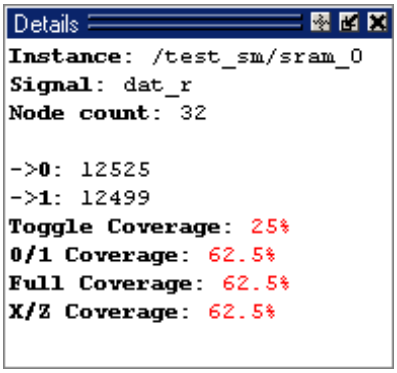


Details pane

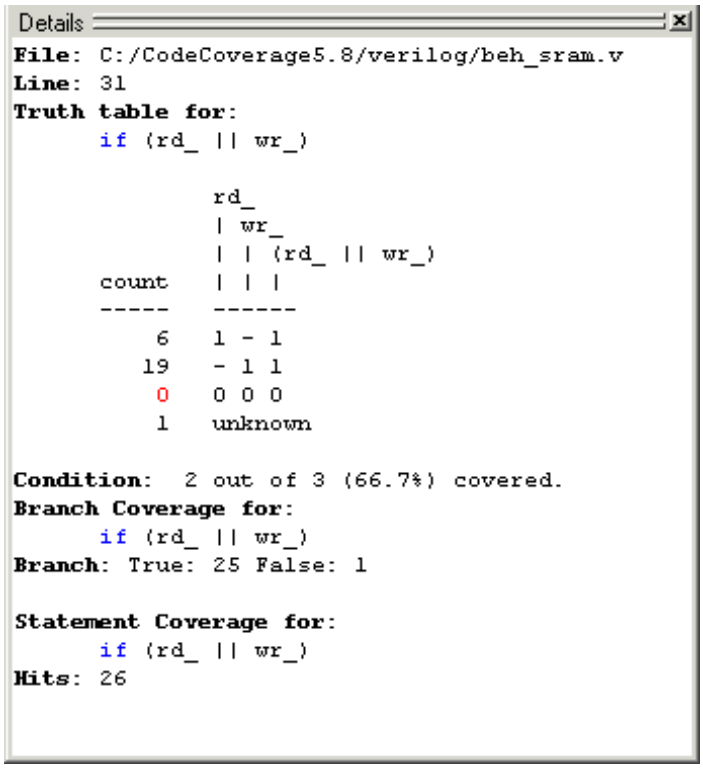
After code coverage is invoked and the simulation is loaded and run, you can turn on the Details pane by selecting **View > Coverage > Details**. The Details pane shows the details of missed coverage. When an object is selected in the Missed Coverage pane, the details of that coverage are displayed in the Details pane. Truth tables will be displayed for condition and expression coverage, as shown here.



Toggle details are displayed as follows:

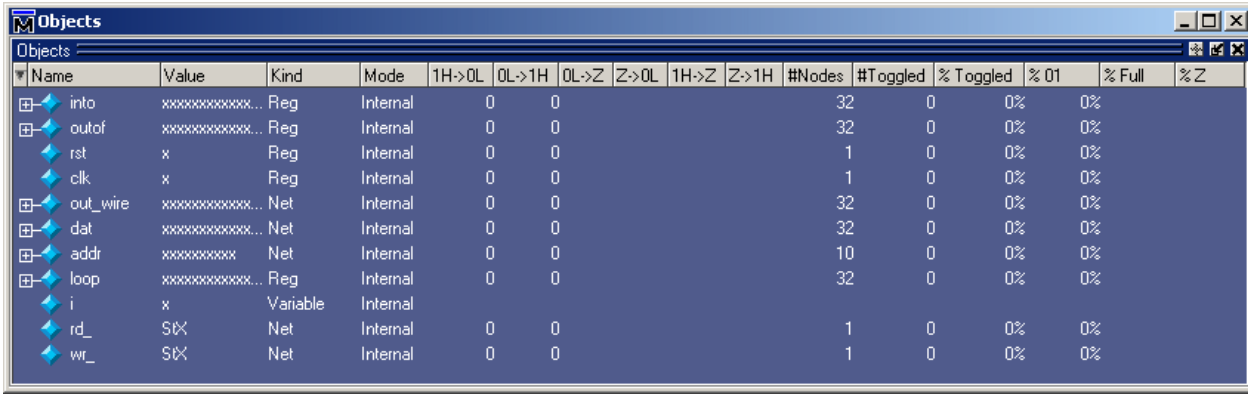


By clicking the left mouse button on the statement Hits column in the Source window, all coverage information for that line will be displayed in the Details pane as shown here:



Objects pane toggle coverage

Toggle coverage data is displayed in the Objects pane in multiple columns, as shown below. There is a column for each of the six transition types.



Right click any column name to toggle a column on or off.

The following table provides a description of the available columns:

Column name	Description
Name	the name of each object in the current region
Value	the current value of each object
Kind	the object type
Mode	the object mode (internal, in, out, etc.)
1H -> 0L	the number of times each object has transitioned from a 1 or a High state to a 0 or a Low state
0L -> 1H	the number of times each object has transitioned from a 0 or a Low state to 1 or a High state
0L -> Z	the number of times each object has transitioned from a 0 or a Low state to a high impedance (Z) state
Z -> 0L	the number of times each object has transitioned from a high impedance state to a 0 or a Low state
1H -> Z	the number of times each object has transitioned from a 1 or a High state to a high impedance state
Z -> 1H	the number of times each object has transitioned from a high impedance state to 1 or a High state
# Nodes	the number of scalar bits in each object
# Toggled	the number of nodes that have transitioned at least once
% Toggled	the current ratio of the # Toggled to the # Nodes for each object

Column name	Description
% 01	the percentage of **1H -> 0L** and **0L -> 1H** transitions that have occurred (transitions in the first two columns)
% Full	the percentage of all transitions that have occurred (all six columns)
% Z	the percentage of **0L -> Z**, **Z -> 0L**, **1H -> Z**, and **Z -> 1H** transitions that have occurred (last four columns)

Code coverage toolbar

When you simulate with code coverage enabled, the following toolbar is added to the Main window.

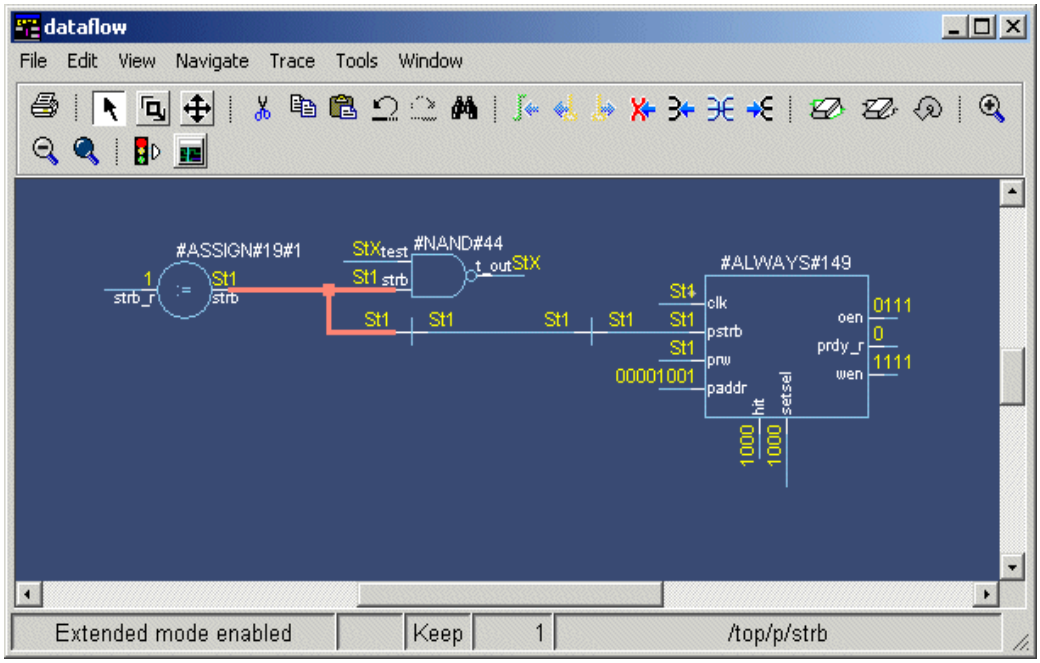
The toolbar has the following buttons:.

Covfilter toolbar buttons	
Button	
	Enable Filtering enables display filtering of coverage statistics in the Workspace and Instance Coverage panes of the Main window
	Threshold above displays all coverage statistics above the Filter Threshold for selected columns
	Threshold below displays all coverage statistics below the Filter Threshold for selected columns
	Filter Threshold specifies the display coverage percentage for the selected coverage columns
	Statement applies the display filter to all Statement coverage columns in the Workspace and Instance Coverage panes of the Main window
	Branch applies the display filter to all Branch coverage columns in the Workspace and Instance Coverage panes of the Main window
	Condition applies the display filter to all Condition coverage columns in the Workspace and Instance Coverage panes of the Main window
	Expression applies the display filter to all Expression coverage columns in the Workspace and Instance Coverage panes of the Main window
	Toggle applies the display filter to all Toggle coverage columns in the Workspace and Instance Coverage panes of the Main window

Dataflow window

The Dataflow window allows you to explore the "physical" connectivity of your design; to trace events that propagate through the design; and to identify the cause of unexpected outputs.

Note: ModelSim versions operating without a dataflow license feature have limited Dataflow functionality. Without the license feature, the window will show only one process and its attached signals or one signal and its attached processes. Contact Model Technology sales for more information if you don't have a dataflow license feature.



Objects you can view

The Dataflow window displays processes; signals, nets, and registers; and interconnect. The window has built-in mappings for all Verilog primitive gates (i.e., AND, OR, etc.). For components other than Verilog primitives, you can define a mapping between processes and built-in symbols. See "Symbol mapping" (UM-313) for details.

Note: You cannot view SystemC objects in the Dataflow window.

Dataflow window menu bar

The following commands are available from the Dataflow window menu bar. Many of the commands are also available from the context menu (click right or 3rd mouse button).

File menu

New Window	create a new Dataflow window
Page setup	configure page formatting for printing
Print	print the current view of the Dataflow window (Windows only)
Print Postscript	print/save the current view of the Dataflow window to a postscript device/file
Close	close the Dataflow window; note that this erases whatever is currently displayed in the window

Edit menu

Undo	undo the last action
Redo	redo the last undone action
Cut	cut the selected object(s)
Copy	copy the selected object(s)
Paste	paste the previously cut or copied object(s) into the display
Erase selected	clear the selected object from the window
Select all	select all objects in the window
Unselect all	deselect all currently selected objects
Erase highlight	remove green highlighting from interconnect lines
Erase all	clear all objects from the window
Regenerate	clear and redraw the display using an optimal layout
Find	search for an instance or signal
Find next	search for the next occurrence of an instance or signal

View menu

Show Wave	open the embedded wave viewer pane
Select	set left mouse button to select mode and middle mouse button to zoom mode
Zoom	set left mouse button to zoom mode and middle mouse button to pan mode
Pan	set left mouse button to pan mode and middle mouse button to zoom mode
Default	set mouse to default mode

Navigate menu

Expand net to drivers	display driver(s) of the selected signal, net, or register
Expand net to readers	display reader(s) of the selected signal, net, or register
Expand net	display driver(s) and reader(s) of the selected signal, net, or register
Expand to design inputs	display the top-level driver of the net, which will most likely be in a testbench or in the top entity or module
Expand to hierarchy inputs	display the primary driver (port) of the net within its level of hierarchy
Hide selected	remove the selected component and all other components from the same region and replace them with a single component representing that region
Show selected	expand the selected component to show all underlying components
View region	clear the window and display all signals from the current region
Add region	display all signals from the current region without first clearing the window
View all nets	clear the window and display all signals from the entire design
Add ports	add port symbols to the port signals in the current region

Trace menu

TraceX™	step back to the last driver of an unknown (X) value
ChaseX™	jump to the source of an unknown (X) value
TraceX Delay	step back in time to the last driver of an unknown (X) value
ChaseX Delay	jump back in time to the point where the output value transitions to X
Trace next event	move the next event cursor to the next input event driving the selected output
Trace event set	jump to the source of the selected input event
Trace event reset	return the next event cursor to the selected output

Tools menu

Load built-in symbol map	load a .bsm file for mapping symbol instances; see "Symbol mapping" (UM-313)
Load symlib library	load a user-defined symbol library
Create symlib index	create an index for a user-defined symbol library
Options	configure Dataflow window preferences

Window menu

The Window menu is identical in all windows. See "Window menu" (GR-32) for a description of the commands.

Dataflow window toolbar

The buttons on the Dataflow window toolbar are described below.

Button	Menu equivalent
Print print the current view of the Dataflow window	File > Print (Windows) File > Print Postscript (UNIX)
Select mode set left mouse button to select mode and middle mouse button to zoom mode	View > Select
Zoom mode set left mouse button to zoom mode and middle mouse button to pan mode	View > Zoom
Pan mode set left mouse button to pan mode and middle mouse button to zoom mode	View > Pan
Cut cut the selected object(s)	Edit > Cut
Copy copy the selected object(s)	Edit > Copy
Paste paste the previously cut or copied object(s)	Edit > Paste
Undo undo the last action	Edit > Undo
Redo redo the last undone action	Edit > Redo
Find search for an instance or signal	Edit > Find

Button	Menu equivalent
Trace input net to event move the next event cursor to the next input event driving the selected output	Trace > Trace next event
Trace Set jump to the source of the selected input event	Trace > Trace event set
Trace Reset return the next event cursor to the selected output	Trace > Trace event reset
Trace net to driver of X step back to the last driver of an unknown value	Trace > TraceX
Expand net to all drivers display driver(s) of the selected signal, net, or register	Navigate > Expand net to drivers
Expand net to all drivers and readers display driver(s) and reader(s) of the selected signal, net, or register	Navigate > Expand net
Expand net to all readers display reader(s) of the selected signal, net, or register	Navigate > Expand net to readers
Erase highlight clear the green highlighting which identifies the path you've traversed through the design	Edit > Erase highlight
Erase all clear the window	Edit > Erase all
Regenerate clear and redraw the display using an optimal layout	Edit > Regenerate

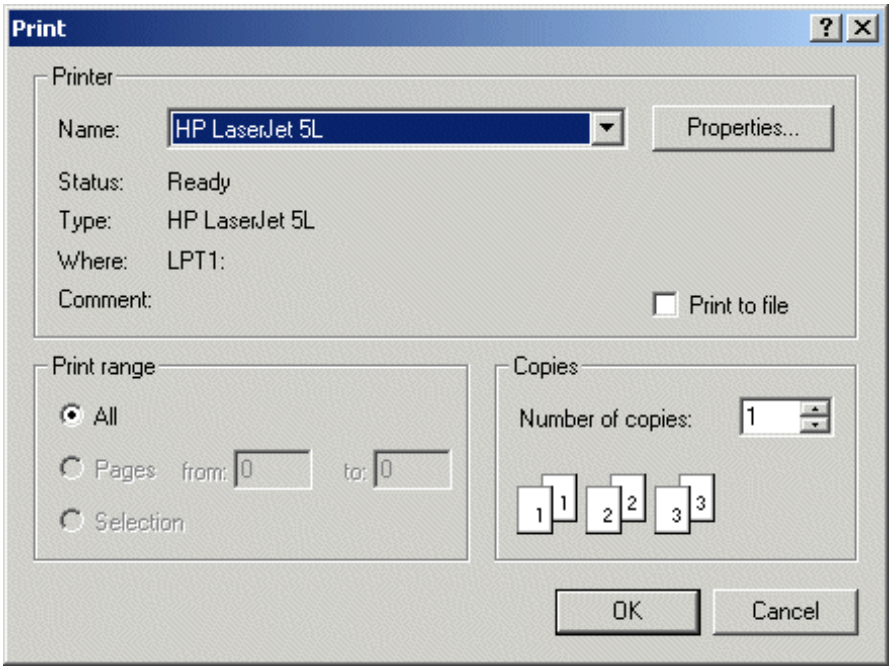
Button	Menu equivalent
Zoom In zoom in by a factor of two from current view	none
Zoom Out zoom out by a factor of two from current view	none
Zoom Full zoom out to show all components in the window	none
Stop Drawing halt any drawing currently happening in the window	none
Show Wave display the embedded wave viewer pane	View > Show Wave

Dataflow window dialogs

This section describes the dialogs that are accessed via the Dataflow window menu bar. The dialogs are listed in the order in which they appear on the menus, top-to-bottom and left-to-right (i.e., starting with the File menu and progressing across the menu bar).

Print dialog

Purpose	Menu command	Additional information
Print the contents of the Dataflow window	**File > Print**	"Printing and saving the display" (UM-310)"Printing on Windows platforms" (UM-311)



The Print dialog includes these options:

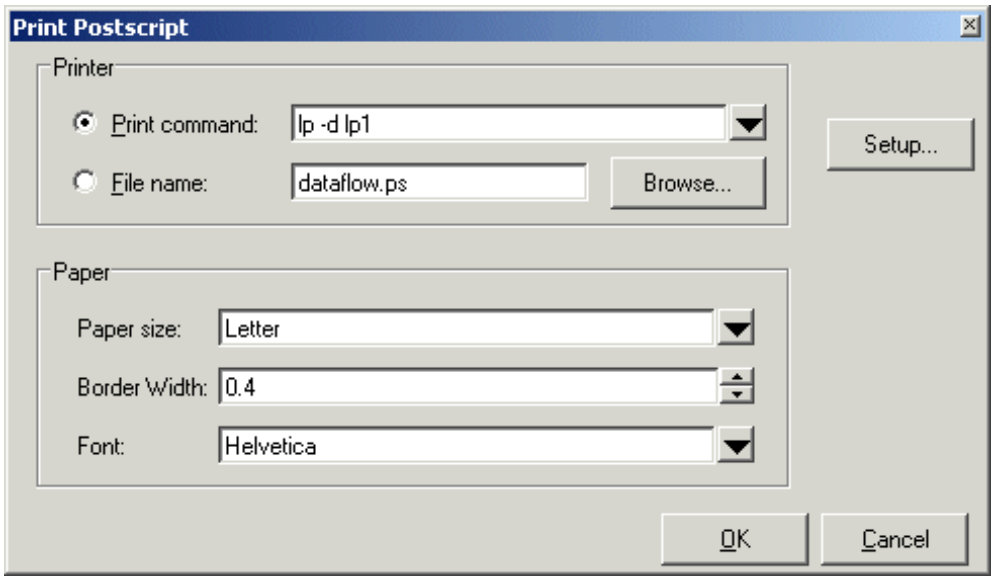
Printer

- **Name**
  Choose the printer from the drop-down menu. Set printer properties with the *Properties* button.
- **Status**
  Indicates the availability of the selected printer.
- **Type**
  Printer driver name for the selected printer. The driver determines what type of file is output if "Print to file" is selected.

- **Where**
  The printer port for the selected printer.
- **Comment**
  The printer comment from the printer properties dialog.
- **Print to file**
  Make this selection to print the display to a file instead of a printer. The printer driver determines what type of file is created. Postscript printers create a Postscript (.ps) file, non-Postscript printers create a .prn or printer control language file. To create an encapsulated Postscript file (.eps) use the **File > Print Postscript** menu selection.

Print Postscript dialog

Purpose	Menu command	Additional information
Print/save a postscript file of the Dataflow window	**File > Print Postscript**	"Printing and saving the display" (UM-310)



The Print Postscript dialog includes these options:

Printer

- **Print command**
  Enter a UNIX print command to print the display in a UNIX environment.
- **File name**
  Enter a filename for the encapsulated Postscript (.eps) file to create; or browse to a previously created .eps file and use that filename.

Paper

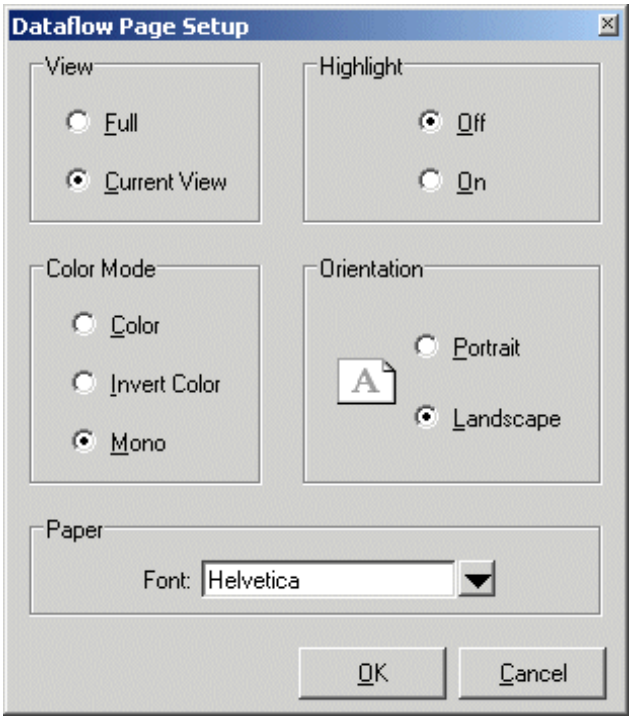
- **Paper size**
  Select the paper size used by the printer.
- **Border width**
  Specify the border in inches.
- **Font**
  Specify the font to use for printing.

Setup button

See "Dataflow Page Setup dialog" (GR-138).

Dataflow Page Setup dialog

Purpose	Menu command	Additional information
Set up page layout for printing	**File** > **Page setup**	"Configuring page setup" (UM-312)

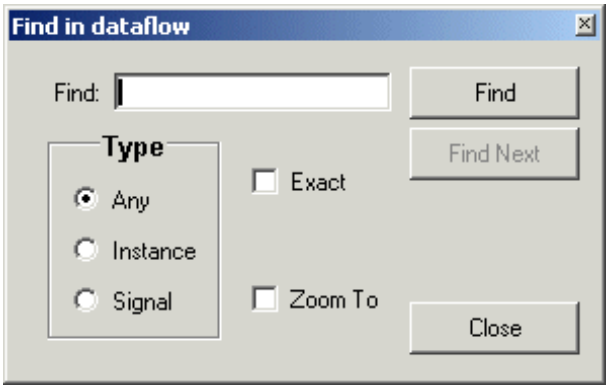


The Dataflow Page Setup dialog includes these options:

- **View**
  Specifies **Full** (everything in the window) or **Current View** (only that which is visible).
- **Highlight**
  Specifies that highlighting (see "Tracking your path through the design" (UM-303)) is **On** or **Off**.
- **Color Mode**
  Specifies **Color** (256 colors), **Invert Color** (gray-scale) or **Mono** (monochrome) color mode.
- **Orientation**
  Specifies **Landscape** (horizontal) or **Portrait** (vertical) orientation.
- **Paper**
  Specifies the font to use for printing (Windows only).

Find in dataflow dialog

Purpose	Menu command	Additional information
Locate a signal or process	**Edit > Find**	"Finding objects by name in the Dataflow window" (UM-309)



The Find in dataflow dialog includes the following options:

- **Find**
  Enter the object name you want to locate.
- **Type**
  Specify whether to search Instance, Signals, or both (Any) for the object name.
- **Exact**
  Find only those objects that match your search exactly. For example, searching for "clk" without **Exact** will find */top/clk* and *clk1*.
- **Zoom To**
  If checked the window zooms in on the located object.

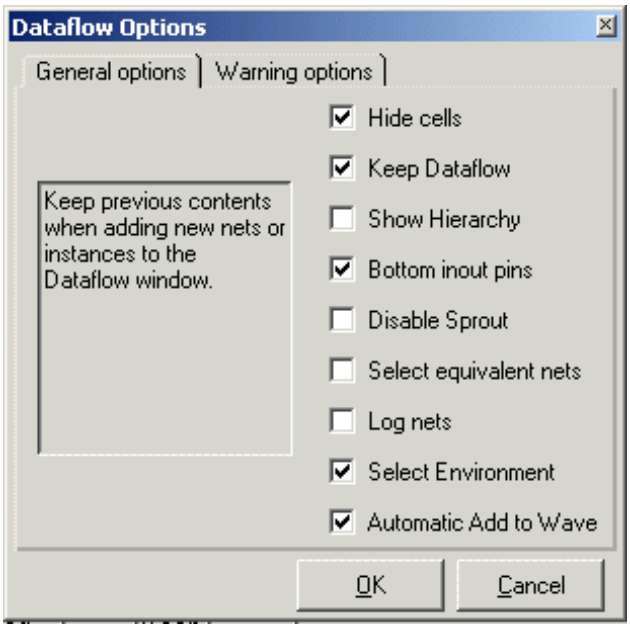
You can continue searching using the Find Next button.

Dataflow Options dialog

Purpose	Menu command	Additional information
Configure Dataflow window options	**Tools > Options**	"Configuring window options" (UM-315)

The settings affect only the current session.

General options tab

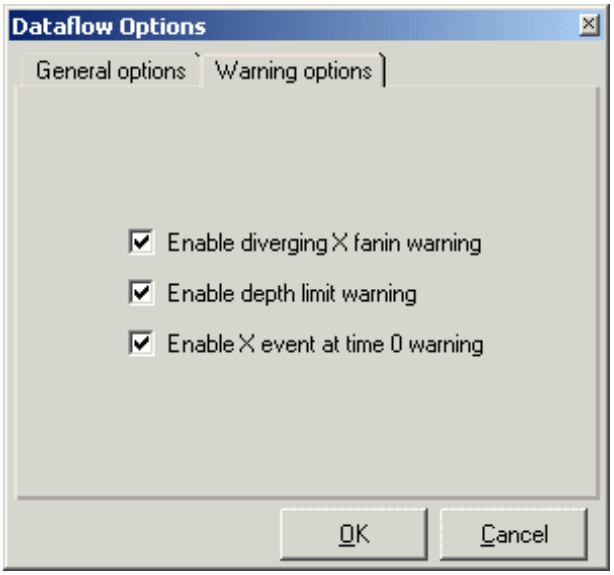


The General options tab includes these options:

- **Hide Cells**
  By default the Dataflow window automatically hides instances that have either 'celldefine, VITAL_LEVEL0, or VITAL_LEVEL1 attributes. Unchecking this disables automatic cell hiding.
- **Keep Dataflow**
  Keeps previous contents when adding new signals or processes to the window.
- **Show Hierarchy**
  Displays connectivity using hierarchical references. Note that selecting this will erase the current contents of the window.
- **Bottom inout pins**
  Places inout pins on the bottom of components rather than on the right with output pins.
- **Disable Sprout**
  Displays only the selected signal or process with its immediate fanin/fanout. Configures window to behave like the Dataflow window of versions prior to 5.6.

- **Select equivalent nets**
  If the object you select traverses hierarchy, then ModelSim selects all connected objects across the hierarchy.
- **Log nets**
  Logs signals when they are added to the window.
- **Select Environment**
  Updates the Structure, Objects, and Source windows to reflect the net selected in the Dataflow window.
- **Automatic Add to Wave**
  Adds signals automatically to the Wave pane or window when executing ChaseX or TraceX.

Warning options tab



The Warning options tab includes these options:

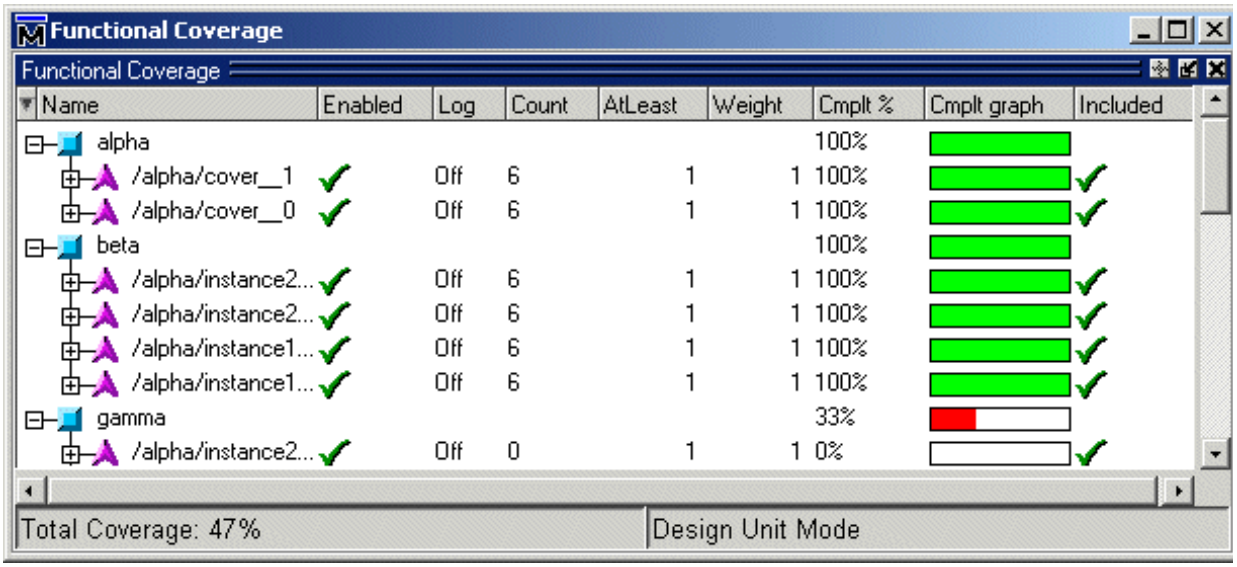
- **Enable diverging X fanin warning**
  Enables the warning message, "ChaseX: diverging X fanin. Reduce the selection list and try again."
- **Enable depth limit warning**
  Enables the warning message, "ChaseX: Stop because depth limit reached! Possible loop?"
- **Enable X event at time 0 warning**
  Enables the warning message, ""Driving X event at time 0."

Customize Toolbar dialog

This dialog is the same for all windows. See "Customize Toolbar dialog" (GR-106) under the Main window for details.

Functional Coverage pane

The Functional Coverage pane displays a list of functional coverage directives in the current region (which is selected via the structure pane in the Main window). See *Chapter 15 - Functional coverage with PSL and ModelSim* in the *ModelSim User's Manual* for more information on functional coverage.



The Functional Coverage pane lists all embedded and external directives that were successfully compiled and simulated during the current session. The plus sign ('+') to the left of the Name column lets you expand the directive hierarchy to show its elements (properties, sequences, clocks, and HDL signals).

The pane can be sorted by design unit or by cover directive. Select **Tools** > **Functional Coverage** > **Design Unit Mode** to change the sorting.

Functional Coverage window columns

The Functional Coverage window includes the columns described below, though only seven are displayed by default. See "Hiding/showing columns in the Assertions pane" (GR-112) for details on how to show or hide particular columns.

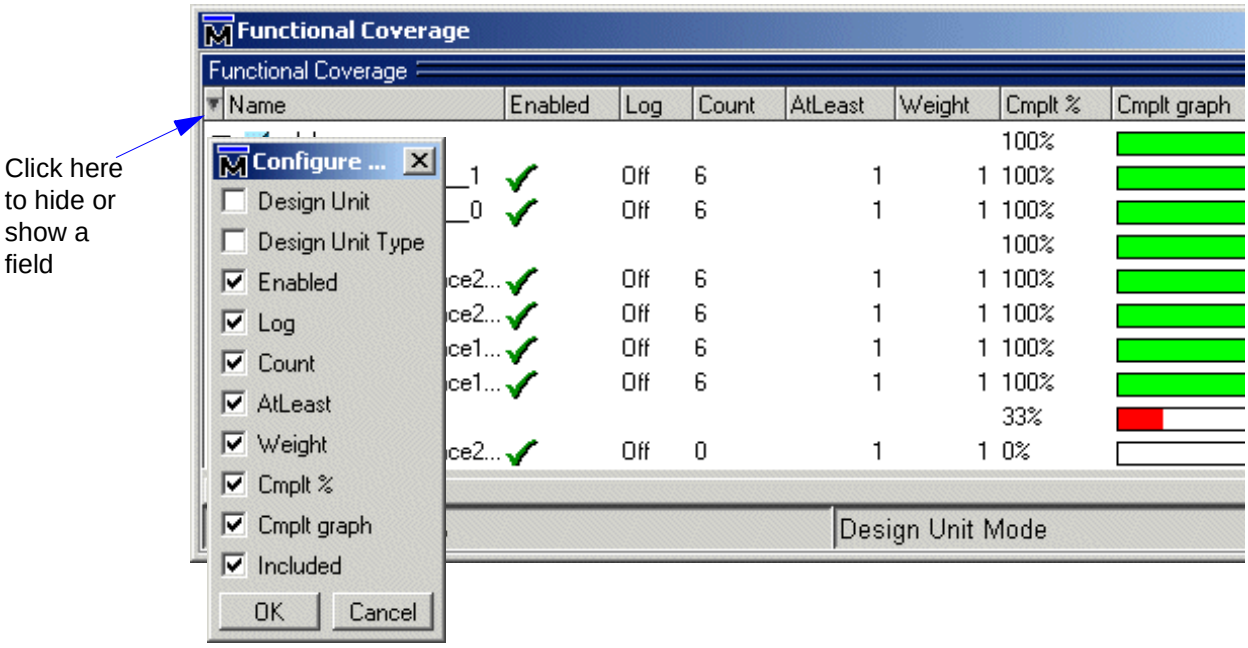
- The **Name** column lists directive names and design units. Also, any signals referenced in a directive are included in the hierarchy. See "Understanding assertion names" (UM-370) for details on how ModelSim names directives.
- The **Design Unit** column identifies the design unit to which the directive is bound. Not displayed by default.
- The **Design Unit Type** column lists the HDL type of the design unit. Not displayed by default.
- The **Enabled** column shows a green checkmark when a directive is enabled and a red X when a directive is disabled.
- The **Log** column indicates whether data for the directive is currently being added to the functional coverage database.

- The **Count** column shows how many times a directive has "fired" during the current simulation.
- The **AtLeast** column shows how many times a directive has to fire to be considered 100% covered. See "Configure cover directives dialog" (GR-149) for more information.
- The **Weight** column shows the weighting factor that has been applied to the directive. See "Configure cover directives dialog" (GR-149) for more information.
- The **Cmplt%** column shows the coverage percentage for a directive. The percentage is the lesser of 100% or Count/AtLeast.
- The **Cmplt graph** column shows a graphical bar chart of the completion percentage. Directives with 100% coverage are displayed in green.
- The **Included** column indicates whether the directive is included in aggregate statistics and reports.

You can also view this same information in textual format using the **fcover report** command (CR-173).

Hiding/showing columns in the Functional Coverage window

You can hide or show any of the columns in the Functional Coverage window. Click the drop-down arrow on the left-hand side of the dialog and select a column name.



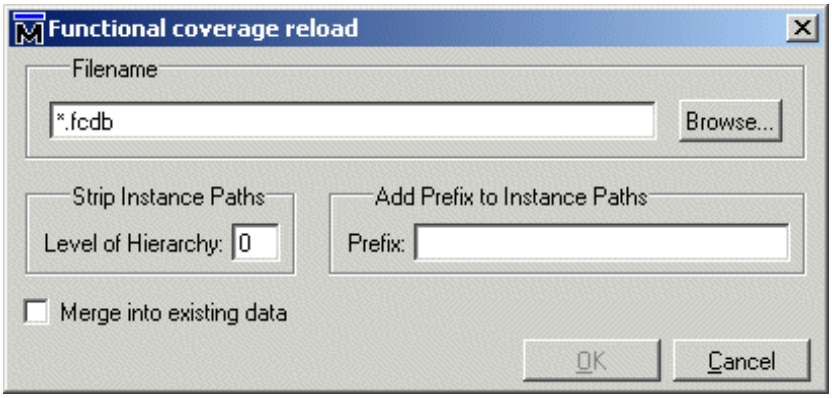
The selection acts as a toggle–select it once to hide a column; select it again to show the column.

Functional Coverage pane dialogs

This section describes the functional coverage-related dialogs that are accessed via the Main window menu bar. Not all dialogs are documented (e.g., Tools > Functional Coverage > Save).

Functional coverage reload dialog

Purpose	Menu command	Additional information
Load a saved coverage database	**Tools > Functional Coverage > Reload**	"Reloading/merging functional coverage data" (UM-396)

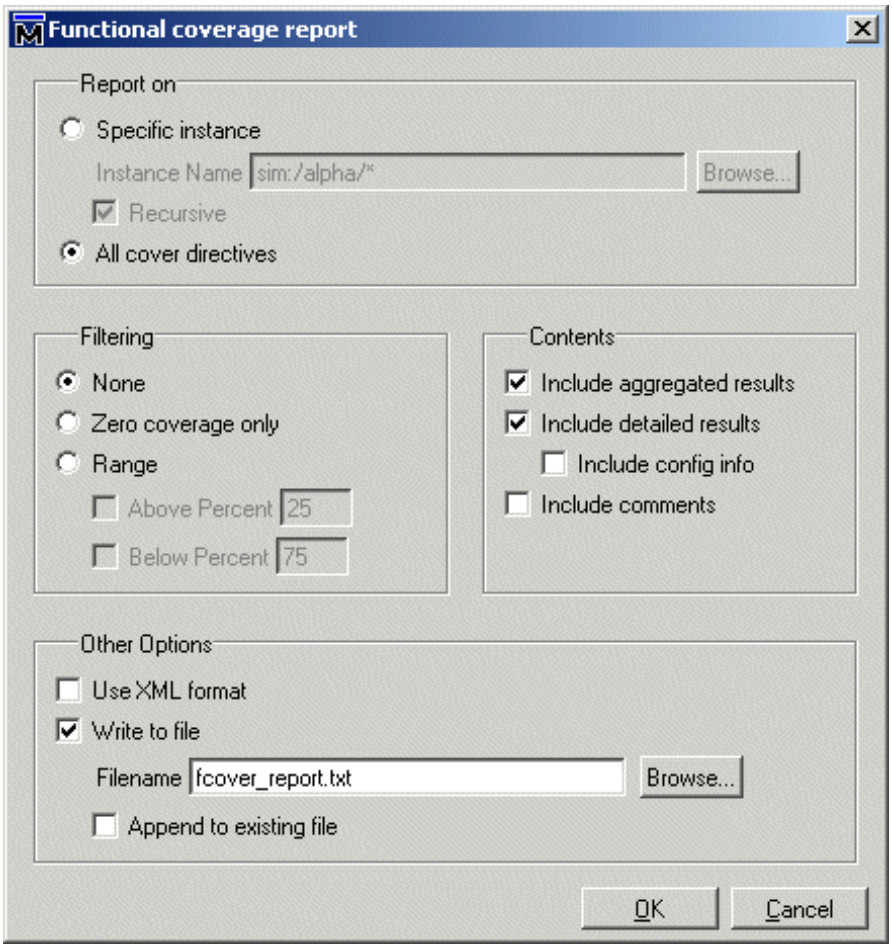


The Functional coverage reload dialog includes these options:

- **Filename**
  The file to reload. Must be a functional coverage database previously saved with the **File > Save** command or the **fcover save** command (CR-175).
- **Strip Instance Paths**
  A number of levels of hierarchy to strip from all instance pathnames. Use this to delete levels of hierarchy when merging statistics from different runs of the same design that were performed in different contexts (e.g., block simulation vs. chip-level simulation vs. system simulation).
- **Add Prefix to Instance Paths**
  A prefix to add to all instance paths. Use this to add levels of hierarchy when merging statistics from different runs of the same design that were performed in different contexts (e.g., block simulation vs. chip-level simulation vs. system simulation).
- **Merge into existing data**
  Merges the file into the current functional coverage database. If left unchecked, the loaded file replaces the current database.

Functional coverage report dialog

Purpose	Menu command	Additional information
Create ASCII report of coverage statistics	**Tools > Functional Coverage > Report**	"Reporting functional coverage statistics" (UM-391)



The Functional coverage filter dialog includes these options:

- **Specific instance**
  An instance for which statistics will be reported.
- **Recursive**
  Searches for directives in subregions of the specified instance.
- **All cover directives**
  Specifies that all directives in the current design will be included in the report.
- **Filtering**
  Filters report data. You can report on all directives, directives with zero coverage, or directives that had a coverage percentage within a specific range.

Contents

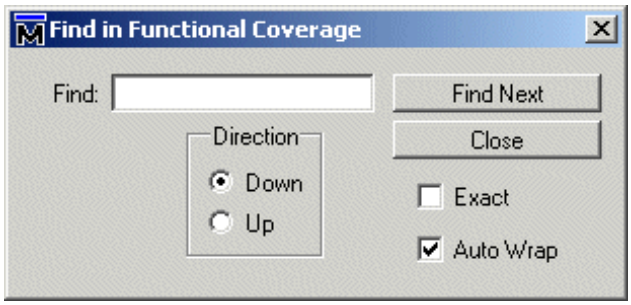
- **Include aggregated results**
  Outputs aggregated statistics when reporting on all directives or directives in a specified instance. See "Understanding aggregated statistics" (UM-393) for more details.
- **Include detailed results**
  Includes details (e.g., "count") associated with each directive.
- **Include config info**
  Includes the current configuration settings for each directive.
- **Include comments**
  Includes any comment meta-data associated with each directive.

Other Options

- **Use XML format**
  Outputs the report in XML format. See "Formatting output in XML" (UM-392).
- **Write to file**
  Writes output to the specified file. If unchecked, the results are output to the Main window transcript.
- **Append to existing file**
  Appends output to the specified file. If unchecked, the output will overwrite the specified file if it already exists.

Find in Functional Coverage dialog

Purpose	Menu command	Additional information
Locate text in the Functional Coverage window	**Edit > Find**	NA



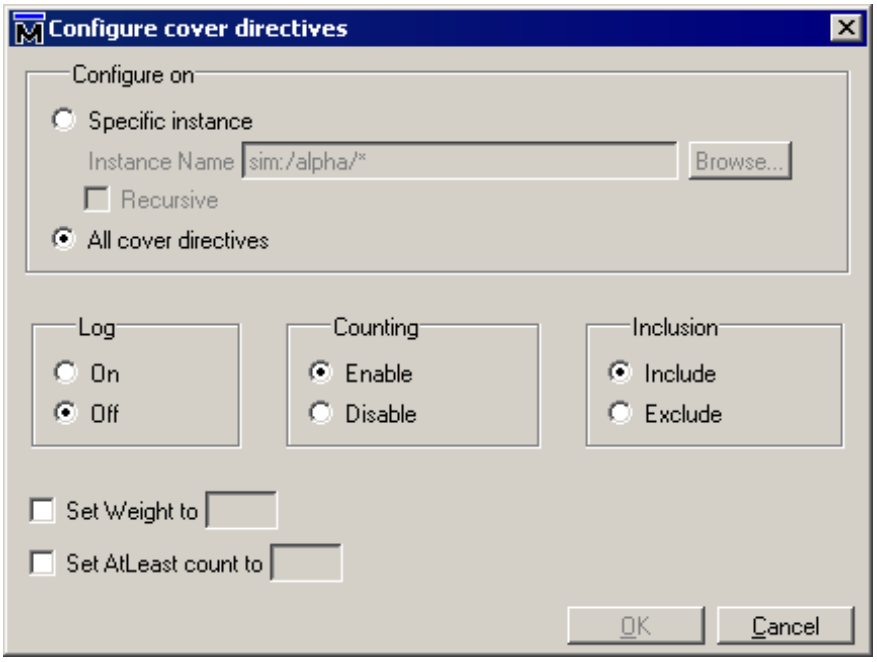
You must activate the Functional Coverage pane by clicking in it before this dialog will be available.

The Find in Functional Coverage dialog includes these options:

- **Find**
  The text you want to locate.
- **Direction**
  Specify the direction to begin searching.
- **Exact**
  Check Exact if you only want to find objects that match your search exactly. For example, searching for "instance" without Exact will find */instance1/cover__1* and */instance2/cover__1*.
- **Auto Wrap**
  Check Auto Wrap to continue the search at the top or bottom of the list.

Configure cover directives dialog

Purpose	Menu command	Additional information
Configure coverage directives	**Tools > Functional Coverage > Configure**	"Configuring functional coverage directives" (UM-386)



The Configure cover directives dialog includes these options:

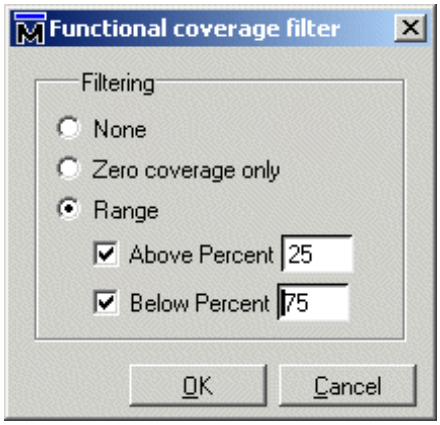
- **Specific instance**
  Specifies a particular instance whose directives will be modified by the configuration settings.
- **Recursive**
  Searches for directives in subregions of the specified instance.
- **All cover directives**
  Specifies that all directives will be modified by the configuration settings.
- **Log**
  Turns on/off logging of directive counts to the Transcript pane. Even with logging off, coverage counts are incremented in the underlying database for the specified coverage directive(s).
- **Counting**
  Enables/disables counting for the specified coverage directive(s). Disabled directives still count toward overall coverage if they had coverage events prior to being disabled.
- **Inclusion**
  Includes/excludes the specified coverage directive(s). Excluded directives will still show

up in the Functional Coverage pane but they do not count toward coverage totals nor do they show up in reports.

- **Set Weight to**
  Applies a weighting to the specified coverage directive(s). Enter a natural integer (>= 0). See "Weighting coverage directives" (UM-387) for more information.
- **Set AtLeast count to**
  Determines the number of times a directive must fire to be considered 100% covered. See "Choosing "AtLeast" counts" (UM-387).

Functional coverage filter dialog

Purpose	Menu command	Additional information
Filter display of directives	**Tools > Functional Coverage > Filter**	"Filtering data in the pane" (UM-388)



The Functional coverage filter dialog includes these options:

- **None**
  All directives are displayed.
- **Zero coverage only**
  Only directives with zero coverage are displayed.
- **Range**
  Specify percentage(s) that define a range from which you want directives displayed.

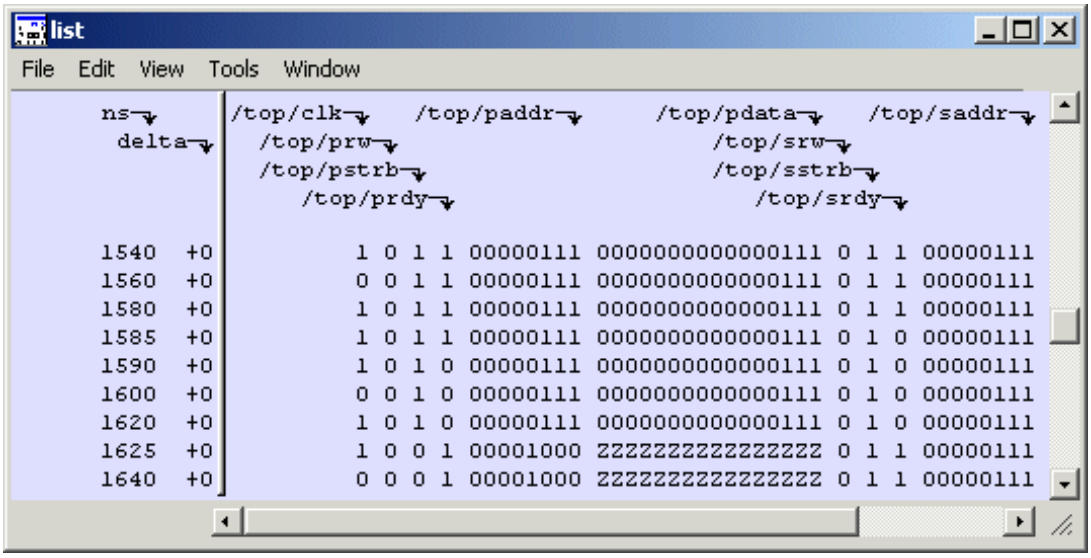
Note that filtering does not affect the gathering of data nor the calculation of aggregated statistics. It merely affects the data display.

Customize Toolbar dialog

This dialog is the same for all windows. See "Customize Toolbar dialog" (GR-106) under the Main window for details.

List window

The List window displays the results of your simulation run in tabular format. The window is divided into two adjustable panes, which allow you to scroll horizontally through the listing on the right, while keeping time and delta visible on the left.



Objects you can view

The following type of objects can be viewed in the List window:

VHDL

signals, aliases, process variables, and shared variables

Verilog

nets, registers, and variables

SystemC

primitive channels and ports

Comparisons

comparison objects; see "Waveform Compare" (UM-270) for more information

Virtuals

Virtual signals and functions

PSL assertions

(indicated by a magenta triangle)
see "Viewing assertions in the Wave window" (UM-382)

List window menu bar

The following menu commands are available from the List window menu bar. Some of the commands are also available on a context menu accessed by clicking the right mouse button on an entry in the right-hand pane.

File menu

New Window	create another instance of the List window
Open	provides these options: Dataset – open a dataset Format – run a List window format DO file previously saved with Save Format
Save	provides these options: Dataset – save the current simulation to a WLF file Format – save the current List window display and signal preferences to a DO (macro) file; running the DO file will reformat the List window to match the display as it appeared when the DO file was created
Write List	save the List window data to a text file in one of three formats; see "Saving List window data to a file" (UM-263) for details
Close	close this copy of the List window

Edit menu

Cut	cut the selected object field from the listing; see "Formatting objects in the List window" (UM-259)
Copy	copy the selected object field
Paste	paste the previously cut or copied object to the left of the currently selected object
Delete	delete the selected object field
Select All	select all signals in the List window
Unselect All	deselect all signals in the List window
Add Marker	add a time marker at the currently selected line
Delete Marker	delete the selected marker from the listing
Find	find the specified object label within the List window

Search	search the List window for a specified value, or the next transition for the selected signal

View menu

Signal Properties	set label, radix, trigger on/off, and field width for the selected object
Goto	choose the time marker to go to from a list of current markers

Tools menu

Combine Signals	combine the selected objects into a user-defined bus; keep copies of the original objects rather than moving them; see "Combining objects/creating busses" (UM-264)
Window Preferences	set display properties for all objects in the window: delta settings, trigger on selection, strobe period, label size, and dataset prefix

Window menu

The Window menu is identical in all windows. See "Window menu" (GR-32) for a description of the commands.

The List window context menu

The following commands are available by clicking the right mouse button on an entry in the right-hand pane:

Examine	display the value of the object at the time selected
Annotate Diff	Add a note to explain a comparison difference. See "Waveform Compare" (UM-270) for further information.
Ignore Diff	Disregard the selected comparison difference. See "Waveform Compare" (UM-270) for further information.
Add Marker	add a time marker at the currently selected line
Delete Marker	delete the selected marker from the listing

List window dialogs

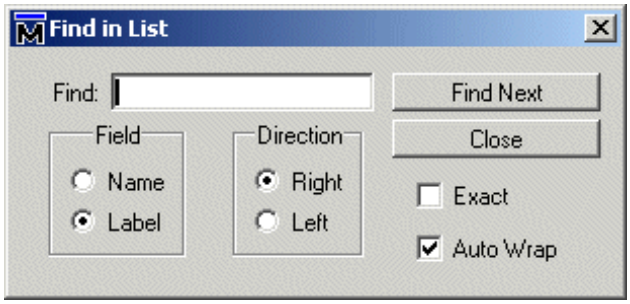
This section describes the dialogs that are accessed via the List window menu bar. The dialogs are listed in the order in which they appear on the menus, top-to-bottom and left-to-right (i.e., starting with the File menu and progressing across the menu bar). Not all dialogs are documented (e.g., File > Write List).

Open Dataset

This is the same dialog as accessed via the Main window File menu. See "Open File dialog" (GR-39).

Find in .list dialog

Purpose	Menu command	Additional information
Locate object names	**Edit > Find**	"Finding signal names" (UM-251)

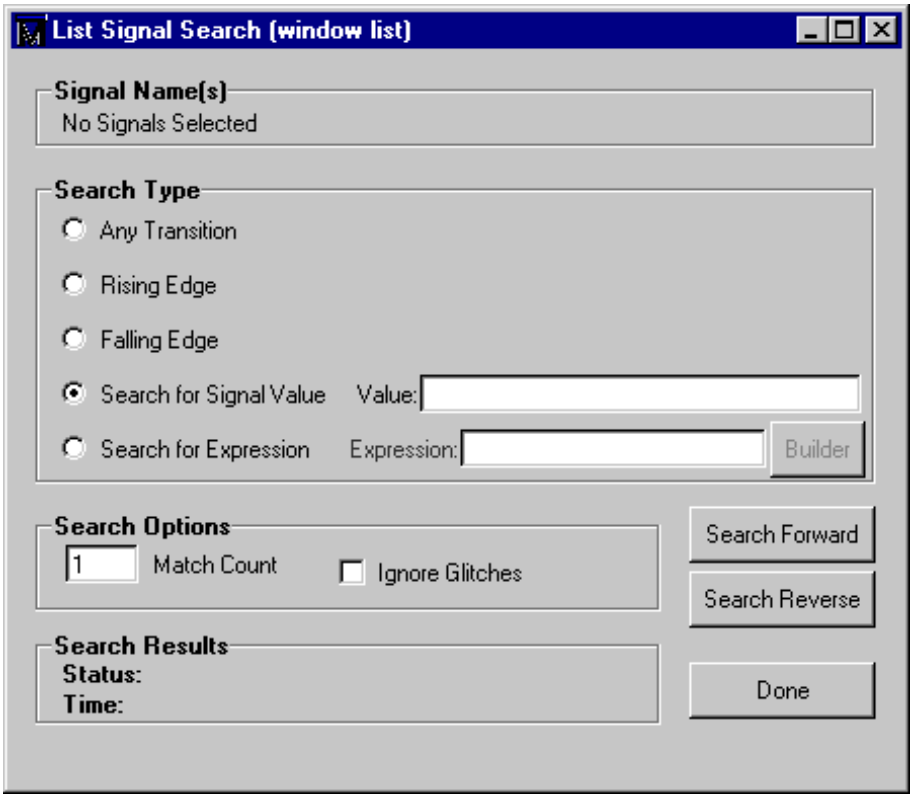


The Find in .list dialog includes these options:

- **Find**
  The text you want to locate.
- **Field**
  Specify **Name** to search the real pathnames of the objects or **Label** to search their assigned names (see "Setting List window display properties" (UM-259)).
- **Direction**
  The direction to search through the List window.
- **Exact**
  Check **Exact** if you only want to find objects that match your search exactly. For example, searching for "clk" without **Exact** will find */top/clk* and *clk1*.
- **Auto Wrap**
  Check **Auto Wrap** to continue the search at the beginning of the window.

List Signal Search dialog

Purpose	Menu command	Additional information
Locate signal values or transitions	**Edit > Search**	"Searching for values or transitions" (UM-252)



The List Signal Search dialog includes these options:

- **Signal Name(s)**
  A list of the objects currently selected in the List window. These objects are the subject of the search.
- **Any Transition**
  Searches for any transition in the selected signal(s).
- **Rising Edge**
  Searches for rising edges in the selected signal(s).
- **Falling Edge**
  Searches for falling edges in the selected signal(s).

- **Search for Signal Value**
  Searches for the value specified in the **Value** field; the value should be formatted using VHDL or Verilog numbering conventions (see "Numbering conventions" (CR-20) for more information).

Note: If your signal values are displayed in binary radix, see "Searching for binary signal values in the GUI" (CR-29) for details on how signal values are mapped between a binary radix and std_logic.

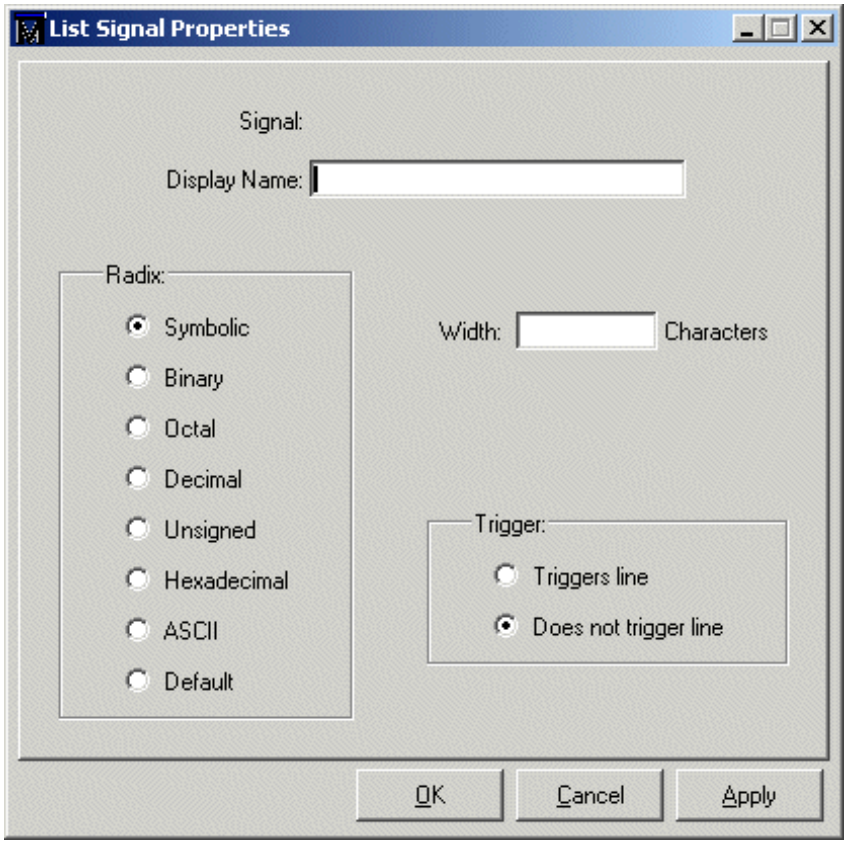
- **Search for Expression**
  Searches for the expression specified in the **Expression** field evaluating to a boolean true. See "Using the Expression Builder for expression searches" (UM-253) for information on the Builder button.

  The expression can involve more than one signal but is limited to signals logged in the List window. Expressions can include constants, variables, and DO files. If no expression is specified, the search will give an error. See "Expression syntax" (CR-23) for more information.
- **Match Count**
  Indicates the number of transitions or matches to search.You can search for the nth transition or the nth match on value.
- **Ignore Glitches**
  Ignores zero width glitches in VHDL signals and Verilog nets.

The Search Results are indicated at the bottom of the dialog.

List Signal Properties dialog

Purpose	Menu command	Additional information
Format signal display properties	**View > Signal Properties**	"Formatting objects in the List window" (UM-259)



The List Signal Properties dialog includes these options:

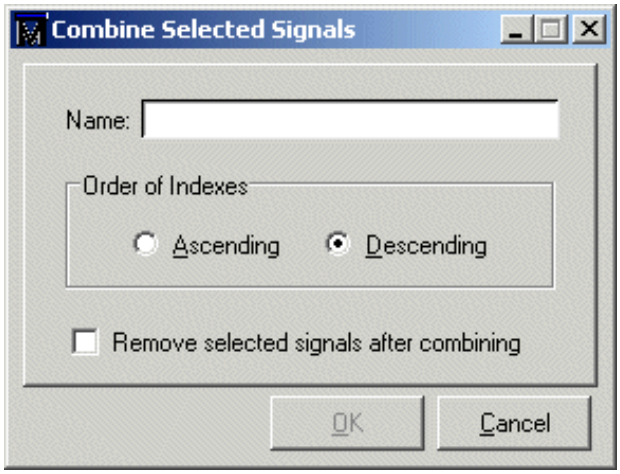
- **Signal**
  Shows the full pathname of the selected signal.
- **Display Name**
  An alias for the signal pathname that will appear at the top of the List window. Labels can make List window data more discernible by un-cluttering the top of the window.
- **Radix**
  Specifies the radix (base) in which the object value is expressed. The default radix is symbolic, which means that for an enumerated type, the List window lists the actual values of the enumerated type of that object. See "Formatting objects in the List window" (UM-259) for more information on setting the radix.

- **Width**
  Allows you to specify the desired width of the column used to list the object value. The default is an approximation of the width of the current value.
- **Trigger: Triggers line**
  Specifies that a change in the value of the selected object causes a new line to be displayed in the List window.
- **Trigger: Does not trigger line**
  Specifies that a change in the value of the selected object does not affect the List window.

  See "Configuring new line triggering in the List window" (UM-265) for more information about triggering.

Combine Selected Signals dialog

Purpose	Menu command	Additional information
Combine signals into a bus	**Tools > Combine Signals**	"Combining objects/creating busses" (UM-264)



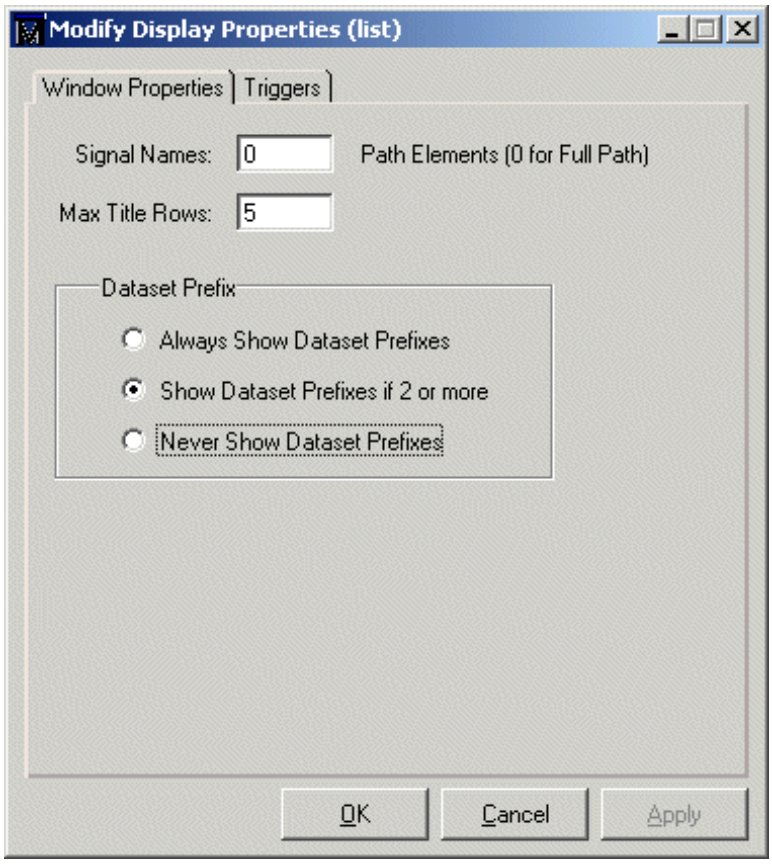
The Combine Selected Signals dialog includes these options:

- **Name**
  Specifies the name of the newly created bus.
- **Order of Indexes**
  Specifies in which order the selected signals are indexed in the bus. If set to **Ascending**, the first signal selected in the List window will be assigned an index of 0. If set to **Descending**, the first signal selected will be assigned the highest index number. Note that the signals are added to the bus in the order that they appear in the window. Ascending and descending affect only the order and direction of the indexes of the bus.
- **Remove selected signals after combining**
  Specifies whether you want to remove the selected signals from the List window once the bus is created.

Modify Display Properties dialog

Purpose	Menu command	Additional information
Configure window display properties	**Tools > Window Preferences**	"Formatting the List window" (UM-259)

Window Properties tab



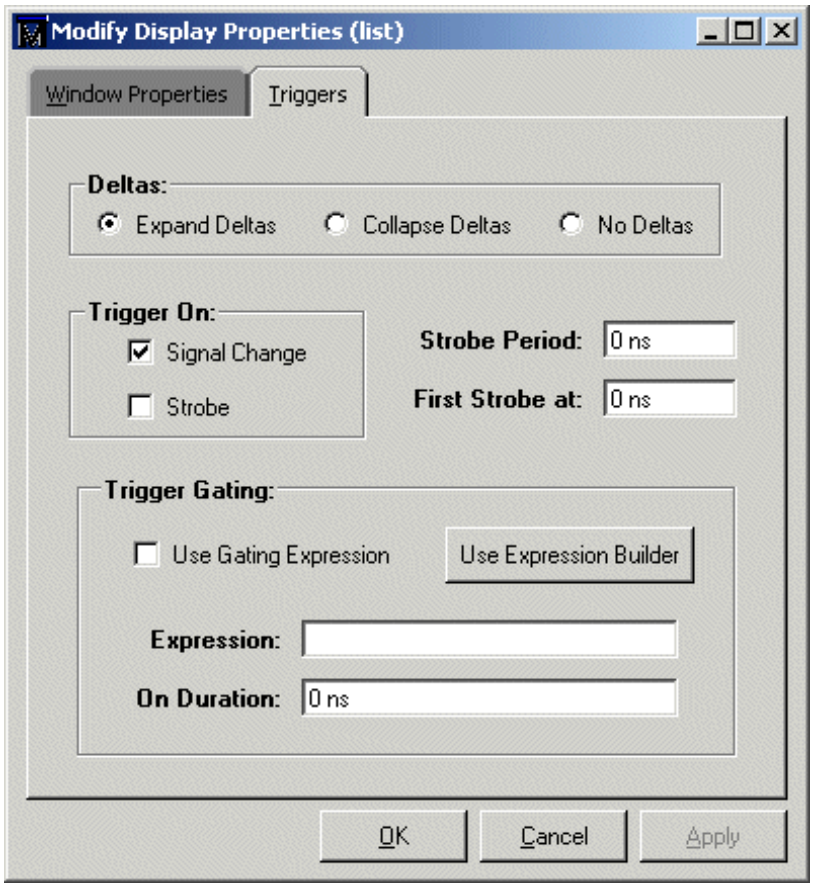
The Window Properties tab includes these options:

- **Signal Names**
  Sets the number of path elements to be shown in the List window. For example, "0" shows the full path. "1" shows only the leaf element.
- **Max Title Rows**
  Sets the maximum number of rows in the name pane.
- **Always Show Dataset Prefixes**
  Displays the dataset prefix associated with each signal pathname. Useful for displaying signals from multiple datasets.
- **Show Dataset Prefix if 2 or more**
  Displays dataset prefixes if there are signals in the window from 2 or more datasets.

- **Never Show Dataset Prefixes**
  Turns off display of dataset prefixes.

Triggers tab

The Triggers tab controls the triggering for the display of new lines in the List window. See "Configuring new line triggering in the List window" (UM-265) for more details.



The Triggers tab includes the following options:

- **Expand Deltas**
  When selected with the **Trigger on: Signal Change** check box, displays a new line for each time step on which objects change, including deltas within a single unit of time resolution.
- **Collapse Deltas**
  Displays only the final value for each time unit.
- **No Deltas**
  Hides the simulation cycle (delta) column.
- **Trigger On Signal Change**
  Triggers on signal changes. Defaults to all signals. Individual signals can be excluded from triggering by using the **View > Signal Properties** dialog or by originally adding them with the **-notrigger** option to the **add list** command (CR-48).

- **Trigger On Strobe**
  Triggers on the Strobe Period you specify; specify the first strobe with First Strobe at:.
- **Use Gating Expression**
  Enables triggers to be gated on (a value of 1) or off (a value of 0) by the specified Expression. See "Using gating expressions to control triggering" (UM-266) for more information.
- **Use Expression Builder** (button)
  Opens the Expression Builder to help you write a gating expression. See "Using gating expressions to control triggering" (UM-266).
- **Expression**
  Enter the expression for trigger gating into this field, or use the Expression Builder (select the Use Expression Builder button). The expression is evaluated when the List window would normally have displayed a row of data (given the trigger on signals and strobe settings above).
- **On Duration**
  Determines for how long triggering stays enabled after the gating expression returns to false (0). The default of 0 duration will enable triggering only while the expression is true (1). The duration is expressed in x number of default timescale units.

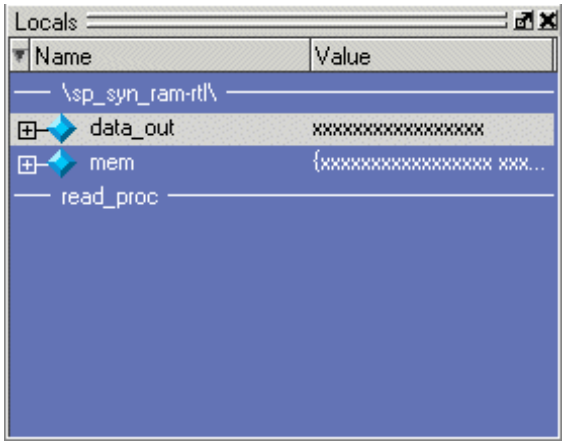
Customize Toolbar dialog

This dialog is the same for all windows. See "Customize Toolbar dialog" (GR-106) under the Main window for details.

Locals pane

The Locals pane displays data objects that are immediately visible from the statement that will be executed next (that statement is denoted by a blue arrow in the Source editor window). The contents of the window change from one statement to the next.

The Locals pane includes two columns. The first column lists the names of the immediately visible data objects. The second column lists the current value(s) associated with each name.

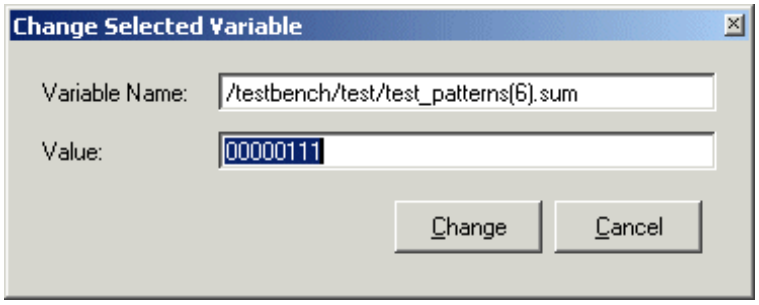


Locals dialogs

This section describes the locals related dialogs that are accessed via the Main window menu bar. Not all dialogs are documented (e.g., File > Save).

Change Selected Variable dialog

Purpose	Menu command	Additional information
Edit a variable value	**Edit** > **Advanced** > **Change**	**change** command (CR-81)

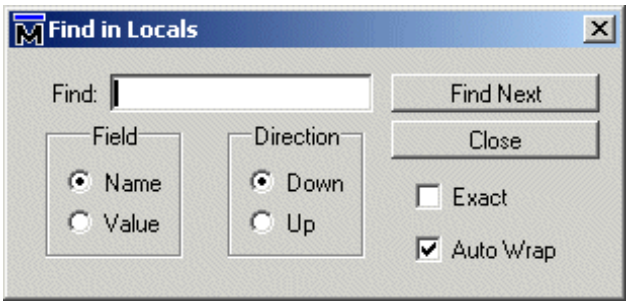


The Change Selected Variable dialog includes these options:

- **Variable Name**
  The variable name whose value you are changing.
- **Value**
  The new value for the specified variable. You can enter any value that is valid for the variable. An array value must be specified as a string (without surrounding quotation marks). To modify the values in a record, you need to change each field separately.

Find in Locals dialog

Purpose	Menu command	Additional information
Locate objects or values	**Edit > Find**	NA



You must activate the Locals pane by clicking in it before this dialog will be available.

The Find in Locals dialog includes these options:

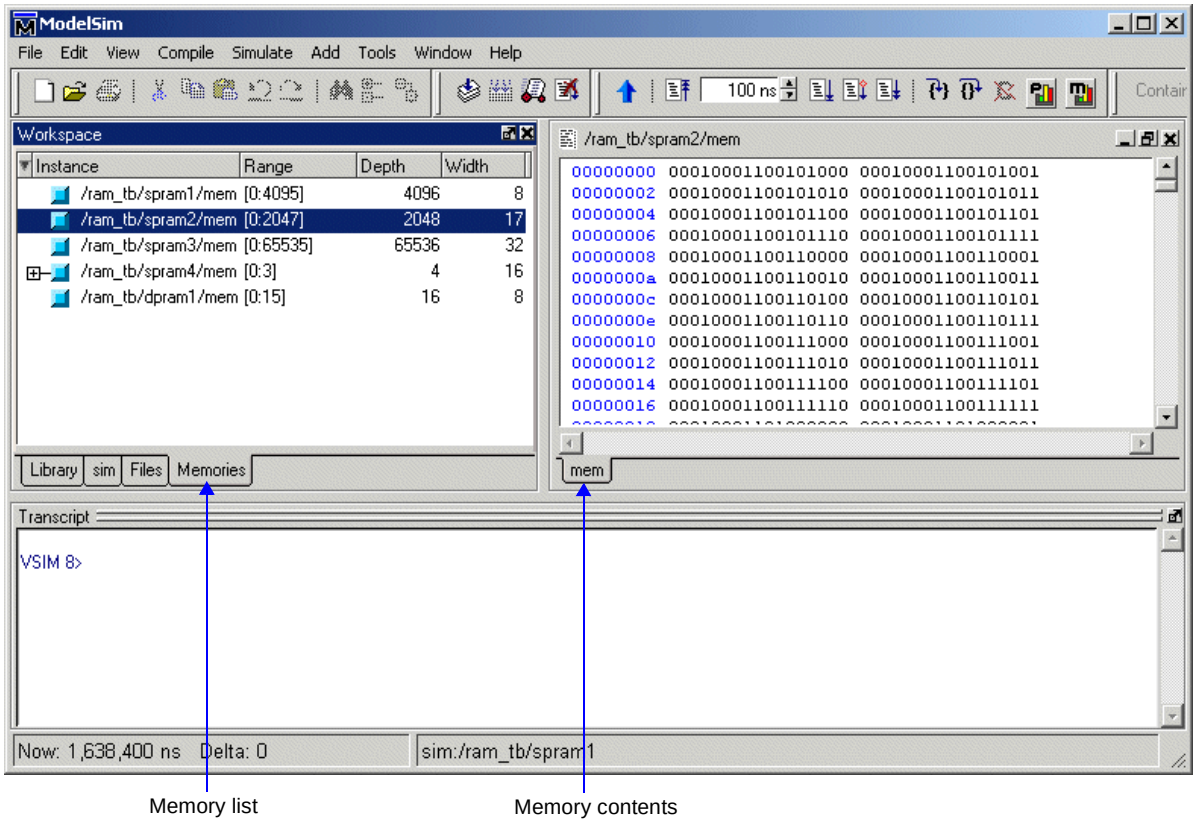
- **Find**
  Specify the text for which you want to search.
- **Field**
  Specify whether to search the name or value column.
- **Direction**
  Specify the direction to begin searching.
- **Exact**
  Check **Exact** if you only want to find objects that match your search exactly. For example searching for "addr" without Exact will find *addr* and *addr_r*.
- **Auto Wrap**
  Check **Auto Wrap** to continue the search at the top or bottom of the pane.

You can also do a quick find from the keyboard. When the Locals pane is active, each time you type a letter the highlight will move to the next object whose name begins with that letter.

Memory windows

The Main window lists and displays the contents of memories in your design. To view memories, select **View > Debug Windows > Memory**.

There are two windows related to memories: the memory list is displayed as a tab in the Main window Workspace; the memory contents windows display in the Main window MDI frame.



The memory list is from the top-level of the design. In other words, it is not sensitive to the context selected in the Structure tab.

Memories you can view

The Memory tab identifies and lists the following types of arrays as memories:

- reg, wire, bit, and std_logic arrays

  Any signal or variable that is an array of two dimensions (including arrays of arrays) are identified as memories and listed if the base type is a Verilog reg or wire type, or a VHDL enumerated type with values in std_ulogic, bit, and all related sub-types.

- Integer arrays

  Single dimensional arrays of integers are interpreted as 2D memory arrays. In these cases, the word width listed in the Memory List pane is equal to the integer size, and the depth is the size of the array itself. The appearance of this type of array in the memory list can be disabled via the View menu or the ShowIntMem (UM-533) variable in the *modelsim.ini* file.

- Single dimensional arrays of VHDL enumerated types other than std_logic or bit

  These enumerated type value sets must have values that are longer than one character. The listed width is the number of entries in the enumerated type definition and the depth is the size of the array itself. The appearance of this type of array in the memory list can be disabled via the View menu or the ShowEnumMem (UM-533) variable in the *modelsim.ini* file.

- 3D or greater arrays

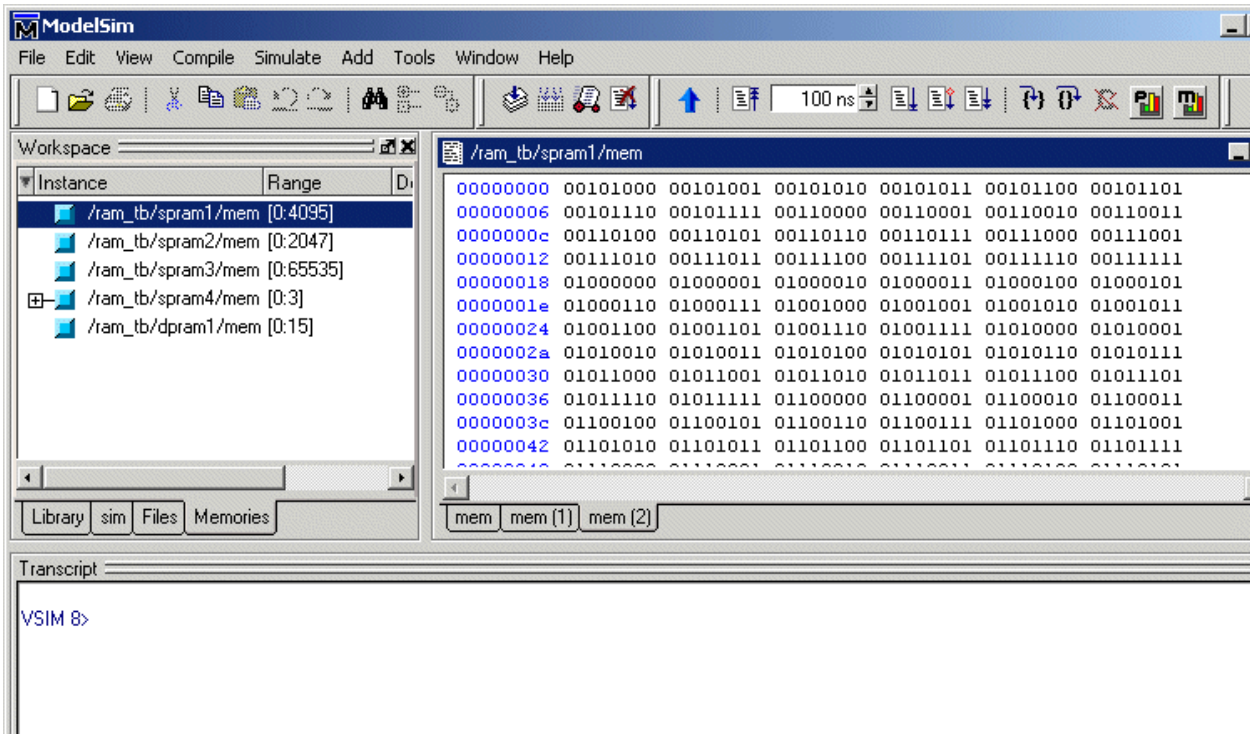
  Memories with three or more dimensions display with a plus sign ’+’ next to their names in the Memory List. Click the ’+’ to show the array indices under that level. When you finally expand down to the 2D level, you can double-click on the index, and the data for the selected 2D slice of the memory will appear in a memory contents window in the MDI frame. The appearance of this type of array in the memory list can be disabled via the View menu or the Show3DMem (UM-533) variable in the *modelsim.ini* file.

Viewing memory contents

When you double-click an instance on the Memory tab, ModelSim automatically displays a memory contents window in the MDI frame (see "Multiple document interface (MDI) frame" (GR-17)). You can also enter the command **add mem <instance>** at the vsim command prompt.

Viewing multiple memory instances

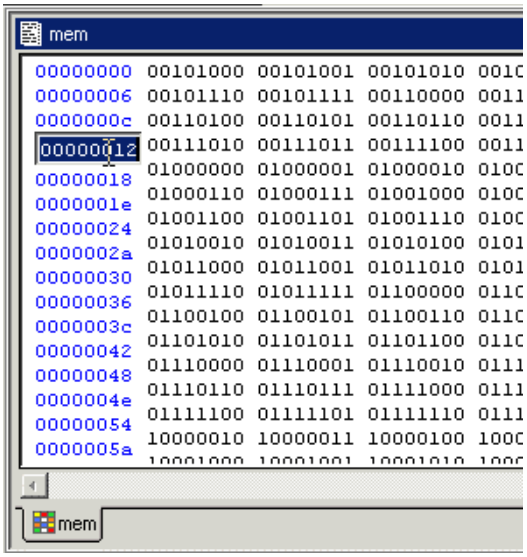
You can view multiple memory instances simultaneously. A window tab appears in the MDI frame for each instance you double-click in the Memory list.



See "Organizing windows with tab groups" (GR-18) for more information on the window tabs.

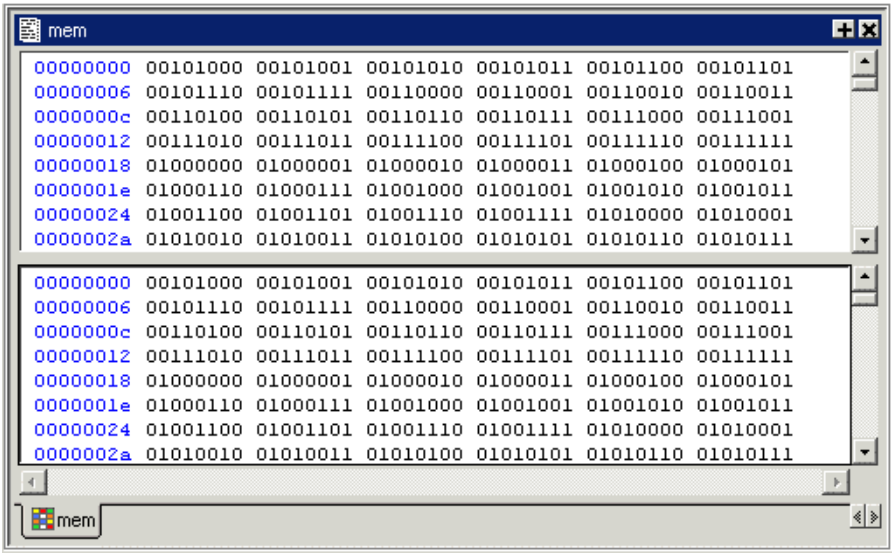
Direct address navigation

You can navigate to any address location directly by editing the address in the address column. Double-click on any address, type in the desired address, and hit **Enter**. The address display scrolls to the specified location.



Splitting the memory contents window

To split a memory contents window into two screens displaying the contents of a single memory instance, select **View > Split Screen** (or right-click in the pane and select **Split Screen** from the pop-up menu). This allows you to view different address locations within the same memory instance simultaneously.



Memory popup menu commands

The following commands are available when you right-click in the Memory tab of the Main window Workspace or the Memory contents pane in the MDI frame.

Memory tab popup menu

View Contents	view memory data for the selected memory in the Memory address pane
Memory Declaration	display the source code declaration for the selected memory in the MDI frame
Compare Contents	compare the contents of the selected memory with a selected reference memory or file; see "Compare Memory dialog" (GR-181)

Memory contents pane popup menus

When you right-click any memory address (first column in the Memory contents pane) the following popup menu commands are available:

Goto	go to specific memory address in currently displayed memory instance
Split Screen	split the memory contents window horizontally; see "Splitting the memory contents window" (GR-172)
Properties	set Address radix, Data radix, and line wrap options (words per line); see "Properties dialog" (GR-183).
Close Instance	close the Memory contents pane display of the currently selected memory instance
Close All	close the Memory contents pane display of all memory instances

When you right-click any memory data field in the Memory contents pane the following popup menu commands are available:

Edit	allows you to manually edit the selected data
Change	change the memory contents for all addresses or a range of addresses in the currently displayed memory instance; see "Change Memory dialog" (GR-179)
Load	load memory data to the currently displayed memory instance from a file; see "Load Memory dialog" (GR-175)
Save	save currently displayed memory data (all or a range) to a file; see "Save Memory dialog" (GR-177)

Find	searches for a specified memory data pattern in the currently displayed memory instance
Split Screen	split the memory contents window horizontally; see "Splitting the memory contents window" (GR-172)
Properties	set Address radix, Data radix, and line wrap options (words per line); see "Properties dialog" (GR-183).
Close Instance	close the Memory contents pane display of the currently selected memory instance
Close All	close the Memory contents pane display of all memory instances

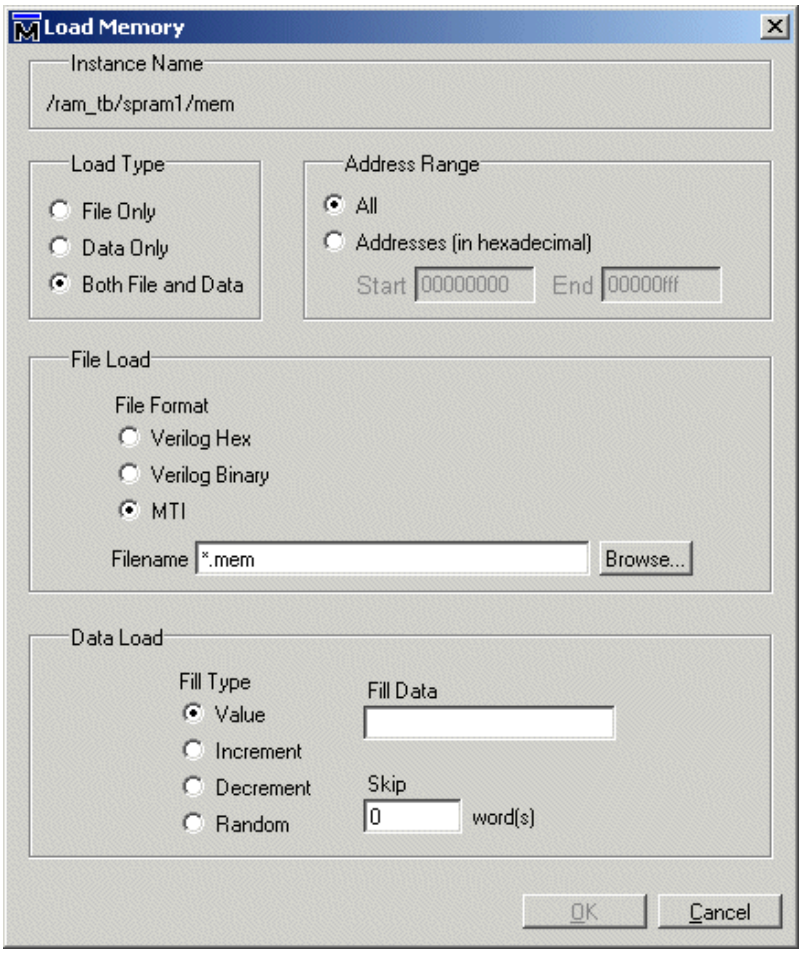
Memory dialogs

This section describes the memory-related dialogs that are accessed via the Main window menu bar. The dialogs are listed in the order in which they appear on the menus, top-to-bottom and left-to-right (i.e., starting with the File menu and progressing across the menu bar). Not all dialogs are documented (e.g., Goto).

Load Memory dialog

Purpose	Menu command	Additional information
Initialize memories	**File** > **Open** (with memory pane active)	**mem load** command (CR-199)

You can initialize memories in your design by either loading the contents from a file or by using an interactive command. An entire memory, a specific range of addresses, or an individual word can be overwritten. Choose the type of Load operation to be performed in the Load Type area. When either File Only or Data Only is selected, the unused section of the dialog is grayed out.

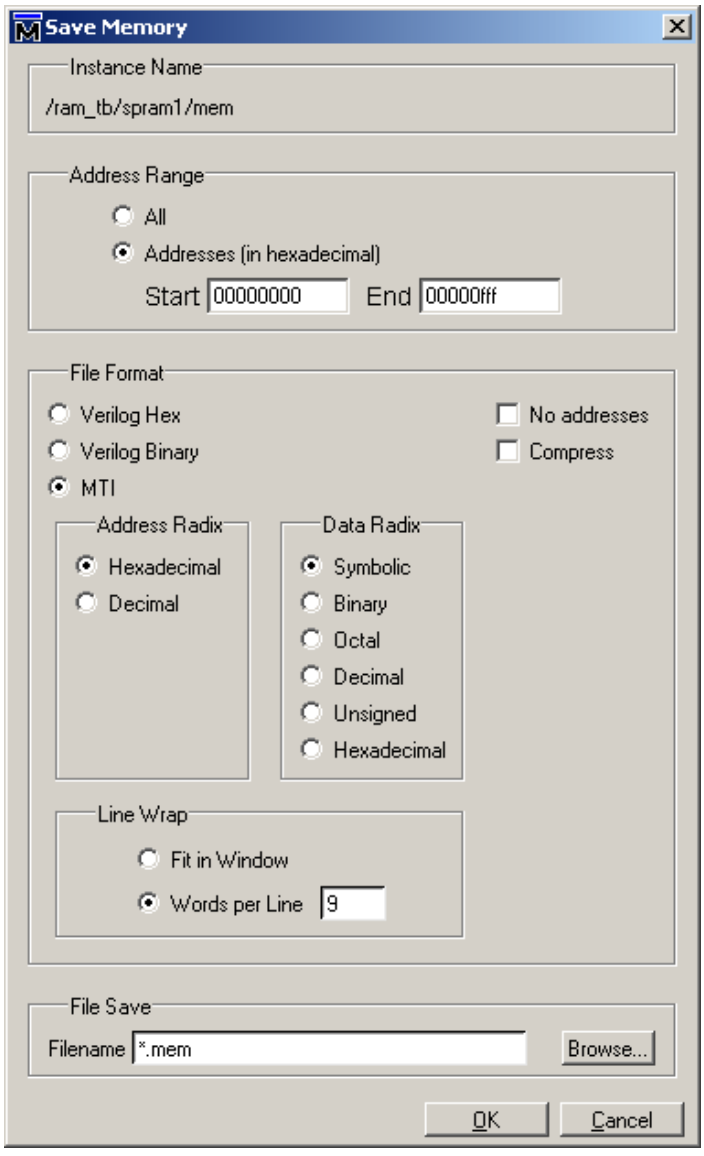


The Load Memory dialog includes these options:

- **Instance Name**
  Displays the name of the memory instance being loaded.
- **Load Type**
  Defines the type of load function you will perform. Your choices for loading data are: File Only, Data Only or Both File and Data.
- **Address Range**
  Specifies all addresses or a range of addresses in the memory that you want to load. The address radix of the displayed memory is shown in parentheses.
- **File Load**
  Contains all inputs related to loading from a file. This area of the dialog is grayed out if Load Type is specified as Data Only.
- **File Format**
  Specifies the format of the file to be loaded. Verilog Hex, Verilog Binary, or MTI format can be explicitly set, or the format can be determined automatically from the file (if the file was created with the **mem save** command).
- **File name**
  The name of the memory file to load. You can manually edit this field or click Browse to select a file.
- **Data Load**
  Contains all inputs related to loading memory data. This area of the dialog is grayed out if Load Type is specified as File Only.
- **Fill Type**
  Specifies how to apply the fill data, either directly as a value, or algorithmically. See the **mem load** command (CR-199) for more information on Fill Type and Fill Data.
- **Fill Data**
  Specifies the fill data for addresses not contained in the load file.
- **Skip**
  Specifies the number of words to skip when applying a fill pattern sequence.

Save Memory dialog

Purpose	Menu command	Additional information
Save memories	**File** > **Save** (with memory pane active)	**mem save** command (CR-202)



The Save Memory dialog includes these options:

- **Instance Name**
  The memory instance being saved.

- **Address Range**
  Specifies all or a range of addresses to be saved into the file.
- **File Format**
  Specifies whether memory is to be saved in Verilog Hex, Verilog Binary, or MTI format. Also, specify the Address and Data radix for MTI format.
- **No addresses**
  Specifies that no addresses are to appear in the saved file. This enables the file to be reloaded anywhere in the memory.
- **Compress**
  Applies a simple ASCII compression to the saved file. The compression algorithm replaces repeating lines with a single asterisk, like is done with the Unix “od” command.
- **Line Wrap**
  Designates that lines of memory data will Fit in Window or allows user to designate Words per Line.
- **Filename**
  Name of file to be saved.

MTI memory data file format

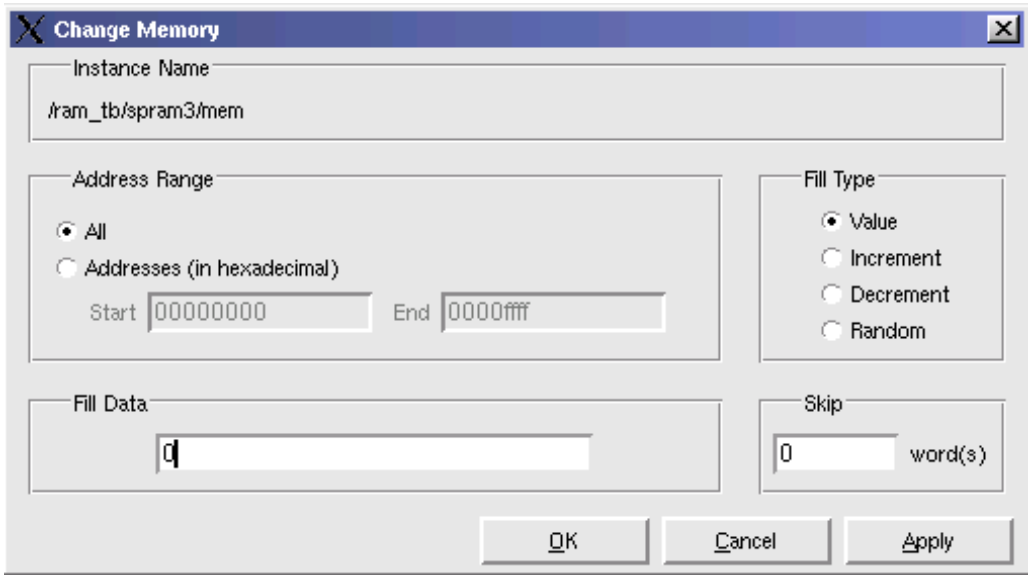
The MTI memory data file format is as illustrated in the following example:

```
// memory data file
// (do not edit the following line - required for mem load use)
// format=mti addressradix=d dataradix=s direction=ascending
 0: 110 110 110 110 110 110
 6: 110 110 110 110 000 000
12: 000 000 000 000 000 000
18: 000 000 000 000 000 000
24: 000 000 000 000 000 000
30: 000 000
```

The possible format, address radix, data radix, and direction settings are as specified by the corresponding options in the **mem save** command (CR-202) and **mem load** command (CR-199).

Change Memory dialog

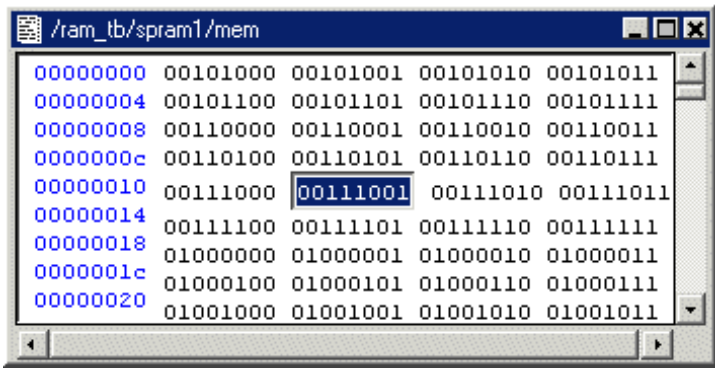
Purpose	Menu command	Additional information
Edit memory data values	**Edit** > **Advanced** > **Change** (with memory pane active)	NA



The Change Memory dialog includes the following:

- **Instance Name**
  Displays the name of the memory instance being loaded.
- **Address Range**
  Specifies all addresses or a starting and ending address to be changed. The address radix of the currently displayed memory is shown in parentheses.
- **Fill Data**
  Specifies the fill data for specified addresses.
- **Fill Type**
  Specifies how to apply the fill data, either directly as a value, or algorithmically. See the **mem load** command (CR-199) for more information on Fill Type and Fill Data.
- **Skip**
  Specifies the number of words to skip after applying a fill pattern sequence.

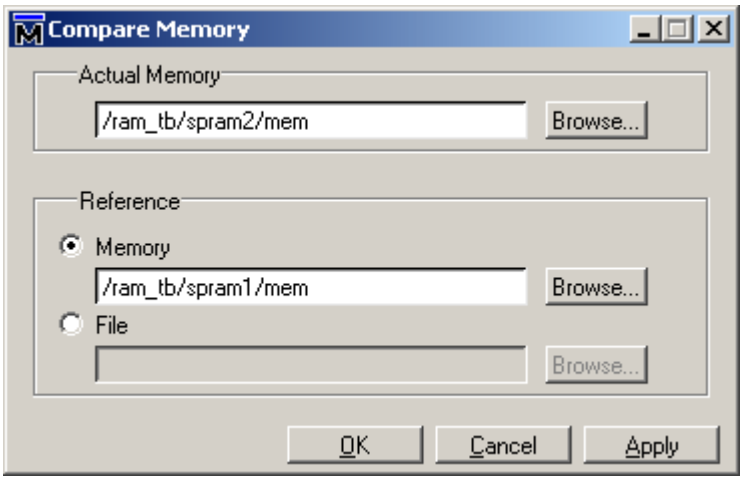
Changing data for individual addresses



To edit memory data in place, double-click (or right-click and select **Edit)** any word in a memory contents window. The data is highlighted. Type in the desired change. Pressing <Enter> commits the change; <Esc> aborts it. <Tab> scrolls down the list of data entries, while <Shift>-<Tab> scrolls up the list.

Compare Memory dialog

Purpose	Menu command	Additional information
compare selected memory to reference memory or file	right click Memory tab of Main window Workspace > select **Compare Contents**	NA

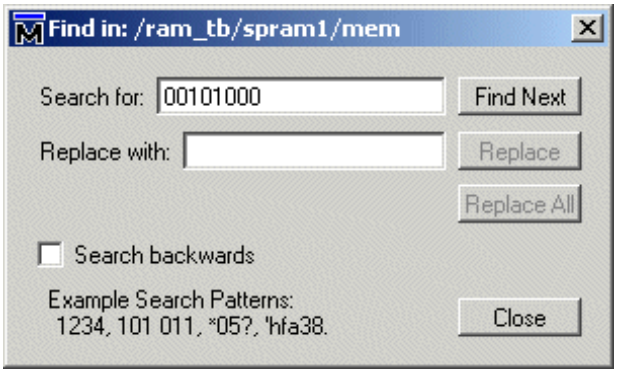


The Compare Memory dialog includes the following fields:

- **Actual Memory**
  Specifies the name of the memory that will be compared to a reference memory or file. You can manually edit this field or click Browse to select a memory.
- **Reference Memory**
  Specifies the name of the reference memory. You can manually edit this field or click Browse to select a memory.
- **Reference File**
  Specifies the name of the reference file. You can manually edit this field or click Browse to select a file.

Find dialog

Purpose	Menu command	Additional information
Locate a value in the memory contents	**Edit > Find**	NA



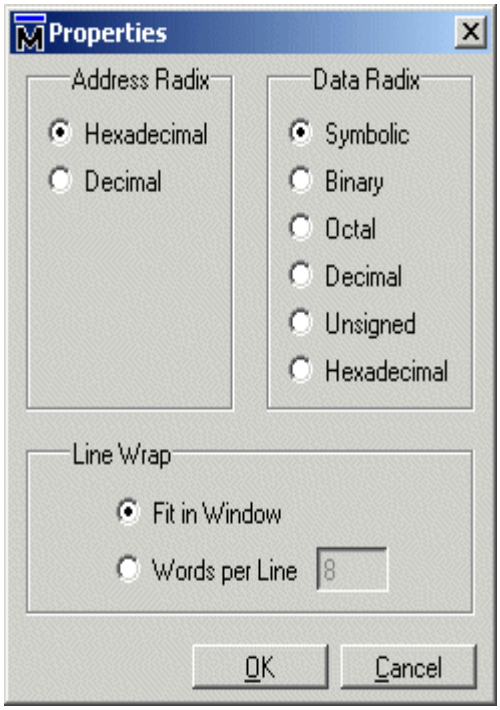
You must activate a memory content window in the MDI frame by clicking in it before this dialog will be available.

The Find dialog includes these options:

- **Search for:**
  The value you want to find.
- **Replace with**
  An optional value to replace the located value.
- **Search backwards**
  Search backwards through the memory.

Properties dialog

Purpose	Menu command	Additional information
Configure window display properties	**View > Properties**	**mem display** command (CR-196)



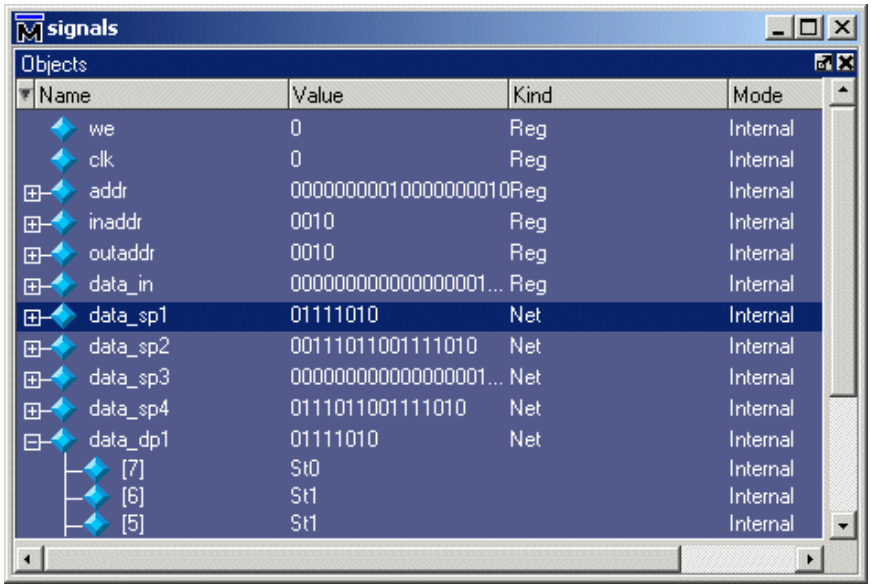
The Properties dialog includes these options:

- **Address Radix**
  The radix for the address. Can be Hexadecimal or Decimal.
- **Data Radix**
  The radix for the data. Non-enumerated type memories can be Symbolic, Binary, Octal, Decimal, Unsigned, and Hexadecimal. Enumerated type memories are only symbolic data types, and all other options are grayed out.
- **Line Wrap**
  The number of words per line can be set, or arbitrarily determined based on the size of the window.

Objects pane

The Objects pane shows the names and current values of declared data objects in the current region (selected in the structure tabs of the Workspace). Data objects include signals, nets, registers, constants and variables not declared in a process, generics, parameters, and member data variables of a SystemC module.

Clicking an entry in the window highlights that object in the Dataflow and Wave windows. Double-clicking an entry highlights that object in a Source editor window (opening a Source editor window if one is not open already). You can also right click an object name and add it to the List or Wave window, or the current log file.



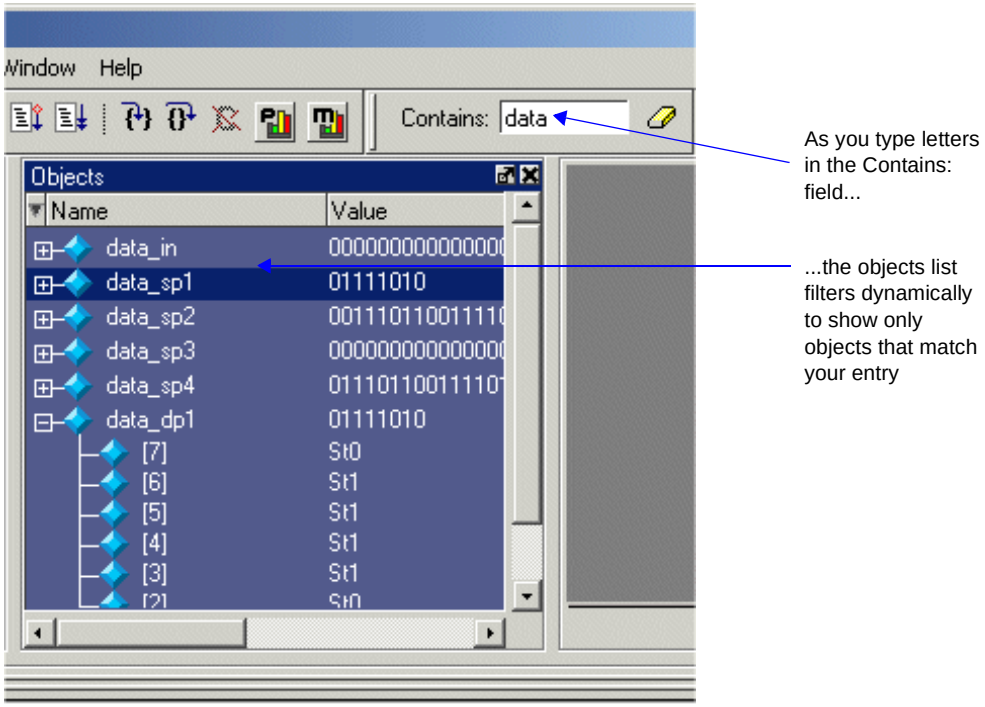
Filtering the objects list

You can filter the objects list by name or by object type.

Filtering by name

To filter by name, start typing letters in the **Contains** field on the Main window toolbar.

As you type letters, the objects list filters to show only those signals that contain those letters.



To display all objects again, click the Eraser icon to clear the entry.

Filters are stored relative to the region selected in the Structure window. If you re-select a region that had a filter applied, that filter is restored. This allows you to apply different filters to different regions.

Filtering by signal type

The **View > Filter** menu selection allows you to specify which signal types to display in the Objects window. Multiple options can be selected.

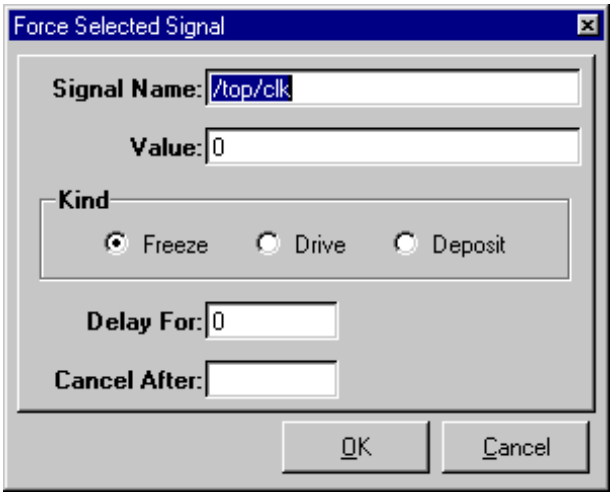
Objects dialogs

This section describes the objects related dialogs that are accessed via the Main window menu bar. Not all dialogs are documented (e.g., File > Save).

Force Selected Signal dialog

Purpose	Menu command	Additional information
Apply stimulus to a signal or net	**Edit > Advanced > Force**	**force** command (CR-180)

The **Force** function (unavailable for SystemC) allows you to apply stimulus to the selected signal or net. Multiple signals can be selected and forced; the force dialog remains open until all of the signals are either forced, skipped, or you close the dialog. To cancel a force command, use the **Edit > Advanced > NoForce** command.



The Force Selected Signal dialog includes these options:

- **Signal Name**
  Specifies the signal or net for the applied stimulus.
- **Value**
  Initially displays the current value, which can be changed by entering a new value into the field. A value can be specified in radixes other than decimal by using the form (for VHDL and Verilog, respectively):

  ```
  base#value -or- b|o|d|h'value
  ```

  16#EE or h'EE, for example, specifies the hexadecimal value EE.

Kind

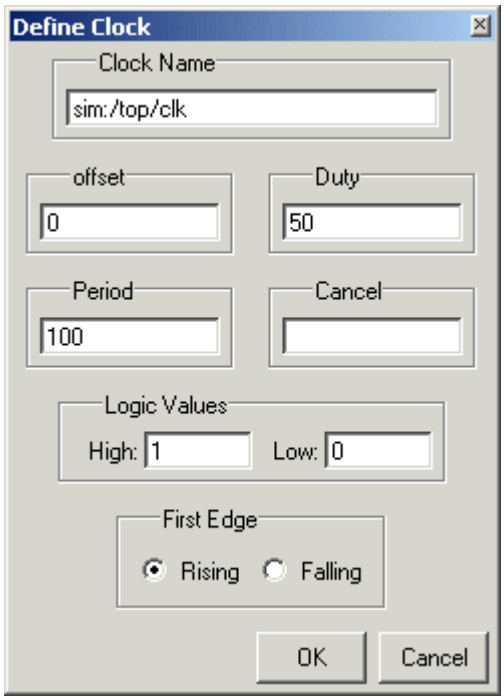
- **Freeze**
  Freezes the signal or net at the specified value until it is forced again or until it is unforced with a **noforce** command (CR-208).

  Freeze is the default for Verilog nets and unresolved VHDL signals and **Drive** is the default for resolved signals.

  If you prefer Freeze as the default for resolved and unresolved signals, you can change the default force kind in the *modelsim.ini* file (see "Preference variables located in INI files" (UM-524)).
- **Drive**
  Attaches a driver to the signal and drives the specified value until the signal or net is forced again or until it is unforced with a **noforce** command (CR-208). This type of force is illegal for unresolved VHDL signals.
- **Deposit**
  Sets the signal or net to the specified value. The value remains until there is a subsequent driver transaction, or until the signal or net is forced again, or until it is unforced with a **noforce** command (CR-208).
- **Delay For**
  Allows you to specify how many time units from the current time the stimulus is to be applied.
- **Cancel After**
  Cancels the force after the specified period of simulation time.

Define Clock dialog

Purpose	Menu command	Additional information
Add clock signals	**Edit** > **Advanced** > **Clock**	**force** command (CR-180)

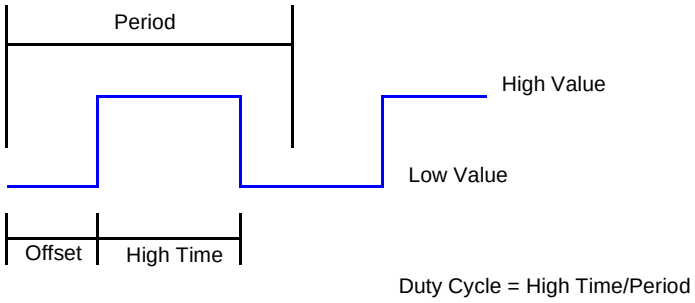


The Define Clock dialog includes the following options:

- **Clock Name**
  The name of the clock signal.
- **Offset**
  The time after the current simulation time that the first transition will occur.
- **Duty**
  The percentage of the period that the clock is high or low.
- **Period**
  The period of the clock signal.
- **Cancel**
  A simulation period after which the clock definition should be cancelled.
- **Logic Values**
  If the signal type is std_logic, std_ulogic, bit, verilog wire, verilog net, or any other logic type where 1 and 0 are valid, then 1 is the default High Value and 0 is the default Low Value. For other signal types, you will need to specify a High Value and a Low Value for the clock.

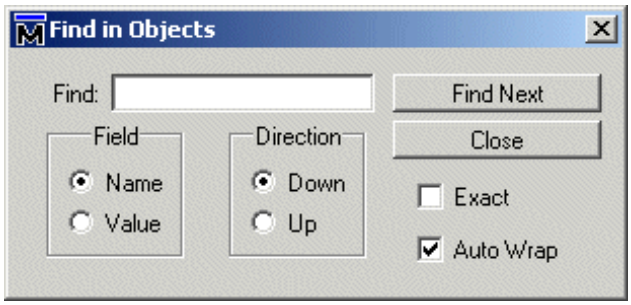
- **First Edge**
  Specify whether the first transition will be rising or falling.

For clock signals starting on the rising edge, a visual depiction of Period, Offset, and Duty Cycle looks like this:



Find in Objects dialog

Purpose	Menu command	Additional information
Locate objects or values	**Edit > Find**	NA



You must activate the Objects pane by clicking in it before this dialog will be available.

The Find in Signals dialog includes these options:

- **Find**
  Specify the text for which you want to search.
- **Field**
  Specify whether to search the name or value column.
- **Direction**
  Specify the direction to begin searching.
- **Exact**
  Check **Exact** if you only want to find objects that match your search exactly. For example, searching for "clk" without Exact will find */top/clk* and */top/clk1*.
- **Auto Wrap**
  Check **Auto Wrap** to continue the search at the top or bottom of the window.

You can also do a quick find from the keyboard. When the Objects window is active, each time you type a letter the signal selector (highlight) will move to the next signal whose name begins with that letter.

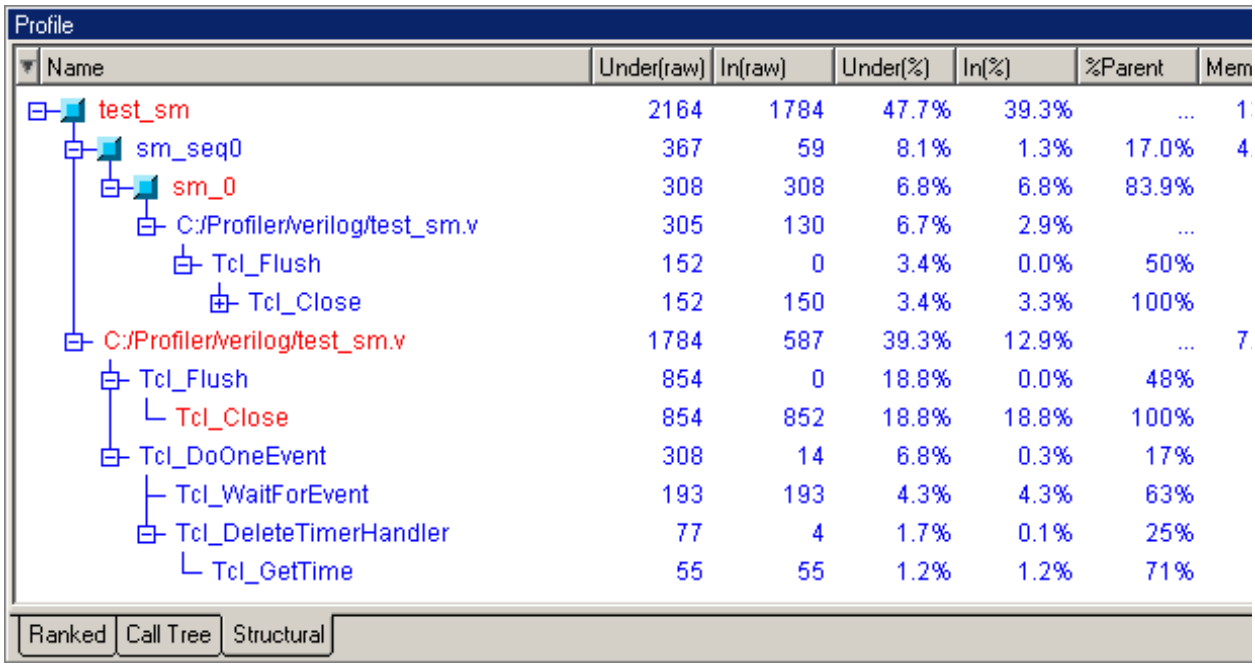
Modify Breakpoints dialog

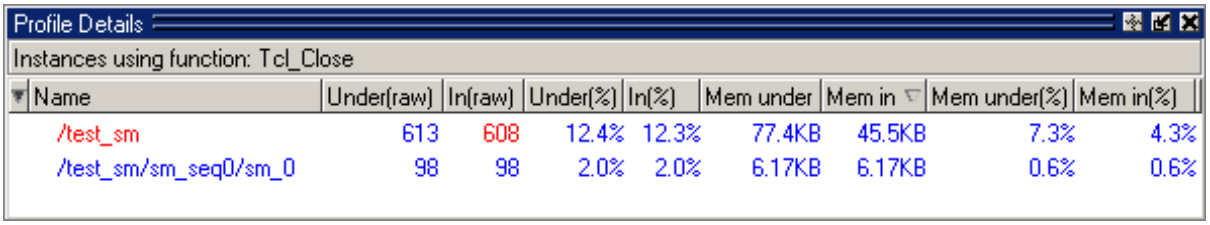
This dialog is the same as the one you access in the Main window. See "Modify Breakpoints dialog" (GR-95) for more information.

Profile panes

The Profile and Profile Details panes display the results of statistical performance and memory allocation profiling. By default, both panes are displayed within the Main window but they can be undocked from the Main window to stand alone. Each pane contains three tabs for displaying profile results: Ranked, Call Tree, and Structural.

For details about using the profiler see *Chapter 12 - Profiling performance and memory use* in the *ModelSim User's Manual*.





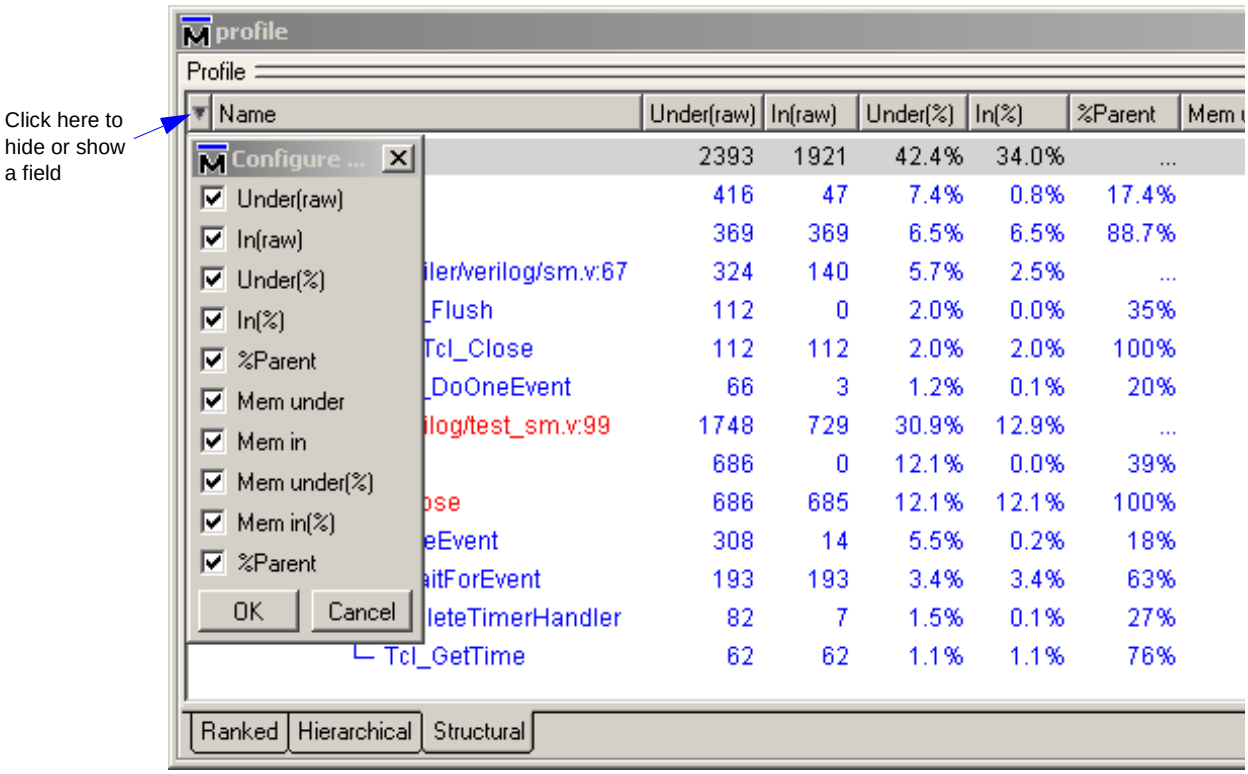
Profile pane columns

The Profile panes include the columns described below. See "Hiding/showing columns in the Profile panes" (GR-194) for details on how to show or hide particular columns.

- The **Name** column lists the filename of an HDL function or instance, and the line number at which it appears. Most useful names consist of a line of VHDL or Verilog source code. If you use a PLI/VPI or FLI routine, then the name of the C function that implements that routine can also appear in the Name column.
- The **Under (raw)** column lists the raw number of Profiler samples collected during the execution of a function, including all support routines under that function; or, the number of samples collected for an instance, including all instances beneath it in the structural hierarchy.
- The **In (raw)** column lists the raw number of Profiler samples collected during a function or instance.
- The **Under%** column lists the ratio (as a percentage) of the samples collected during the execution of a function and all support routines under that function to the total number of samples collected; or, the ratio of the samples collected during an instance, including all instances beneath it in the structural hierarchy, to the total number of samples collected.
- The **In%** column lists the ratio (as a percentage) of the total samples collected during a function or instance.
- The **%Parent** column (not in Ranked view) lists the ratio, as a percentage, of the samples collected during the execution of a function or instance to the samples collected in the parent function or instance.
- The **Mem under** column lists the amount of memory allocated to a function, including all support routines under that function; or, the amount of memory allocated to an instance, including all instances beneath it in the structural hierarchy.
- The **Mem in** column lists the amount of memory allocated to a function or instance.
- The **Mem under (%)** column lists the ratio (as a percentage) of the amount of memory allocated to a function and all of its support routines to the total memory available; or, the ratio of the amount of memory allocated to an instance, including all instances beneath it in the structural hierarchy, to the total memory available.
- The **Mem in (%)** column lists the ratio (as a percentage) of the amount of memory allocated to a function or instance to the total memory available.
- The **%Parent** column lists (not in Ranked view) the ratio, as a percentage, of the memory allocated to a function or instance to the memory allocated to the parent function or instance.

Hiding/showing columns in the Profile panes

You can hide or show any of the columns in the Profile panes. Click the drop-down arrow on the left-hand side of the dialog and select a column name.



The selection acts as a toggle. Select it once to hide a column; select it again to show the column.

Profiler popup menu commands

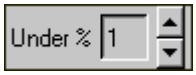
The following menu commands are available when you right click in the Ranked, Call Tree, and Structural views of the Profile window, or in the Profile Details window. (The Ranked view does not contain all of the commands available in the Call Tree and Structural views.)

View Source	displays source code of selected function in Source window
Function Usage	displays all instances using the selected function in the Profile Details window
Instance Usage	(Structural view only) displays all instances with the same definition as the selected instance in the Profile Details window
View Instantiation	(Structural view only) opens Source window at the point in the source code where the selected instance is instantiated
Callers & Callees	displays all callers and callees for the selected function in the Profile Details window. Items above the selected function are callers; items below are callees. The selected function is designated with an arrow.
Display in Call Tree	expands the Call Tree view of the Profile window to display all occurrences of the selected function; puts the selected function into a search buffer so you can easily cycle across all occurrences of that function.
Display in Structural	expands the Structural view of the Profile window to display all occurrences of the selected function; puts the selected function into a search buffer so you can easily cycle across all occurrences of that function.
The following commands are only available in the Call Tree and Structural views	
Set Root	causes the display to be rooted at the currently selected item
Ascend Root	causes the display root to ascend one level
Reset Root	causes the display to be reset to normal
Expand Selected	expand hierarchy of the selected function or instance
Collapse Selected	collapse hierarchy of the selected function or instance
Expand All	expand hierarchy of all functions and instances
Collapse All	collapse hierarchy of all functions and instances
Collapse To Parent	collapse hierarchy to the parent function or instance
Expand One Level	expand hierarchy of selected function or instance one level
Show Calls	toggle the display of call stack entries

Profiler toolbar

The Ranked, Call Tree and Structural views all share a toolbar in the Main window. The table below describes the icons in this toolbar.

Main window Profiler toolbar buttons

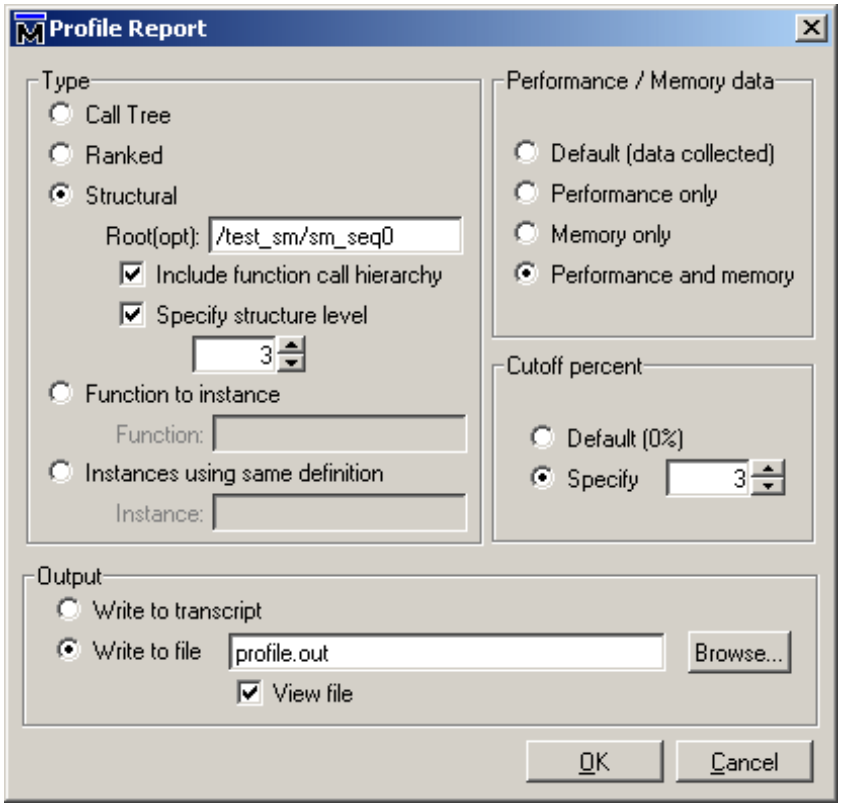
Button	Menu equivalent	Command equivalents
Memory Profiling enable collection of memory usage data	Tools > Profile > Memory	
Performance Profiling enable collection of statistical performance data	Tools > Profile > Performance	
Collapse Sections on/off toggling of reporting for collapsed processes and functions.	Tools > Profile > Collapse Sections	
 **Profile Cutoff** display performance and memory profile data equal to or greater than set percentage		
Refresh profile data refresh profile performance and memory data after changing profile cutoff		
Save profile results save profile data to output file (prompts for file name)	Tools > Profile > Profile Report	profile report (CR-231)
Profile Find search for the named string in the Profile pane		

Profiler dialogs

This section describes the profiler-related dialogs that are accessed via the Main window menu bar. Not all dialogs are documented (e.g., File > Save).

Profile Report dialog

Purpose	Menu command	Additional information
Create textual reports from performance and memory profile results	**Tools** > **Profile** > **Profile Report**	**profile report** command (CR-231)



The Profile Report dialog includes the following options:

- **Type**
  Save a textual report from Call Tree, Ranked, and Structural profile data. The Structural option allows you to designate the root instance for the report, include the function call hierarchy, and specify the structure level. You can also create a Function to instance report for the designated function, and a report of Instances using the same definition as the designated instance.

- **Performance/Memory data**
  Elect to save performance profile data only, memory allocation data only, or both.
- **Cutoff percent**
  Report results including and above the designated or Default percentage.
- **Output**
  Writes the textual report directly to the transcript or to a file. Will also display the file immediately after it is created if "View file" is selected.

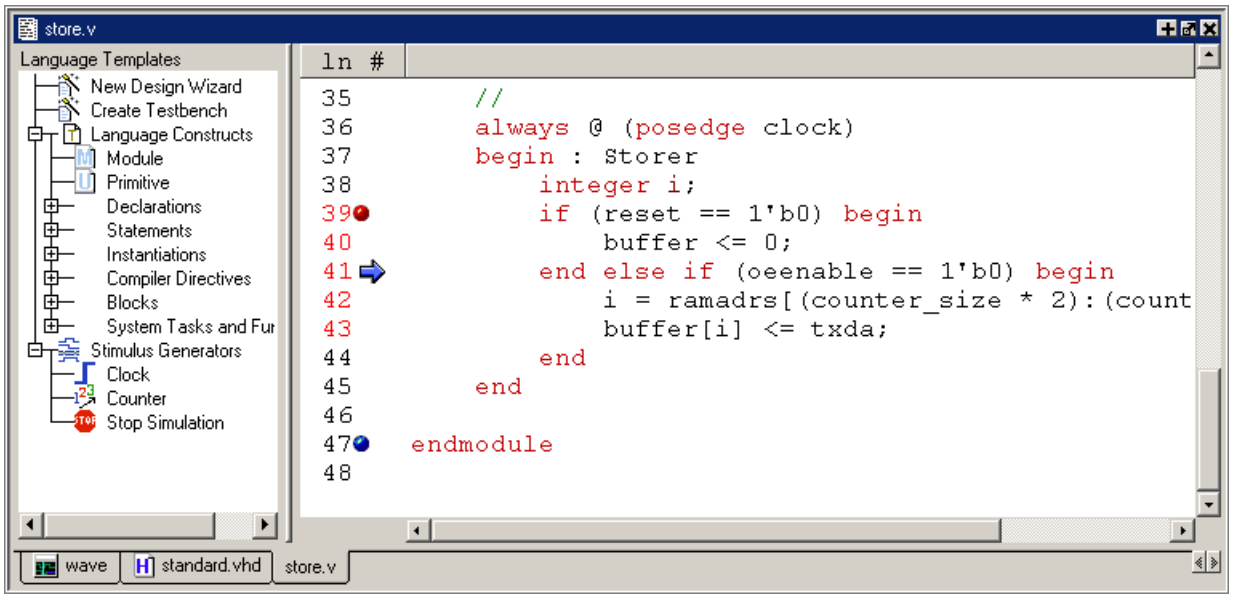
Source window

Source files display by default in the MDI frame of the Main window along with the memory content and Wave windows. The window can be undocked from the Main window by pressing the Undock button in the window header or by using the **view -undock source** command.

You can edit source files as well as set breakpoints, step through design files, and view code coverage statistics.

By default, the Source window displays your source code with line numbers. You may also see the following graphic elements:

- Red line numbers – denote lines on which you can set a breakpoint
- Blue arrow – denotes the currently active line or a process that you have selected in the "Active Processes pane" (GR-108)
- Red circles – denote file-line breakpoints; gray circles denote breakpoints that are currently disabled
- Blue circles – denote line bookmarks
- Language Templates pane – displays Language templates (GR-201)

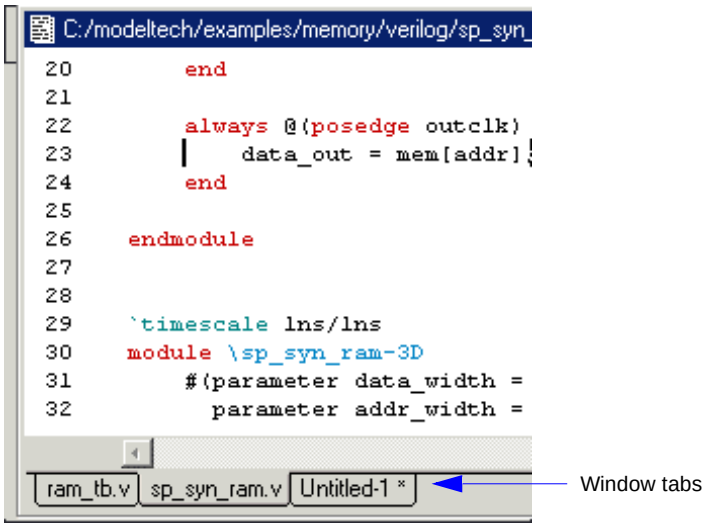


Opening source files

You can open source files using the **File > Open** command. Alternatively, you can open source files by double-clicking objects in other windows. For example, if you double-click an item in the Objects window or in the structure tab of the Workspace, the underlying source file for the object will open, and the cursor will scroll to the line where the object is defined.

Displaying multiple source files

By default each file you open or create is marked by a window tab, as shown in the graphic below.



See "Organizing windows with tab groups" (GR-18) for more information on these tabs.

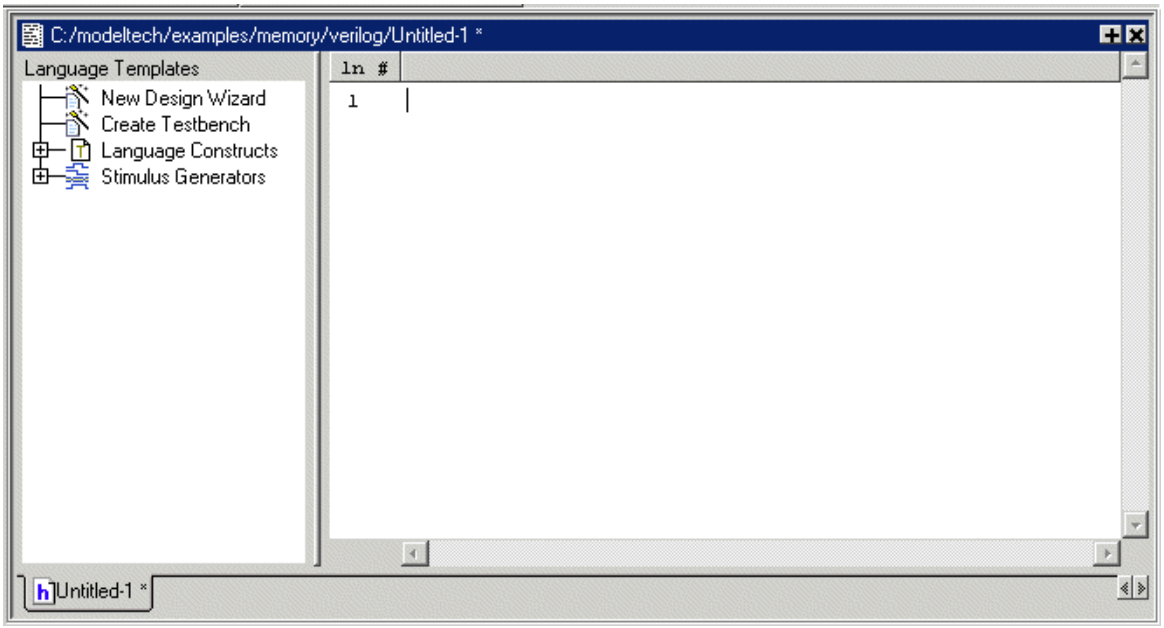
You can also display source files in independent windows within the MDI frame. To switch between the two layouts, select **View > Tabbed MDI**.

Language templates

ModelSim language templates help you write code. They are a collection of wizards, menus, and dialogs that produce code for new designs, testbenches, language constructs, logic blocks, etc.

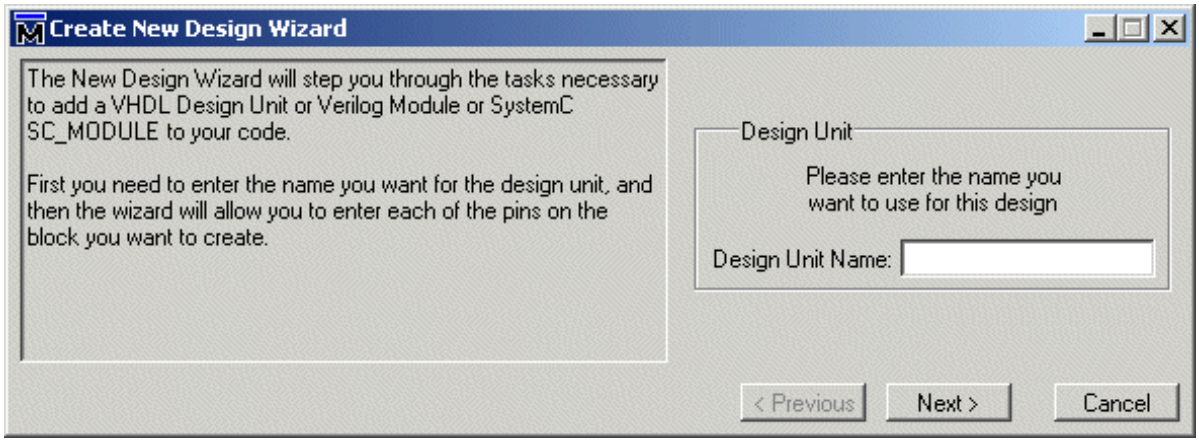
Important: The language templates are not intended to replace thorough knowledge of coding. They are intended as an interactive "reference" for creating small sections of code. If you are unfamiliar with a particular language, you should attend a training class or consult one of the many available books.

To use the templates, either open an existing file, or select **File > New > Source** to create a new file. Once the file is open, select **View > Source > Show language templates**. This displays a pane that shows the available templates.

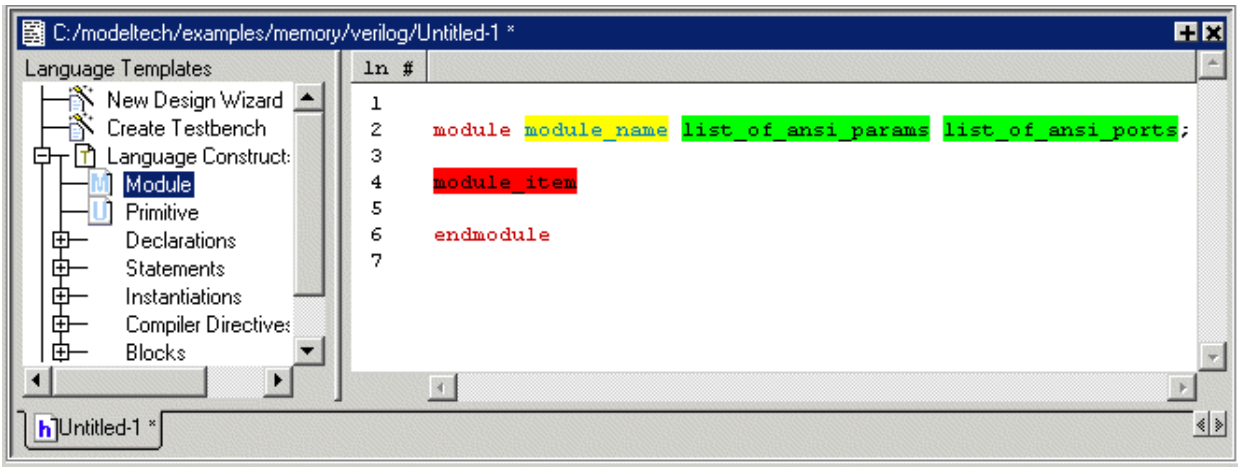


The templates that appear depend on the type of file you create. For example Module and Primitive templates are available for Verilog files, and Entity and Architecture templates are available for VHDL files.

Double-click an object in the list to open a wizard or to begin creating code. Some of the objects bring up wizards while others insert code into your source file. The dialog below is part of the wizard for creating a new design. Simply follow the directions in the wizards.

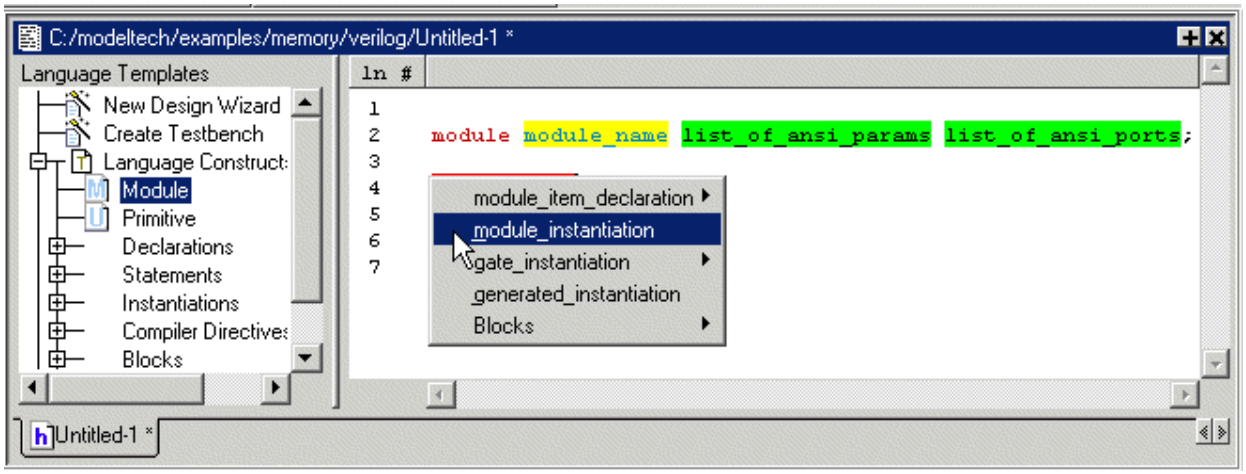


Code inserted into your source contains a variety of highlighted fields. The example below shows a module statement inserted from the Verilog template.



Some of the fields, such as *module_name* in the example above, are to be replaced with names you type. Other fields can be expanded by double-clicking and still others offer a

context menu of options when double-clicked. The example below shows the menu that appears when you double-click *module_item*.



Setting file-line breakpoints

You can easily set "File-line breakpoints" (GR-264) in a Source window using your mouse. Click on a red line number at the left side of the Source window, and a red circle denoting a breakpoint will appear. The breakpoints are toggles – click once to create the breakpoint; click again to disable or enable the breakpoint.

To delete the breakpoint completely, right click the red circle, and select **Remove Breakpoint**. Other options on the context menu include:

- **Disable/Enable Breakpoint**
  Deactivate or activate the selected breakpoint.
- **Edit Breakpoint**
  Open the "File Breakpoint dialog" (GR-98) to change breakpoint arguments.
- **Edit All Breakpoints**
  Open the "Modify Breakpoints dialog" (GR-95)

Checking object values and descriptions

There are two quick methods to determine the value and description of an object displayed in the Source window:

- select an object, then right-click and select **Examine** or **Describe** from the context menu
- pause over an object with your mouse pointer to see an examine pop-up

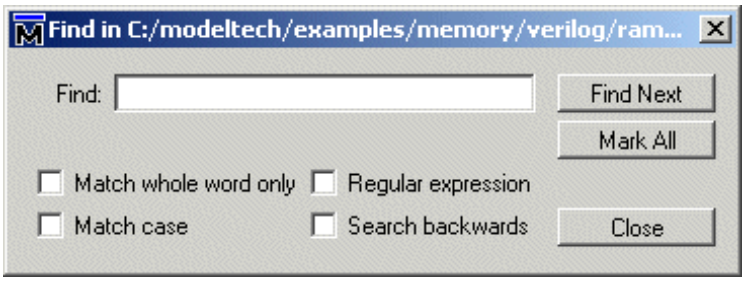
Select **Tools > Options > Examine Now** or **Tools > Options > Examine Current Cursor** to choose at what simulation time the object is examined or described.

You can also invoke the **examine** (CR-162) and/or **describe** (CR-147) command on the command line or in a macro.

Finding and replacing in a Source window

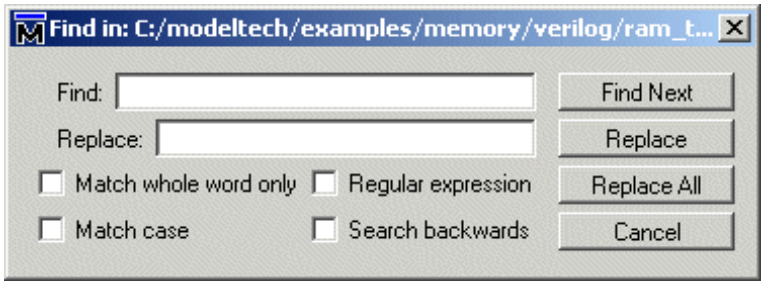
Two dialogs with slightly different options allow you to find, mark, and replace text strings or regular expressions in a Source window.

If you select **Edit > Find**, you will see the following dialog:



Enter the value to search for in the **Find** field. Optionally specify whether the entries are case sensitive and whether to search backwards from the current cursor location. Check **Match whole word only** to prevent implicit wildcards. Check the **Regular expression** checkbox if you are using regular expressions. The Mark All button places bookmarks on all lines that contain the text for which you are searching (see "Marking lines with bookmarks" (GR-204)).

If you select **Edit > Replace**, you will see this dialog:



Most of the options are the same as those in the Find dialog, but you would also enter a value in the **Replace** field.

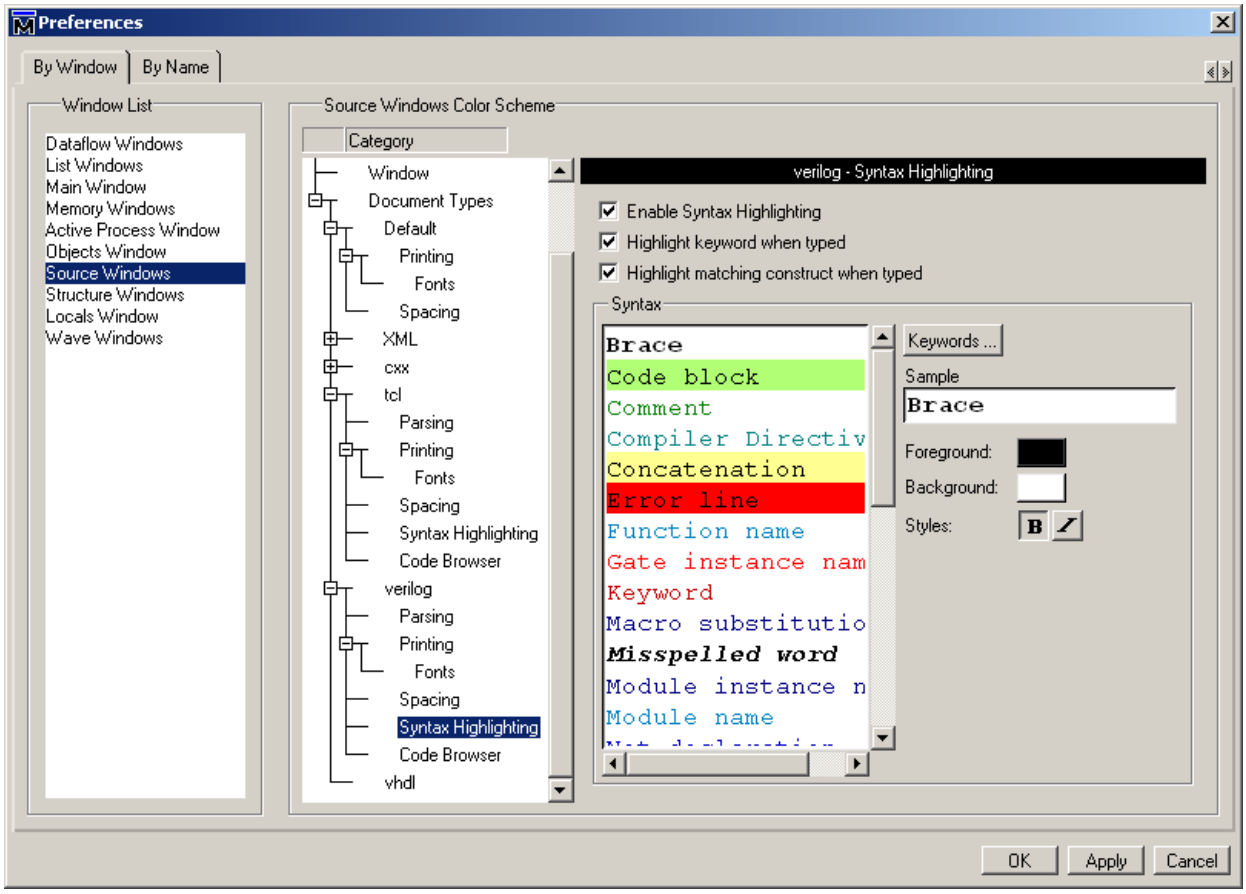
Marking lines with bookmarks

Source window bookmarks are blue circles that mark lines in a source file. These graphical icons may ease navigation through a large source file by "highlighting" certain lines.

As noted above in the discussion about finding text in the Source window, you can insert bookmarks on any line containing the text for which you are searching. The other method for inserting bookmarks is to right-click a line number and select **Add/Remove Bookmark**. To remove a bookmark, right-click the line number and select Add/Remove Bookmark again.

Customizing the Source window

You can customize a variety of settings for Source windows. For example, you can change fonts, spacing, colors, syntax highlighting, and so forth. To customize Source window settings, select **Tools > Edit Preferences**. This opens the Preferences dialog. Select **Source Windows** from the Window List.



Select an item from the Category list and then edit the available properties on the right. Click OK or Apply to accept the changes.

The changes will be active for the next Source window you open. The changes are saved automatically when you quit ModelSim.

Source window menus

The following menu commands are available in the Source window when it is undocked from the Main window. When the Source window is docked in the Main window, these functions can be found in the Main window menu bar (see Main window menu bar (GR-20)). Several commands are also available in a context menu by right-clicking in a Source window.

File menu

New	create a new VHDL, Verilog, SystemC, DO or other source file
Open	open a source file
Use Source	specify an alternative file to use for the current source file; this alternative source mapping exists for the current simulation only
Source Directory	add to a list of directories to search for source files; you can set this permanently using the **SourceDir** variable in the *modelsim.tcl* file
Save/Save As	save the active source file
Print	print the active source file
Close	close the active source file

Edit menu

Undo	undo previous action
Cut	cut selected source code
Copy	copy selected source code
Paste	paste code at selected location in the source code
Select All	select all source code in the active source file
Unselect All	unselect selected source code
Comment/ Uncomment Selected	add or remove comment characters from the selected lines
Find	find specific code in the active source file; allows you to match whole word only, match case, search for regular expressions, and search backwards in the active source file; you can also mark all occurrences
Replace	find and replace specified source code in the active source file; allows you to match whole word only, match case, search for and replace regular expressions, and search backwards in the active source file; you can also replace all occurrences

Previous Coverage Miss	jump to previous line of code not executed
Next Coverage Miss	jump to next line of code not executed
Goto	jump to a line number in the active source file
Read Only	toggle read only status of active source file

View menu

Show line numbers	toggle display of line numbers Show language templates
Show language templates	toggle display of the Language templates (GR-201) pane
Properties	list a variety of information about the source file; for example, file type, file size, file modification date

Tools menu

Examine	display the current value of the object selected in the active Source window; same as the **examine** (CR-162) command
Describe	display information about the object selected in the active Source window; same as the **describe** command (CR-147)
Drivers	list the names of all drivers of the object selected in the active Source window
Readers	list the names of all readers of the object selected in the active Source window
Compile	compile the active source file
C Debug	see "C Debug sub-menu" (GR-31)
Breakpoints	add, edit, or delete file-line and signal breakpoints; see "Creating and managing breakpoints" (GR-264)
Options	the Options menu includes these Source related options: Examine Now–examine selected object at the current simulation time; this option affects the behavior of the Examine and Describe commands as well as the examine popup; see "Checking object values and descriptions" (GR-203) Examine Current Cursor–examine selected object at the time of the current cursor in the Wave window; this option affects the behavior of the Examine and Describe commands as well as the examine popup; see "Checking object values and descriptions" (GR-203)

Watch pane

The Watch pane shows values for signals and variables at the current simulation time. Unlike the Objects or Locals pane, the Watch pane allows you to view any signal or variable in the design regardless of the current context.

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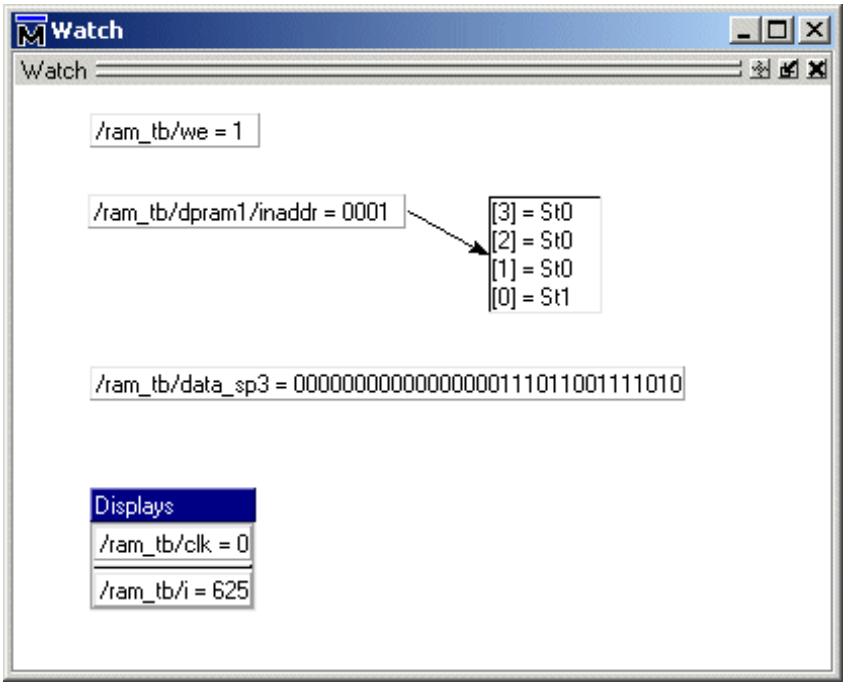


Objects you can view

VHDL objects

signals, aliases, generics, constants, and variables

Verilog objects

nets, registers, variables, named events, and module parameters

SystemC objects

primitive channels and ports

Virtual objects

virtual signals and virtual functions

Adding objects to the pane

To add objects to the Watch pane, drag-and-drop objects from the Structure tab, Objects pane, or Locals pane. Alternatively, use the **add watch** command (CR-51).

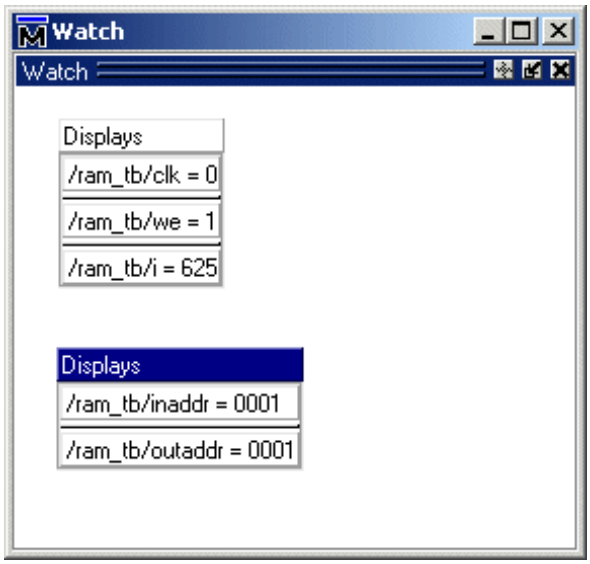
Expanding objects to show individual bits

If you add an array or record to the Watch pane, you can view individual bit values by double-clicking the array or record. As shown in the graphic above, */ram_tb/dpram1/inaddr* has been expanded to show all the individual bit values. Notice the arrow that "ties" the array to the individual bit display.

Grouping and ungrouping objects

You can group objects in the Watch pane so they display and move together. Select the objects, then right click one of the objects and choose Group.

In the graphic below, two different sets of objects have been grouped together.



To ungroup them, right-click the group and select Ungroup.

Saving and reloading format files

You can save a format file (a DO file, actually) that will redraw the contents of the Watch window. Right-click anywhere in the window and select **Save Format**.

Once you have saved the file, you can reload it by right-clicking and selecting **Load Format**.

Other Watch pane commands

The table below summarizes some other Watch pane commands, all of which are available via a context menu by clicking in the pane with the right mouse button.

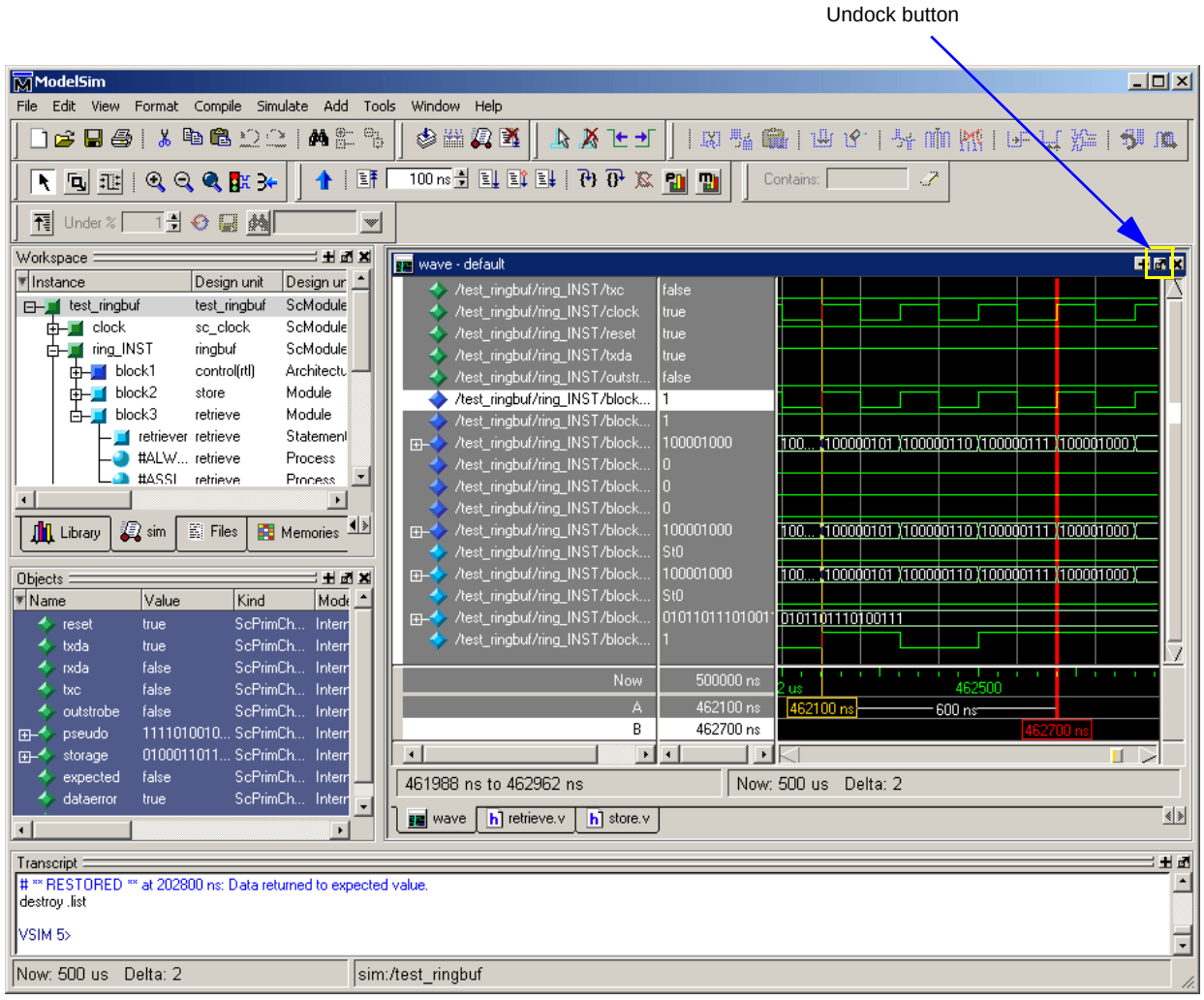
Command	Description
Add Wave	Add the selected items to the Wave window
Add List	Add the selected items to the List window
Log Signal	Add selected signals to the active log file

Command	Description
Force	Apply stimulus to a net or signal; see "Force Selected Signal dialog" (GR-186)
Noforce	Cancel a previous force command
Clock	Create a clock signal; see "Define Clock dialog" (GR-188)
Change	Modify the value of a variable
Follow Selection Context	Identifies location of object in design hierarchy in structure tab of Workspace
Save Format	Save the current Watch window display and signal preferences to a DO (macro) file; running the DO file will reformat the Watch window to match the display as it appeared when the DO file was created
Load Format	Executes or loads a previously saved DO file in the Watch window
Clear	Clear all objects from the Watch pane
Tile	Organizes objects in the pane
Group/Ungroup	Group or ungroup selected objects
Properties	Set the displayed radix of the selected signal
Clear	Clear the Watch window

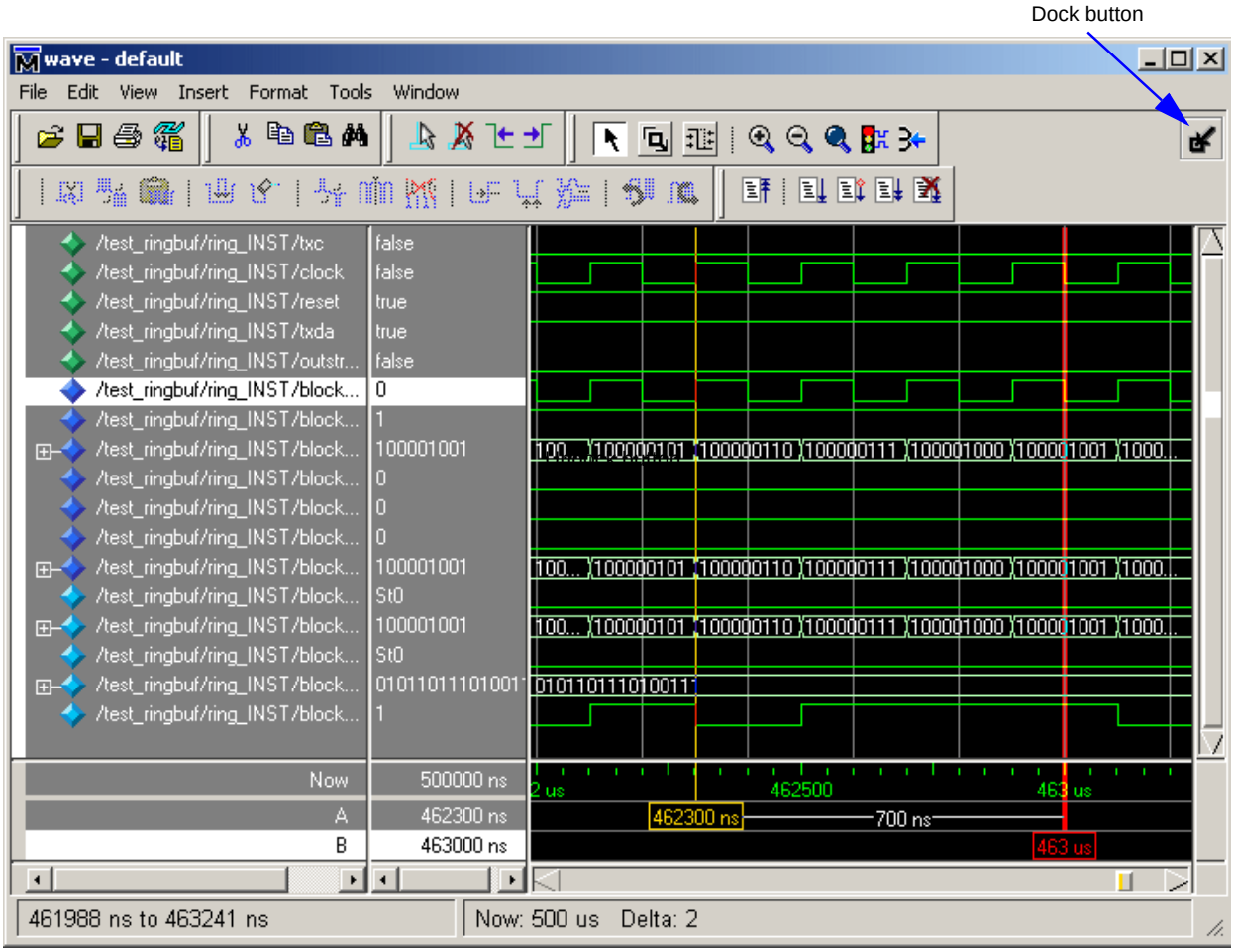
Wave window

The Wave window, like the List window, allows you to view the results of your simulation. In the Wave window, however, you can see the results as waveforms and their values.

The Wave window opens by default in the MDI frame of the Main window as shown below. The window can be undocked from the main window by pressing the Undock button in the window header or by using the **view -undock wave** command. The preference variable PrefWave(ViewUnDocked) can be used to control this default behavior. By setting the value of this variable to 1, the Wave Window will open undocked.

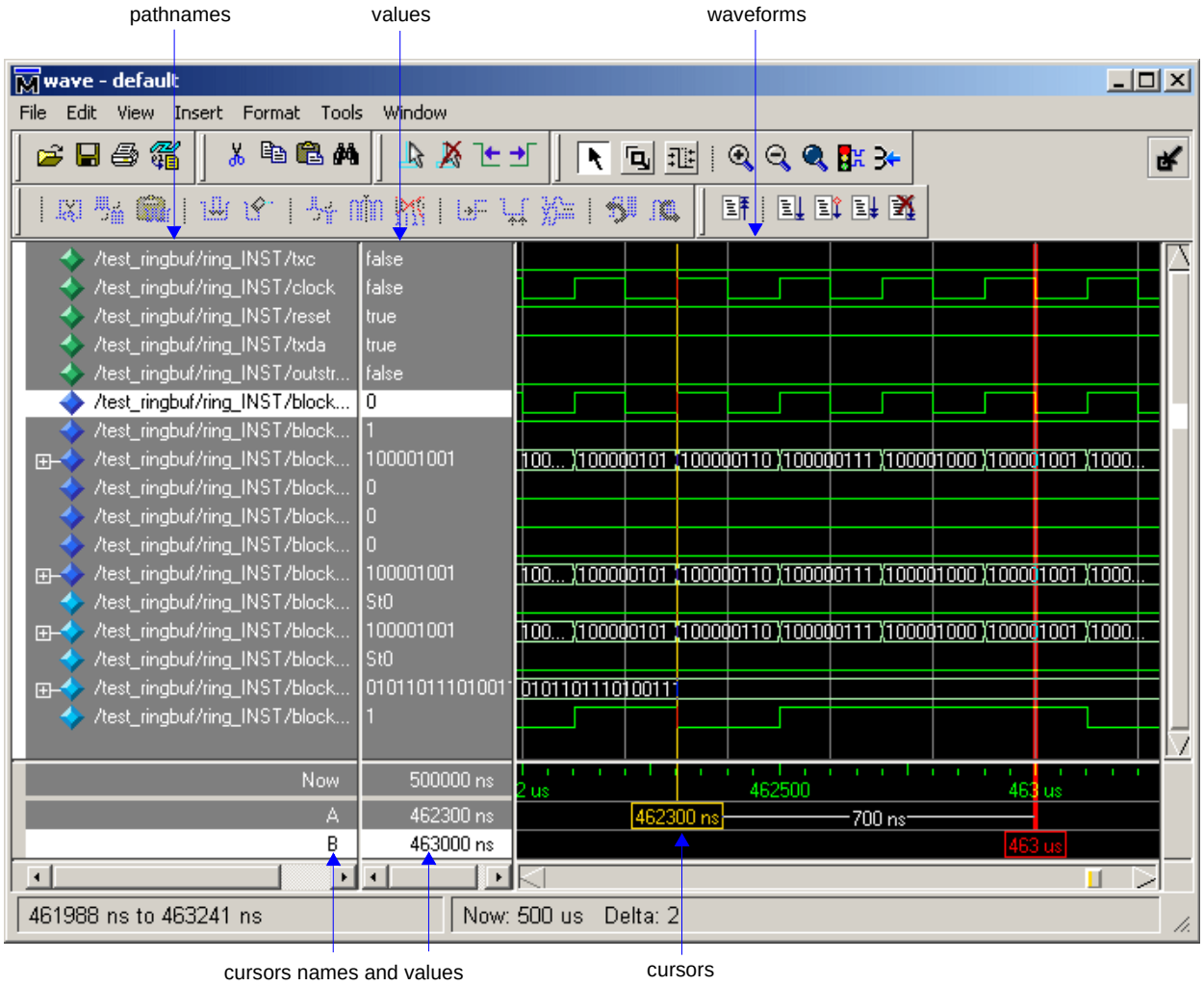


Here is an example of a Wave window that is undocked from the MDI frame. All menus and icons associated with Wave window functions now appear in the menu and toolbar areas of the Wave window.



If the Wave window is docked into the Main window MDI frame, all menus and icons that were in the standalone version of the Wave window move into the Main window menu bar and toolbar. See "Main window menu bar" (GR-20) for more information.

The Wave window is divided into a number of window panes. All window panes in the Wave window can be resized by clicking and dragging the bar between any two panes.



Wave window panes

The sections below describe the various Wave window panes.

Pathname pane

The pathname pane displays signal pathnames. Signals can be displayed with full pathnames, as shown here, or with only the leaf element displayed. You can increase the size of the pane by clicking and dragging on the right border. The selected signal is highlighted.

The white bar along the left margin indicates the selected dataset (see "Splitting Wave window panes" (UM-257)).

Value pane

The value pane displays the values of the displayed signals.

The radix for each signal can be symbolic, binary, octal, decimal, unsigned, hexadecimal, ASCII, or default. The default radix can be set by selecting **Simulate > Runtime Options**.

The data in this pane is similar to that shown in the Objects pane (GR-184), except that the values change dynamically whenever a cursor in the waveform pane is moved.

Waveform pane

The waveform pane displays the waveforms that correspond to the displayed signal pathnames. It also displays up to 20 cursors. Signal values can be displayed in analog step, analog interpolated, analog backstep, literal, logic, and event formats. Each signal can be formatted individually. The default format is logic.

If you rest your mouse pointer on a signal in the waveform pane, a popup displays with information about the signal. You can toggle this popup on and off in the **Wave Window Properties** dialog (see "Grid & Timeline tab" (GR-257)).

Cursor panes

There are three cursor panes–the left pane shows the cursor names; the middle pane shows the current simulation time and the value for each cursor; and the right pane shows the absolute time value for each cursor and relative time between cursors. Up to 20 cursors can be displayed. See "Measuring time with cursors in the Wave window" (UM-245) for more information.

Objects you can view

The following types of objects can be viewed in the Wave window

VHDL objects

(indicated by a dark blue diamond)
signals, aliases, process variables, and shared variables

Verilog objects

(indicated by a light blue diamond)
nets, registers, variables, and named events

SystemC objects

(indicated by a green diamond)
primitive channels and ports

Virtual objects

(indicated by an orange diamond)
virtual signals, buses, and functions, see; "Virtual Objects (User-defined buses, and more)" (UM-233) for more information

Comparison objects

(indicated by a yellow triangle)
comparison region and comparison signals; see "Waveform Compare" (UM-270) for more information

PSL assertions

(indicated by a magenta triangle)
see "Viewing assertions in the Wave window" (UM-382)

Coverage directives

(indicated by a magenta arrow)
see "Viewing coverage directives in the Wave window" (UM-389)

Created waveforms

(indicated by a red dot on a diamond)
see *Chapter 10 - Generating stimulus with Waveform Editor*

The data in the object values pane is very similar to the Objects window, except that the values change dynamically whenever a cursor in the waveform pane is moved.

At the bottom of the waveform pane you can see a time line, tick marks, and the time value of each cursor's position. As you click and drag to move a cursor, the time value at the cursor location is updated at the bottom of the cursor.

You can resize the window panes by clicking on the bar between them and dragging the bar to a new location.

Waveform and signal-name formatting are easily changed via the Format menu (GR-218). You can reuse any formatting changes you make by saving a Wave window format file (see "Saving the window format" (UM-261)).

Wave window menu bar

The following commands are available from the Wave window menu bar when the Wave window is undocked. When the Wave window is docked in the MDI frame (see "Wave window" (GR-211)), the commands are distributed amongst the Main window menus.

Many of these commands are also available via a context menu by clicking your right mouse button within the Wave window itself.

File menu

New Window	create a new instance of the Wave window
Open	open a dataset (WLF file)
Load	run a Wave window format (DO) file previously saved with Save Format
Save	provides these options: Dataset – save the current simulation to a WLF file Format – save the current Wave window display and signal preferences to a DO (macro) file; running the DO file will reformat the Wave window to match the display as it appeared when the DO file was created
Export	provides these options: Waveform – export a created waveform; see "Exporting waveforms to a stimulus file" (GR-294); Image – saves a bitmap image of the Wave window.
Import EVCD	import a previously exported EVCD file for waveform editor; see "Driving simulation with the saved stimulus file" (GR-295)
Page Setup	configure page setup including paper size, margins, label width, cursors, grid, color, scaling and orientation
Print (Windows only)	send the contents of the Wave window to a selected printer; see "Printing and saving waveforms in the Wave window" (UM-262) for details
Print Postscript	save or print the waveform display as a Postscript file; see "Saving a .eps file and printing under UNIX" (UM-262) for details
Close	close this copy of the Wave window
Quit	exit ModelSim

Edit menu

Cut	cut the selected object and waveform from the Wave window
Copy	copy the selected object and waveform
Paste	paste the previously cut or copied object above the currently selected object
Delete	delete the selected object and its waveform
Edit Wave	select from numerous options for editing waveforms; see "Editing waveforms" (GR-290)
Edit Cursor	open a dialog to specify the location of the selected cursor
Delete Cursor	delete the selected cursor from the window
Delete Window Pane	delete the selected window pane
Remove All (Panes and Signals)	removes all signals and additional window panes, leaving the window in its original state
Select All Unselect All	select, or unselect, all object names in the pathname pane
Find	find the specified object label within the pathname pane or the specified value within the value pane
Search	search the waveform display for a specified value, or the next transition for the selected object; see "Searching for values or transitions" (UM-252)
Force	force a value on the selected object; see "Force Selected Signal dialog" (GR-186)
Noforce	cancel a previous force command
Clock	define a clock; see "Define Clock dialog" (GR-188)

View menu

Zoom <selection>	selection: Full, In, Out, Last, or Range to change the waveform display range
Mouse Mode	toggle mouse pointer between Select Mode (click left mouse button to select, drag with middle mouse button to zoom) and Zoom Mode (drag with left mouse button to zoom, click middle mouse button to select)

Object Declaration	open the source file in the Source window and highlight the declaration for the currently selected object
Cursors	choose a cursor to go to from a list of available cursors
Bookmarks	choose a bookmark to go to from a list of available bookmarks
Goto Time	scroll the Wave window so the specified time is in view; "g" hotkey produces the same result
Sort	sort the top-level objects in the pathname pane; sort with full path or viewed name; use ascending or descending order
Justify Values	justify values to the left or right margins of the window pane
Refresh Display	clear the Wave window, empty the file cache, and rebuild the window from scratch
Properties	set properties for the selected object (use the Format menu to change individual properties)

Insert menu

Divider	insert a divider at the current location
Breakpoint	add a breakpoint on the selected signal; see "Signal breakpoints" (GR-264)
Bookmark	add a bookmark with the current zoom range and scroll location; see "Saving zoom range and scroll position with bookmarks" (UM-250)
Cursor	add a cursor to the waveform pane
Window Pane	split the pathname, values and waveform window panes to provide room for a new waveset

Format menu

Radix	set the selected objects' radix
Format	set the waveform format for the selected objects – Literal, Logic, Event, Analog
Color	set the color for the selected objects from a color palette
Height	set the waveform height in pixels for the selected objects

Tools menu

Waveform Compare	see "Waveform Compare sub-menu" (GR-29)
Breakpoints	add, edit, and delete signal breakpoints; see "Creating and managing breakpoints" (GR-264)
Bookmarks	add, edit, delete, and goto bookmarks; see "Saving zoom range and scroll position with bookmarks" (UM-250)
Dataset Snapshot	enable periodic saving of simulation data to a WLF file; see "Saving at intervals with Dataset Snapshot" (UM-231)
Combine Signals	combine the selected objects into a user-defined bus; see "Combining objects/creating busses" (UM-264)
Window Preferences	set various display properties such as signal path length, cursor snap distance, row margin, dataset prefixes, waveform popup, etc.

Window menu

The Window menu is identical in all windows. See "Window menu" (GR-32) for a description of the commands.

Wave window toolbar

The Wave window toolbar gives you quick access to these ModelSim commands and functions.

Wave window toolbar buttons			
Button		**Menu equivalent**	**Other options**
	Load Wave Format run a Wave window format (DO) file previously saved with Save Format	File > Open > Format	**do** wave.do see **do** command (CR-151)
	Save Wave Format save the current Wave window display and signal preferences to a do (macro) file	File > Save > Format	none
	Print print a user-selected range of the current Wave window display to a printer or a file	File > Print File > Print Postscript	none
	Export Waveform export a created waveform	File > Export > Waveform	none
	Cut cut the selected signal from the Wave window	Edit > Cut	right mouse in pathname pane > Cut
	Copy copy the signal selected in the pathname pane	Edit > Copy	right mouse in pathname pane > Copy
	Paste paste the copied signal above another selected signal	Edit > Paste	right mouse in pathname pane > Paste
	Find find a name or value in the Wave window	Edit > Find	<control-f> Windows <control-s> UNIX

Wave window toolbar buttons			
Button		**Menu equivalent**	**Other options**
	Insert Cursor add a cursor to the waveform pane	Insert > Cursor	right click in cursor pane and select New Cursor
	Delete Cursor delete the selected cursor from the window	Edit > Delete Cursor	right mouse in cursor pane > Delete Cursor n
	Find Previous Transition locate the previous signal value change for the selected signal	Edit > Search (Search Reverse)	keyboard: Shift + Tab **left** <arguments> see **left** command (CR-189)
	Find Next Transition locate the next signal value change for the selected signal	Edit > Search (Search Forward)	keyboard: Tab **right** <arguments> see **right** command (CR-250)
	Select Mode set mouse to Select Mode – click left mouse button to select, drag middle mouse button to zoom	View > Mouse Mode > Select Mode	none
	Zoom Mode set mouse to Zoom Mode – drag left mouse button to zoom, click middle mouse button to select	View > Mouse Mode > Zoom Mode	none
	Zoom In 2x zoom in by a factor of two from the current view	View > Zoom > Zoom In	keyboard: i I or + right mouse in wave pane > Zoom In
	Zoom Out 2x zoom out by a factor of two from current view	View > Zoom > Zoom Out	keyboard: o O or - right mouse in wave pane > Zoom Out
	Zoom Full zoom out to view the full range of the simulation from time 0 to the current time	View > Zoom > Zoom Full	keyboard: f or F right mouse in wave pane > Zoom Full
	Stop Wave Drawing halts any waves currently being drawn in the Wave window	none	.wave.tree interrupt

Wave window toolbar buttons			
Button		**Menu equivalent**	**Other options**
	Show Drivers display driver(s) of the selected signal, net, or register in the Dataflow window	[Dataflow window] Navigate > Expand net to drivers	[Dataflow window] Expand net to all drivers right mouse in wave pane > Show Drivers
	Restart reloads the design elements and resets the simulation time to zero, with the option of keeping the current formatting, breakpoints, and WLF file	Main menu: Simulate > Run > Restart	**restart** <arguments> see: **restart** (CR-246)
	Run run the current simulation for the default time length	Main menu: Simulate > Run > Run <default_length>	use the **run** command at the VSIM prompt see: **run** (CR-252)
	Continue Run continue the current simulation run	Main menu: Simulate > Run > Continue	use the **run -continue** command at the VSIM prompt see: **run** (CR-252)
	Run -All run the current simulation forever, or until it hits a breakpoint or specified break event	Main menu: Simulate > Run > Run -All	use the **run -all** command at the VSIM prompt see: **run** (CR-252), also see "Assertions tab" (GR-86)
	Break stop the current simulation run	none	none

Waveform editor toolbar

ModelSim's waveform editor has its own toolbar. The toolbar becomes active once you add an editable wave to the Wave window. See *Chapter 10 - Generating stimulus with Waveform Editor* in the *ModelSim User's Manual* for more details.

Waveform editor toolbar buttons			
Button		**Menu equivalent**	**Other options**
	Cut Wave cut the selected section of the waveform to the clipboard	Edit > Edit Wave > Cut	**wave edit cut** see **wave edit** command (CR-400)

Waveform editor toolbar buttons			
Button		**Menu equivalent**	**Other options**
	Copy Wave copy the selected section of the waveform to the clipboard	Edit > Edit Wave > Copy	**wave edit copy** see **wave edit** command (CR-400)
	Paste Wave paste the wave from the clipboard	Edit > Edit Wave > Paste	**wave edit paste** see **wave edit** command (CR-400)
	Insert Pulse Insert a transition at the selected time	Edit > Edit Wave > Insert Pulse	**wave edit insert_pulse** see **wave edit** command (CR-400)
	Delete Edge Delete the selected transition	Edit > Edit Wave > Delete Edge	**wave edit delete** see **wave edit** command (CR-400)
	Invert Invert the selected section of the waveform	Edit > Edit Wave > Invert	**wave edit invert** see **wave edit** command (CR-400)
	Mirror Mirror the selected section of the waveform	Edit > Edit Wave > Mirror	**wave edit mirror** see **wave edit** command (CR-400)
	Change Value Change the value of the selected section of the waveform	Edit > Edit Wave > Value	**wave edit change_value** see **wave edit** command (CR-400)
	Stretch Edge Move the selected edge by increasing/decreasing waveform duration	Edit > Edit Wave > Stretch Edge	**wave edit stretch** see **wave edit** command (CR-400)
	Move Edge Move the selected edge without increasing/decreasing waveform duration	Edit > Edit Wave > Move Edge	**wave edit move** see **wave edit** command (CR-400)
	Extend All Waves Increase the duration of all editable waves	Edit > Edit Wave > Extend All Waves	**wave edit extend** see **wave edit** command (CR-400)

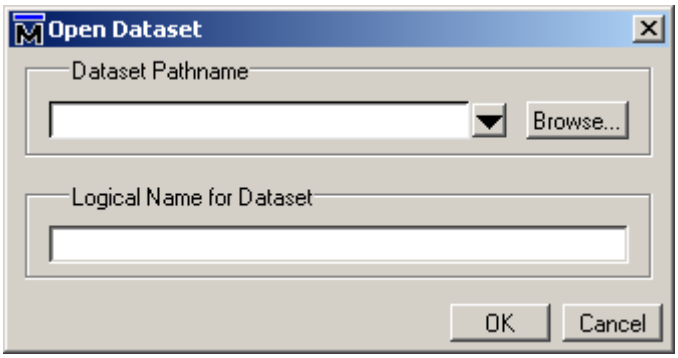
Waveform editor toolbar buttons			
Button		**Menu equivalent**	**Other options**
	Wave Undo Undo a previous waveform edit	Edit > Edit Wave > Undo	**wave edit undo** see **wave edit** command (CR-400)
	Wave Redo Redo a previously undone waveform edit	Edit > Edit Wave > Redo	**wave edit redo** see **wave edit** command (CR-400)

Wave window dialogs

This section describes the dialogs that are accessed via the Main window menu bar when the Wave window is docked, and via the Wave window menu bar when it is undocked. The dialogs are listed in the order in which they appear on the menus, top-to-bottom and left-to-right (i.e., starting with the File menu and progressing across the menu bar). Not all dialogs are documented (e.g., Open Format dialog).

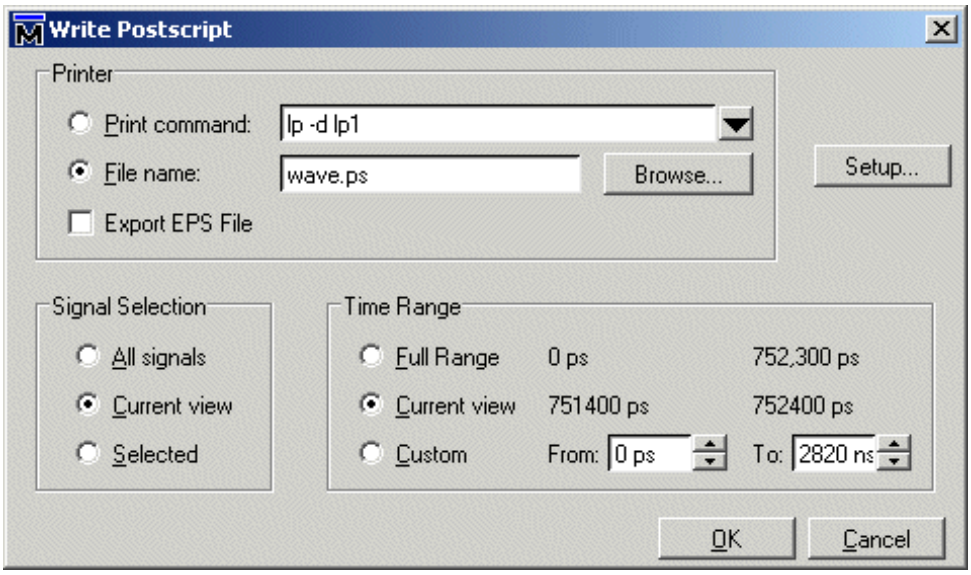
Open Dataset dialog

Purpose	Menu command	Additional information
Open a new dataset	**File** > **Open**	Opening datasets (UM-227)



Write Postscript dialog

Purpose	Menu command	Additional information
Print/save a postscript file	**File > Print Postscript**	"Printing and saving waveforms in the Wave window" (UM-262)



The Write Postscript dialog includes these options:

Printer

- **Print command**
  Enter a UNIX print command to print the waveform in a UNIX environment.
- **File name**
  Enter a filename to be created or browse to a previously created file and use that filename.
- **Export EPS File**
  Save the file in encapsulated postscript (EPS) format.

Signal Selection

- **All signals**
  Print all signals.
- **Current View**
  Print signals in the current view.
- **Selected**
  Print all selected signals.

Time Range

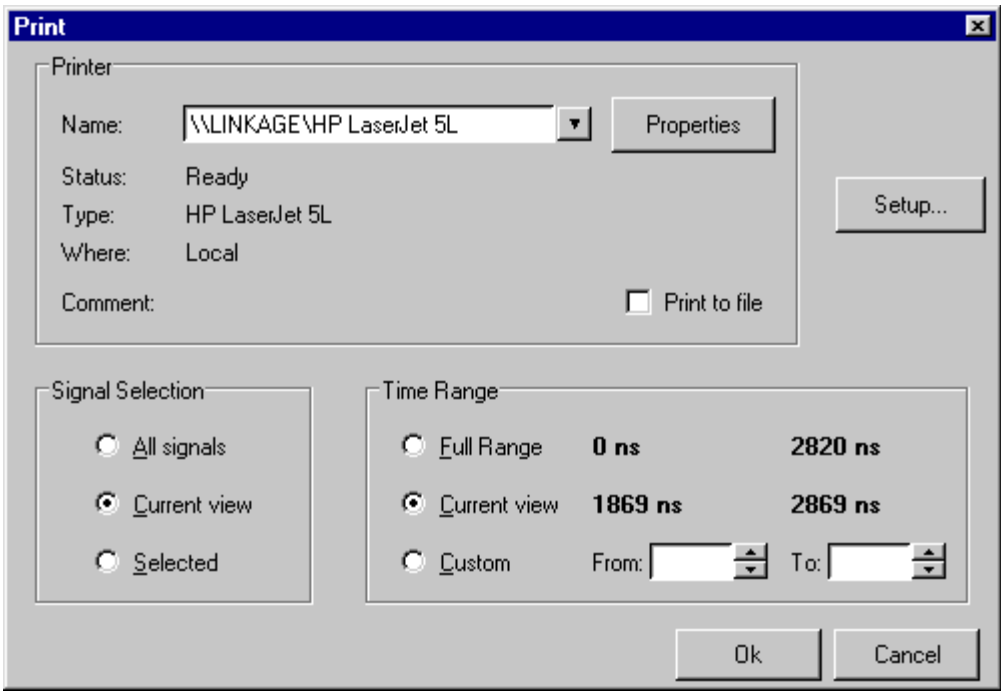
- **Full Range**
  Print all specified signals in the full simulation range.
- **Current view**
  Print the specified signals for the viewable time range.
- **Custom**
  Print the specified signals for a user-designated **From** and **To** time.

Setup button

See "Page Setup dialog" (GR-230)

Print dialog

Purpose	Menu command	Additional information
Print the Wave window contents	**File > Print**	"Printing and saving waveforms in the Wave window" (UM-262)



The Print dialog includes these options:

Printer

- **Name**
  Choose the printer from the drop-down menu. Set printer properties with the **Properties** button.
- **Status**
  Indicates the availability of the selected printer.
- **Type**
  Printer driver name for the selected printer. The driver determines what type of file is output if "Print to file" is selected.
- **Where**
  The printer port for the selected printer.
- **Comment**
  The printer comment from the printer properties dialog.

- **Print to file**
  Make this selection to print the waveform to a file instead of a printer. The printer driver determines what type of file is created. Postscript printers create a Postscript (.ps) file, non-Postscript printers create a .prn or printer control language file. To create an encapsulated Postscript file (.eps) use the **File** > **Print Postscript** menu selection.

Signal Selection

- **All signals**
  Print all signals.
- **Current View**
  Print signals in current view.
- **Selected**
  Print all selected signals.

Time Range

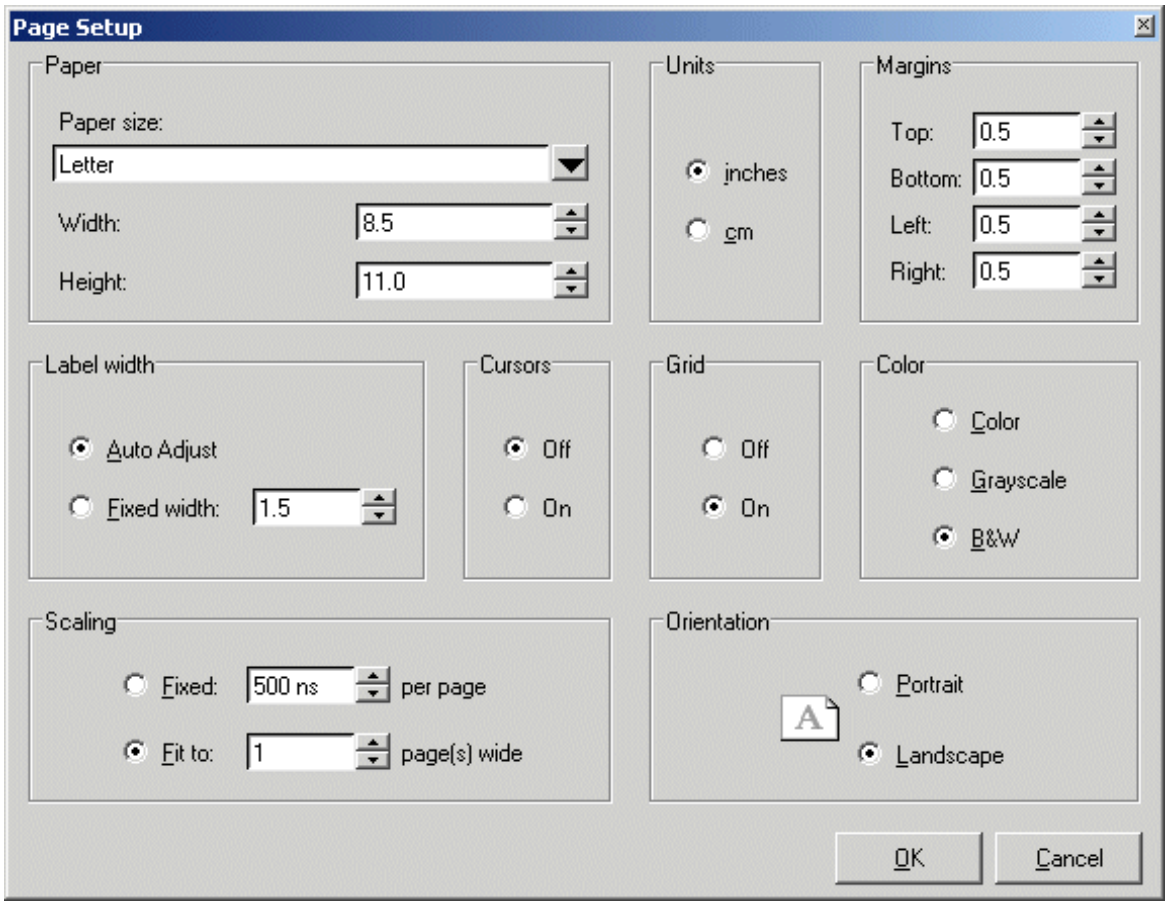
- **Full Range**
  Print all specified signals in the full simulation range.
- **Current view**
  Print the specified signals for the viewable time range.
- **Custom**
  Print the specified signals for a user-designated **From** and **To** time.

Setup button

See "Page Setup dialog" (GR-230)

Page Setup dialog

Purpose	Menu command	Additional information
Set up page layout for printing	**File > Page Setup**	"Printing and saving waveforms in the Wave window" (UM-262)



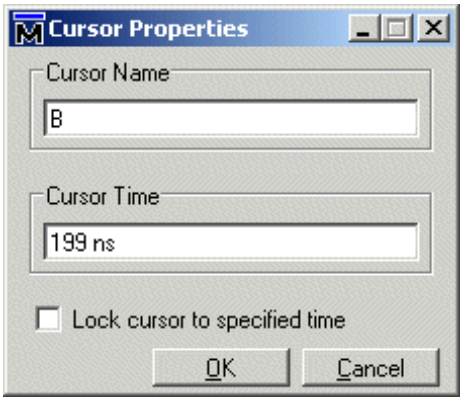
The Page Setup dialog includes these options:

- **Paper Size**
  Select your output page size from a number of options; also choose the paper width and height.
- **Units**
  Specify whether measurements are in inches or centimeters.
- **Margins**
  Specify the page margins; changing the **Margin** will change the **Scale** and **Page** specifications.
- **Label width**
  Specify Auto Adjust to accommodate any length label, or set a fixed label width.

- **Cursors**
  Turn printing of cursors on or off.
- **Grid**
  Turn printing of grid lines on or off.
- **Color**
  Select full color printing, grayscale, or black and white.
- **Scaling**
  Specify a **Fixed** output time width in nanoseconds per page – the number of pages output is automatically computed; or, select **Fit to** define the number of pages to be output based on the paper size and time settings; if set, the time-width per page is automatically computed.
- **Orientation**
  Select the output page orientation, **Portrait** or **Landscape**.

Cursor Properties dialog

Purpose	Menu command	Additional information
Name, move, or lock a cursor	**Edit** > **Edit Cursor**	"Measuring time with cursors in the Wave window" (UM-245)

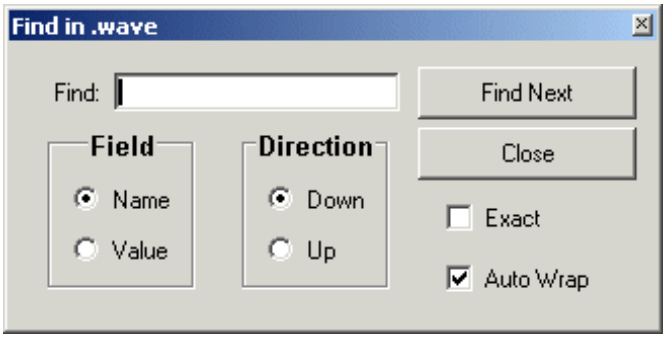


The Cursor Properties dialog includes these options:

- **Cursor Name**
  The name of the selected cursor.
- **Cursor Time**
  The position of the selected cursor.
- **Lock cursor to specified time**
  Freezes the selected cursor so it will not move. A cursor will turn red in the Wave window when it is locked. See "Working with cursors" (UM-245) for more information.

Find in .wave dialog

Purpose	Menu command	Additional information
Locate objects	**Edit > Find**	"Searching in the Wave and List windows" (UM-251)



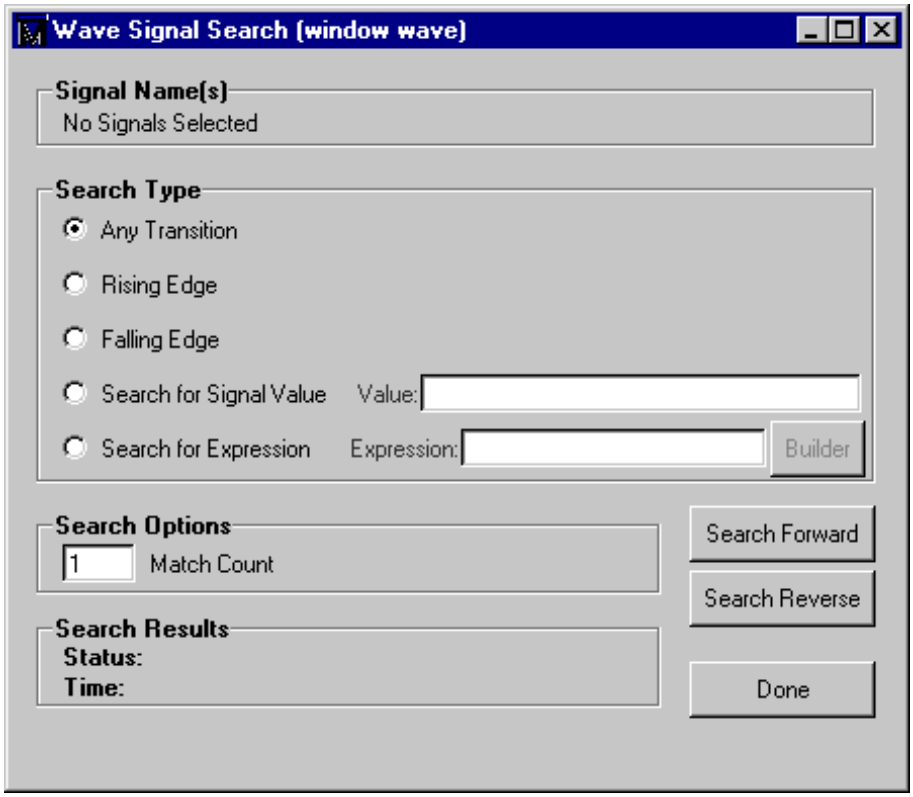
The Find in .wave dialog includes these options:

- **Find**
  Specify the text for which you want to search.
- **Field**
  Specify whether to search the name or value column.
- **Direction**
  Specify the direction to begin searching.
- **Exact**
  Check **Exact** if you only want to find objects that match your search exactly. For example searching for "addr" without Exact will find *addr* and *addr_r*.
- **Auto Wrap**
  Check **Auto Wrap** to continue the search at the top or bottom of the window.

The find operation works only within the active pane.

Wave Signal Search dialog

Purpose	Menu command	Additional information
Locate values and transitions	**Edit > Search**	"Searching in the Wave and List windows" (UM-251)



The Wave Signal Search dialog includes these options:

- **Signal Name(s)**
  A list of the objects currently selected in the Wave window. These objects are the subject of the search.
- **Any Transition**
  Searches for any transition in the selected signal(s).
- **Rising Edge**
  Searches for rising edges in the selected signal(s).
- **Falling Edge**
  Searches for falling edges in the selected signal(s).

- **Search for Signal Value**
  Searches for the value specified in the **Value** field; the value should be formatted using VHDL or Verilog numbering conventions (see "Numbering conventions" (CR-20) for more information).

  Note: If your signal values are displayed in binary radix, see "Searching for binary signal values in the GUI" (CR-29) for details on how signal values are mapped between a binary radix and std_logic.

- **Search for Expression**
  Searches for the expression specified in the **Expression** field evaluating to a boolean true. See "Using the Expression Builder for expression searches" (UM-253) for information on the Builder button.

  The expression can involve more than one signal but is limited to signals logged in the Wave window. Expressions can include constants, variables, and DO files. If no expression is specified, the search will give an error. See "Expression syntax" (CR-23) for more information.

- **Match Count**
  Indicates the number of transitions or matches to search.You can search for the nth transition or the nth match on value.

The Search Results are indicated at the bottom of the dialog.

Force Selected Signal dialog

This is the same dialog that is accessible via the Objects window. See "Force Selected Signal dialog" (GR-186) for more information.

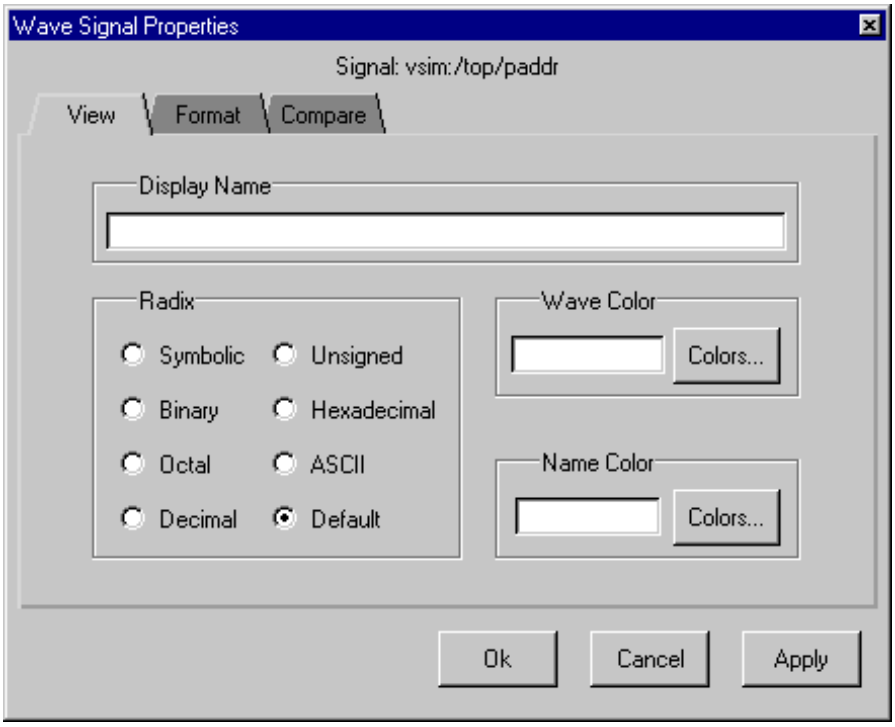
Define Clock dialog

This is the same dialog that is accessible via the Objects window. See "Define Clock dialog" (GR-188) for more information.

Wave Signal Properties dialog

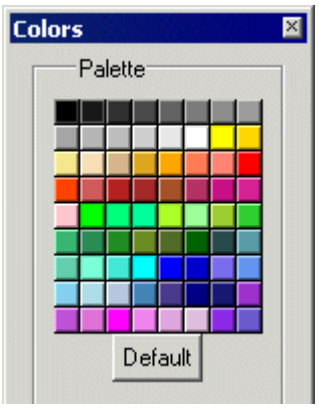
Purpose	Menu command	Additional information
Format object display properties	**View > Properties**	"Formatting the Wave window" (UM-255)

View tab



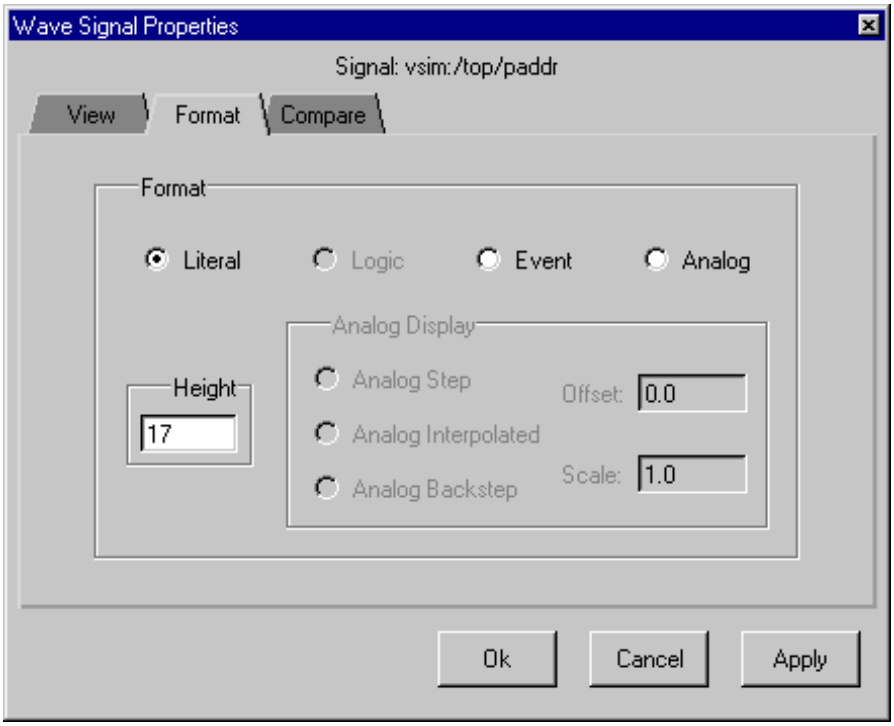
The View tab includes these options:

- **Display Name**
  Specifies a new name (in the pathname pane) for the selected signal.
- **Radix**
  Specifies the Radix of the selected signal(s). See "Changing radix (base)" (UM-255).



- **Wave Color**
  Specifies the waveform color. Select a new color from the color palette, or enter a color name. The Default button in the Colors palette allows you to return the selected object's color back to its default value.
- **Name Color**
  Specifies the signal name's color. Select a new color from the color palette, or enter a color name. The Default button in the Colors palette allows you to return the selected object's color back to its default value.

Format tab



The Format tab includes these options:

Format

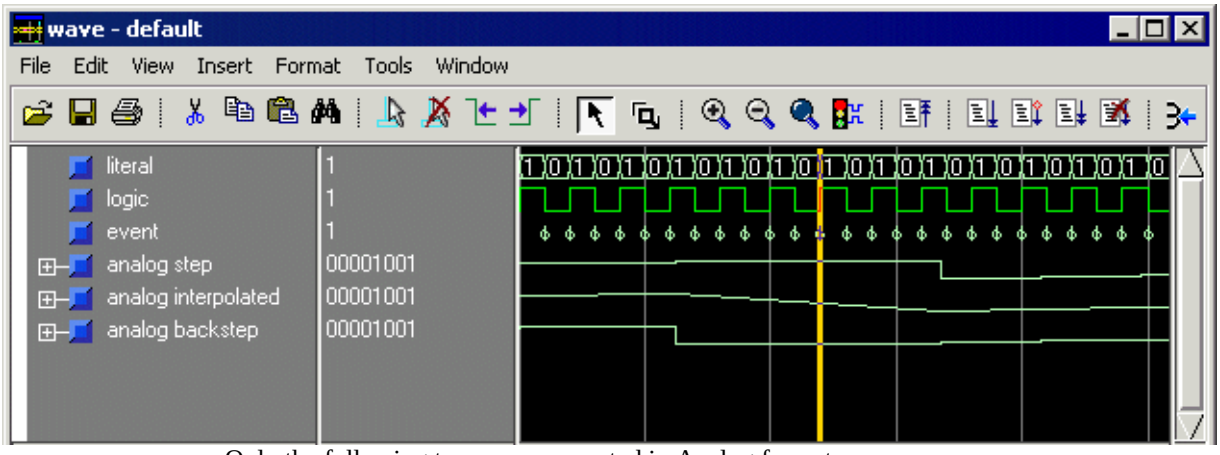
- **Literal**
  Displays the waveform as a box containing the object value (if the value fits the space available). This is the only format that can be used to list a record.
- **Logic**
  Displays values as U, X, 0, 1, Z, W, L, H, or -.
- **Event**
  Marks each transition during the simulation run.

- **Analog**
  Displays the values in one of three analog styles, as detailed below.
- **Height**
  Allows you to specify the height (in pixels) of the waveform.

Analog

- **Analog Step**
  Displays the waveform in step style.
- **Analog Interpolated**
  Displays the waveform in interpolated style.
- **Analog Backstep**
  Displays the waveform in backstep style. Often used for power calculations.
- **Offset**
  Allows you to adjust the scale of the object as it is seen on the display. Offset is the number of pixels offset from zero.
- **Scale**
  Reduces (if less than 1) or increases (if greater than 1) the number of pixels displayed.

The signals in the following illustration demonstrate the various signal formats.



Only the following types are supported in Analog format:

- **VHDL types:**
  All vectors - std logic vectors, bit vectors, and vectors derived from these types
  Scalar integers
  Scalar reals
  Scalar times
- **Verilog types:**
  All vectors
  Scalar reals
  Scalar integers
- **SystemC types:**
  Vector types (sc_int<>, sc_bigint<>, etc.)
  Scalar integers (char, short, int, long, etc.)
  float, double

Compare tab

The **Compare** tab includes the same options as those in the "Add Signal Options dialog" (GR-244).

Wave Divider Properties dialog

Purpose	Menu command	Additional information
Divide the Wave window	**Insert > Divider**	"Dividing the Wave window" (UM-256)

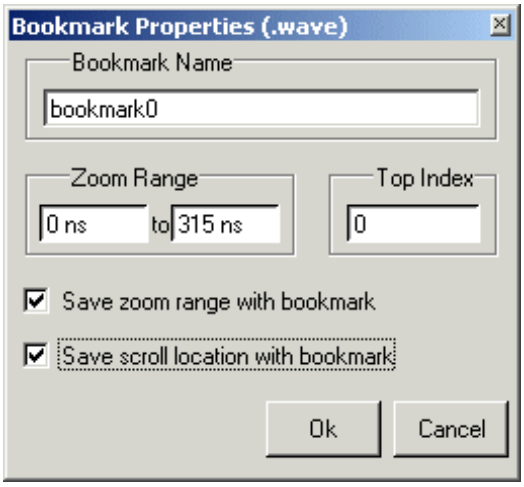
When the Wave window is docked, this selection is available through the right-click menu.

The Wave Divider Properties dialog includes these options:

- **Divider Name**
  The name of the divider. Default is "New Divider". A dash "-" cannot be used as the first character of the Divider Name. A space may be used as the first character, and it may be followed by a dash. For example, "-Test Signals-" is not permitted as a Divider Name but " -Test Signals- " is permitted.
- **Divider Height**
  The height of the divider in pixels.

Bookmark Properties dialog

Purpose	Menu command	Additional information
Save zoom and scroll position	(window docked) **Add** > **Bookmark** (window undocked) **Insert** > **Bookmark**	"Saving zoom range and scroll position with bookmarks" (UM-250)

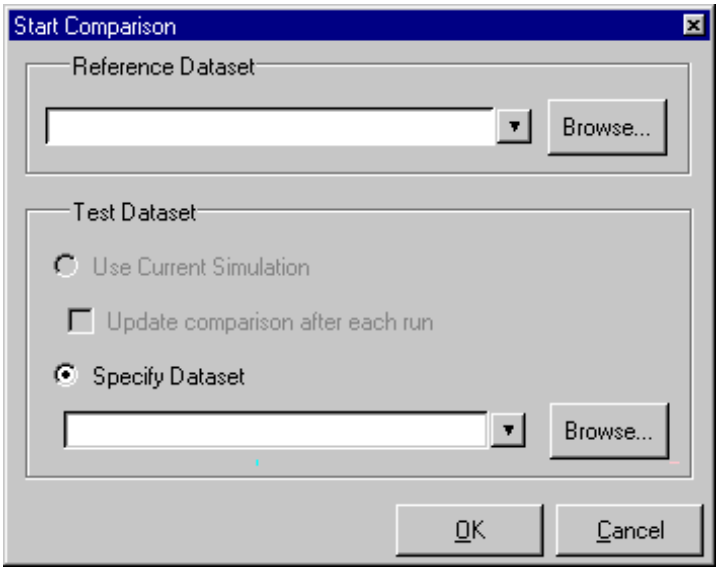


The Bookmark Properties dialog includes the following options.

- **Bookmark Name**
  A text label to assign to the bookmark. The name will identify the bookmark on the **View** > **Bookmarks** menu.
- **Zoom Range**
  A starting value and ending value that define the zoom range.
- **Top Index**
  The object that will display at the top of the Wave window. For instance, if you specify 15, the Wave window will be scrolled down to show the 15th object in the window.
- **Save zoom range with bookmark**
  When checked the zoom range will be saved in the bookmark.
- **Save scroll location with bookmark**
  When checked the scroll location will be saved in the bookmark.

Start Comparison dialog

Purpose	Menu command	Additional information
Start a waveform comparison	**Tools > Waveform Compare > Start Comparison**	"Setting up a comparison with the GUI" (UM-271)



The Start Comparison dialog includes the following options.

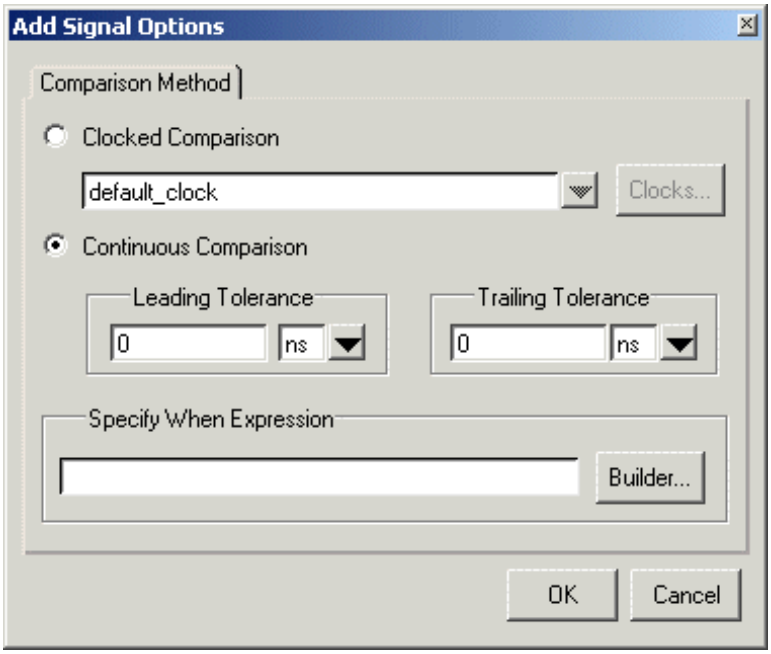
- **Reference Dataset**
  The dataset to which the test dataset will be compared. It can be a saved dataset, the current simulation dataset, or any part of the current simulation dataset.

Test Dataset

- **Use Current Simulation**
  Uses the current active simulation as the test dataset.
- **Update comparison after each run**
  Tracks the current simulation, updating differences after every run command. If you wish to see differences soon after they occur, use many relatively short run commands.
- **Specify Dataset**
  Enter the name of an existing dataset to compare against the reference dataset.

Add Signal Options dialog

Purpose	Menu command	Additional information
Specify comparison method	**Tools > Waveform Compare > Add > Compare by Signal**	"Specifying the comparison method" (UM-276)

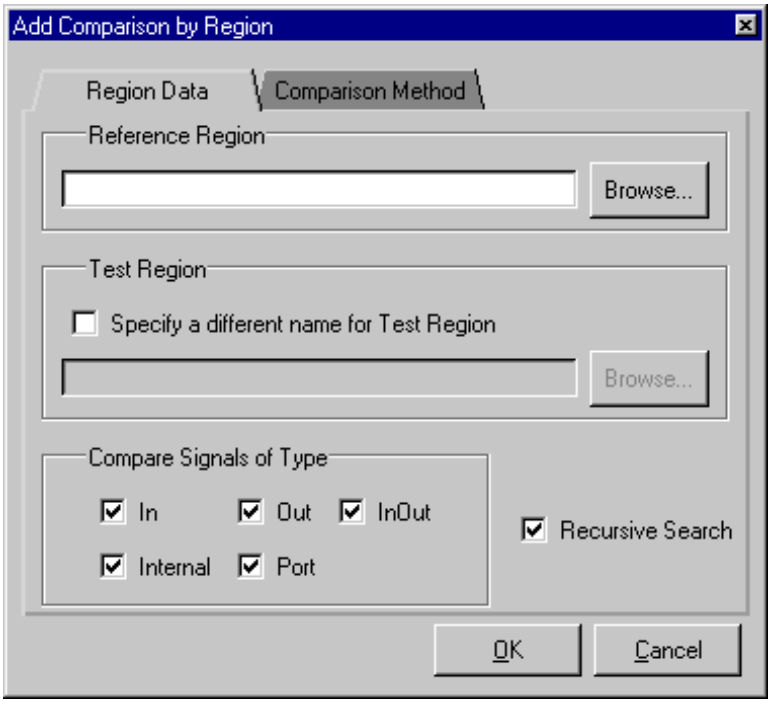


The Add Signal Options dialog includes these options:

- **Clocked Comparison**
  Compare the datasets only at or just after an edge on some signal. In this mode, you define one or more clocks. The test signal is compared to a reference signal and both are sampled relative to the defined clock.
- **Continuous Comparison**
  Compare the test signals to the reference signals at each transition of the reference.
- **Leading Tolerance**
  How much earlier the test signal edge may occur before the reference signal edge. May be specified differently for each signal compared.
- **Trailing Tolerance**
  How much later the test signal edge may occur after the reference signal edge. May be specified differently for each signal compared.
- **Specify When Expression**
  A conditional expression that must evaluate to "true" or 1 at the signal edge for the comparison to become effective. See "GUI_expression_format" (CR-22) for legal expression syntax.

Add Comparison by Region dialog

Purpose	Menu command	Additional information
Add a region to a waveform comparison	**Tools > Waveform Compare > Add > Compare by Region**	"Adding signals, regions, and clocks" (UM-274)



The Add Comparison by Region dialog includes these options:

Region Data tab

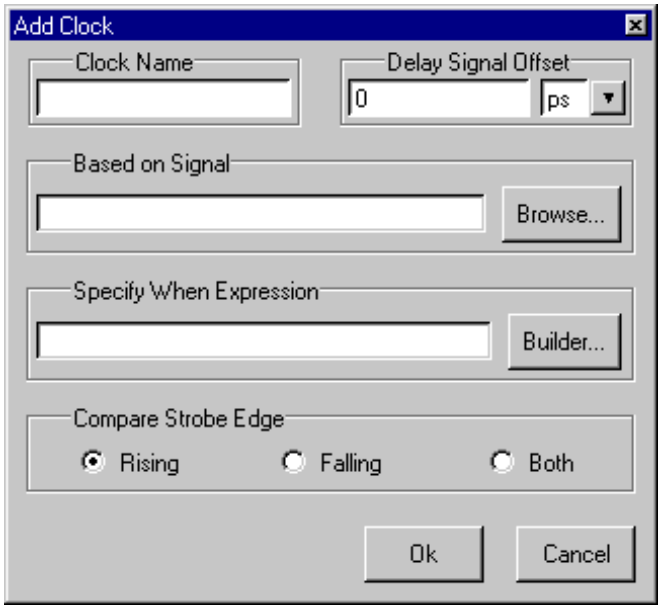
- **Reference Region**
  The reference region that will be used in the comparison.
- **Test Region**
  Use this if you have a test region that has a different name than the reference region.
- **Compare Signals of Type**
  The types of signals to compare.
- **Recursive Search**
  Check if you wish to search for signals in the hierarchy below the specified region.

Comparison Method tab

The Comparison Method tab includes the same options as those in the "Add Signal Options dialog" (GR-244).

Add Clocks dialog

Purpose	Menu command	Additional information
Add a clock for a clocked comparison	**Tools** > **Waveform Compare** > **Add** > **Clocks**	"Adding signals, regions, and clocks" (UM-274)



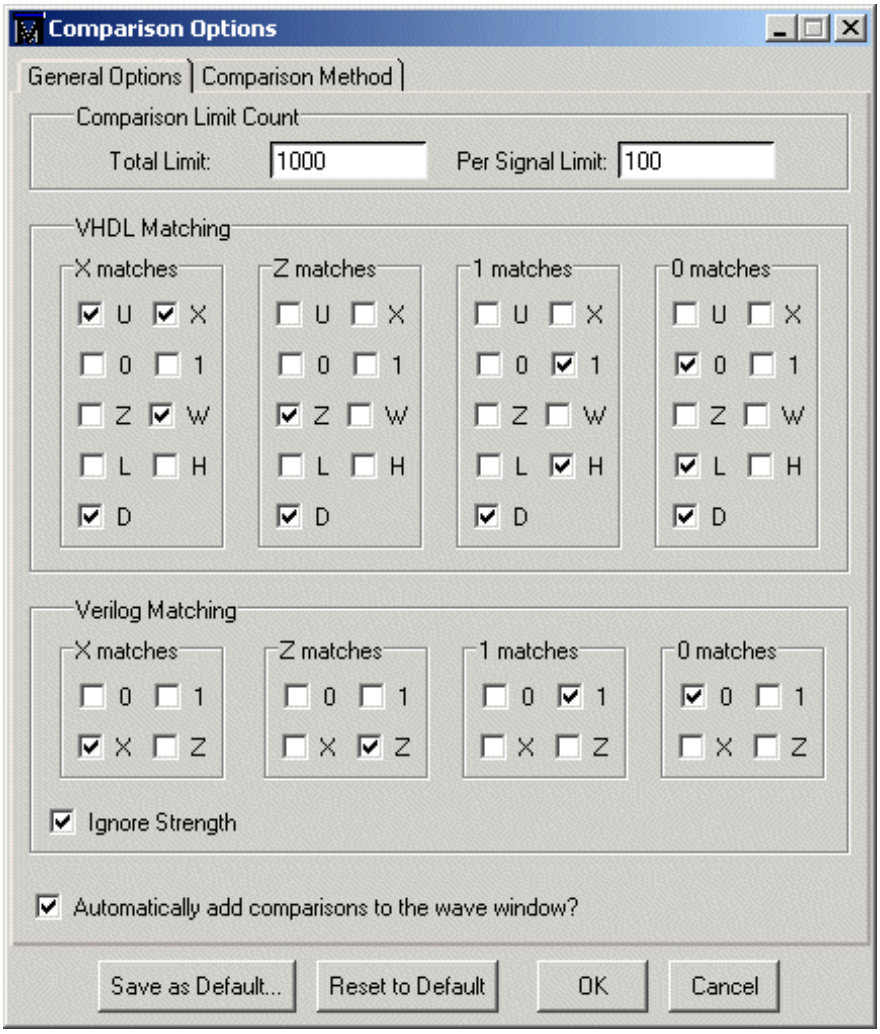
The Add Clock dialog includes these options:

- **Clock Name**
  A name for the clock.
- **Delay Signal Offset**
  A time value for delaying the sample time beyond the specified signal edge.
- **Based on Signal**
  The signal whose edge(s) is to be used as the strobe trigger.
- **Specify When Expression**
  A conditional expression that must evaluate to "true" or "1" for the clock edge to be used as a strobe. Optional. The expression is evaluated at the time of the clock edge rather than after the delay has been applied. See "GUI_expression_format" (CR-22) for legal expression syntax.
- **Compare Strobe Edge**
  The edge(s) of the specified signal that should be used for the strobe trigger.

Comparison Options dialog

Purpose	Menu command	Additional information
Configure waveform comparison option	**Tools > Waveform Compare > Options**	"Setting compare options" (UM-278)

General Options tab



The General Options tab includes these options:

- **Comparison Limit Count**
  Limit the comparison to a specific number of total differences and/or a specific number of differences per signal.
- **VHDL Matching**
  Designate which VHDL signal values will match X, Z, 1, and 0 values.

- **Verilog Matching**
  Designate which Verilog signal values will match X, Z, 1, and 0 values.
- **Ignore Strength**
  Ignore the strength of the Verilog signal and consider only logic values.
- **Automatically add comparisons to the Wave window?**
  If checked new signal comparison objects are added automatically to the Wave window.
- **Save as Default**
  Saves the settings to a *modelsim.tcl* file so they become the defaults for future comparisons. See "Preference variables located in Tcl files" (UM-540) for more information.
- **Reset to Default**
  Reset the dialog to the default options with which ModelSim ships.

Comparison Method tab

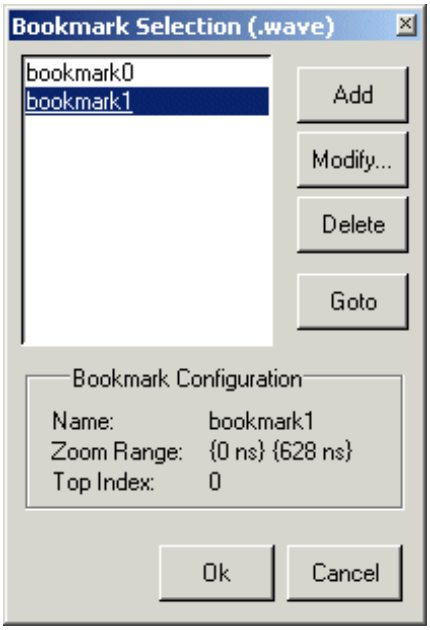
The Comparison Method tab includes the same options as those in the "Add Signal Options dialog" (GR-244).

Modify Breakpoints dialog

This is the same dialog that is accessible via the Main window. See "Modify Breakpoints dialog" (GR-95) for more information.

Bookmark Selection dialog

Purpose	Menu command	Additional information
Add/edit/delete bookmarks	**Tools** > **Bookmarks**	"Saving zoom range and scroll position with bookmarks" (UM-250)

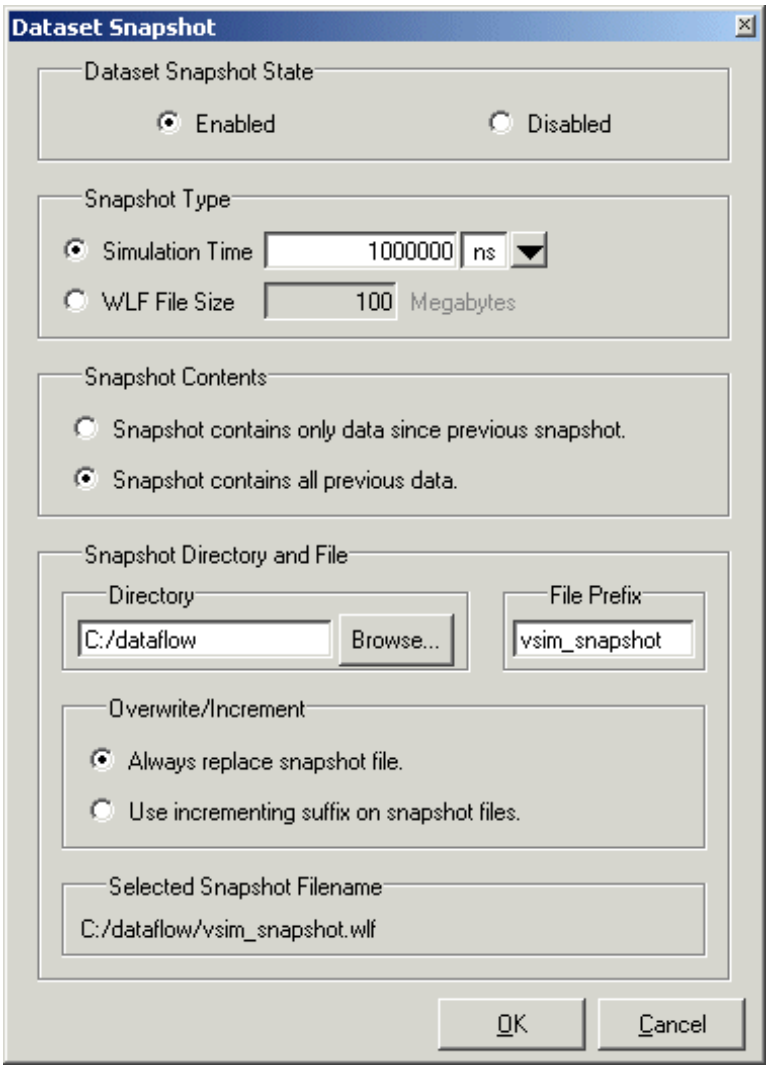


The Bookmark Selection dialog includes the following options.

- **Add**
  Add a new bookmark.
- **Modify**
  Edit the selected bookmark.
- **Delete**
  Delete the selected bookmark.
- **Goto**
  Zoom and scroll the Wave window using the selected bookmark.

Dataset Snapshot dialog

Purpose	Menu command	Additional information
Save simulation results at regular intervals	**Tools > Dataset Snapshot**	"Saving at intervals with Dataset Snapshot" (UM-231)



The Dataset Snapshot dialog includes these options:

Dataset Snapshot State

- **Enabled/Disabled**
  Enable or disable Dataset Snapshot. All other dialog options are unavailable if Disabled is selected.

Snapshot Type

- **Simulation Time**
  Specifies that data is copied to the specified snapshot file every <x> time units. Default is 1000000 time units.
- **WLF File Size**
  Specifies that data is copied to the specified snapshot file whenever the current simulation WLF file reaches <*x*> megabytes. Default is 100 MB.

Snapshot Contents

- **Snapshot contains only data since previous snapshot**
  Specifies that each snapshot contains only data since the last snapshot. This option causes ModelSim to clear the current simulation WLF file each time a snapshot is taken.
- **Snapshot contains all previous data**
  Specifies that each snapshot contains all data from the time signals were first logged. The entire contents of the current simulation WLF file are saved each time a snapshot is taken.

Snapshot Directory and File

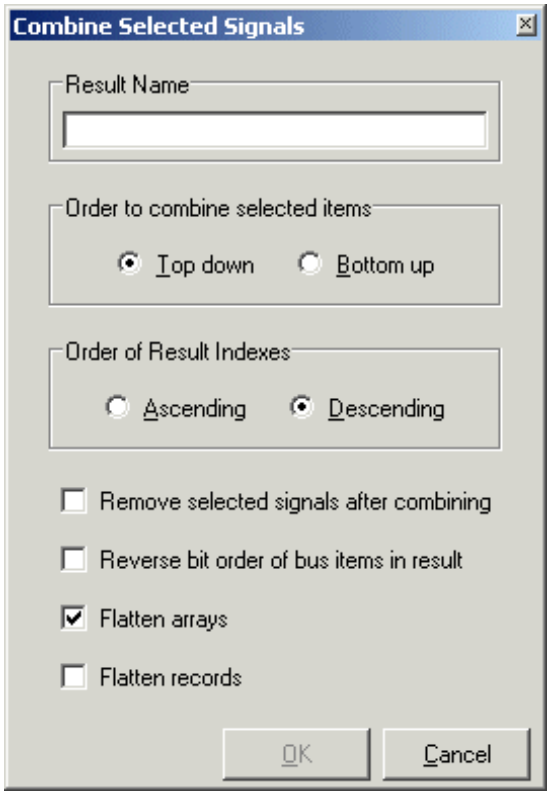
- **Directory**
  The directory in which ModelSim saves the snapshot files.
- **File Prefix**
  The name of the snapshot files. ModelSim adds *.wlf* to the snapshot files.

Overwrite / Increment

- **Always replace snapshot file**
  Specifies that a single file is created for all snapshots. Each new snapshot overwrites the previous.
- **Use incrementing suffix on snapshot files**
  Specifies that a new file is created for each snapshot. Each new snapshot creates a separate file (e.g., *vsim_snapshot_1.wlf*, *vsim_snapshot_2.wlf*, etc.).

Combine Selected Signals dialog

Purpose	Menu command	Additional information
Create busses from individual signals	**Tools > Combine Signals**	"Combining objects/creating busses" (UM-264)



The Combine Selected Signals dialog includes these options:

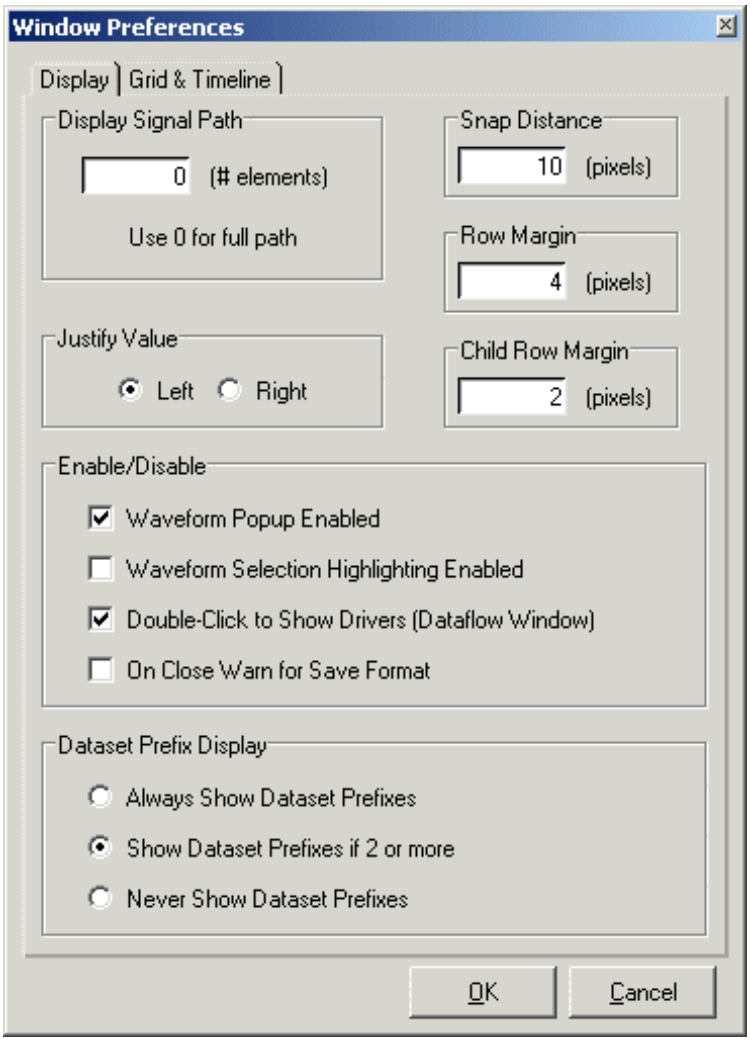
- **Result Name**
  Specifies the name of the newly created bus.
- **Order to combine selected items**
  Specifies the order in which to combine the selected signals. "Top down" specifies that the selected signals are ordered as they appear top-to-bottom in the Wave window. "Bottom up" reverses the order.
- **Order of Result Indexes**
  Specifies in which order the selected signals are indexed in the bus. If set to Ascending, the first signal selected in the Wave window will be assigned an index of 0. If set to Descending, the first signal selected will be assigned the highest index number.
- **Remove selected signals after combining**
  Specifies whether you want to remove the selected signals from the Wave window once the bus is created.

- **Reverse bit order of bus items in the result**
  If checked, the bits of each selected signal are reversed in the newly created bus. The order of the signals in the bus is not affected.
- **Flatten arrays**
  If checked, ModelSim combines the signals into one big array. If unchecked, ModelSim combines signals together without merging them into one array. The signals become elements of a record and retain their original names. When expanded, the new signal looks just like a group of signals.
- **Flatten records**
  If checked, causes elements of a record type signal to be pulled up to the top level.

Window Preferences dialog

Purpose	Menu command	Additional information
Configure window preferences	(window docked) **Tools > Options > Wave Preferences** (window undocked) **Tools > Window Preferences**	"Formatting the Wave window" (UM-255)

Display tab



The Display tab includes the following options:

- **Display Signal Path**
  Sets the display to show anything from the full pathname of each signal (e.g., *sim:/top/*

clk) to only its leaf element (e.g., *sim:clk*). A non-zero number indicates the number of path elements to be displayed. The default is Full Path.

- **Justify Value**
  Specifies whether the signal values will be justified to the left margin or the right margin in the values window pane.
- **Snap Distance**
  Specifies the distance the cursor needs to be placed from an object edge to jump to that edge (a 0 specification turns off the snap).
- **Row Margin**
  Specifies the distance in pixels between top-level signals.
- **Child Row Margin**
  Specifies the distance in pixels between child signals.

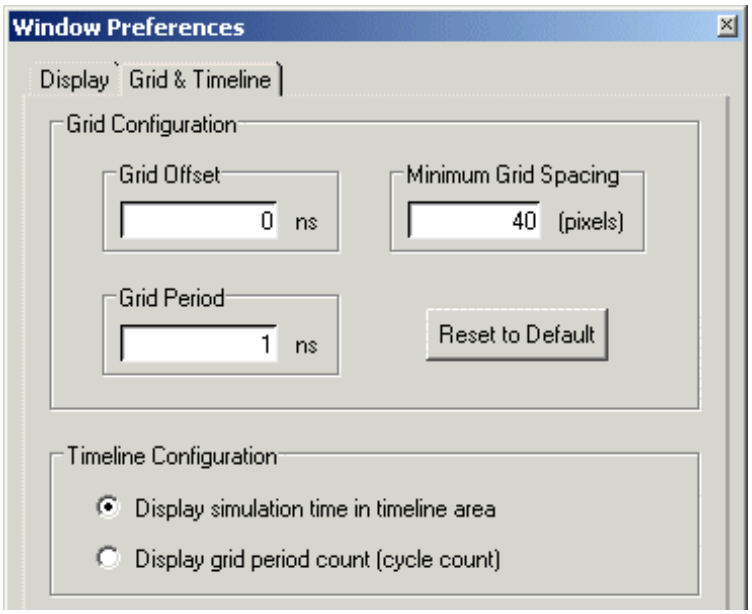
Enable/Disable

- **Waveform Popup Enable**
  Toggles on/off the popup that displays when you rest your mouse pointer on a signal or comparison object.
- **Waveform Selection Highlighting Enabled**
  Toggles on/off waveform highlighting. When enabled the waveform is highlighted if you select the waveform or its value.
- **Double-Click to Show Drivers (Dataflow Window)**
  Toggles on/off double-clicking to show the drivers of the selected waveform. See "Displaying drivers of the selected waveform" (UM-269) for more details.
- **On Close Warn for Save Format**
  Toggles on/off a message that prompts you to save the Wave window format when you close the window. See "Saving the window format" (UM-261) for more details.

Dataset Prefix Display

- **Always Show Dataset Prefixes**
  All dataset prefixes will be displayed along with the dataset prefix of the current simulation ("sim").
- **Show Dataset Prefixes if 2 or more**
  Displays all dataset prefixes if 2 or more datasets are displayed. "sim" is the default prefix for the current simulation.
- **Never Show Dataset Prefixes**
  No dataset prefixes will be displayed. This selection is useful if you are running only a single simulation.

Grid & Timeline tab



The Grid & Timeline tab includes the following options:

- **Grid Offset**
  Specifies the time (in user time units) of the first grid line. Default is 0.
- **Grid Period**
  Specifies the time (in user time units) between subsequent grid lines. Default is 1.
- **Minimum Grid Spacing**
  Specifies the closest (in pixels) two grid lines can be drawn before intermediate lines will be removed. Default is 40.
- **Timeline Configuration**
  Specifies whether to display simulation time or grid period count on the horizontal axis. Default is to display simulation time.

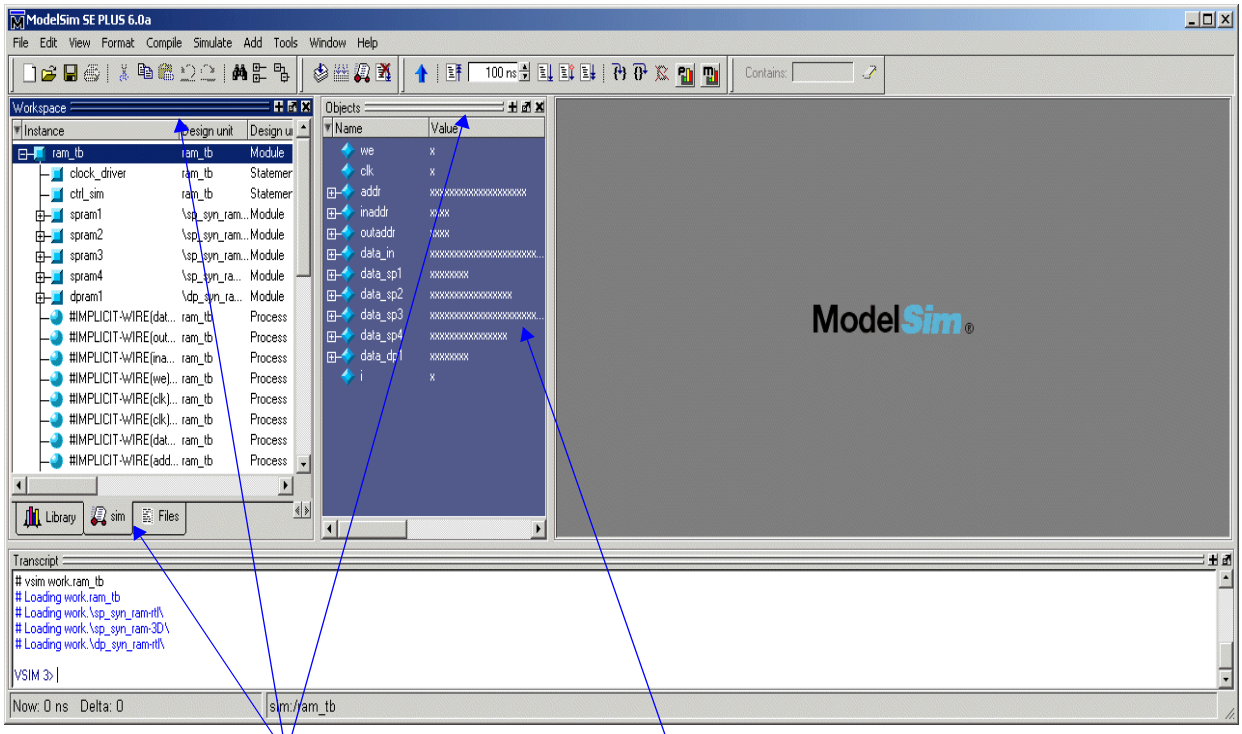
You can also access this tab by right-clicking in the cursor tracks at the bottom of the Wave window and selecting Grid & Timeline Properties.

Customizing the GUI layout

You can customize the layout of panes, windows, toolbars, etc., and ModelSim will remember your settings the next time you start the tool. This section discusses the various options for customizing the GUI layout.

Moving, docking, and undocking panes

Window panes (e.g., Transcript) can be positioned at various places within the parent window or they can be dragged out ("undocked") of the parent window altogether. When you see a double bar at the top edge of a pane, it means you can modify the pane position.



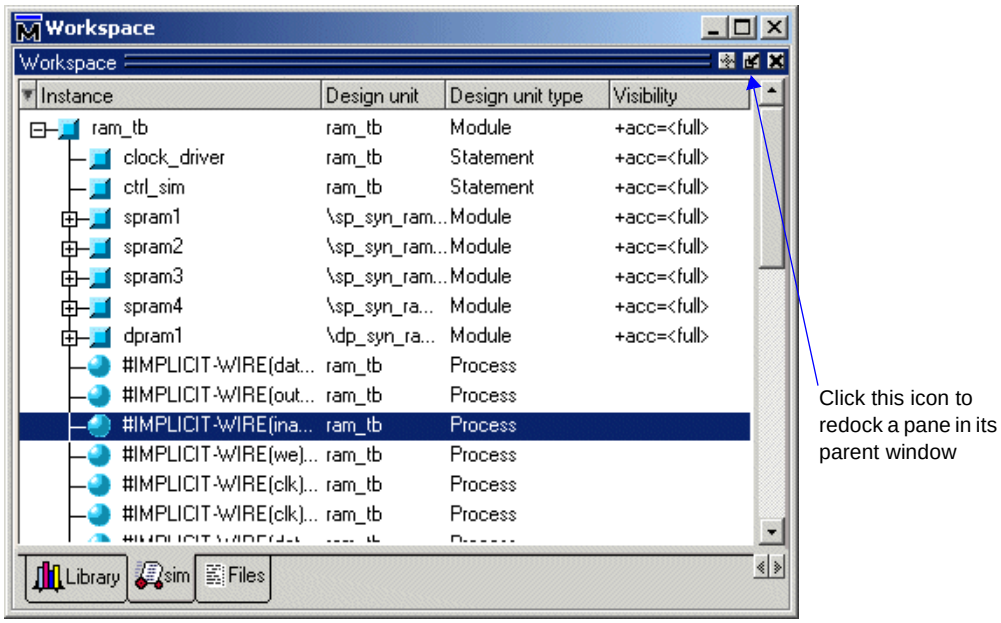
Click-and-drag on the double bar to move, undock, or dock a pane

Click this icon to undock a pane; click it again to redock

Click-and drag on the double bar to reposition the pane inside the parent window. As you move the mouse to various parts of the main window, a gray outline will show you valid locations to drop the pane.

Or, drag the pane outside of the parent window, and when you let go of the mouse button, the pane becomes a free-floating window.

To redock a floating pane, click on the double bar at the top of the window and drag it back into the parent window or click the undock/dock icon as shown in the graphic below:

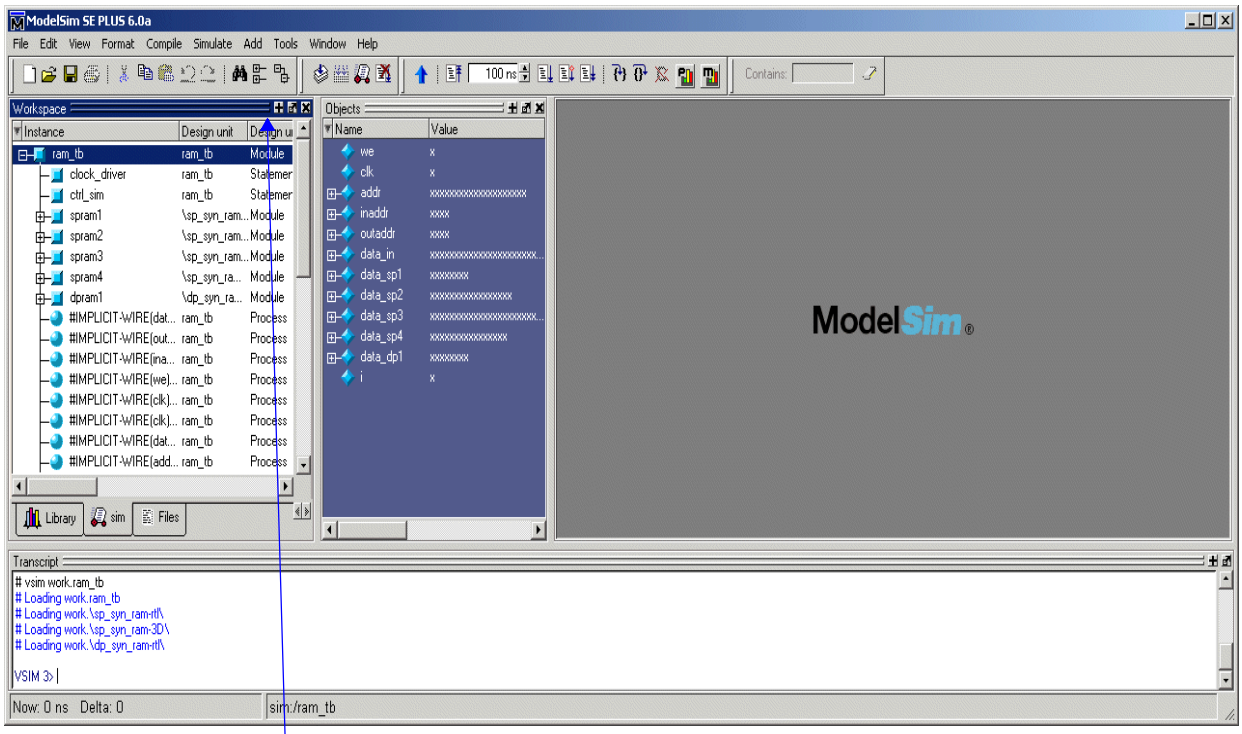


You can also undock a pane by clicking the undock/dock icon, as noted in the picture above.

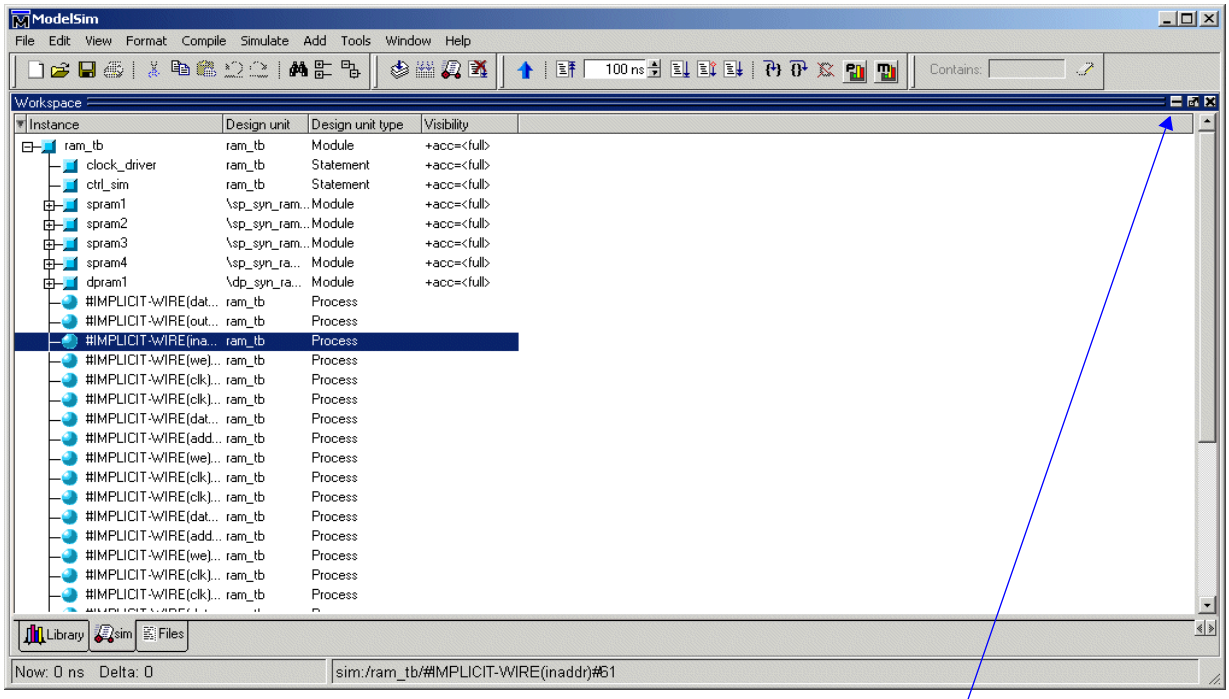
Note: If you want to return to the original default layout, select **Window** > **Initial Layout**.

Zooming panes

You can expand panes to fill the entire Main window by clicking the zoom icon. For example, in the graphic below, clicking the zoom icon on the Workspace pane makes it fill the entire Main window, as shown on the following page.



Click the zoom icon to expand a pane to fill the entire window

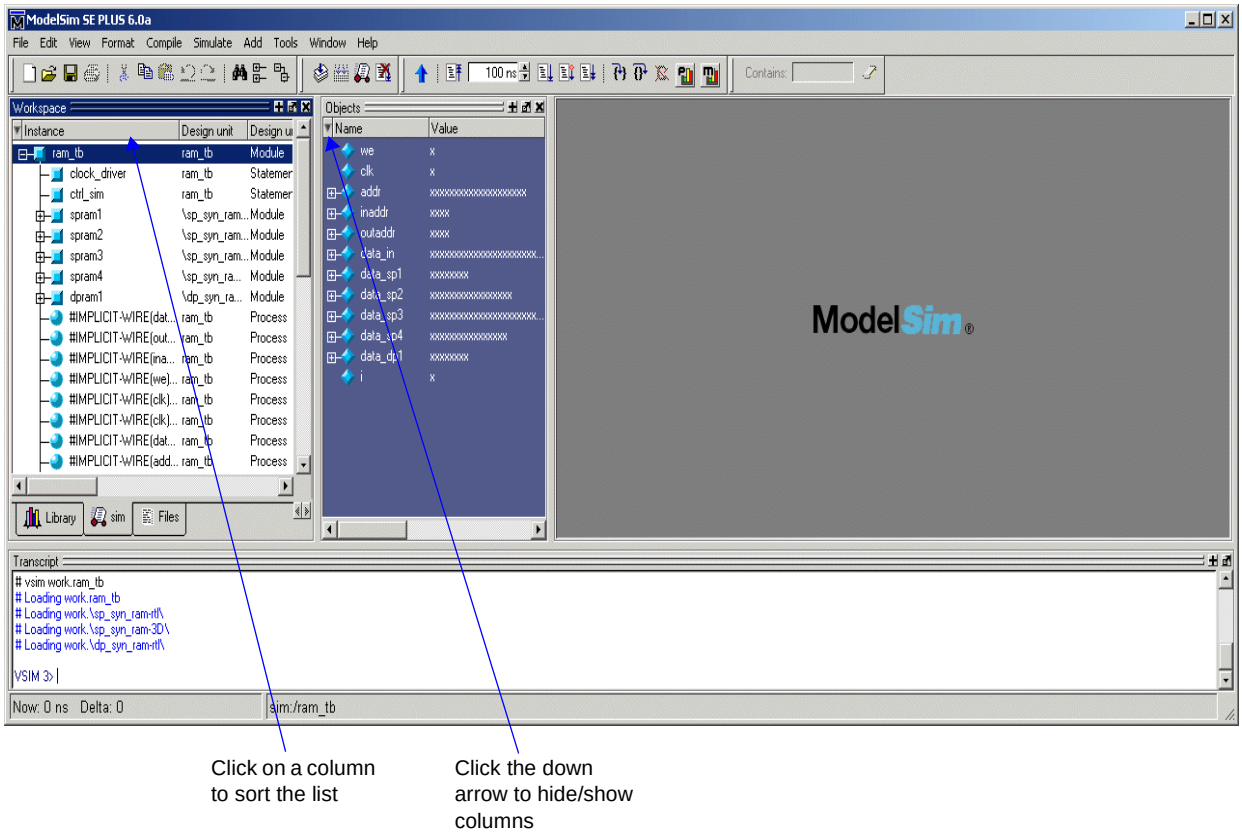


Click the unzoom icon to restore the pane to its original size and position

Columnar information display

Many panes (e.g., Objects, Workspace, etc.) display information in a columnar format. You can perform a number of operations on columnar formats:

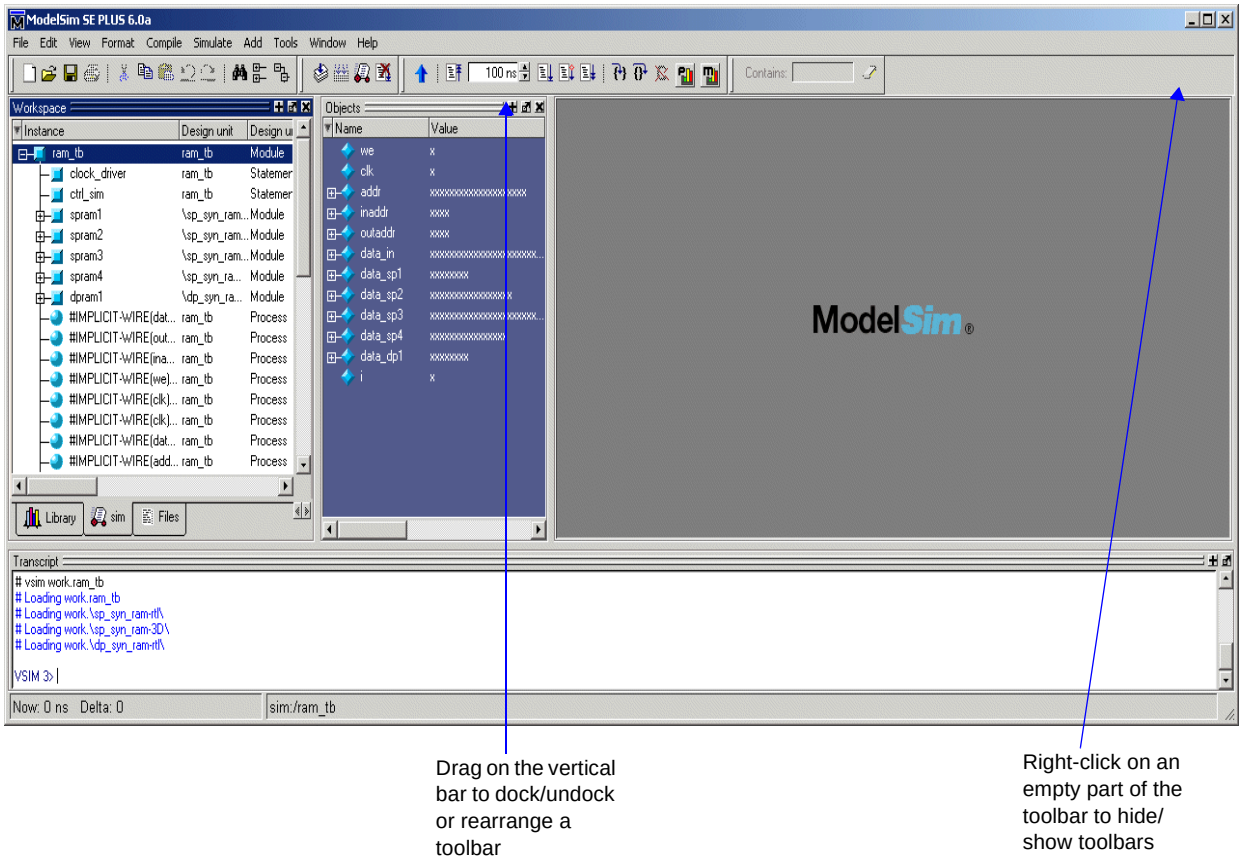
- Click and drag on a column heading to rearrange columns
- Click and drag between columns to increase/decrease column size
- Sort columns by clicking once on the column heading to sort in ascending order; clicking twice to sort in descending order; and clicking three times to sort in default order.
- Hide or show columns by either right-clicking a column heading and selecting an object from the context menu or by clicking the column-list drop down arrow and selecting an object.



Quick access toolbars

Toolbar buttons provide access to commonly used commands and functions. Toolbars can be docked and undocked (moved to or from the main toolbar area) by clicking and dragging on the vertical bar at the left-edge of a toolbar.

You can also hide/show the various toolbars. To hide or show a toolbar, right-click on a blank spot of the main toolbar area and select a toolbar from the list.



To reset toolbars to their original state, right-click on a blank spot of the main toolbar area and select **Reset**.

Creating and managing breakpoints

ModelSim supports both signal (i.e., when conditions) and file-line breakpoints. Breakpoints can be set from multiple locations in the GUI or from the command line. Breakpoints within SystemC portions of the design can only be set using File-line breakpoints (GR-264).

Signal breakpoints

Signal breakpoints (when conditions) instruct ModelSim to perform actions when the specified conditions are met. For example, you can break on a signal value or at a specific simulator time (see the **when** command (CR-407) for additional details). When a breakpoint is hit, a message in the Main window transcript identifies the signal that caused the breakpoint.

Setting signal breakpoints from the command line

You use the **when** command (CR-407) to set a signal breakpoint from the VSIM> prompt. See the *Command Reference* for further details.

Setting signal breakpoints from the GUI

Signal breakpoints are most easily set in the Objects pane (GR-184) and the Wave window (GR-211). Right-click a signal and select **Insert Breakpoint** from the context menu. A breakpoint is set on that signal and will be listed in the **Breakpoints** dialog.

Alternatively you can set signal breakpoints from the "Modify Breakpoints dialog" (GR-95).

File-line breakpoints

File-line breakpoints are set on executable lines in your source files. When the line is hit, the simulator stops.

Since C Debug is invoked when you set a breakpoint within a SystemC module, your C Debug settings must be in place prior to setting a breakpoint. See Setting up C Debug (UM-402) for more information. Once invoked, C Debug can be exited using the C Debug menu.

Setting file-line breakpoints from the command line

You use the **bp** command (CR-75) to set a file-line breakpoint from the VSIM> prompt. See the *Command Reference* for further details.

Setting file-line breakpoints from the GUI

File-line breakpoints are most easily set using your mouse in the Source window (GR-199). Click on a blue line number at the left side of the Source window, and a red diamond denoting a breakpoint will appear. The breakpoints are toggles – click once to create the colored diamond; click again to disable or enable the breakpoint. To delete the breakpoint completely, click the red diamond with your right mouse button, and select **Remove Breakpoint**.

Alternatively you can set file-line breakpoints from the "Modify Breakpoints dialog" (GR-95).

2 - Setting GUI preferences

Chapter contents

ModelSim GUI preferences GR-266
Setting variables from the GUI GR-267
Setting variables from the command line GR-267

This chapter describes how to set preferences for the ModelSim GUI.

ModelSim GUI preferences

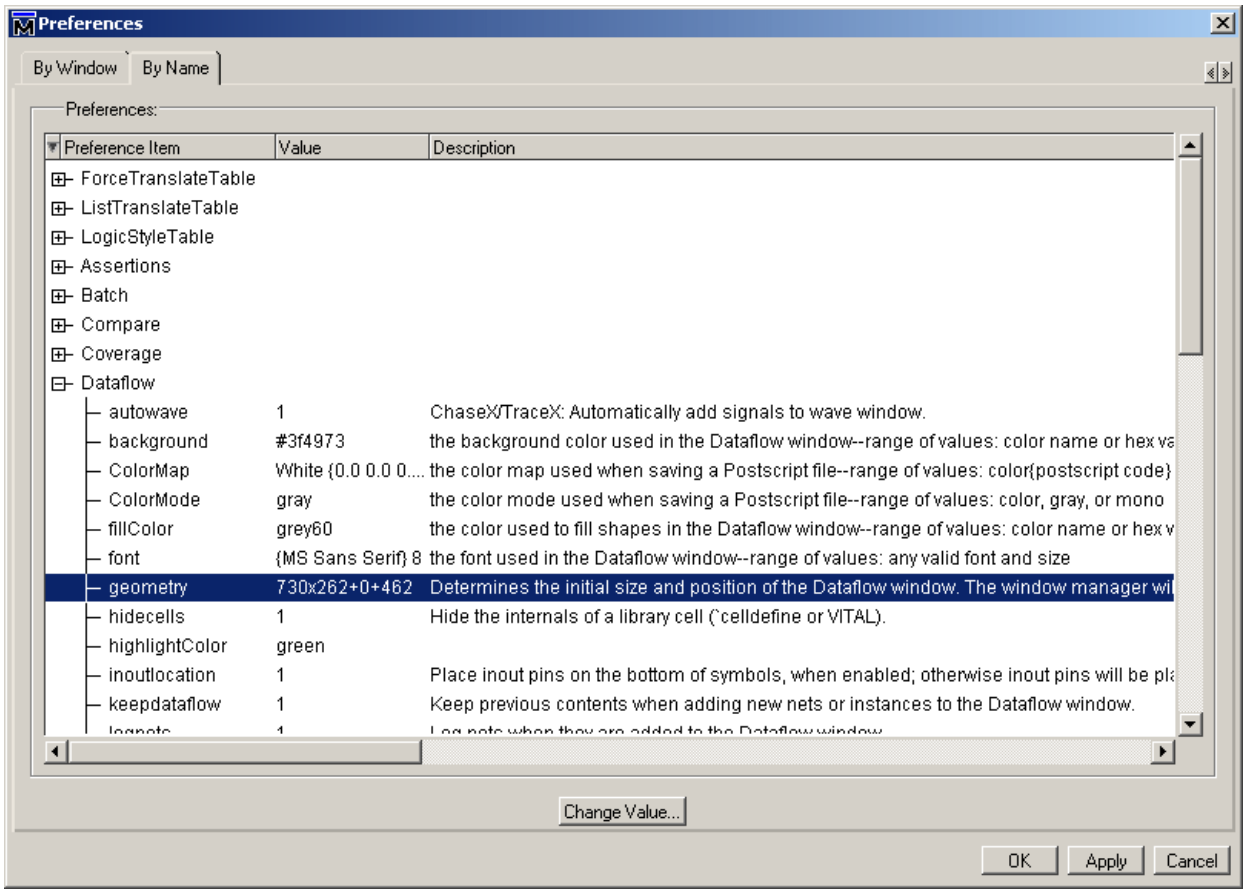
ModelSim Tcl preference variables give you control over fonts, colors, prompts, and other GUI characteristics. When you invoke ModelSim the first time, it loads default preferences from the *pref.tcl* file. You can customize the preference variables and save a file called *modelsim.tcl* file that ModelSim reads in lieu of *pref.tcl*. Once you have created a *modelsim.tcl* file, ModelSim attempts to load the file each time it starts up. ModelSim searches for the file as follows:

- use MODELSIM_TCL (UM-521) environment variable if it exists (if MODELSIM_TCL is a list of files, each file is loaded in the order that it appears in the list); else
- use *./modelsim.tcl*; else
- use $(HOME)/modelsim.tcl if it exists

Important: If your preference file is not named *modelsim.tcl*, or if the file is not located in the directories mentioned above, you must refer to it with the MODELSIM_TCL environment variable.

Setting variables from the GUI

Select **Tools** > **Edit Preferences** in the Main window to open the Preferences dialog box.



You can change settings on either the By Window tab or the By Name tab. The By Window tab allows you to change colors and fonts. The By Name tab lists every Tcl variable in ModelSim. Clicking the OK button saves all changes to a user preference file which is invoked every time ModelSim is invoked. See "Preferences dialog" (GR-104) for more details on the dialog.

Setting variables from the command line

Use the Tcl **set** command (UM-477) to customize preference variables from the Main window command line:

```
set <variable name> <variable value>
```

This command establishes variable values for the current session only. To save the current preference settings to a *modelsim.tcl* file, use the **write preferences** command:

```
write preferences modelsim.tcl
```

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