

Model Technology

A MENTOR GRAPHICS COMPANY

General Information - Last Updated: 03/24/00

ModelSim SE/EE 5.4 Quick Guide

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ModelSim Editions	
<i>ModelSim-PE</i>	Personal Edition (FPGA, Basic Functionality)
<i>ModelSim-SE/EE</i>	Special Edition / Elite Edition (ASIC signoff, Code Coverage, Performance Analyzer)
ModelSim Products	
<i>ModelSim-VHDL</i>	VHDL Compiler, Simulator, Debugger
<i>ModelSim-VLOG</i>	Verilog Compiler, Simulator, Debugger
<i>ModelSim-PLUS</i>	VHDL & Verilog Compiler, Simulator, Debugger
<i>ModelSim-LNL</i>	VHDL or Verilog Compiler, Simulator, Debugger
ModelSim Definitions	
<i>LNL</i>	Language Neutral Licensing (VHDL or Verilog)
<i>SKS</i>	Single Kernel Simulator
Quick Guide Notes	
Find this document at http://www.model.com/pdf/se_guide.pdf	
Commands in bold are typed at the ModelSim> or VSIM> prompts	
Licensing Help	
http://www.model.com/resources/licensing/licensing_help.html	

Installation / Environment / Licensing

Documentation		
ModelSim Start Here: http://www.model.com/pdf/se_start.pdf		
ModelSim Tutorial: http://www.model.com/pdf/se_tutor.pdf		
Globetrotter FlexLM Doc: http://www.globetrotter.com/manual.htm		
Web - Download the Latest Release		
http://www.model.com/support/download.html		
ftp://ftp.model.com/pub/	(206.103.63.81)	[Fast]
ftp://support.model.com/pub/model.com/	(206.103.57.2)	[Slow]
Environment Variables (see ModelSim cmd "printenv")		
LM_LICENSE_FILE	Required	Pathname of <i>license.dat</i> file
DOPATH	Optional	Search path for ".do" files
EDITOR	Optional	Specifies editor for "edit" cmd
MODELSIM	Optional	Pathname of <i>modelsim.ini</i> file
MODELSIM_TCL	Optional	List of <i>modelsim.tcl</i> files
MODEL_TECH_TCL	Optional	Pathname to Tcl/Tk libraries
MODEL_TECH	Don't Set	Used internally by ModelSim
MGC_LOCATION_MAP	Optional	Used as "soft" path to find files
MTI_TF_LIMIT	Optional	Limits Transcript file size (k)
PLIOBJS	Optional	Used to load PLI object files
TMPDIR	Optional	Used by VSIM for temp space
Mentor Graphics Licensing Environment Variable		
MGLS_LICENSE_FILE		Pathname for Mentor license file
MGLS_HOME		Pathname for Mentor Licensing
PATH Environment Variable		
Unix: Add <code><install_dir>/modeltech/bin</code> to \$path		
PC: PATH will be updated automatically during install		
Starting the License Server		
Unix: Copy <i>license.dat</i> file to <code><install_dir>/modeltech/<platform>/</code>		
Run <code><install_dir>/modeltech/<platform>/START_SERVER</code>		
PC: Run <code><install_dir>/modeltech/win32/flexlm.cpl</code>		
Use "Setup" and "Control" tabs to configure and start server		
Licensing Diagnostics		
Unix: Run <code><install_dir>/modeltech/<platform>/lmstat -a</code> or <code>lmdiag</code>		
PC: Run <code><install_dir>/modeltech/win32/lmutl lmstat -a</code> or <code>lmutil lmdiag</code>		
Invoking ModelSim		
Unix: Run <code><install_dir>/modeltech/bin/vsim</code>		
PC: <code>Start->Programs->Model Tech->ModelSim -or-</code>		
PC: Double-click on: <code><install_dir>/modeltech/win32/modelsim.exe</code>		

Key ModelSim Commands (see Command Reference for more)

Command	Where used: (Shell, ModelSim> VSIM>	Description
For details on these commands refer to the ModelSim Reference Manual		
vcom	Sh, M, V	VHDL Compiler (see below)
vdel	Sh, M, V	Deletes a design unit from a specific library
vdir	Sh, M, V	Lists the contents of a library
vlib	Sh, M, V	Creates a design library
vlog	Sh, M, V	Verilog Compiler (see below)
vmap	Sh, M, V	Defines or displays library mappings
vsim	Sh, M, V	VHDL and/or Verilog Simulator (see below)
add button	M, V	Adds a button (e.g., add button MyRun {run 5000})
add list wave	V	Add signals to the List or Wave windows
add log	V	Log signals to <i>vsim.wlf</i> file for analysis later
alias	M, V	Create a user defined alias (e.g., alias h "history")
bp, bd	V	Set/Clear a breakpoint (see Managing Breakpoints below)
cd	Sh, M, V	Change directory
change	V	Modify a VHDL variable or Verilog register
checkpoint	V	Save the state of you simulation (see restore)
configure	M, V	Configure List or Wave window attributes
delete	V	Remove HDL item from List or Wave window
do	M, V	Execute a file of commands (e.g., do macro.do)
drivers	V	Display current and future value of signal or net drivers
echo	M, V	Display message (e.g., echo "Time is \$now ns.")
edit	M, V	Invoke editor specified by the EDITOR env variable
environment	M, V	Display or change current region/signal environment
examine	M, V	Examine one or more HDL items (e.g., exa /top/clk)
find	V	Display pathnames of matching HDL items
force	V	Force signals or nets (e.g., force clk 1 10, 0 20 -r 100)
history	M, V	List previous commands
log	M, V	Same as add log above
.main clear	M, V	Clears the Main window transcript
noforce	V	Release signals or nets from force commands
notepad	M, V	Simple text editor
printenv	M, V	Display names and values of environment variables
property	V	Change List or Wave signal attributes (color, radix, etc.)
pwd	M, V	Display current path in Main transcript window
radix	M, V	Change the default radix in all windows
report	M, V	report simulator control returns all control variable values
report	M, V	report simulator state returns all state variable values
restart	V	Restart the simulator
restore	M, V	Restore the simulation state from a previous checkpoint
resume	M, V	Resume macro execution after a pause command
right left	V	Search in wave window for next transition or -expr
run	V	Advance simulation time (e.g., run 1000)
search next	V	Search specified window for next item matching pattern
seetime	V	Scroll List or Wave window to time (e.g., seetime wave 500)
view	M, V	Open a ModelSim window and pop it to the top
vsource	V	Display HDL source file in Source window
when	M, V	Perform action on condition (e.g., when clk=1 {echo clk})
where	M, V	Display info about the environment
write	M, V	Records names, window contents and preferences to a file
↑↓	M, V	Toggle thru last commands
<ctrl-a>	M, V	Move to beginning of line
<ctrl-e>	M, V	Move to end of line
<ctrl-c>	M, V	Copy the selection in the Main transcript window
<ctrl-v>	M, V	Paste to the Main transcript window (see <ctrl-c>)
!! !n	M, V	Repeat last command, Repeat nth command
!abc	M, V	Repeat cmd starting "abc"
^abc^xyz	M, V	Replace "abc" in previous command with "xyz"
dumplog64	Sh	Dump the contents of the <i>vsim.wlf</i> file in a readable form
vgencomp	Sh	Create VHDL component from compiled Verilog module
vmake	Sh	Print a makefile for a library

Wave Window

<left mouse button>	Select signal / Place cursor
<middle mouse button>	Zoom In
<right mouse button>	Zoom Popup Menu
<ctrl-f>	Find next item
<tab> (go right)	Search forward for next edge
<shift-tab> (go left)	Search backward for next edge
i or + o O or -	Zoom in Zoom out
f or F l or L	Zoom full Zoom Last
add wave <item> <item>	Wave specific signals/nets
add wave *	Wave signals/nets in scope
add wave -r /*	Wave all signals/nets in design
add wave -label <name> <item>	Wave and rename a signal/net
add wave abus(31:15)	Wave a slice of a bus
view wave	Display wave window
view wave -new	Display additional wave window
.wave.tree zoomfull	Zoom full
.wave.tree zoomrange <f1> <f2>	Zoom Range
write wave	Print wave window to file

vsim

Key Arguments (use -help for full list)

[-help]	Display vsim syntax help
[-version]	Returns vsim version
[-c]	Run in cmd line mode
[-do "cmd" <file>]	Run cmd or file at startup
[-f <filename>]	Pass in args from file
[-g[G<name=value>]]	Set VHDL Generic values
[-hazards]	Enable hazard checking
[-l <logfile>]	Save transcript to log file
[+notimingchecks]	Disable timing checks
[-quiet]	Disable loading messages
[-restore <filename>]	Restore a simulation
[-sdf [min typ max]]	Apply SDF timing data e.g.,
<region>=><sdf file>]	sdfmin /top=MySDF.txt
[-sdfnowarn]	Disable SDF warnings
[-t [<mult>]<unit>]	Time resolution (shell only)
[-view <filename>]	Log file for VSIM to view
[-wv <filename>]	VSIM log file to create
[<libname>,<config>]	Configuration, Module or
<module>	Entity/Arch to simulate
<entity>[(<arch>)]	

Examples

```
vsim top
vsim -lib mywork top -do commands.do
```

vcom

Key Arguments (use -help for full list)

[-help]	Display vcom syntax help
[-version]	Returns vcom version
[-93] [-87]	Choose VHDL-1993 or 1987
[-check_synthesis]	Turn on synthesis checker
[-debugVA]	Print VITAL opt status
[-explicit]	Resolve ambiguous overloads
[-f <filename>]	Pass in arguments from file
[-nocheck]	Disable run time range checks
[-nodebug]	Strip internal names
[-novitalcheck]	Disable VITAL95 checking
[-nowarn <#>]	Disable individual warning msg
[-O0]	Disable optimization
[-quiet]	Disable loading messages
[-refresh]	Regenerate library image
[-work <libname>]	Specify work library
<filename(s)>	VHDL file(s) to be compiled

Examples

```
vcom MyDesign.vhd
vcom -93 -work /lib/mylib util.vhd
vcom -refresh
```

vlog

Key Arguments (use -help for full list)

[-help]	Display vlog syntax help
[-version]	Returns vlog version
[-compat]	Disable event order optimizations
[-f <filename>]	Pass in arguments from file
[-hazards]	Enable run-time hazard checking
[-nodebug]	Hide internal variables & structure
[-quiet]	Disable loading messages
[-R <simargs>]	Invoke VSIM after compile
[-refresh]	Regenerate lib to current version
[-work <libname>]	Specify work library
[-v <library_file>]	Specify Verilog source library
<filename(s)>	Verilog file(s) to be compiled

Examples

```
vlog top.v
vlog -work mylib -refresh
```

modelsim.ini

Copy modelsim.ini to current directory

```
Execute vmap -c
```

Loading order (stops after finding first file)

1. \$MODELSIM environment variable
2. Current directory if \$MODELSIM is not set
3. In /<install_dir>/modeltech/<platform> directory
4. In /<install_dir>/modeltech directory

For Detailed Information see:

ModelSim User's Manual "ModelSim Variables"

modelsim.tcl

Loading order

Always loads: /<install_dir>/modeltech/tcl/vsim/pref.tcl
Loads the first found from:

1. \$MODELSIM_TCL if it exists (";" separated list) (all files in list are loaded)
2. Current directory ./modelsim.tcl
3. \$HOME/modelsim.tcl

Managing Breakpoints

bp	Sets a breakpoint; without arg shows all bps
bd	Deletes a breakpoint
disablebp	Turn off all breakpoints
onbreak	Define what to do when a breakpoint is hit during a macro (e.g., onbreak {resume})
when	Perform actions under certain conditions

Examples

```
bp alu.vhd 147 {do macro.do} Set breakpoint
bd alu.vhd 147 Clear breakpoint
when -label when1 {clk`event and b="01100111"} {
echo "Signal c is [examine -bin c]" stop }
Use "when" to show the current whens.
```

Files

<i>modelsim.ini</i>	System Initialization or Project file; stores library locations, simulator resolution, paths, etc.
<i>modelsim.tcl</i>	Window sizes, positions, colors, etc.; user Tcl/Tk code
<i>startup.do</i>	Default name of macro executed after design is loaded See "startup=" line in modelsim.ini
<i>transcript</i>	Default filename that ModelSim transcript window activity is saved to
<i>vsim.wlf</i>	Default name of simulation log file saved by VSIM
<i>my_project.mpf</i>	ModelSim project file

Tcl/Tk

Environment Variable

MODELSIM_TCL

Online Documentation

Help->Tcl Help
Help->Tcl Syntax
Help->Tcl Man Pages
Help->Technotes->MTI_Widgets

Language Syntax

command arg1 arg2 arg3 ...

Language Syntax: Commands

set <var> <value>
expr <math expression>
exec <ShellCommand>
info <option> <procedure name>
winfo <option> <window name>

Language Syntax: Procedures

```
proc name {arglist} {body}
proc diag {a b} {
set c [expr sqrt($a*$a + $b*$b)]
return $c
}
```

Language Syntax: Conditionals

```
if {boolean} {bodytrue} else {bodyfalse}
if {$snow < 10000} {echo $snow}
```

Language Syntax: Loops

```
while {boolean} {body}
foreach loopVar {valuelist} {cmdBody}
for {initial} {test} {final} {body}
```

Poking around in ModelSim Tcl/Tk

info Get info on a Tcl construct
info xx Find out the args to **info**
winfo Get info on Tk widgets
winfo xx Find out args to **winfo**
winfo children . Return the sub-widgets to ModelSim
lecho [configure wave] Get wave props

Examples

```
#Print the string length of "Hello, World!"
set len [string length "Hello, World!"]
echo "Hello, World! is $len characters long!"

#Create a button in the wave window that does something
apply_button_adder wave controls right red white SayHi {echo hi}

#Display the Tcl/Tk source code to apply_button_adder
info body apply_button_adder

#Set the right mouse button to execute "drivers" on selected signal
bind .signals.tree <Button-3> {
set signalnum [.signals.tree index anchor]
set signalline [.signals.tree get2 $signalnum]
set signalname [index $signalline 0]
echo [drivers $signalname]
}

#Create a separate window containing most used functions:
toplevel .hot
frame .hot.run
frame .hot.zoom
pack .hot.run .hot.zoom -side top
button .hot.run.b1 -text "Run 10" -command {run 10}
button .hot.run.b2 -text "Run 100" -command {run 100}
button .hot.run.b3 -text "Run 1000" -command {run 1000}
pack .hot.run.b1 .hot.run.b2 .hot.run.b3 -side left
label .hot.zoom.l1 -text "Zoom: "
pack .hot.zoom.l1 -side left
button .hot.zoom.b1 -text "Full" -command {.wave.tree zoomfull}
button .hot.zoom.b2 -text "4x" -command {WaveZoom .wave out 4.0}
button .hot.zoom.b3 -text "1/4x" -command {WaveZoom .wave in 4.0}
pack .hot.zoom.b1 .hot.zoom.b2 .hot.zoom.b3 -side left

#Figure out how to change one of the Run buttons in .hot
winfo children .hot
winfo children .hot.run
.hot.run.b2 configure -fg red
.hot.run.b2 configure -text "Run 67"
.hot.run.b2 configure -command {run 67}
```

Standards Supported

VHDL

IEEE 1076-1987
IEEE 1076-1993
VITAL 2.2b & '95

Verilog

IEEE Std 1364-1995
PLI 1.0

Timing

SDF 1.0, 2.0, & 2.1

Value Change Dump

VCD for Verilog and VHDL

More Info . . .

Paper and Online (see docs sub-directory)

Start Here [se_start.pdf](#)
User's Manual [se_man.pdf](#)
Command Reference [se_cmds.pdf](#)
ModelSim Tutorial [se_tutor.pdf](#)

Technical Notes

www.model.com/support/technote/index.html

See <install_dir>/modeltech/docs/technotes

Company Periodical

ModelUser (req via modeluser@model.com)

ModelSim Help Pulldown

Help > Release Notes
Help > Tcl Man Pages

Training

<http://www.model.com/support/training.html>

This Quick Guide

http://www.model.com/pdf/se_guide.pdf