
VietNam National University
University of Engineering and Technology

# Simulating using ModelSim

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Laboratory for Smart Integrated Systems

# Objectives

- In this lecture you will be introduced to:
  - Simulating your design by ModelSim tool

# ModelSim Overview

- **Mentor Graphics**
- **Target Use:**
  - ✓ **A *verification and simulation tool for VHDL, Verilog, SystemVerilog, SystemC, and mixed-language designs***
- **ModelSim PE Student Edition**
  - ✓ Free download at: http://www.mentor.com/company/higher_ed/modelsim-student-edition
  - ✓ Support for both VHDL and Verilog designs (non-mixed)
  - ✓ Capacity: 10,000 lines of executable code
  - ✓ Suitable for student to do academic coursework and basic educational projects.

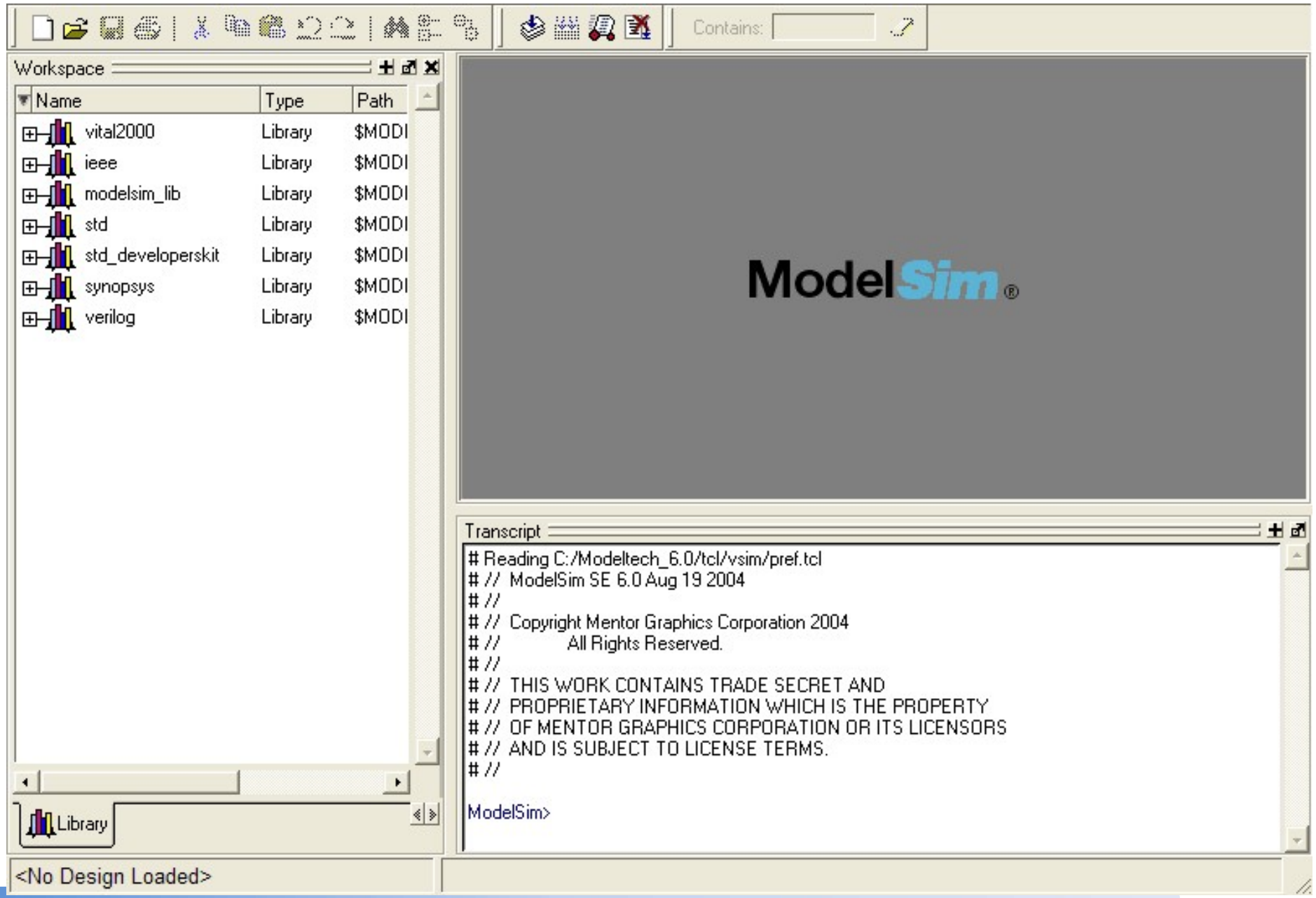
# Where to Find ModelSim Documentation

| Document | Format | How to get it |
|---|---|---|
| *Installation & Licensing Guide* | PDF | **Help** > **PDF Bookcase** |
| | HTML and PDF | **Help** > **InfoHub** |
| *Quick Guide* (command and feature quick-reference) | PDF | **Help** > **PDF Bookcase** and **Help** > **InfoHub** |
| *Tutorial* | PDF | **Help** > **PDF Bookcase** |
| | HTML and PDF | **Help** > **InfoHub** |
| *User's Manual* | PDF | **Help** > **PDF Bookcase** |
| | HTML and PDF | **Help** > **InfoHub** |
| *Reference Manual* | PDF | **Help** > **PDF Bookcase** |
| | HTML and PDF | **Help** > **InfoHub** |

# How to Use ModelSim

- **Create a new directory for this course (***e.g. C:/work_station/ELT6061_LSI_design/)*
- **Run ModelSim**
- **Select *File* > *Change Directory* and change to the directory you created in step 1**

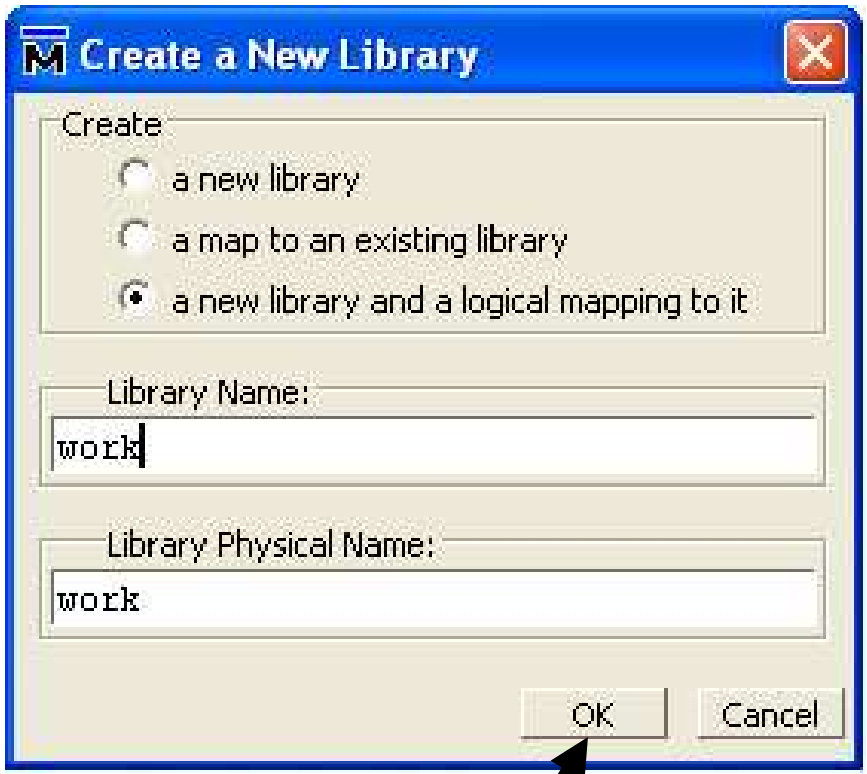
# Main Windows

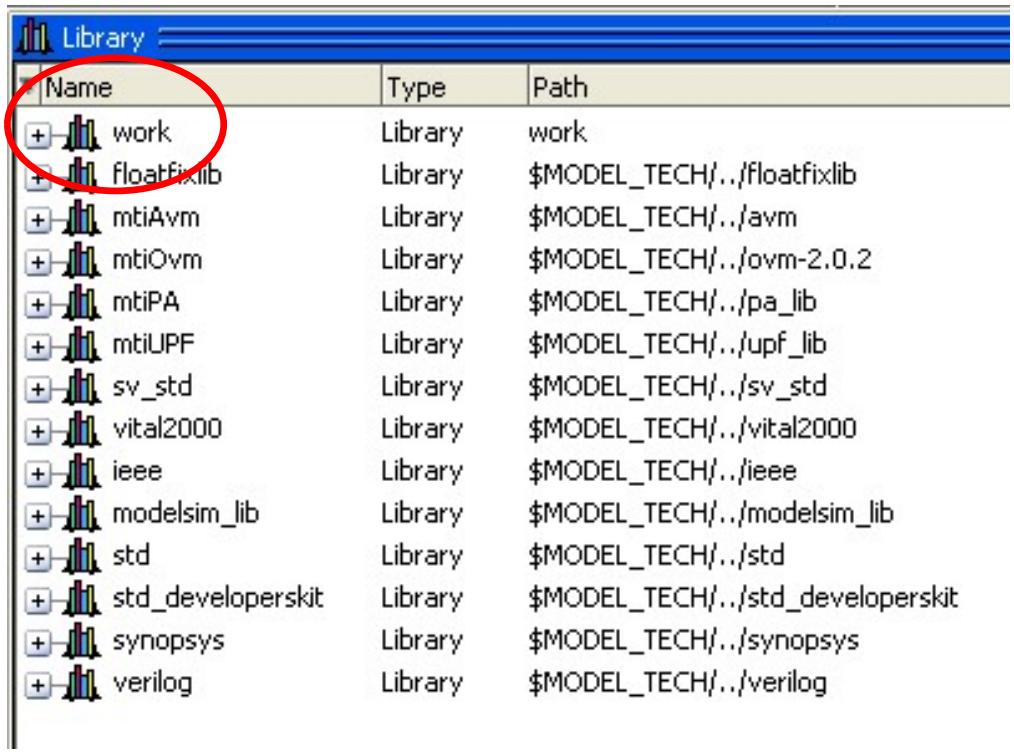


# How to Use ModelSim

## ➢ Create the working Library

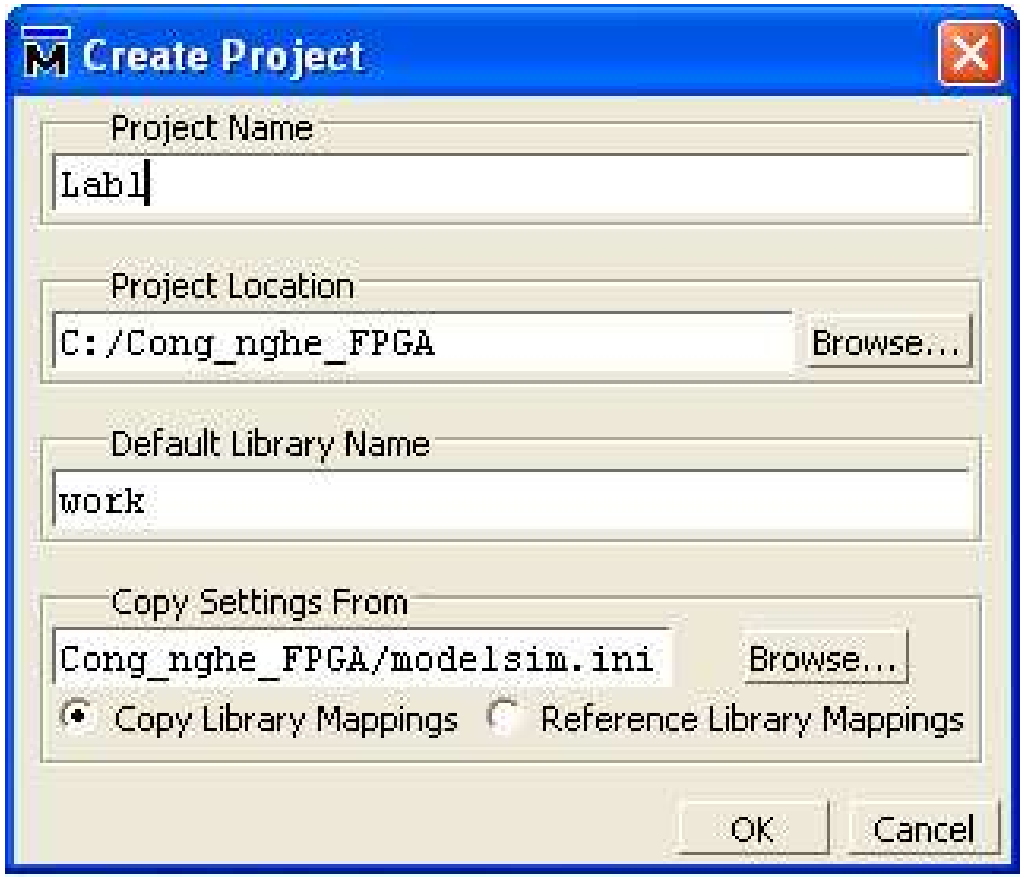
- ✓ Select **File > New > Library**
- ✓ Type **work** in the Library Name field
- ✓ Click **OK**.



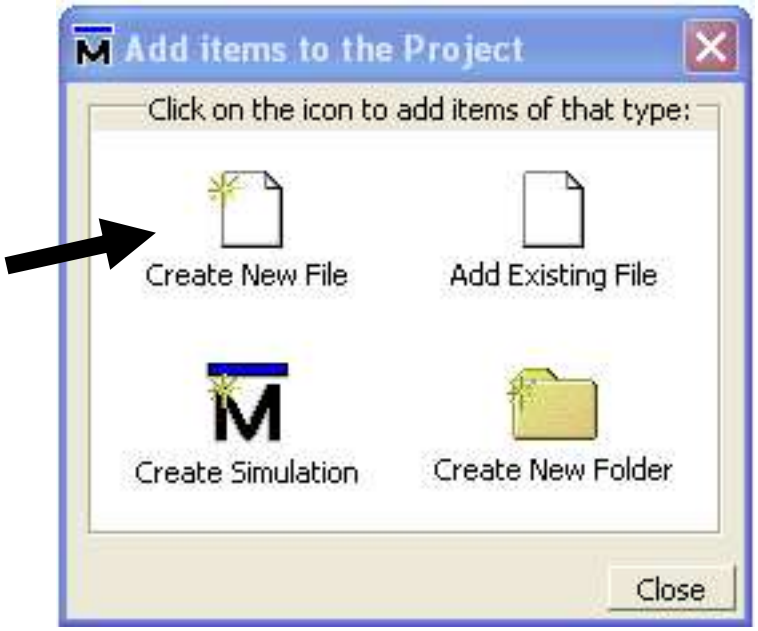



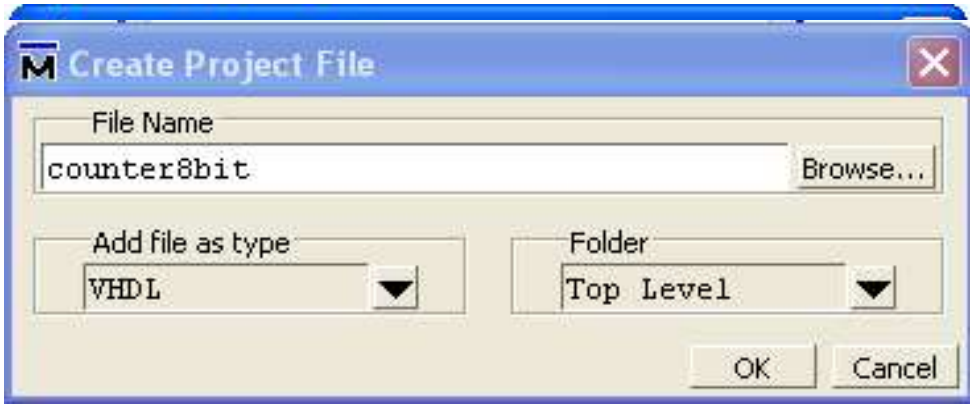
# How to Use ModelSim

- **Create a new Project**
  - **Select: File -> New -> Project**



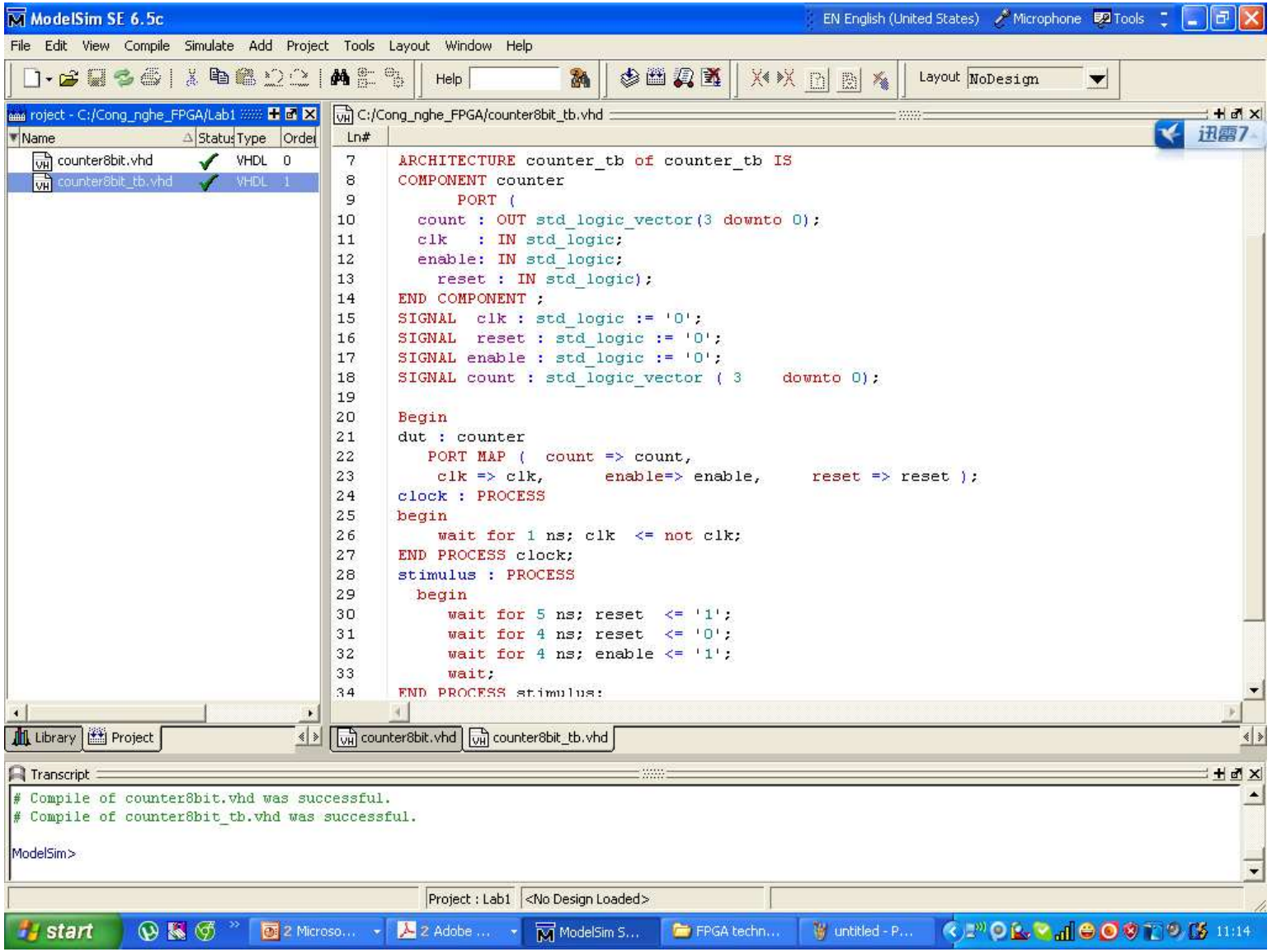
# How to Use ModelSim



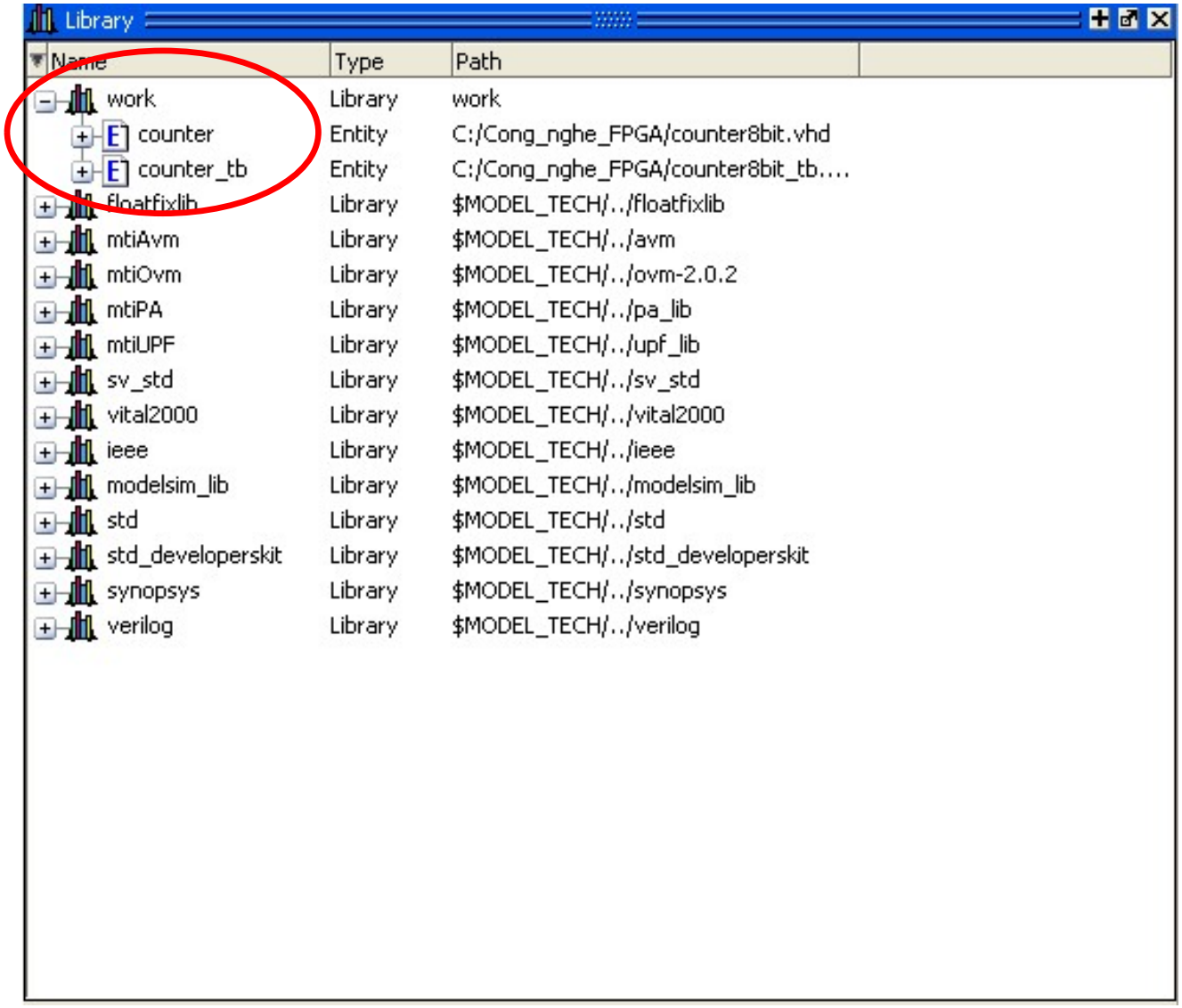
# How to Use ModelSim

## Design Entry and Compilation



# How to Use ModelSim

## Library Window



# How to Use ModelSim

## Optimize for Design Visibility

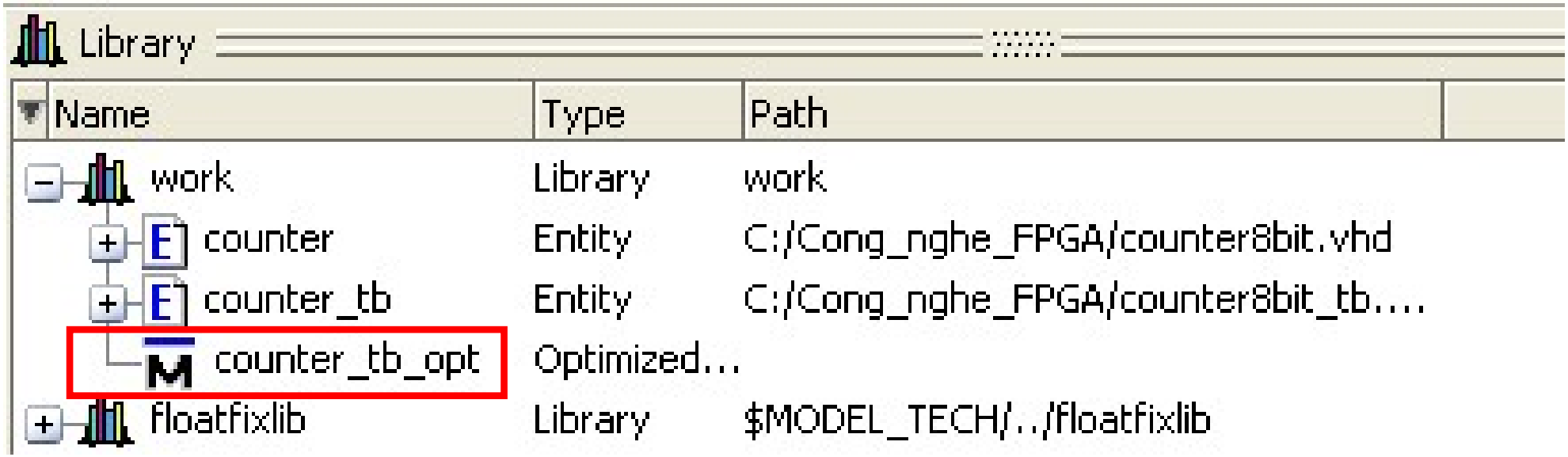
- Use the *vopt* command to optimize the design with full visibility into all design units.
  - Enter the following command at the QuestaSim> prompt in the Transcript window:

```
vopt +acc counter_tb –o counter_tb_opt
```

Where:
- The +acc switch provides visibility into the design for debugging purposes.
- The -o switch allows you designate the name of the optimized design file (testcounter_opt).

# How to Use ModelSim

## Optimize for Design Visibility

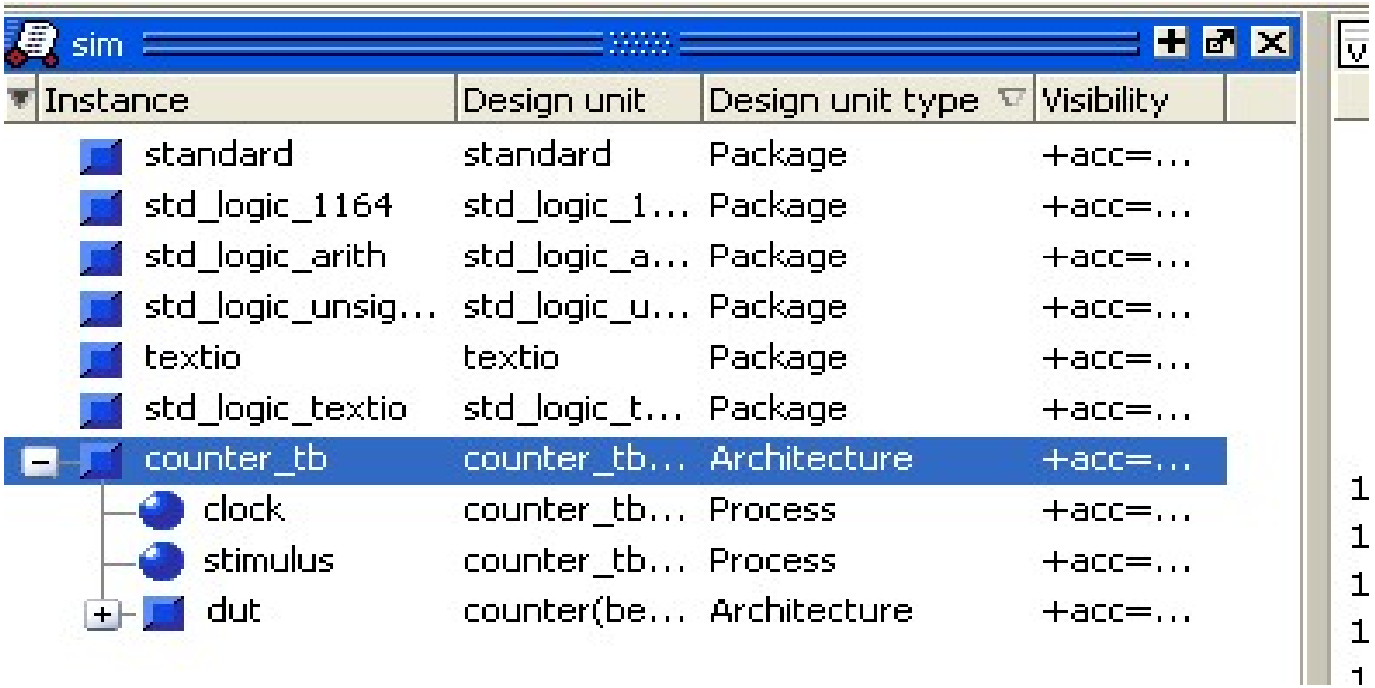


# How to Use ModelSim

## Load the Design

1. Load the counter_tb design unit.
   a. Use the optimized design name to load the design with the *vsim* command:

```
vsim counter_tb_opt
```



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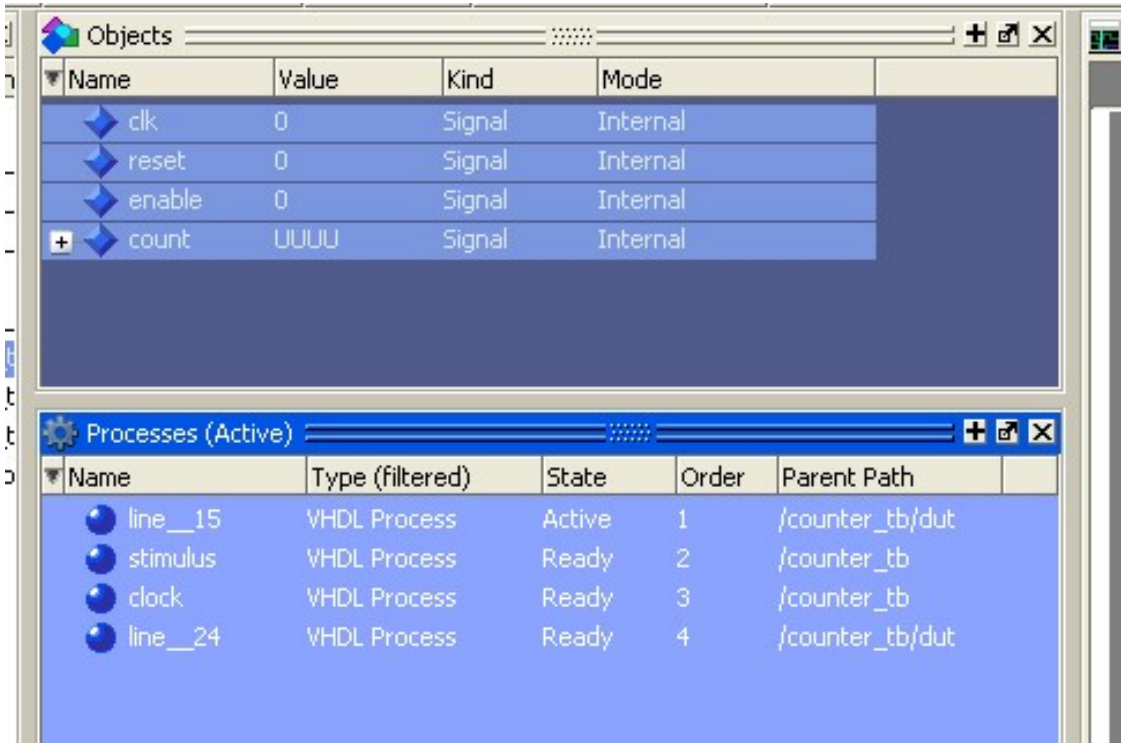
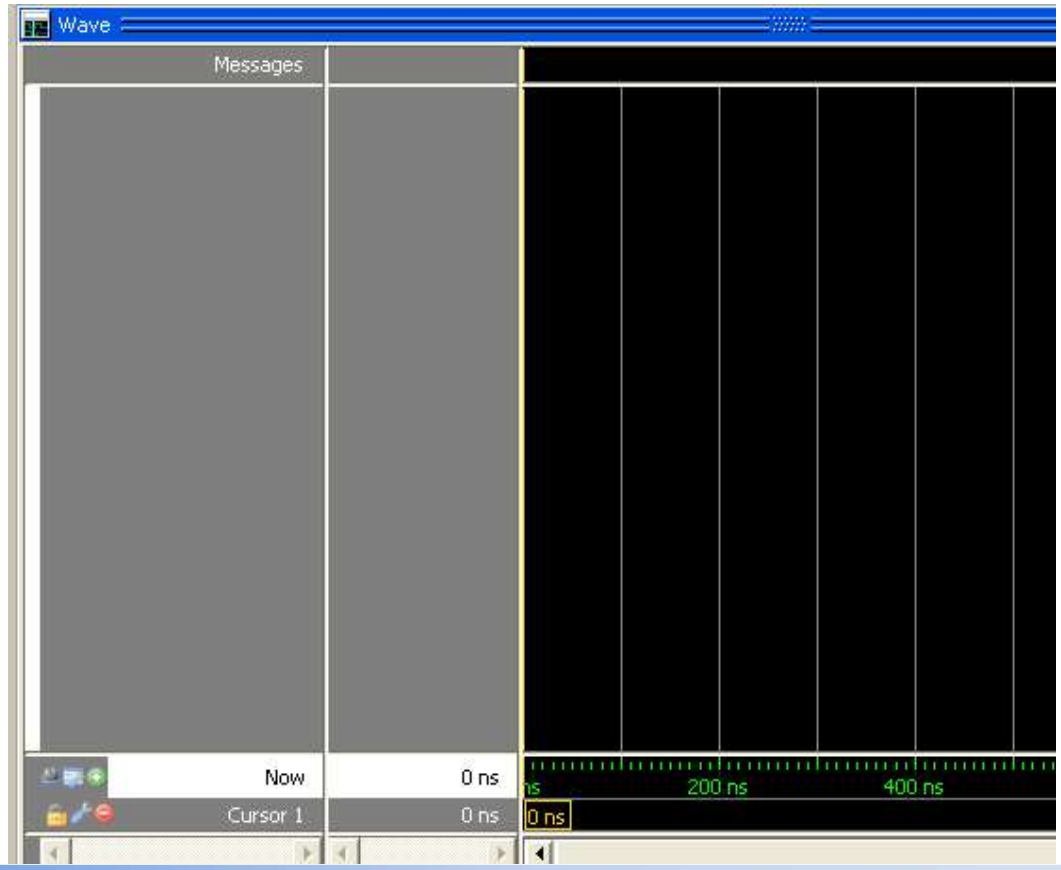


# How to Use ModelSim

## Run the Simulation

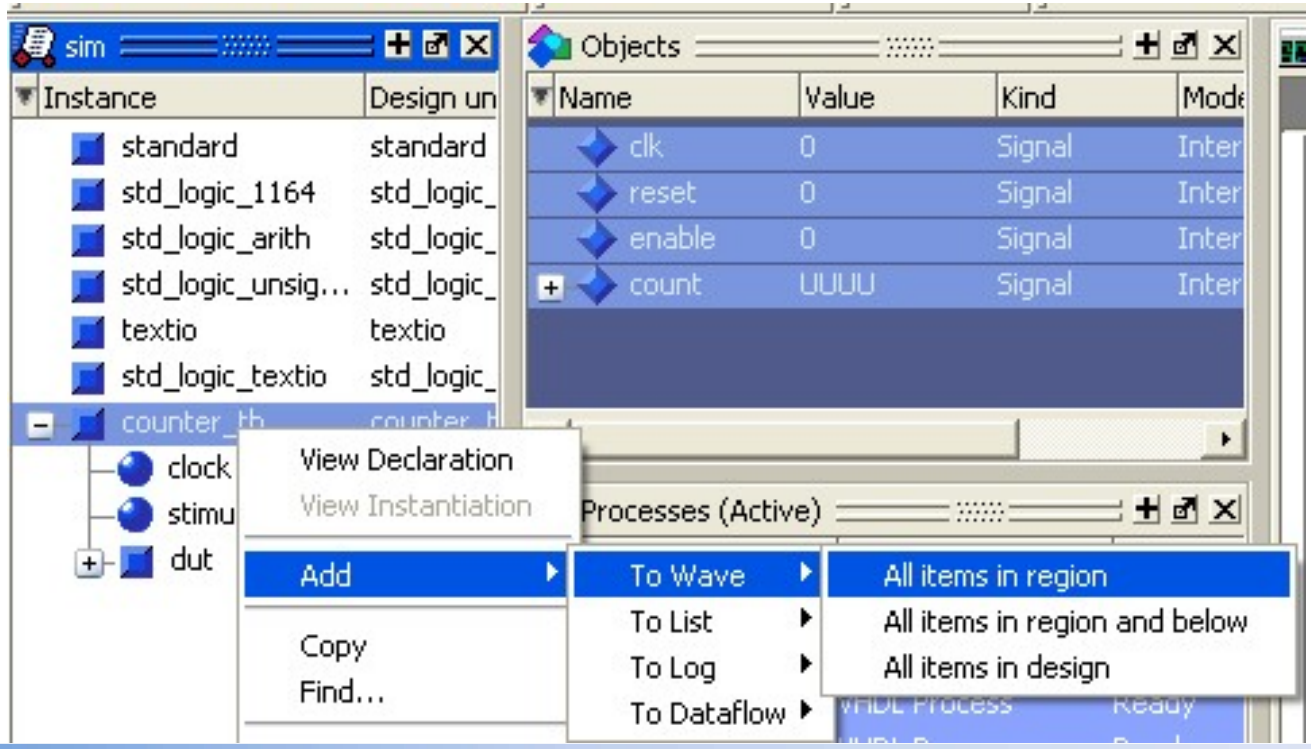
1. Open the Wave window.
   a. Enter **view wave** at the command line.
   You can also use the **View > Wave** menu selection to open a Wave window.



# How to Use ModelSim

## Run the Simulation

2. Add signals to the Wave window.
   a. In the Structure (sim) window, right-click *counter_tb* to open a popup context menu.
   b. Select **Add > To Wave > All items in region**.
   All signals in the design are added to the Wave window.



# How to Use ModelSim

## Run the Simulation

3. Run the simulation.
   a. Click the Run icon. 

   b. Enter run 500 at the VSIM> prompt in the Transcript window