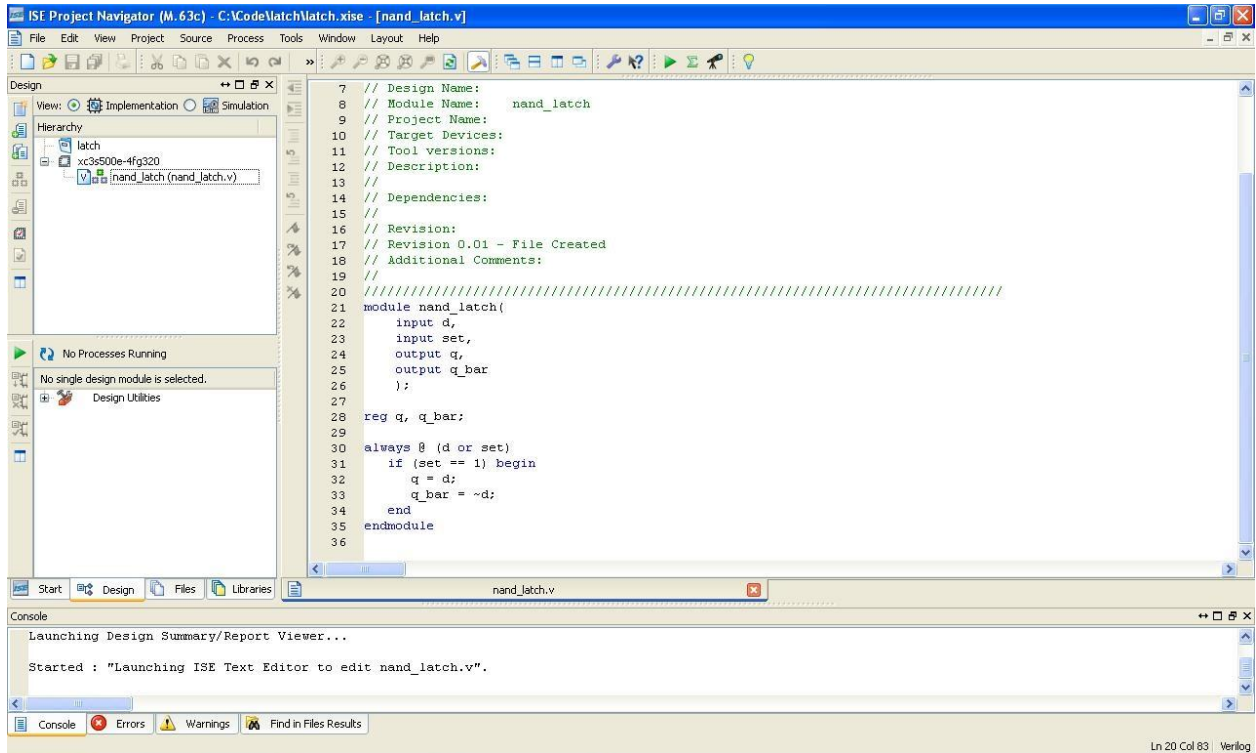


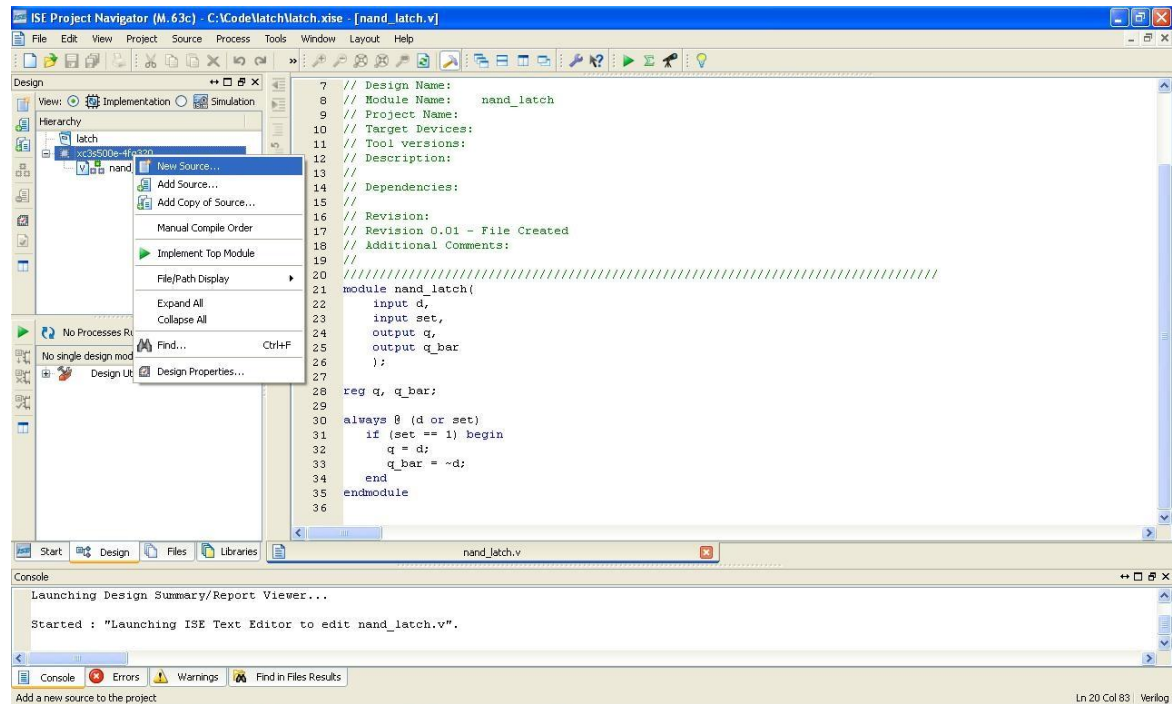
ISim Testbench Tutorial

ISIM or the ISE Simulator allows you to analyze and debug your code. This tutorial will show you how to write a simple testbench for your module and run the simulation using ISim.

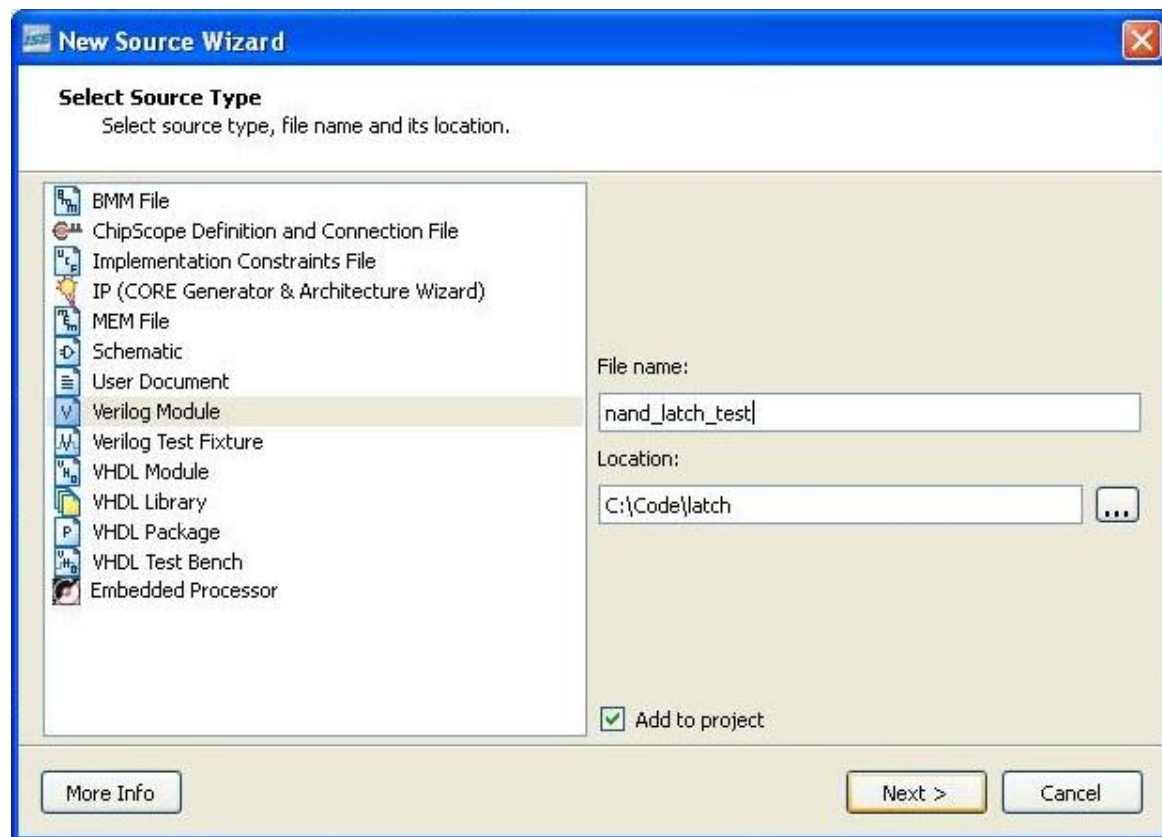
1. First open your project with the top level module that you want to test.



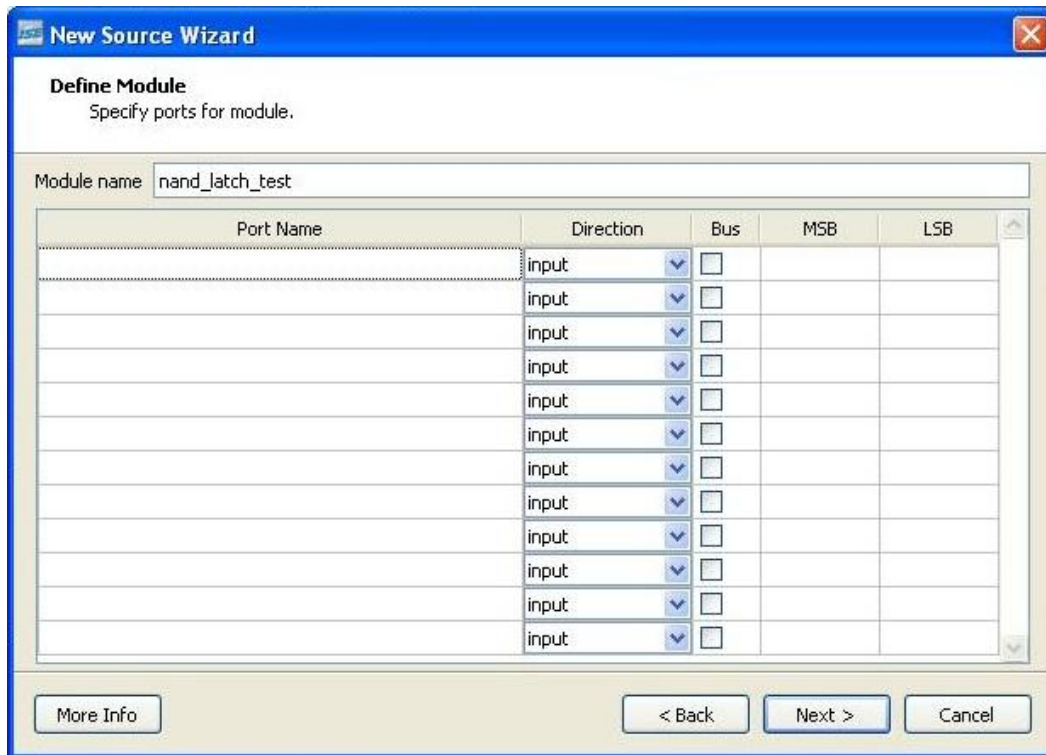
2. Next we need to create the testbench for this design. Add a new source to the design



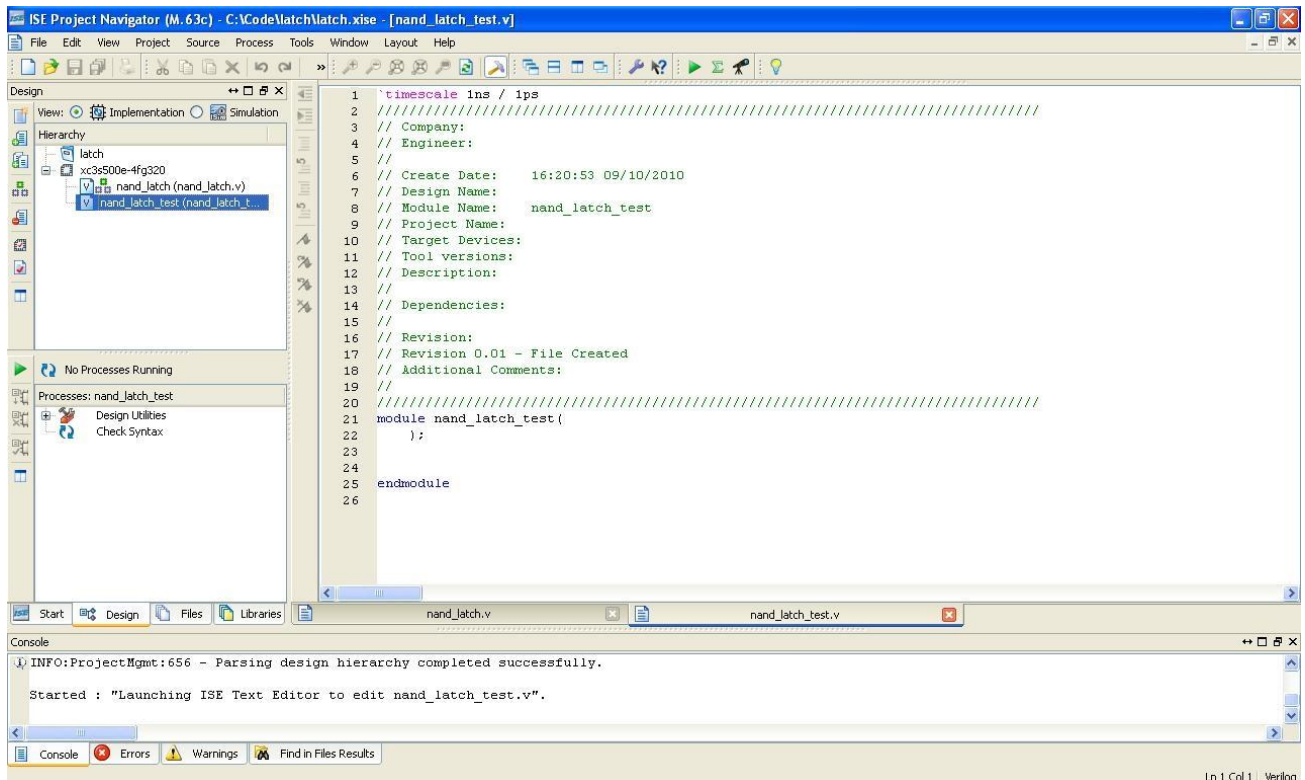
3. Select Verilog Module and name your testbench.



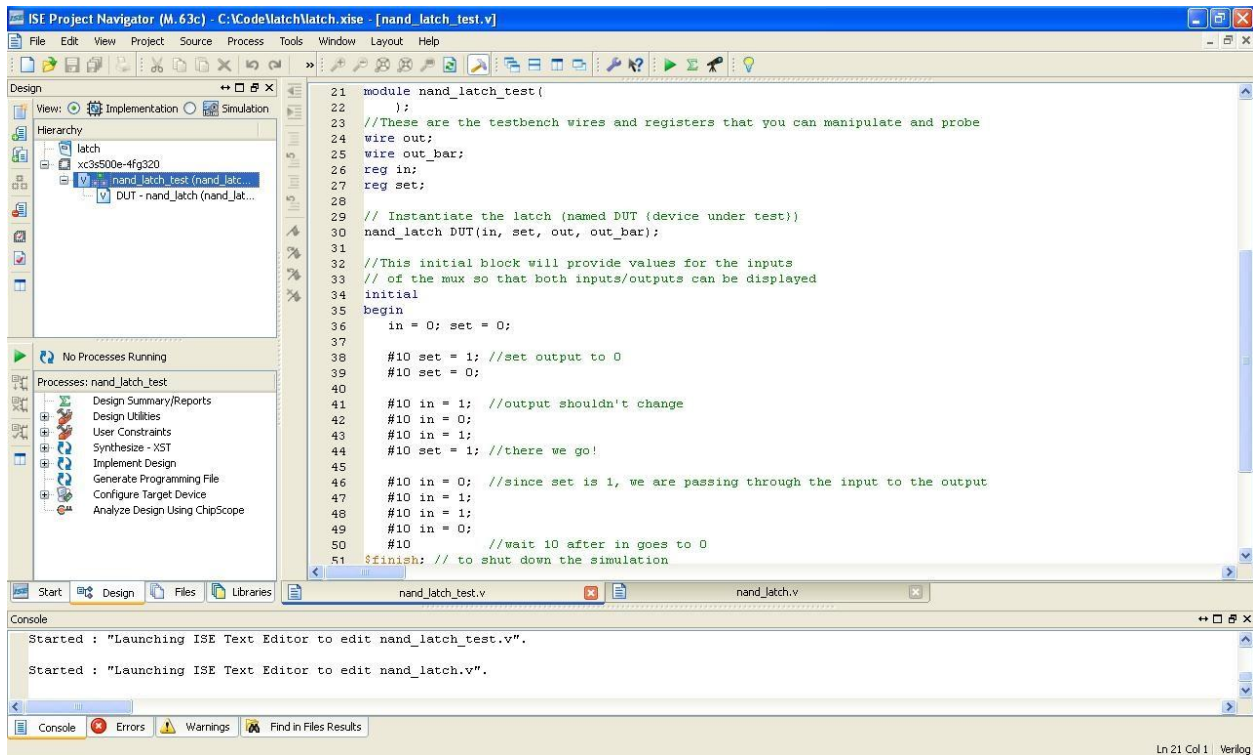
4. The testbench does not require any inputs or outputs so you can ignore the ports window.



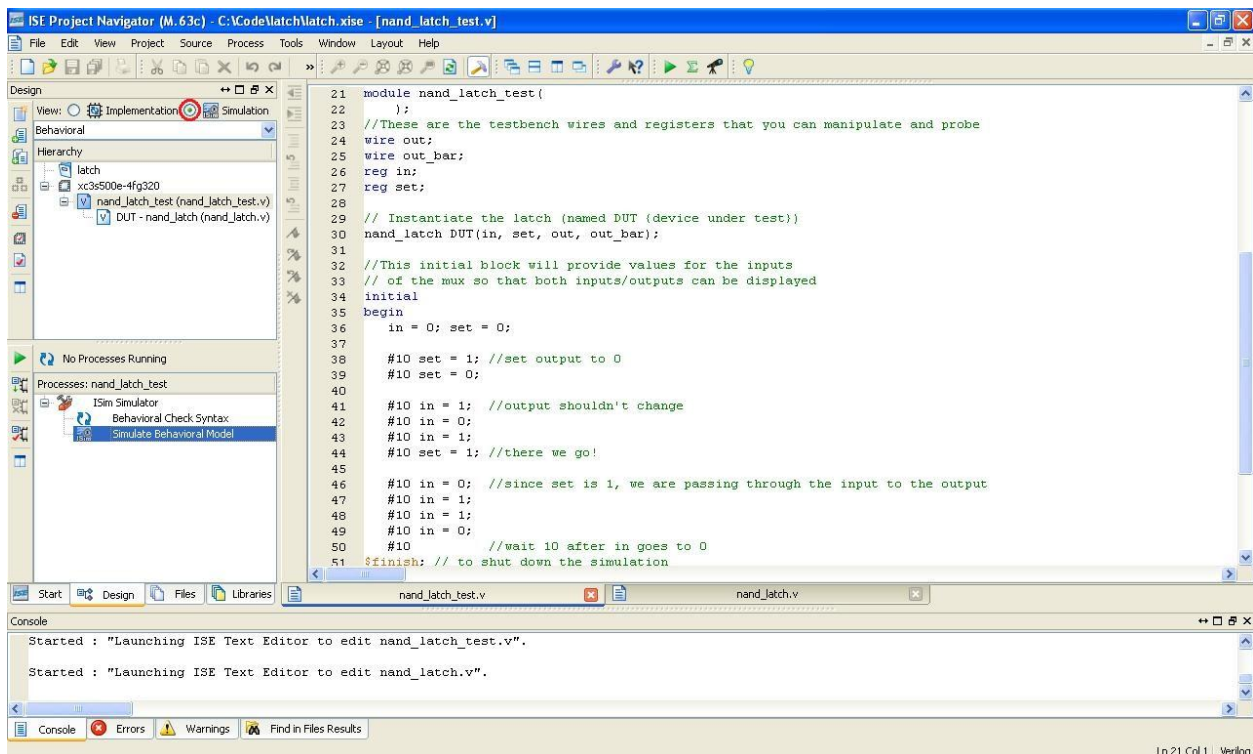
5. This is what your project window should look like after adding your testbench.



6. Next create your testbench. After you save it your project should look like this.



7. Inside the design area select the simulation radial button (circled in red). Select your testbench and double click simulate behavioral model.



8. ISim will launch and from here you can look at your waveform to debug your top level module. Anything set to display to the console will be saved in "isim.txt" in your project folder.

The screenshot displays the ISim (ModelSim) interface. The main window shows a waveform for a simulation. The waveform has a time scale from 0 ns to 110 ns. The signal names and their values are listed in the table below:

Name	Value
out	x
out_bar	x
in	0
set	0

The console window at the bottom shows the following output:

```
Finished circuit initialization process.  
At in=0 sel=0 out=x out_bar=x  
At in=0 sel=1 out=0 out_bar=1  
At in=0 sel=0 out=0 out_bar=1  
At in=1 sel=0 out=0 out_bar=1  
At in=0 sel=0 out=0 out_bar=1  
At in=0 sel=1 out=0 out_bar=1  
At in=1 sel=0 out=0 out_bar=1  
At in=1 sel=1 out=1 out_bar=0  
At in=0 sel=1 out=0 out_bar=1  
At in=0 sel=1 out=0 out_bar=1  
At in=1 sel=1 out=1 out_bar=0  
At in=0 sel=1 out=0 out_bar=1  
Stopped at time : 110 ns : File "C:/Code/latch/nand_latch_test.v" Line 51  
ISim>
```

The status bar at the bottom right indicates "Sim Time: 110,000 ps".