Vivado Simulator Basics

2014.1

Objectives

After completing this module, you will be able to:

- **Describe the relationship between the XSim and Vivado tools**
- **Using XSim, demonstrate how to**
  - Locate and select signals for simulation
  - Simulate for a fixed period of time
  - Set breakpoints
  - Single step
  - Locate points of interest in the waveform

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Vivado IDE and XSim

- **Vivado IDE and XSim**
- Navigating XSim
- Summary

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Xilinx and Simulation

- **Vivado IDE provides an integrated simulator environment using the Vivado simulator (XSim)**
- **XSim can now be launched from the Vivado IDE tool environment**
- **XSim GUI window supports**
  - Adding and removing signals
  - Navigating waveforms
  - Running and restarting simulation

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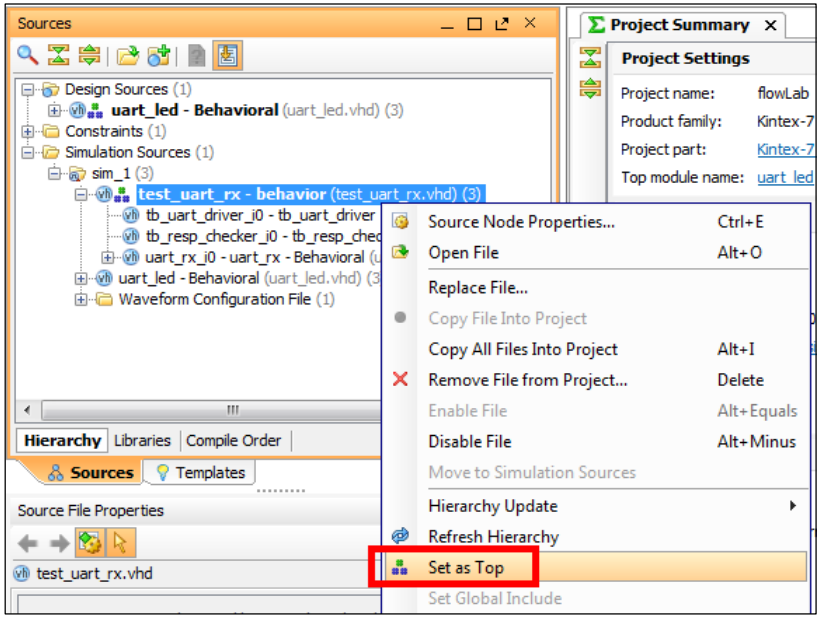
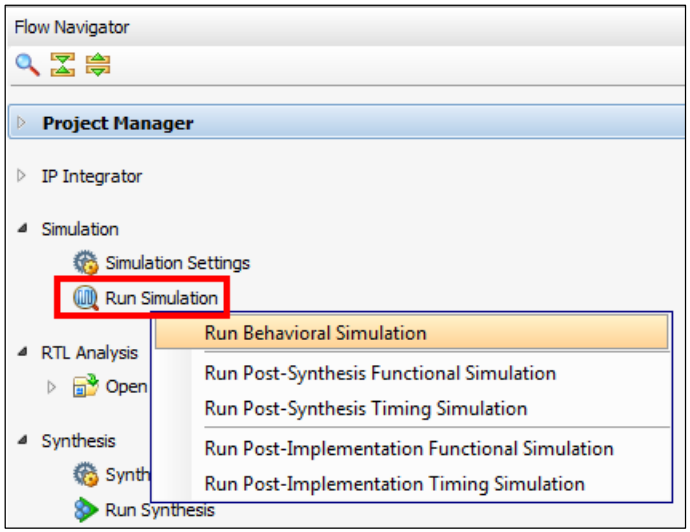
Accessing XSim in the Vivado IDE

- Behavioral simulation (direct simulation of the source code) is accessed via the Project Manager
- Vivado tool requires the top of the hierarchy to be specified





- When selected, all the top-level testbenches are displayed
  - Select the appropriate testbench to simulate
- *Warning:* The process will be applied to any item that is available in the top module list
  - Only simulate testbenches

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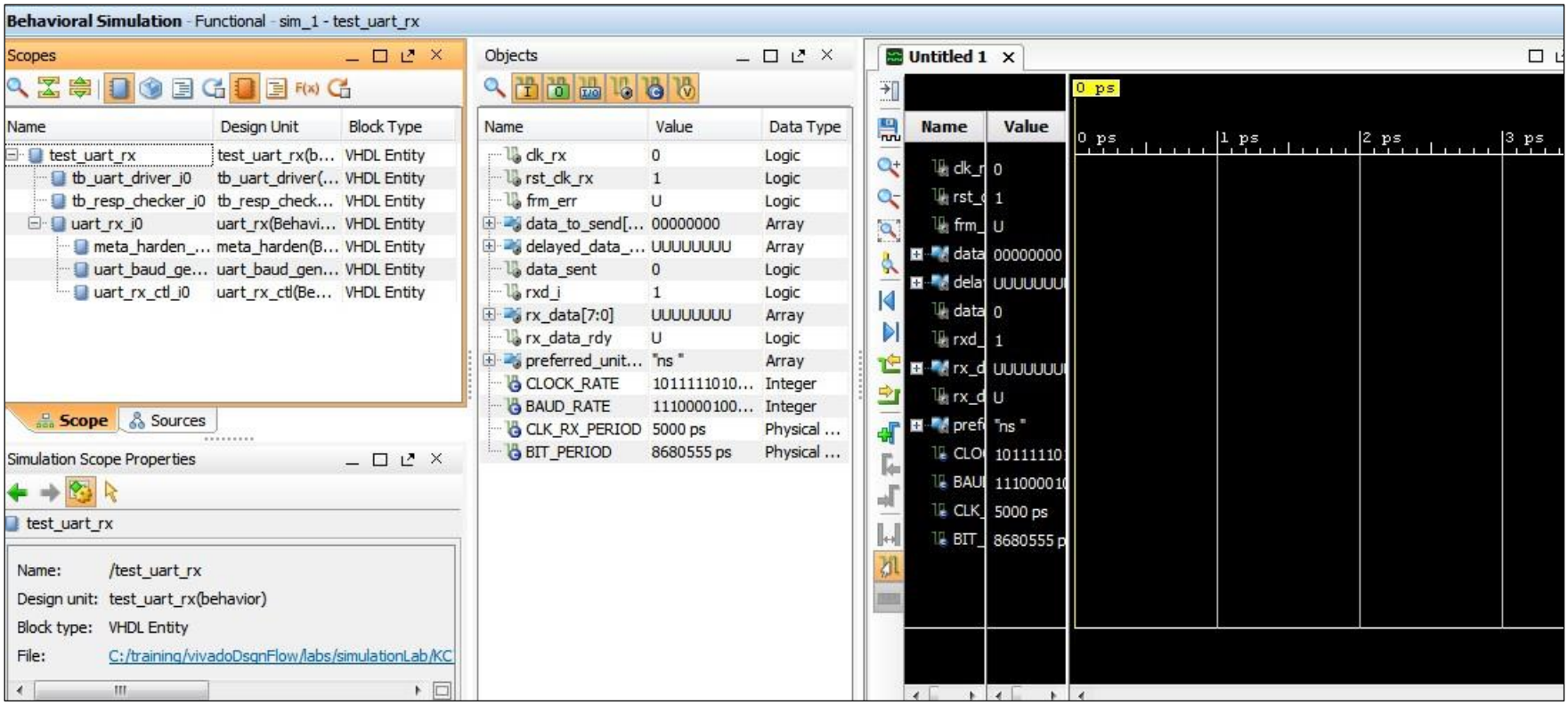
Vivado Simulator



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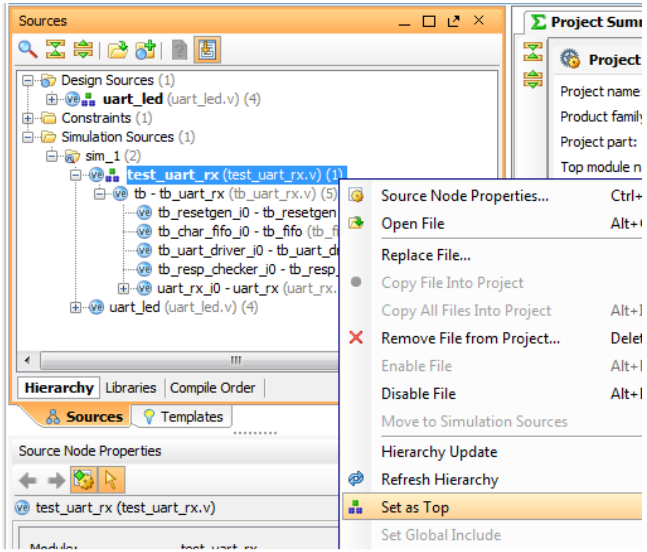
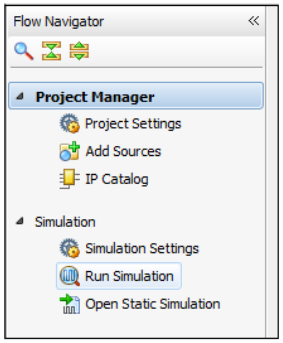
Running a Simulation

- In the Sources view, expand Simulation Sources > sim_1
- Select a testbench in the Hierarchy window
- Right-click and select Set as Top
- In the Flow Navigator select Simulation > Run Simulation
- Simulator launches in the Vivado IDE and executes the testbench





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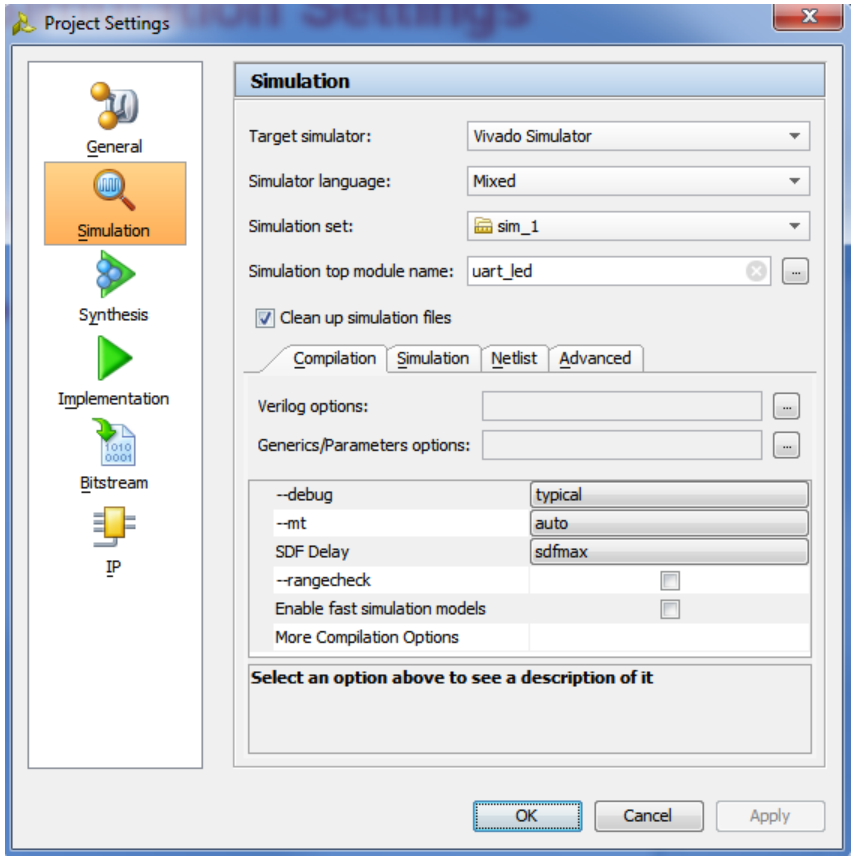
Simulation Settings

- From the Flow Navigator, click Simulation Settings
- Allows selection of compilation and simulation properties
  - Additional options can be entered via more options



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Navigating ISim

- Vivado IDE and XSim
- **Navigating XSim**
- Summary

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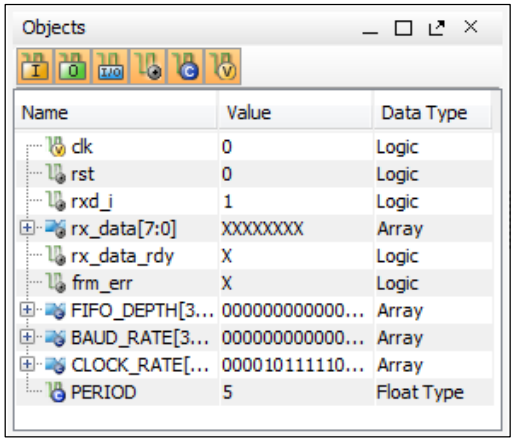
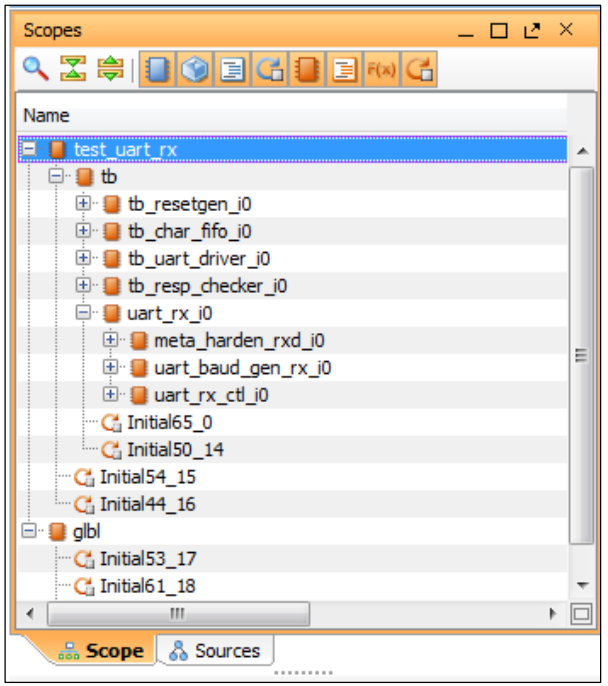
Selecting Signals

- **The Scopes view supports hierarchical signal browsing**
  - Entire hierarchical signal collections can be imported into the viewer
- **The Objects window enables individual signal selection**





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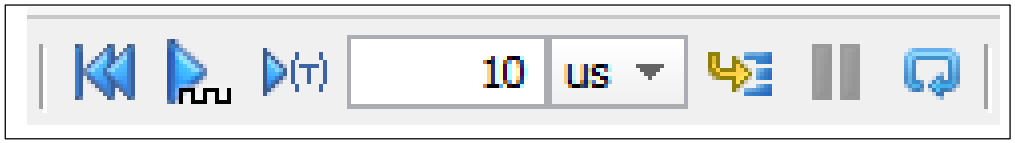
Simulator Simulation Controls

- **Controlling the simulation**
  - Restart simulation
  - Run all
  - Run for specified time
  - Single step through source
  - Pause simulation (Break)
  - Re-launch Simulation



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Simulator Viewing Controls

- **Viewing the results**
  - Zoom in/out
  - Zoom full range
  - Zoom to selected
  - Jump to time 0 or end
  - Jump to previous/next transition on selected signal
  - Insert marker
  - Jump to previous/next marker
  - Swap cursors
  - Snap to transitions
  - Floating ruler

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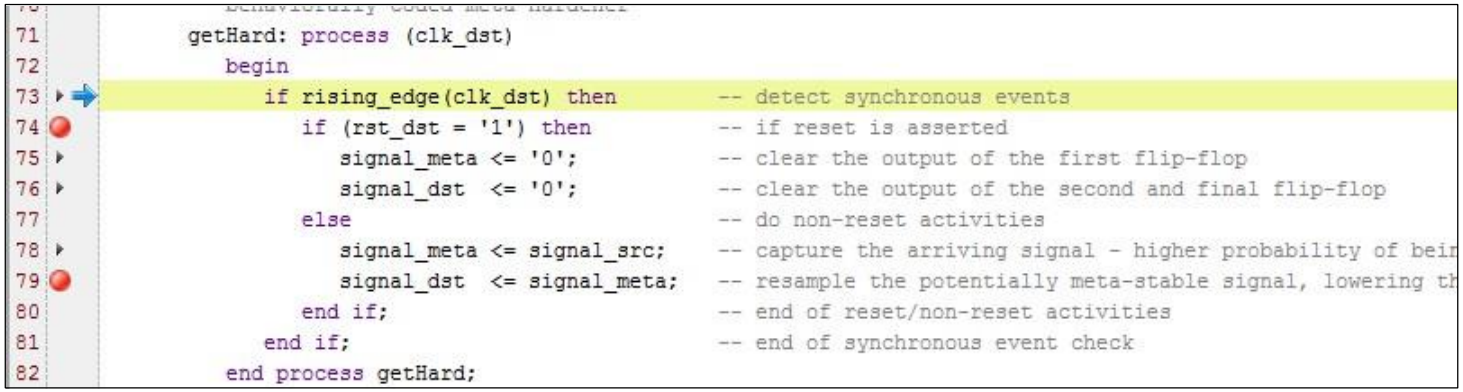
Breakpoints

- **Select any level of hierarchy or item from the object window, right-click and select Go to Source Code**
  - Immediately opens the containing file and positions the cursor at the object
- **Breakpoints can be set/cleared by clicking in the region between the line number and the source window**
  - Only lines with executable code are selectable



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Summary

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- Navigating XSim
- **Summary**

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Summary

- **The XSim tool is integrated with the Vivado IDE**
- **The simulation executable is created within the Vivado IDE**
- **The XSim waveform viewer "runs" the simulation and supports**
  - Customization of the waveform
  - Zoom/pan controls
  - Marker
  - Single stepping the source code
  - Breakpoints

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What's Next?

- **Now you know**
  - How to build a basic testbench (from the previous module)
  - The basics of how to run the Vivado simulator
- **What do you do now?**
  - Simulate a design

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