

# Vivado 2015.2 Tutorial

## *How to display internal logic elements in the simulation waveform*

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### Introduction

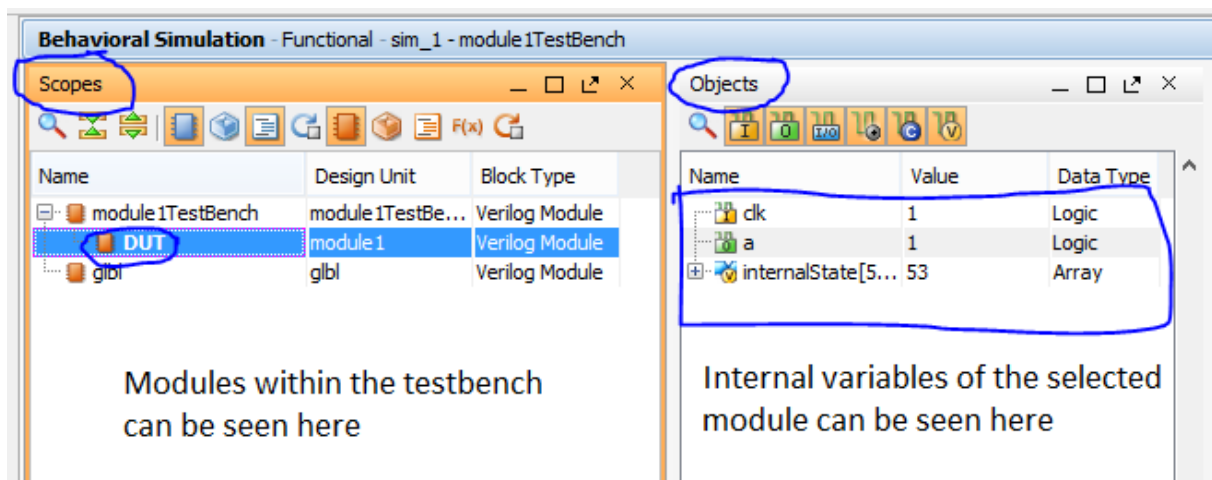
This short tutorial will show you how to display internal variables of a simulated module in the simulation waveform to be able to debug it effectively as well as how to create a new simulation set. However the process of creating the project or the information on how to write the module and the testbench is not included here.

### Display internal variables in the waveform

- 1-1. First run the simulation by **Flow > Run Simulation > Run Behavioral Simulation**.
- 1-2. If the simulation is completed without errors, behavioral simulation window will show up which consists of 3 internal windows:
  - Scopes
  - Objects
  - Waveform

The *Scopes* window allows selecting a particular module whose variables will be shown in the *Objects* window.

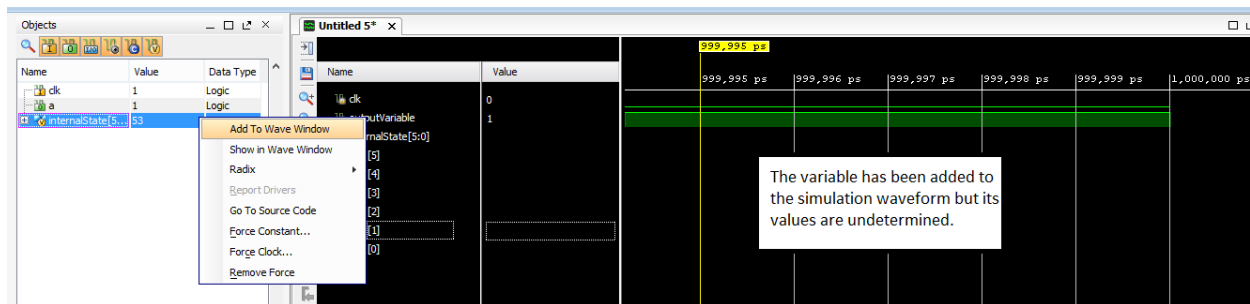
Now, select the module which has the internal variable that you want to display in the simulation waveform from the *Scopes* window.



**Figure 1.** Scopes and Objects windows

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- 1-3. Select the internal variable which you want to display in the waveform. Right click on it and select **Add to Wave Window** option.
- 1-4. The selected variable will be added to the waveform but its values will not be determined since it is added after the simulation has been completed. To be able to display it correctly, the simulation needs to be restarted. However, if the configuration file is not saved, the settings that are applied until this step will be lost upon restarting the simulation. So first save the configuration file by pressing the hotkey **Ctrl + S** while waveform window is selected. A new window will show up. Type a name for the configuration file and click **Save**.



**Figure 2.** Adding a variable to the waveform window

- 1-5 Now restart the simulation by **Flow > Run Simulation > Run Behavioral Simulation** .  
Voila! The internal variable is now displayed in the simulation waveform!

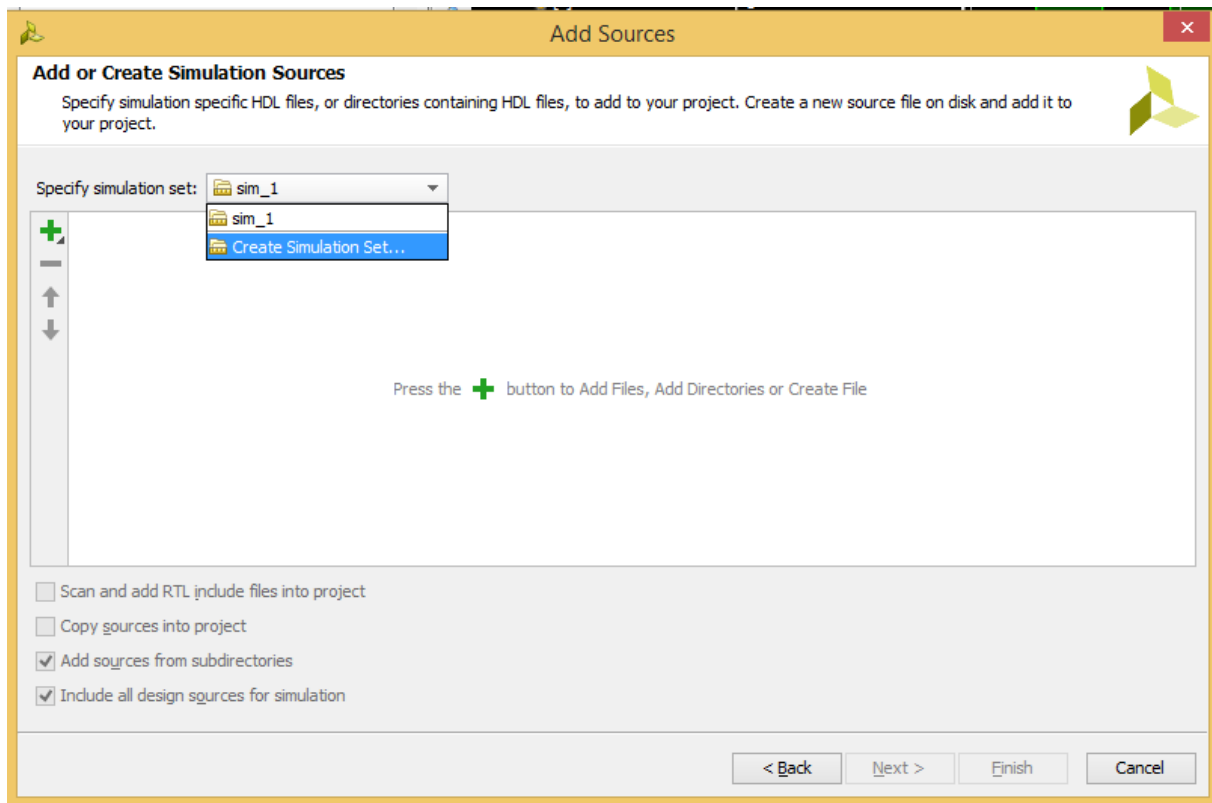


**Figure 3.** The variable is added to the simulation waveform

## Creating a new simulation set

Each simulation set can have only one configuration file and is designed to simulate only one top level module. In order to simulate other modules with different configurations it is required to create a new simulation set.

- 2-1. First click **File > Add Sources** then select **Add or create simulation sources** and click **Next** .
- 2-2. At the near top of the opened window, there is a text **Specify simulation set** . Right next to it there is a dropdown menu to select the simulation set. Choose **Create simulation set...** and type the name of the new simulation set then click **OK**.



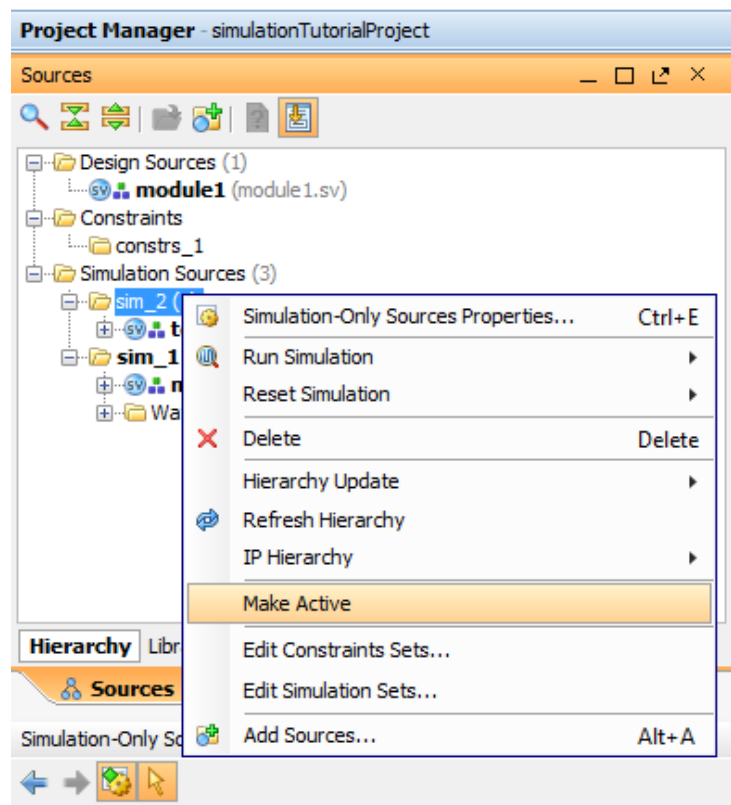
**Figure 4.** Creating a new simulation set

2-3. Now click on the + button in the left panel and select **Create file** then select the file and type and the name and click on **OK**. Afterwards click **Finish**.

2-4. A module definition window will show up, since we are adding a testbench there should not be any inputs or outputs. Click on the input port then click - from the left panel. Then click **OK** to create the testbench in a new simulation set.

2-5. Now activate the new simulation set by right-clicking the new simulation set in the *Sources* window which is in the **Project Manager** panel and selecting **Make active**.

2-6. You can start simulating now on the new simulation set by selecting **Flow > Run Simulation > Run Behavioral Simulation**.



**Figure 5.** Making the new simulation set active