Introduction to the Vivado Logic Analyzer Demo Script

Introduction

This demonstration introduces the dashboards in the Vivado® logic analyzer. You will learn to use the dashboards and understand their benefits.
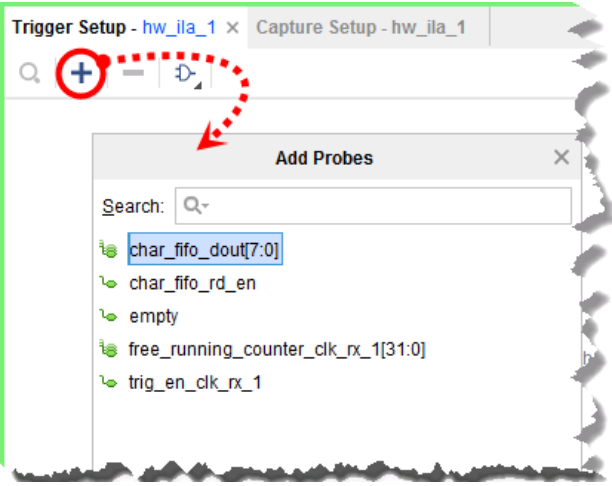
Preparation:

- Required files: `$TRAINING_PATH/VLA_Intro/demo/ZCU104/vhdl`

- Required Hardware: ZCU104 evaluation board

Introduction to the Vivado Logic Analyzer

Action with Description	Point of Emphasis and Key Takeaway
• Launch Vivado Design Suite 2021.2.	
• Open the project **wave_gen.xpr** from the `$TRAINING_PATH/ VLA_Intro/demo/ZCU104/vhdl` directory.	• The Open Project selection gives designers access to existing projects.
• Notice that the design provided is already implemented and the bitstream has been generated. • Set up the board and make the necessary connections and verify before turning on the power. • Power on the board.	• Powering up allows you to establish connections to the target board.

Action with Description	Point of Emphasis and Key Takeaway
• Click **Program and Debug** > **Open Hardware Manager** from the Flow Navigator to establish a connection to the board. • Click **Open target** > **Auto Connect** to connect to the target board automatically with the default settings.	• A hardware manager is the portion of the Vivado Design Suite that enables the monitoring of debug cores that were added to a design.
Now that a connection to the board is established, your first task is to download a bitstream to your board. • Right-click the **xczu7_0** device and select **Program Device**. • Make sure that you use the bit file and debug_nets file from the current project directory and click **Program**. **Note:** If any extra ILA dashboards are created, delete them.	• A bitstream programming file is used to download to your hardware device, whereas debug probe files contain details of the probing signals for cores like VIO and ILA.
• How many debug cores do you see in the design? • There are three debug cores in the design: two ILA and one VIO.	

Action with Description	Point of Emphasis and Key Takeaway
• Review the default dashboards that are automatically created.	• After programming the FPGA on a hardware target for the first time, the tool automatically detects the debug IP within your design and creates a set of default dashboards for you. • A separate dashboard is created for each ILA in the design. • The Waveform window can now appear within a dashboard. • Unlike ILAs, the VIO has only one window (double-click hw_vio_1 in Hardware window).

• What are the default windows that are present in the ILA dashboard?
    • Settings
    • Status
    • Trigger Setup
    • Capture Setup
    • Waveform window	

• Select the **Trigger Setup** window and drag the window using the mouse and place it horizontally above the Capture Setup window.	• Note that dropping one window onto an existing window places the two window tabs in the same region. • You cannot move windows out of the workspace.
• Click the **Dashboard Options** tab on the left side of the dashboard.	• The Dashboard Options tab can be used to customize the dashboard and select the windows that appear on the current dashboard.

Action with Description	Point of Emphasis and Key Takeaway
• Enable the **hw_vio_1** check box in the Dashboard Options tab. • Observe that the hw_vio_1 window is included in the current dashboard.	• You can select any windows from any of the ILAs or VIO within the design to add to any particular dashboard.
• Click the **Plus** (**+**) icon in the Trigger Setup window of any dashboard. This opens the Add Probes window. • Select any desired probes and click **OK**. 	• You can add probes to the Trigger Setup, Capture Setup, Waveform and VIO Probes windows. • Notice that only the probes for that particular ILA or VIO are listed in the Add Probes window. • This demo only shows how to add the debug probe in the Trigger Setup window—you are not providing any trigger conditions. • The debugging of the added signals can be done by using a trigger condition and observing the corresponding waveform.
• Select **Window** > **Debug Probes** to open the Debug Probes window that is hidden by default.	• The Debug Probes window provides the full list of all probes in the ILA and VIO cores.
• Right-click the debug object in the Hardware window and select **Dashboard** > **New Dashboard**. • Review the options for the dashboards. • Leave everything else at their defaults and click **OK** to create the new dashboard.	• Observe that the newly created dashboard **dashboard_1** is added to the workspace.

Action with Description	Point of Emphasis and Key Takeaway
• If you want to undo the changes you have made or want to start with the default settings again you can select **Window** > **Dashboard** > **Reset to Default** to restore the dashboards to their default settings.	• The layout of your dashboards is automatically saved within your project when you make changes.
• Close the hardware manager and exit the Vivado Design Suite.	• Exit the GUI and applications.
• Power off the ZCU104 evaluation board.	

Summary

This demonstration illustrated the dashboards in the Vivado logic analyzer. You also learned about features such as window management, dashboard customization, and creating new dashboards.

References:

- Supporting materials
  - *Vivado Design Suite User Guide: Programming and Debugging* (UG908)