



Simulating a Boundary Scan Device

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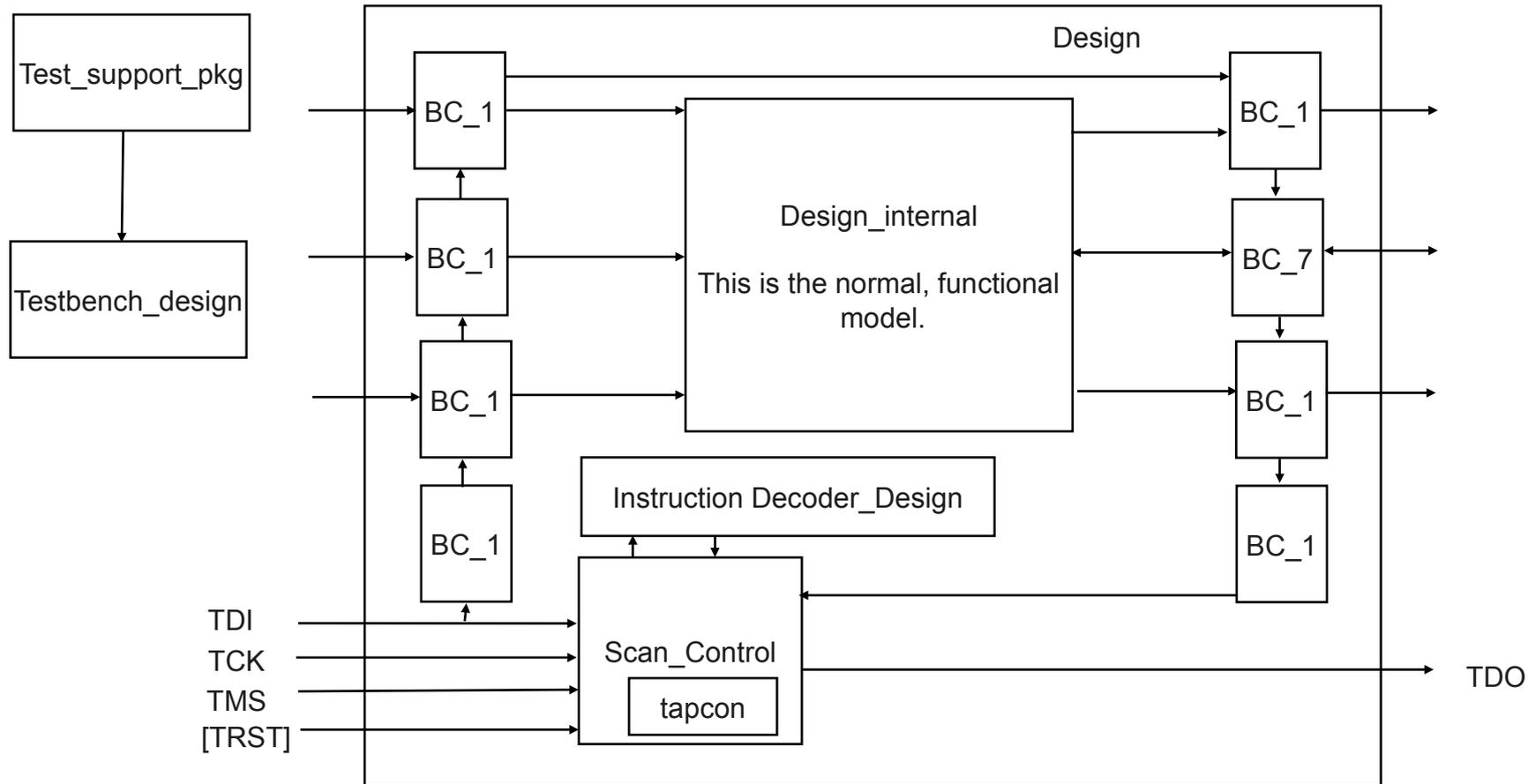
Abstract

- Boundary scan as defined by IEEE 1149.1 is used in a variety of components to assist in printed circuit board test and software installation.
- The eightolives' Workspaces Desktop tool has various features to allow you to simulate these devices in an external simulator using VHDL models or in the tool's Waveform Viewer tool.
- You can run a simulation demo that demonstrates these concepts.

The Simulation Approach

- Boundary scan involves a serial protocol that allows external test equipment to capture and observe device inputs, control device outputs and interact with the device for operations such as programming the device with software.
- Vendors provide Boundary Scan Description Language (BSDL) files for their parts. These files contain the information necessary to describe how to interact with the Boundary Scan logic.
- The eightolives' Design Tool creates a structural model of the device based on the BSDL file. The tool also provides simulatable models of the parts used in that structure.

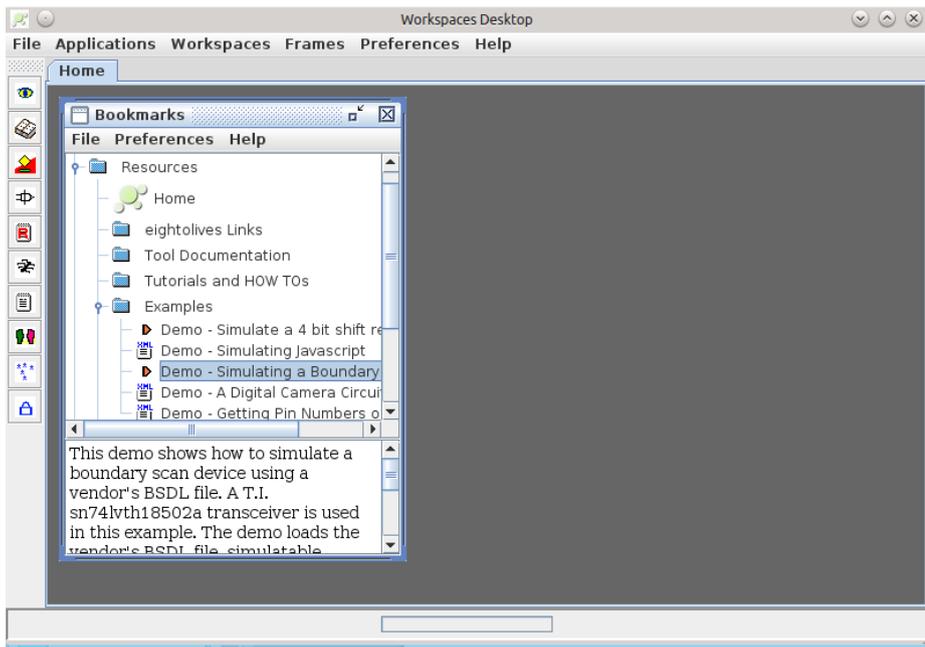
Boundary Scan Model for Simulation



The Design Tool creates the simulatable structure when you open a vendor's BSDL file for the part.

You can save the structured design in VHDL for use in third-party simulators.

About Workspaces Desktop



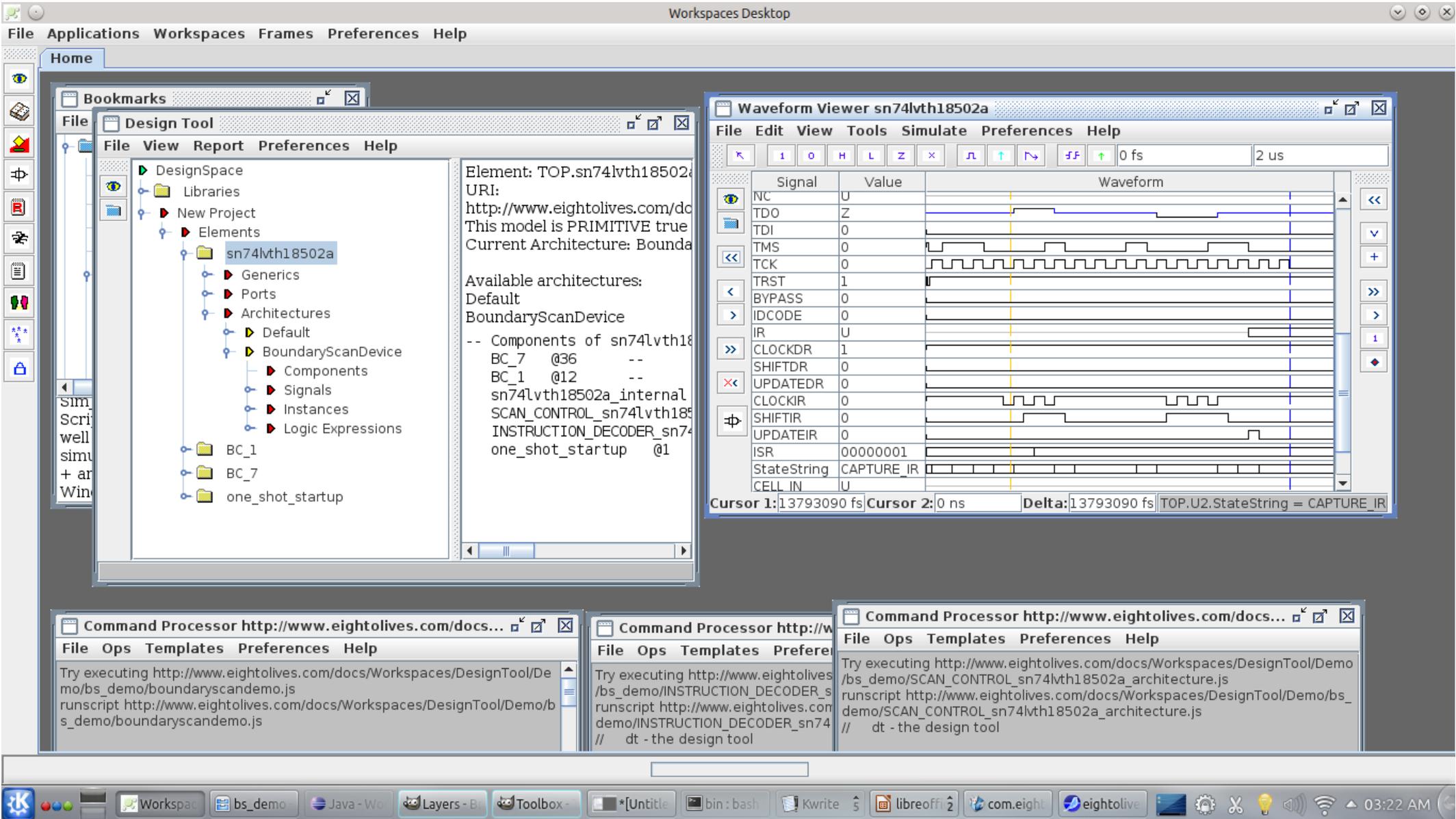
- Workspaces Desktop provides a tool suite that helps you in digital design.
- The Design Tool lets you input, create and manipulate VHDL designs.
- Other tools support Javascript scripting, simulation, inventory, requirements, process, encryption and test.
- The tool deals with files of type .vhd, .sdf, .edf, .vcd, .bsdl, .js

You can get Workspaces Desktop from the eightolives web site at <http://www.eightolives.com>

You can run this demonstration

- From the Workspaces Desktop's Bookmark tool:
 - Open the Resources folder, then the Examples sub-folder
 - Double click the entry: “Demo – Simulating a Boundary Scan Device”
- The demo script will open the Design Tool, load a BSDL file for a T.I. Sn74lvth18502a transceiver, load simulatable models from eightolives' Sim_Library, load Javascript ScriptableArchitectures for a few components, invoke the Waveform Viewer tool, and load a VCD file containing stimulus waveforms for simulation.
- To run the simulation in the Waveform Viewer:
 - Click the “+” button (Adds the stimulus waveforms to the sim queue)
 - Click the “>>” button to run the sim

When you run the demo, you see:



What's Inside

- Upon reading the BSDL file, the Design Tool created the sn74lvth18502a Element (entity) and added a BoundaryScanDevice architecture
- The architecture consists of BC_1 and BC_7 scan cells, a SCAN_CONTROL Element, an INSTRUCTION_DECODER Element, a one_shot_startup Element for initial reset and an internal version of the part that would model its normal functionality.

Getting VHDL Models

- For third-party VHDL simulation, you can retrieve models for BC_1, BC_7, one_shot_startup and SCAN_CONTROL from the eightolives Boundary Scan Library
- The INSTRUCTION_DECODER is created by right-clicking the sn74lvth18502a Element and selecting Test > Testbench > Make Instruction Decoder VHDL
- The top level VHDL is created by right-clicking the sn74lvth18502a Element and selecting Make New > VHDL
- The sn74lvth18502a_internal model, which represents the normal functionality of the part, would need to be separately created by you.

For Waveform Viewer Simulation

- Simulatable models can be retrieved from the eightolives Simulation Library
- The INSTRUCTION_DECODER is created by right-clicking the sn74lvth18502a Element and selecting Test > Testbench > Make Instruction Decoder Architecture Javascript
 - The INSTRUCTION_DECODER Element's option Import > Architecture is used to load the Javascript file as a ScriptableArchitecture which allows edits and reloading while using the same WaveformViewer.

For more information

- Check the tutorials at <http://www.eightolives.com/tutorials.htm>
 - Workspaces Desktop Tool Overview
 - Scripting (Using Javascript and the CommandProcessor)
 - Modeling Hardware in Java (using the com.eightolives.Hardware package to represent digital designs)
 - Simulating Javascript Models (writing ScriptableArchitectures)
- Read the Workspaces Desktop Users Manual