Functional Verification of FPGA Designs

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4. Juni 2024

Functional Verification of FPGA Designs

Download:

https://github.com/flufpuf/functional_verification_of_fpga_designs_presentation

What is testing?
&
Why should we test?

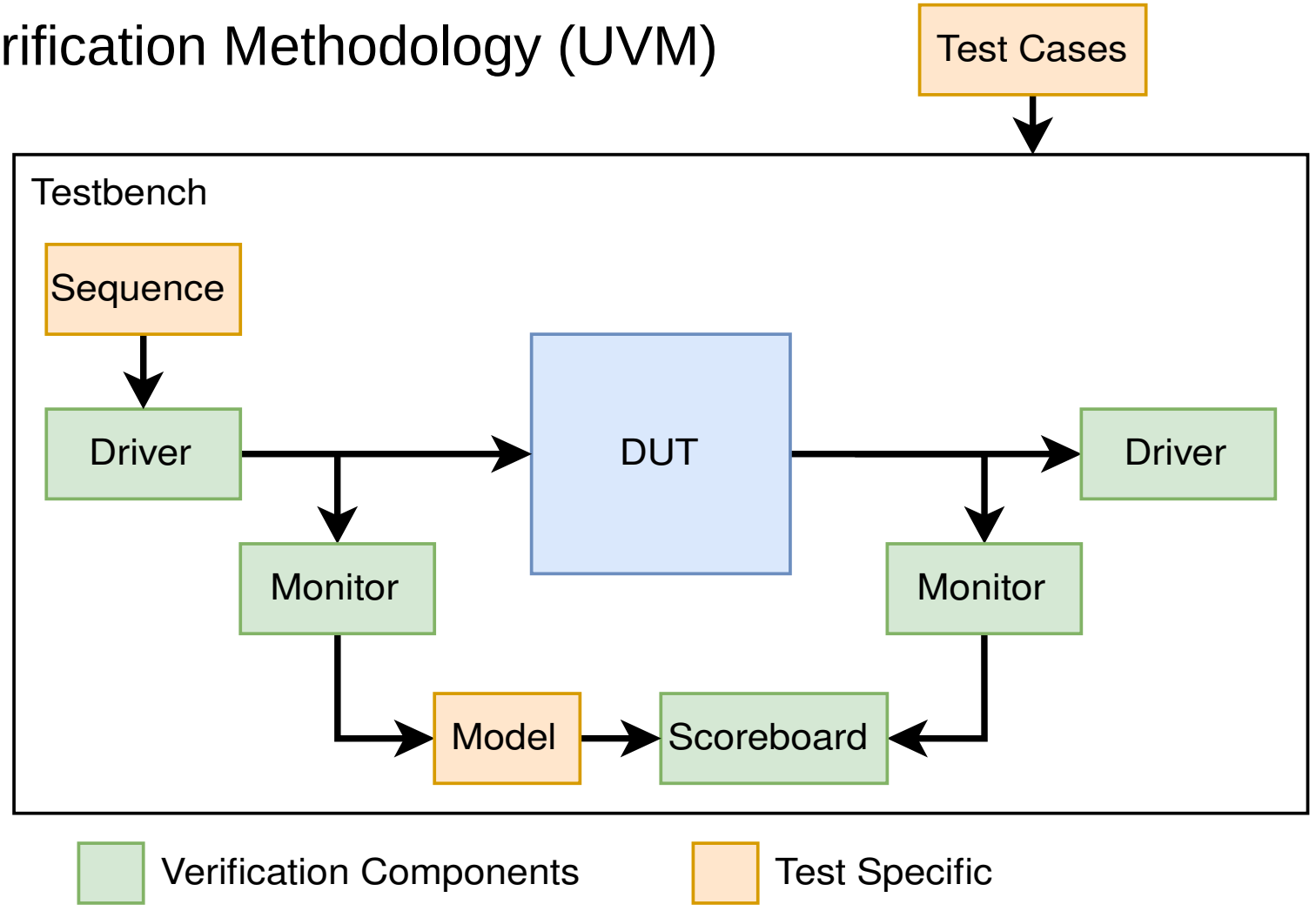
https://github.com/flufpuf/functional_verification_of_fpga_designs_presentation

How do you test your designs?

https://github.com/flufpuf/functional_verification_of_fpga_designs_presentation

Functional Verification of FPGA Designs

Universal Verification Methodology (UVM)



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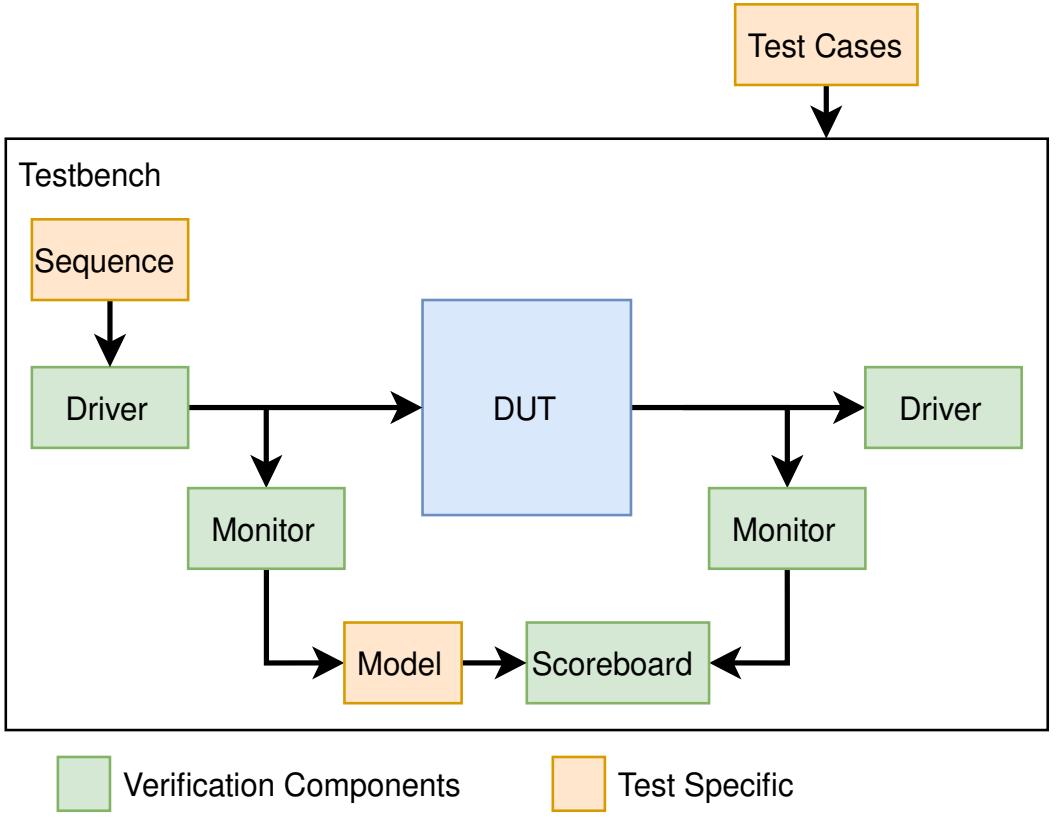
Universal Verification Methodology (UVM)

- Universal testbench architecture
- Collection of reusable VCs
- Transaction Level Modelling (TLM) as abstracted VC API

Requirement:
Design for Testability (DFT)
(makes live easier)



UVM Standard (Accellera):
https://www.accellera.org/downloads/standards/uvm

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Some free and open source tools

OSVVM

- Simulation interface
- Test case management
- Test configuration
- Verification Components
- Transfer Level Modelling (TLM)

VUnit

- Randomization
- Assertion checking
- Logging
- Report generation

Cocotb

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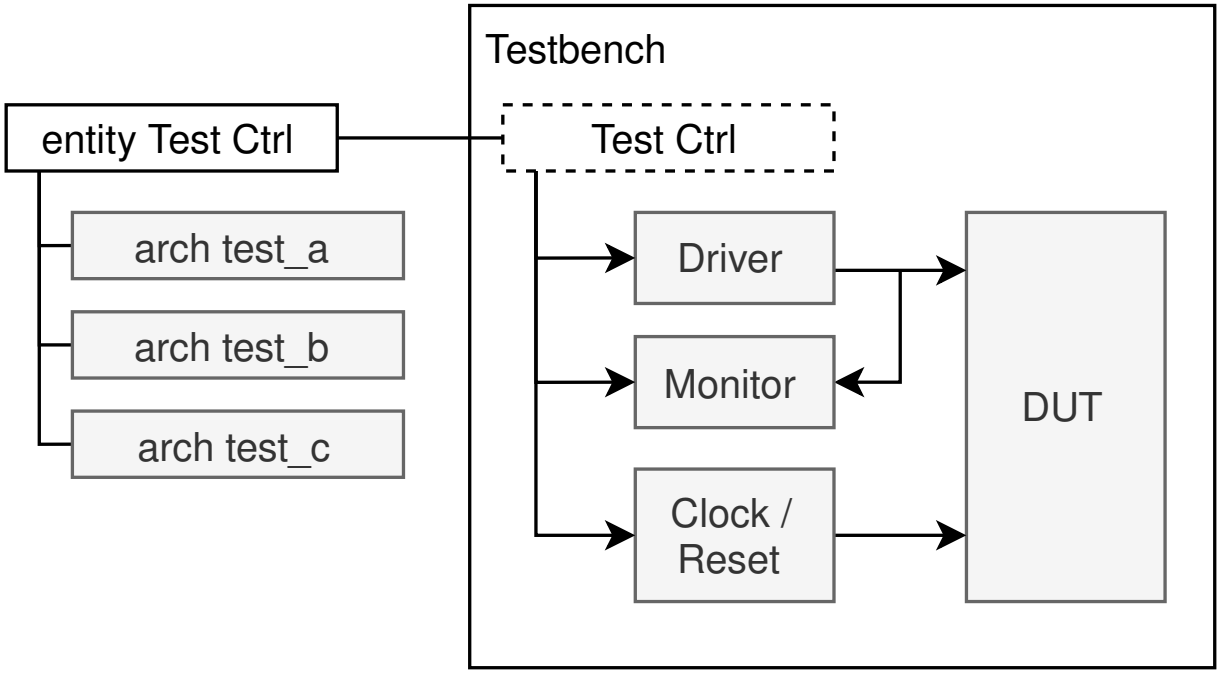
OSVVM

- Jim Lewis
  (IEEE VHDL WG Chair)
- Classic VHDL
- Test cases are defined by VHDL configurations
- TCL framework for test management



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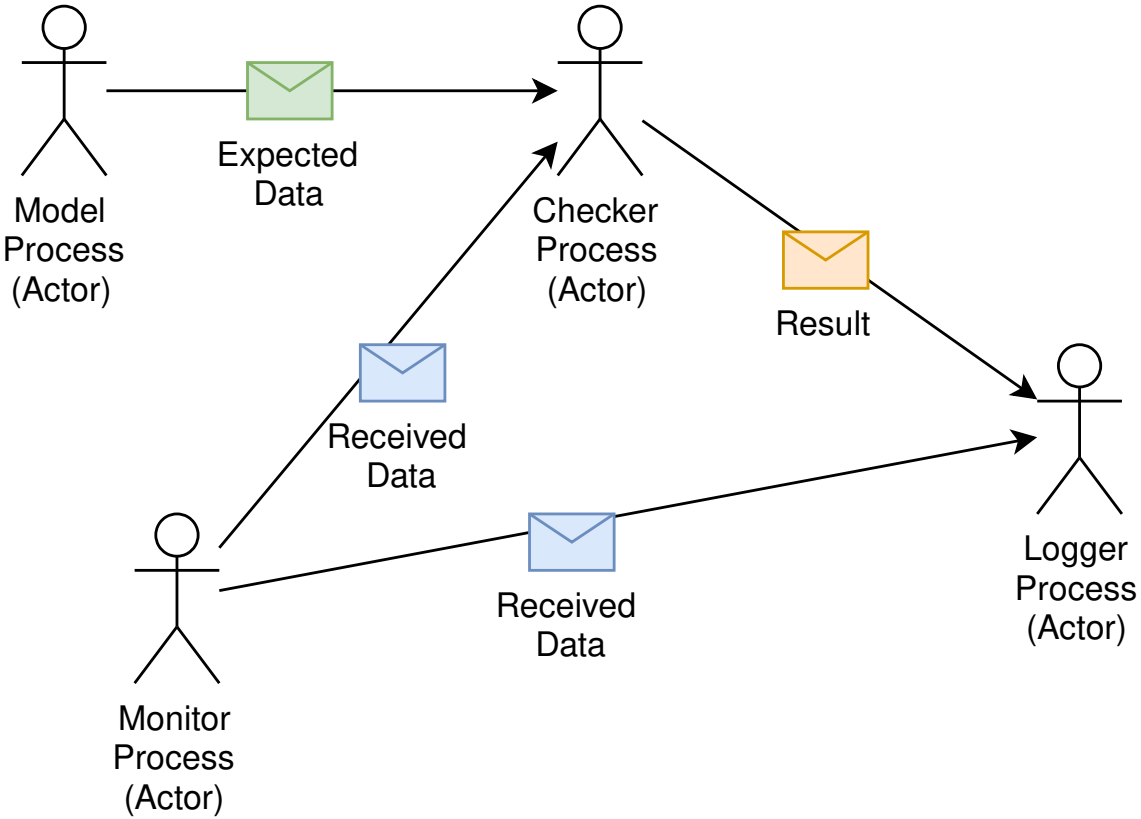
VUnit

- Python
- Simple and powerful
- Test management and configuration
- Actor Model
- Hacked “strong typing” of VHDL



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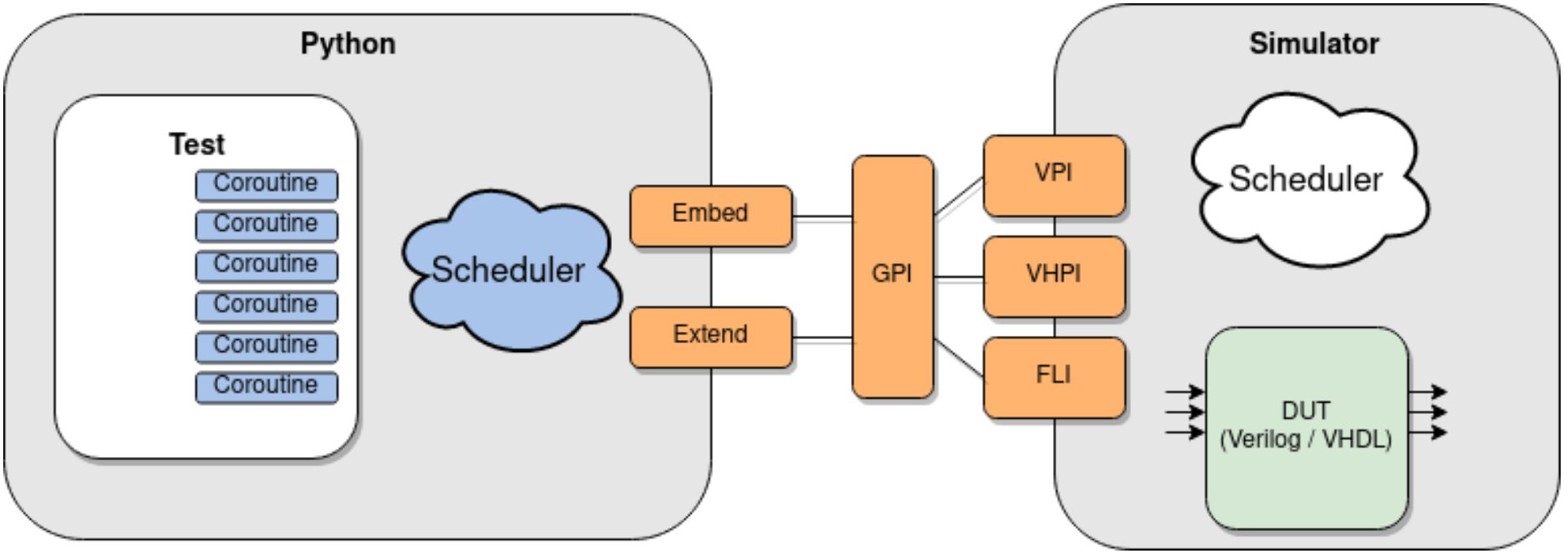
CocoTB



Source: docs.cocotb.org

Verilog Procedural Interface (VPI)
VHDL Programming Language Interface (VHPI)
Foreign Language Interface (FLI)

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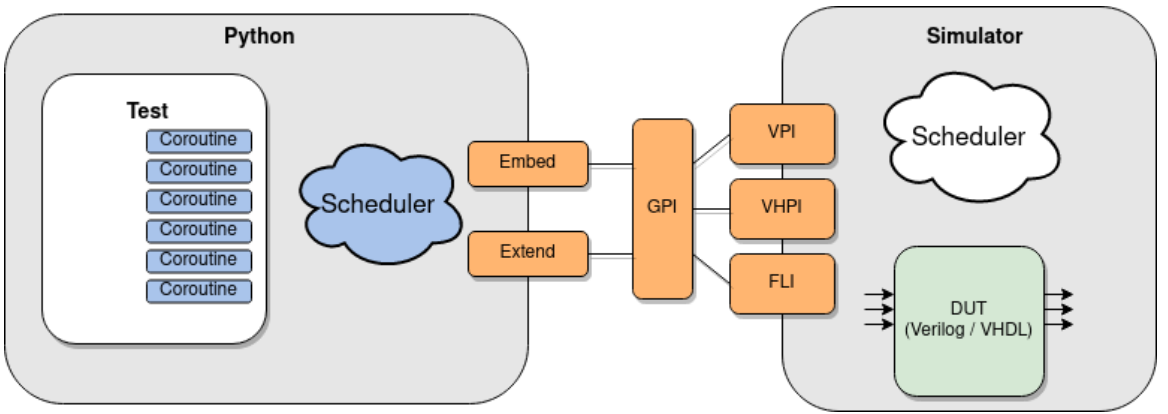
CocoTB

- DUT runs in Simulator
- Testbench runs in python
- Based on python coroutines (asyncio)
- All python features can be used



Source: docs.cocotb.org

Verilog Procedural Interface (VPI)
VHDL Programming Language Interface (VHPI)
Foreign Language Interface (FLI)

Appendix

Links

- UVM Standard (Accellera):
  https://www.accellera.org/downloads/standards/uvm
- OSVVM:
  https://osvvm.org/ and https://github.com/OSVVM
- Vunit:
  https://vunit.github.io/ and https://github.com/VUnit/vunit
- Cocotb:
  https://www.cocotb.org/ and https://github.com/cocotb/cocotb
- GHDL:
  https://github.com/ghdl/ghdl
- gtkwave:
  https://github.com/gtkwave/gtkwave
- NVC:
  https://github.com/nickg/nvc