

# VHDL CODE WITH CHISEL TESTER

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A LOOK INTO USING VHDL WITH VERILOG-ONLY TOOLS



# WHY?

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- Open-source tools
- Verilog only tools
  - VHDL is more difficult to parse
- Chisel with legacy code
  - Only when using Verilator

# HOW?

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- Open-source tools
- GHDL
  - Open-source VHDL simulator
  - Full support for 1987, 1993, 2002
  - Partial support for 2008
- Yosys – Yosys Open SYnthesis Suite
  - Open-source RTL synthesis tools
  - Verilog-2005 only
- Combined
  - Ghdl-yosys-plugin

# GETTING STARTED

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- Run natively on Linux
  - <https://github.com/chisel-uvn/vhdl2verilog>
- Run through Docker
  - <https://github.com/chisel-uvn/Docker>
  - Both vhdl2Verilog and Chisel

# CONVERSION

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- `yosys -m ghdl -p 'ghdl --std=08 src/accualu.vhd -e accualu; write_verilog synth_accualu.v'`
  - `--std=08` for VHDL 2008 support
  - Files required
    - Needs to be in order
  - `-e` is the entity
  - Generates a file called `synth_accualu.v`
  - Support for generics



# BLACKBOX IN CHISEL

- Same as for Verilog
- Blackbox

```
"AluAccuGenerated" should "pass" in {  
  test(new AluAccuGenerated(32)).withAnnotations(Seq  
    (VerilatorBackendAnnotation)) { dut => testFun(dut) }  
}
```

```
class accualu extends BlackBox with HasBlackBoxResource {  
  val io = IO(new Bundle {  
    val clock = Input(Clock())  
    val reset = Input(Reset())  
    val op = Input(UInt(3.W))  
    val din = Input(UInt(32.W))  
    val ena = Input(Bool())  
    val accu = Output(UInt(32.W))  
  })  
  
  //Points to the Verilog file, which is located under src/main/resources  
  setResource("/accualu_converted.v")  
}  
  
class AluAccuGenerated(size: Int) extends AluAccu(size) {  
  val AluAccu = Module(new accualu())  
  
  //Needs to be done with explicit clock and reset  
  // because blackbox does not have this defined.  
  AluAccu.io.op := io.op  
  AluAccu.io.din := io.din  
  AluAccu.io.ena := io.ena  
  io.accu := AluAccu.io.accu  
  AluAccu.io.clock := clock  
  AluAccu.io.reset := reset  
}
```

# DEMO AND FUTURE

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- Currently used for converting old files
- Should be called within Chisel
- Support for generics on the fly
  - -gBIT\_WIDTH=12