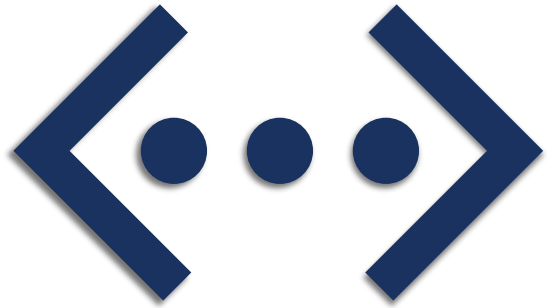
COVERAGE

INTRODUCTION AND DEMONSTRATION



Code Coverage

ScalaTest Coverage

OVERVIEW OF PRESENTATION

CODE COVERAGE

- Measures execution of DUV
- Coverage metrics
  - Statement / block coverage
  - Path coverage
  - Expression coverage

Explicit block (verilog)

```
if (dtack == 1'b1) begin: acked
    as      <= 1'b0;
    data    <= 16'hZZZZ;
    bus_rq  <= 1'b0;
    state   <= IDLE;
end
```

Implicit block (VHDL)

```
address <= h"FFED";
ale     <= '1';
rw      <= '1';
wait until dtack = '1';
read_data := data;
ale     <= '0';
```

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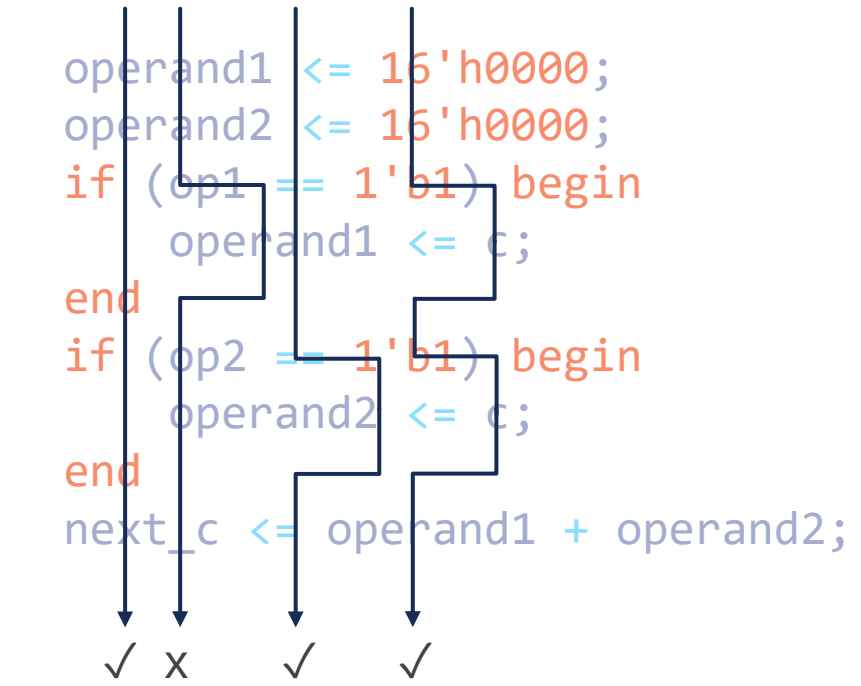
Path coverage (verilog)



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- Measures execution of DUV
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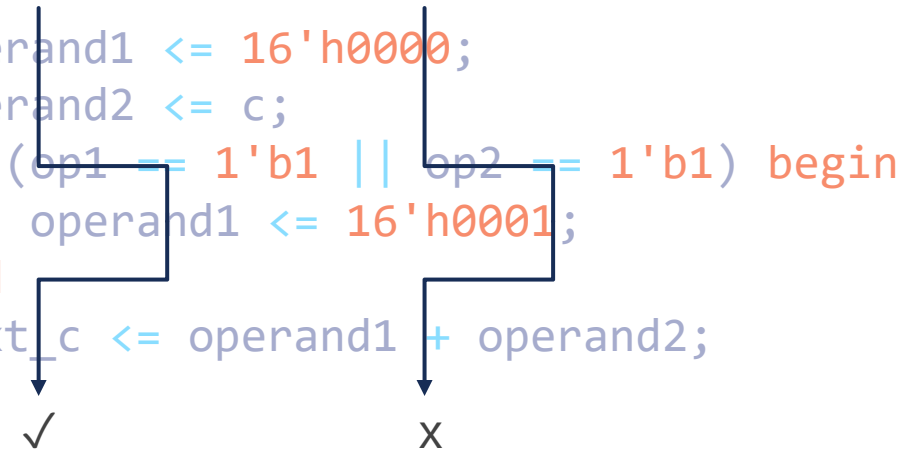
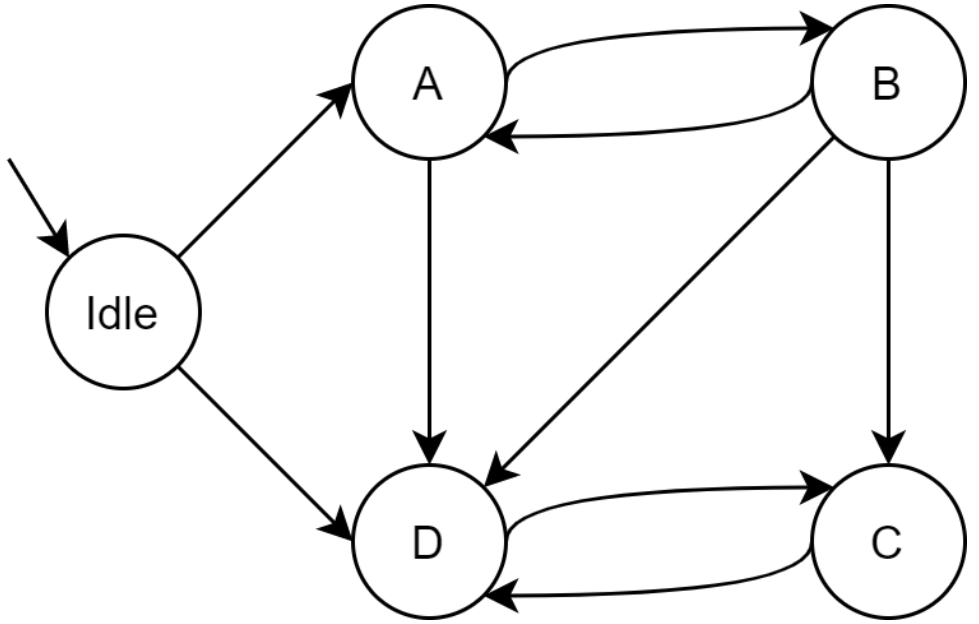
Expression coverage (verilog)



FSM COVERAGE

- State coverage
- Transition coverage
  - Like expression coverage

- E.g. Idle → A → B → C → D
  - 100% state coverage
  - 36% transition coverage

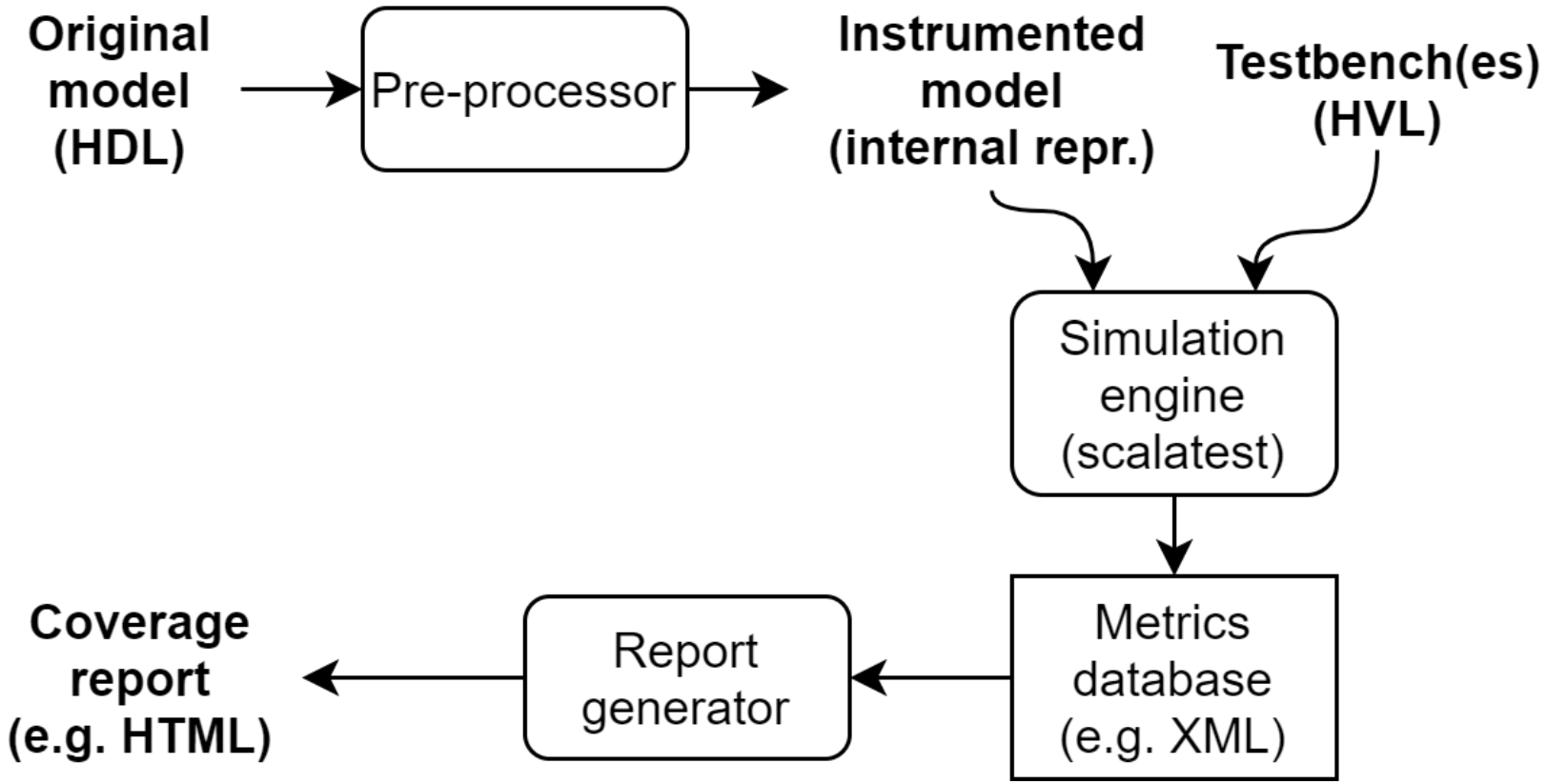


WHAT TO AIM FOR

- 100% coverage?
  - Statement coverage – achievable
  - Path coverage – difficult
  - Expression coverage – very difficult
- Code *not* meant to execute
  - Fully specified VHDL case with default
  - Assertions
- Thoroughness, correctness and completeness

Assertion (VHDL)

```
-- state : std_logic_vector(1 downto 0)
case (state) is
    when b"00" => ...
    when b"01" => ...
    when b"10" => ...
    when b"11" => ...
    when others =>
        report "this should not execute"
        severity error;
end case ;
...
```



CODE COVERAGE PROCESS

SCALATEST COVERAGE

- ScalaC Scoverage plugin
  - Statement coverage
  - Branch coverage
  - No line coverage metric
- SBT Scoverage
- Chisel3 support
  - According to Github Wiki
  - Limited coverage

```
val status = if (age < 18) "No beer" else "Beer for you"
```

VS

```
var status = ""
if (age < 18)
    status = "No beer"
else
    status = "Beer for you"
```

Lightbend, Inc.

ADDITIONS AND OPTIONS

- Plugin file – in project/plugins.sbt

```
addSbtPlugin("org.scoverage" % "sbt-scoverage" % "1.6.1")
```

- Options – in build.sbt

```
coverageEnabled := true
coverageMinimum := 70
coverageFailOnMinimum := false
coverageHighlighting := true
```

DEMONSTRATION