Code Coverage
Coverage Types

- Code Coverage
- Functional Coverage
Code Coverage

- Tests how thoroughly Tests exercises DUT
- No Extra HDL required
- Supported by most simulators
- Statistics gathered by the simulator on
  - Line coverage
  - Path coverage
  - Toggle coverage
  - FSM Coverage
Code Coverage with VCS

- Line coverage
- Conditional coverage
- Toggle coverage
- FSM Coverage
VCS Line Coverage

- Keeps track of certain kinds of the procedural statements that cause a simulation event, such as
  - a procedural assignment statement,
  - a system task,
  - statements that control what other statements are executed such as a while or if statement.
VCS Toggle Coverage

- Toggle coverage is determining whether the signals in your design had $0 \rightarrow 1$ and $1 \rightarrow 0$ transitions.
VCS Conditional Coverage

- Conditional coverage is monitoring whether certain expressions and sub-expressions in your code evaluate to true or false.
VCS FSM coverage

- FSM coverage can tell you things about your design, including the FSMs in your design that you cannot learn from other types of coverage.
Example of FSM Coverage

module dev (clk, in, state);
input clk, in;
output [1:0] state;
reg [1:0] state, next;
parameter idle = 2'b00,
    first = 2'b01,
    second = 2'b10,
    third = 2'b11;
initial
begin
    state = idle;
    next = idle;
end
always @ (posedge clk)
begin
    state = next;
endmodule
Line Coverage using vcs

- vcs -cm line test_fixture.v
- simv -cm line
- urg –dir simv.vdb
- Access reports using a browser in urgReport directory
Line coverage commands

- **vcs -cm line source.v**
  - VCS compiles for line coverage and only line coverage.

- **simv -cm line**
  - During simulation VCS looks for line coverage and only line coverage.
Complete Coverage with VCS

vcs -cm fsm+line+tgl+cond source.v
simv -cm fsm+line+tgl+cond
urg –dir simv.vdb