Assignment #: 04

Section #: 21

Submitted by:

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Date: 1/4/2024

1- Test_bench:

```systemverilog
Ln#
1    module fsm_tb();
2    reg in,clk,reset;
3    wire [2:0] out;
4
5
6    typedef enum { S0, S1, S2, S3} S;
7
8    FSM a(.*);
9
10   covergroup cb;
11
12   cp: coverpoint a.current_state
13         {      bins p0=(S0 =>S0);
14                bins p1=(S0 =>S1);
15                bins p2=(S1 =>S2);
16                bins p3=(S2 =>S3);
17                bins p4=(S3 =>S0);
18          }
19   endgroup
20
21   //clock generation
22   initial begin
23   clk=1;
24   forever
25   #1 clk=~clk;
26   end
27
```

```systemverilog
Ln#
28
29   initial begin
30
31   cb cov;
32   cov=new();
33   reset=0; in=1;
34
35   @(negedge clk); reset=1; in=0; cov.sample();
36   @(negedge clk); reset=0; in=0; cov.sample();
37   @(negedge clk); reset=0; in=1; cov.sample();
38   @(negedge clk); reset=0; in=0; cov.sample();
39   @(negedge clk); reset=0; in=1; cov.sample();
40   @(negedge clk); reset=0; in=0; cov.sample();
41   @(negedge clk); reset=0; in=1; cov.sample();
42   @(negedge clk); reset=0; in=0; cov.sample();
43   @(negedge clk); reset=0; in=1; cov.sample();
44   @(negedge clk); reset=0; in=0; cov.sample();
45   @(negedge clk); reset=0; in=1; cov.sample();
46
47   $stop;
48   end
49
50   assert property(@(posedge clk) a.current_state==S0 |-> out==0);
51   assert property(@(posedge clk) a.current_state==S1 |-> out==1);
52   assert property(@(posedge clk) a.current_state==S2 |-> out==3);
53   assert property(@(posedge clk) a.current_state==S3 |-> out==7);
54   endmodule
```

2- wave form:
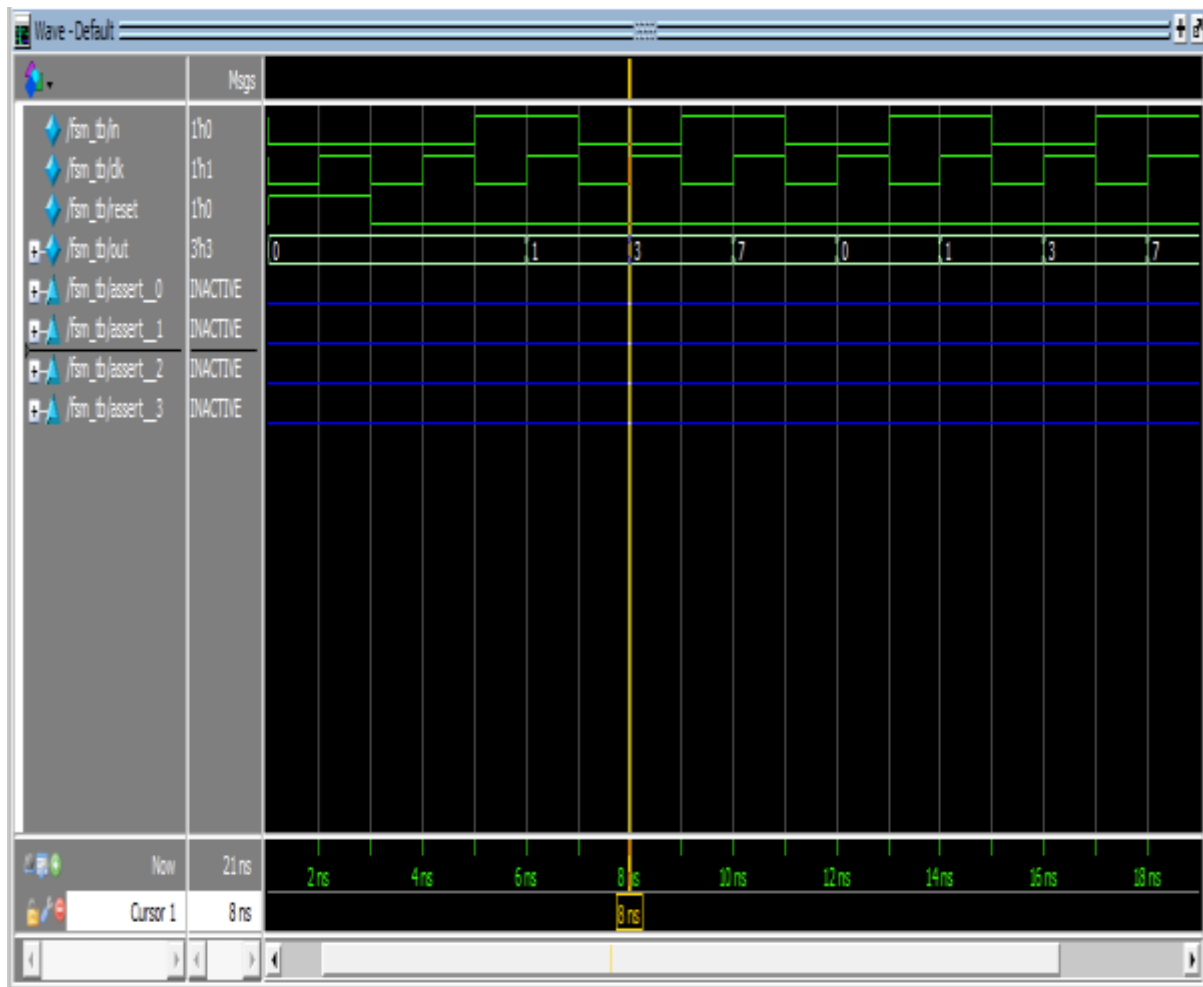
3- Report:

```
Covergroup                                       Metric    Goal    Bins    Status

--------------------------------------------------------------------------------
TYPE /fsm_tb/cb                                  100.00%   100     -       Covered
   covered/total bins:                           5         5       -
   missing/total bins:                           0         5       -
   % Hit:                                         100.00%   100     -
   Coverpoint cp                                 100.00%   100     -       Covered
      covered/total bins:                        5         5       -
      missing/total bins:                        0         5       -
      % Hit:                                     100.00%   100     -
Covergroup instance \/fsm_tb/#ublk#114964130#30/cov
                                                 100.00%   100     -       Covered
   covered/total bins:                           5         5       -
   missing/total bins:                           0         5       -
   % Hit:                                         100.00%   100     -
   Coverpoint cp                                 100.00%   100     -       Covered
      covered/total bins:                        5         5       -
      missing/total bins:                        0         5       -
      % Hit:                                     100.00%   100     -
      bin p0                                     1         1       -       Covered
      bin p1                                     2         1       -       Covered
      bin p2                                     2         1       -       Covered
      bin p3                                     2         1       -       Covered
      bin p4                                     2         1       -       Covered
```

```
===============================Toggle Details================================

Toggle Coverage for instance /fsm_tb/a --

                              Node    1H->0L    0L->1H                    "Coverage"
                      ----------------------------------------------------------------
                               clk       1        1                         100.00
                     current_state              ENUM type    Value    Count
                                                    S0          1      100.00
                                                    S1          2      100.00
                                                    S2          1      100.00
                                                    S3          1      100.00
                                in       1        1                         100.00
                        next_state               ENUM type    Value    Count
                                                    S0          1      100.00
                                                    S1          3      100.00
                                                    S2          1      100.00
                                                    S3          1      100.00
                           out[2-0]      1        1                         100.00
                              reset      1        1                         100.00

Total Node Count       =          14
Toggled Node Count     =          14
Untoggled Node Count   =           0

Toggle Coverage        =    100.00% (20 of 20 bins)


==============================================================================
=== Instance: /fsm_tb
```