



Hacettepe University Computer Science and Engineering Department

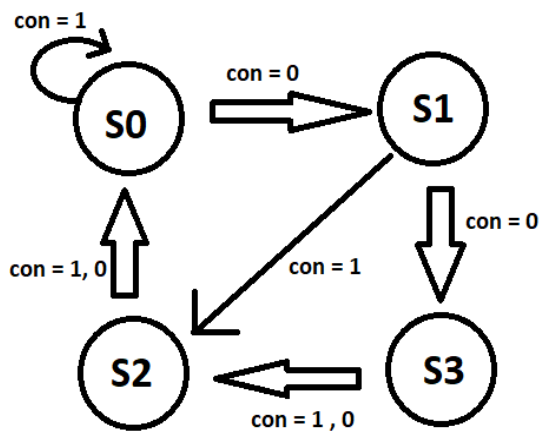
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Subject : BBM 233 LOGIC DESIGN LAB PROJECT

Problem Definition: In this project, we are expected to design and implement a Martian Underground Road Junction Control System. There were certain traffic rules we had to follow.

Solution: First I decided what the states represent. Then I found the next states according to traffic congestion. According to the information in pdf, I made different time definitions for each state. I created state table, state diagram with this data. (I have added to the pictures below). Then I wrote my verilog code and testbench via behavioral solution according to my state and next states.



congestion = con;

S0 (00) represents GO for the main road, STOP for the side road

S1 (01) represents GO-ATTENTION for the main road, STOP-ATTENTION for the side road

S2 (10) represents STOP for the main road, GO for the side road

S3 (11) represents STOP-ATTENTION for the main road, GO-ATTENTION for the side road

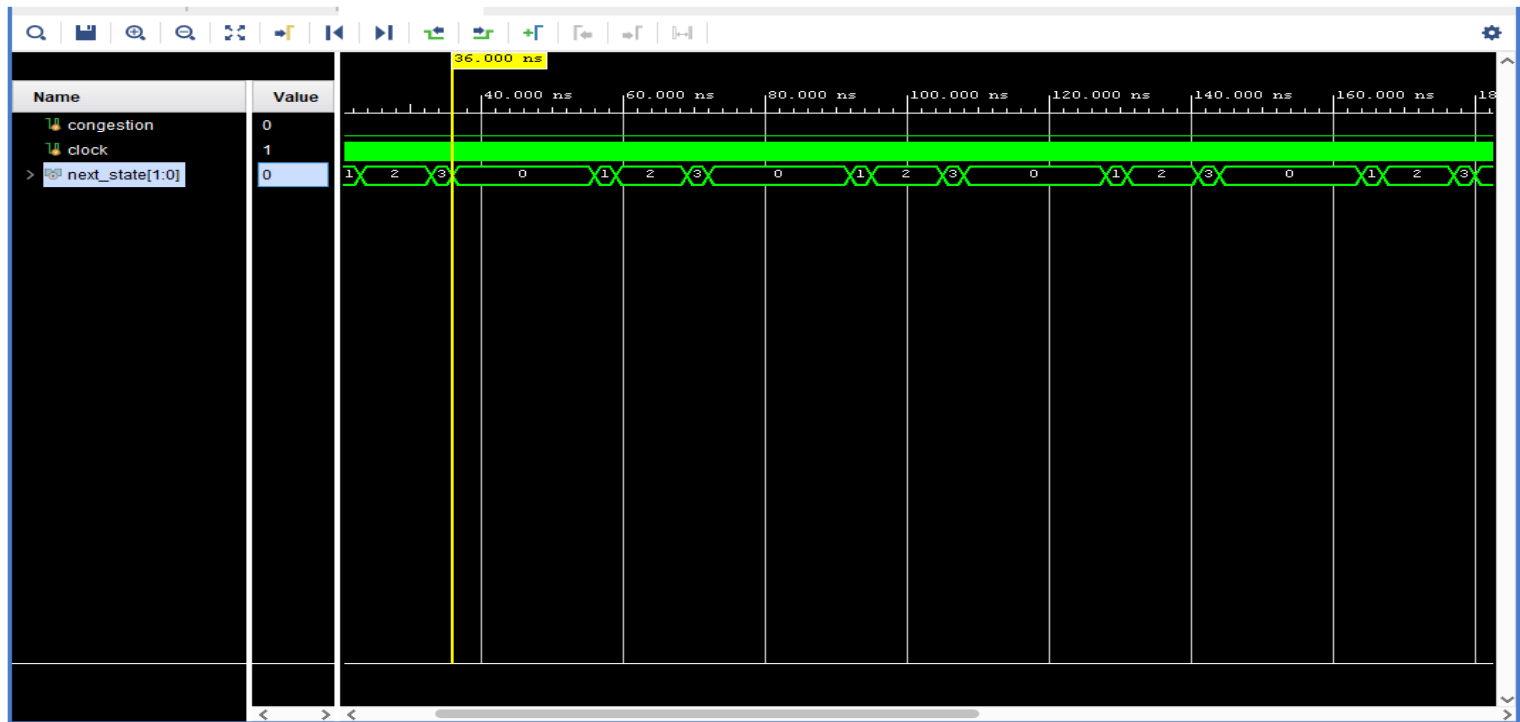
I have defined 20 for S0, 3 for S1, 10 for S2 and 10 seconds for S3.

| current state | input (congestion) | next state |
|------------------|-----------------------|---------------|
| AB | C | A*B* |
| 00 | 0 | 01 |
| 00 | 1 | 00 |
| 01 | 0 | 10 |
| 01 | 1 | 11 |
| 10 | 0 | 11 |
| 10 | 1 | 11 |
| 11 | 0 | 00 |
| 11 | 1 | 00 |

TESTBENCH 1

congestion = 0;

#300;

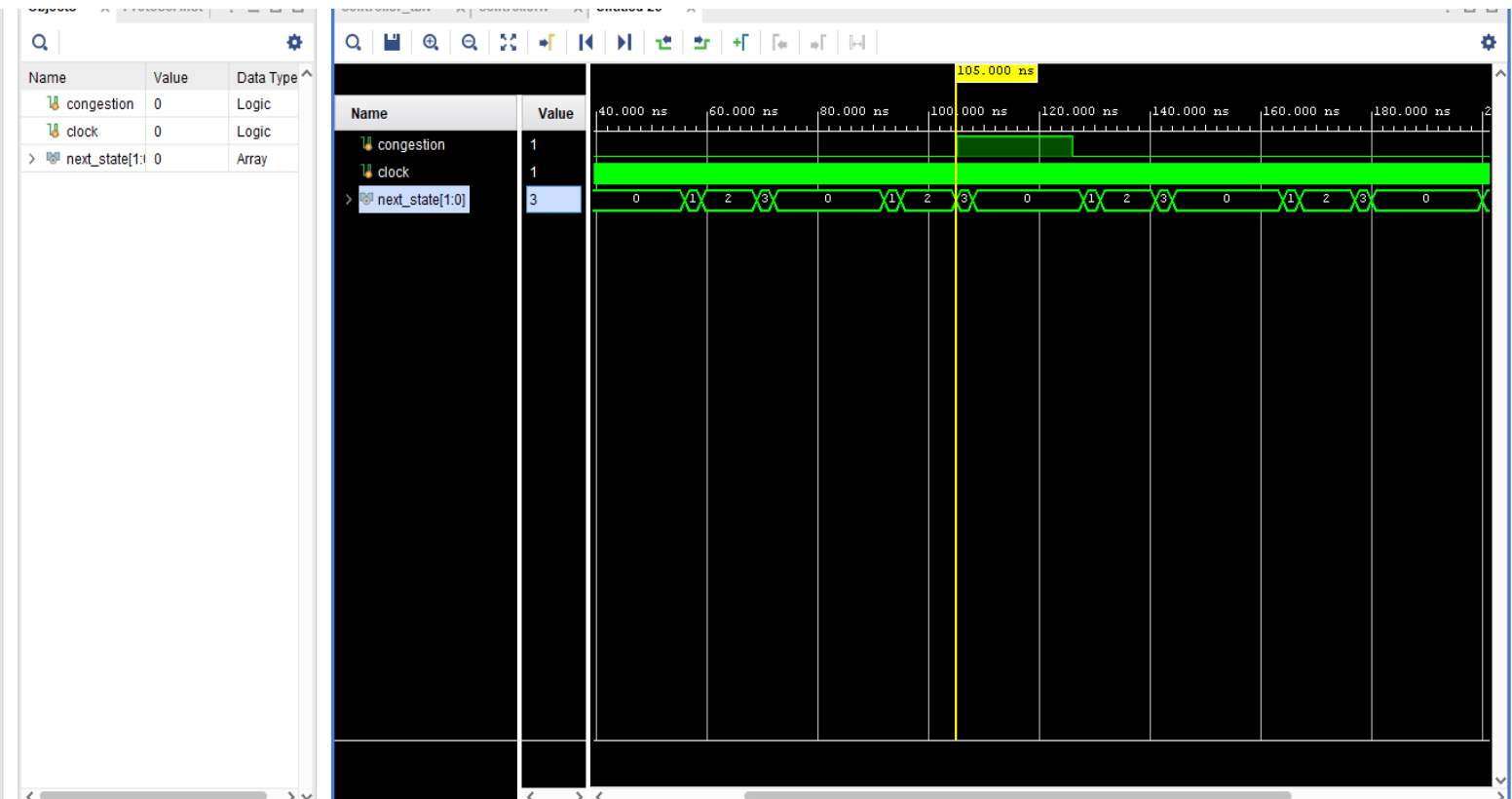


In the absence of congestion (input = 0) s0 for 20, s1 for 3, s2 for 10, s3 for 3 ns continues waiting. The main road is in the go state while the side road is at a stop.

TESTBENCH 2

congestion = 0; #105;

congestion = 1; #20;

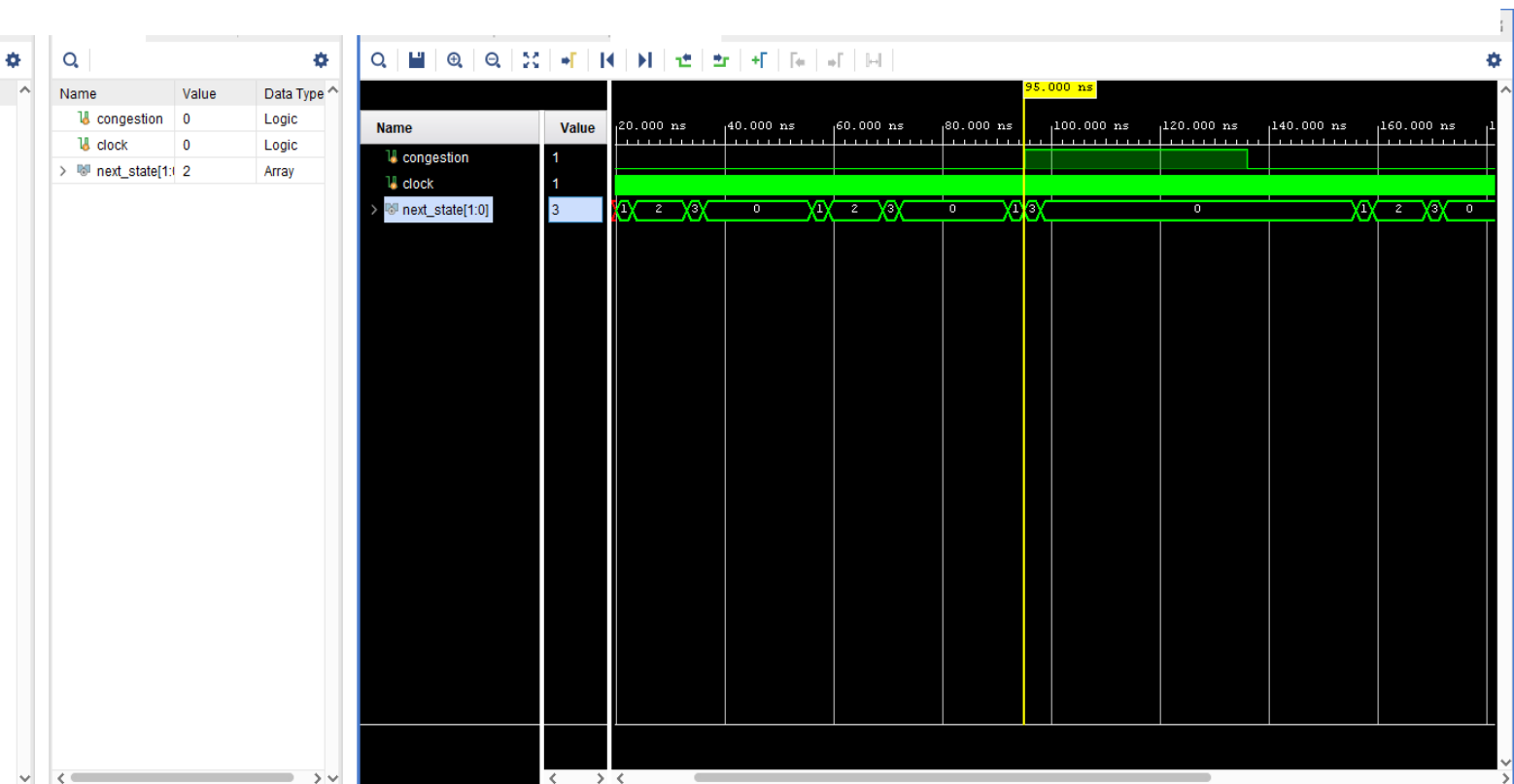


The first 105 ns congestion was 0. In 105th ns the congestion was equaled to 1 and passed S3 as preparation for having go on the main road. In 108 ns, it went into S0. (ie main road go, side road stop status) s0 status lasted 20 sec and the next state was s1 because there was no congestion in 128 ns.

TESTBENCH 3

congestion = 0; #95;

congestion = 1; #45;

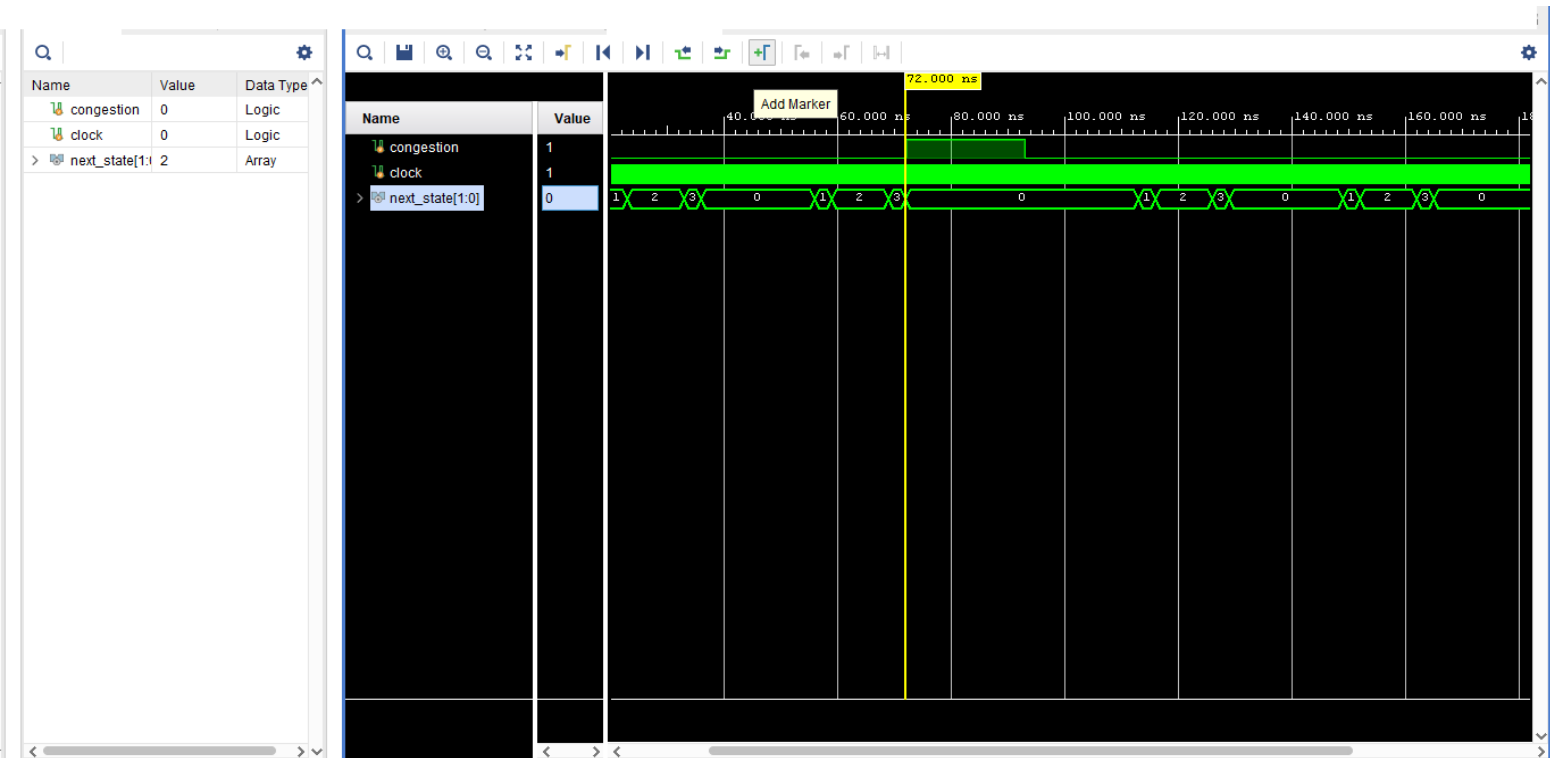


The first 95 ns congestion was 0. At 95 ns, the congestion was equaled to 1 and surpassed S3 in preparation for the main road. He entered S0 at 98 ns. (ie go to main road, side road stop state) s0 status lasted 40 ns. At 138th second, the s0 status continued again as the congestion was still 1.

TESTBENCH 4

congestion = 0; #72;

congestion = 1; #21;



TESTBENCH 5

congestion = 0; #80;

congestion = 1; #35;

