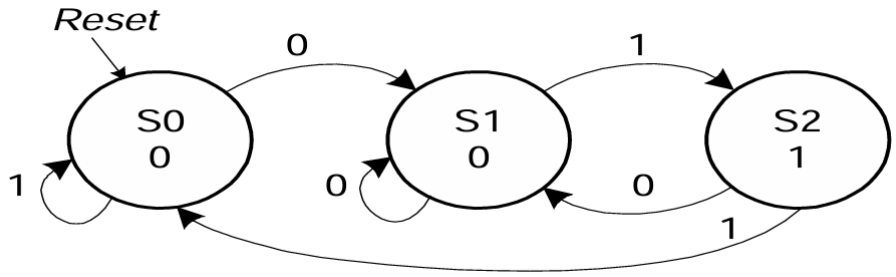
PROBLEM STATEMENT –

The snail smiles whenever the last two digits it has crawled over are 01. Design Moore FSMs of the snail's brain.

FSM Diagram –



Source code -

```
module snailsmile01(
    input a, clk, reset,
    output y
);
    reg [1:0] state, nextstate;
    parameter s0 = 2'b00;
    parameter s1 = 2'b01;
    parameter s2 = 2'b10;

    always @(posedge clk or posedge reset) begin
        if (reset)
            state <= s0;
        else
            state <= nextstate;
    end
    always@* begin
        case(state)
            s0: if(a) nextstate = s0; else nextstate = s1;
            s1: if(a) nextstate = s2; else nextstate = s1;
            s2: if(a) nextstate = s0; else nextstate = s1;
            default: nextstate = s0;
        endcase
    end
    assign y = (state == s2);
endmodule
```

Testbench code -

```
module snailsmile01_tb();
    reg a,clk,reset;
    wire y;
    snailsmile01 dut (.a(a), .clk(clk), .reset(reset), .y(y));
    initial begin
    clk = 0;
    forever #5 clk = ~clk;
    end
    initial begin
        a=0;
        reset = 1;
        #5 a=1;
        #10 a=0;
        reset = 0;
        #10 a=1;
        #10 a=1;
        #10 a=0;
        #10 a=0;
        #10 a=0;
        #10 a=1;
        #10 a=0;
        #10 a=1;
        #10 a=1;
        #10 a=1;
        #10 a=0;
        #10 $finish;
    end
endmodule
```

Simulated waveform from vivado –