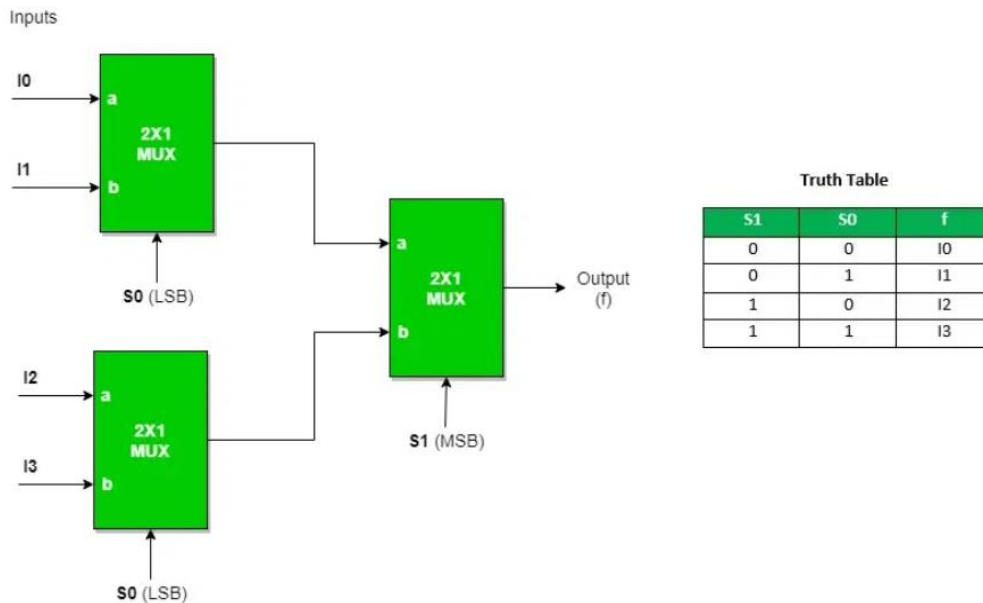


## 4<sup>th</sup> Day

### 4 : 1 Mux using 2 : 1 Mux



4 : 1 MUX using 2 : 1 MUX

### Design

```
module mux_2_1(input a,b,sel,output y);  
  assign y=sel?b:a;  
endmodule
```

```
module mux_4_1(input [3:0]in,input[1:0]sel,output y);  
  wire w1,w2;  
  mux_2_1 m1(in[0],in[1],sel[0],w1);  
  mux_2_1 m2(in[2],in[3],sel[0],w2);  
  mux_2_1 m3(w1,w2,sel[1],y);  
endmodule
```

## Testbench

```
module mux_4_1_tb();

reg [3:0]in;

reg [1:0]sel;

wire y;

mux_4_1 dut(in,sel,y);

initial
begin
    $monitor("in=%b,sel=%b,y=%b",in,sel,y);

    in=$random;

    sel=2'b00;

    #1;

    sel=2'b01;

    #1;

    sel=2'b10;

    #1

    sel=2'b11;

    #5;

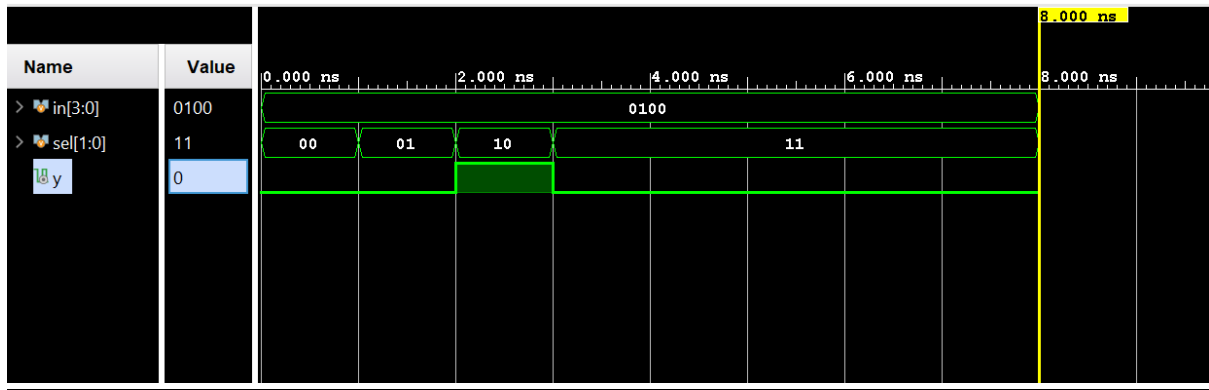
    $finish;

end

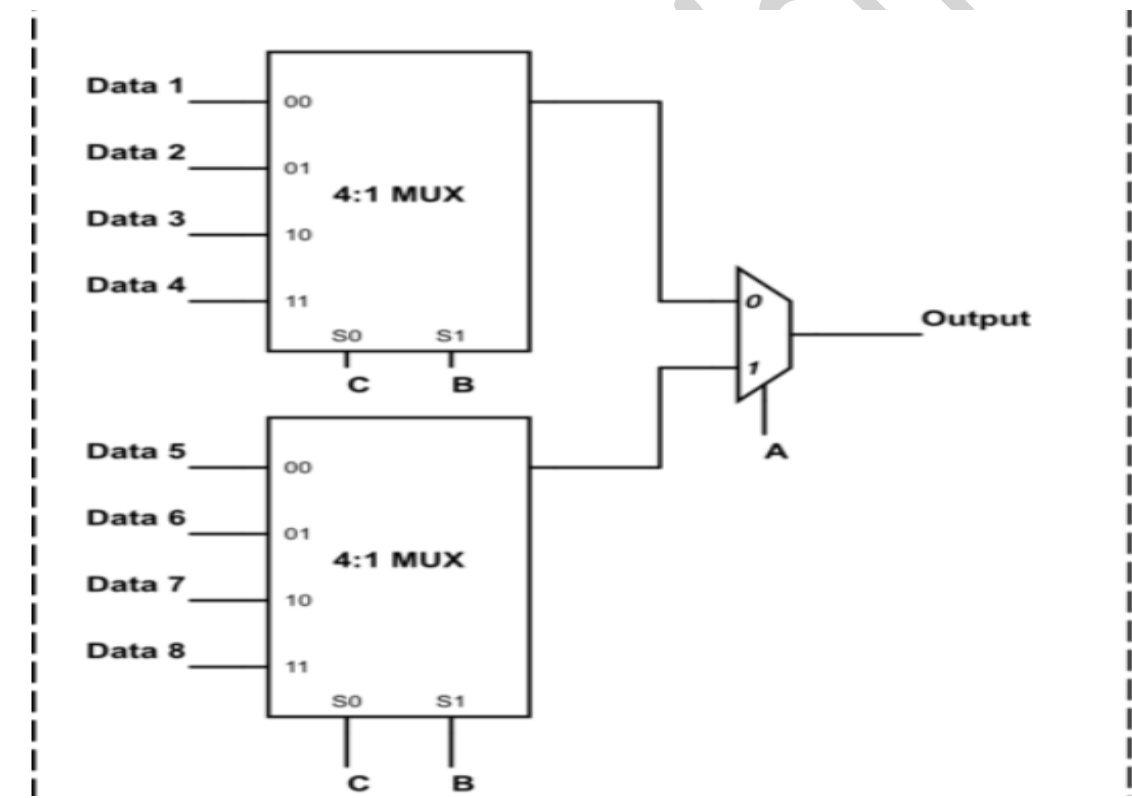
endmodule
```

## Simulation

```
# }
# run 1000ns
in=0100,sel=00,y=0
in=0100,sel=01,y=0
in=0100,sel=10,y=1
in=0100,sel=11,y=0
$finish called at time : 8 ns : File "C:/Users/manojmsd/100_days_of_RTL/100_days_of_RTL.srcs/sources_1/new/mux_4_1_tb.v" Line 44
INFO: [USF-XSim-96] XSim completed. Design snapshot 'mux_4_1_tb_behav' loaded.
INFO: [USF-XSim-97] XSim simulation ran for 1000ns
launch_simulation: Time (s): cpu = 00:00:04 ; elapsed = 00:00:11 . Memory (MB): peak = 1590.859 ; gain = 0.000
```



## 8 1 Mux Using 4 1 and 2 1 Mux



## **Design**

```
module mux_8_1(input[7:0]in,[2:0]sel,output y );  
  
wire w0,w1;  
  
mux_4_1 m1 (in[3:0],sel[1:0],w0);  
mux_4_1 m2 (in[7:4],sel[1:0],w1);  
mux_2_1 m3 (w0,w1,sel[2],y);  
  
endmodule
```

## **Testbench**

```
module mux_8_1_tb( );  
  
reg [7:0]in;  
reg [2:0]sel;  
wire y;  
mux_8_1 dut(in,sel,y);  
  
initial  
begin  
    $monitor("in=%b,sel=%b,y=%b",in,sel,y);  
    in=$random;  
    repeat(7)  
    begin  
        sel=$random;  
        #5;  
    end  
    $finish;  
end  
  
endmodule
```

# Simulation

```
# }
# }
# run 1000ns
in=00100100,sel=001,y=0
in=00100100,sel=011,y=0
in=00100100,sel=101,y=1
in=00100100,sel=010,y=1
$finish called at time : 35 ns : File "C:/Users/manojmsd/100_days_of_RTL/100_days_of_RTL.srcs/sources_1/new/mux_8_1_tb.v" Line 40
INFO: [USF-XSim-96] XSim completed. Design snapshot 'mux_8_1_tb_behav' loaded.
INFO: [USF-XSim-97] XSim simulation ran for 1000ns
launch_simulation: Time (s): cpu = 00:00:03 ; elapsed = 00:00:11 . Memory (MB): peak = 1596.527 ; gain = 3.191
```

