Problem

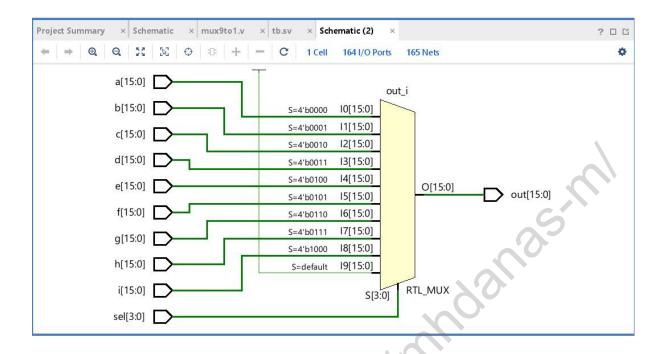
#Day10: Create a 16-bit wide, 9-to-I multiplexer. sel=0 chooses a, sel=1 chooses b, etc. For the unused cases (sel=9 to 15), set all output bits to '1'.

<u>Design</u>

NAMILIA

```
module mux #(parameter Bitwidth=16)( input [Bitwidth-1:0]
a,b,c,d,e,f,g,h,i,input [3:0]sel,
           output reg [Bitwidth-1:0] out);
  always @(*) begin
 case(sel)
 4'd0:out=a;
 4'd1:out=b;
 4'd2:out=c;
 4'd3:out=d;
 4'd4:out=e;
 4'd5:out=f;
 4'd6:out=g;
 4'd7:out=h;
 4'd8:out=i;
 default:out=16'hffff;
 endcase
endmodule
```

Circuit



Testbench

```
module tb();
   reg [15:0] a,b,c,d,e,f,g,h,i;reg [3:0]sel;
   wire [15:0] out;
    mux a1(a,b,c,d,e,f,g,h,i,sel,out);
initial begin
repeat(10) begin
a=$random;
b=$random;
sel=$random;
c=$random;
d=$random;
e=$random;
f=$random;
g=$random;
h=$random;
i=$random;
#50;
endmodule
```

Waveform

Name	Value	80.000 ns 10	0.000 ns 120.000 ns 140.	000 ns 160.000 ns 180.000 ns	s 200.000 ns
> № a[15:0]	3524	£176	d612	6263	dd6b
▶ ₩ b[15:0]	5e81	cd3d	db8f	870a	2ad5
> ₩ c[15:0]	5663	f78c	96ce	2120	3eae
→ W d[15:0]	7b0d	e9f9	7ae8	45aa	e91d
> ₩ e[15:0]	998d	24c6	4ec5	cc9d	72cf
▶ ₩ f[15:0]	8465	84c5	495c	3e96	4923
> ₩ g[15:0]	5212	d2aa	28bd	ъ813	650a
▶ W h[15:0]	e301	f7e5	582d	380d	Oaca
→ W i[15:0]	cd0d	7277	2665	d653	4c3c
> ₩ sel[3:0]	9	d	2	0	2
	ffff	ffff	96ce	6263	3eae
	liukes				