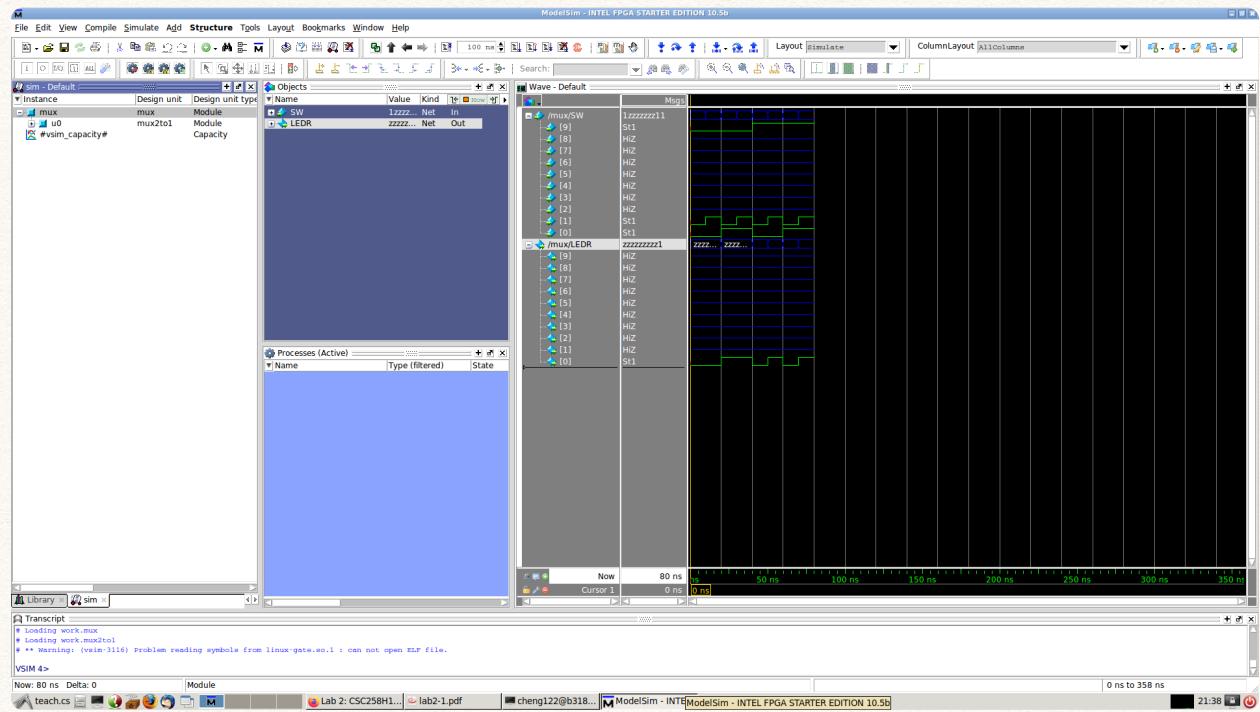


5.1

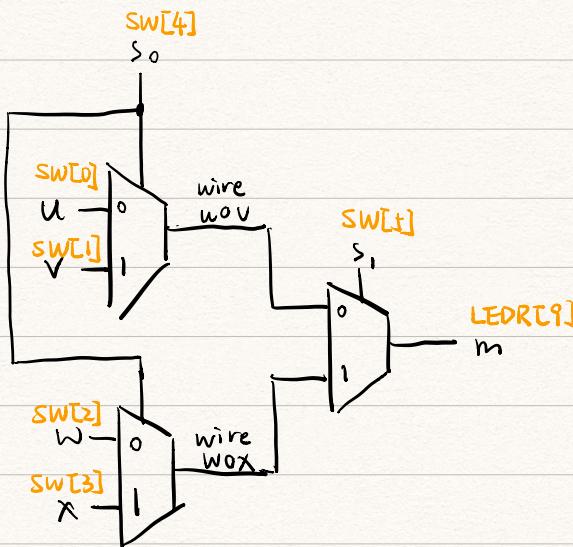


It works as expected

6.1 We now have s_1, s_0, u, v, w, x , six inputs

It would have $2^6 = 64$ combinations / rows.

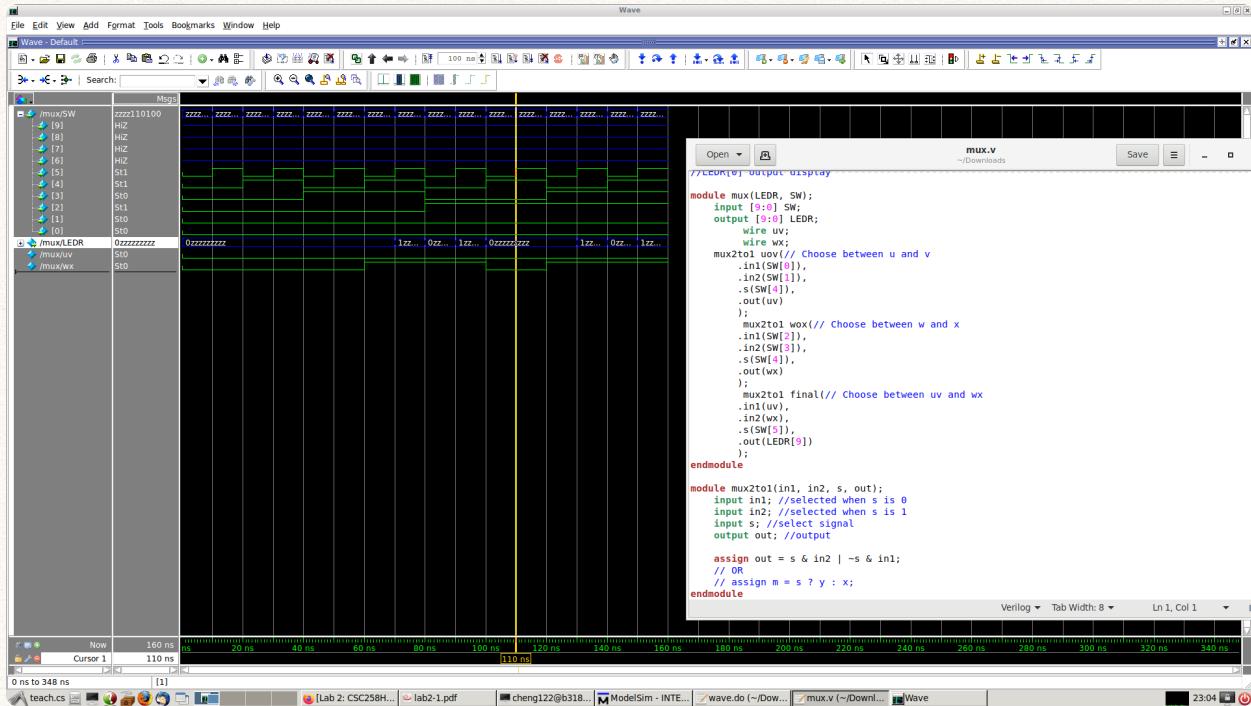
6.2



6.3. see mux4to1.v

6.4. SW[0] SW[1] SW[2] SW[3] SW[4] SW[5]

u v w x s₀ s₁



7.1 $x_3 \quad x_2 \quad x_1 \quad x_0 \quad \text{HEX}_0$

0	0	0	0	0	0
0	0	0	1	1	1
0	0	1	0	2	0
0	0	1	1	3	0
0	1	0	0	4	1
0	1	0	1	5	0
0	1	1	0	6	0
0	1	1	1	7	0
1	0	0	0	8	0
1	0	0	1	9	0
1	0	1	0	A	0
1	0	1	1	b	1
1	1	0	0	C	0
1	1	0	1	d	1
1	1	1	0	E	0
1	1	1	1	F	0

$$\begin{array}{cccc}
 \frac{0}{x_3} & \frac{0}{\bar{x}_3} & \frac{0}{x_2} & \frac{0}{\bar{x}_2} \\
 \frac{0}{x_1} & \frac{0}{\bar{x}_1} & \frac{1}{x_0} & \frac{1}{\bar{x}_0}
 \end{array}$$

$\frac{0}{x_3} \cdot \frac{0}{\bar{x}_2}$	0	$\frac{1}{x_1} \cdot \frac{0}{x_0}$	0
$\frac{0}{\bar{x}_3} \cdot \frac{1}{x_2}$	1	$\frac{0}{x_1} \cdot \frac{0}{x_0}$	0
$\frac{1}{x_3} \cdot \frac{1}{x_2}$	0	$\frac{1}{x_1} \cdot \frac{1}{x_0}$	0
$\frac{1}{\bar{x}_3} \cdot \frac{0}{x_2}$	0	$\frac{0}{x_1} \cdot \frac{1}{\bar{x}_0}$	0

$$\text{HEX}_0 = \frac{0}{x_3} \cdot \frac{0}{\bar{x}_2} \cdot \frac{1}{x_1} \cdot \frac{0}{x_0} + \frac{0}{\bar{x}_3} \cdot \frac{1}{x_2} \cdot \frac{0}{x_1} \cdot \frac{1}{\bar{x}_0} + \dots$$

7.1 $x_3 \quad x_2 \quad x_1 \quad x_0$ HEX,

0 0 0 0 0 0

0 0 0 1 1 0

0 0 1 0 2 0

0 0 1 1 3 0

0 1 0 0 4 0

0 1 0 1 5 1

0 1 1 0 6 1

0 1 1 1 7 0

1 0 0 0 8 0

1 0 0 1 9 0

1 0 1 0 A 0 H

1 0 1 1 B 1 I

1 1 0 0 C 1 E

1 1 0 1 D 0 F

1 1 1 0 E 1 E

1 1 1 1 F 1 F

$$\begin{array}{cccc} 0 & 0 & 0 & 0 \\ \overline{x_3} \cdot \overline{x_2} & \overline{x_1} \cdot x_0 & \overline{x_1} \cdot x_0 & x_1 \cdot x_0 \\ \hline \end{array}$$

$$\begin{array}{cccc} 0 & 0 & 0 & 0 \\ \overline{x_3} \cdot \overline{x_2} & 0 & 0 & 0 \\ \hline \end{array}$$

$$\begin{array}{cccc} 0 & 0 & 0 & 0 \\ \overline{x_3} \cdot x_2 & 1 & 0 & 1 \\ \hline \end{array}$$

$$\begin{array}{cccc} 0 & 0 & 0 & 0 \\ x_3 \cdot \overline{x_2} & 0 & 0 & 1 \\ \hline \end{array}$$

$$HEX_1 = x_3 x_2 \overline{x_1} \overline{x_0} + \overline{x_3} x_2 \overline{x_1} x_0 + x_3 x_1 x_0 + x_2 x_1 \overline{x_0}$$

7.1	x_3	x_2	x_1	x_0	HEX ₂
	0	0	0	0	0
	0	0	0	1	1
	0	0	1	0	2
	0	0	1	1	3
	0	1	0	0	4
	0	1	0	1	5
	0	1	1	0	6
	0	1	1	1	7
	1	0	0	0	8
	1	0	0	1	9
	1	0	1	0	A
	1	0	1	1	B
	1	1	0	0	C
	1	1	0	1	D
	1	1	1	0	E
	1	1	1	1	F

	$\overline{x_3} \cdot \overline{x_2}$	$\overline{x_1} \cdot \overline{x_0}$	$\overline{x_1} \cdot x_0$	$x_1 \cdot x_0$	$x_1 \cdot \overline{x_0}$
	0	0	0	0	1
	0	1	0	0	0
	1	0	0	0	0
	1	1	1	1	1
	0	0	0	0	0

$$\text{HEX}_2 = \overline{x_3} \overline{x_2} x_1 \overline{x_0} + x_3 x_2 \overline{x_0} + x_3 x_2 x_1$$

7.1	x_3	x_2	x_1	x_0	HEX ₃	
	0	0	0	0	0	$\begin{smallmatrix} 1 \\ - \\ 1 \end{smallmatrix}$
	0	0	0	1	1	$\begin{smallmatrix} 1 \\ 1 \end{smallmatrix}$
	0	0	1	0	2	0
	0	0	1	1	3	0
	0	1	0	0	4	1
	0	1	0	1	5	0
	0	1	1	0	6	0
	0	1	1	1	7	1
	1	0	0	0	8	0
	1	0	0	1	9	0
	1	0	1	0	A	$\begin{smallmatrix} ? \\ 1 \\ 1 \end{smallmatrix}$
	1	0	1	1	b	$\begin{smallmatrix} 1 \\ 1 \end{smallmatrix}$
	1	1	0	0	C	$\begin{smallmatrix} 1 \\ 1 \end{smallmatrix}$
	1	1	0	1	d	$\begin{smallmatrix} 1 \\ 1 \end{smallmatrix}$
	1	1	1	0	E	$\begin{smallmatrix} 1 \\ 1 \end{smallmatrix}$
	1	1	1	1	F	$\begin{smallmatrix} 1 \\ 1 \end{smallmatrix}$

	$\frac{0}{x_3} \cdot \frac{0}{x_2}$	$\frac{0}{x_3} \cdot x_0$	$x_1 \cdot x_0$	$x_1 \cdot \frac{0}{x_0}$
	$\frac{0}{x_3} \cdot \frac{0}{x_2}$	0	0	0
	$\frac{0}{x_3} \cdot x_2$	1	0	0
	$x_3 \cdot x_2$	0	0	0
	$x_3 \cdot \frac{0}{x_2}$	0	0	1

$$HEX_3 = \overline{x_3} \overline{x_2} \overline{x_1} x_0 + \overline{x_3} x_2 \overline{x_1} \overline{x_0} + x_2 x_1 x_0 + x_3 \overline{x_2} x_1 \overline{x_0}$$

7.1	x_3	x_2	x_1	x_0	HEX ₄	
	0	0	0	0	0	0
	0	0	0	1	1	1
	0	0	1	0	2	0
	0	0	1	1	3	1
	0	1	0	0	4	1
	0	1	0	1	5	1
	0	1	1	0	6	0
	0	1	1	1	7	1
	1	0	0	0	8	0
	1	0	0	1	9	1
	1	0	1	0	A	0
	1	0	1	1	b	0
	1	1	0	0	C	0
	1	1	0	1	d	0
	1	1	1	0	E	0
	1	1	1	1	F	0

	$\overline{x_3} \cdot \overline{x_2}$	$\overline{x_1} \cdot x_0$	$\overline{x_1} \cdot x_0$	$x_1 \cdot x_0$	$x_1 \cdot \overline{x_0}$
0	0	0	0	0	0
0	1	0	1	1	0
1	1	1	1	1	0
1	0	0	0	0	0
1	1	0	0	0	0
0	1	1	0	0	0
1	0	1	1	0	0
0	0	1	1	0	0

$$HEX_4 = \overline{x_3}x_0 + \overline{x_3}x_2\overline{x_1} + \overline{x_2}\overline{x_1}x_0$$

7.1	x_3	x_2	x_1	x_0	HEX ₅	
	0	0	0	0	0	0
	0	0	0	1	1	1
	0	0	1	0	2	1
	0	0	1	1	3	1
	0	1	0	0	4	0
	0	1	0	1	5	0
	0	1	1	0	6	0
	0	1	1	1	7	1
	1	0	0	0	8	0
	1	0	0	1	9	0
	1	0	1	0	A	0
	1	0	1	1	b	0
	1	1	0	0	C	0
	1	1	0	1	d	1
	1	1	1	0	E	0
	1	1	1	1	F	0

	$\overline{x_3} \cdot \overline{x_2}$	$\overline{x_1} \cdot \overline{x_0}$	$\overline{x_1} \cdot x_0$	$x_1 \cdot x_0$	$x_1 \cdot \overline{x_0}$
0	0	0	0	1	1
0	1	0	0	1	0
1	0	0	0	0	0
1	1	0	1	0	0
1	0	1	0	0	0
0	1	1	0	0	0

$$\text{HEX}_5 = \overline{x_3} \overline{x_2} x_0 + \overline{x_3} \overline{x_2} x_1 + \overline{x_3} x_1 x_0 + x_3 x_2 \overline{x_1} x_0$$

7.1	x_3	x_2	x_1	x_0	HEX ₆
	0	0	0	0	0 1
	0	0	0	1	1 1
	0	0	1	0	2 0
	0	0	1	1	3 0
	0	1	0	0	4 0
	0	1	0	1	5 0
	0	1	1	0	6 0
	0	1	1	1	7 1
	1	0	0	0	8 0
	1	0	0	1	9 0
	1	0	1	0	A 0 H
	1	0	1	1	b 0 H
	1	1	0	0	C 1 E
	1	1	0	1	d 0 E
	1	1	1	0	E 0 E
	1	1	1	1	F 0 F

	$\overline{x_3} \cdot \overline{x_2}$	$\overline{x_1} \cdot x_0$	$\overline{x_1} \cdot x_0$	$x_1 \cdot x_0$	$x_1 \cdot \overline{x_0}$
0	0	0	1	1	0
0	1	0	0	0	0
1	0	0	0	1	0
1	1	0	0	0	0
0	0	1	1	0	0
1	0	1	0	0	0
1	1	0	0	0	0
0	1	1	0	0	0

$$\text{HEX}_6 = \overline{x_3} \overline{x_2} \overline{x_1} + \overline{x_3} x_2 x_1 x_0 + x_3 x_2 \overline{x_1} \overline{x_0}$$

7.2. see seven-segment-hex.v file

7.3. see seven-segment-hex.do file