

Report Format Example

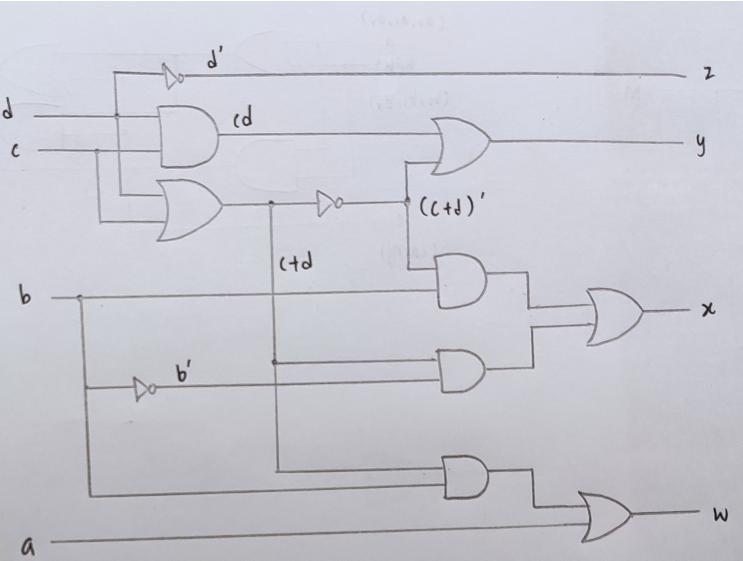
Design Specification

Lab2 1:

output w, x, y, z
input a, b, c, d

Block Diagram:

$$\begin{aligned}W &= a + bc + bd \\ \Rightarrow W &= a + b(c+d) \\x &= b'd + b'c + bc'd' \\ \Rightarrow x &= b'(c+d) + bc'd' \\x &= b'(c+d) + b(c+d)' \\y &= cd + c'd' \\ &= cd + (c+d)' \\z &= d'\end{aligned}$$



Lab2_2:

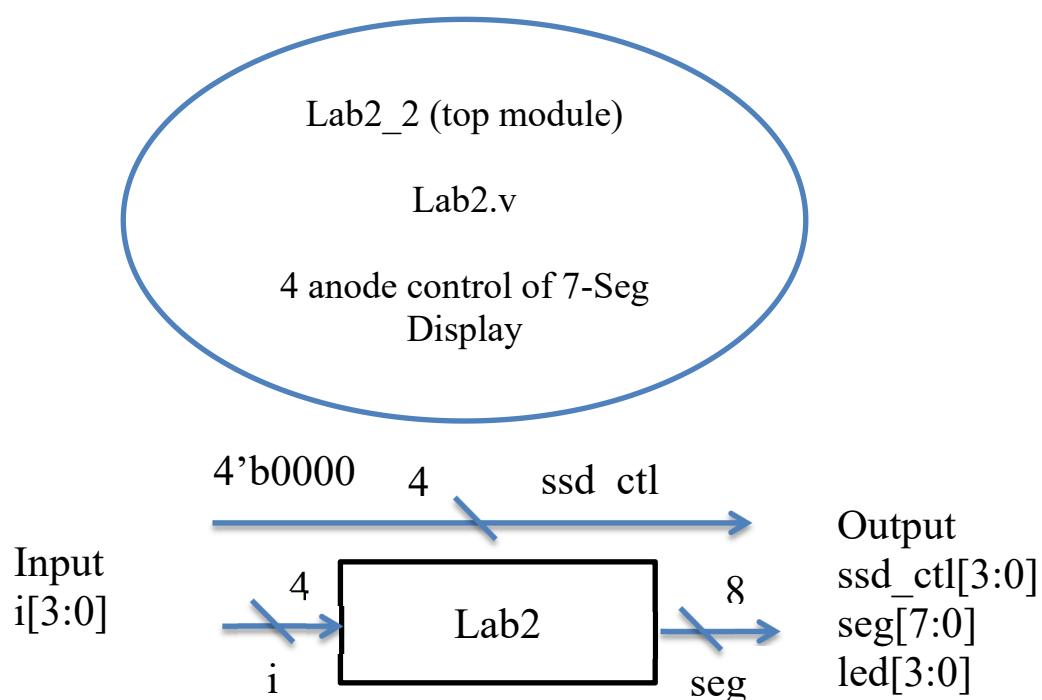
Top module: lab2_2

```
output [3:0] ssd_ctl;  
output [7:0] seg;  
output [3:0] led;  
input [3:0] i;
```

Module lab2:

```
output [7:0] segs;  
output [3:0] leds;  
input [3:0] i;
```

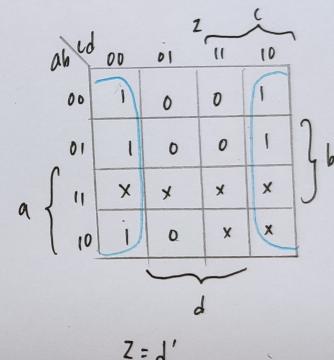
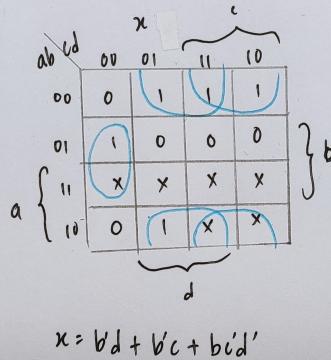
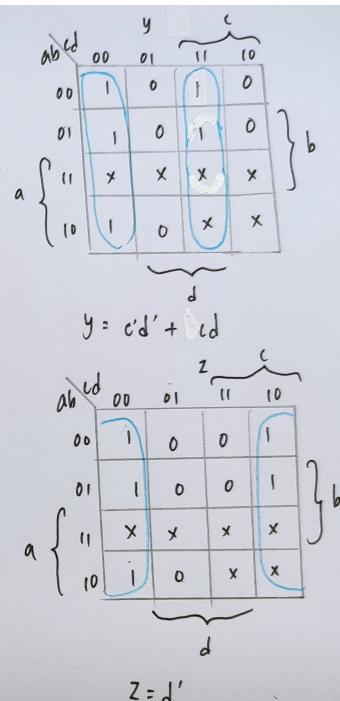
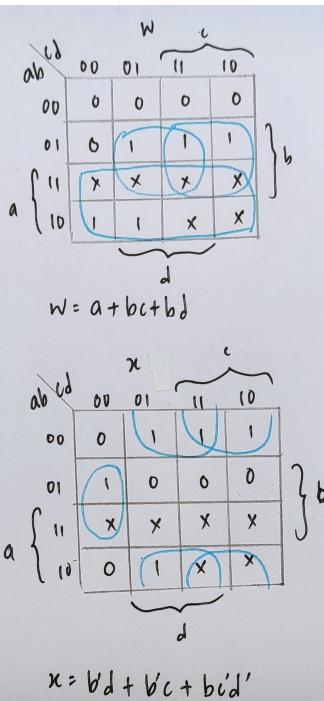
Block Diagram:



Design Implementation

Lab2_1:

input				output			
a	b	c	d	w	x	y	z
0	0	0	0	0	0	1	1
0	0	0	1	0	1	0	0
0	0	1	0	0	1	0	1
0	0	1	1	0	1	1	0
0	1	0	0	0	1	1	1
0	1	0	1	1	0	0	0
0	1	1	0	1	0	0	1
0	1	1	1	1	0	1	0
1	0	0	0	1	0	1	1
1	0	0	1	1	1	0	0
1	0	1	0	x	x	x	x
1	0	1	1	x	x	x	x
1	1	0	0	x	x	x	x
1	1	0	1	x	x	x	x
1	1	1	0	x	x	x	x
1	1	1	1	x	x	x	x



$$\begin{aligned} w &= a + bc + bd \\ &= a + b(c + d) \end{aligned}$$

$$\begin{aligned} x &= b'd + b'c + bc'd' \\ &= b'(c + d) + b(c + d)' \end{aligned}$$

$$y = c'd' + cd$$

$$z = d'$$

The I/O port is set as the LOC as described. Which is the inputs(a, b, c, d) are the switches, and the outputs(w, x, y, z) are the LEDs on the board.

Lab2_2:

The 16 outputs(segs) are firstly define as SS_X(in which X are from 0 to 15) variables, with the segments that each of them will represented after received the inputs i. The other outputs are the leds, in which they will bright when the inputs are received.

Discussion

From this experiment, I had learned how to assign the cathode and anode of the 7 segment display, and knew that the BASSY 3 device is a low activated device. In order to get the expected result successfully, we have to write the code in low active state.

I also learned more about implementation of decoder from this experiment.

Conclusion

The things that I learn from this experiment is the basic knowledge about the FPGA emulation. For example, how to use the BASSY 3 board, the 7 segment display, the anode of segment and so on.

References

Digital Design a system approach by William J. Dally and R.Curtis Harting, page 142