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Lab # 2

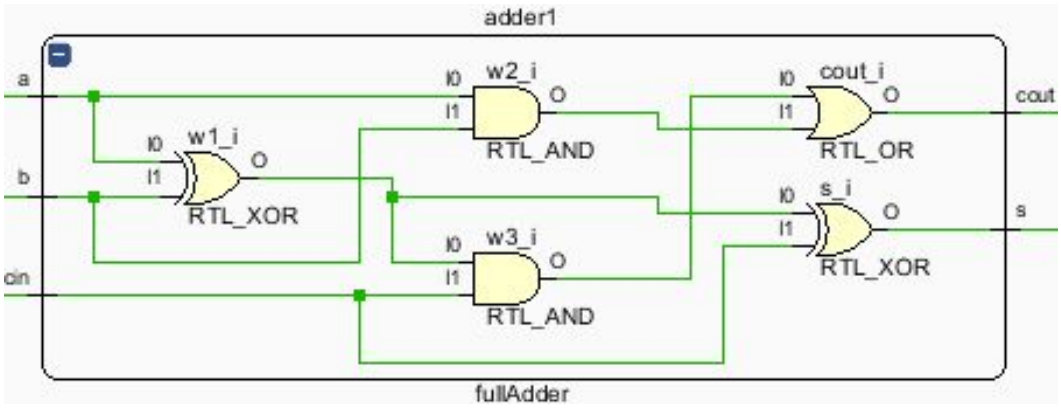
Lab Section - 1B

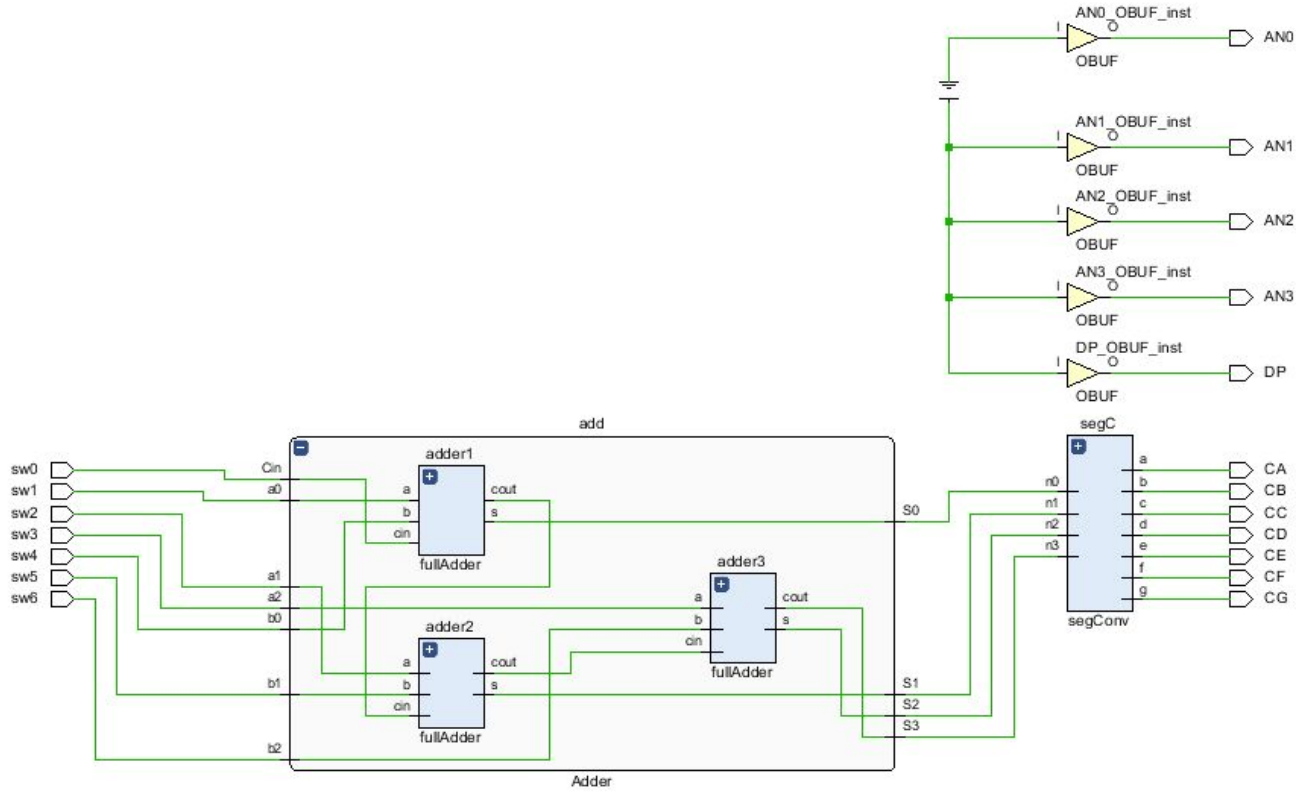
1/24/2020

For this lab, the objective was to create a 7bit adder to add 2, 3bit numbers and one carry in. It was also a test of how to nest different functions in a hierarchy. My hierarchy was as follows

- Main - Pieced all the functions together with the board.
    - Adder - Combined each of the three full adders
        - Full Adder - Contained the gates to give a Sum and Carry out, when given an Ain, Bin, and Carry in
    - 7seg - translated the 4 bit number into something that can be displayed on the seven segment screen on the board.

This resulted in the following schematic:

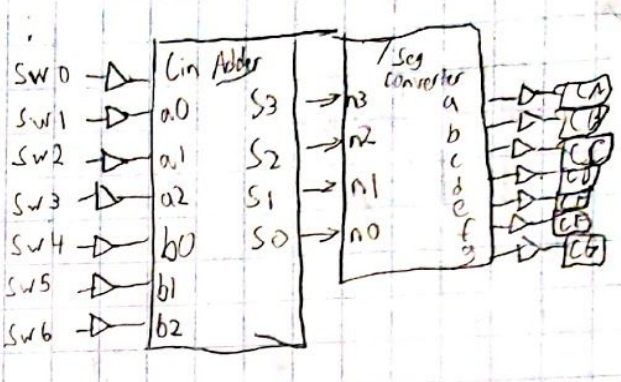




The 7seg part was the hardest part because it involved making a long truth table, tying the 4 bit number to segments being turned on, on the board. I then had to make a sum of products for what turned each segment of the display on. The display was also activated low, as in a 0 bit turned on the segment. I was able to get it done without having to debug any errors.

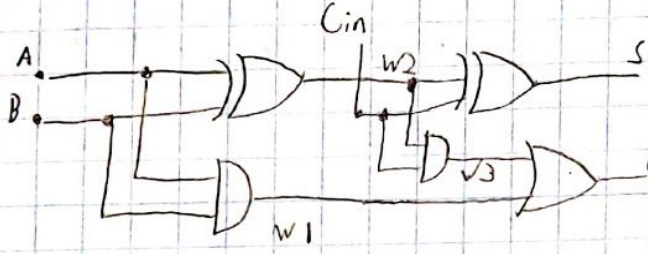
Lab #2

I started out by creating the top level:



- Main
  - Adder
    - Full adder
  - 7 seg

adder:



SegConv

n3	n2	n1	n0	a	b	c	d	e	f	g
0	0	0	0	1	1	1	1	1	1	X
0	0	0	1	X	1	1	X	X	X	X
0	0	1	0	1	1	X	1	1	X	1
0	0	1	1	1	1	1	1	X	X	1
0	1	0	0	X	1	1	X	X	1	1
0	1	0	1	1	X	1	1	X	1	1
0	1	1	0	1	X	1	1	1	1	1
0	1	1	1	1	1	1	X	X	X	X
1	0	0	0	1	1	1	1	1	1	1
1	0	0	1	1	1	1	X	X	1	1
1	0	1	0	1	1	1	X	1	1	1
1	0	1	1	X	X	1	1	1	1	1
1	1	0	0	1	X	X	1	1	1	X
1	1	0	1	X	1	1	1	1	X	1
1	1	1	0	1	X	X	1	1	1	1
1	1	1	1	1	X	X	X	1	1	1

$g = (\bar{n}_3 \bar{n}_2 n_1 \bar{n}_0) + (\bar{n}_3 \bar{n}_2 \bar{n}_1 n_0) + (\bar{n}_3 n_2 n_1 n_0) + (n_3 n_2 \bar{n}_1 n_0)$

$f = (\bar{n}_3 \bar{n}_2 \bar{n}_1 n_0) + (\bar{n}_3 \bar{n}_2 n_1 \bar{n}_0) + (\bar{n}_3 \bar{n}_2 n_1 n_0) + (\bar{n}_3 n_2 n_1 n_0) + (n_3 n_2 \bar{n}_1 n_0)$

$e = (\bar{n}_3 \bar{n}_2 \bar{n}_1 n_0) + (\bar{n}_3 \bar{n}_2 n_1 n_0) + (\bar{n}_3 n_2 \bar{n}_1 \bar{n}_0) + (\bar{n}_3 n_2 \bar{n}_1 n_0) + (\bar{n}_3 n_2 n_1 n_0) + (n_3 \bar{n}_2 \bar{n}_1 n_0)$

$d = (\bar{n}_3 \bar{n}_2 \bar{n}_1 n_0) + (\bar{n}_3 n_2 \bar{n}_1 \bar{n}_0) + (\bar{n}_3 n_2 n_1 n_0) + (n_3 \bar{n}_2 \bar{n}_1 n_0) + (n_3 \bar{n}_2 n_1 \bar{n}_0) + (n_3 n_2 n_1 n_0)$

$c = (\bar{n}_3 \bar{n}_2 n_1 \bar{n}_0) + (n_3 n_2 \bar{n}_1 \bar{n}_0) + (n_3 n_2 n_1 \bar{n}_0) + (n_3 n_2 n_1 n_0)$

$b = (\bar{n}_3 n_2 \bar{n}_1 n_0) + (\bar{n}_3 n_2 n_1 \bar{n}_0) + (n_3 \bar{n}_2 n_1 n_0) + (n_3 n_2 \bar{n}_1 n_0) + (n_3 n_2 n_1 \bar{n}_0) + (n_3 n_2 n_1 n_0)$

$a = (\bar{n}_3 \bar{n}_2 \bar{n}_1 n_0) + (\bar{n}_3 n_2 \bar{n}_1 \bar{n}_0) + (n_3 \bar{n}_2 n_1 n_0) + (n_3 n_2 \bar{n}_1 n_0)$

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