Lab 6

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Prelab: A piece of paper with writing on it

Description automatically generated with medium confidence

Text

Description automatically generated

Purpose:

The purpose of lab 6 was to design a circuit that used a seven-segment display to display the results of a 2-bit subtractor in Xilinx Vivado.

Lab Procedure:

We started the lab by opening Vivado and then our lab 3 project. We continued by creating a design source file called Lab\_6 with I/O ports for the file. The inputs were x and y, the inout was result, and the outputs were anode and LED\_out. We then copied over our lab 3 inputs and outputs to save time and made that code segment a component to Lab\_6. We continued by making std\_logic inputs and outputs for the copied over code and also port maps to lab 3. Finally, we declared anode to use the segment display and also set the LED\_out values so it would produce the correct number for the inputs.

Next, we created a simulation file titled lab6sim, copy and pasted the I/O from Lab\_6 into lab6sim, created std\_logic signals for the inputs and outputs, and also added a port map to Lab\_6. Finally, we added our 16 test cases into the program(0000- 1111).

We then ran the Behavioral Simulation and took note of the waveform output, modified our code from the lab 3 that would allow us to enter our inputs on a Basys 3 board, then ran Synthesis, Implementation, and finally Generated Bitstream. We then connected the Basys 3 board to the computer and manually tested the outputs on it.

Basys 3 Board-

A picture containing text, electronics

Description automatically generated

A close-up of a computer chip

Description automatically generated with low confidence

Bitstream-

Graphical user interface

Description automatically generated

Conclusion:

In this lab, we made a 2-bit subtractor in Xilinx Vivado that would use a seven-segment display to display its outputs. The results of this lab showed that for the inputs -3, -2, -1, 0, 1, 2, and 3, the equivalent output was shown on the Basys 3’s seven-segment display. We were able to manually test these with the Basys 3 board which had switches we could move between high and low input.

Finally, I believe physically constructing a circuit is more beneficial to my learning.

Observations:

The main observation I have to improve my performance on future experiments would be to double check the written code in programs. During this lab, I messed up by naming the programs for lab 5 even though we were on lab 6.