Lab 7

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Prelab:

Schematic

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Purpose:

The purpose of lab 7 was to design a two-bit adder and two-bit multiplier that would use a seven-segment display to display the output. We would also use a switch to go between addition and multiplication.

Lab Procedure:

We started the lab by opening Vivado and creating an RTL project that was set to ‘VHDL’ target language. We continued by creating a design source file called Lab\_7 and then copied code over from the given design\_file\_draft.txt file. We then modified the entity and architecture names to Lab\_7 from addmul.

Next, we created a simulation file titled lab7sim and copied code from the given test\_bench\_draft.txt file and then changed the entity and architecture names to lab7sim. We also changed the component name to Lab\_7 from addmul. Finally, we added our 16 test cases into the program(0000 – 1111) for both addition and multiplication.

We then ran the Behavioral Simulation and took note of the waveform output, created one final program called lab7test and copied over code from the given constraint\_file.txt file which would allow us to enter our inputs on a Basys 3 board. Finally, we ran Synthesis, Implementation, Generated Bitstream, and then connected the Basys 3 board to the computer and manually tested the outputs on it.

Vivado Code-

Graphical user interface, text, application

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Graphical user interface, application, Word

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Graphical user interface, text, application, Word

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Graphical user interface, application, Word

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Background pattern

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Graphical user interface, text, application, email

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Basys 3 Board-

Addition:

Input: 0000

A close-up of a circuit board

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Input: 1101

A close-up of a computer chip

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Input: 0101

A close-up of a computer chip

Description automatically generated with low confidence

Multiplication:

Input: 0000

A close-up of a computer chip

Description automatically generated with low confidence

Input: 0101

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Description automatically generated

Input: 1101

A close-up of a circuit board

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Bitstream-

Addition:

Graphical user interface

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Multiplication:Graphical user interface

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Conclusion:

In this lab, we made a 2-bit adder and a 2-bit multiplier in Vivado that used a seven-segment display to display the outputs. We also implemented a switch that would change between addition and multiplication. The results of this lab showed the correct outputs for every addition and multiplication input combination.

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 realize when code is not complete. In this lab, I didn’t realize that only 1 output was done.