Digital Design CSCE 2114

Lab 5 Report

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Abstract

The main purpose of the lab was to learn to use the Mega Function Wizard to design complex circuits. Along with that, we were to learn to simulate our design before FPGA implementation with an adder/sub.

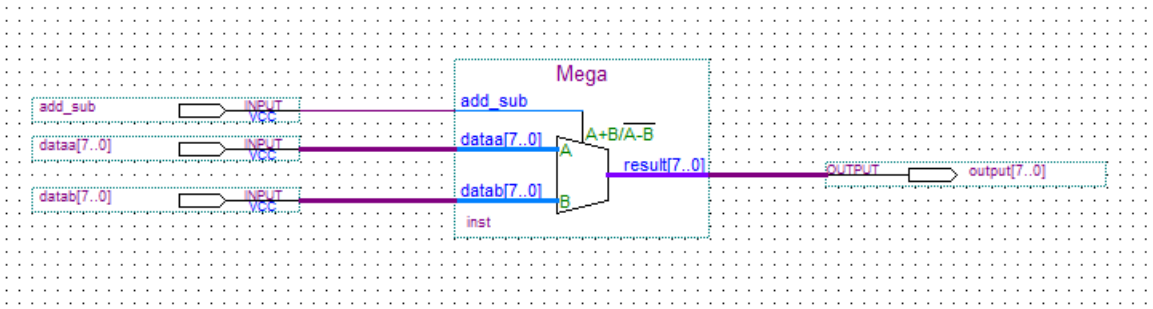
Introduction

Starting off we had to create a new project in Quartus. Once we had our FPGA plugged in and the project set up, we set up a new default block diagram. I had to refer back to lab 2 to correctly recall all the steps in setting up a new project. The basic purpose now was to use the already created circuits from the Mega Wizard Plug-In to help us create an adder/subtractor.

After creating the circuit, the lab goes on to help show how to use the vector waveform editing tool to pre-input bus values and see the simulated results without implementing an actual circuit. The results from the simulation were easy to follow and made sense.

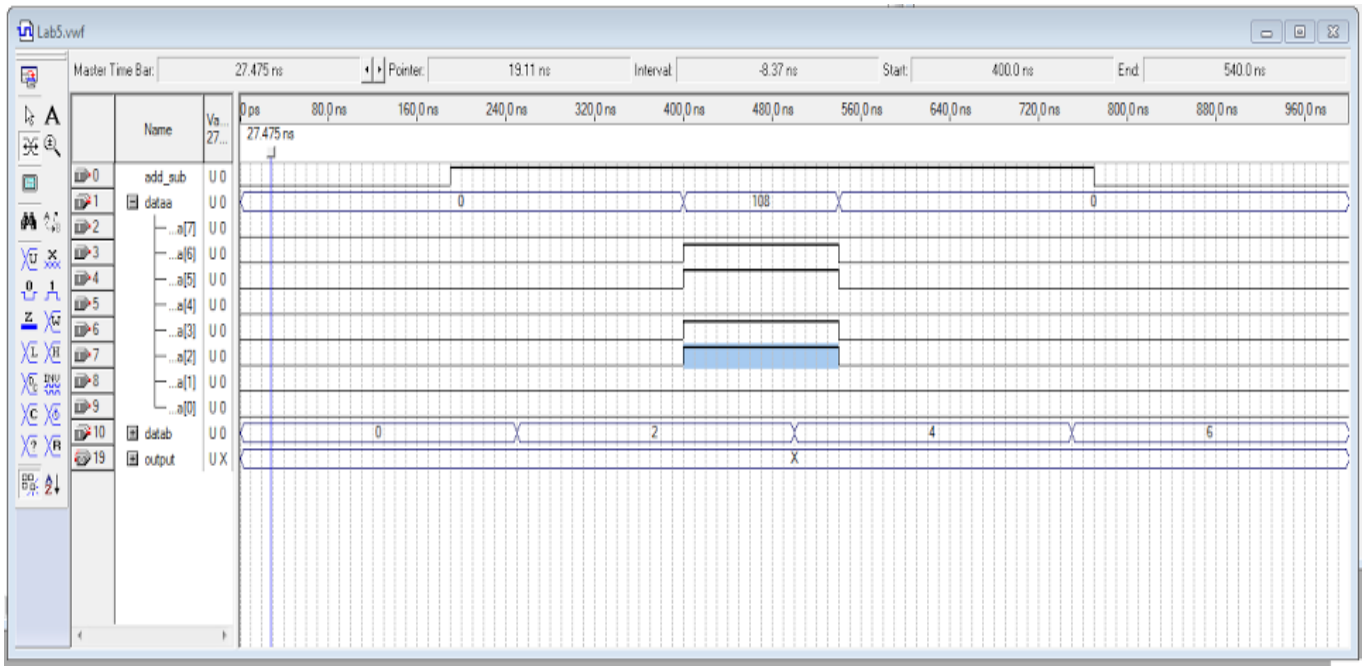
Design and Implementation

In the beginning of the lab, we started off with just a blank block diagram/schematic file. Using the Mega Wizard Plug-In Manager, the lab said to select under the Arithmetic section the LPM_ADD_SUB, and specify an output name. Once we had the circuit, we had t connect the correct input/output pins and compile.



The buses are named dataa and datab, respectively, but they are also named as arrays. Once we had the circuit compiled it was time to move on to testing different input signals.

To test different inputs, we had to start with a new Vector Waveform File. Using the node finder we connected our the three inputs (dataa, datab, add_sub) as well as the output pin. Using the waveform editing tool, we're able to see the input/output bus values from 0ns to 1000ns, as well as manipulate them ourselves.

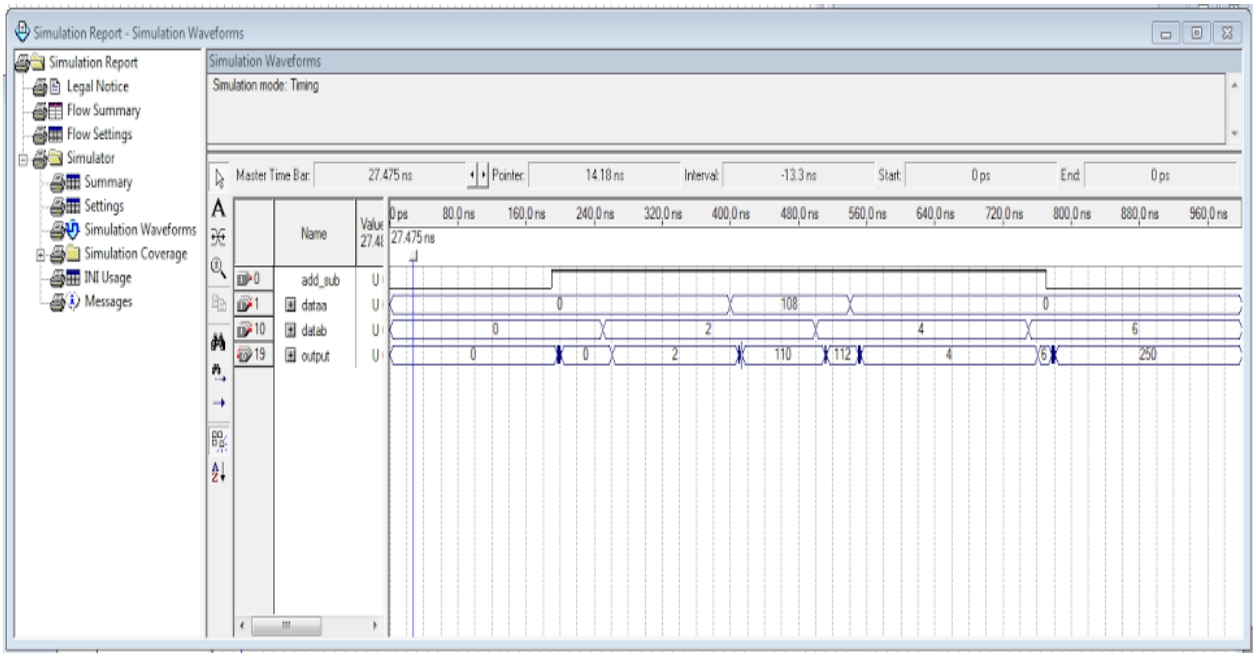


You can even select the individual bits on each of the two dataa and datab inputs by selecting the (+) next to their name and edit each of them individually.

Results

Just before we see results, we had to change the increment on datab to 2 in the count value tab as well as change the timing to 1000ns. After we had selected which bits to modify in our input, all that was needed to do is to save the waveform file and click the

start simulation button. Below is a screenshot of the output of my adder/sub circuit created in the lab.



Conclusion

The purpose of this lab was to implement and simulate an adder/sub circuit within Quartus. We successfully were able to create an adder/sub using the Mega Wizard Plug-In and using a waveform file able to manipulate and visualize different inputs and outputs.