Brian Pappas

**What did you learn from this project?**

I learned how to design and implement all of the necessary components of a CPU, specifically learning how all of the components interact to execute a program. I learned how to design an effective instruction set and then extrapolate a viable data path and control logic module. Furthermore, having to implement the various modules in VHDL and simulating all of the signals proved very beneficial to understanding the inner workings of a simple computer. Finally I gained some experience with Altera products including Quartus II and the Altera FPGA DE board and was able to successfully implement my design onto the FPGA.

**What would you do differently next time?**

If I had this project to do over again knowing what I know now, I would have guaranteed that I was satisfied with each part of the project (instruction set, datapath, control) before moving onto the next part. Having to make changes to the instruction set after the datapath and control had been designed caused a lot of issues in making all of the modules work well with each other. I should have made sure that my instruction set met all of the requirements by generating several programs and manually making sure the instruction set was capable of executing them. I should have more closely verified every part of the datapath with more in depth simulation especially for the jump/branch commands. If each part had been complete before the next one was started, a good bit of time would have been saved.

**What is your advice to someone who is going to work on a similar project?**

Start implementing pieces of your project onto the Altera board as soon as possible. There are several issues that arise during physical implementation that you do not notice in simulation. By making all of the pieces work incrementally you will not have to debug the whole system at the same time when you finally implement your design onto the FPGA.