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Computer Architecture

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**What Have I Learned?**

In this project, I learned the fundamentals of how processors work in computing devices. I created an instruction set, designed a datapath layout, and implemented the design on an FPGA. The only problem I encountered was with the load and store functions. In simulation, the worked correctly, but on the board, they did not work correctly all of the time. I think it was due to some race conditions. I placed extra cycles in order to try to give the data more time to prorogate, but it failed to correct the problem. All of the other instructions worked completely correct.

**What Would I Have Done Differently?**

If I were to do the project again, I would try harder to implement the pipeline datapath. I started with the intention of doing a pipelining datapath, but I couldn’t figure out how to properly keep the pipeline in order. Pipelining seems like it would need more planning in order to get it partially functioning. Even then, much time would have to be places on testing and optimizing the datapath. I could have adjusted the load and store instructions to make them work better with my datapath, since they do not work 100% with my current processor.

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

The first thing to do is to look ahead and try to see where the decisions you make now will impact the project later on. Do research on all the datapaths and make an informed decision on which one you feel most comfortable with. I would also recommend that the instructions are consistent in which the ordering of the registers are the same for similar type of instructions. Feel free to change things as the project evolves and become more complex. Lastly, simulation of each instruction is always needed to make sure they function properly; however, when testing on the board, the instructions may not work as it did in simulation.