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Project 6 Report

ELEC 5200

1. What did you learn from this project?

There is no one specific thing that I learned from this project, but rather a multitude of small things. However the largest lesson: nothing is ever as simple as it seems. A single cycle data path certainly sounded initially like the most straightforward option but turned out to be a bit of a nightmare. With multi-cycle data path, one can reliably use clock signals to ensure that each stage of the operation of an instruction occurs as it should. Design with a single cycle is a bit more asynchronous and as such a bit more difficult for me to wrap my mind around. Things must be designed so that they “settle” to the appropriate level in time for the instruction to execute properly. This methodology forced me to think in a different manner than I had been accustomed, which is exactly what needs to happen during the course of an education.

1. What would you do differently next time?

As mentioned above, I would not select a single cycle data path. Chaining together multiple stages via registers and clock cycles would be much easier to test and implement on a stage by stage basis. Debugging an entire pseudo-asynchronous system at large is problematic, time consuming, and tedious. Things could be broken down into much smaller chunks as far as testing is concerned with a multi-cycle data path.

A second mistake I made was to create a multi-function accumulator. It would add and subtract, and/or and could be transferred to and from. This would turn out to be the bane of my project. As the hub of so many different operations, it was integral to the success of my project. While it worked flawlessly when tested alone, I spent hour after hour attempting to make it play nicely with the rest of my processor. I just could not get it to work, and do not have a working processor to show for my troubles. I do however, have a highly complicated functional accumulator that is good for absolutely nothing.

1. What is your advice for someone who is going to work on a similar project?

The old adage K.I.S.S. Keep It Simple Stupid. Do not try to get terribly fancy with your design. Do not try to get creative with your components. Instead, focus on the elegance of simplicity. If something has multiple “modes”, that means that it is going to have multiple bit control signals that is in turn going to make the control unit even more complex. Simple is best, as it is easiest to design, implement, and debug.