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**Computer Architecture Project Part 6**

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

During the design and implementation of a 16-bit processor, a multi-cycle datapath was used. One of the most important parts of designing the instructions of the processor was a basic understanding of how each instruction would be implemented when deciding which instructions to include in our design. We had to modify our instruction set a couple of times due to a misunderstanding of how the instructions would be implemented. During the testing and verification of the datapath, we learned that the timing of the control lines was the most important part when deciding whether or not the datapath worked. Most of the problems that occurred during the entire project was spent on fixing the timing of the control lines.

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

If we could do the project over again, we would probably adjust the instructions a little, because we believe that they could be improved a little that would make the implementation of the processor simpler. When first designing the actual datapath of the instructions, we had to alter the instructions a little for a simpler datapath. A more straightforward instruction set at the beginning of the project would have made our lives a lot easier had we not had to go back and alter our previous work. We would also redo our state table we created for the datapath control signals to ensure proper operation of the instruction. The most problems that occurred and the longest time spent on this project was trying to find the correct times when the controls lines should be changed and what they should be changed to.

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

Start as early as possible when testing the control signals. Sometimes it was as simple as forgetting to setting one of the control lines to ‘0’ at the appropriate line or adding one more clock cycle to allow a line to propagate down the datapath at the right time. Some of these could have been avoided had the instruction set been a little simpler which, the complexity of ours allowed several problems to occur. I would also recommend re-familiarizing yourself with VHDL and the simulation software since there are a few things I had to look up how to do on multiple occasions which got irritating after the third time.