

William Dalby

Friday 10/4/19

- Met for 1 hour about what type of ISA we wanted to use. We decided on a stack mixed with load store. We worked on the instruction types that we wanted and the instructions that we needed. Talked over the procedure calling convention and addressing modes.

Sunday 10/6/19

- Met for 2.5 hours on the code for relPrime. Much discussion about the procedure calling conventions and how deep the stack in use is. The layout and usage of the instructions were designed by the team. There was talk about addressing modes and how to handle essentially everything in the code.

Monday 10/7/19

- Met for 3 hours redesigning our language. As of this moment, I'm still not very sure I understand what's going on with our architecture. I try to ask questions but they end up not being very helpful or are obvious to my peers. It is slightly discouraging. I will have to spend time understanding what our architecture is trying to do on my own time or I feel I will be a bit behind. The deliverables are done at this point though. We didn't designate exactly what to do for the next milestone.

Tuesday 10/8/19

- Met for an hour cleaning up the document and our journals. Prepared for the meeting on Wednesday.

Wednesday 10/9/19

- Met for 2 hours correcting the issues with our document. We added an executive summary and title page. We started to designate where our memory was going to be so that we wouldn't have any variable addresses. We created a list of things that we needed to fix before starting the second milestone.

Sunday 10/13/19

- We met for 3 hours fixing all of the issues from milestone 1. This included making the memory stack and designating where things are allocated. We changed how we saved things to memory by utilizing a stack pointer. This changed our code substantially (knocking off about a page and a half of code) and it all had to be rewritten. All of the addresses for the machine code had to be changed and a number of opcodes were changed. In addition, we added a funct to our C-type ISA so that we could push and pop from both registers and memory separately. We started to add RTL for each of our operations. This was scratchwork and will need to be changed into the summary table later. We began to discuss what hardware we'd need but we definitely to look into that more.

Monday 10/14/19

- Met for 2 hours. The main things that were worked on were solidifying our RTL for all of our operations. We put all of our scratchwork into a summary chart that, frankly, looks terrible. This is not because the information is bad but because the formatting just doesn't look good. My bad. We made diagrams and input output descriptions for all of the hardware we think that we'll need. These look pretty decent (my good) and I feel that we're starting to actually have a project coming together. We solidified a couple of our ideas and how the programmer will need to use them. At this point I feel quite a bit better about the project. While there are certain aspects where I feel a little behind my partners at this point I am understanding our operations better and better. I feel that the level of abstraction is decreasing which is helping me quite a bit. We are still not designating what needs to be done for the next milestone ahead of time. I think that the reason for this is that we do all of our work together as a team. This may not work out in the long run but at the moment we're rolling with it.

As an aside, how formal should these journals be? Also, is dialogue between myself and yourself encouraged here?

Monday 10/21/19

- Met for 2 hours. Mainly worked on the three labs that are due on Friday. I realized that I have messed up the ALU lab quite a bit by trying to jump straight to the 4bit alu rather than doing it incrementally. Will need to fix that. I also implemented the shifter but then lost it after a GIT accident.

Tuesday 10/22/19

- Tori and I met for 3 hours and worked on fixing the issues from the last milestone and testing our components. I worked mainly on adding the machine code for our common operations but I also remade the shifter. I also made the ALU but I am worried that its implementation may not be the way that is desired by the project. I simply used a 17 bit register to store the output and then its most significant bit was the overflow detector. Also, there is no implementation of an adder. I just used the built in verilog commands. I feel as though I'm going to have to change this at some point to more closely resemble the ALU from the lab. I have not yet finished the lab yet so I'm going to roll with the ALU as it stands.

Wednesday 10/23/19

- Met for 2 hours during lab. I updated more of our machine code for our common operations. I worked on drawing the datapath. This was more out of lack of anything else to do as I cannot claim to be the best artist so I personally apologize for the appearance of the spaghetti that is our data path. I am a bit confused as to how it's all going to work, however. How will operations that do multiple pushes and pops work? The main one that I'm concerned by is the flip as it pushes a and then pushes b. SO that

would mean that we need to push and then push again and I'm not sure how that's going to work on our datapath. The same goes for dup as it pushes multiple values but that command in itself is intimidating so there's a number of things to be concerned about there as well. I worry that the items I implemented might be lacking in terms of test cases. I'm not sure how extensively to test them but I'm sure that I need to implement more test cases.

- One other thing that came up during our meeting was that our memory addresses can only be 10 bits. This is quite confusing to me. I will probably ask about it during our meeting but I was wondering a number of things; why is this, how will our memory stack have to change to accommodate this, what does this mean for our memory pushes and pops, etc.

Friday 10/25/19

- Turned in the ALU lab (lab 06). There was quite a bit of unfun issues with this lab. A few things first about skipping around - don't. When it comes to components it is truly much much better to build from the smaller parts than to start trying to build a larger component straight away. I had to start over because of this and that wasn't fun. The other really big thing is to make sure that I'm using combinatorial logic rather than sequential. Everything else in the project can be working perfectly but if the logic isn't the right kind then the timing will be all off and nothing will work. This wasn't so much of an issue with add, sub, and, and or but with SLT as it had to forward some data. USE COMBINATORIAL LOGIC, FOREHEAD. Once the ALU was finished (thanks to some generous donations from my local Sidison's Bank), I added a modified 16bit ALU to our own implementation.

Wednesday 10/30/19

- Tried to catch up on Milestone 4. The datapath was redrawn. Had to integrate BEQ and BNE logic. Thanks to the second exam that wasn't so bad. As we look to do control more and more small issues or discrepancies seem to arise. One thing at the moment is that our shift has 2 different versions. The actual hardware at the moment can shift both directions and takes a signed shamt. The RTL version is two commands that do left shifting and right shifting. We believe we're going to switch to the bidirectional shifter in all aspects. There is also a debate whether or not to make the shamt larger. We never actually shift by more than 2 bits in any of our code that needs to run but having a larger shamt from those unused bits would be fine. Having to convert all images (the datapath) to a jpg so that google can insert it is frustrating. I also started to try to integrate some parts together. I am not currently very confident in my verilog skills but hopefully if I keep connecting the individual components it will work out.
- Git is messed up. Oh boy.

Days from Wednesday 10/30/19 up to but not including Wednesday 11/6/19

- These days are being combined into one entry as they were mostly the same. I fell behind in this project. I feel terrible and I've heard that it's upset Tori. I got caught up in other projects that I was trying to finish so that I could work more on this project but they took too long and this milestone is lacking in terms of my effort. I do have plans to make up for this in the coming days by taking over work on an assembler. I would very much like to make one and I feel that it's certainly achievable. I hope that this lapse in work doesn't reflect too poorly upon me and I am quite sorry if I upset any of my team members.

Wednesday 11/6/19

- Team met for 4 hours to complete milestone 5. I worked on making the multicycle diagram all pretty and wrote a testing method for our combined processor. I also worked a little bit on the assembler but parsing is hard. Alternatively, I've forgotten how to do it. I still think that getting the assembler done is a good project for me considering my partners seem quite involved in the datapath. Something that will probably be mentioned in our professor meeting on Thursday is what to do with our shifting instruction. I'll mention it here so that hopefully I don't forget. Currently our hardware implementation of our shifter takes in a signed shamt. Our RTL and instructions don't describe this, they describe two different shift methods, one for left and one for right. Our main question is which method we should switch to and commit to. My thinking is that leaving it with the signed shamt is the easier option of the two.

Saturday 11/9/19

- Tori and I met for 4 hours about the datapath and correcting the manual control values. We were able to get almost all of the control values done in this time. I was also updating our multicycle diagrams while this was going on. We changed when pushSrc was set so that it was set in time for pushes.

Sunday 11/10/19

- Met with the group for 2 hours. Changed the clock edges for some of the components and began to work on timing.

Monday 11/11/19

- Began testing the individual instructions with control. I worked with Tori to iron out the different pushes and pops.

Tuesday 11/12/19

- Tested pushR, pushUi and popM. Figured out the multicycle for pushR and pushUi but I was unable to figure out popM. It seems that the write value is a cycle behind the address so then the write value is wrong when the address gets there. Changed the shifter to take in a larger shamt so that pushUi actually puts the right value into the stack.

Wednesday 11/13/19

- Worked with Tori to figure out the issue with popM. We realized that if we don't pop until a later cycle then the value for B will still be the write value and the address will still be calculated correctly. We then started to test various instructions with our connected control to verify that it still worked. Once we were satisfied, we put relPrime into our memory. It didn't work. But, we did discover that or pops too many values so we fixed that. Then we worked on testing recursion and procedure calling so that we have a better chance of making relPrime work. Making recursive functions hurts my brain.

From Wednesday 11/13/19 to Sunday 11/17/19

- Worked on updating the design document quite a bit. I also updated the assembler to handle a few pseudo instructions and made an arithmetic shifter, tested it, and added it into the datapath with control. Pretty sure it works. I talked with my roommate (Andrew Johnson) about our project and he pointed out a few things that could be improved. The main thing is that we could reduce like 6 cycles and also eliminate using a number of pushR instructions. I wish I could've updated our processor to have these changes but I couldn't find the time. That makes me quite sad. What it made me realize though is that I wish I had been more confident during this project. I feel that if I had been more assertive about certain things I could've been quite a bit more helpful for the overall project. This is not to say that I didn't contribute. I did the extra features and while I wish I could have done more with the assembler I'm happy with it. I just wish I'd been more assertive or less intimidated. I just feel that this could've lead to a better processor. I'll have to keep that in mind for future projects.