Design Process Journal

Meeting #1 – First the type of Processor that everyone wanted to build was discussed. The vote was between the accumulator and the stack, with the accumulator winning. The accumulator was chosen with the reason that it could potentially be more user friendly. Git Hub was also agreed to be used as the group repo. The next topic was what everyone wanted to focus on when making the processor. It was agreed that we all wanted to make the processor fast in speed but also user friendly. We then discussed potential types and instructions that we would be implementing.

Meeting #2 – The first item discussed in this meeting was the types and there bit usage breakdowns. I, R, and IR types were agreed upon except we were not able to fully agree upon a bit distribution for the R-type. The I-type has 12 bits for the immediate (which we thought would be more than enough for add’s, and’s, or’s, etc.) and any command with I type will be using the main accumulator register. So for example, the I-type add will add an immediate value to what is currently in the accumulator. The IR-type has access to any of the registers and to a 9 bit immediate value. Our ideas for this IR-type included being able to do comparison with the main accumulator to a register (for something like a beq) and then going to an immediate value destination. We then listed out our commands that we wanted and gave them operation codes. We also started working on how some commands would be implemented in assembly code. We also agreed upon using 8 registers including the main accumulator register.

Meeting #3 – The R-type bit distribution has been decided upon. The final R-type has a func code with 2 registers and a tailing 2 unused bits. Our thoughts here, included being able to add, and, or, etc. two registers together and place the value into the accumulator. The func codes were the next item discussed and agreed upon. We have gone through each operation and wrote out how we would like them written in assembly code. Much of the documentation was done during this meeting because we now have everyone agreeing upon the current design of each command and type.

Meeting #4 – The code for Euclid’s algorithm written in our assembly code is almost complete. There has been a key point, raised when trying to do branches using our accumulator. It has been decided that we will create two more operations in the func codes, beqz and bnez. These are branches will compare values against zero. The idea behind these comparisons is that there will be much less swapping of values into registers if we can just check to see if the value in register is zero or not.

Meeting #5

Drawing out a simplified version of our potential data path, to determine a RTL.

We have agreed on multi-cycle for our processor, one main reason being we will be using the common swap frequently when writing assembly code, multi-cycle should make these swaps take hardly anytime.

Li and lui are going to be hard wired in, saves one instruction for our design.

Copy and move are going to be hard wired and swap will a pseudo instruction.

Josh did the documentation for this meeting, Ben, Jeff, and Thomas drew the design of RTL and the data path on the white board.

Meeting #6

Ben and Josh only available for this meeting. Listing out the components needed for the agreed upon data path. Described about three fourths of the components (what they do). In this meeting we had a picture of our data path and our RTL, and we went through a listed out each component and control signal we would need. Then we on the white board and in our design journal gave a good description of each component and its purpose. This will continue into the next meeting.

Meeting #7

NOTE DECISION: Each write to register instruction will be written to the main register, so a mux will not be needed in front of the register file.

We have decided to keep the $at register even though as of right now we only have one pseudo instruction, we will soon be adding pseudo instructions, the amount depends on how extreme our final data path is.

Ben and Josh working on the rest of the components list descriptions, with Ben editing the list and Josh doing the documenting for the design process journal.

Thomas working on the tests for RTL.

Jeff will be checking our work over because he was not able to make this meeting. He will also be writing the memo for this Milestone.

Thomas and Josh have begun finalizing the RTL.

Ben is working on the input, output, and control signals.

Branches/Jumps are added to the data path.

NOTE DECISION: We are using an extra adder in the branch because we can do the addition of PC + Immediate while we do the comparison, which saves us a cycle.