Assignment for Laboratory 5
HW Instruction Set Architecture
Computer Science 240

You will be spending the next lab implementing and experimenting with a data and control path for the HW ISA (small instruction set architecture you have begun learning about in lecture). Review the notes from lecture, and answer the following questions.

1. How many instructions are there in the HW instruction set?

2. How many bits are there in each instruction?

3. What assembly language instruction is represented by the hexadecimal value 0x0021? (each digit represents 4 bits). Describe what you expect the instruction to do.

4. What is the 16-bit binary form of the following instruction?

ADD R1 R1 R4

What are the contents of Register 1 and Register 4 after this instruction is executed?

5. Given the following instruction stored at address 8 in memory:

   8: BEQ R5 R6 C

Assume register 5 contains FFFE, and register 6 contains FFFE and that the offset is interpreted as a signed, 4-bit, two's complement values.

After this instruction is executed, what will be the address of the next instruction?

6. Repeat question 5, but assume that the original value of register 5 = 0003, and register 6 = 0002. What will be the address of the next instruction?

7. Fill in the table for the following program:

Address	Instruction	Operation	Rs	Rt	Rd/offset	Purpose
0:	5002	OR	R0	R0	R2	initialize R2 = 0
2:	5003					
4:	1220					
6:	0230					
8:	2122					
A:	8002					

Describe the result (specific values of modified registers and address locations) after allowing 18 instructions to execute:

Does the program ever stop?