CEC 470 - Computer Architecture
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Project 1 Questions

1. What opcode will blank memory initialized to 0x00 look like to the processor?
   0x00 in binary is 0000 0000. This translates to the function bit being Store, the register bit being ACC and the method bits indicating the operand is an address. Thus the opcode 0x00 is: STOR ACC, [address]. If the memory is blank, the operand will also be 0x0000. Therefore, the final function will be STOR ACC, [0x0000]

2. Of the 256 possible opcodes we can get from and 8-bit opcode, how many are not being used in our instruction set, i.e., how many instructions could we add for future expansions of our processor?
   Out of the 256 possible opcodes, 103 were undefined opcodes and 18 were operands of three or more bytes. Therefore, the accepted range was 103 to 121.

3. What would we need to add to our simulator to be able to include the following instructions: compare ACC with a constant, PUSH to or PULL from the stack, and take the 2's complement of ACC?
   The operations would require more opcode assigned to that function. For 2’s complement all the opcode patterns are already used for the mathematical operations, the other two could be assigned to the special operations set. For PUSH and PULL, there would need to be at least one pointer register pointing to memory where the stack is. To compare ACC to a constant, there would need to be another register for the virtual subtraction and a set of flags. 2’s complement would need to have to do ACC=-ACC.

4. If executeInstruction() were divided into two parts, decode and execute, what additional global resources would be needed for your simulator?
   If you wanted to divide executeInstruction() into two parts, the results of the decode would have to be passed to executeInstruction() to perform it.