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CSCE A248
12/8/22
Homework #5

1) 16 digits

2)
   a) 4 kilobytes
   b) 13 address lines

3) 21 address lines

4) 14 bit address = 16,385 memory locations
16,385 * 8 bits per memory location = 131,072 memory bits
131,072 / 1 bit per ram chip = 131,072 ram chips

5) If your processor could pull from storage directly you could theoretically run a computer without volatile memory, but it would run millions of times slower than normal.

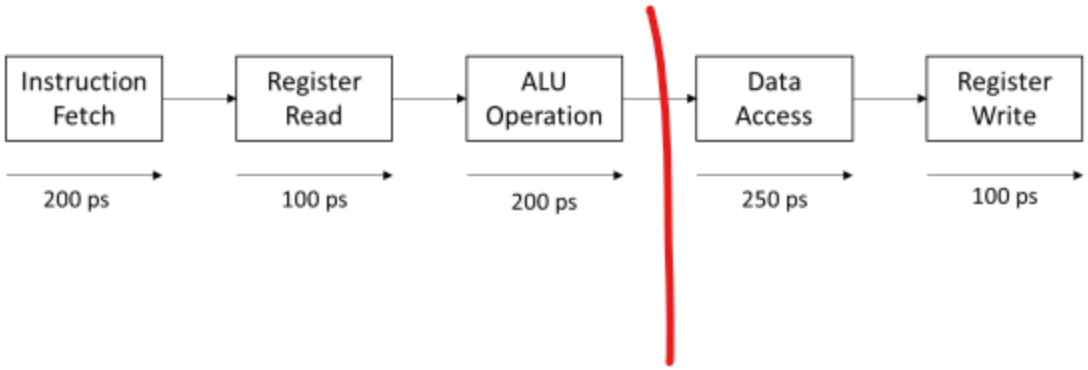
6) You can not build a computer with only volatile memory because it would have no instructions or data or anything to go off of when turning on for the first time.

7)
   a) Lg 32 = 5 bit opcode
   b) Lg 16 = 4 bit register fields

8)
   a) 2 bits for opcode = 4 potential opcodes
   b) You could use one opcode to represent a set of instructions that use an additional 3 bits as a secondary opcode, with the final 3 bits being a register field. That would hold your single address instructions. The final three opcodes would be used for the three 2-address instructions.

9)
   a) i, ii, and iii
   b) i, ii, iii, and iv

10)
   a) 850ps
   b) 1.176 gigahertz



c)

The clock time for this 2-stage pipeline would be 500 ps instead of 850 ps which leads to a frequency of 2 gigahertz.

11)

a) No
b) No