EEL4768C.04 Homework 3 Due: 10/20/19

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1. Explain the organization of the classical Von Neuwmann machine and its major functional units.

   The Von Neumann architecture is a arithmetic logic unit (ALU), memory unit, registers, control unit and inputs and outputs. Because the architecture is designed this way, it allows for instructions and data to be stored in the same memory.

   Arithmetic Logic Unit (ALU): Allows for arithmetic operations and logic operations in the system.

   Memory Unit: RAM, primary/main memory. Directly accessible to the CPU. Loading from secondary memory into the RAM allows the CPU to operate much quicker.

   Control Unit: Controls operation of ALU, memory and input/output devices, telling them how to respond to instructions interpreted from the memory unit.

   Registers: High speed storage areas in the CPU. All data must be stored in a register before it can be processed.

2. Explain and compare the generation of control signals using hardwired or micro-programmed implementation for a control unit.

   The **hardwired control unit** uses logic gates to generate the output. This method is very fast for a limited number of operations. Because of how the hardwired control unit is implemented, making modifications is difficult and if one part is changed the system has to be rewired. Hardwired control units are known as Reduced Instruction Set Computers (RISC).
   The **Microprogrammed Control Unit** uses microinstructions in the control memory to to produce control signals. Because instructions require memory accesses the speed of operations is slower. Modifications are made by changing the microinstructions. Complex instructions can be broken into multiple smaller instructions. Used in Complex Instruction Set Computers (CISC).
   In general, hardwired control units are more difficult and costly to implement or alter than microprogrammed control units. Despite that, hardwired control units are more specialized and thus faster at what it was designed to do than microprogrammed control units.