CS-341 Computer Organization

Dr. Vickery
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Administrivia

- Textbook
  - Tanenbaum, Structured Computer Organization, Fourth Edition
    - Probably different next semester
- QC Online for course material
  - Need Vanguard account
  - Be sure to enter correct email address
- Two midterm exams and a final
- Contact me by email: vickery@qc.edu
- Office hours in SB A-222
  - Tuesdays and Fridays after class.

Assignments for Week 1

- Units of Measure Web Page
  - Link is on course Page
- Read Chapter 1
  - Von Neumann Architecture
  - Moore's Law
  - Microprogramming: hw/sw interface
  - Exercises 1, 2, 5, 10, 12

Computer Architecture

- Processors (Central and I/O)
  - CPU datapath
- Memory Hierarchy
  - Registers, Cache, Main, Secondary
- I/O Devices
- Busses
- Clocks

Clocks and State Changes

- A *clock* is a signal that repeats at regular intervals.
  - The repetition rate is measured in *Hertz* (Hz).
  - The repetition interval is the reciprocal of the rate, and is measured in seconds.
  - Use powers of ten for measuring these.
    - *1 MHz = 1 * 10^6 = 1,000,000 pulses per second*
    - *1 msec = 1 * 10^{-3} = 0.001 seconds per pulse*
- Each clock pulse causes the CPU to change its *state*.
  - *Datapath cycle*: Connect two registers to the ALU, perform an operation, and return the result to a register.
  - All in one clock cycle.

Measuring Processor Speed

- Time to execute a program is the product of:
  - Instructions per program
  - Average number of clock pulses to execute an instruction
  - Clock pulse period (interval)
- **Sec/Prog = Instr/Prog * Pulses/Instr * Sec/Pulse**