Assignment for Next Class

- Read chapter 4 (pp. 130 - 171)
- Self-Assessment test (pp. 171-172)
- Check that you know the key terms listed on p. 171
- Prepare review questions 1, 13, 14
- Prepare case studies 1, 2, 3!

What’s that?

Characteristics and Functionality

- **Data** - can be human or machine readable
- **Data entry** - converts human readable data into machine-readable form
- **Data input** - transfers machine-readable data into the system
- **Source data automation** - capturing and editing data at its source

Five Main Hardware Components

- Central processing unit (CPU)
- Primary storage (main memory; memory)
- Secondary storage
- Input devices
- Output devices

Hardware Components
Machine Language

CLEAR A   0000: 100
LOAD A, 7  0001: 200 7
LOAD B, 5  0003: 201 5
SUB A, B   0005: 150
JUMP TO 0034 IF ZERO  0006: 170 0034
...
Assembler  0034: ...
(Mnemonics) Machine Language

Hardware Components in Action

- Step 1: Fetch instruction
- Step 2: Decode instruction
- Step 3: Execute the instruction
- Step 4: Store results

Hardware Components in Action

Clock Speed – The Computer’s Drum Beat

Clock Speed

Physical Characteristics of the CPU

- Digital circuits on chips
- Electrical current flows through silicon
- “Moore’s Law” - transistor density of chips will double every 18 months

...Human capabilities do not double every 18 months!
Complex and Reduced Instruction Set Computing

- Complex instruction set computing (CISC) - places as many microcode instructions into the central processor as possible (French Restaurant 😊)
- Reduced instruction set computing (RISC) - involves reducing the number of microcode instructions built into a chip to an essential set of common microcode instructions (Fast food 😋)

Secondary Storage

- Offers the advantages of nonvolatility, greater capacity, and greater economy
- Access methods, storage capacities, and portability required are determined by the information system’s objectives

Access Methods

- Sequential: records must be retrieved in order
  - Devices used are called sequential access storage devices (SASD)
- Direct: records can be retrieved in any order
  - Devices used are called direct access storage devices (DASDs)

Devices

- Magnetic tapes
- Magnetic disks
- RAID
- Storage area networks (SAN)
- Optical disks
- Magneto-optical (MO) disks
- Digital versatile disks (DVDs)

Hard Disks

- Platters
- Read/Write Head
- Actuator Arm

http://computer.howstuffworks.com/hard-disk.htm/printable
**Speed**

\[ r = \frac{3.5\text{"}}{2} \]
\[ \text{diameter} = 3.5\text{"} \]
\[ \text{circumference} = 2\pi r \]

\[ \Rightarrow 3.5\text{"} \times 3.1415 = \text{ca. 11"} \]

\[ \Rightarrow 7200 \text{ rpm} \]
\[ \Rightarrow 11" \times 7,200 \text{ inch/minute (79,200 "/min)} \]
\[ \Rightarrow 11" \times 7,200 \times 60 \text{ inch/hour} \]
\[ \Rightarrow 4,752,000 \text{ inch/hour} \]
\[ \Rightarrow 4,752,000 / 63,360 = 75 \text{ mph} \]

**Dust and Abrasion**

Dust Particle

- a few micrometers (ca. 1/1,000,000 yard)

**Hard Disks**

- Tracks
- Sectors


**How should you organize backup copies of your data?**

**Thank you!**

The slides will be available on the internet at
[http://ruby.fgcu.edu/courses/mhepp/](http://ruby.fgcu.edu/courses/mhepp/)
(-> CRN10033)