INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

CSN-101 (Introduction to Computer Science and Engineering)

Lecture 2: Computer Hardware Components and Their Working

Dr. Sudip Roy

Assistant Professor

Department of Computer Science and Engineering

Piazza Class Room: https://piazza.com/iitr.ac.in/fall2019/csn101

[Access Code: csn101@2019]

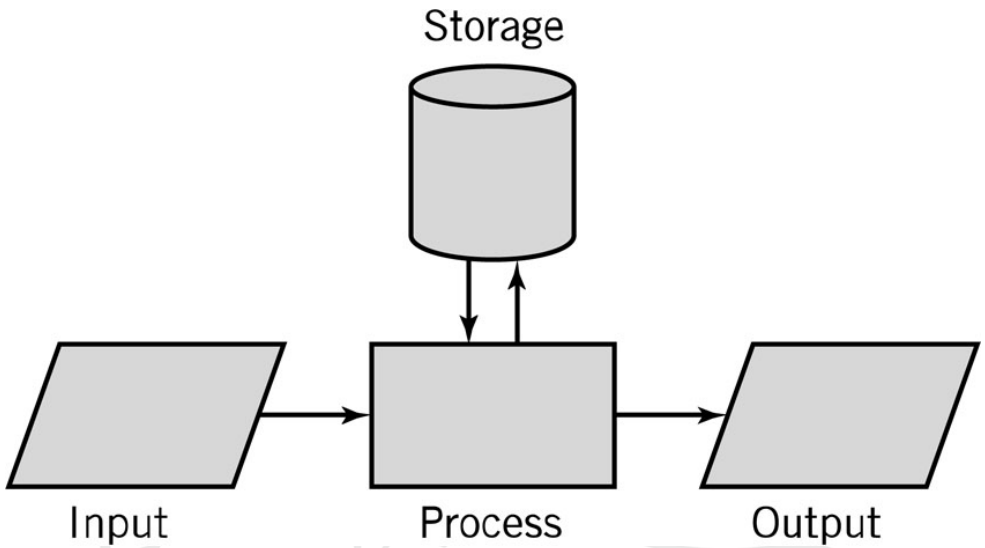
Moodle Submission Site: https://moodle.iitr.ac.in/course/view.php?id=45

[Enrollment Key: csn101@2019]

Plan for Lecture Classes in CSN-101 (Autumn, 2019-2020)

Week	Lecture 1 (Monday 4-5 PM)	Lecture 2 (Friday 5-6 PM)
1	Evolution of Computer Hardware and Moore's Law, Software and Hardware in a Computer	Computer Structure and Components, Operating Systems
2	Computer Hardware: Block Diagrams, List of Components	Computer Hardware: List of Components, Working Principles in Brief, Organization of a Computer System
3	Linux OS	Linux OS
4	Writing Pseudo-codes for Algorithms to Solve Computational Problems	Writing Pseudo-codes for Algorithms to Solve Computational Problems
5	Sorting Algorithms – Bubble sort, selection sort, and Search Algorithms	Sorting Algorithms – Bubble sort, selection sort, and Search Algorithms
6	C Programming	C Programming
7	Number Systems: Binary, Octal, Hexadecimal, Conversions among them	Number Systems: Binary, Octal, Hexadecimal, Conversions among them
8	Number Systems: Negative number representation, Fractional (Real) number representation	Boolean Logic: Boolean Logic Basics, De Morgan's Theorem, Logic Gates: AND, OR, NOT, NOR, NAND, XOR, XNOR, Truth-tables
9	Computer Networking and Web Technologies: Basic concepts of networking, bandwidth, throughput	Computer Networking and Web Technologies: Basic concepts of networking, bandwidth, throughput
10	Different layers of networking, Network components, Type of networks	Network topologies, MAC, IP Addresses, DNS, URL
11	Different fields of CSE: Computer Architecture and Chip Design	Different fields of CSE: Data Structures, Algorithms and Programming Languages
12	Different fields of CSE: Database management	Different fields of CSE: Operating systems and System softwares
13	Different fields of CSE: Computer Networking, HPCs, Web technologies	Different Applications of CSE: Image Processing, CV, ML, DL
14	Different Applications of CSE: Data mining, Computaional Geometry, Cryptography, Information Security	Different Applications of CSE: Cyber-physical systems and IoTs

Computer Model



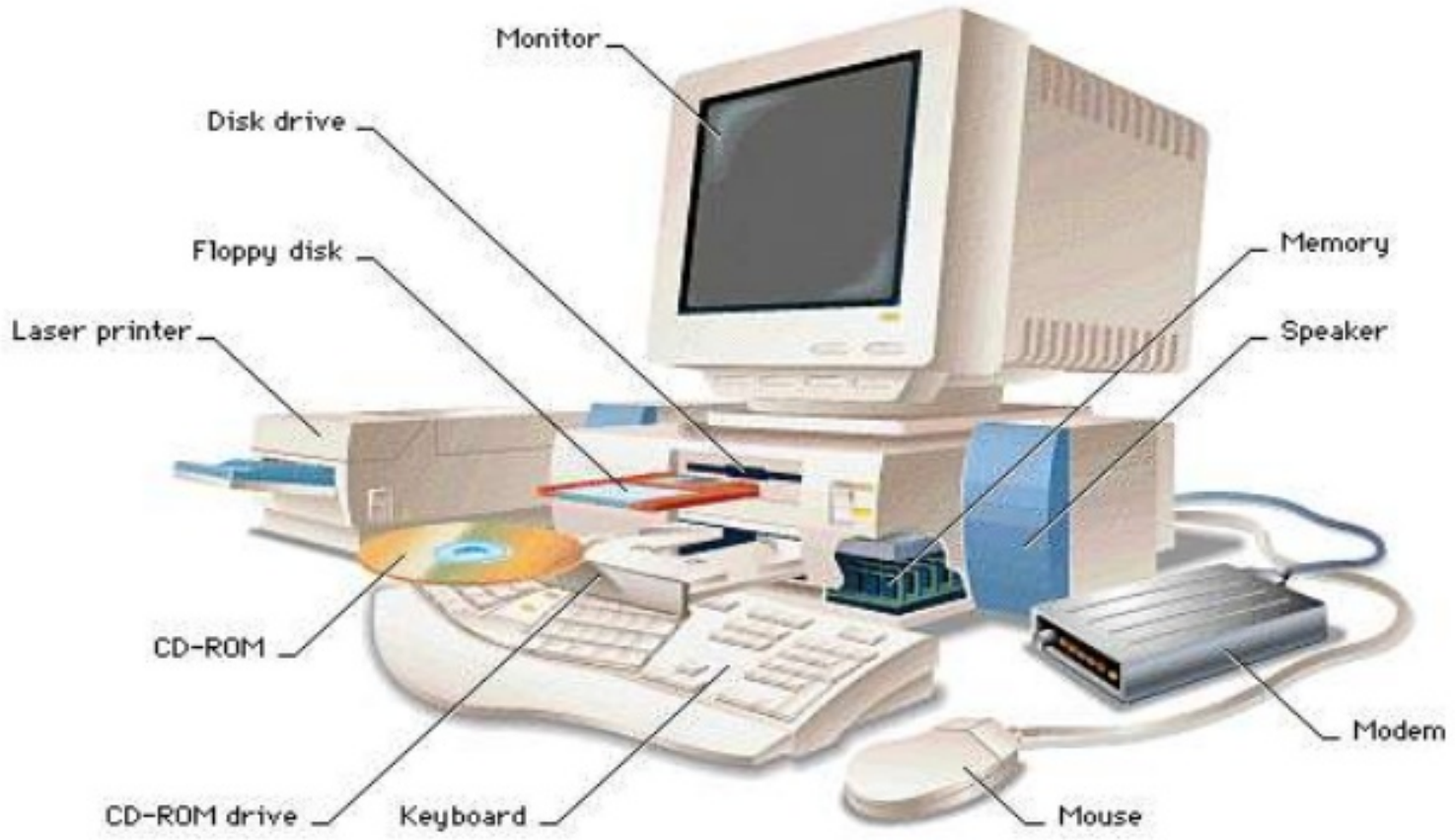
- Input: keyboard, mouse, scanner, punch cards
- Processing: CPU executes the computer program
- Output: monitor, printer, fax machine
- Storage: hard drive, optical media, diskettes, magnetic tape

Desktop Personal Computer (PC):

Personal Computer Components

A typical personal computer has components to display and print information (monitor and laser printer); input commands and data (keyboard and mouse); retrieve and store information (CD-ROM and disk drives); and communicate with other computers (modem).

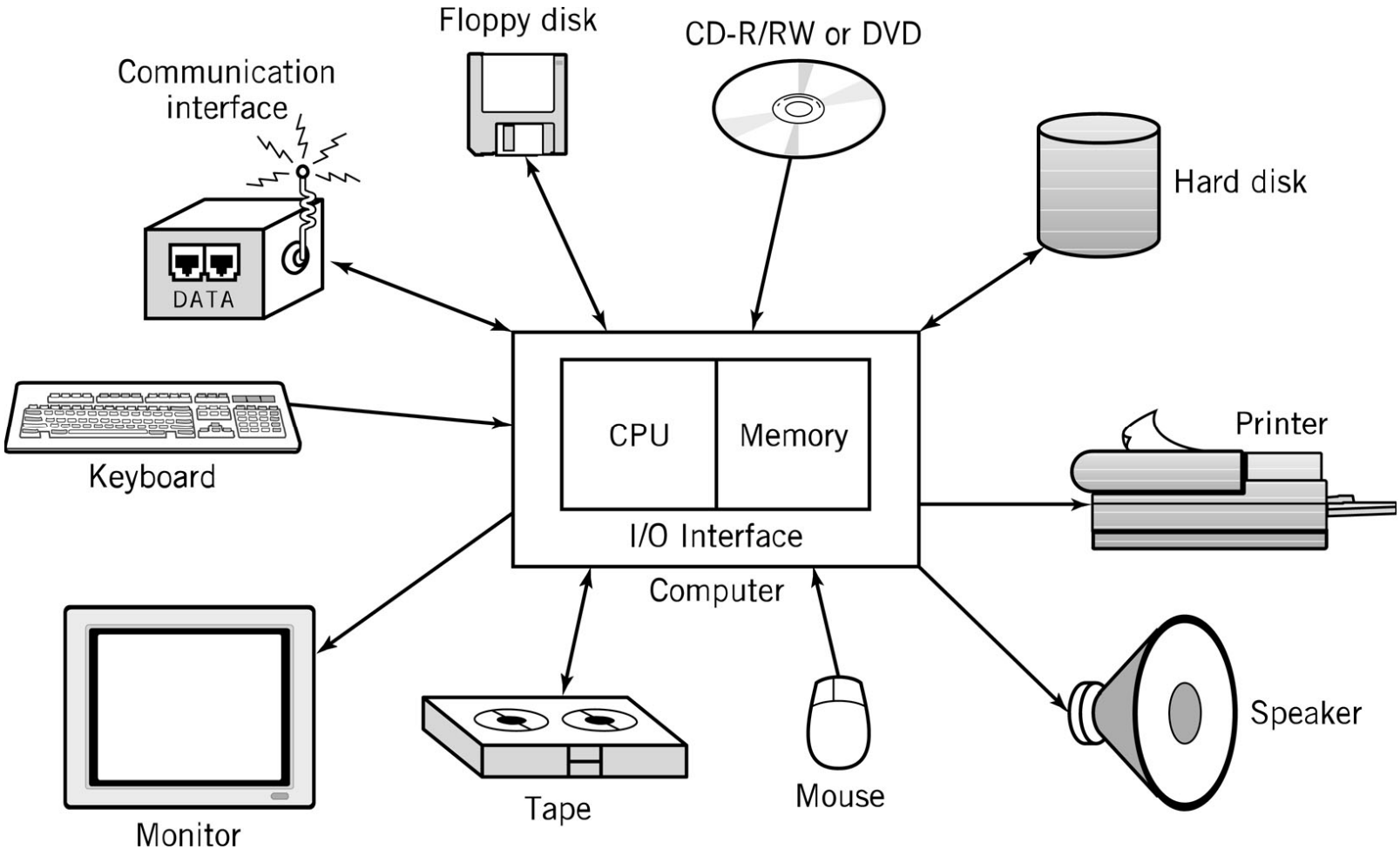
.



Components of a Computer:

FIGURE 1-7
Typical computer hardware.

Computer Components



Computer Components

- CPU
- Mother Board
- Memory
- Hard Disk
- Display
- Keyboard
- Mouse
- Power Supply
- Network Interface

Computer Basic Components:

Components	Input Devices	Output Devices
Motherboard	Keyboard	Monitor
Processor	Mouse	Printer
Memory	Web Camera	Speaker
Hard Disk Drive (HDD)	Microphone	Printer
Cables	Other Removable Devices…	Other Removable Devices…
Cards		
Ports		
Power Supply		
Storage Devices		
And more…		

Inside the Computer:

Figure 2.1 Computer Components

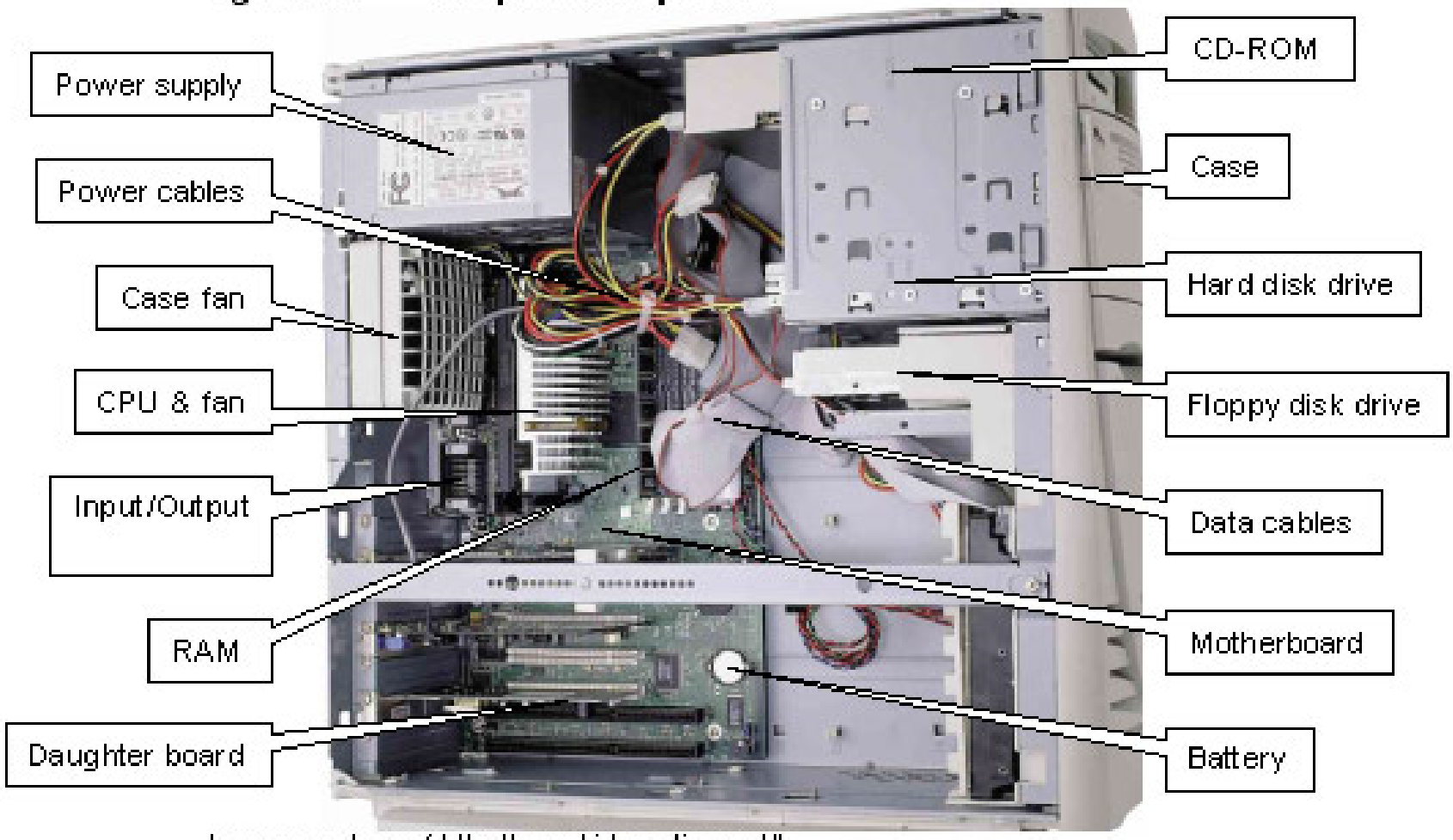
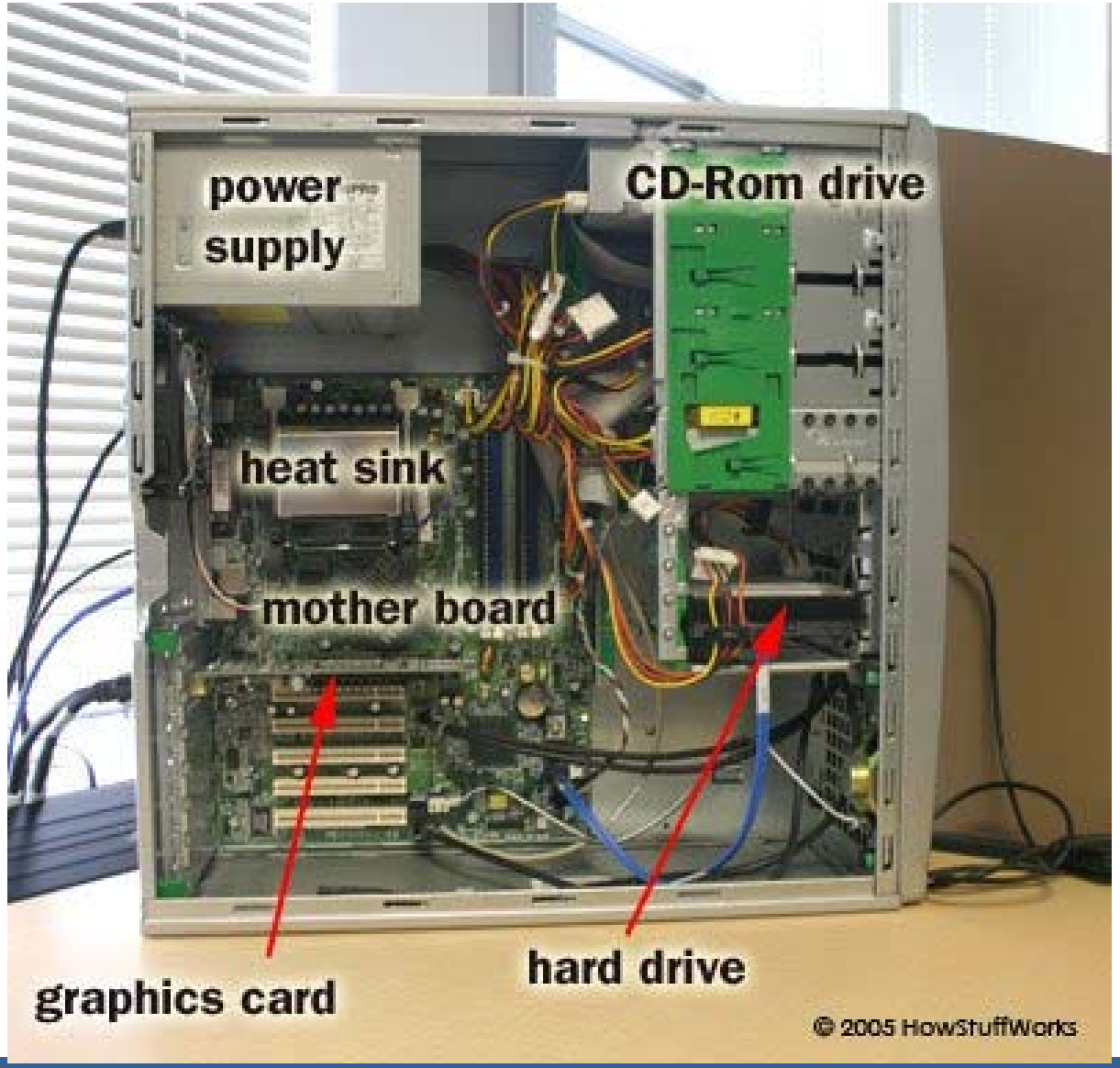


Image courtesy of http://www.kids-online.net/

Inside the Computer:



Example Processors:

- Desktop Processor: Intel Core i7, Intel Core 2 Duo, Intel Pentium IV, AMD Athelon (Dual/Quad Core)
- Mobile Processor: Intel (Centrino 2) Core 2 Duo, AMD Turion (Dual Core)
- Server Processor: Intel Xeon Quad Core, AMD Optron Quad Core, IBM Power PC, SUN SPARC
- Embedded System Processor: Intel Atom Processor

CPU:

- **CPU – Central Processing Unit (Microprocessor) consists of three parts:**
  - **Control Unit**
    - **Execute programs/instructions: the machine language**
    - **Move data from one memory location to another**
    - **Communicate between other parts of a PC**
  - **Arithmetic Logic Unit**
    - **Arithmetic operations: add, subtract, multiply, divide**
    - **Logic operations: and, or, xor**
    - **Floating point operations: real number manipulation**
  - **Registers**
- **CPU speed is influenced by several factors:**
  - **Clock speed:** Megahertz, Gigahertz
  - **Word size :** 32-bit or 64-bit word sizes
  - **Cache: Level 1, Level 2 caches**
  - **Instruction set size**
- **Single Core/Multi Core**

Continued to Next Class…