BACS1024 INTRODUCTION TO COMPUTER SYSTEMS

Chapter 1: Introduction To Computer Systems

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1. Computer Systems
2. Information Processing Cycle
3. Computer Components
4. Computer Hardware Components
5. Computer Software Components
6. Computer Network

0. Overview

0. Overview

Computer Systems

1. Computer Systems

1. Computer Systems

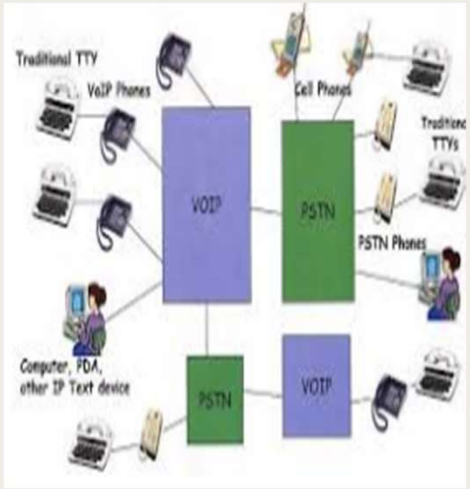
- **A computer systems is a computer-based information system (IS) that made up of 4 major elements:**
  - **Hardware elements: Physical mechanisms that process data by executing instruction, storing & moving data**
  - **Software elements: System software & application software that define instructions.**
  - **Data elements: Fundamental representation of facts and observations.**
  - **Communication elements: Hardware & Software that facilitate sharing, locally & remotely data accesses.**

- **Computer System / information system**

  = Hardware + Software + Data + Communication

1. Computer Systems

■ **Hardware + Software + Data + Communication = Computer System**

Hardware	Software	Data	Communication	Comp. System
 Hard Disk  Keyboard		User's data  Computer's data 01110101011010101 10100101011010101 01010101011010101 01000101011010101 01101010101001100 00101011101100111 10101001010101010		Mainframe (1950)  Microcomputer (1970)  Smart phone (2006)  IoT (2013) 

2. Information Processing Cycle

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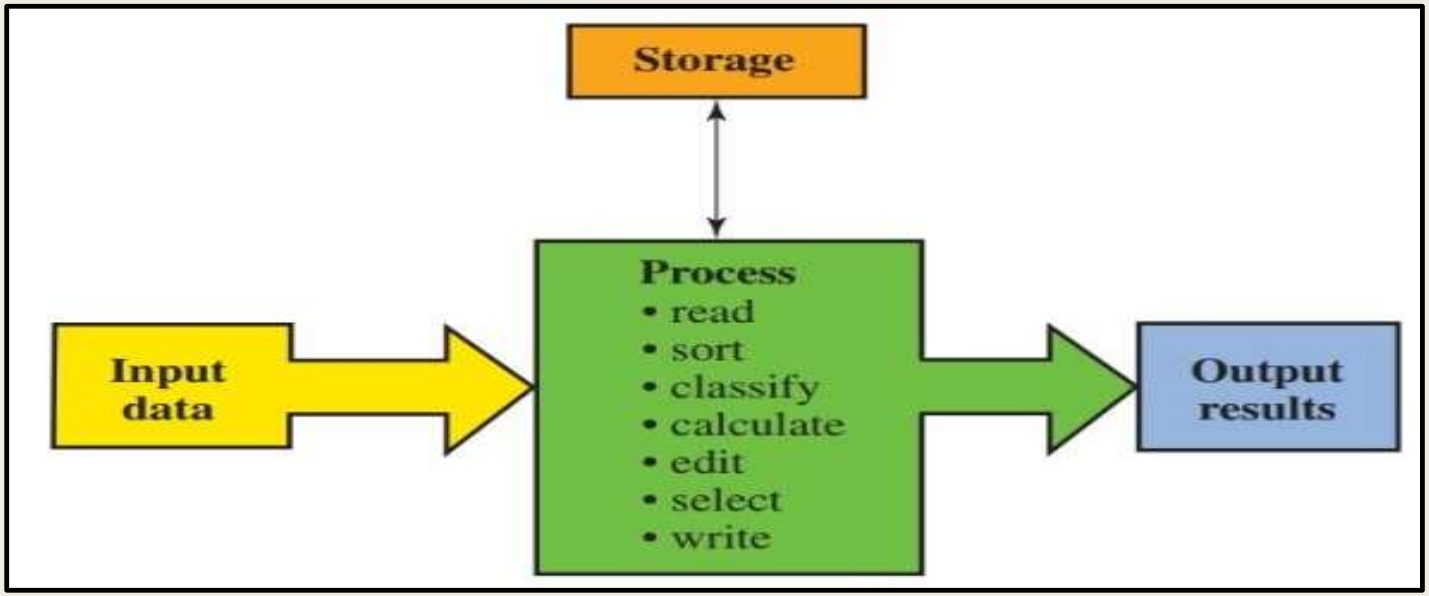
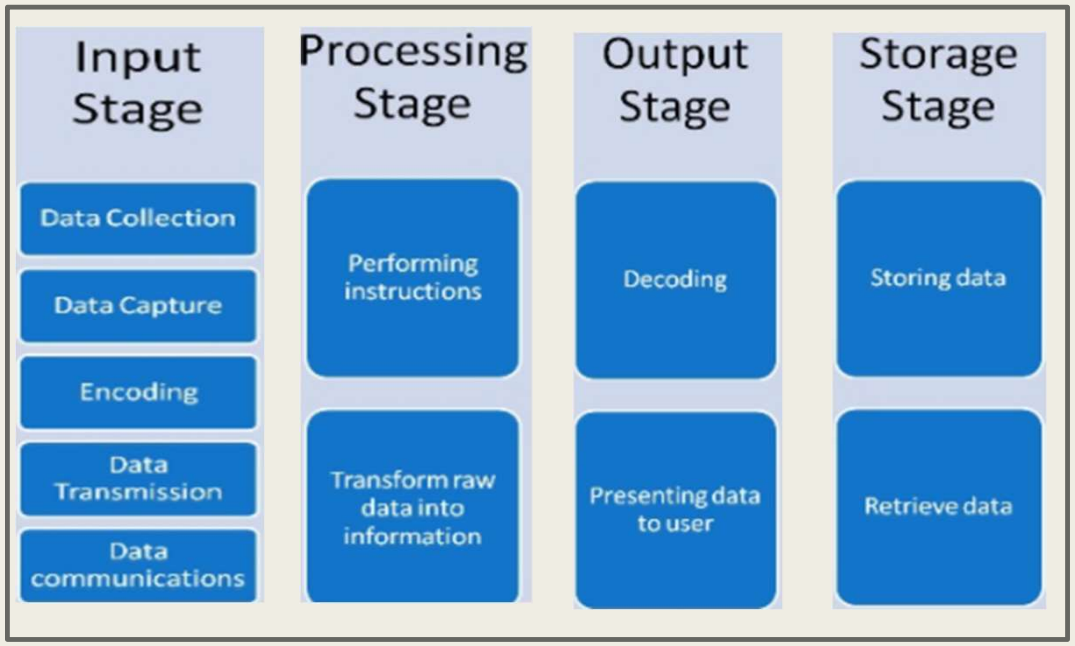
- The work performed by an individual computer system within the IT system can be characterized by input, processing and output, i.e. Input-Process-Output (IPO) model or Information Processing Cycle (IPC).



2. Information Processing Cycle

- **Information Processing Cycle (IPC) provides an important basic tools for system operations**



Example

Input : Press "5"
Processing: Addition
Storage : Save as pdf file
Output : "5" displayed on the screen

3. Computer Components

3. Computer Components

- **Computer components: Hardware + Software + Data + Communication**
  - ❑ **Hardware + Software = Fundamental to Computer Architecture**
  - ❑ **Data + Application Software = Fundamental to Computer Operation**
  - ❑ **User = Key supplier to the Computer System**

- **Objective:**
  - ❑ **To facilitate IPC**

4. Computer Hardware Components

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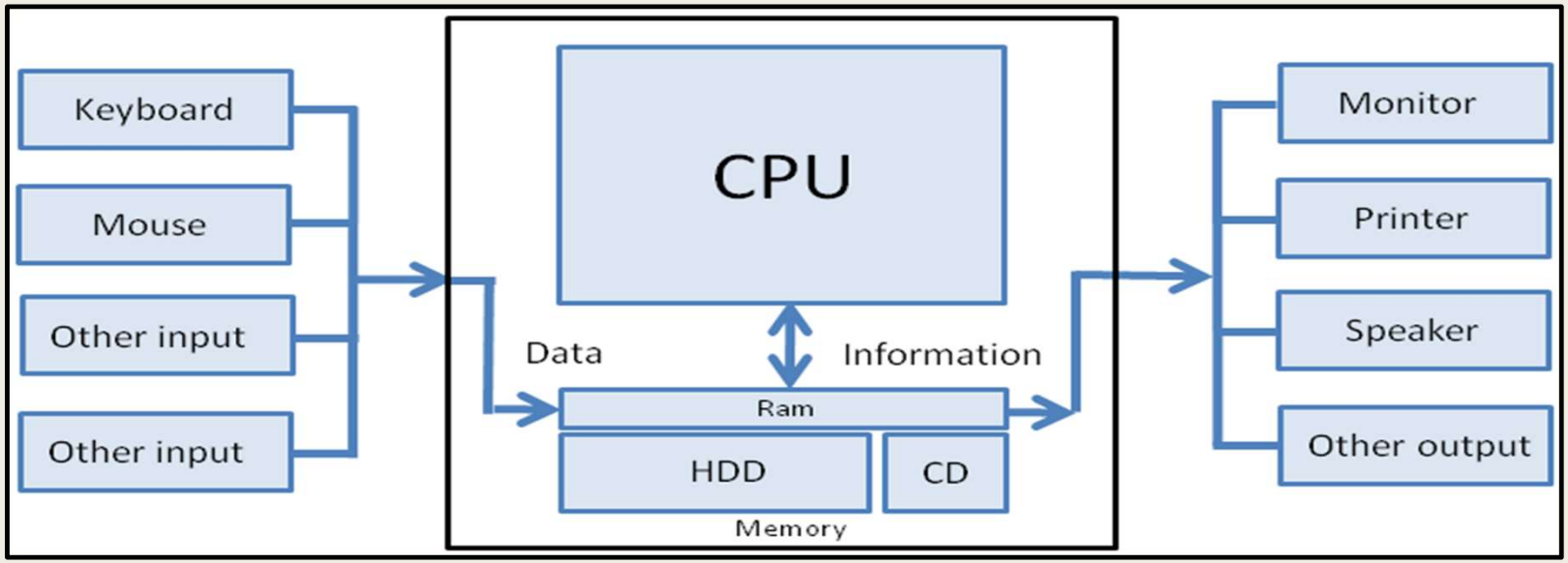
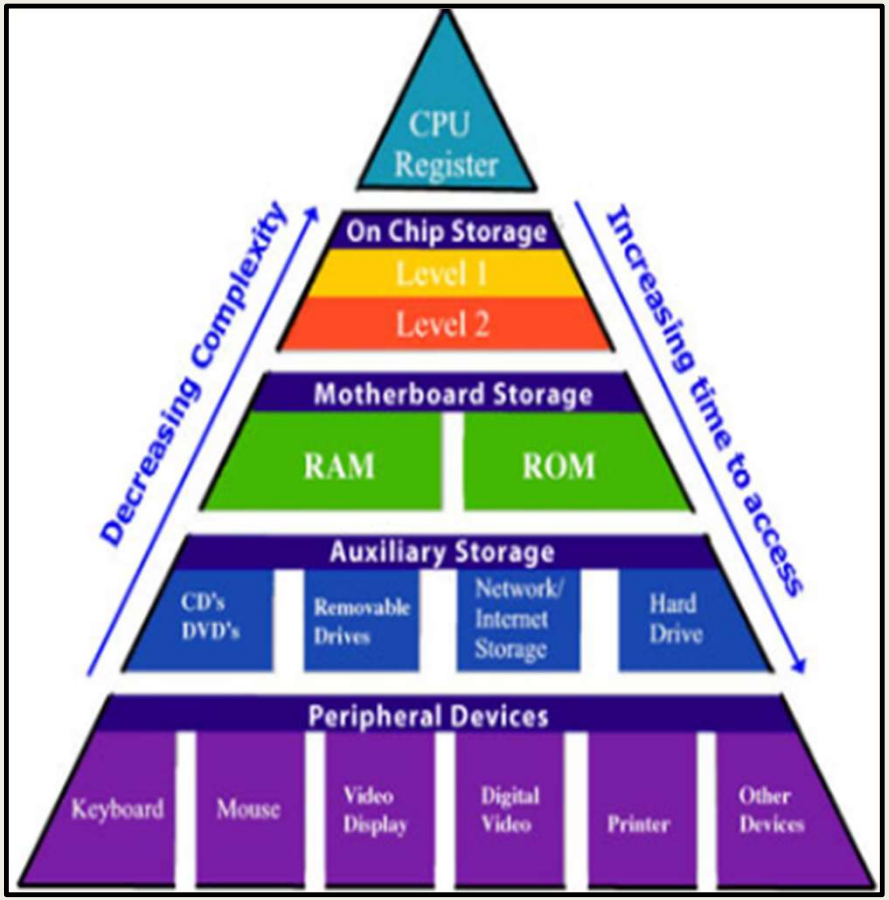
Computer hardware

- The physical & visible components to support IPC (IPOS model).



4. Computer Hardware Components

- **Computer hardware**
  - **Memory**
    - **A.k.a. primary storage**
    - **Aims to facilitate data storage**
    - **Made up of large amount of cells , individually addressable at 8 bits each.**
    - **Modern Computer hold 32-bits / 64-bits for large instruction & data.**



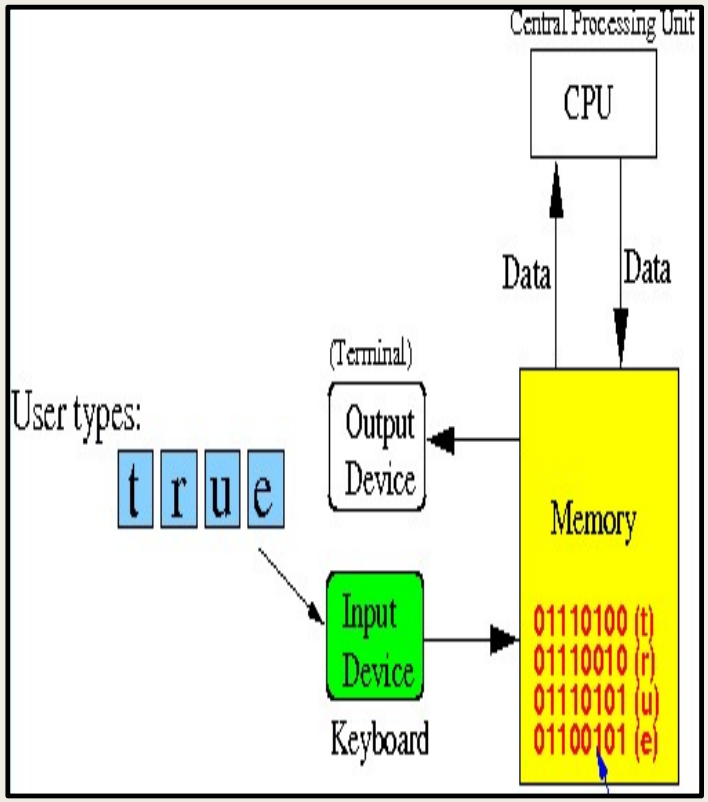
4. Computer Hardware Components

- **Computer hardware**
  - **Memory**
    - **2 types: Volatile memory & non-volatile memory**

	Volatile	Non-volatile
Characteristic	Loses its content when computer power is turned off	Content remained even when the power is turned off
Nature	Temporary	Permanent
Examples	• Random Access Memory (RAM), cache memory	• Read Only Memory (ROM), • Complementary Metal-Oxide-Semiconductor (CMOS)

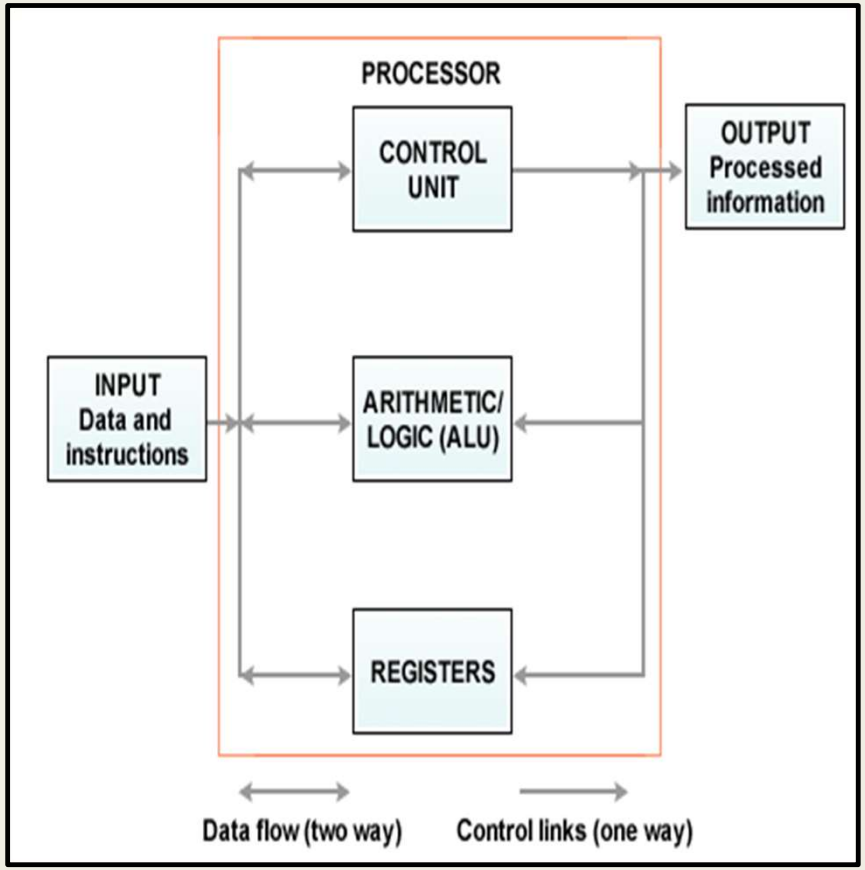
4. Computer Hardware Components

- **Computer hardware**
  - **Memory**
    - **The smallest measurement unit in computer is bit, i.e. ON (1) or OFF (0).**
      - ✔ **ON = presence of electricity / electronic charge**
      - ✔ **OFF = absence of electricity / electronic charge**
    - **Memory size is measured in byte (8 bits.)**
    - **E.g.: ASCII code A = 41H = 0100 0001B**



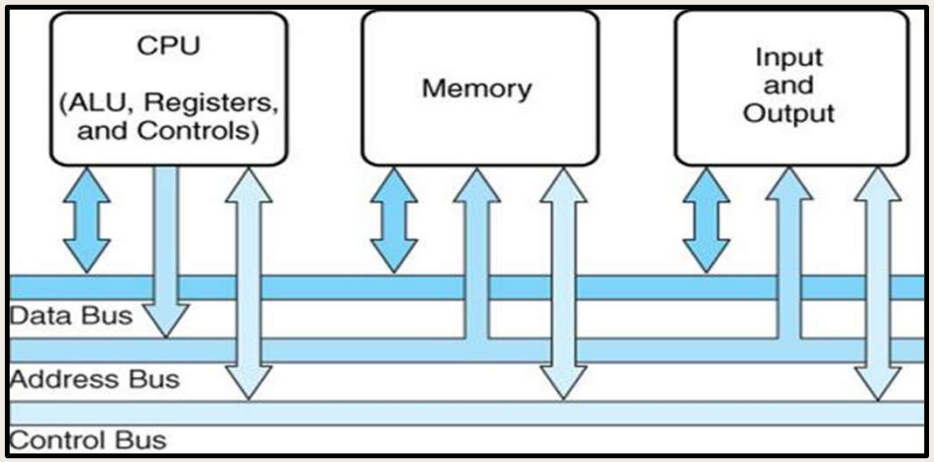
4. Computer Hardware Components

- **Computer hardware**
  - **Central processing unit (CPU)**
    - Facilitate calculations and other computations
    - Consists of:
      - a) **Arithmetic Logic Unit (ALU)**
        Perform arithmetic & Boolean logical operations
      - b) **Control Unit (CU)**
        Control the instruction processing
      - c) **Registers**
        Facilitate machine cycle



4. Computer Hardware Components

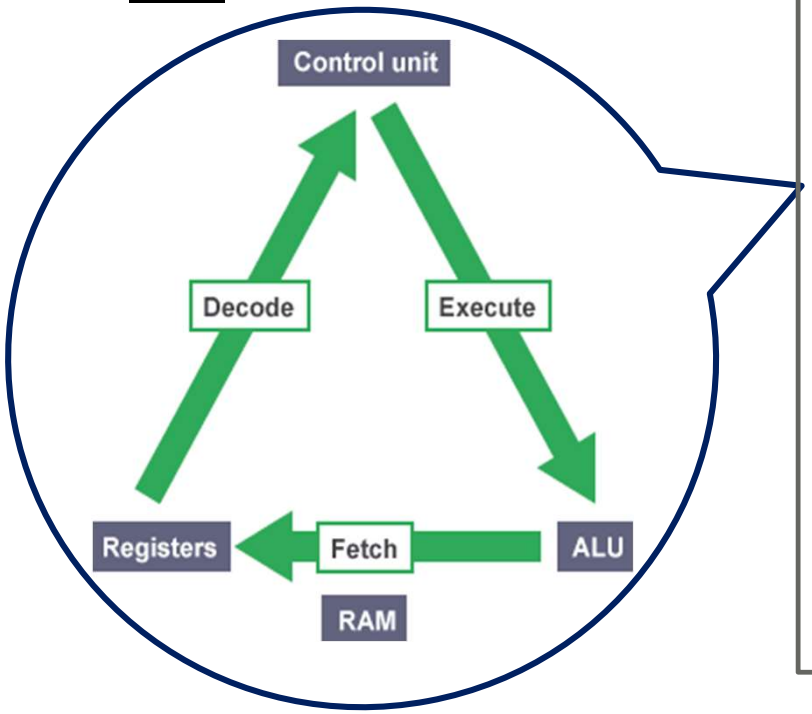
- **Computer hardware**
  - **Input devices** (e.g. mouse, keyboard)
    - Facilitate data (e.g.: data, commands) insertion
  - **Output devices** (e.g. printer, speaker)
    - Facilitate information generation
- **Bus**
  - Uses wire / wireless way to carry signals & power between different components.

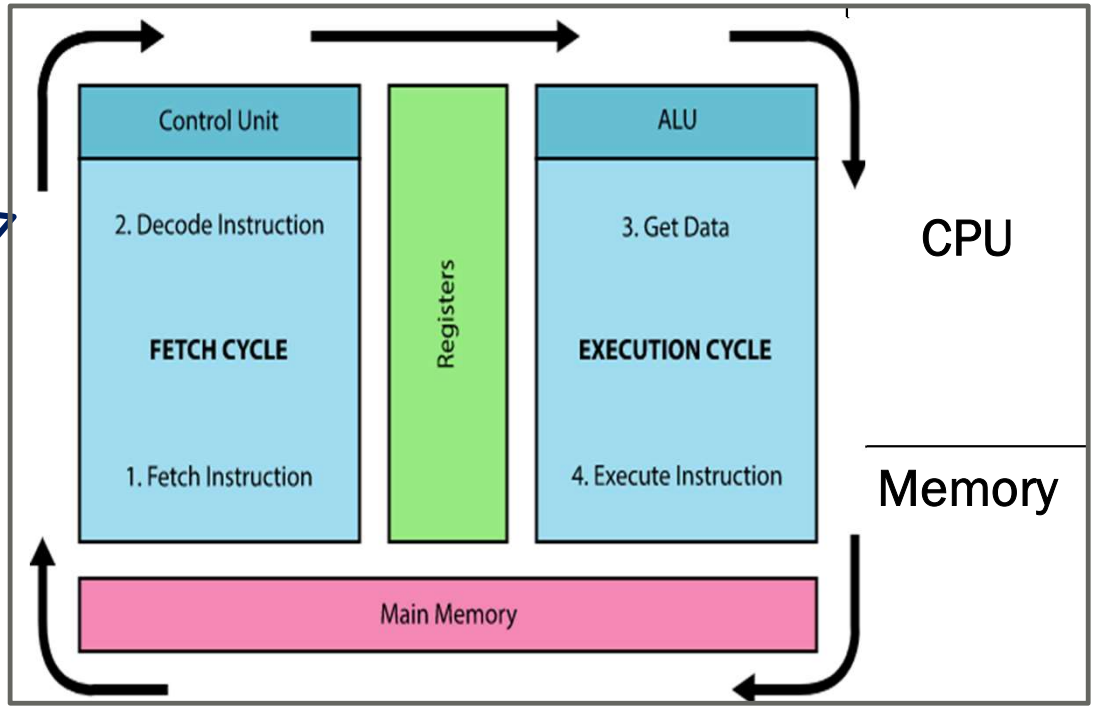


4. Computer Hardware Components

Machine Cycle

Inside CPU:





5. Computer Software Components

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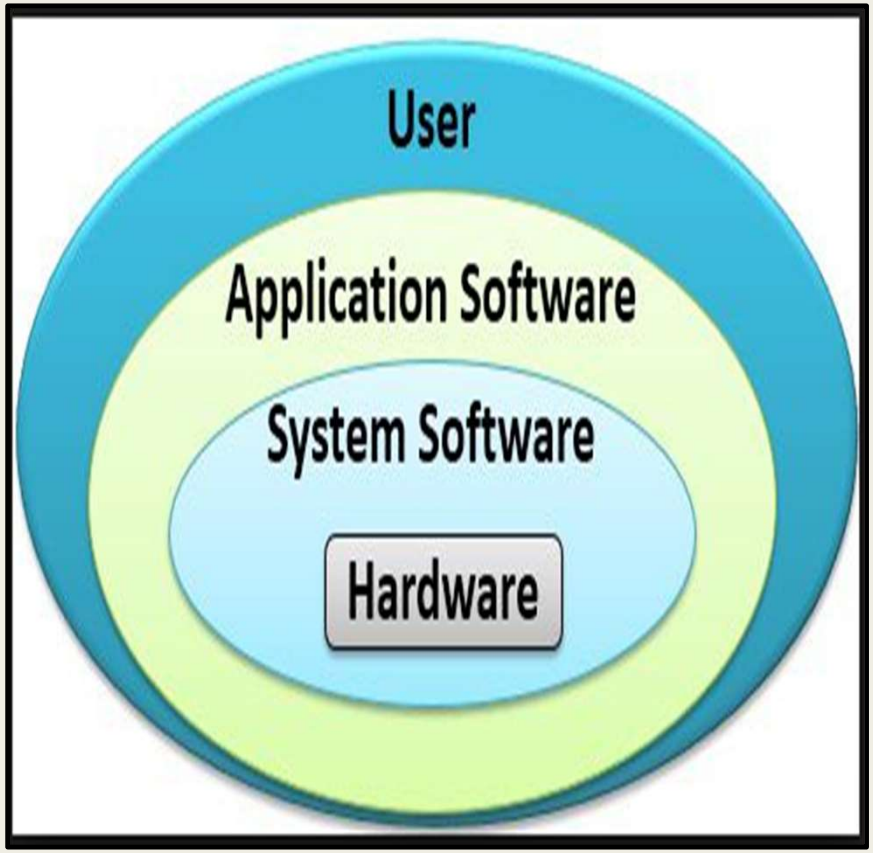
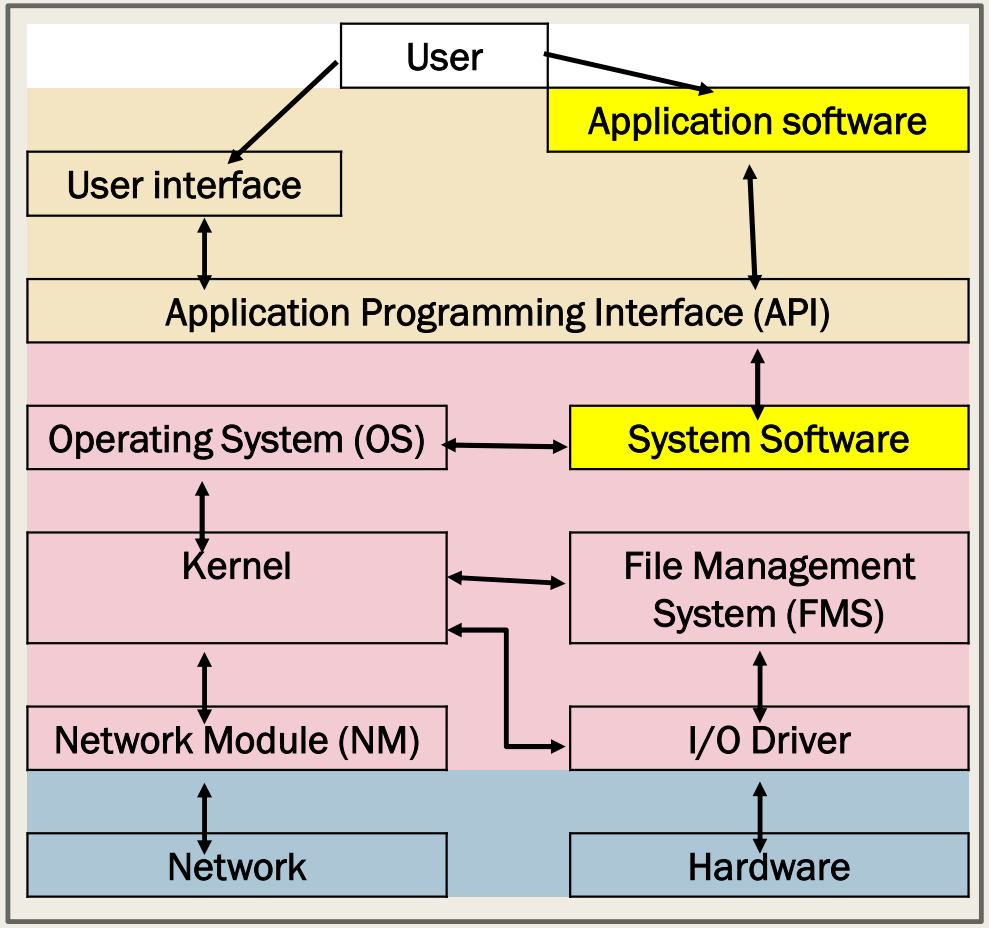
- Software consists of programs & instructions that tell the computer what to do.
- There are 2 major categories:
  - System software: Manages files, load and execute programs
  - Application software: Perform functions, tasks, activities for the benefits of the user



5. Computer Software Components

- **User interface**: Present output
- **API**: facilitate access to internal services of operating system, e.g.: file, I/O, data communication, user interface, program execution, etc
- **OS**: Manage computer
- **Kernel**: Core component of OS
- **FMS**: Allocate & manage storage space
- **NM**: Control interactive between computer system & networks
- **I/O driver**: Perform actual file storage & retrieval



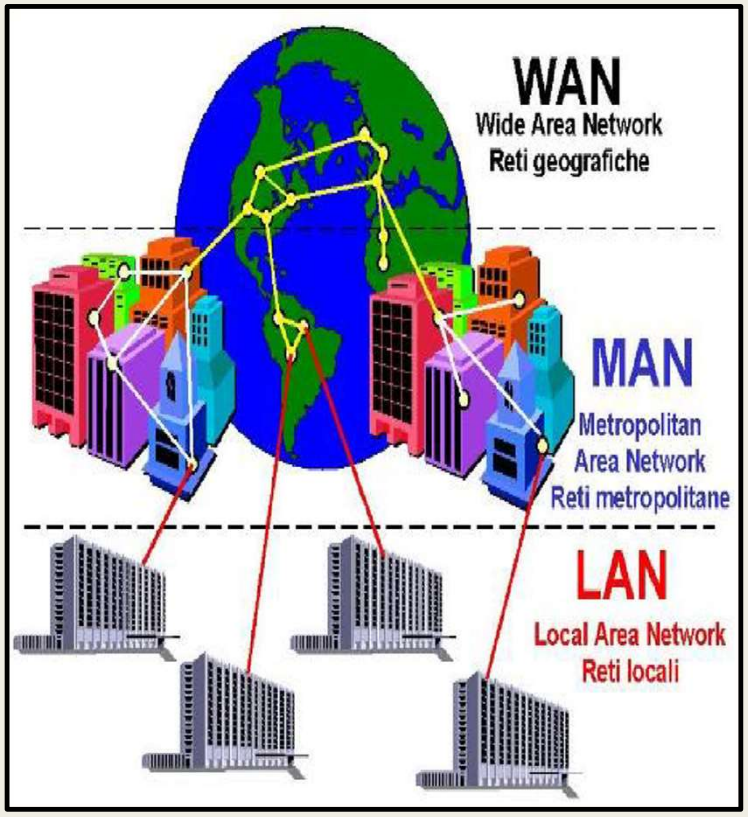
6. Computer Network

6. Computer Network

- **Computer network** is a collection of computers and devices connected together via communication devices and transmission media.
- In the digital era, network is essential to facilitate physical connection and data communication, hardware sharing, data and information, share software sharing, and funds transfer
- Communication components required are including:
  - **Communication channel**: To establish connection. E.g.: fiber-optic cable
  - **I/O hardware**: To serve an interface between computer & communication channel. E.g.: modem
  - **Network protocol**: To define the specific sets of rules for communication. E.g.: Transmission Control Protocol / Internet Protocol (TCP/IP)

6. Computer Network

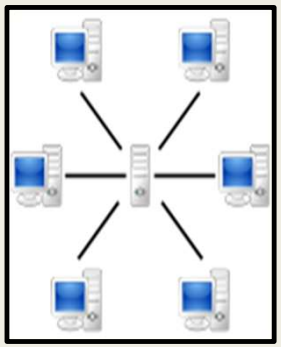
- There are 3 major types of computer network:



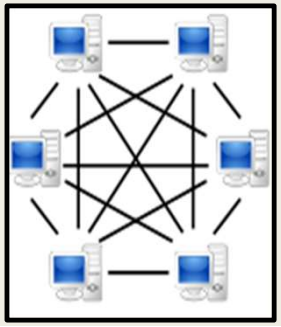
	LAN	MAN	WAN
Area	Limited	Include 1/more LAN but coverage smaller than WAN	Large geographical area
Places	Home, laboratory, office	City / town	World wide
Usages	Resource sharing	Regional communication	Wide area communication & sharing
Management	Private	Consortium of user / network provider	none

6. Computer Network

- **Network architecture** provides communication framework for computers, devices and media in the network
- There are 2 major network architectures:
  - **Client server architecture**
    - server / host controls access to the hardware, software & other resources on the networks &provides a centralized storage area
    - The clients are other devices that rely on the server for its resources
    - It is idea for medium & large size businesses

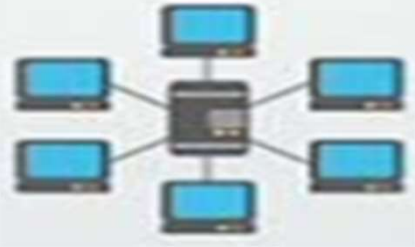
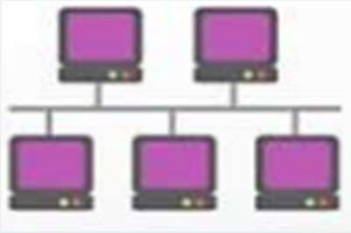
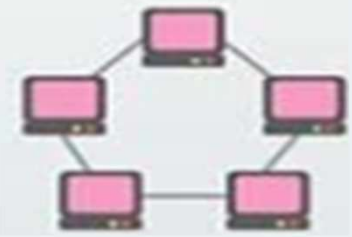


  - **Peer-to-peer architecture**
    - Each computer called peer, has equal responsibilities and capabilities, sharing hardware, data, or information with other peers.
    - Ideal for small & home users



6. Computer Network

- **Network topology specifies the layout of the computers & devices in a communication networks**
- **The 3 major types of computer network topologies are including STAR, BUS & RING topology.**

	Star	Bus	Ring
Connection:	Through a central device	Via main cable	Form a closed loop
Data transfer:	Through central hub / switch	Both direction	One direction until it reached destination
Diagram:			

Chapter Review

Chapter Review

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   - ❑ Software
   - ❑ Data
   - ❑ Communication
4. Computer Hardware Components
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     - ❖ Output devices
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