

# Fundamental of Computer

Unit 1

# What is computer ?

Commonly operating machine and processing unit which is use in technical education & research area. It an electronic device and computer word comes from the Latin language word compute which means calculation. So computer is also a calculation machine. It is also calculating of entrapments such as input, output, storage, processing etc.

A computer is an electronic device designed to process data and perform complex calculations at high speed. It operates by taking input, processing it based on instructions, and delivering meaningful output. Computers have revolutionized various fields, from education and healthcare to business and entertainment.

# Computer stands for:-

- C-Common
- O-Operating
- M-Machine
- P-Process
- U-User/Unit
- T-Technical
- E-Educational
- R-research

# Key Features of Computers/ Characteristics of Computers

**Speed:** Executes millions of instructions per second.

**Accuracy:** Delivers precise and error-free results when programmed correctly.

**Automation:** Can perform tasks automatically without constant human intervention.

**Storage:** Can store vast amounts of data for retrieval at any time.

**Multitasking:** Ability to run multiple applications simultaneously.

**Connectivity:** Internet and network compatibility for communication.

**Versatility:** Can handle multiple types of tasks, such as data processing, gaming, and communication.

# Objectives of Computers

- Data Processing: To process raw data into useful information for decision-making.
- Automation of Tasks: To reduce manual effort and improve efficiency.
- Enhancing Productivity: To perform tasks quickly and accurately, boosting output.
- Communication: To enable instant sharing of information through networking.
- Problem Solving: To solve complex mathematical, scientific, and technical problems.
- Storage and Retrieval: To store large datasets and retrieve them when needed.
- Entertainment: To provide tools for gaming, streaming, and multimedia experiences.



# Development of Computer System

## Generation of Computer

# 1. Early Mechanical Computers (Pre-1940s)

## Conceptual Foundation:

- Charles Babbage's Analytical Engine (1837) laid the groundwork for programmable computers.
- Ada Lovelace created the first algorithm intended for a machine, making her the first programmer.

## Mechanical Devices:

- Devices like the abacus, Pascaline, and Difference Engine were used for calculations.

# First Generation (1940s-1950s): Vacuum Tube Computers

## Technology:

- Used vacuum tubes for circuitry and magnetic drums for memory.

## Features:

- Bulky and consumed a lot of power.
- Programming done in machine language.

## Examples:

- ENIAC (Electronic Numerical Integrator and Computer)
- UNIVAC (Universal Automatic Computer)



# Second Generation (1950s-1960s): Transistor Computers

## Technology:

- Replaced vacuum tubes with transistors, making computers smaller and more efficient.

## Features:

- Faster, more reliable, and less power-hungry.
- Used assembly language and early high-level languages (e.g., COBOL, FORTRAN).

## Examples:

- IBM 1401, UNIVAC II

# Third Generation (1960s-1970s): Integrated Circuit (IC) Computers

## Technology:

- Introduction of integrated circuits, which combined multiple transistors on a single chip.

## Features:

- Smaller size, higher speed, and greater reliability.
- Use of operating systems and widespread adoption of keyboards and monitors.

## Examples:

- IBM 360 series, PDP-8

# Fourth Generation (1970s-Present): Microprocessor-Based Computers

## Technology:

- Development of microprocessors, integrating the CPU on a single chip.

## Features:

- Personal computers became common.
- Use of graphical user interfaces (GUIs), networking, and advanced software.

## Examples:

- Early PCs: Apple II, IBM PC
- Modern PCs: Laptops, Desktops

# Fifth Generation (Present and Beyond): Artificial Intelligence and Advanced Computing

## Technology:

- Incorporation of Artificial Intelligence (AI), Machine Learning, and Quantum Computing.
- Use of nanotechnology and parallel processing.

## Features:

- Voice recognition, natural language processing, and advanced robotics.
- Cloud computing and IoT (Internet of Things).

## Examples:

- AI-driven systems, self-driving cars, quantum computers.

# Key Milestones in Computer Development

1947:

- Invention of the transistor by Bell Labs.

1971:

- Introduction of Intel 4004, the first microprocessor.

1980s:

- Rise of personal computers and GUIs.

1990s:

- Emergence of the internet and multimedia computing.

2000s:

- Cloud computing and mobile devices.

2010s:

- Advancements in AI, big data, and IoT.



# Types of Computers

## Based on Purpose

### General-Purpose Computers:

Designed for a wide range of tasks (e.g., PCs, laptops).

### Special-Purpose Computers:

Built for specific tasks (e.g., ATMs, embedded systems in cars).

# Types of Based on Size and Performance

## Supercomputers:

### Characteristics:

Extremely fast, used for complex computations like weather forecasting, space exploration, and scientific simulations.

### Examples:

Summit, Fugaku.

### Limitations:

Expensive and requires special environments to operate.

# Types of Based on Size and Performance

## Mainframe Computers:

### Characteristics:

Handle large-scale transaction processing and data storage for enterprises.

### Examples:

IBM Z series.

### Limitations:

High cost and require significant maintenance.

# Types of Based on Size and Performance

## Minicomputers (Midrange Computers):

### Characteristics:

Intermediate between mainframes and PCs, used in small industries.

### Examples:

PDP series by Digital Equipment Corporation.

### Limitations:

Becoming obsolete with the rise of PCs and servers.

# Types of Based on Size and Performance

## Personal Computers (PCs):

### Characteristics:

Affordable and suitable for individual use. Includes desktops and laptops.

### Examples:

Dell Inspiron, MacBook.

### Limitations:

Limited processing power for high-end tasks.



# Types of Based on Size and Performance

## Workstations:

### Characteristics:

High-performance PCs for tasks like 3D modeling and engineering.

### Examples:

HP Z series.

### Limitations:

More expensive than standard PCs.

# Types of Based on Size and Performance

## Servers:

### Characteristics:

Manage network resources, host applications, and data.

### Examples:

Blade servers, rack servers.

### Limitations:

Require robust hardware and constant uptime.

# Types of Based on Size and Performance

## Mobile Devices:

Characteristics:

Portable devices like smartphones and tablets.

Examples:

iPhone, Samsung Galaxy.

Limitations:

Limited multitasking compared to PCs.

# Characteristics of Computers

Already done in slide 4

# Limitations of Computers

## Lack of Intelligence:

- Cannot think or reason; requires explicit instructions.

## Dependence on Humans:

- Operates only as per the user's instructions; no independent decision-making.

## No Creativity:

- Cannot generate original ideas or emotions.

## Data Dependency:

- Accuracy depends on the quality and correctness of input data.

## Hardware Failures:

- Prone to malfunctions like overheating, power surges, or wear-and-tear.

## Cybersecurity Risks:

- Vulnerable to hacking, viruses, and other security threats.

## Cost:

- High-end computers (like supercomputers) can be extremely expensive.



# Generation of Computer

Already done in slide 6 to 13

# Types of PC's desktop

Type	Performance	Portability	Upgradability	Usage
Tower Desktop	High (varies by setup)	Low	High	General, gaming, high-performance
All-in-One (AIO)	Moderate to High	Low	Low	Home, office, multimedia
Gaming Desktop	Very High	Low	High	Gaming, VR, streaming
Compact Desktop	Moderate	High	Low	Basic tasks, minimal workspaces
Workstation	Very High	Low	Moderate	Professional, engineering tasks
Thin Client	Low	Low	Very Low	Centralized environments

# Laptop Computers

## Definition:

- Portable computers with all components integrated into a single unit.

## Characteristics:

- Size: Compact and lightweight.
- Portability: Battery-powered, easy to carry.
- Performance: Varies from basic models for everyday tasks to high-performance gaming and business laptops.
- Usage: Common for students, professionals, and travelers.

## Advantages:

- Highly portable.
- Built-in components (camera, speakers, touchpad).

## Limitations:

- Limited upgradability.
- Higher cost for high-performance models.

# Notebook Computers

## Definition:

- A subtype of laptops, lighter and slimmer, optimized for portability and basic computing tasks.

## Characteristics:

- Size: Slimmer and lighter than standard laptops.
- Performance: Lower processing power, suitable for basic tasks like browsing, document editing, and streaming.
- Usage: Ideal for users prioritizing portability over high performance.

## Advantages:

- Long battery life.
- Extremely portable.

## Limitations:

- Limited processing power for demanding tasks.
- Often lacks advanced connectivity options (e.g., fewer ports).



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# Workstations

## Definition:

- High-performance computers designed for professional tasks requiring significant computational power.

## Characteristics:

- **Performance:** Equipped with powerful CPUs, GPUs, and large memory capacity.
- **Reliability:** Built for intensive tasks like 3D modeling, animation, engineering simulations, and scientific research.
- **Usage:** Common in industries like architecture, engineering, and video production.

## Advantages:

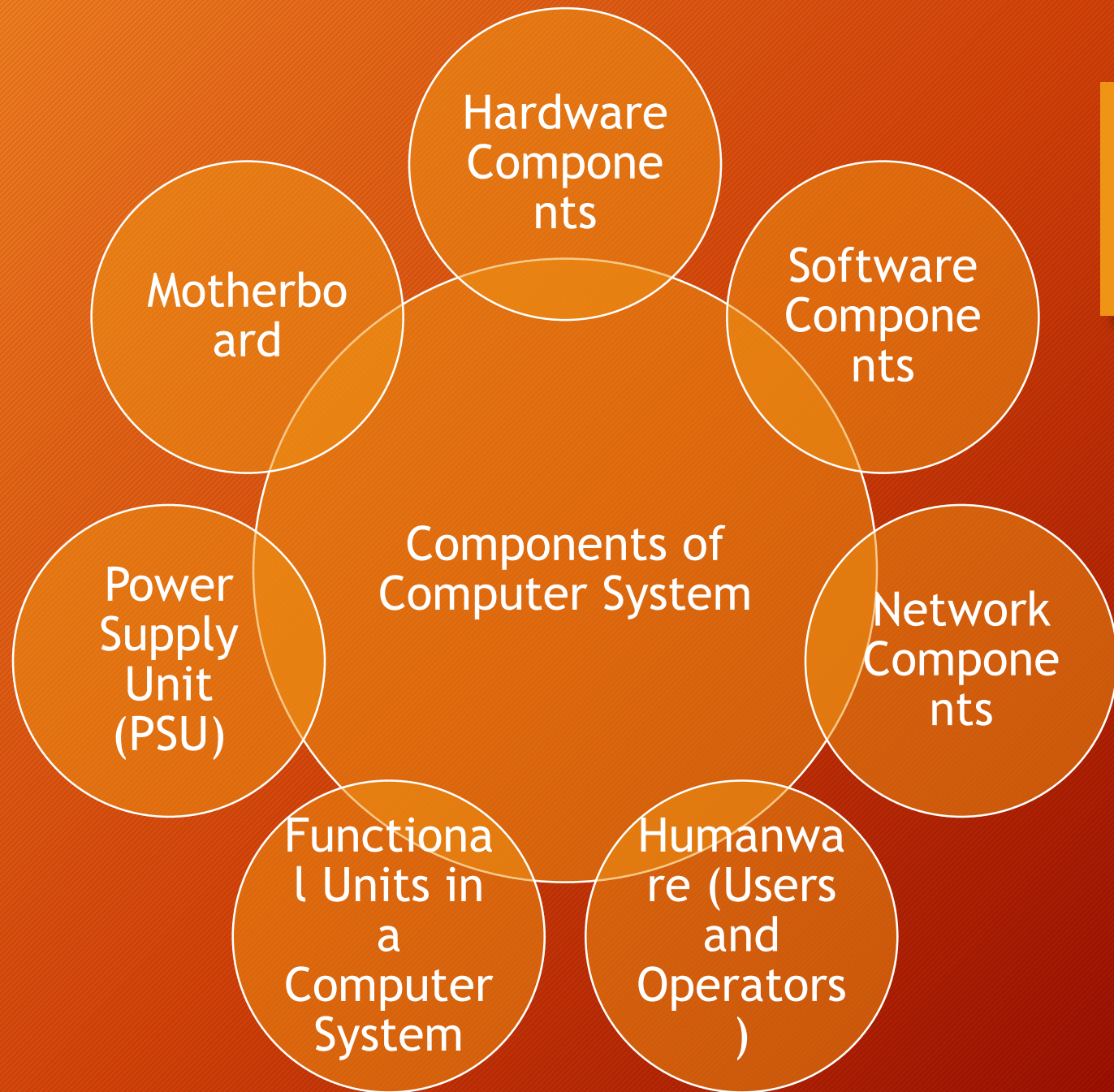
- Handles demanding applications with ease.
- Robust cooling and reliability under continuous heavy workloads.

## Limitations:

- Expensive.
- Less portable than laptops or notebooks.

# Comparison Table

Type	Portability	Performance	Usage	Cost	Upgradability
Desktop	Low	Moderate to High	Home, office, gaming	Affordable	High
Laptop	High	Moderate to High	Students, professionals	Moderate to High	Low to Moderate
Notebook	Very High	Low to Moderate	Basic computing on the go	Affordable	Low
Workstation	Low	Very High	Professional, high-demand tasks	Very High	Moderate





# Hardware Components

Hardware refers to the physical parts of a computer system. These are further divided into:

## A. Input Devices

- Devices that allow users to input data and instructions into the computer.
- Examples: Keyboard, Mouse, Scanner, Microphone, Touchscreen, Joystick.
- Purpose: To provide raw data for processing.

## B. Central Processing Unit (CPU)

- The "brain" of the computer that performs calculations, logical operations, and controls other components.
- Subcomponents: Control Unit (CU): Directs the flow of data and instructions.
- Arithmetic Logic Unit (ALU): Performs arithmetic and logical operations.
- Registers: High-speed storage locations within the CPU for

## C. Memory/Storage

- Primary Memory (Volatile):
- RAM (Random Access Memory): Temporary storage for active processes.
- Cache: High-speed memory for frequently accessed data.
- Secondary Memory (Non-Volatile):
- Hard Drives (HDD), Solid State Drives (SSD), USB Drives.
- Purpose: To store data and programs

## D. Output Devices

- Devices that display or produce the processed information.
- Examples: Monitor, Printer, Speakers, Projector.
- Purpose: To communicate results to the user.

## E. Peripherals

- Additional devices that extend the computer's functionality.
- Examples: External hard drives, Graphic Tablets, Webcams.

# Software Components

Software refers to the instructions that control hardware and allow users to interact with the computer.

## A. System Software

- Manages hardware and provides a platform for applications.
- Examples: Operating Systems (Windows, macOS, Linux), Utility Programs.

## B. Application Software

- Enables users to perform specific tasks.
- Examples: MS Office, Web Browsers, Games, Multimedia Software.

## C. Programming Software

- Tools for developers to create and debug applications.
- Examples: IDEs, Compilers, Debuggers.

# Network Components

Allow computers to communicate and share resources.

## Network Interface Card (NIC):

- Connects to a network.

## Modems/Routers:

- Enable internet access.

## Switches and Hubs:

- Manage data transfer in networks.



## Humanware (Users and Operators)

The people who interact with the computer system.

- Roles: End-users, system administrators, and developers.

# Functional Units in a Computer System

## Input Unit:

- Captures data from the user.

## Processing Unit (CPU):

- Processes the data.

## Storage Unit:

- Saves data permanently or temporarily.

## Output Unit:

- Presents the processed data to the user.

## Control Unit:

- Manages all operations and ensures coordination.

## Power Supply Unit (PSU)

Provides and regulates power to all components of the system.

# Motherboard

The main circuit board that connects and facilitates communication between the CPU, memory, storage, and peripherals.

## Components:

- Chipset, BIOS/UEFI, Expansion Slots.

# Types of PC, Desktop, Laptop, Notebook

Already done in slide 25 to 29

# Unit 1

End



# What is hardware?

- A physical components of a computer that is called hardware.

# What is software?

- A sequence of instruction given to a computer to perform a particular task. That is called software.

There are  
two type of  
software.

```
graph TD; A[There are two type of software.] --- B[application software]; A --- C>window software
```

application  
software

window  
software

Application software

```
graph TD; A((Application software)) --> B((Coding software)); A --> C((Graphic software)); B --> D((Language software)); B --> E((Programming software)); C --> F((Designing software)); C --> G((Animation software));
```

Coding software

Graphic software

Language software

Programming software

Designing software

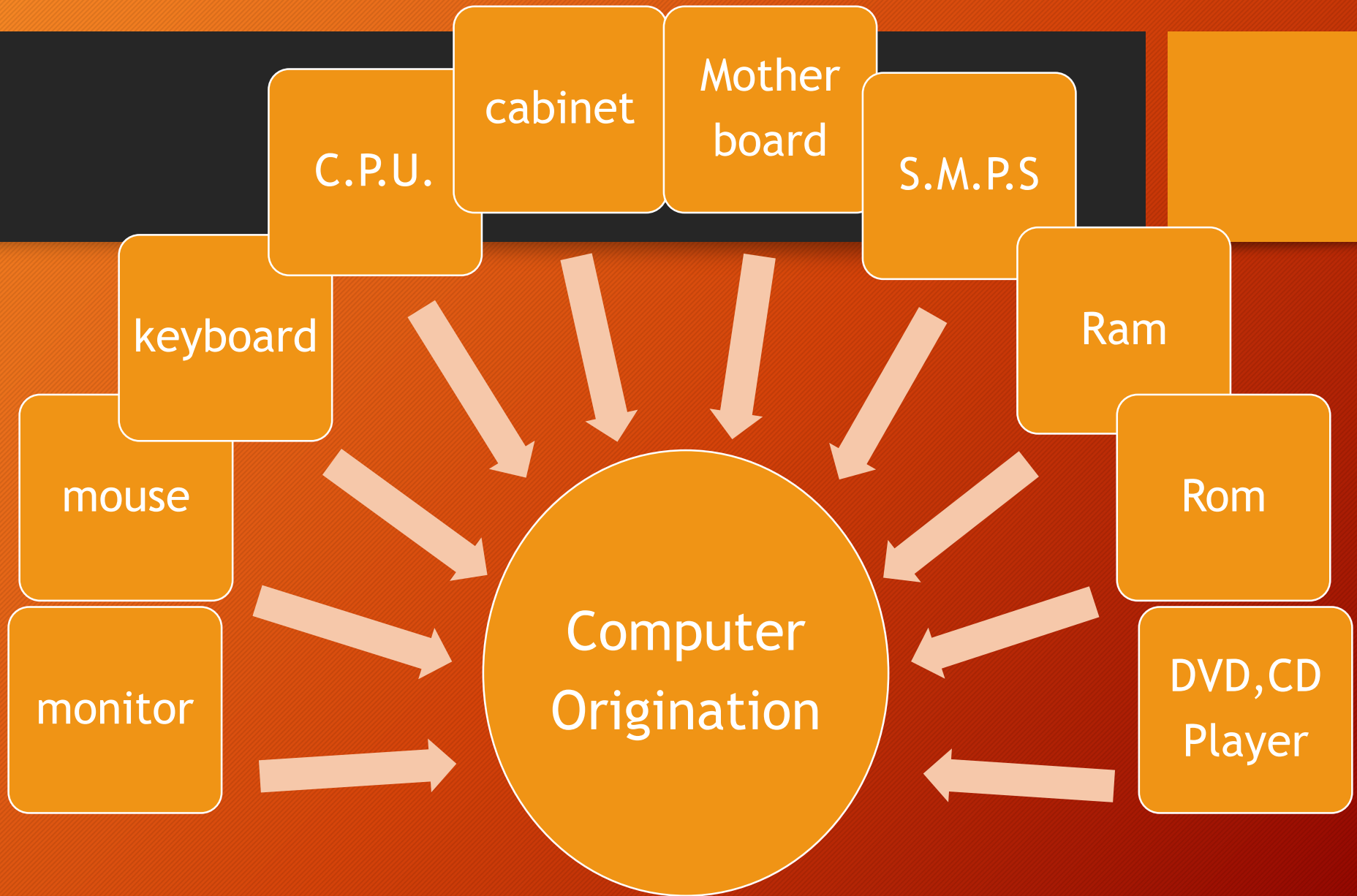
Animation software

# Types of device in computer?

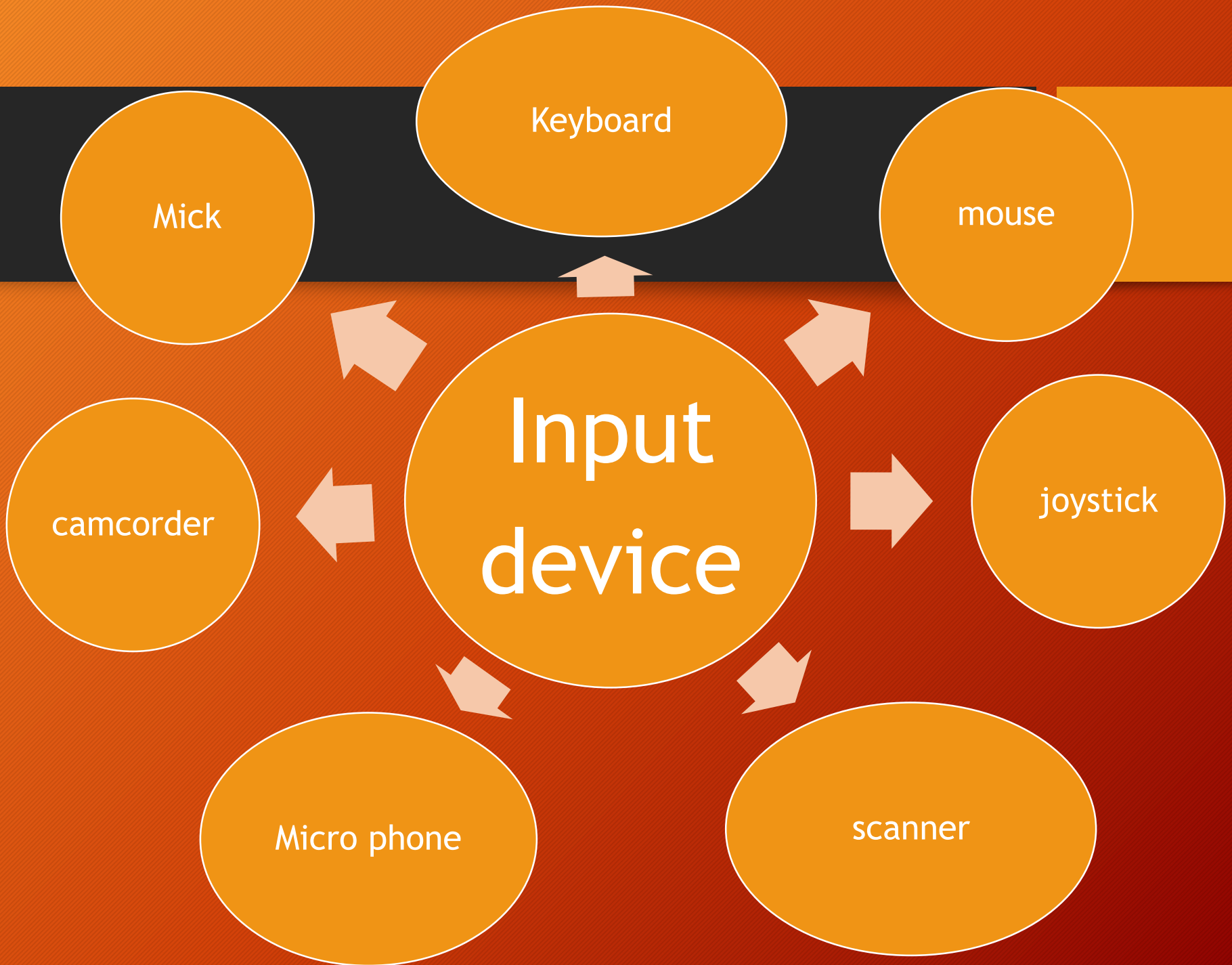
Input device

Input/output  
device

Output  
device







# Output device

- Monitor
- Projector
- Printer
- Speaker
- Led screen

# Memory units

Name	Equal To	Size (In Bytes)
Bit	1 Bit	1 / 8
Nibble	4 Bits	1 / 2 (rare)
Byte	8 Bits	1
Kilobyte	1024 Bytes	1024
Megabyte	1024 Kilobytes	1, 048, 576
Gigabyte	1024 Megabytes	1, 073, 741, 824
Terabyte	1024 Gigabytes	1, 099, 511, 627, 776
Petabyte	1024 Terabytes	1, 125, 899, 906, 842, 624
Exabyte	1024 Petabytes	1, 152, 921, 504, 606, 846, 976
Zettabyte	1024 Exabytes	1, 180, 591, 620, 717, 411, 303, 424
Yottabyte	1024 Zettabytes	1, 208, 925, 819, 614, 629, 174, 706, 176

# What is window?

Window is the mediator between user and computer.

- Example:-
  - Window 98
  - Window XP
  - Window 7
  - Window 8
- Etc.....



# What is input device?

- A device which used to give commands and instructions to the computer that is called input device.



# What is output device?

- A device which show result that is called output device.

# What is hard disk?

- Hard disk is a data storage device it is second memory of computer. Hard disk is also called permanent memory of computer. hard disk is mind of computer.

# What is RAM ?

- RAM stands for random access memory it is the primary memory of computer. RAM is also called temporary memory.

# What is ROM ?

- ROM stands for read only memory. ROM is the secondary memory. It is a permanent memory of a computer and its also called non-volatile memory.

# What is mother board ?

- Mother board is just like a platform of a computer. All the components of PC are connected with it. Its also called Main-board.



# How many types of RAM ?

- There are five types of RAM
- RD RAM-Rumbas dynamic
- SD RAM-Synchronous dynamic
- DDR1 RAM-Double data rate 1
- DDR2 RAM-Double data rate 2
- DDR3 RAM-Double data rate 3

# How many types of computer ?

- There are four types of computer.
- Mini computer
- Micro computer
- Personal computer
- Super computer

# What is folder ?

- A special kind of container which contents other types of files and folder that is called folder.

# What is file ?

- A file can content any kind of information such as programs and applications.
- There are three types of file Attributes.
- Archive
- Read only
- Hidden

# Who is father of computer ?

- Charles Babbage (analytical engine)



Who is father of software?

Bilgates

What is the name of first  
calculating machine?

Abacus.

# Full form :-

- WWW- world wide web
- HTML-Hyper text markup language
- USB-Universal serial bus
- RGB-Red green blue
- OS-operating system
- LAN-Local area network
- WAN-Wide area network
- IDE-Integrates drive electronics
- DDR1.2-Double data rate 1.2
- CGA-Common graphic array
- VGA-Video graphic array
- CGI-Common gateway interface

- BPS-Bites per second
- BIOS-Basic input output system
- POST-Power on self test
- CD-Compact disc
- ROM-Read only memory
- RAM-Random access memory
- LCD-Liquid Cristal display
- CU-Control unit
- CPU-Central processing unit
- ALU-Arithmetical logical unit
- SMPS-Switch mode power supply
- HDD-Hard disk drive
- FDD-Floppy disk drive
- HTTP-Hyper text transfer protocol
- FTP-File transfer protocol
- PROM-Programmable read only memory
- EPROM-Erasable programmable read only memory



- IC-Integrates circuits
- BASIC-bigness all prepress symbolic instruction code
- LSICS-large scale Integrates circuits
- ULSICS-ultra larger scale Integrates circuits
- OCR-optical character reorganization
- OMR-optical mark reader
- MICR-magnetic ink character Reorganization
- CMYK-cyan magenta yellow black (kala)
- MAN-metro Politian area network
- CSS-cascading style sheet
- PAN-personal area network
- DPI-dot per inch
- RPS-round per second
- FPS-frame per second
- CRT-cathode ray tube



# Generation of computer

The re-evaluation of computer started from 16 century and result in from that see today.

The present day of computer now ever was also gone vapid changes. During this 50years this pried during which the re-evaluation of the computer to place can be divided into five faces as know as the generation of computer.

1<sup>st</sup> generation started 1946 - ENIAC stands for electronic numerical intergraded and calculation was built in 1946 it made by john Eckert and john mouchly from USA.

IT was the 1<sup>st</sup> generation of computer. The ENIAC was 30 tan wt. and 30 to 50 feet long. It's content 18000 vacuums tubes 70000 transistors and 10000 capacitor and used the power 150000 volte.

EDSAC-stands for electronic delay storage