Introduction to computers and Computer Hardware

Presented by

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Outlines

- Introduction to Computer
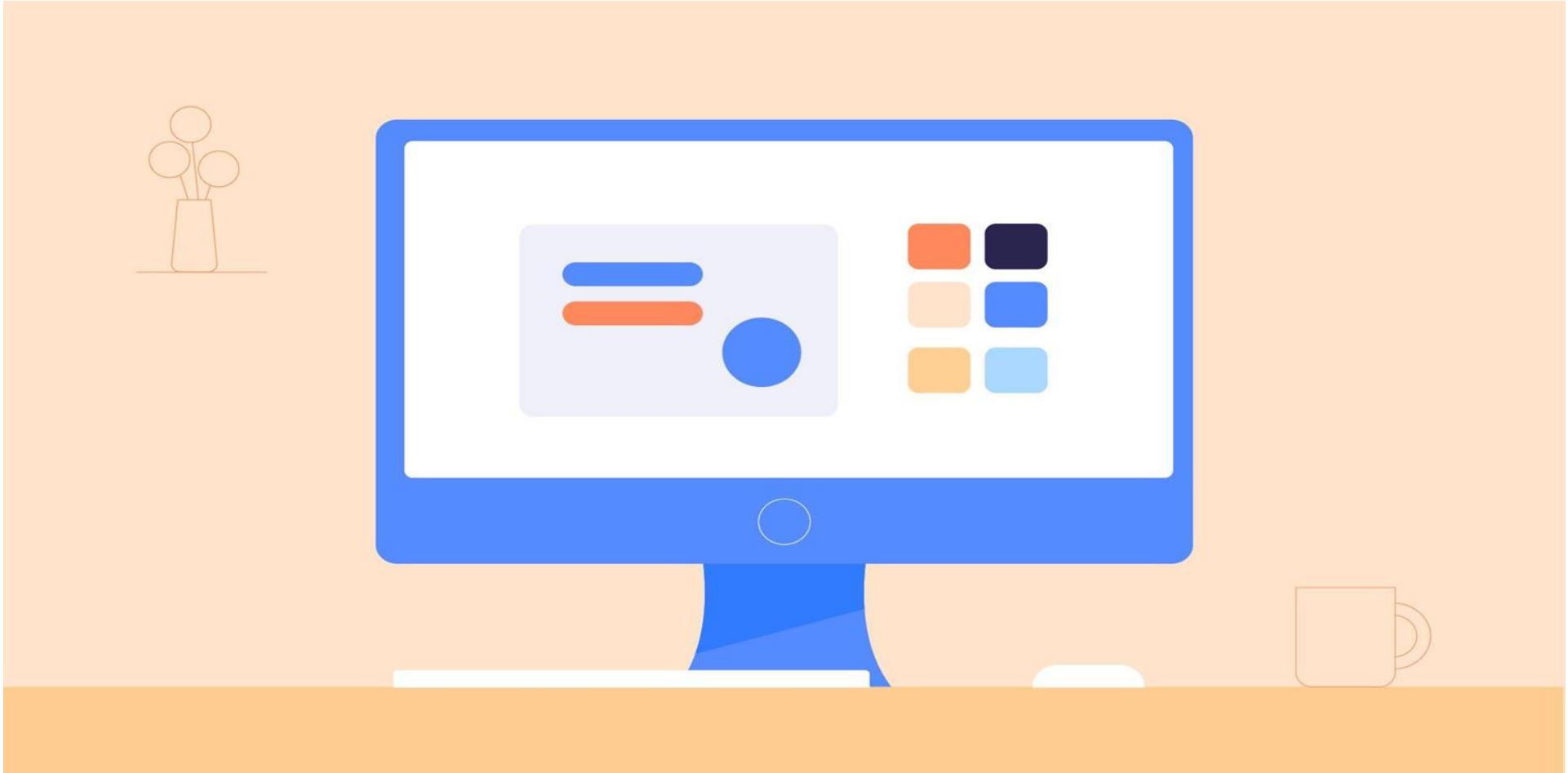- Major Components of the Computer
- Basic Architecture of the Computer
- Processor
- Memory
- I/O Devices

What is a Computer?

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➢ The term computer is derived from the word **compute**. The word **compute** means to calculate.

➢ A **computer** is an electronic machine that accepts data from the user, processes the data by performing calculations and operations on it, and generates the desired output results.

➢ **Computer** performs both simple and complex operations, with speed and accuracy.

History Of Computers

• Before the 1500s, in Europe, calculations were made with an abacus

   Invented around 500BC, available in many cultures (China, Mesopotamia, Japan, Greece, Rome, etc.)

• In 1642, Blaise Pascal (French mathematician, physicist, philosopher) invented a mechanical calculator called the Pascaline

• In 1671, Gottfried von Leibniz (German mathematician, philosopher) extended the Pascaline to do multiplications, divisions, square roots: the Stepped Reckoner

None of these machines had memory, and they required human intervention at each step
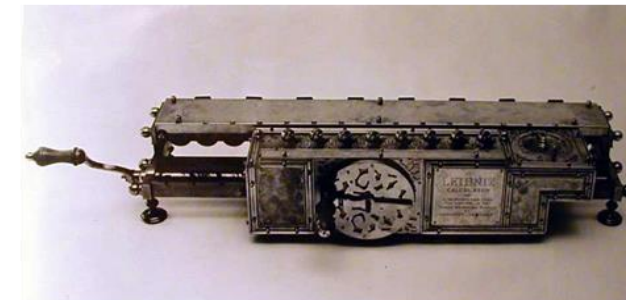
- In 1822 Charles Babbage (English mathematician, philosopher), sometimes called the "father of computing" built the Difference Engine

- Machine designed to automate the computation (tabulation) of polynomial functions (which are known to be good approximations of many useful functions)
  - Based on the "method of finite difference"
  - Implements some storage

- In 1833 Babbage designed the Analytical Engine, but he died before he could build it
  - It was built after his death, powered by steam

<u>Generations of Computers</u>:

Introduction To Computers

Generation 0: Mechanical Calculators

Generation 1: Vacuum Tube Computers

Generation 2: Transistor Computers

Generation 3: Integrated Circuits

Generation 4: Microprocessors

Characteristics Of Computer

➢ **Speed:** The computer can process data very fast, at the rate of millions of instructions per Second.

➢ **Accuracy:** The computer provides a high degree of accuracy.

➢ **Diligence:** When used for a longer period of time, the computer does not get tired or fatigued.

➢ **Storage Capability:** Large volumes of data and information can be stored in the computer and also retrieved whenever required.

➢ **Versatility:** Computer is versatile in nature. It can perform different types of tasks with the same ease.
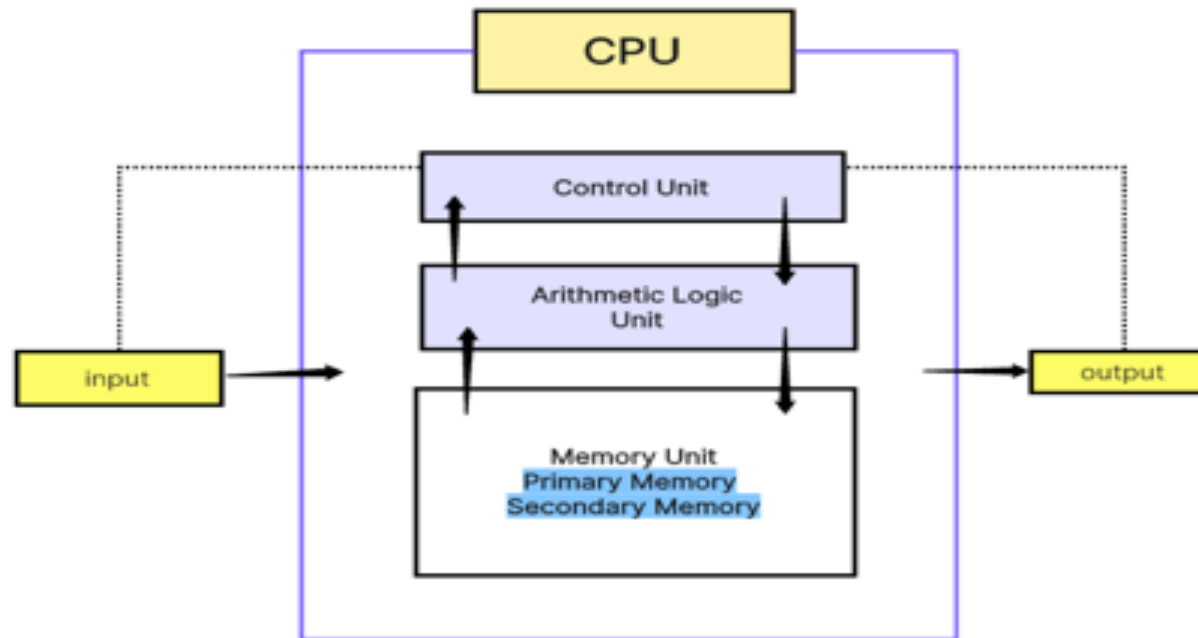
Computer System
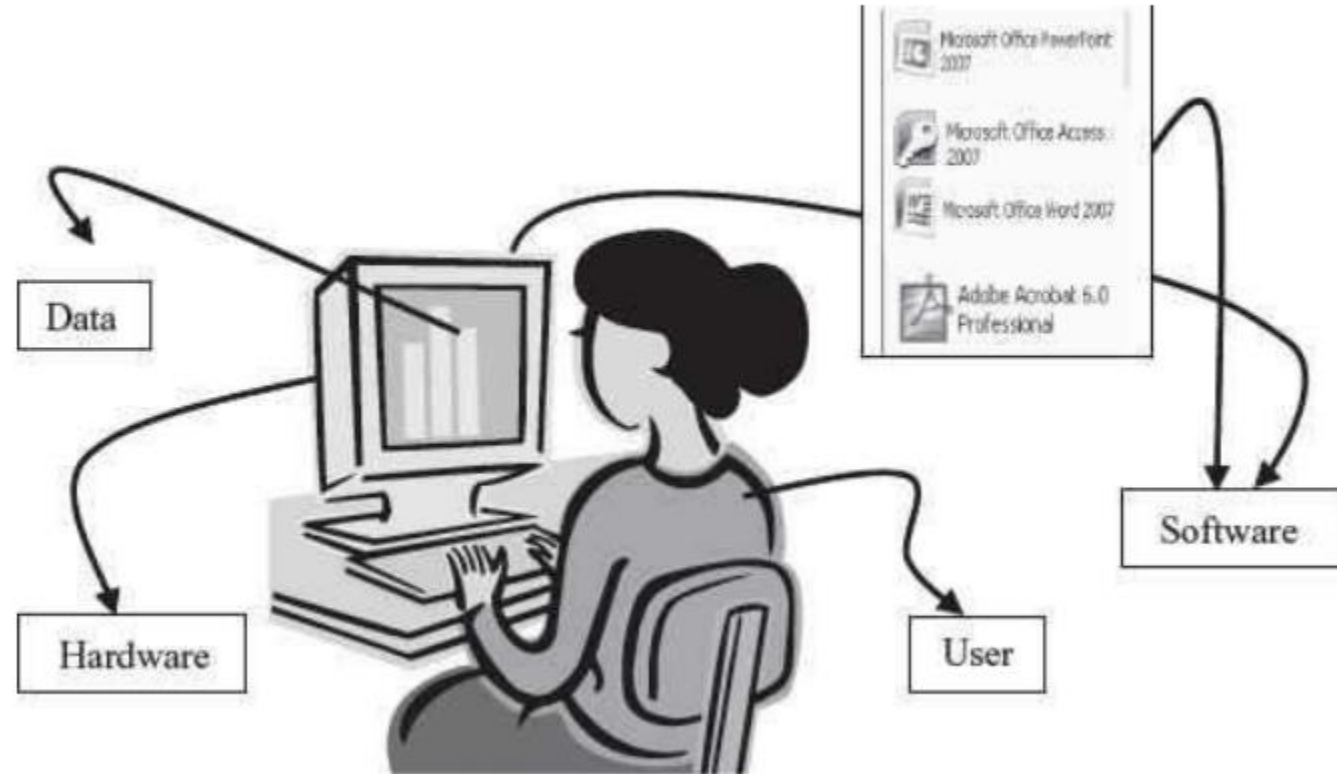
Computer System

Computer is an electronic device that accepts data as input, processes the input data by performing mathematical and logical operations on it, and gives the desired output. The computer system consists of four parts:

➢ **Hardware:** consists of the mechanical parts that make up the computer as a machine. The hardware consists of physical devices of the computer.

➢ **Software:** Software is a set of instructions that tells the computer about the tasks to be performed and how these tasks are to be performed.

➢ **Data:** Data are isolated values or raw facts, which by themselves have no much significance. For example, the data like 29, January, and 1994 just represent values.

➢ **Users:** are people who write computer programs or interact with the computer.
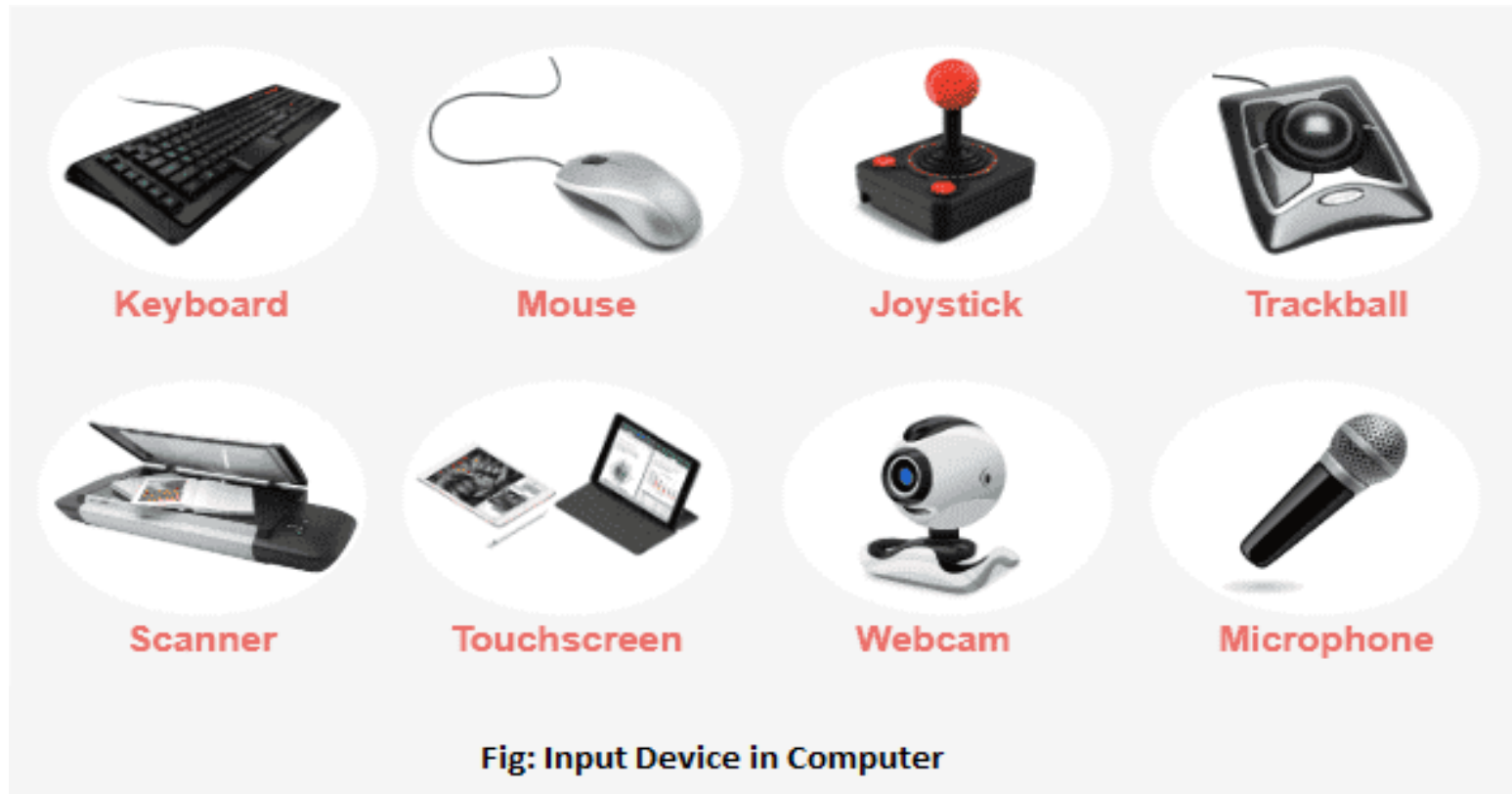
Components of Computer Hardware

The computer system hardware comprises of three main components —
1. Input/Output (I/O) Unit,
2. Central Processing Unit (CPU), and
3. Memory Unit.

Input Devices

Input devices accept data and instructions from the user or from another computer system.

Fig: Input Device in Computer

Output Devices

Output devices return processed data to the user or to another computer system.

Common Output Devices of Computer

Central Processing Unit

➢ A Central Processing Unit is also called a processor, central processor, or microprocessor. It carries out all the important functions of a computer.

➢ It receives instructions from both the hardware and active software and produces output accordingly.

➢ It then performs calculations, manipulates data, and produces output based on those instructions.

➢ It stores all important programs like operating systems that manage the computer's resources and allows you to interact with it and application software that you use to perform tasks like word processing, web browsing, and gaming.

➢ It has three parts: Control Unit(CU), Arithmetic and Logic Unit(ALU) and Memory Unit

Central Processing Unit: Control Unit

This unit controls the operations of all parts of the computer but **does not carry** out any actual data **processing** operations. The functions of this unit are −

➢ It is responsible for controlling the **transfer** of data and instructions among other units of a computer.

➢ It **manages and coordinates** all the units of the computer.

➢ It **fetch** the instructions from the memory, **interprets** them, and **directs** the operation of the computer.

➢ It communicates with Input/Output devices for the **transfer** of data or results from storage.

Central Processing Unit: Arithmetic and Logic Unit(ALU)

➢ It is the arithmetic logic unit, which carries out arithmetic and logical operations.

➢ Included in the list of arithmetic operations are addition, subtraction, multiplication, division, and comparisons.

➢ Data selection, comparison, and merging are the primary logical operations.

Central Processing Unit: Memory Unit

➤ In a computer, **memory** is one or more sets of chips that store data and/or program instructions, cither temporarily or permanently.

➤ Personal computers use several different types of memory, but the two most important arc called **random access memory(RAM)** and **read-only memory (ROM).**

➤ These two types of memory work in very different ways and perform distinct functions.
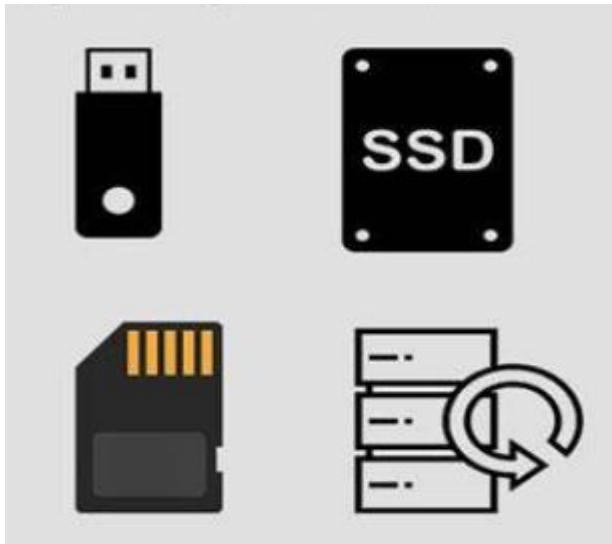
Classification Of Computer

Based on **data handling capabilities**, the computer is of three types:

    ✓ Analogue Computer
    ✓ Digital Computer
    ✓ Hybrid Computer

The digital computers that are available nowadays vary in their size and types. The computers are broadly classified into four categories based on **their size and type**

    ➢ Microcomputers,
    ➢ Mini-computers,
    ➢ Mainframe computers and
    ➢ Supercomputer.

Analog Computers

An Analog computer is another kind of computer that represents data as a variable across a continuous range of values. The earliest computers were analog computers. Analog computers are used for measuring parameters that vary continuously in real-time, such as temperature, pressure and voltage.

Digital Computers

A digital computer uses distinct values to represent the data internally. All information is represented using the digits Os and 1s. The computers that we use at our homes and offices are digital computers.

Microcomputers

➢ Microcomputers are small, low-cost and **single-user digital** computer.

➢ They consist of CPU, input unit, output unit, storage unit and the software.

➢ Although microcomputers are stand-alone machines, they can be connected together to create a network of computers that can serve more than one user.

➢ Example: IBM PC based on Pentium microprocessor and Apple Macintosh

Minicomputers

➢ Minicomputers are digital computers, generally used in **multi-user systems**.

➢ They have high processing speed and high storage capacity than the microcomputers.

➢ Minicomputers can support 4–200 users simultaneously.

➢ The users can access the minicomputer through their PCs or terminal. They are used for real-time applications in industries, research centers, etc.

Mainframe Computers

➢ Mainframe computers are **multi-user**, **multi-programming** and high performance computers.

➢ They operate at a very high speed, have very large storage capacity and can handle the workload of many users.

➢ Mainframe computers are large and powerful systems generally used in **centralized databases**

➢ Used in Software companies.

Supercomputers

➢ Supercomputers are the fastest and the most expensive machines.

➢ They have high processing speed compared to other computers.

➢ Some of the faster supercomputers can perform trillions of calculations per second.

➢ Supercomputers are used for **highly calculation-intensive tasks,** such as, weather forecasting, climate research (global warming), molecular research, biological research, nuclear research and aircraft design.

Any Questions?

Thank You