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Computer Definition

A computer is defined as a programmable electronic device that processes, stores, and manipulates data.

Note:

- The acronym for "computer" is commonly stated as Common Operating Machine Purposely Used for Technological and Educational Research. However, this interpretation is often regarded as a myth rather than an official definition, as the term "computer" originally derives from the Latin word *computare*, meaning "to calculate"

- In essence, while the acronym provides a descriptive context, it is not universally accepted or recognized in technical literature.

Father of Computer

- Charles Babbage is commonly referred to as the "Father of the Computer."

- He conceptualized and designed the Analytical Engine in the 1830s, which was a mechanical general-purpose computing device.

- Though never fully built during his lifetime, his designs laid the groundwork for future developments in computing.

Father of Modern Computer

- Alan Turing is often called the "Father of the Modern Computer." His work in the 1930s and 1940s, particularly his concept of the Turing machine, established a theoretical framework for the computers we use today. He also played a significant role in World War II by designing machines that cracked the German Enigma code, which demonstrated real-world computing power.

- However, this title isn't universally exclusive to him.

Generation of Computer

Generation	Time Period	Technology Used	Key Characteristics
First Generation	1940-1956	Vacuum Tubes	Large size, high power consumption
Second Generation	1956-1963	Transistors	Smaller, more reliable, less heat
Third Generation	1964-1971	Integrated Circuits	Faster, smaller, improved efficiency
Fourth Generation	1971-Present	Microprocessors	Personal computers, user-friendly interfaces
Fifth Generation	Present-Future	AI hardware, quantum computing	Advanced AI capabilities

First Computer

- The first computer is often attributed to the ENIAC (Electronic Numerical Integrator and Computer), which was developed in the early 1940s.

- **Developed By:** John W. Mauchly and J. Presper Eckert at the University of Pennsylvania's Moore School of Electrical Engineering.

- **Year:** Completed in 1945 and became operational in 1946.

- **Technology:** Utilized approximately 18,000 vacuum tubes, which were the primary technology of the first generation of computers.

- **Purpose:** Initially designed for military calculations, including artillery trajectory calculations and atomic bomb development.

Characteristics:

- It was a general-purpose computer but could only execute one instruction at a time.

- Input was primarily through punched cards, and output was generated on printouts.

- It was massive, occupying about 1,800 square feet and weighing nearly 30 tons.
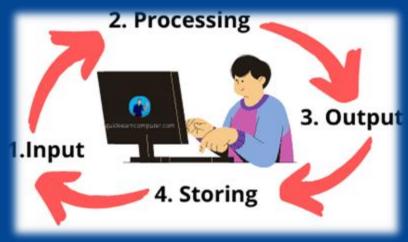
Functions of a computer ?

(Computer performs four basic functions)

Input : Information or data that is entered into a computer is called input. It send data and instruction to the CPU.

Processing : It is the sequence of actions taken on data to convert it into a information which is meaningful to the user.

Output : It makes processed data available to the user. It is mainly used to display the result.

Storage : It stores and programs permanently. It is used to store information during the time of program execution and possible to get any type of information from it.

Input Unit

- The input unit of a computer is a crucial component that enables users to provide data and instructions to the system. It serves as the interface between the external environment and the computer, allowing for interaction and data entry.

Commonly used Input Devices

- **Keyboard:** The primary device for typing text and commands. It consists of keys for letters, numbers, and special characters, making it essential for data entry and command input.

- **Mouse:** A pointing device that allows users to navigate the graphical user interface (GUI). It typically has two buttons and a scroll wheel, enabling users to click, drag, and scroll through content on the screen.

- **Touchpad:** Often found on laptops, this device serves as a built-in alternative to a mouse, allowing users to control the cursor by moving their fingers across a flat surface.

- **Scanner:** Converts physical documents and images into digital formats. Scanners are used to digitize text and graphics for storage or editing.

Commonly used Input Devices

- **Microphone:** Captures audio input, converting sound waves into electrical signals for recording or communication purposes.

- **Webcam:** A digital camera that captures video and images, often used for video conferencing and streaming.

- **Touch Screen:** Allows users to interact directly with what is displayed on the screen by touching it, eliminating the need for a separate mouse or keyboard.

- **Joystick:** Primarily used for gaming, this device allows users to control movement in games or simulations.

- **Barcode Reader:** An optical scanner that reads barcodes, commonly used in retail and inventory management to scan product information quickly.

Output Unit

- The output unit of a computer is responsible for converting processed data into a human-readable form, allowing users to perceive the results of computations.

- Output devices play a crucial role in facilitating interaction between the user and the computer by presenting information visually, audibly, or in printed form.

Common Types of Output Devices

- Visual Output Devices:
    - **Monitor:** Displays images, videos, and text on a screen. Modern monitors use LCD or LED technology to provide high-resolution visuals. Also called as **Visual Display Unit (VDU)**
    - **Projector:** Projects images and videos onto larger surfaces for presentations or entertainment.

Common Types of Output Devices

- **Print Output Devices:**
  - **Printer:** Produces physical copies of documents and images. Types include:
  - **Inkjet Printers:** Use liquid ink to create images on paper.
  - **Laser Printers:** Use laser technology to produce high-quality prints quickly.
  - **Dot Matrix Printers:** An older technology that uses a print head to strike an ink ribbon against paper.

Common Types of Output Devices

- **Audio Output Devices:**

  - **Speakers:** Convert digital audio signals into sound, allowing users to hear music, notifications, and other audio outputs.
  - **Headphones:** Provide personal audio output directly to the user.

Common Types of Output Devices

- **Specialized Output Devices:**

  - **Plotter:** Used for printing large-scale graphics and designs, such as architectural blueprints.

  - **Braille Embosser:** Converts text into Braille for visually impaired users.

  - **3D Printer:** Creates three-dimensional objects from digital models by layering materials.

CPU

- **The Central Processing Unit (CPU), also known as the central processor, main processor, or simply processor,** is the primary component of a computer responsible for executing instructions from software and performing calculations. It acts as the control center of the computer, coordinating the activities of all other components.

Components of CPU

Component	Function
Arithmetic Logic Unit (ALU)	Performs arithmetic and logical operations
Control Unit (CU)	Directs operations within the CPU
Registers	Hold temporary data and instructions
Cache Memory	Provides fast access to frequently used data
Memory Management Unit (MMU)	Manages data flow between RAM and CPU

ALU

- **Function:** The ALU performs all arithmetic operations (such as addition, subtraction, multiplication, and division) and logical operations (such as comparisons and bitwise operations).

- Role: It is essential for executing the mathematical calculations required by programs.

Control Unit

- **Function:** The CU directs the operation of the CPU by fetching instructions from memory, decoding them, and executing them by coordinating the actions of the ALU and other components.

- **Role:** It manages the flow of data within the CPU and between the CPU and other parts of the computer.

Memory Management Unit (MMU)

- **Function:** The MMU is responsible for managing the data flow between the CPU and the main memory (RAM). It handles tasks such as address translation, converting virtual addresses used by programs into physical addresses in RAM. Additionally, it provides memory protection, ensuring that processes do not interfere with each other's memory spaces.

- **Location:** The MMU is typically located between the CPU and the main memory (RAM). In some modern CPUs, it may be integrated directly onto the CPU chip itself.

Memory Unit (MU)

- **Function:** The term "memory unit" generally refers to any storage component in a computer system, primarily focusing on RAM or other forms of memory where data is stored temporarily or permanently. It encompasses a broader range of memory types without the specific management functionalities provided by the MMU.

- **Location:** The Memory Unit generally refers to the main memory (RAM) itself, which is physically separate from the CPU. It connects to the CPU via the system bus.

Primary Storage

- Primary storage, also known as main memory or internal memory, is a crucial component of a computer that temporarily holds data, programs, and instructions currently in use. It is directly accessible by the CPU, enabling fast read and write operations essential for efficient processing.

Features of Primary Storage

Volatile Nature: Primary storage is typically volatile, meaning it loses its contents when power is turned off. The most common types are:

- Random Access Memory (RAM): Used for storing data that the CPU needs to access quickly.
- Cache Memory: A smaller, faster type of volatile memory located inside or close to the CPU to speed up data access.

- **Non-Volatile Types:** Some forms of primary storage can be non-volatile, such as:
  - Read-Only Memory (ROM): Stores critical startup instructions and data that do not change.

Random Access Memory (RAM)

RAM is volatile memory, meaning it loses its contents when the power is turned off. It is used for temporary storage of data and programs currently in use. The main types of RAM include:

Dynamic RAM (DRAM):

- Requires constant refreshing to maintain data. Commonly used as the main memory in computers.

Static RAM (SRAM):

- Does not need refreshing; retains data as long as power is supplied.
- Faster than DRAM but more expensive, typically used for cache memory.

Read-Only Memory (ROM)

ROM is non-volatile memory that retains its contents even when the power is off. It is primarily used to store firmware and system-level instructions. Types of ROM include:

Programmable ROM (PROM):

Can be programmed once after manufacturing.

Erasable Programmable ROM (EPROM):

Can be erased using UV light and reprogrammed.

Electrically Erasable Programmable ROM (EEPROM):

Can be erased and reprogrammed electrically, allowing multiple cycles of programming.

Summary of Primary Storage

Type	Characteristics	Volatility
RAM	Fast, temporary storage for active data	Volatile
DRAM	Needs refreshing, commonly used	Volatile
SRAM	No refreshing needed, faster but more expensive	Volatile
ROM	Non-volatile, stores firmware	Non-volatile
PROM	Programmable once	Non-volatile
EPROM	Erasable by UV light	Non-volatile
EEPROM	Electrically erasable	Non-volatile
Cache Memory	High-speed memory for frequently accessed data	Volatile

VRAM and GPU

VRAM: A type of memory specifically designed for storing graphical data, such as textures, frame buffers, and images, that the GPU needs to render graphics on a display. It is optimized for high bandwidth and quick access to facilitate smooth rendering of images and videos

GPU: A specialized processor designed to accelerate the rendering of images and videos. It performs complex calculations required for graphics processing, including rendering 3D graphics and video playback. The GPU utilizes VRAM to store the data it processes

Feature	Single-Ported RAM	Dual-Ported RAM
Access	One operation at a time	Simultaneous read/write operations
Performance	Limited bandwidth, potential bottlenecks	Higher bandwidth, reduced latency
Complexity	Simpler design	More complex due to dual access control
Use Cases	General applications	Multi-processor systems, graphics processing (e.g., VRAM)

Secondary Storage

Secondary storage, also known as **auxiliary storage** or **external memory**, is a type of data storage that provides non-volatile, long-term storage for computer systems.

Unlike primary storage (e.g., RAM), which is directly accessible by the CPU and loses its data when the power is turned off, secondary storage retains data even when the system is powered down.

Key Features of Secondary Storage

- **Non-Volatile:** Secondary storage retains data permanently until it is deleted or overwritten, ensuring that information remains intact even when the computer is turned off.

- **Larger Capacity:** Typically offers much larger storage capacities compared to primary storage, accommodating vast amounts of data such as documents, multimedia files, and application software.

- **Slower Access Speed:** Generally, has slower read and write speeds compared to primary storage due to the indirect access through input/output channels.

- **Cost-Effective:** Per unit of storage, secondary storage devices are generally less expensive than primary storage options, making them a more economical choice for extensive data storage.

Types of Secondary Storage Devices

Magnetic Storage

Hard Disk Drives (HDDs):

Commonly used for storing large amounts of data.

Floppy Disks:

An older form of magnetic storage, now largely obsolete.

Types of Secondary Storage Devices

Solid-State Drives (SSDs):

Use flash memory for faster access speeds and greater reliability compared to HDDs.

Optical Storage:

CDs, DVDs, and Blu-ray Discs: Used for media distribution and archiving data.

Types of Secondary Storage Devices

External Storage Devices:

USB Flash Drives:

Portable devices for transferring and storing data.

External Hard Drives:

Provide additional storage capacity and are often used for backups.

Cloud Storage:

Allows users to save and access data on remote servers via the internet, enabling easy sharing and accessibility from multiple devices.

Bus

- A bus in a computer is a communication system that transfers data between various components, such as the CPU, memory, and peripheral devices. It serves as a pathway for data transfer, allowing different parts of the computer to communicate effectively.

Types of Buses

Address Bus:

Function: Carries information about the memory addresses from which data is to be read or written.

Characteristics:

- Unidirectional, meaning it only carries signals from the CPU to memory.

- The width determines how many unique addresses can be accessed (e.g., a 32-bit address bus can address over 4 billion locations).

Types of Buses

Data Bus:

Function: Carries actual data between the CPU, memory, and I/O devices.

Characteristics:

- Bidirectional, allowing data to flow in both directions.

- The width (number of wires) determines how much data can be transferred simultaneously (e.g., a 64-bit data bus can transfer 64 bits at once).

Types of Buses

Control Bus:

Function: Carries control signals from the CPU to other components to manage operations.

Characteristics:

- Includes signals for timing and control, ensuring that data transfers occur smoothly.

- It conveys commands and status information between the CPU and peripheral devices.

Additional Types of Buses

- **System Bus:** This is a combination of the data bus, address bus, and control bus that connects the CPU to the main memory and other components on the motherboard.

- **Internal Bus:** Connects components within the computer, such as the CPU and RAM.

- **External Bus:** Connects external devices to the computer, such as USB ports and other peripheral connections.

- **Expansion Bus:** Allows additional cards or devices to be connected to the motherboard (e.g., PCI or PCIe buses).

Type of Bus	Function	Directionality
Data Bus	Carries actual data	Bidirectional
Address Bus	Carries memory addresses	Unidirectional
Control Bus	Carries control signals	Bidirectional
System Bus	Combination of data, address, and control buses	N/A
Internal Bus	Connects internal components	N/A
External Bus	Connects external devices	N/A
Expansion Bus	Connects expansion cards	N/A

50 Years Of Email

1978: Gary Thuerk, sent a marketing email to sell computer This email became famous as the **first spam email in history.**

1993: It became possible to access emails anytime, anywhere thanks **web-mail clients** like Outlook.com.

2002: Email comes to mobile devices via Blackberry

2018: Since launch in 2004, Gmail has become the most popular email platform with plugins further enhancing its capabilities.
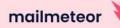
1971 : Ray Thomlinson found a way to send mail to addresses over the ARPANET to different computers.

1988: The **first** commercially **available email client** was released by Microsoft, called 'MSMail'.

1997: Hotmail was acquired by Microsoft and later replaced with Outlook in 2011

2003: Rules like making it compulsory to provide a way to unsubscribe from emails came into play.

mailmeteor

The process of arranging data in logical sequence is called

A. Classifying

B. Reproducing

C. Summarizing

D. Sorting

How many bits are equal to one byte?

8

10

12

14

Which of the following was used as circuitry for first generation of computers?

A. Vacuum tube

B. Transistors

C. Integrated circuits

D. Microprocessors

The first computer made available for commercial use was

A. MANIAC

B. ENIACS

C. UNIVAC

D. EDSAC

Computers process binary numbers, which are composed of

A. 1 and 2

B. 1 and 10

C. 2 and 3

D. 0 and 1

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