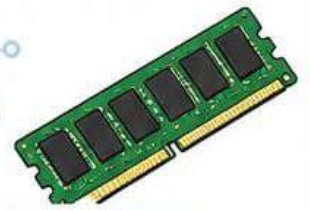




MEMORY AND ITS TYPES



Memory is the storage area of a computer where data, instructions and information are stored, either temporarily or permanently.

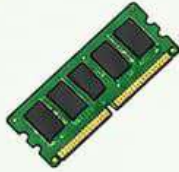
TYPES OF MEMORY

1 PRIMARY (MAIN) MEMORY

Directly accessed by the CPU. Holds data and instructions that are currently in use.

Characteristics:

- Faster
- Smaller capacity
- Costlier
- Volatile (mainly)



Types:

- **RAM (Random Access Memory)** – Volatile memory used to store data and programs in use.
- **ROM (Read Only Memory)** – Non-volatile memory that stores permanent instructions (firmware).



2 SECONDARY (AUXILIARY) MEMORY

Used for long-term storage of data and programs.

Characteristics:

- Slower than primary memory
- Larger capacity
- Cheaper
- Non-volatile



Hard Disk (HDD)



Solid State Drive (SSD)



USB Flash Drive



CD / DVD



Memory Card

It stores data permanently even when the power is turned off.

3 CACHE MEMORY

A small, very fast memory located between CPU and RAM.

Characteristics:

- Faster than RAM
- Smaller capacity
- More expensive
- Used to speed up CPU performance

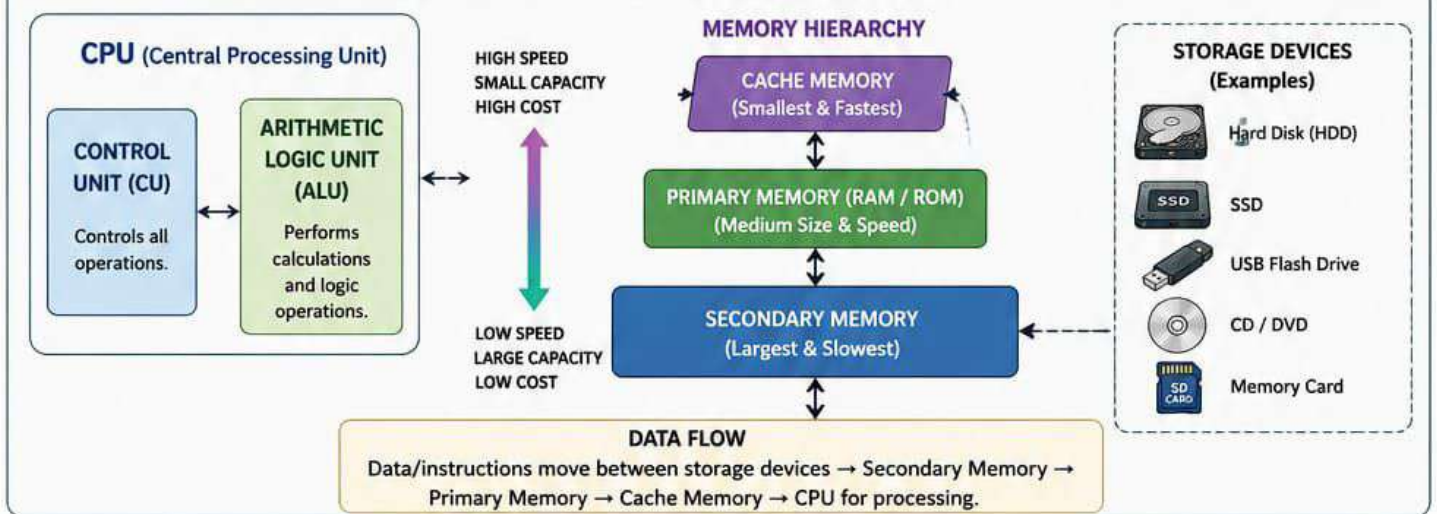


It stores frequently used data and instructions so that CPU can access them quickly.

Remember:

- **Speed:** Cache > RAM > Secondary
- **Capacity:** Secondary > RAM > Cache
- **Cost:** Cache > RAM > Secondary

ORGANIZATION OF MEMORY IN A PC



KEY TAKEAWAYS

- Memory is essential for storing data, instructions and results.
- Primary memory is used by CPU directly.
- Secondary memory stores data permanently.
- Cache memory improves the speed of processing.
- Different types of memory work together to make the computer efficient.



QUICK COMPARISON

Type	Speed	Capacity	Cost	Volatility
Cache	Very Fast	Very Small	Very High	Volatile
Primary (RAM)	Fast	Medium	High	Volatile
Primary (ROM)	Medium	Small	Medium	Non-volatile
Secondary	Slow	Very Large	Low	Non-volatile



EXAMPLES IN DAILY LIFE

- Opening a file: Data is read from HDD/SSD → RAM → Cache → CPU.
- Saving a file: Data is processed by CPU → RAM → HDD/SSD.
- More RAM and Cache = Faster performance.



TYPES OF SOFTWARE



Software is a set of instructions, programs and related data that tells a computer what to do and how to do it. It makes the hardware useful.

SOFTWARE IS MAINLY OF 3 TYPES

1 SYSTEM SOFTWARE

System software manages and controls the computer system and hardware and provides a platform for running application software.

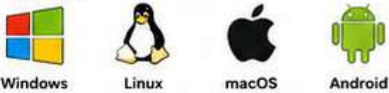


TYPES OF SYSTEM SOFTWARE

1 OPERATING SYSTEMS

It acts as an interface between user and computer hardware. It manages all the resources and provides common services.

Examples:



2 SYSTEM UTILITIES

These are maintenance programs that keep the computer system running smoothly, securely and efficiently.

Examples:



3 DEVICE DRIVERS

These are special programs that help the operating system to communicate with hardware devices.

Examples:



System software runs in the background and is essential for the computer to work.

2 PROGRAMMING TOOLS AND LANGUAGE TRANSLATORS

These software are used by programmers to write, test and convert programs written in high-level or low-level languages into machine code.



TYPES

1 ASSEMBLER

It converts assembly language (low-level language using mnemonics) into machine language (binary code).



Example: Converts "MOV AL, 01" to binary code.

2 COMPILER

It translates the entire high-level language program into machine code at once. It produces an object code or executable file.



Examples: C, C++, Java, Pascal, Go, Rust

3 INTERPRETER

It translates and executes the program line-by-line. It does not create a separate object code.



Examples: Python, JavaScript, PHP, MATLAB

These tools help programmers create software by converting human-readable code into machine language the computer understands.

3 APPLICATION SOFTWARE

Application software is designed to perform specific tasks for end users. It does not directly manage the hardware.

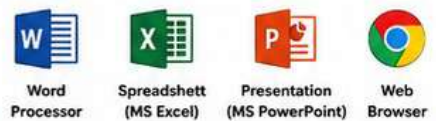


TYPES OF APPLICATION SOFTWARE

1 GENERAL PURPOSE SOFTWARE

Used for common tasks that many users perform.

Examples:



2 SPECIFIC PURPOSE SOFTWARE

Designed for specific tasks or professions.

Examples:



APPLICATION SOFTWARE CAN ALSO BE

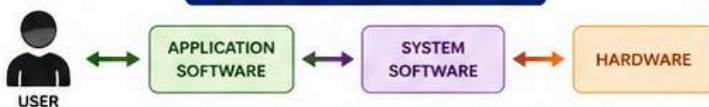
Desktop Applications: Installed on local computer (e.g., MS Word, VLC)

Web Applications: Run on web browsers (e.g., Gmail, Google Docs)

Mobile Applications: Run on smartphones (e.g., WhatsApp, Instagram)

Application software helps users do their work easily and productively.

HOW THEY WORK TOGETHER



User uses Application Software. It requests services from System Software, which manages the Hardware and gets the work done.

KEY POINTS

- ★ System Software is the backbone of the computer system.
- ★ Programming Tools help developers create new software.
- ★ Application Software helps users perform specific tasks.
- ★ All three types are essential and work together.



"SOFTWARE MAKES THE HARDWARE WORK. TOGETHER, THEY MAKE THE WORLD OF COMPUTING POSSIBLE!"





OPERATING SYSTEM (OS)

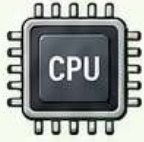
The Operating System is system software that manages computer hardware and software resources and provides common services for computer programs.



FUNCTIONS OF THE OPERATING SYSTEM

An Operating System acts as an interface between users, applications and computer hardware.

Its main functions are:



1 PROCESS MANAGEMENT

The OS creates, schedules, coordinates, and terminates processes. It allocates CPU time to ensure efficient multitasking.



5 STORAGE MANAGEMENT

The OS manages secondary storage (HDD, SSD, etc.). It allocates disk space, monitors usage and ensures data safety.



2 MEMORY MANAGEMENT

The OS keeps track of memory usage, allocates and deallocates memory to programs, and ensures efficient use of RAM.



6 SECURITY AND PROTECTION

The OS protects data and resources from unauthorized access. It provides user authentication, access control and data protection.



3 FILE SYSTEM MANAGEMENT

The OS organizes and manages data in files and folders on storage devices. It supports operations like create, delete, read, write, rename and search.



7 USER INTERFACE

The OS provides an interface for users to interact with the system. It may be Command Line Interface (CLI) or Graphical User Interface (GUI).



4 DEVICE MANAGEMENT

The OS controls and coordinates all input/output devices (keyboard, mouse, printer, display, etc.) through device drivers.



8 COMMUNICATION

The OS enables communication between different programs, users and devices through system calls, shared memory, message passing, etc.

OS USER INTERFACE

The User Interface is the means by which users interact with the operating system.

There are two main types:

1. COMMAND LINE INTERFACE (CLI)

Users type commands at a prompt to perform tasks. It is text-based and requires users to remember commands.

```
C:\> dir
C:\> cd Documents
C:\Documents> copy file.txt backup.txt
C:\Documents> del oldfile.txt
C:\Documents> |
```

ADVANTAGES

- Fast for advanced users
- Requires less memory
- Can be automated using scripts

DISADVANTAGES

- Difficult for beginners
- Commands must be memorized
- No visual feedback

Examples:



MS-DOS



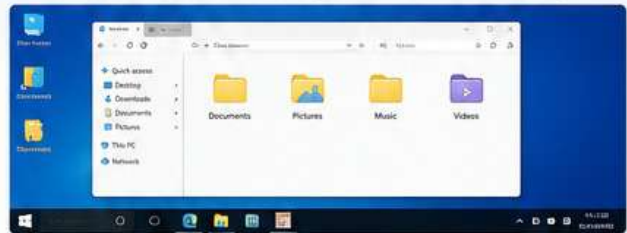
UNIX Shell



PowerShell

2. GRAPHICAL USER INTERFACE (GUI)

Users interact using graphical elements like icons, windows, menus, and buttons. It is easy to learn and user-friendly.



ADVANTAGES

- Easy to learn and use
- Visual and user-friendly
- Supports multitasking with windows

DISADVANTAGES

- Requires more memory
- Slower than CLI
- More resource intensive

Examples:



Windows



macOS



Linux (GNOME)



Android



iOS

POPULAR OPERATING SYSTEMS



Windows



macOS



Linux



Android



iOS



IN SHORT

- ✓ The OS manages hardware and software resources.
- ✓ It provides services to programs and users.
- ✓ It makes the computer system convenient, efficient and secure to use.
- ✓ Without an OS, no program can run on the computer.



★ THE OPERATING SYSTEM IS THE HEART OF THE COMPUTER SYSTEM. ★