OPERATING SYSTEM

Multitasking and Multiprogramming

1. Multiprogramming

Multiprogramming is a technique where **multiple programs are loaded into memory at the same time**, and the CPU switches between them to improve resource utilization.

Key Points:

- Several programs **reside in memory simultaneously**.
- The CPU switches to another program when one is waiting for I/O.
- The main goal is **to keep the CPU busy**.
- It increases system **throughput** (number of jobs done).

Example:

If Program A is waiting for input from the keyboard, the CPU switches to Program B, instead of sitting idle.

2. Multitasking

Multitasking refers to **executing multiple tasks at the same time** by sharing CPU time among them in very small time slices.

Key Points:

- It allows users to run multiple applications at once.
- Achieved through **time-sharing**.
- Gives the **illusion of parallel execution**.
- The main goal is **to improve user interaction**.

Example:

A user can:

- Listen to music
- Browse the internet
- Download a file
  all at the same time.

Difference Between Multiprogramming and Multitasking

Feature	Multiprogramming	Multitasking
Purpose	Maximize CPU usage	Improve user interaction
Users	Mainly for batch systems	Used in interactive systems
Execution	CPU switches when a program waits	CPU switches rapidly among tasks
User Involvement	No direct user interaction	Supports active users
Speed of Switching	Slower	Very fast (milliseconds)
Example	Batch job processing	Using multiple apps at once