

Time Sharing Operating System

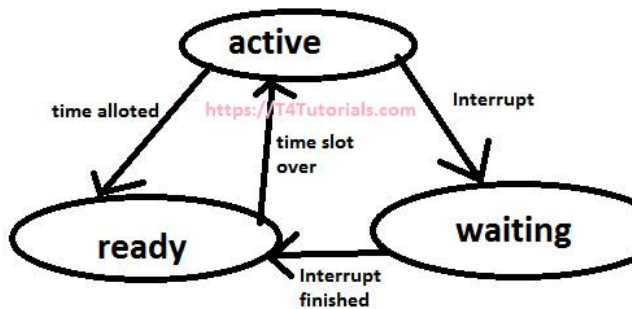


Fig 1.1

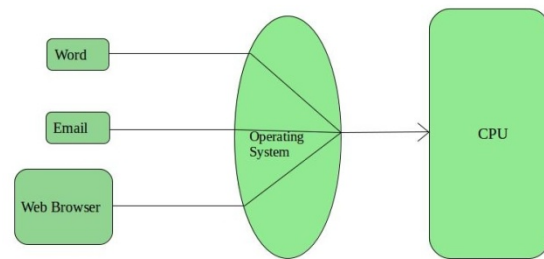


Fig 1.2

Definition:

A time-sharing operating system allows multiple users to concurrently share a single computer's resources by switching between tasks rapidly using TIME-SLICING.

Each user gets a small CPU time quantum, providing quick response times and the illusion of dedicated system usage. This model optimizes CPU efficiency and lowers costs.

Key Concepts

- **TIME SLICING QUANTUM:** The CPU executes a task for a very short, fixed duration (time quantum) before switching to the next, creating a round-robin effect also called as Fair scheduling.
- **CONCURRENT INTERACTION:** Multiple users at different terminals (or virtual sessions) can interact with the system simultaneously.
- **FAST SWITCHING:** The rapid switching between processes makes it feel as though each user has the entire machine allotted to individual task given at the run time.

Advantages

- **Reduced Response Time:** High efficiency ensures faster turnaround for user tasks.
- **Increased CPU Utilization:** Minimizes idle time by keeping the CPU busy with multiple tasks.
- **Resource Sharing:** Allows multiple users to access data and software simultaneously, reducing hardware requirements.
- **Interactive Use:** Enables users to run programs and receive immediate feedback.

Disadvantages

- **Complexity:** Managing multiple users and tasks requires a more complex, robust OS.
- **Security and Data Reliability:** Risks exist for data mixing or unauthorized access between user sessions.
- **High Hardware Requirements:** Requires fast CPUs and significant memory to manage constant, quick context switching.

Examples

- **Early Systems:** MULTICS, Dartmouth Time-Sharing System (DTSS), CTSS.
- **Modern/General Purpose:** UNIX, Linux, Windows (multi-user/server), and macOS.

Note: While many modern operating systems use multitasking (a derivative of time-sharing) to allow a single user to run multiple applications, the classic time-sharing model was specifically designed for multiple users on a single processor.

References:

- Contents taken from several online platforms.
- Meant for study purpose only
- For conformation, must consult to books prescribed as “Operating System” by William Stallings.