1. Steps in process execution:
2. Process creation
3. Scheduling
4. Process state(ready, running , waiting/blocked, terminated)

Process scheduler is used to allocate CPU time to processes. Process ID(PID) is assigned to a process on its creation. Initially the state is new. The scheduler moves the process through different states like Ready, Running, Blocked and Terminated.

Different algorithms such as FSFS, SJF, RR are used to to determine the scheduling of processes to maximize the CPU usage and minimize the CPU idle time to increase the efficiency.

1. Multithreading means CPU executing multiple threads at the same time. Thread is a small part of the process. A process is divided into multiple threads. This helps executing the process faster and utilize multiple cores of the CPU.

Concurrency is the management of multiple tasks either simultaneously or by interleaving.

Synchronization mechanisms like mutex and semaphores are used to avoid conflicts and data inconsistencies because multiple threads may access shared resources.

1. Deadlock occurs when two or more threads are blocked forever, waiting for each other to release resources. All the Following conditions are required for deadlock to occur:

Mutual Exclusion, Hold and wait, No preemption, Circular wait.

To resolve deadlock:

Deadlock prevention, Deadlock detection and recovery.

1. I/O buffering improves performance by temporarily storing data in memory before it is written to or read from an external device. This reduces the number of read/write operations required and optimizes the efficiency of I/O. Buffer sizes can significantly impact performance; for example, larger buffers can handle more data at once but may introduce latency. In general, buffering allows the system to continue performing other tasks while waiting for I/O operations to complete, improving overall system throughput.
2. I/O scheduling algorithms:

First come first serve(FCFS): Long waiting time for disk access

Shortest seek time first(SSTF): Prioritized request close to disk, But starvation for distant requests.

Elevator(SCAN): disk head movies in one direction until it reaches the end of the disk then reverses.

Deadline scheduling: Prioritizes I/O requests with strict deadlines.

1. OSI model:

Physical

Data Link

Network

Transport

Session

Presentation

Application

1. Transmission control protocol: ensures ordered, error free delivery of data by using handshakes and acknowledgements.

User datagram protocol: ideal when speed is important than reliability of data transfer.

TCP for accuracy and UDP for faster speed.

1. Process creation using fork() and exec(). Kernel schedules the execution using various algorithms.

ps command shows the process details such as PID, status, resource usage, ..

top command displays real time resource consumption.

Kill used to terminate the process.

1. Read(r): allows reading the file

Write(w): allows modifying

Execute(x): allows executing file as program

Permission set for owner, group and others can be modified using chmod,chown and chgrp commands. Permission management ensures system security and protects files from unauthorized access.

1. Tasks like backup, system monitoring, can be automated using shell scripting .

Cron is used to schedule and run periodically without user input.

Improves efficiency and ensures system tasks are consistently performed without manual input.

#!/bin/bash

Tar -czf backup.tar.gz /path/to/directory

Crontab -e