

Processes in Operating Systems

Understanding Process Management

What is a Process?

- A process is a program in execution, consisting of:
- - Program Code (instructions)
- - Current Activity (data, resources, CPU registers)
- - The OS manages multiple processes to enable multitasking.

Process Lifecycle

- Stages of a process:
- - Creation: Process is initialized
- - Execution: Actively running on the CPU
- - Waiting: Paused for resources (I/O, memory)
- - Termination: Process completes or is stopped.

Process States

- - New: Process is being created
- - Ready: Waiting for CPU time
- - Running: Actively executing on CPU
- - Waiting: Paused for I/O or other resources
- - Terminated: Process has finished execution.

Process State Transitions

- The OS moves a process between states based on events like:
 - - Scheduling by CPU
 - - Waiting for I/O
 - - Process termination.

Process Control Block (PCB)

- PCB stores process details:
- - Process ID
- - Process State
- - CPU Registers
- - Memory Allocation
- - I/O Status.

Context Switching

- When switching between processes, the OS saves the current process state and loads the next one.
- - Enables multitasking
- - Ensures fair CPU usage.

Process Scheduling

- CPU decides which process to execute next.
- Types:
 - - Short-Term: Chooses process for execution.
 - - Medium-Term: Manages suspended processes.
 - - Long-Term: Controls new process admission.

Multiprogramming & Multitasking

- - Multiprogramming: Multiple processes exist in memory to improve CPU utilization.
- - Multitasking: Multiple processes execute seemingly simultaneously for better user experience.

Conclusion

- Processes are essential for OS multitasking.
- Key Concepts:
 - - Process lifecycle
 - - Process states & transitions
 - - PCB & Context Switching
- Efficient process management improves system performance.