

PCB (Process Control Block):

- A Process Control Block (PCB) is a data structure used by the operating system to manage and keep track of each individual process in a computer system.
- It serves as a central repository of information about a process, containing all the essential details required for the OS to manage the process efficiently.
- Each process in the system has its PCB assigned to it.
- When the OS needs to switch between processes (context switching), it saves the current process's state from its PCB and loads the state of the next process from its corresponding PCB.

The PCB typically includes the following information:

1. Process State: Indicates the current state of the process (e.g., running, ready, blocked).
2. Program Counter (PC): Contains the address of the next instruction to be executed in the process.
3. CPU Registers: Store the current values of the CPU registers used by the process.
4. Memory Management Information: Includes base and limit registers for the process's memory address space.
5. Process ID (PID): A unique identifier assigned to each process by the operating system.
6. Parent Process ID (PPID): The ID of the process that created the current process (except for the initial process).
7. Priority: The priority level of the process, used for scheduling purposes.
8. List of Open Files: Keeps track of files opened by the process.
9. Accounting Information: Tracks CPU time used, execution history, and other performance metrics.

10. I/O Status Information: Records the status of I/O operations initiated by the process.

Process Context

Process Context is a snapshot of a process's execution state, including all necessary information for the operating system to pause and resume the process efficiently.

It is stored in the Process Control Block (PCB) and serves the following purposes:

1. Context Switching: Allows the operating system to switch between processes without losing their execution progress.
2. Interrupt Handling: Enables the CPU to suspend the current process and handle interrupts, then resume the process afterward.
3. CPU Register Values: Stores the current values of CPU registers, program counter (PC), and other essential data for the process.
4. Memory Management Information: Includes base and limit registers, defining the process's memory address space.
5. Process State: Indicates whether the process is running, ready, blocked, or terminated.
6. I/O Status Information: Tracks the status of I/O operations initiated by the process.
7. Accounting Information: Records CPU time used, execution history, and other performance metrics.
8. Priority and Scheduling Information: Holds the priority level of the process for task scheduling.
9. List of Open Files: Keeps track of files opened by the process.
10. Process Identifier (PID): A unique ID assigned to each process for identification and management.