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I confirm that I understand my coursework needs to be submitted online via MST Classroom under the relevant module page before the deadline for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a mark of zero will be awa

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Process Management

1. Introduction

Process management is one of the critical concepts that is used in operating systems that helps to prevent data loss and missed steps within a process or operating system that involves activities related to managing and controlling processes. In simple words, a program in execution is called a process. A process can be defined as a program in execution, consisting of the program of code and its current activity and its associated resources such as CPU time, memory files, and input/output devices. However, modern computer systems often support multiple applications or processes. Simultaneously, process management ensures that system resources are utilized efficiently, fairly, and securely among all active processes.

Moreover, we can take process management as a simple term. Process management acts as the manager of the CPU; it decides which process gets executed, for how long it runs, and what it orders. It involves several tasks such as process scheduling, synchronization, inter-process communication (IPC), and deadlock handling. In the absence of process management, it would not be able to maintain multitasking, responsiveness, or reliability.

The importance of process management extends beyond performance. It ensures that no single process runs the system, prevents resources from conflicts, and guarantees multiprocessing. In today's computing environment, process management remains one of the core pillars of operating design. (Vishal Das, 2005)

2. Objective

The key objective of writing this report is to gain a clear understanding of process management in operating system and how important it is for improving the effective execution of programs. By exploring the concepts, functions and types of process management, this report aims to:

- Understand the definition of process management and how it works on operating management and its life cycle.
- Research how the operating system handles the start, run, schedule and stop of programs.
- Study the different types of process management such as multitasking, multiprocessing and real-time processing.
- Understand how important process management is to attaining reliability, management is to attaining reliability, efficiency and integrity.
- Enhance theoretical knowledge for practical application labs and future computer modules.

3. Types of Process Management

In general, there is no fixed process management in an OS, but the system manages system in different ways depending on the needs of system what type of process management requires during the system runs. Despite of having different types of process management, we only consider certain types of process management system which handles the OS multiple tasks, shares the CPU, and keeps system runs smoothly

3.1. Process Creation and Termination

Process creation is the act of creating a new process by giving unique information and setting up its information in the system. For example, when we open a web browser, the operating system creates a process for it. Process termination the process finishes its tasks or stooped by the system of its parent process. For example, when we close the browser, the operating system frees up the memory and other resources that the process was using. Basically, process creation and termination mean that a process uses resources while running and releases then after it is done. (Vishal Das, 2025)

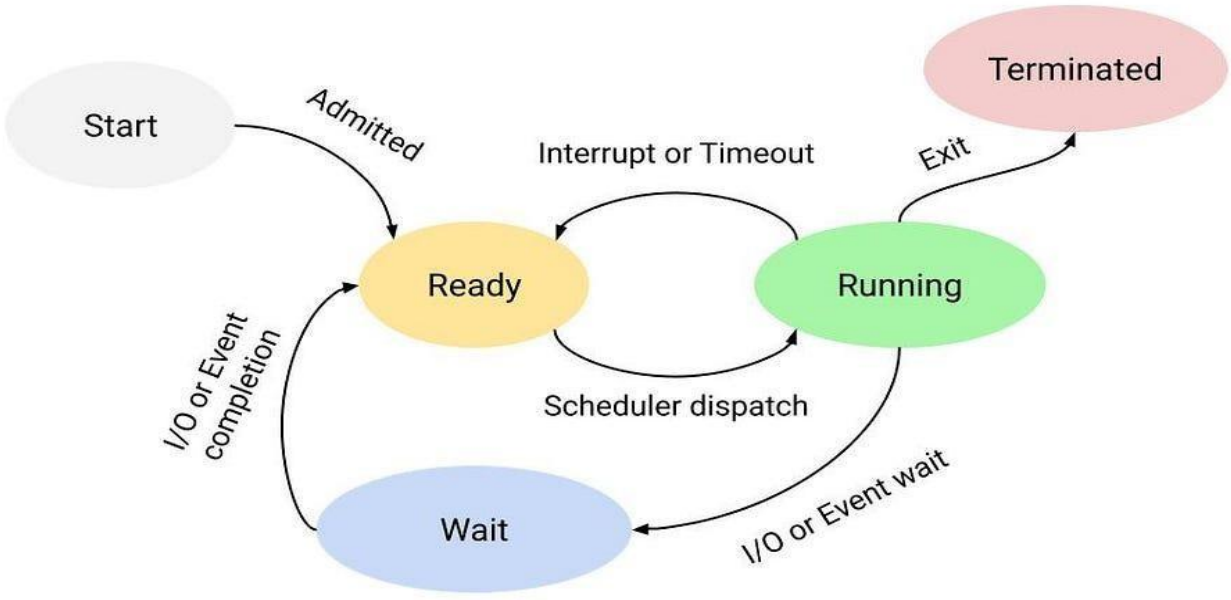

Figure 1 Process creation and termination

3.2. CPU scheduling

In a system with multiple processes, the CPU can only execute one process at a time. CPU scheduling is the method used by the OS to decide the order processes run. For example, when we download a file while watching a video, the OS schedules CPU time for both tasks so they run smoothly without delay. Simply, CPU scheduling means the computer decides which task should use the CPU first, which one next, and so on, so everything runs smoothly. (Scalar Coorporeation, 2025)

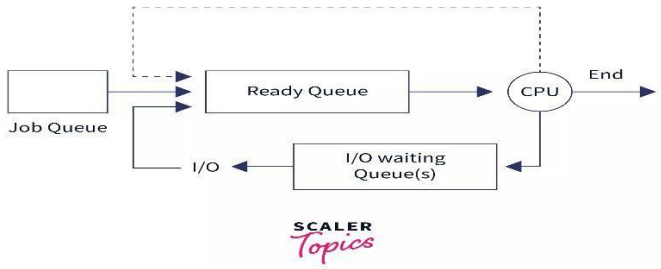

Figure 2 CPU scheduling

3.3. Deadlock Handing

Deadlock occurs when two or more processes wait for resources held by each other, causing all of them to stop working. For example, if process A holds a printer and waits for a scanner while process B holds the scanner and waits for the printer, both processes are stuck. Deadlock handling ensures that OS detects or prevents such situations so processes can continue running. Simply, deadlock handling deals with the situations where two or more processes are stuck, each waiting for the other release resources, so none of them can proceed. Deadlock handling is how the OS detects, prevents or resolves this situation so processes can continue running. (Scalar Topics, 2025)

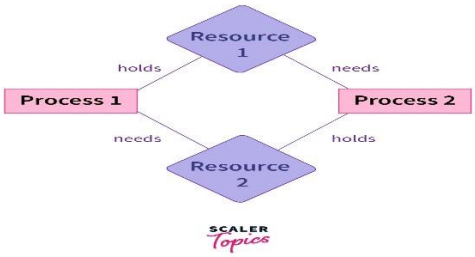

Figure 3 Deadlock Handling

3.4. Inter-Processing Communication (IPC)

IPC make sure that all shared information work together with the help of processes. The OS exchange the message or passing information throughout shared information. IPC ensures that processes exchange information safely and efficiently. In simple terms, IPC (Inter-Process Communication) is the way two or more processes communicates with each other and share data while running. (GreeksforGeeks, 2025)

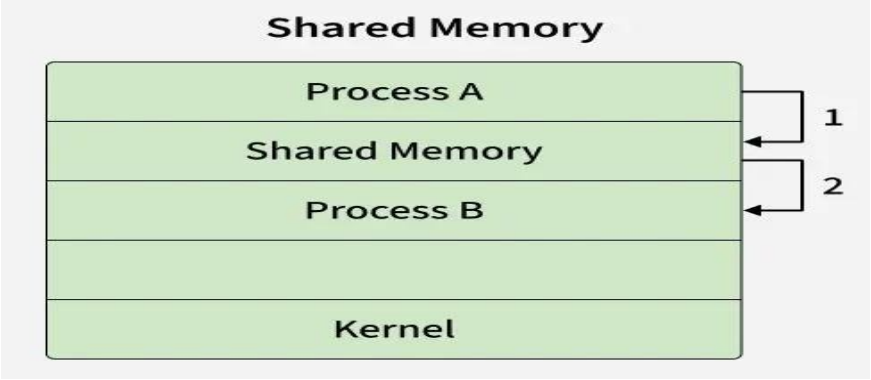

Figure 4 Inter-Processing Communication

3.5. Process Synchronization

When multiple processes use shared resources like memory or files, they must be coordinated to avoid conflicts. Process synchronization ensures their coordination. For example, if two banking processes try to update the same account balance at the same time, synchronization prevents errors like double deductions or incorrect balances. In simple terms, process synchronization means making sure multiple processes work together properly without interfering with each other when shared resources. (ScalarTopics, 2025)

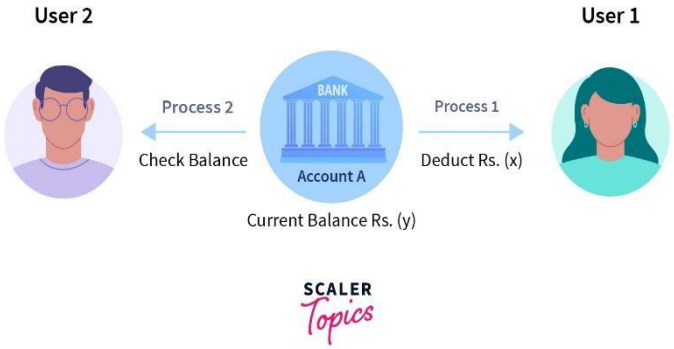

Figure 5 Process Synchronization

4. Conclusion

To conclude, process management plays crucial roles in operating system. Process management ensures that every process runs smooth and efficient execution of programs. It also manages system such as creating and terminating processes, scheduling CPU time, synchronization processes and maintaining the communication between them and preventing from deadlocks. By handling these tasks effectively, the OS ensures that multiple processes can run simultaneously without conflicts or clash, resources are used efficiently and makes system performance remains stable. Learning about these topics helps how process management works and what are the types of process management and how operating systems maintain multitasking, reliability in modern computing environments.

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