ASSIGNMENT # 04

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SECTION A

Submitted To:

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Task 01:

a) What are the state transitions of a process CPU burst where context switching occurs?

Answer:

In a process's CPU burst, context switching occurs when the operating system interrupts the current process and switches to another process. This can happen due to various reasons, such as time-slicing, I/O request, or a higher-priority process becoming ready.

These state transitions allow the operating system to efficiently utilize the CPU by allowing multiple processes to share it through time-sharing and handling various events or requests.

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b) Discuss how the exponential averaging method reduces the effect of each subsequent previously estimated time value of CPU bursts by selecting the value of alpha (α).

Answer:

By selecting the value of α, you can control the smoothing effect and the impact of each subsequent observed value. If α is close to 1, the method will give more weight to the most recent observations, resulting in a more reactive estimate that quickly adapts to changes. Conversely, if α is close to 0, the method will place more emphasis on historical data and previous estimates, leading to a smoother estimate that changes more slowly.

Take the first observed CPU burst time and update the estimated value using the formula: New Estimated Value = α * Observed Value + (1 - α) * Previous Estimated Value.

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c) Discuss how the shortest job first (SJF) scheduling is the most efficient non-Preemptive scheduling algorithm?

Answer:

The Shortest Job First (SJF) scheduling algorithm is considered one of the most efficient non-preemptive scheduling algorithms because it minimizes the average waiting time and turnaround time for a set of processes. In SJF scheduling, the process with the shortest burst time is selected to run first among all the available processes in the ready queue. The main idea behind this algorithm is to give priority to the jobs that require the least amount of CPU time, assuming that shorter jobs will complete more quickly.

- Minimizes Waiting Time: By selecting the shortest job first, SJF reduces the average waiting time for processes. Shorter jobs are executed quickly.
- Minimizes Turnaround Time: Turnaround time is the total time taken by a process from arrival to completion. SJF scheduling minimizes the turnaround time because shorter jobs are completed earlier.
- Optimal for Minimizing Average Waiting Time: SJF provides an optimal solution for minimizing the average waiting time, given a set of processes.
- AWT = (WaitingTime1 + WaitingTime2 + ... + WaitingTime n) / n

In SJF scheduling, the process with the shortest burst time is executed first. Therefore, the waiting time of the shortest job is zero. The waiting time of each subsequent job depends on the length of the previous jobs.