CPU Scheduling Algorithms – II

Objective

To schedule the processes using SJF – Shortest Job First scheduling algorithm.

Important Terms to Understand:

Convoy Effect

Convoy Effect is phenomenon associated with the First Come First Serve (FCFS) algorithm, in which the whole Operating System slows down due to few slow processes. In Convoy Effect, one slow process (usually referred to as a process with large burst time) slows down the performance of the entire set of processes (other processes waiting for CPU in the ready queue) and leads to the wastage of CPU time and other devices.

Preemptive Scheduling

The CPU scheduler selects a process from ready queue and allocates the process to CPU. The scheduling which takes place when a process switches from running state to ready state or from waiting state to ready state is called Preemptive Scheduling.

Non-Preemptive Scheduling

The scheduling which takes place when a process terminates or switches from running to waiting for state this kind of CPU scheduling is called Non-Preemptive Scheduling.

States of a Process:

Start

This is the initial state when a process is first started/created.

Ready

The process is waiting to be assigned to a processor. Ready processes are waiting to have the processor allocated to them by the operating system so that they can run. Process may come into this state after **Start** state or while running it by but interrupted by the scheduler to assign CPU to some other process.

Running

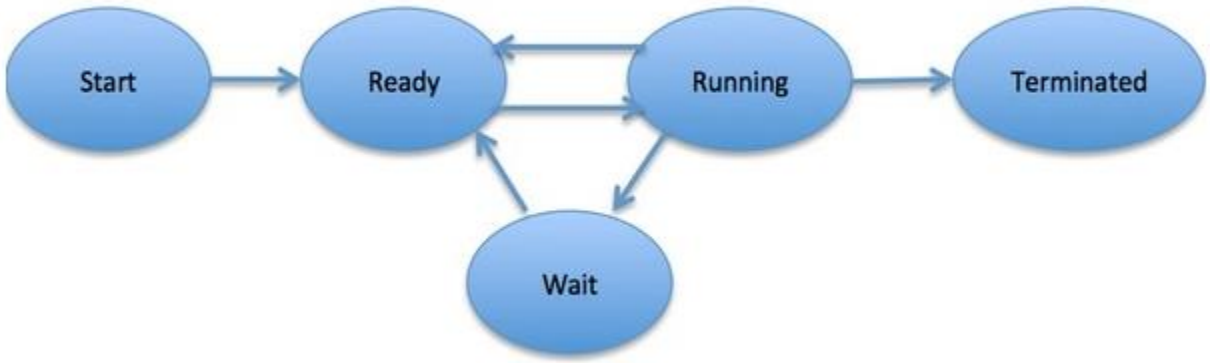
Once the process has been assigned to a processor by the OS scheduler, the process state is set to running and the processor executes its instructions.

Waiting

Process moves into the waiting state if it needs to wait for a resource, such as waiting for user input, or waiting for a file to become available.

Terminated/Exit

Once the process finishes its execution, or it is terminated by the operating system, it is moved to the terminated state where it waits to be removed from main memory.



Shortest Job First

Shortest job first (SJF) or shortest job next, is a scheduling policy that selects the waiting process with the smallest execution time or burst time to execute next. SJF is a non-preemptive algorithm. Shortest Job first has the advantage of having minimum average waiting time among all scheduling algorithms. It is a Greedy Algorithm since it chooses the processes with shortest burst time to run first.

Lab Tasks

1. Suppose there are five processes in the ready queue with arrival time = 0.

Process ID	Burst Time
pid_0	4

pid_1	3
pid_2	2
pid_3	1
pid_4	3

Calculate the waiting time and turn-around time of each process. Also calculate the average waiting time and average turn-around time which the processes have to face in the ready queue.

2. Suppose now that there are five processes in the ready queue with different arrival times and burst times.

Process ID	Arrival Time	Burst Time
pid_0	3	4
pid_1	5	3
pid_2	0	2
pid_3	5	1
pid_4	4	3

Calculate the waiting time, turn-around time, average waiting time and average turn-around time for the above set of processes in the ready queue.