Assignment No. 4

Problem Definition:

Write a Java program (using OOP features) to implement following schedulingalgorithms:
FCFS, SJF (Preemptive), Priority (Non - Preemptive) and Round Robin (Preemptive)

1.1 Prerequisite:
Basic concepts of Scheduling, Different types of scheduling algorithms

1.2 Learning Objectives:
Understand the implementation of the Scheduling Algorithms and performance comparativestudy of Scheduling algorithms

1.3 New Concepts:

Schedular:-
Schedular is an Operating System module that selects the next job to be admitted into the system & next process to run. There are major three types of schedular basically as follows:-

1. **Short Term Schedular**
2. **Mid Term Schedular**
3. **Long Term Schedular**

Scheduling :-
Scheduling is the method specified by some means is assigned to resourcesthat complete the work; work may be either virtual computation elements like thread, processes, data flows etc. There is Major two types of scheduling algorithmto solve anysort of operations.

Preemptive Scheduling	**Non-Preemptive Scheduling**
Processor can be preempted to execute a different process in the middle of execution of any current process.	Once Processor starts to execute a process it must finish it before executing the other. It cannot be paused in middle.
CPU utilization is more compared to Non-Preemptive Scheduling.	CPU utilization is less compared to Preemptive Scheduling.
Waiting time and Response time is less.	Waiting time and Response time is more.
The preemptive scheduling is prioritized. The highest priority process should always be the process that is currently utilized.	When a process enters the state of running, the state of that process is not deleted from the scheduler until it finishes its service time.
If a high priority process frequently arrives in the ready queue, low priority	If a process with long burst time is running CPU, then another process

process may starve. with less CPU burst time may starve.
Preemptive scheduling is flexible. Non-preemptive scheduling is rigid. Ex:- Priority, Round Robin, etc. Ex:- FCFS, SJF, Priority, etc.

1.4 Scheduling Algorithms:-

1. **FCFS (First Come First Serve)**
2. **SJF (Shortest Job First)**
3. **Priority**
4. **Round Robin**

1.4.1 FCFS CPU SCHEDULING ALGORITHM :-

For FCFS scheduling algorithm, read the number of processes/jobs in the system, theirCPU burst times. The scheduling is performed on the basis of arrival time of the processes irrespective of their other parameters. Each Process will be executedaccording to its arrival time. Calculate the waiting time and turnaround time of eachof the processes accordingly.

Process	Arrival Time	Execute Time	Service Time
P0	0	5	0
P1	1	3	5
P2	2	8	8
P3	3	6	16

Process Wait Time : Service Time - Arrival Time P0 0 - 0 = 0
P1 5 - 1 = 4
P2 8 - 2 = 6
P3 16 - 3 = 13

Average Wait Time: (0+4+6+13) / 4 = 5.75

1.4.2 SJF CPU SCHEDULING ALGORITHM

For SJF scheduling algorithm, read the number of processes/jobs in the system, Their CPU burst times arrange all the jobs in order with respect to their burst times. There may be two jobs in queue with the same execution time, and then FCFS approachis to be performed. Each process will be executed according to the length of its burst time. Then calculate the waiting time and turnaround time of each of the processes accordingly

Process	Arrival Time	Execute Time	Service Time
P0	0	5	3
P1	1	3	0
P2	2	8	16
P3	3	6	8

Process Wait Time : Service Time - Arrival Time P0 3 - 0 = 3

P1 0 - 0 = 0

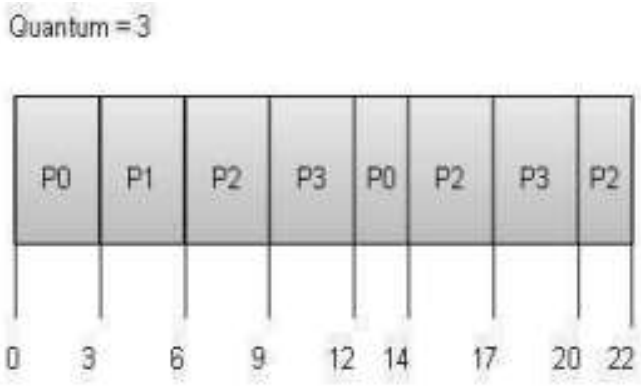
P2 16 - 2 = 14

P3 8 - 3 = 5

Average Wait Time: (3+0+14+5) / 4 = 5.50

1.4.3 ROUND ROBIN CPU SCHEDULING ALGORITHM

For Round Robin scheduling algorithm, read the number of processes/jobs in thesystem, their CPU burst times, and the size of the time slice. Time slices are assignedtoeach process in equal portions and in circular order, handling all processes execution. This allows every process to get an equal chance. Calculate the waiting time andturnaround time of each of the processes accordingly.



Process Wait Time : Service Time - Arrival Time P0 (0 - 0) + (12 - 3) = 9

P1 (3 - 1) = 2

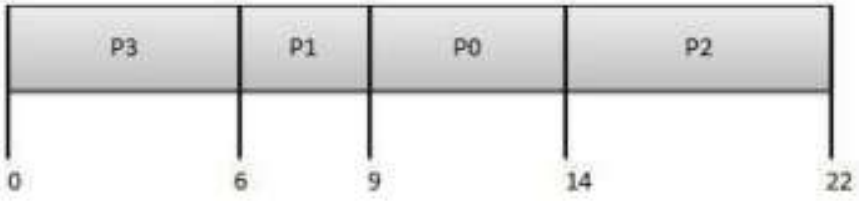
P2 (6 - 2) + (14 - 9) + (20 - 17) = 12 P3 (9 - 3) + (17 - 12) = 11

Average Wait Time: (9+2+12+11) / 4 = 8.5

1.2.4 PRIORITY CPU SCHEDULING ALGORITHM

For priority scheduling algorithm, read the number of processes/jobs in the system, their CPU burst times, and the priorities. Arrange all the jobs in order with respect totheir priorities. There may be two jobs in queue with the same priority, and thenFCFSapproach is to be performed. Each process will be executed according to its priority. Calculate the waiting time and turnaround time of each of the processes accordingly.

Process	Arrival Time	Execute Time	Priority	Service Time
P0	0	5	1	9
P1	1	3	2	6
P2	2	8	1	14
P3	3	6	3	0



Process Wait Time : Service Time - Arrival Time P0 9 - 0 = 9

P1 6 - 1 = 5

P2 14 - 2 = 12

P3 0 - 0 = 0

Average Wait Time: (9+5+12+0) / 4 = 6.5