CSE 4510 Operating Systems Laboratory
Scheduling Assignment

Spring 2025

Total Marks: 30

Assignment Description

Given the list of processes, their CPU burst times, arrival times and priorities implement SJF, Priority and Round Robin scheduling algorithms on the processes with preemption. For each of the scheduling policies, compute and print the completion Time(CT), Turnaround Time(TAT), and Waiting Time(WT) for each process using C Programming.

Turnaround time: Time elapsed by each process to get completely served. (Difference between arrival time and completion time).

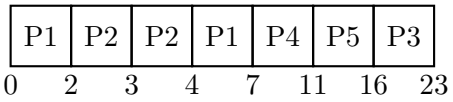
Waiting time: Processes need to wait in the process queue before execution starts and in execution while they get preempted. (Difference between turnaround time and burst time)

1 SJF Scheduling with preemption

You can use the following input as sample:

Process	Arrival Time	Burst Time
P1	0	5
P2	2	2
P3	3	7
P4	4	4
P5	5	5

Solution in a Gantt chart:



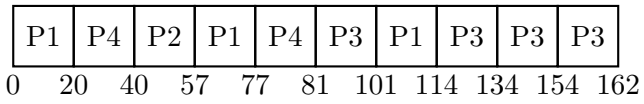
2 Round Robin

You can use the following input as sample:

Time Quantum = 20 ms

Process	Arrival Time	Burst Time
P1	0	53
P2	12	17
P3	33	68
P4	8	24

Solution in a Gantt chart:

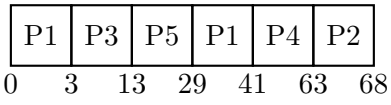


3 Priority Scheduling

You can use the following input as sample:

Process	Arrival Time	Burst Time	Priority
P1	0	15	2
P2	14	5	4
P3	3	10	0
P4	9	22	3
P5	7	16	1

Solution in a Gantt chart:



Submission Guidelines

A input file name `input.txt` will be given. The format is shown below:

```
7             // number of process
3             // quantum time (for round robin)
4 3 4         // arrival time, burst time, priority (for priority scheduling)
6 2 3
2 1 1
6 3 6
4 1 5
0 3 0
0 1 2
```

You have to read this txt file and implement `preemptive_SJF`, `round_robin` and `priority_scheduling` algorithm to simulate process scheduling.

Use one cpp file for implementing all three algorithms.

Your code should generate **three output txt files** for three algorithms. A sample output format is given below:

```
Final Completion Time: 14
Average Waiting Time: 2.57143
Average Turnaround Time: 4.57143

ID,Arrival,Burst,Completion,Turnaround,Waiting
1,4,3,8,4,1
2,6,2,11,5,3
3,2,1,5,3,2
4,6,3,14,8,5
5,4,1,9,5,4
6,0,3,3,3,0
7,0,1,4,4,3
```

Rename your code $<$ *your_roll* $>$ *.cpp* and then submit. *Improper naming will cause mark deduction.*

Bonus ($5 + 5 = 10$ marks)

Make a more efficient implementation of `preemptive_SJF` and `priority_scheduling` using a **priority queue**.