OS Scheduler System

Introduction

It is required to implement an OS scheduler using different scheduling algorithms. The work is divided into two modules:

- “Process Generator”: generates the processes to bescheduled.
- “Scheduler”: produces the schedules based on the chosen algorithm and demonstrates these schedules by visualgraphs.

Process Generator Module

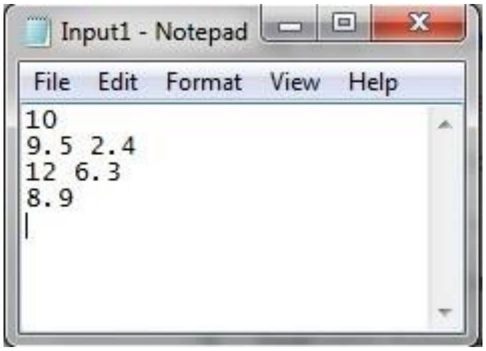
Each process has a set of parameters. Each parameter is generated randomly following a certain distribution as indicated:

1. Arrival Time : follows Normal distribution
2. Burst Time : follows Normal distribution
3. Priority : follows Poisson distribution

Input:is a text file organized as follows:

- First line should include the number of processes.
- Second line should include μ and σ of arrival time distribution separated by a whitespace.
- Third line should include μ and σ of burst time distribution separated by a whitespace.
- Fourth line should include λ of priority distribution.

Input File Example:

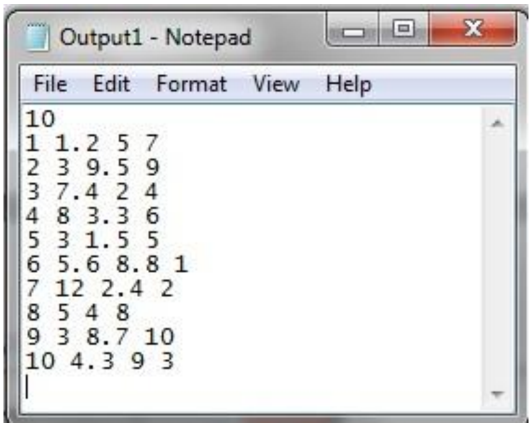


```
10
9.5 2.4
12 6.3
8.9
```

Output:is a text file organized as follows:

- First line should include the number ofprocesses.
- Each line contains the parameters for one process only, separated by a white space, in the following order:
  process number, arrival time, burst time andpriority.

Output File Example:(N.B.: The values in the given file are imaginary ones)



```
10
1 1.2 5 7
2 3 9.5 9
3 7.4 2 4
4 8 3.3 6
5 3 1.5 5
6 5.6 8.8 1
7 12 2.4 2
8 5 4 8
9 3 8.7 10
10 4.3 9 3
```

Scheduler Module

This module is responsible for generating a schedule for the current processes in the system to specify the CPU usage by these processes.

You are required to implement 3 scheduling algorithms:

1. [15%] Non-Preemptive Highest Priority First.(HPF)
2. [15%] First Come First Served. (FCFS)
3. [20%] Round Robin with fixed time quantum.(RR)
4. [20%] Preemptive Shortest Remaining Time Next.(SRTN)

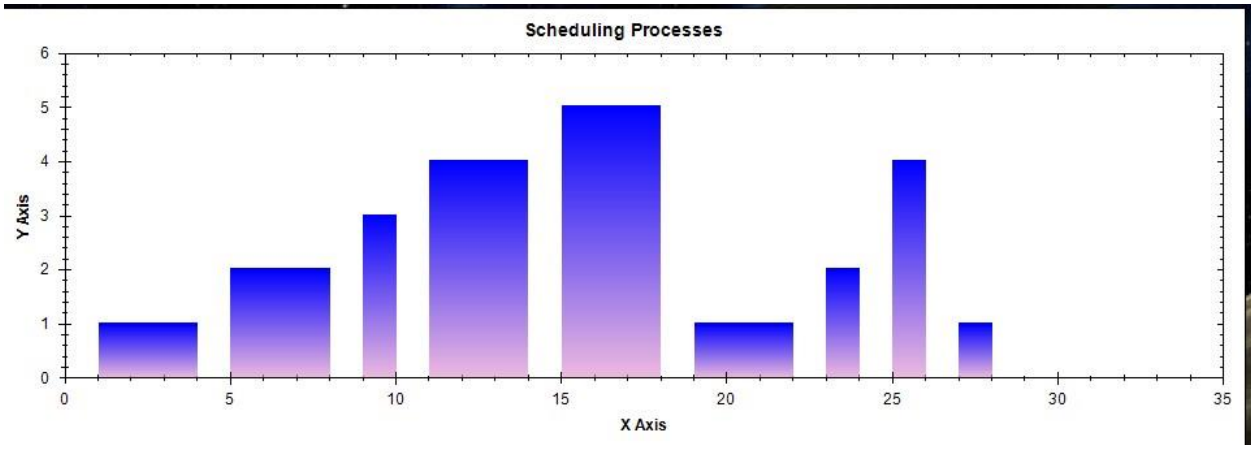
Input:Through a simple GUI the user should be able to do the following:

- Enter the input file name generated by the Process GeneratorModule.
- Choose one of the implemented scheduling algorithms torun.
- Specify the “Context Switching”time.
- Specify the “Time Quantum” in case of choosing RoundRobin.

Output:

- A visual graph that shows the generated schedule. Output Graph Example:

The x-axis represents the time while the y-axis represents the process number.



- A text file containing the following metrics for the generatedschedule:

- Waiting time of each process.
- Turnaround time of each process.
- Weighted Turnaround time of each process.
- Average Turnaround time of the schedule.
- Average Weighted turnaround time of the schedule.

Languages and OperatingSystems

 You can use any programming language.

- You can work under any of the following OSs: Windows, Linux orMacOS.

General Guidelines

- The scheduler should be notified every time a new process has arrived in the system to act accordingly.
- Any tie should be broken by starting with the process whose number issmaller.

For example: In HPF algorithm, if more than one process has the same priority, you should break the tie by starting with the process whose number is smaller.

- Assume that the memory size is infinite and that I/O requests aredisabled.
- Assume that a greater number means a higherpriority.
- To generate a graph, you can use any appropriate library such as:ZedGraph.
- In your calculations, do not ignore the context switchingtime.
- Stick to the file formats specified above, as you will be given testingscenarios.

Deliverables

- Samples of input/output text files generated by “Process Generator Module”. (at least 3samples)
- SourceCode.
- Executable file. (make sure that it runs correctly with no missingdependencies)