Program 4: CPU Scheduler

Objective:

In this lab, you will write a CPU scheduler to schedule the processes and output the CPU Utilization, Throughput, Average Waiting Time, and Average Turnaround Time.

1. Learn CPU scheduling algorithms: FCFS, RR
2. Calculate the statistics of the CPU Utilization, Throughput, Average Waiting Time, and Average Turnaround Time.

   CPU Utilization = sum of burst time/(sum of contextSwitch * 0.1 + sum of burst time) – this depends on your assumption.
   Throughput = the number of processes / time
   Average Response Time = sum of all response / the number of processes
   Average Waiting Time = sum of all wait / the number of processes
   Average Turnaround Time = sum of all turnaround / the number of processes
3. Compare pros and cons of different CPU scheduling algorithms.

Descriptions:

The purpose of the CPU Scheduler is to have a list of processes that are ready, of which are to be chosen to run on the CPU.

1. Download files: Driver.java, Process.java, Scheduler.java, Utilities.java and test.csv.
2. Fill blank in Scheduler.java. First Come First Serve algorithm (fcfs()) and Round Robin algorithm (rr()) miss some code. You have to fill the code and complete the algorithms. Pseudo codes are inside in the source file.
3. Fill blank in Utilities.java. This file is to calculate the statistical data. Pseudo codes are inside in the source file.
4. Compare the two scheduling algorithms and list the pros and cons of these two algorithms. Write it in your program report → "Learned" section.

Key words:

- First Come First Server (FCFS)
- Round Robin (RR)
- CPU scheduling
- CPU utilization
- Throughput
- Average waiting time

- Average turnaround time

Run the program:

>javac *.java
>java Driver
Please enter filename: test.csv
Please enter Time Quantum: 2

Sample output with the given data in test.csv file:

```
>javac *.java
```

```
>java Driver
```

```
Please enter filename: test.csv
Please enter Time Quantum: 2
-----------------FCFS----------------

CPU Utilization: 0.9803921568627452
Throughput: 0.2
Average Response Time: 5.75
Average Waiting Time: 5.75
Average Turnaround Time: 10.75
```

```
Please enter filename: test.csv
Please enter Time Quantum: 2
-----------------RR------------------

CPU Utilization: 0.947867298578199
Throughput: 0.2
Average Response Time: 2.75
Average Waiting Time: 7.25
Average Turnaround Time: 12.25
```

```
Please enter filename: test.csv
Please enter Time Quantum: 5
-----------------RR------------------

CPU Utilization: 0.9708737864077669
Throughput: 0.2
Average Response Time: 5.25
Average Waiting Time: 6.0
Average Turnaround Time: 11.0
```

Hand Ins:

Documents below:

1) Source code and screenshots of the running program.
2) Programming report. See report template.

Rubric:

Criteria	**0 Marks**	**Full Marks**	**Extra Marks**
Execute: Compile and execute correctly with no errors	0 pts	10 pts	
FCFS algorithm implemented correctly	0 pts	15 pts	
RR algorithm implemented correctly	0 pts	15 pts	
Every other algorithm implementation			10pts
Statistic calculation is correct	0 pts	20 pts	
Report: Fill all blanks with detailed and reasonable explanation	0 pts	20 pts	
Total Points: 80			+10*x