Course: Operating System (TC1V, TT2V)

Lecturer: Mrs. Tan Saw Chin

Assignment Topic: Simulation of CPU scheduling algorithms

Programming Language: Java
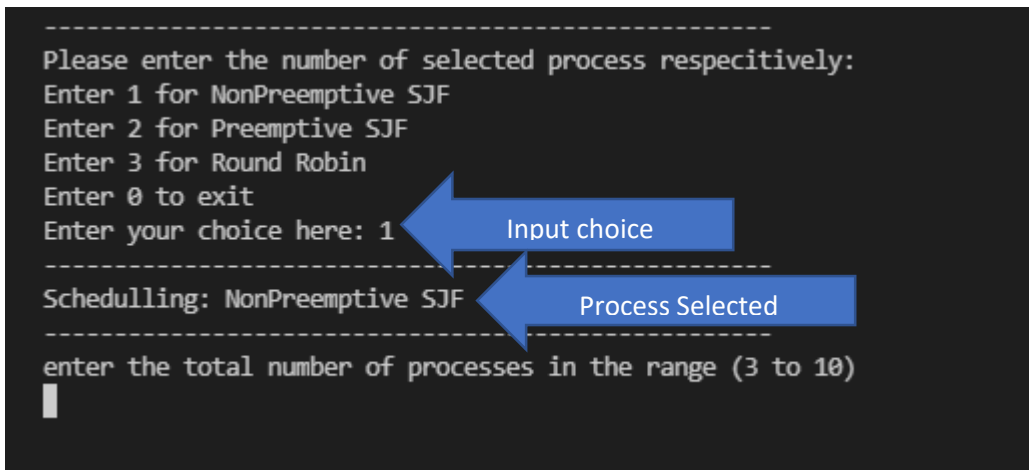
Student ID	Student Name	Student Contribution
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Introduction

In a system, there are a number of processes that are present in different states at a particular time. Some processes may be in the waiting state, others may be in the running state and so on. Have you ever thought how CPU selects one process out of some many processes for execution? Yes, you got it right. CPU uses some kind of process scheduling algorithms to select one process for its execution amongst so many processes. The process scheduling algorithms are used to maximize CPU utilization by increasing throughput. Our team have selected three types of process scheduler to come up with a simulator. These types are:

- Non-Preemptive SJF
- Preemptive SJF
- Round Robin

Our main program allows users to select the type of process they want to run, and then requests data required to simulate the scheduling process. Here's an example:

Non Preemptive SJF

Set 1 Input:

```
Please enter the number of selected process respecitively:
Enter 1 for NonPreemptive SJF
Enter 2 for Preemptive SJF
Enter 3 for Round Robin
Enter 0 to exit
Enter your choice here: 1
------------------------------------------------
Schedulling: NonPreemptive SJF
------------------------------------------------
enter the total number of processes in the range (3 to 10)
5
enter the process Id, arrival time and Burst time for 1th process
p1
0        Insert process ID then HIT ENTER KEY followed by Arrival time and so on
8
enter the process Id, arrival time and Burst time for 2th process
p2
3
5
enter the process Id, arrival time and Burst time for 3th process
p3
4
10
enter the process Id, arrival time and Burst time for 4th process
p4
6
9
enter the process Id, arrival time and Burst time for 5th process
p5
11
7
```

Set 1 Output:

```
-------------------Gantt Chart----------------------

  | p1 (8)  | p2 (13) | p5 (20) | p4 (29) | p3 (39)
-------------------Table----------------------------
P        TT      WT
p1       8       0
p2       10      5
p3       35      25
p4       23      14
p5       9       2
Total waiting time: 46.0
average waiting time: 9.2
Total turnaround time: 85.0
average turnaround time: 17.0
------------------------------------------------
```

Set 2 Input:

```
------------------------------------------------------
Please enter the number of selected process respecitively:
Enter 1 for NonPreemptive SJF
Enter 2 for Preemptive SJF
Enter 3 for Round Robin
Enter 0 to exit
Enter your choice here: 1
------------------------------------------------------
Schedulling: NonPreemptive SJF
------------------------------------------------------
enter the total number of processes in the range (3 to 10)
4
enter the process Id, arrival time and Burst time for 1th process
p1
3
2
enter the process Id, arrival time and Burst time for 2th process
p2
2
4
enter the process Id, arrival time and Burst time for 3th process
p3
0
6
enter the process Id, arrival time and Burst time for 4th process
p4
1
4
```

Set 2 Output:

```
-------------------Gantt Chart-----------------------

  |  p3 (6)  |  p1 (8)  |  p2 (12)  |  p4 (16)
--------------------Table-----------------------------
P         TT       WT
p1        5        3
p2        10       6
p3        6        0
p4        15       11
Total waiting time: 20.0
average waiting time: 5.0
Total turnaround time: 36.0
average turnaround time: 9.0
------------------------------------------------------
```

Set 3 Input:

```
-----------------------------------------------------
Please enter the number of selected process respecitively:
Enter 1 for NonPreemptive SJF
Enter 2 for Preemptive SJF
Enter 3 for Round Robin
Enter 0 to exit
Enter your choice here: 1
-----------------------------------------------------
Schedulling: NonPreemptive SJF
-----------------------------------------------------
enter the total number of processes in the range (3 to 10)
5
enter the process Id, arrival time and Burst time for 1th process
p1
0
10
enter the process Id, arrival time and Burst time for 2th process
p2
1
2
enter the process Id, arrival time and Burst time for 3th process
p3
2
3
enter the process Id, arrival time and Burst time for 4th process
p4
3
1
enter the process Id, arrival time and Burst time for 5th process
p5
4
5
```

Set 3 Output:

```
------------------Gantt Chart---------------------

  |  p1 (10)  |  p4 (11)  |  p2 (13)  |  p3 (16)  |  p5 (21)
-------------------Table-----------------------------
P         TT        WT
p1        10        0
p2        12        10
p3        14        11
p4        8         7
p5        17        12
Total waiting time: 40.0
average waiting time: 8.0
Total turnaround time: 61.0
average turnaround time: 12.2
-----------------------------------------------------
```

Preemptive SJF

Set 1 Input:

```
Please enter the number of selected process respecitively:
Enter 1 for NonPreemptive SJF
Enter 2 for Preemptive SJF
Enter 3 for Round Robin
Enter 0 to exit
Enter your choice here: 2
---------------------------------------------------
Schedulling: Preemptive SJF
---------------------------------------------------
Please enter the number of Processes range (3 to 10):
5
Please enter the Arrival Time for Process 1:
0
Please enter the Burst Time for Process 1:
8
Please enter the Arrival Time for Process 2:
3
Please enter the Burst Time for Process 2:
3
Please enter the Arrival Time for Process 3:
4
Please enter the Burst Time for Process 3:
10
Please enter the Arrival Time for Process 4:
6
Please enter the Burst Time for Process 4:
9
Please enter the Arrival Time for Process 5:
11
Please enter the Burst Time for Process 5:
7
```

Set 1 Ouptut:

```
-------------------Gantt Chart---------------------
0--P1--3--P2--6--P1--11--P5--18--P4--27--P3--37

-------------------Table---------------------------
P         TT        WT
1         11         3
2          3         0
3         33        23
4         21        12
5          7         0


Total Waiting time: 38.0
The Average Waiting time is: 7.6
Total turnaround time: 75.0
The Average Turnaround time is: 15.0
---------------------------------------------------
```

Set 2 Input:

```
-------------------------------------------------------
Please enter the number of selected process respecitively:
Enter 1 for NonPreemptive SJF
Enter 2 for Preemptive SJF
Enter 3 for Round Robin
Enter 0 to exit
Enter your choice here: 2
-------------------------------------------------------
Schedulling: Preemptive SJF
-------------------------------------------------------
Please enter the number of Processes range (3 to 10):
5
Please enter the Arrival Time for Process 1:
0
Please enter the Burst Time for Process 1:
10
Please enter the Arrival Time for Process 2:
1
Please enter the Burst Time for Process 2:
2
Please enter the Arrival Time for Process 3:
2
Please enter the Burst Time for Process 3:
3
Please enter the Arrival Time for Process 4:
3
Please enter the Burst Time for Process 4:
1
Please enter the Arrival Time for Process 5:
4
Please enter the Burst Time for Process 5:
5
```

Set 2 Output:

```
--------------------Gantt Chart----------------------
0--P1--1--P2--3--P4--4--P3--7--P5--12--P1--21

--------------------Table-----------------------------
P       TT      WT
1       21      11
2       2       0
3       5       2
4       1       0
5       8       3

Total Waiting time: 16.0
The Average Waiting time is: 3.2
Total turnaround time: 37.0
The Average Turnaround time is: 7.4
-------------------------------------------------------
```

Set 3 Input:

```
-----------------------------------------------------
Please enter the number of selected process respecitively:
Enter 1 for NonPreemptive SJF
Enter 2 for Preemptive SJF
Enter 3 for Round Robin
Enter 0 to exit
Enter your choice here: 2
-----------------------------------------------------
Schedulling: Preemptive SJF
-----------------------------------------------------
Please enter the number of Processes range (3 to 10):
4
Please enter the Arrival Time for Process 1:
0
Please enter the Burst Time for Process 1:
15
Please enter the Arrival Time for Process 2:
1
Please enter the Burst Time for Process 2:
4
Please enter the Arrival Time for Process 3:
2
Please enter the Burst Time for Process 3:
5
Please enter the Arrival Time for Process 4:
3
Please enter the Burst Time for Process 4:
1
```

Set 3 Output:

```
-------------------Gantt Chart----------------------
0--P1--1--P2--3--P4--4--P2--6--P3--11--P1--25

--------------------Table----------------------------
P        TT       WT
1        25       10
2        5        1
3        9        4
4        1        0

Total Waiting time: 15.0
The Average Waiting time is: 3.75
Total turnaround time: 40.0
The Average Turnaround time is: 10.0
```

Round Robin

Set 1 Input:

```
---------------------------------------------------
Please enter the number of selected process respecitively:
Enter 1 for NonPreemptive SJF
Enter 2 for Preemptive SJF
Enter 3 for Round Robin
Enter 0 to exit
Enter your choice here: 3
---------------------------------------------------
Schedulling: Round Robin
---------------------------------------------------
enter no. of processes range (3 to 10) :
5
enter time quantum :
5
enter burst time of process 1
8
enter burst time of process 2
3
enter burst time of process 3
10
enter burst time of process 4
9
enter burst time of process 5
7
enter arrival time of process 1
0
enter arrival time of process 2
3
enter arrival time of process 3
4
enter arrival time of process 4
6
enter arrival time of process 5
11
```

Set 1 Output:

```
P1 (5) | P2 (8) | P3 (13) | P4 (18) | P5 (23) | P1 (26) | P3 (31) | P4 (35) | P5 (37) |
P       TT      WT
1       26      18
2       5       2
3       27      17
4       29      20
5       26      19
total waiting time : 76
average waiting time : 15.2

total turn around time : 113
avg turn around time : 22.6
---------------------------------------------------
```

Set 2 Input:

```
-----------------------------------------------------
Please enter the number of selected process respecitively:
Enter 1 for NonPreemptive SJF
Enter 2 for Preemptive SJF
Enter 3 for Round Robin
Enter 0 to exit
Enter your choice here: 3
-----------------------------------------------------
Schedulling: Round Robin
-----------------------------------------------------
enter no. of processes range (3 to 10) :
5
enter time quantum :
3
enter burst time of process 1
10
enter burst time of process 2
2
enter burst time of process 3
3
enter burst time of process 4
1
enter burst time of process 5
5
enter arrival time of process 1
0
enter arrival time of process 2
1
enter arrival time of process 3
2
enter arrival time of process 4
3
enter arrival time of process 5
4
```

Set 2 Output:

```
P1 (3) | P2 (5) | P3 (8) | P4 (9) | P5 (12) | P1 (15) | P5 (17) | P1 (20) | P1 (21) |
P       TT      WT
1       21      11
2       4       2
3       6       3
4       6       5
5       13      8
total waiting time : 29
average waiting time : 5.8

total turn around time : 50
avg turn around time : 10.0
-----------------------------------------------------
```

Set 3 Output:

```
------------------------------------------------------
Please enter the number of selected process respecitively:
Enter 1 for NonPreemptive SJF
Enter 2 for Preemptive SJF
Enter 3 for Round Robin
Enter 0 to exit
Enter your choice here: 3
------------------------------------------------------
Schedulling: Round Robin
------------------------------------------------------
enter no. of processes range (3 to 10) :
5
enter time quantum :
3
enter burst time of process 1
5
enter burst time of process 2
3
enter burst time of process 3
6
enter burst time of process 4
1
enter burst time of process 5
4
enter arrival time of process 1
0
enter arrival time of process 2
1
enter arrival time of process 3
3
enter arrival time of process 4
5
enter arrival time of process 5
6
```

Set 3 Output:

```
P1 (3) | P2 (6) | P3 (9) | P4 (10) | P5 (13) | P1 (15) | P3 (18) | P5 (19) |
P       TT      WT
1       15      10
2       5       2
3       15      9
4       5       4
5       13      9
total waiting time : 34
average waiting time : 6.8

total turn around time : 53
avg turn around time : 10.6
------------------------------------------------------
```