King Saud University
College of Computer Science and Information Sciences
Computer Science Department

CSC227: Operating Systems
Course Project – S2 – 1443
Instructor: L. Haifa Aleid
Section: 69227

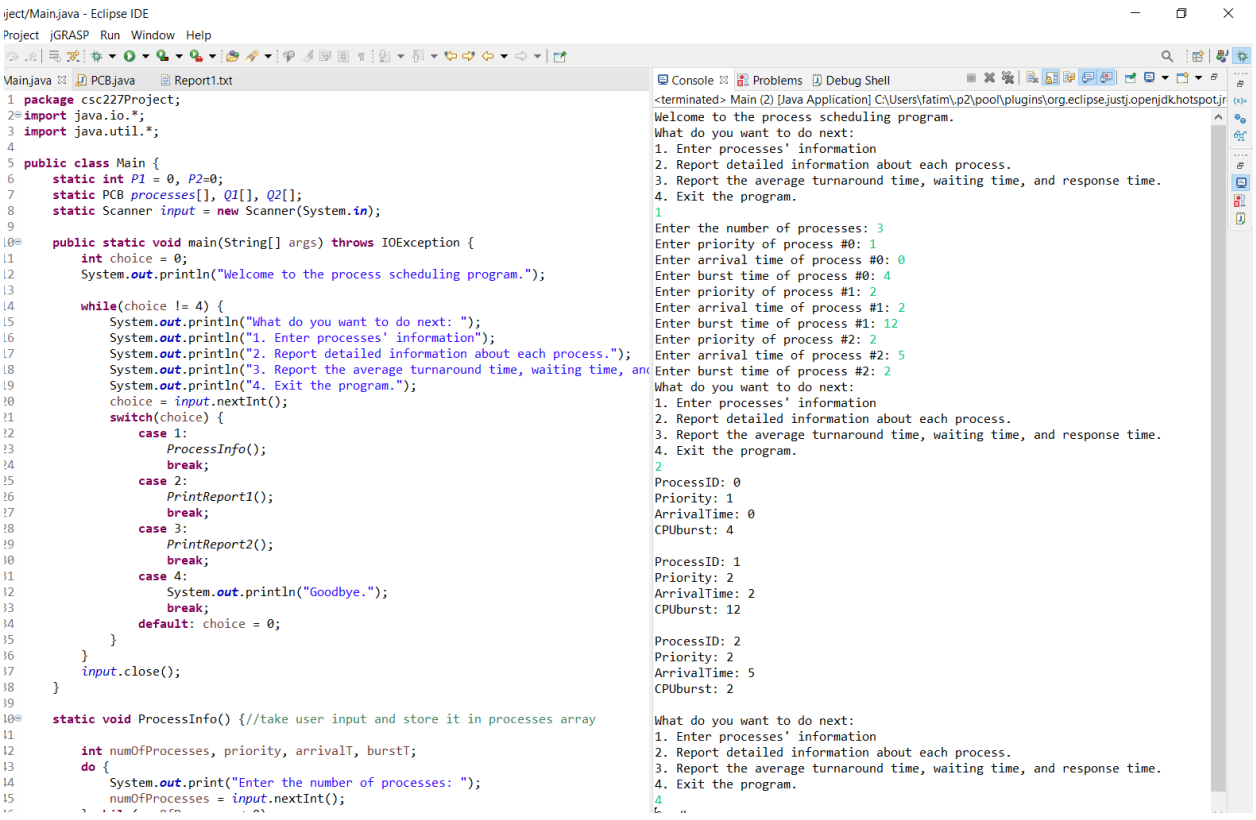
Group Members

Name	ID
Waad Faihan Alshebani	438200125
Fatimah Abdullah Alhumaidhi	**441200921**
Reem Al-Essa	441200983

NAME	PHASE I WORK DISTRIBUTION
Reem Al-Essa	Worked on: -enhancing ProcessInfo() -creating PrintReport1()
Waad Alshebani	Worked on: -creating ProcessInfo() -enhancing assign() -enhancing PrintReport1() -creating PCB class
Fatimah Alhumaidhi	Worked on: -creating Main menu -creating assign() -enhancing ProcessInfo()

NAME	PHASE 2 WORK DISTRIBUTION
Reem Al-Essa	Worked on: -Report1() -PCB class -MLQ()
Waad Alshebani	Worked on: -README file -enhancing PCB class
Fatimah Alhumaidhi	Worked on: -Report2() -MLQ()

sample input/output for phase 1:



```
ject/Main.java - Eclipse IDE
Project  jGRASP  Run  Window  Help
```

Main.java | PCB.java | Report1.txt

```
1  package csc227Project;
2  import java.io.*;
3  import java.util.*;
4
5  public class Main {
6      static int P1 = 0, P2=0;
7      static PCB processes[], Q1[], Q2[];
8      static Scanner input = new Scanner(System.in);
9
10     public static void main(String[] args) throws IOException {
11         int choice = 0;
12         System.out.println("Welcome to the process scheduling program.");
13
14         while(choice != 4) {
15             System.out.println("What do you want to do next: ");
16             System.out.println("1. Enter processes' information");
17             System.out.println("2. Report detailed information about each process.");
18             System.out.println("3. Report the average turnaround time, waiting time, and
19             System.out.println("4. Exit the program.");
20             choice = input.nextInt();
21             switch(choice) {
22                 case 1:
23                     ProcessInfo();
24                     break;
25                 case 2:
26                     PrintReport1();
27                     break;
28                 case 3:
29                     PrintReport2();
30                     break;
31                 case 4:
32                     System.out.println("Goodbye.");
33                     break;
34                 default: choice = 0;
35             }
36         }
37         input.close();
38     }
39
40     static void ProcessInfo() {//take user input and store it in processes array
41
42         int numOfProcesses, priority, arrivalT, burstT;
43         do {
44             System.out.print("Enter the number of processes: ");
45             numOfProcesses = input.nextInt();
```

Console | Problems | Debug Shell

```
<terminated> Main (2) [Java Application] C:\Users\fatim\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jr
Welcome to the process scheduling program.
What do you want to do next:
1. Enter processes' information
2. Report detailed information about each process.
3. Report the average turnaround time, waiting time, and response time.
4. Exit the program.
1
Enter the number of processes: 3
Enter priority of process #0: 1
Enter arrival time of process #0: 0
Enter burst time of process #0: 4
Enter priority of process #1: 2
Enter arrival time of process #1: 2
Enter burst time of process #1: 12
Enter priority of process #2: 2
Enter arrival time of process #2: 5
Enter burst time of process #2: 2
What do you want to do next:
1. Enter processes' information
2. Report detailed information about each process.
3. Report the average turnaround time, waiting time, and response time.
4. Exit the program.
2
ProcessID: 0
Priority: 1
ArrivalTime: 0
CPUburst: 4

ProcessID: 1
Priority: 2
ArrivalTime: 2
CPUburst: 12

ProcessID: 2
Priority: 2
ArrivalTime: 5
CPUburst: 2

What do you want to do next:
1. Enter processes' information
2. Report detailed information about each process.
3. Report the average turnaround time, waiting time, and response time.
4. Exit the program.
4
```

Main.java | PCB.java | Report1.txt

```
1 process ID     Process Priority    CPU burst      Arrival time
2 p0              1                   4              0
3 p1              2                   12             2
4 p2              2                   2              5
5
```

sample input/output for phase 2:

```
Welcome to the process scheduling program.
What do you want to do next:
1. Enter processes' information
2. Report detailed information about each process.
3. Report the average turnaround time, waiting time, and response time.
4. Exit the program.
1
Enter the number of processes: 3
Enter priority of process P0: 1
Enter arrival time of process P0: 0
Enter burst time of process P0: 4
Enter priority of process P1: 2
Enter arrival time of process P1: 2
Enter burst time of process P1: 12
Enter priority of process P2: 2
Enter arrival time of process P2: 5
Enter burst time of process P2: 2
What do you want to do next:
1. Enter processes' information
2. Report detailed information about each process.
3. Report the average turnaround time, waiting time, and response time.
4. Exit the program.
2
ProcessID: P0
Priority: 1
ArrivalTime: 0
CPUburst: 4
StartTime: 0
TerminationTime: 4
TurnAroundTime: 4
WaitingTime: 0
ResponseTime: 0
```

```
ProcessID: P1
Priority: 2
ArrivalTime: 2
CPUburst: 12
StartTime: 4
TerminationTime: 16
TurnAroundTime: 14
WaitingTime: 2
ResponseTime: 2

ProcessID: P2
Priority: 2
ArrivalTime: 5
CPUburst: 2
StartTime: 16
TerminationTime: 18
TurnAroundTime: 13
WaitingTime: 11
ResponseTime: 11


Scheduling order chart: [P0|P0|P0|P0|P1|P1|P1|P1|P1|P1|P1|P1|P1|P1|P1|P2|P2]
What do you want to do next:
1. Enter processes' information
2. Report detailed information about each process.
3. Report the average turnaround time, waiting time, and response time.
4. Exit the program.
3
average TurnAround Time: 10.3
average Waiting Time: 4.3
average Response Time: 4.3
```

```
1. Enter processes' information
2. Report detailed information about each process.
3. Report the average turnaround time, waiting time, and response time.
4. Exit the program.
4
Goodbye.
```

Report 1:

Report1.txt

process ID	Process Priority	CPU burst	Arrival time	Start time	Termination time	Turn around time	Waiting time	Response time
P0	1	4	0	0	4	4	0	0
P1	2	12	2	4	16	14	2	2
P2	2	2	5	16	18	13	11	11

Scheduling order chart: [P0|P0|P0|P0|P1|P1|P1|P1|P1|P1|P1|P1|P1|P1|P1|P2|P2]

Report 2:

Report2.txt

```
average TurnAround Time: 10.3
average Waiting Time: 4.3
average Response Time: 4.3
```

Simulation Reflection

We used a multilevel queue with two queues (Q1, Q2) to schedule system and batch processes according to their priority , After using SJF on Q1 and the result was a queue with processes ordered by their shortest arrival time first and After using FCFS on Q.2 the result was a queue with processes ordered by their arrival order.

Suggestions for performance improvements:

To avoid starvation a multilevel feedback queue can be used instead of a multilevel queue.

Peer evaluation:

Team work			
Criteria	**fatima**	**reem**	**waad**
Work division: Contributed equally to the work	**1**	**1**	**1**
Peer evaluation: Level of commitments (Interactivity with other team members), and professional behavior towards team & TA	**1**	**1**	**1**
Project Discussion: Accurate answers, understanding of the presented work, good listeners to questions			
Time management: Attending on time, being ready to start the demo, good time management in discussion and demo.			
Total / 4			