CMPE 261 - Large Scale Programming

Assignment 3

Due: November 26th Monday, 23:00

You have to explain your program with comments in detail, every non-trivial component of the program has to be explained. If there are some parts that are not clear, you are not be able to get points from these parts. Students who does not write any comments or does not explain their approach in detail will get zero from this assignment.

You have to submit before the deadline without any errors and warnings. The grading person must compile and run your submitted program without modifications, otherwise you will get zero.

Plagiarism is strictly prohibited, you will be evaluated as if you cheat during the written exams. Involved students will get zero. In case of doubt of integrity, you are expected to explain your work verbally to the grader.

You are supposed to implement a supermarket simulation in this assignment.

- The supermarket is opened at 09:00:00 and customers may enter until 17:00:00. After 17:00:00 only the customers who have been waiting in the queues will be processed and the supermarket will be closed.

- The customers will arrive at the supermarket by random time intervals varying between 2 and 15 minutes.

- Each customer will spend random amount of time between 2 and 30 minutes while choosing products to buy.

- They will select from 1000 different products. Note that they may select 1 to 20 different products. From the products they choose, they buy 1-5 samples.

- Each cashier will have their own queue. Customers who are going to pay will first look for empty queues. If there are multiple cashiers available, they will select a random one to pay. If there is only one empty queue, they will choose it. If there are no empty queues, half of the customers will look for the shortest queue, the other half will choose a random queue to wait in.

- When the items are processed by the cashier, the customer will wait for (total quantity of the products they buy)*1 seconds, pay and exit the supermarket.

- The list of products and prices are provided in "products_prices.txt".

- Console output should look like:

```
Customer23 entered at 14:02:26
Customer23 entered queue3 at 14:10:41
Customer24 entered at 14:11:14
Customer23 waited for 3 minutes and 12 seconds in queue3
Customer25 entered at 14:13:57
Customer25 entered queue2 at 14:15:38
Customer23 items are processed in 2 minutes 21 seconds
Customer23 paid $24 and left at 14:16:14
Customer25 waited for 2 minutes 18 seconds in queue2
Customer24 entered queue3 at 14:18:11
Customer24 waited for 0 minutes and 0 seconds in queue3
Customer25 items are processed in 1 minutes 5 seconds
Customer25 paid $9 and left at 14:19:01
Customer24 items are processed in 3 minutes 2 seconds
Customer24 paid $138 and left at 14:21:13
```

- **BONUS:** Calculate the average waiting time of the customers who select the shortest queue. Calculate the average waiting time of the customers who select their queue randomly.