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CSC 130

MWF

CSC 130 Programming Assignment 2: Do Express Lines Really Help?

Dale Fletter

**Introduction**: In this assignment we are going to find out if express lines at a store actually help the flow of customers. We will write a java program that will simulate a store and its 10 cashiers who will check out 1000 customers. These 1000 customers will have a random set of items ranging from 1-100, we will sort the customers who have 20 or less items.

**Purpose**: During this assignment we will get a look at what Queue are and how they work. We will also be challenged with populating the queue and removing the population of the queue. This will be done during a clock cycle and the times must be noted.

**Discussion:** For this assignment partial code from the previous assignment was used and modified slightly to work for this assignment. For the remaining of the code it was written anew. For the customers a loop was set to increment and label them from 1-1000 as for the items a loop was set to make up to 1-100 and inserted into the above class. A try and catch statement was used to cover this loop so we can use the Thread.*sleep*(); functions to make the loop wait for the amount of items for the customer. This was in the millisecond format. After this we are then starting a timer, in a thread, that will count in true seconds and this time will be recorded and used for statistical analysis.

Now we go to the Functions class and here we will insert the customers into a queue and check them out at the same time. For the insertion we will use an if-elseif-else statement structure in which we compare the previous cashier to the next, we will be comparing the size and checking who has the shorter line. As for the Express line we put an if-else loop on the outer most that will check if the item is less than or equal to 20 then check for which cashier has the shortest line, whereas cashier 1 and 2 only accept customers with less than or equal to 20 items. CODE FOR THIS PORTION IS ATTACHED AT THE BACK. PLEASE SEE Functions.java without Express lines AND Function.java with Express lines.

As for the process to check out the customer items we must do this along with the inserting of the customer items into the Queue. For this a thread was devised that would receive the queue and will store it into a local queue and then remove from the local queue and pass back the remove. This thread is called in the Functions class when the put the customers in the queue. The Code then ends after it has emptied the Queues out and the time is noted.

**Results:** As for the results we see how the express lines differ from the regular lines. 1000 customers where used in this statistic run and that was more than enough to see the difference between the two types of cashier lines. From the runs compared (upto 5 runes for each) we can tell that the express lines do not help speed the checkout process they slow it down.

This is due to the fact all customers with less than 20 items are allowed into the 2 cashier whereas everyone else goes to the other 8 cashiers. After the 2 cashiers are done with their people they stop because they are not allowed to help the other people, this makes the other 8 cashiers have more people than they would have if all 10 cashiers would have taken the load. A chart for these results is listed below. Code for this assignment is attached.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | RUN 1 | RUN 2 | RUN 3 | RUN 4 | RUN 5 |
| Cashier 1 | 47s | 49s | 48s | 50s | 48s |
| Cashier 2 | 49s | 49s | 49s | 50s | 51s |
| Cashier 3 | 50s | 50s | 50s | 51s | 52s |
| Cashier 4 | 52s | 51s | 50s | 53s | 52s |
| Cashier 5 | 52s | 51s | 51s | 53s | 52s |
| Cashier 6 | 52s | 52s | 52s | 53s | 54s |
| Cashier 7 | 53s | 53s | 53s | 55s | 54s |
| Cashier 8 | 54s | 53s | 53s | 55s | 56s |
| Cashier 9 | 54s | 53s | 53s | 56s | 56s |
| Cashier 10 | 56s | 54s | 55s | 58s | 57s |

1. *No Express Lines – Time in Seconds after code Starts when Cashier Completes*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | RUN 1 | RUN 2 | RUN 3 | RUN 4 | RUN 5 |
| Cashier 1 - eX | 5s | 6s | 4s | 7s | 4s |
| Cashier 2 - eX | 5s | 18s | 4s | 19s | 19s |
| Cashier 3 | 61s | 59s | 60s | 58s | 58s |
| Cashier 4 | 62s | 60s | 62s | 60s | 60s |
| Cashier 5 | 63s | 61s | 63s | 60s | 60s |
| Cashier 6 | 63s | 62s | 63s | 61s | 60s |
| Cashier 7 | 64s | 62s | 63s | 61s | 61s |
| Cashier 8 | 65s | 64s | 65s | 62s | 62s |
| Cashier 9 | 66s | 65s | 65s | 62s | 63s |
| Cashier 10 | 68s | 66s | 66s | 64s | 64s |

1. *Express Lines – Time in Seconds after code Starts when Cashier Completes*

|  |  |  |  |
| --- | --- | --- | --- |
|  | AVG | MIN | MAX |
| No Express Lines | 51.28s | 47s | 58s |
| Express Lines | 9.1s | 4s | 19s |
| Express Lines Regular Cashiers | 62.35 | 58s | 68s |