

CMSC 206: Data Structures
Assignment #5: QMart
due on Gradescope by the beginning of class on Thursday, March 29, 2018

Write a simulation of a retail store's checkout lines. Each line will be represented by a queue of `Customer`s. (The `Customer` class is on our syllabus page.) A `Customer` has a name and a number of items; these items are stored in a `Queue` internal to the `Customer` class. During every minute of the simulation, one item gets processed in each line, and there is the possibility of a new customer getting into a line.

The user chooses the number of lines to simulate, the probability of a new customer appearing during each minute (entered as a decimal between 0 and 1, inclusive), the maximum number of items a customer may have, and the number of minutes to simulate.

For every minute of the simulation, your program will print out the item being processed (if any) in each checkout line. It will then determine whether a new customer arrives, based on the probability given by the user (the higher the number, the more likely a new customer will arrive). If a new customer should arrive, it randomly chooses the number of items that customer will have; this number will fall between 1 and the maximum number of items entered by the user, inclusive. Your program then creates this customer, using the `Customer` constructor, which chooses and prints a random name and random items. Finally, your program will place the new customer into a randomly chosen checkout line. Your program must wait after each minute of the simulation for the user to request to continue; the easiest way of doing this is with a `in.nextLine()` ; on a line by itself.

You will need to download *Customer.java*, *Words.java*, and *words.txt* from our syllabus page for this assignment. For everything to work, the *words.txt* file must not be in your *src* folder – just put it directly in the project folder, in the same place as *bin* and *src*. You need to write a `QMart` class with a `main` method that conforms to the description above.

Here is an example run of the program:

```
Welcome to QMart!
How many checkout lines do you have? 4
What are the odds of a new customer arriving during a given
minute?
Enter your choice as a decimal (between 0 and 1): .8
What is the maximum number of items a customer can have? 5
How many minutes should the simulation run? 10

Processing queues...
Checkout line 1 is empty!
Checkout line 2 is empty!
Checkout line 3 is empty!
Checkout line 4 is empty!
A new customer Pangaea has arrived.
```

That customer has the following items:

hemlock

sedate

jitterbug

packer

Added customer to queue 1

Press Enter to continue.

Processing queues...

Checkout line 1: processing hemlock from Pangaea

Checkout line 2 is empty!

Checkout line 3 is empty!

Checkout line 4 is empty!

No new customers this minute.

Press Enter to continue.

Processing queues...

Checkout line 1: processing sedate from Pangaea

Checkout line 2 is empty!

Checkout line 3 is empty!

Checkout line 4 is empty!

No new customers this minute.

Press Enter to continue.

Processing queues...

Checkout line 1: processing jitterbug from Pangaea

Checkout line 2 is empty!

Checkout line 3 is empty!

Checkout line 4 is empty!

A new customer Sal has arrived.

That customer has the following items:

fatals

bans

centerpiece

blockhouse

parallelizing

Added customer to queue 3

Press Enter to continue.

Processing queues...

Checkout line 1: processing packer from Pangaea

Checkout line 2 is empty!

Checkout line 3: processing fatals from Sal

Checkout line 4 is empty!
A new customer Orientalize has arrived.
That customer has the following items:
syringes
Added customer to queue 1
Press Enter to continue.

Processing queues...
Checkout line 1: processing syringes from Orientalize
Checkout line 2 is empty!
Checkout line 3: processing bans from Sal
Checkout line 4 is empty!
A new customer Isolde has arrived.
That customer has the following items:
gilded
denumerable
waiter
Added customer to queue 2
Press Enter to continue.

Processing queues...
Checkout line 1 is empty!
Checkout line 2: processing gilded from Isolde
Checkout line 3: processing centerpiece from Sal
Checkout line 4 is empty!
A new customer Voss has arrived.
That customer has the following items:
heritage
unlinks
shines
rum
Added customer to queue 4
Press Enter to continue.

Processing queues...
Checkout line 1 is empty!
Checkout line 2: processing denumerable from Isolde
Checkout line 3: processing blockhouse from Sal
Checkout line 4: processing heritage from Voss
A new customer Newfoundland has arrived.
That customer has the following items:
accuse
telegraphers
Added customer to queue 4

Press Enter to continue.

Processing queues...

Checkout line 1 is empty!

Checkout line 2: processing waiter from Isolde

Checkout line 3: processing parallelizing from Sal

Checkout line 4: processing unlinks from Voss

A new customer Thomistic has arrived.

That customer has the following items:

stiffest

erases

Added customer to queue 3

Press Enter to continue.

Processing queues...

Checkout line 1 is empty!

Checkout line 2 is empty!

Checkout line 3: processing stiffest from Thomistic

Checkout line 4: processing shines from Voss

A new customer Nellie has arrived.

That customer has the following items:

rooting

antidisestablishmentarianism

rubbish

Added customer to queue 2

Press Enter to continue.

Press Enter to exit...