

**CSC 383, Sections 401 and 410**  
**Fall, 2011**  
**Assignment 3**  
**Due 11:59pm CT, Tuesday, September 20<sup>th</sup>**

**Requirements.** You are to write a program that simulates and evaluates two approaches for serving customers waiting in a line at a fast-food restaurant.

The first method is one employed by restaurants like Cusi®: There is one line in which everyone waits and that is served by several order-takers. The second method is the one found in many McDonald's restaurants: There is one line for each order-taker.

A customer has (at least) two pieces of information: The time at which he or she arrived and the amount of time he or she will spend with the order-taker. The lines will be simulated by queues of customer objects. A customer arriving is simulated by adding an entry to a queue and a customer being served is simulated by popping an entry off a queue.

There will be a main loop that executes once for each simulated second of time. In the loop customers arrive (sometimes), get in line, and get served. And this is where you keep track of how long a customer had to wait.

When the simulation finishes, the program will print the total time simulated and, for each approach, the number of customers served and the average wait time. For the McDonald's simulation, it will also print how many lines were used.

Several questions should come to mind:

- How do we know that a customer has arrived?
- In the McDonald's simulation, which line does a customer get added to upon arrival?
- How do we determine the amount of time a customer will spend being served?
- How do we determine the amount of time a customer has waited to be served?
- What do we do with a customer who has never been to a McDonald's (!) and proceeds to ask detailed question about every item on the menu, including whether it's possible to have an Egg McMuffin® *without the egg*?

Other questions will surely arise and we will discuss them in class on Wednesday the 14<sup>th</sup>.

The program takes no input so test files won't be necessary.

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Submit a zip file called `Simulation.zip` containing source files. The one containing the main program must be called `Simulation.java`.

**Grading rubric:** This assignment is worth 50 points, with points assigned as follows:

- Variable and method names descriptive and mnemonic (4 points)
- Comment block with information specified (4 points)
- The values of various parameters controlling the simulation like the number of lines at McDonald's and the arrival rate of customers, are specified using constants defined at the top of the program (10 points)
- Randomness is used to make the simulation more realistic (5 points)
- A customer is an object and so defined in its own class (5 points)
- Program runs to completion and prints all requested output (20 points)
- Code is properly indented (2 points)

Beyond the above rubric, 2 points will be deducted for each missed requirement. If I say to do something a certain way, do it that way.