

Homework #4 Data Structures

Due: March 13, 2010 (Saturday at 11:59 PM)

Drive-Up Bank Discrete-Event Simulation

Write a drive-up bank simulation to determine: (1) how long customers had to wait in line on average, (2) the number of customers served during the simulation time, and (3) the number of customers waiting in line(s) at the end of the simulation. Write the simulation so you can produce six tables similar to the one below for the number of teller-windows varying from 1 to 6.

Assume the transaction times for each customer can vary as:

- 20% of the customers take 2 minutes
- 50% of the customers take 4 minutes
- 30% of the customers take 7 minutes

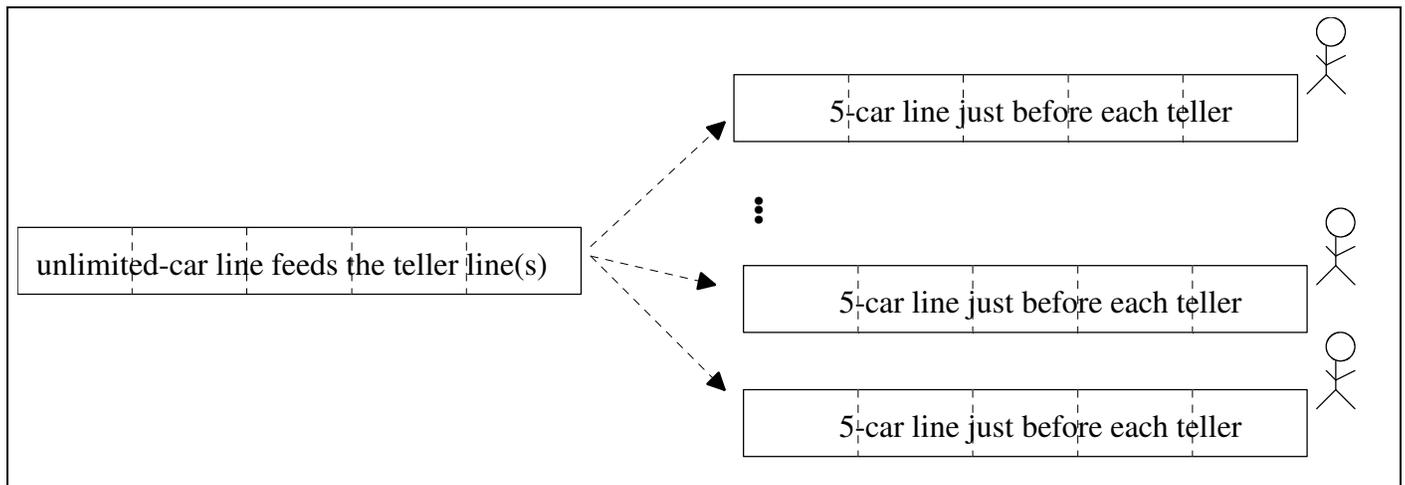
Use an integer counter as a simulated “wall clock.” Time stamp each customer with this simulated wall-clock time upon their arrival at the rear of the line. When a customer reaches a teller, the difference between their time-stamp and current “wall clock” determines how long they had to wait in line.

Run each simulation with arrival time probabilities of 0.6, 0.5, 0.4, 0.3, 0.2, and 0.1. For each of the arrival time probabilities, run the simulation for 120, 240, 360, 480, 600 minutes. For each simulation with a different number of tellers, your program should generate a table similar to the following:

2-Teller SIMULATION
 AVERAGE WAITING TIMES FOR CUSTOMERS
 (NUMBER OF CUSTOMERS SERVICED)
 [NUMBER OF CARS WAITING AT END OF SIMULATION]

Simulation Duration, min	Arrival Probabilities					
	0.6	0.5	0.4	0.3	0.2	0.1
120	234.2 (1200) [300]	...				
240	.					
360	.					
480	.					
600						

The parking lot is designed as a common line that splits into a smaller line(s) for each open teller window.



Hints:

- 1) Use queues to store the “cars” waiting in each line.
- 2) All you need to store in your queue is the time stamp of when a car arrived.
- 3) Start early and see me if you get stuck!

Submit your homework electronically at http://www.cs.uni.edu/~schafer/submit/which_course.cgi

The steps for the homework submission system are:

1. Write, debug, and test your program. Zip all files together in a file called Save it in a file called bankSim.zip
2. Log on to the submission system at: http://www.cs.uni.edu/~schafer/submit/which_course.cgi
(It is very likely that you will get some security certificate warnings when trying to use this. You may add an exception and accept the existing security certificate.) Use the same AD-ITS User name and password you use to log on the lab computers.
3. Select the course and section number of "810:052, Data Structures, Fienup". Click the "Continue" button.
4. Select the homework that you wish to submit: "HW 4 Bank Simulation". Click the "Continue" button.
5. Specify how many extra files you want to submit. Just leave it at 0. Click the "Continue" button.
6. Upload your program by Browsing and selecting your bankSim.zip file. Click the "Continue" button.
7. The next page reports on the status of the upload(s). You can always continue to upload a better version of the program until the deadline. The newer file will replace an older file of the same name.