Assignment 6: Event Driven Simulation solution

Make Commands :
(i) make : it creates the following files
1. qSim : two copies, one in bin folder, other in the main directory
2. ass6.o EventQueue.o EventQueue.so : in obj sub-directory

(ii)make clean:
It cleans all object files and output files.
(iii) make run : this command will execute in this way
for i=1 to 17 do
./qSim 100 4 60 2.3
done

Each execution will create following output files:
1. arrTimes.txt : it contains arrival times of all costumers.

2. costumerStaticsCommonLine.txt : it contains arrTime, WaitingTime, serviceTime and TotalTimeinBank of each costumer in case of a single Queue of Costumers. Costumer who leaves first is written first here.

3. costumerStaticsSepLine.txt : it contains arrTime, WaitingTime, serviceTime and TotalTimeinBank of each costumer in case of multiple Queues of Costumers. Costumer who leaves first is written first here.

4. gnuinputs.txt : this file contains no. of tellers and average time spent in the bank by each costumer. It appends after every execution.

5. gnuplot.pdf : this is the plot of the data we get from gnuinputs.txt.

6. output.txt : It contains the following details for every execution for both cases :
i. type of queuing
ii. total number of tellers
iii. Total time required to serve these costumers
iv. average spent time by a costumer
v. Maximum Waiting time of a costumer
vi. Total ServiceTime by all tellers
vii. Total idletime by all tellers

7. tellerStaticsCommonLine.txt : it contains totalIdleTime and totalServiceTime of each teller in case of Single Queue.

8. tellerStaticsSepLine.txt : it contains totalIdleTime and totalServiceTime of each teller in case of Mulitple Queues.

CONDITIONS OF THE PROGRAM:
Since, there were some ambiguites in the assignment document, So I assume the following points :
1. The bank will open till simulation time, i.e. there will be no work after simulation time.

2. If a costumer arrives the bank before simulation time but could not get his/her turn for servicing, he/she will have to go home without being served.

3. At the end of simulation time, costumers who are currently getting services will be completed by simulation Time.

TestCases :

There are three test cases with different number of total Costumers and tellers with different simulation time and avgServiceTime.

Make commands for these test cases :

1. make run
2. make run_test2
3. make run_test3

RESULTS :

Single Queuing Model is better than Multiple Queuing model because Maximum Waiting Time for a costumer is higher than Single Queuing Model in Multiple Queuing Model. Becuase A costumer can't change his/her line in Multiple Queuing Model.

REASON :

Initial condition :

t1	t2	t3	t4
c1	c2	c3	c4
c5		c6	

Now suppose costumer c7 comes. He will either go in the queue t2 or in t4. For now assume he goes in t2.

t1	t2	t3	t4
c1	c2	c3	c4
c5	c7	c6	

Now also fill queues with c8 c9 and c10

t1	t2	t3	t4
c1	c2	c3	c4
c5	c7	c6	c8
c9	c10		

Now suppose service time of c2 is very low and service time of c3 is very high. Then c7 will get service before c6 but c6 arrives in the bank before c7. So Waiting Time of c6 will be high.

Thus, Multiple Queue is a biased Model because it does not tell that the costumer who comes early will surely get service early.

But in Single Queue model, costumer who comes early will definately get service early.

If number of tellers are greater than number of costumers then both models are same.

GnuPlot : For large inputs, average time spent by a costumer first decreases by increasing number of tellers, then it becomes almost constant.

THANKS
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