CSE 6010

Assignment 6

Zheng Cai/Rui Jia

1. Introduction

Our program aims to simulate the lining system in the restaurant. It can be divided into three parts generator, queue station, and exit. Incoming customers can be generated by a generator with a specific time and enter the queue station for service and then get out or stay in this system. We create the event datatype to store the information of every customer and schedule these events by timestamp. There are three types of event: arrival, departure and generate. A function called eventhandler is used to assign each event.

1. Study of simulation outcomes

We built the system as the assignment required:

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0 G 15.0 1

1 Q 6.0 4 0.2 0.4 0.2 0.2 2 3 4 5

2 Q 192.0 2 0.5 0.5 6 7

3 Q 102.0 2 0.5 0.5 6 7

4 Q 198.0 2 0.5 0.5 6 7

5 Q 168.0 2 0.5 0.5 6 7

6 Q 30 2 0.5 0.5 8 9

7 Q 30 2 0.5 0.5 8 9

8 Q 60 5 0.95 0.0125 0.0125 0.0125 0.0125 10 2 3 4 5

9 Q 60 5 0.95 0.0125 0.0125 0.0125 0.0125 10 2 3 4 5

10 E

That shows the number and brief name of each component, and the first number after that is the average serving/interarrival time. Then there are the probabilities corresponding to components it links in the following. And last, are the next components.

1. Customer number analysis

And then we run that system by setting running time to 10, 60 and 240 minutes. In the following, there are the number of customers of these running time:

1. 10 minutes:

number of entered customers:37

number of exited customers:9

2. 60 minutes:

number of entered customers:258

number of exited customers:80

3. 240 minutes:

number of entered customers:982

number of exited customers:343

It shows that although we set the proportion of exiting after check-out is 95%, the ratio of excited to the entered customer is around 1/3. Except somebody goes back to queue after checking, there are still many customers keeping waiting at the system. Regard to the longer running time, more people are available to get out, which makes this ratio goes up with the increase of the running time.

1. Time analysis

From these three graphs, all the time in the system must be larger than waiting time since they include both waiting and serving time. And minimum waiting time can be 0 when the line is empty. The tendency we can find is with the increase in running time, both maximum and average time of waiting and being in the system increase because more customers get into the system that leads to crowded. But the minimum time in the system is not that case because of the difference in serving time of queue stations and the station the fastest customer chooses.

Right here is the average waiting time of each queue station throughout all three conditions. It reflects that more running time, longer waiting time for queues because there are more customers come in. Theses queue 2,3,4,5 that have long serving-time lead to more waiting time although customers are separated to a different one of them. To queue 8 and 9, all customers need to go there to check out but their waiting time is not quite long due to the fast service.