

CS 520

Introduction to Operating Systems

Homework Assignment 3

By-
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1. Does the distance between the adjacent buses remain the same? If not, what should be done to ensure that it be the same?
2. What is the average size of a waiting queue at each stop (and what are its maximum and minimum)?

Solutions

1. The distance between the adjacent buses does not remain the same throughout the simulation. This is because at every stop there are a varying number of people waiting to board and hence buses depart different stops at different times leaving the distances between the buses to change. A solution to this problem might be to make sure the buses leave the stops they are at after exactly a set time no matter if the boarding is complete or not. This way the buses will always maintain the same distance between each other.
2. The average size of waiting queue at each stop and the maximum and minimum are available in the file snapshot.txt provided in the zip file in the folder “Bus Service Original”. All the data is for each particular hour and is reset every hour. The formula for average waiting used is $(\text{Total people coming in queue in the hour}) / (\text{Total buses coming at the stop in the hour})$. For the first hour the above requested data is:

Hour 1

	Minimum Waiting	Maximum Waiting	Average Waiting
Stop 1	0	122	106
Stop 2	0	136	158
Stop 3	0	152	105
Stop 4	0	126	100
Stop 5	0	137	147
Stop 6	0	111	93
Stop 7	0	129	94
Stop 8	0	118	152
Stop 9	0	109	96
Stop 10	0	95	89
Stop 11	0	110	151
Stop 12	0	129	101
Stop 13	0	115	100
Stop 14	0	124	154
Stop 15	0	118	98

The reason for some average waitings to be greater than maximum waiting is that as and when people arrive in the queue they get boarded and so maximum number does not count all the people coming in the queue.

The solution proposed in point 1 is available in the folder “Bus Service Solution”. The value set for the bus departing is 15 minutes. This would mean that the bus would be at a stop for 10 minutes since it will spend 5 minutes reaching the stop. I found this the most effective

after many experiments since a bus can service 4 stops in an hour which is great and gives enough time for many passengers to board the bus.

All the outputs are based on the initial values suggested in the assignment file.

The output can be found in the log.txt file and the snapshots in snapshot.txt. The instructions to run the file as well as more information can be found in the README.txt file.