CS 520: Introduction to Operating Systems

Homework Assignment #2

(due *October 11 2016)*

This assignment is somewhat **open-ended**—start working on it as soon as you can!

As a minimum, a program must be written and a report prepared with the specific questions answered, but there is much room for using your creativity—please use it! The most important thing that you will have learned from this assignment is the discreet simulation technique, which you will apply (by re-using most of the code you develop to deal with this particular problem) later.

Write the bus simulation, as explained in the class and described in the notes. Feel free to look on the web for and then re-use any suitable code for the random number generator or for linked list algorithms. With that, 1) don't **forget** to include a reference to the source of any code you re-use and 3) remember to test all re-used code as you are the only one responsible for its performance..

The purpose of the simulation is to observe the behavior of the system, and answer the following questions:

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)? (You may provide this information on an hourly [simulation time] base.)

Plot the positions of buses as a function of time (you will need to generate periodic snapshots of the system for that). Feel free to change parameters; then observe and document the results.

What you hand in (again, everything you hand in must be in hard copy!) must include

1. The source code of your program (it **must** be well-commented) as well as the listing any of the input files it may use
2. Your report, including plots, observations, and—especially—your recommendations for change in the scheduling policies. Needless, to say you will need runs that demonstrate that your recommendations solve the problems you observe. **Remember that preparing a report is a very essential part of this assignment. This is not merely a programming exercise! The program must be working (or the assignment will get a grade of 0), but the report is the most important part.**

Feel free to change the simulation parameters. My initial suggestion is that there are

- 15 bus stops
- 5 buses
- The time to drive between any two contiguous stops is 5 minutes
- The passenger's mean arrival rate at each stop is 5 persons/min
- The boarding time is 2 seconds for each passenger
- The total simulation time is 8 hours.

Make sure you start this project as early as possible, and then… experiment, experiment, experiment! **(100 points)**