CS 150: Project I - Managing A Farmer's Market

Version as of: 07:19 Wednesday 23$^{\text{rd}}$ September, 2015
Due: 11:55pm, Saturday October 17,2015

Introduction

Project Description

Easton has the oldest continuously operating outdoor farmers market (`http://eastonfarmersmarket.com/`) in the US. One of the most important tasks of the market manager is to determine the number and type of stalls that should be in the market. The project will be to develop a simulation to help the manager at this task.

Goals

The goals of the simulation are to:

- minimize the time spent in line for each customer

- satisfy as many requirements for each customer as possible

- try to ensure that the market meet at least 50% of every customer's needs

- maximize the number of people going through the market

Market Constraints

1. the market opens at 9:30am and closes at 1pm

2. the market has a capacity of 750 units and each stall can take up 15 units and one person occupies 1 unit

3. the types of stalls to be considered are:

    - meat
    - baked goods

- vegetables
- fruits
- dairy
- coffee/tea (beverages)

4. there is at least one line per stall

5. each stall is manned by a minimum of two people. Two workers are required to suppprt one line.

6. each stall can take up a maximum of 35 units (including the workers and customers)

To see how to generate random numbers with a Gaussian (normal) distribution see `http://www.javapractices.com/topic/TopicAction.do?Id=62`.

Project Constraints

The following constraints apply to the project:

1. The project is to be completed individually. The only person you can consult is the instructor.

2. Each configuration of parameters should be run *at least* 5 times with different random seeds to obtain an "average" value.

Extensions

You can extend your project with one (or more) of the following:

1. Add additional workers. Each additional worker at a stall can manage an additional line.

2. Vary the space taken up by a stall -

   - meat stalls take up 14 units
   - vegetable stalls take up 17 units
   - dairy stalls take up 10 units
   - baked goods stalls take up 12 units
   - beverage stalls take up 15 units

3. run the simulation with various sizes for the market to determine "what is the optimum size of the market?"

Simplifications

You can simplify your project in one (or more) of the following ways:

1. only focus on a subset of the goals

2. have a smaller number of items available (at least 2 items should be available)

3. run your simulation for a shorter period of time - 9:30 to 11:30

Report

Your simulation and report should try to answer questions like the following:

1. what is the average time a customer spends in the market?

2. what is the optimum distribution (how many of each type) of stalls for the market?

3. what is the most critical type of stall in the market? Another way of asking the question: If the number of customers were to increase by 10%, what stalls should be added first?

Grading

Your project will be graded on the following criteria (assuming the program compiles and runs):

1. correctness of the program

2. documentation (methods and classes)

3. unit testing

4. object oriented design

5. quality of the simulation and analysis

Submission

Submission is in 3 parts:

1. Part I - 2pts (due Saturday September 26): the "story" of your program

2. Part II - 2 pts (due Saturday October 3): class diagrams for your program

3. Part III - 96 pts (due October 17): the rest including a draft report

 Your submission for Part III will be composed of the following:

1. source files (*.java) that are commented and have javadoc directives

2. test files, one test file per class

3. a README.txt file that contains instructions on how to run your program

4. a draft of the project report (see project report guidelines `www.cs.lafayette.edu/~liew/courses/cs150/writeup-guidelines.pdf`) - 50% of the report grade is assigned to this. The remaining 50% will be given to a final report. The final report will be due several days after the draft is corrected and returned.