Lab 5   {Note Lab 5 runs for two weeks}   9 points
Simulating a Shopper on the Third Floor

In Program 5, you must simulate in C++ concurrent shoppers shopping in a four-floor mall. To assist the student in breaking up a large programming assignment into smaller design components, Lab 5 addresses an easier problem, simulating a single shopper on the Third Floor.

The Lab 5 program will read in a line of information of the form:

  xpos ypos stores

where
xpos ypos indicate the start location for the shopper on the Third Floor.
        {Assume the upper left corner position on a floor is $(0, 0)$.}

stores is the number of stores the shopper will visit.

For example, given the input line:

  7 7 4

the shopper starts from an initial location on the Third Floor in location $(7, 7)$ which is just to the left of store 3213 (see the Third Floor plan).

The program then reads in stores lines of input of the form:

  store-id service-time

where

  service-time   indicates that the shopper will need service-time units of simulated time at store
               store-id.

For example, using the above shopper visiting 4 stores, a sample input is:

```
3106    10
3207    85
3405   102
3506    26
```

In this case, the simulation would send the shopper to four stores (3106, 3207, 3405 and 3506) and the total time spent in the four stores is 223 simulated time units. Assume the stores are input sorted in increasing store-id order. After leaving the last store on the store list, the shopper goes to the stairs and the simulation ends.

For this lab assignment, your program should implement time in each store as a round robin (RR) queue with a time slice of 3 time units. Note, for a single shopper simulation, the RR queue is overkill and the queue mechanism does not get fully exercised. But it is important to have this queue mechanism operational for Lab 5 before moving on to Program 5. If you do not have a working version of Program 3, we will make a working C version of a RR queue available prior to the start of the lab.

Main Assignment

This lab assignment runs over two labs with attendance at the second lab being optional. Your C++ program simulates the scenario of a single shopper detailed above.

Lab Program Output

The Lab 5 program should print out a log of the shopper's significant events that includes, but not necessarily in this format:

The shopper begins at location (x,y) on at time t.
The shopper arrives at store s at time t.
The shopper leaves store s at time t.
The shopper exits the simulation at time t.

Lab 5 Assignment

0.   Prior to coming to the lab prepare a preliminary solution to the program above.
1.   Create a make file.
2.   Run the program on the provided test data file 'lab4.dat' redirecting the output to lab5.out
3.   Create a README file that contains any useful information to assist in the grading of your lab program.
4.   Create a tarred file that contains all the source and header files, the make file and the README file and your output file.
5.   Use the Unix version of the 'turnin' to turn-in the tarred file. [The deadline for this lab turn-ins is <u>8 days</u> after the beginning of your assigned lab 5.]