Homework 1: File Reading and Class Design

CSCI 60

Due before class Wednesday, January 15, 2020

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Overview. This first programming assignment has you write two programs. Both have starter files which contain some useful code already written for you. The first program is a review of file I/O; if you are new to C++, you can find everything you need in the early part of the textbook's chapter on file I/O. The second program has you design a class `MazeRacer` to modify and keep track of a racer's coordinates on a grid.

Submission instructions. Submit your two files to Camino before your class next Wednesday. Make sure to include your name in the comments at the top of each file. Do not change the names of the starter files.

Question 1. Your completed program should simulate rolls of several pairs of dice and store them in a data file, and then it should read from the data file to produce a histogram file with a simple text representation of a histogram. The simulation is already done for you; your task is to produce a histogram, formatted as on the reverse sheet. You are encouraged to use the helper functions in the starter file as guidance, but you don't have to as long as you produce a correct histogram.

Question 2. For this program, you will design a class `MazeRacer` to keep track of where a mouse or human is on a grid. You will use this class to write an application program that first asks the user to provide names for two `MazeRacer` objects and starting coordinates for the second of them. The program then requests target coordinates and a move sequence for each `MazeRacer`. Finally, it reports whether each racer ended up at the target. A sketch of the application is provided in your starter file. When you are finished, your program should be able to produce output as follows:

```
Enter a name for the first maze competitor: Algernon
Algernon will start at (0,0).
Enter a name for the second maze competitor: Charlie
Enter starting coordinates for Charlie: 1 2
Enter the target coordinates: 3 4
Enter a sequence of moves (LRUD) for Algernon:
RRURUUU
Enter a sequence of moves (LRUD) for Charlie:
RRU
Algernon was at the target after 7 moves
Charlie was not at the target after 3 moves
```

Although you could probably get a program that produces output as above without using classes, the purpose of this problem is to practice class design, and so the information about Algernon should be processed by one `MazeRacer` object and the information about Charlie should be processed by another. Your class must have member variables that keep track of the name, location, and number of moves that have been taken by a racer. It should have member fields that allow the location to change with incremental moves (e.g., `moveLeft()`). These move functions should be the only way to modify the location. Add accessor methods wherever your program needs it. You should have at least two constructors, and you should make thoughtful decisions abut what should be public and what should be private.

Question 1 sample output. The following represent the contents of `data.txt` and its corresponding `hist.txt`, respectively, for `N_ROLLS=15`.

```
4
9
8           2:
4           3:
8           4: ****
7           5: **
4           6: *
10          7: *
4           8: **
10          9: **
6           10: ***
10          11:
9           12:
5
5
```