CptS 223 – Advanced Data Structures in C++

Micro-assignment 3: C++ STL Map

I. Learner Objectives:

At the conclusion of this programming assignment, participants should be able to:

Apply the C++ STL std::map associative container

II. Prerequisites:

Before starting this programming assignment, participants should be able to:

Analyze a basic set of requirements and apply top-down design principles for a problem

Describe and analyze red-black trees

Design, implement, and test medium programs in an object-oriented language

Edit, build, and run programs through a Linux environment

III. Overview & Requirements:

We understand that a *map* is an abstract data type. It is also sometimes known as an *associative container* or generalized *dictionary*. A map is composed of a collection of key-value pairs that are ordered by unique keys. In C++, we can use the STL `std::map`. The C++ `std::map` is implemented using a red-black tree.

To get a feel for the official C++ devdocs on *maps*, I highly recommend that you checkout: https://devdocs.io/cpp/header/map. However, the following site does a nice job of summarizing the operations that you will need to use for the assignment: https://en.cppreference.com/w/cpp/container/map.

In this micro-assignment, you will start with the code found on Canvas. Feel free to add more files as you see fit! You will need to use a `std::map` to store the Twitter account information provided in the existing code. Note: the amount of data is purposely very small so that we can focus more on the map operations. In the code, you are provided with some constraints on how the data members of the class `TwitterData` are used. You should not change TwitterData class.

What is required?

In your main.cpp:

(50 pts) Map Scenario 1: Search based on UserName

- (10 pts) Create a new std::map
- (10 pts) Insert all Twitter data into the std::map. Use a proper data member in TwitterData class to be the key. Use TwitterData class as the value.
- (10 pts) Iterate through the std::map and print the key-value pairs line by line
- (10 pts) Find the person whose username is savage1 and print out the entire record
- (10 pts) Remove this person from the map

(40 pts + 10 bonus pts) Map Scenario 2: Search based on EmailAddress

- (10 pts) Create a new std::map
- (10 pts) Insert all Twitter data into the std::map. Use a proper data member in TwitterData class as the key. Use TwitterData class as the value.
- (10 pts) Iterate through the std::map and print the key-value pairs line by line
- (10 pts) Find the person whose email is kat@gmail.com and print out the entire record
- (10 bonus pts) Remove this person from the map

Other requirements:

- (10 pts) Correctly use cmake to build. The given project already has a correct CMakeLists.txt. You can change it if needed.

IV. Submitting Assignments (either way):

1. Options 1: Canvas

   Zip all source files (including CMakeLists.txt, etc., if any) and upload it to Canvas.

2. Option 2: Git

   1) On your local file system, and inside of your Git repo for the class, create a new branch called MA3, push all files of the given project to the MA3 branch of your private GitHub repo created in PA1.
   2) Submission: You must submit a URL link to the branch of your private GitHub repository. Please make sure the instructor and TAs (GitHub account listed in Syllabus) are the collaborators of your repository. Otherwise, we won't be able to see your repository. DO NOT CREATE NEW REPO.
   3) Do not push new commits the branch after you submit your URL to Canvas otherwise it might be considered as late submission.

V. Grading Guidelines:

This assignment is worth 100 points + 10 bonus.

*Sample output:

```
Print searchByName map:
Key: kittyKat72, Value: kittyKat72,Kathryn Smith,kat@gmail.com,56,health
Key: lexi5, Value: lexi5,Alexis Anderson,lexi5@gmail.com,900,education
Key: rangerPower, Value: rangerPower,Rick Smit,smitRick@gmail.com,1117,power lifting
Key: savage1, Value: savage1,Ken Savage,ksavage@gmail.com,17,president
Key: smithMan, Value: smithMan,Rick Smith,rick@hotmail.com,77,olympics
Search for key: savage1 Value: savage1,Ken Savage,ksavage@gmail.com,17,president
Print searchByEmail map:
Key: kat@gmail.com, Value: kittyKat72,Kathryn Smith,kat@gmail.com,56,health
Key: ksavage@gmail.com, Value: savage1,Ken Savage,ksavage@gmail.com,17,president
Key: lexi5@gmail.com, Value: lexi5,Alexis Anderson,lexi5@gmail.com,900,education
Key: rick@hotmail.com, Value: smithMan,Rick Smith,rick@hotmail.com,77,olympics
Key: smitRick@gmail.com, Value: rangerPower,Rick Smit,smitRick@gmail.com,1117,power lifting
Search for key: kat@gmail.com Value: kittyKat72,Kathryn Smith,kat@gmail.com,56,health
```