CS 200 – Intro to Programming

Assignment 1 Fall 2018

Release Date: **Sunday** 23rd September 2018, 12:00 AM
Due Date: **Sunday** 30th September 2018, 11:55 PM

Please keep in mind the following guidelines:

- Do not share your program code with anyone.
- Do not copy code from the internet.
- If you receive any assistance, mention the part of code in which you received assistance.
- You must be able to explain any part of your submitted code.
- All submissions are subject to automated plagiarism detection.

Submission:

You have to submit all the .cpp files containing source code. Zip all .cpp files into one file named as <your8DigitRollNumber> .zip and submit the zip file.

Task 1:

The teaching assistants for CS200 want to make their grading and reporting tasks easier by making a program to help them input the set of students from a file and output their letter grades. Your task is to use classes, functions and file handling to make this program in C++. You will have to perform the following tasks:

File format: Student_Name Roll_number Marks

John_Doe1 2100xxxx 98
John_Doe2 2100xxxx 96

example file available on LMS

1. Make a class called "Students" with the following private members:
    i. Name
    ii. Roll Number
    iii. Marks(0-100)
2. Make a function inputStudentInfo() which will take a file, which includes all information of students and save it in the object of the class Students. You can make an array of objects. A file with formatted student info is given, you need only cater to this form of input.
3. Make a function sortMarks() to sort all of the students in ascending order according to the marks given to each student. You will have to use a sorting algorithm here.
4. Make a function assignGrades() to all of the students after they have been sorted. You can use the following scheme:
    i. A: 85 and higher
    ii. B: between 75 and 85
    iii. C: between 65 and 75
    iv. D: between 50 and 65
    v. F: 50 and below
5. Make a function writeToFile() to write all of the student data along with the assigned grades to a file in the same format as the file given to you.

(30 Marks)

Task 2:

Write a program that performs number system conversion. You have to deal with binary, decimal and hexadecimal number systems. Program takes input in any of above mentioned number system as desired by user and outputs equivalent value in other number systems.

Useful Resources:

- (Read Section 2.5 from book 'C++ for everyone'
- http://www.cplusplus.com/reference/string/string/operator[]/).

(Do not use built in function of c++ to perform number system conversion).

Program Flow:

- Program shows the list of supported number systems.
- User selects desired number system and enters input.
- Program shows equivalent values in other number systems corresponding to the given input.
- Program should keep running until "***sentinel value***" is entered.

Sample Run:

```
>> Enter 1 for decimal number system
>> Enter 2 for binary number system
>> Enter 3 for hexadecimal number system
>> Enter -1 to exit
>> Enter your choice : 3
>> Enter a hexadecimal number : f0a87

Decimal : 985735
Binary : 11110000101010000111
Hexadecimal : f0a87

>> Enter your choice : -1
>>
```

Assume that input number can be of 5 digits at maximum. In case of hexadecimal numbers, input is not case sensitive. For example f0a87, F0a87 and f0A87 should be treated as same number. Moreover, you have to show proper error messages if invalid input is entered.

(40 Marks)

Task 3:

For this question you have to create two files. A header (complex.h file) that stores only the class declaration. An implementation file (complex.cpp) file that stores the implementation of the class. Also, the main function can be in a main.cpp file.

Create a class that implements a new type called complex numbers which is able to add and multiply and display complex numbers. You have to read about complex numbers and their addition and multiplication from the internet.

You have to include the following in the class:

private data members:
real and imaginary parts of a complex number. (both are float or double type)
public members (define the parameters yourself):

1. **`Constructor`**: default constructor without parameters. Initialize members to zero
2. **`SetReal`**
3. **`GetReal`**
4. **`SetImaginary`**
5. **`GetImaginary`**
6. **`Assign`**: Method that takes a complex number object as parameter and assigns itself its values
7. **`Add`**: Method that takes two complex numbers as parameters and returns their sum (think carefully on the type of parameters and their return types)
8. **Multiply**: Method that takes two complex numbers as parameters and returns their product (think carefully on the type of parameters and their return types)
9. **PrintNumber**: This method should output the number in the form a+ib
10. **InputNumber**: This method should input the values of real and imaginary parts from the user

In the main function create a **menu** that tests all the above methods.

(30 Marks)

(END -- GOOD LUCK!)