**CIS 223 Computer Science II**

**Assignment Four**

**Due: May 16, 2022**

**Option 1: Person Class**

For this assignment, design and implement class Person, Doctor, Patient, and Billing.

Define a base class called Person. The class should have two data members to hold the first name and last name of a person, both of type string.

The Person class will have a default constructor to initialize both data members to empty strings, a constructor to accept two string parameters and use them to initialize the first and last name, and a copy constructor. Also include appropriate accessor and mutator member functions. Overload the operators == such that two objects of class Person are considered equal if and only if both first and last names are equal. Overload the assignment operator = such that one object of Person can be copied to another Person object.

Also overload operators >> and <<.

The definition of Person class follows:

**Step 2: Doctor Class**

Define a class called Doctor derived from the Person class.

The class should have a data member to hold the doctor's hourly rate (of type double), a default constructor to initialize the rate to 0, and a constructor that takes a double and a reference to an object of type Person and initializes the data members to their appropriate values. Also include an accessor and mutator member functions for the doctor's hourly rate. In Doctor class, redefine the operator = such that it not only copies the first and last name, but also copies the hourly rate.

**Step 3: Patient Class**

Define another class called Patient derived from the Person class.

This class should have a data member to hold the patient's primary physician (of class Doctor). Include a default constructor that would call the default constructors of class Doctor and Person to initialize the object; also include a constructor that accepts a reference to an object of class Doctor and Person and initializes the Patient object's data members to their respective values. Add accessor and mutator member functions to access or set the primary physician.

**Step 4: Billing Class**

Define a class called Billing that would hold information about medical bills.

This class should have the following data members: an object of type Doctor to hold the doctor to whom the money is paid, an object of type Patient to hold the patient who pays the money, and a variable of type double to hold the amount due. The Billing class will have a default constructor that initializes amount due to 0.0 and calls the default constructors for Patient and Doctor objects and a constructor that accepts references to Doctor and Patient objects and the amount of hours (type int). The latter constructor will calculate the amount due in the following fashion:

\* if the doctor involved in the bill is the patient's primary physician, then the amount due is hours multiplied by the doctor's hourly rate;

\* if the doctor involved is not the patient's primary physician, then the amount due is hours times **doctor's hourly rate** times 1.25.

Write a main function that would prompt the user to enter the patient's name, their primary physician's name and rate, another doctor's name and rate, and the amount of hours spent in the doctor's office. Creates at least two patients, at least two doctors, and at least two Billing records, then the program will calculate and output the total amount that the patients owe for doctors’ services.

Note: two doctors are considered the same if and only if their names match (i.e. you can assume no doctors with the same name and different rates exist).

* Make sure that all your member functions should be tested and documentation added.

**Sample Output:**

Enter the patient's name: Michael Johnson

Enter primary physician's name and their rate: Jessica White 120.0

Enter a doctor's name and their hourly rate: Jessica White 120.0

Enter amount of hours: 3

Enter the patient's name: John Smith

Enter primary physician's name and their rate: Jessica White 120.0

Enter a doctor's name and their hourly rate: Eric Wagner 120.0

Enter amount of hours: 3

Enter the patient's name: Megan Miller

Enter primary physician's name and their rate: Peter Kipp 150.0

Enter a doctor's name and their hourly rate: Sean Anderson 120.0

Enter amount of hours: 2

Michael Johnson owes: 360 dollars.

John Smith owes: 450 dollars.

Megan Miller owes: 300 dollars.

The total income from the billing records: 1110.0 dollars

**Option 2: Design your own Game**

In this assignment, you can create your own game using C++ libraries. Though you will choose the game and implement it from scratch, your implementation must be well designed and must integrate several programming concepts from this course.

Use this project as a chance to show off everything you’ve learned and to build a large-scale application of your own design. You will demo your game and explain your design to me in a one-on-one session.

Have fun doing this assignment! This will historically be students’ favorite project of CIS223, and you are more than welcome to go a little overboard if you choose. :-) You can invent a totally new game as part of this project, and these are always a ton of fun to show off.

You are completely free to either implement an existing game or come up with your own unique, awesome game. No matter what kind of game you build, it must meet the requirements. I encourage you to discuss any ideas and details of your game design with me.

**Submission**

You are to submit electronically:

* All files constituting the solution of this assignment.
* Complete program documentation is required. That means that line comments AND function description boxes are needed.
* Write a report file describing how the programs work and input/output screenshot.
* Submit a copy of the source code(s) to the DropBox using D2L.