PROG24310: Programming Languages

Evaluation: 10 points, 10% of your final grade.
Due date: November 28th, 2016 (11:30pm)

In this assignment you need to write class definitions and a main program to simulate different pricing plans for a cellular telephone provider.

Suppose you work in the marketing department of the GreedyCellular company. Your boss wants you to compare a proposed plan that offers customers a Basic plan and a Premium plan. The Premium plan is designed so that customers who make many calls save money by paying a higher monthly fee.

Write class definitions for **Customer** and for a derived class **PremiumCustomer**. Customer should contain data members common to all customers, like the number of calls made in a month, the customer's name, balance and so on.

Also implement a virtual member function for computing a bill, **computeBill( )** which uses the appropriate algorithm and data members to compute a monthly charge for each type of customer.

In all classes be sure to also include any constructors and other member functions that you think are needed especially if you use dynamic memory allocation in your class. The derived class should contain data members and initializations specific to its payment plan, and a specific implementation for the **computeBill()** method which overrides the default method.

In your program you need to create a simulation: make a large population of customers half of whom use each plan. Use a random number generator to vary the number of calls from 10 to 100 per month. Also use a random number generator to vary the number of minutes per call from 1 minute to 4 hours (all the calls are rounded to an int).

Your program must answer which plan is better for most customers in the simulation. For the customers who do save with the premium plan you need to indicate the average savings.

You need to improve **addCall()** method shown below so it can record phone number called and date/time of the call. Implement **printBill()** method that prints detailed call log.

You can start with the following sample template for the main program:

```
int main () {
  Customer *list[6] ;
  list[0] = new Customer("John Smith", 20); // 20 is the initial balance
  list[1] = new Customer("Bob Smith", 50);
  // list goes on...
  list[6] = new PremiumCustomer("Jane Doe", 100);
  list[7] = new PremiumCustomer("Mary Doe", 60);


  // Add number of calls:
  list[0].addCall(51); // call was for 50 minutes
  list[0].addCall(23); // call was for 23 mins
  list[6].addCall(71);
  // more calls added…

  for(int i=0; i<6; i++) {
  cout << "Customer " << list[i] << " owes "
     << list[i].computeBill() << " dollars." << endl;
  }

  return 0;
}
```

Compute the basic Customer's bill as:
`Bill = monthlyfee + (percall × numcalls)`
using a monthly fee of $10 and a per call charge of $0.50.

Compute a Premium Customer's bill as:
`Bill  = monthlyfee + (percall × numcalls) + (permin × nummins)`
using a monthly fee of $20, a per call rate of $0.05, and a per minute call of $0.10

Requirements:

Your C++ program must:

- Use proper C++ libraries.
- Use proper Object-Oriented concepts.
- Be reasonable optimized: use proper data types, properties and methods, etc.

Submission:

- Please make sure your programs work in NetBeans/Cygwin!
- You must upload .**zip** file of the entire project to the Dropbox.
- Your submission must be unique.
- **Late submissions are not accepted!**

Mark Breakdown & Deductions:

Missing Functionality	Mark deduction
The program is not optimized.	up to -3 points
Program doesn't compile/run, or partial functionality is provided.	varies