Object Oriented Programming

Lab Report

Lab07

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Class	Object Oriented Programming CSC241 (**BCE-4B**)
Instructor's Name	Maam Amber Madeeha Zeb

In Lab Tasks

5.1 Question 1:

Imagine a publishing company that markets both book and audio-cassette versions of its works. Create a class publication that stores the title and price of a publication.

a. from this class derive two classes:

- **book, which adds a page count and**
- **tape, which adds a playing time in minutes.**

each of these three classes should have getdata() function to get its data from the user at the keyboard and a putdata() function to display its data.

b. Write a main() program to test the book and tape class by creating instances of them, asking the user to fill in their data with getdata() and then displaying the data with putdata().

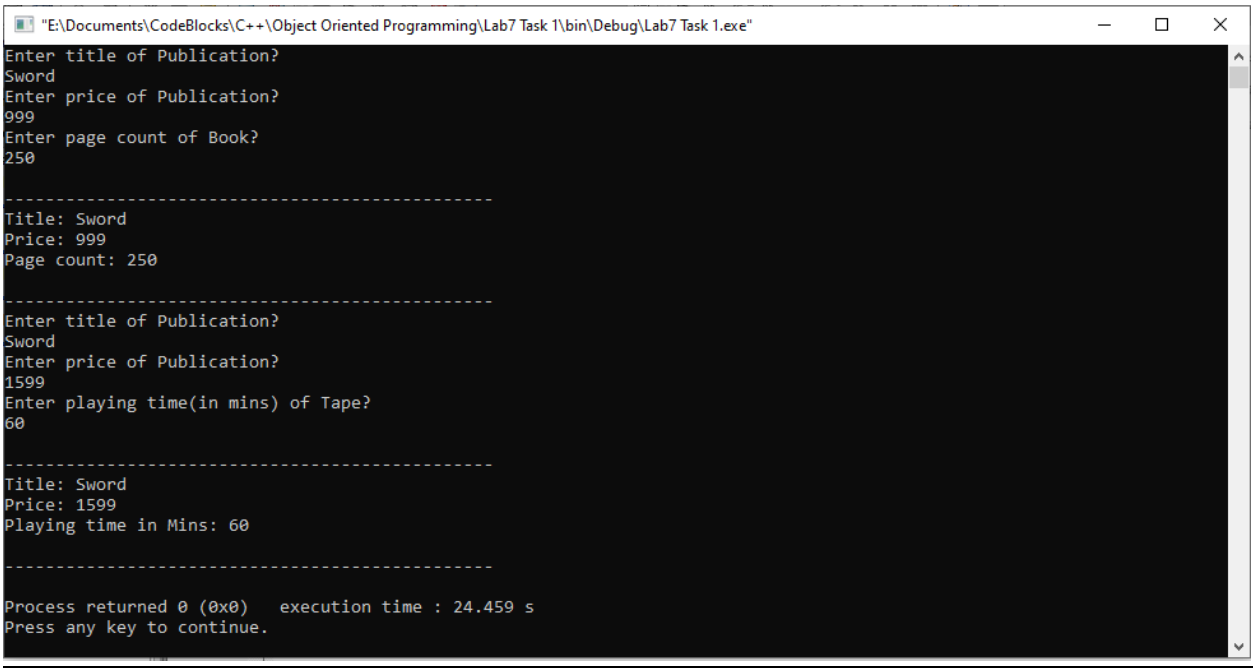
Solution:

The code is given below,

```
1  #include <iostream>
2
3  using namespace std;
4
5  class publication
6  {
7  protected:
8
9      string title;
10     float price;
11 public:
12
13     void getData()
14     {
15         cout<<"Enter title of Publication?"<<endl;
16         cin>>title;
17         cout<<"Enter price of Publication?"<<endl;
18         cin>>price;
19     }
20     void putData()
21     {
22         cout<<"\n-----------------------------------------------\n";
23         cout<<"Title: "<<title<<endl;
24         cout<<"Price: "<<price<<endl;
```

```
25      }
26
27  };
28
29  class book:public publication
30  {
31  private:
32      int page_count;
33  public:
34      void getData()
35      {
36          publication::getData();
37          cout<<"Enter page count of Book?"<<endl;
38          cin>>page_count;
39      }
40      void putData()
41      {
42        publication::putData();
43          cout<<"Page count: "<<page_count<<endl;
44          cout<<"\n-----------------------------------------------\n";
45      }
46
47
48  };
49  class tape:public publication
50  {
51  private:
52      int playing_time_min;
53  public:
54      void getData()
55      {
56          publication::getData();
57          cout<<"Enter playing time(in mins) of Tape?"<<endl;
58          cin>>playing_time_min;
59      }
60
61      void putData()
62      {
63
64          publication::putData();
65          cout<<"Playing time in Mins: "<<playing_time_min<<endl;
66          cout<<"\n-----------------------------------------------\n";
67      }
68
69  };
70
71  int main()
72  {
73      publication p;
74      book b;
75      tape t;
76
77
78      b.getData();
79      b.putData();
80
81      t.getData();
82      t.putData();
83
84      return 0;
85  }
```

Console Output is shown below.



5.2 Question 2:

Write a class Person that has attributes of id, name and address. It has a constructor to initialize, a member function to input and a member function to display data members. Create another class Student that inherits Person class. It has additional attributes of rollnumber and marks. It also has member function to input and display its data members.

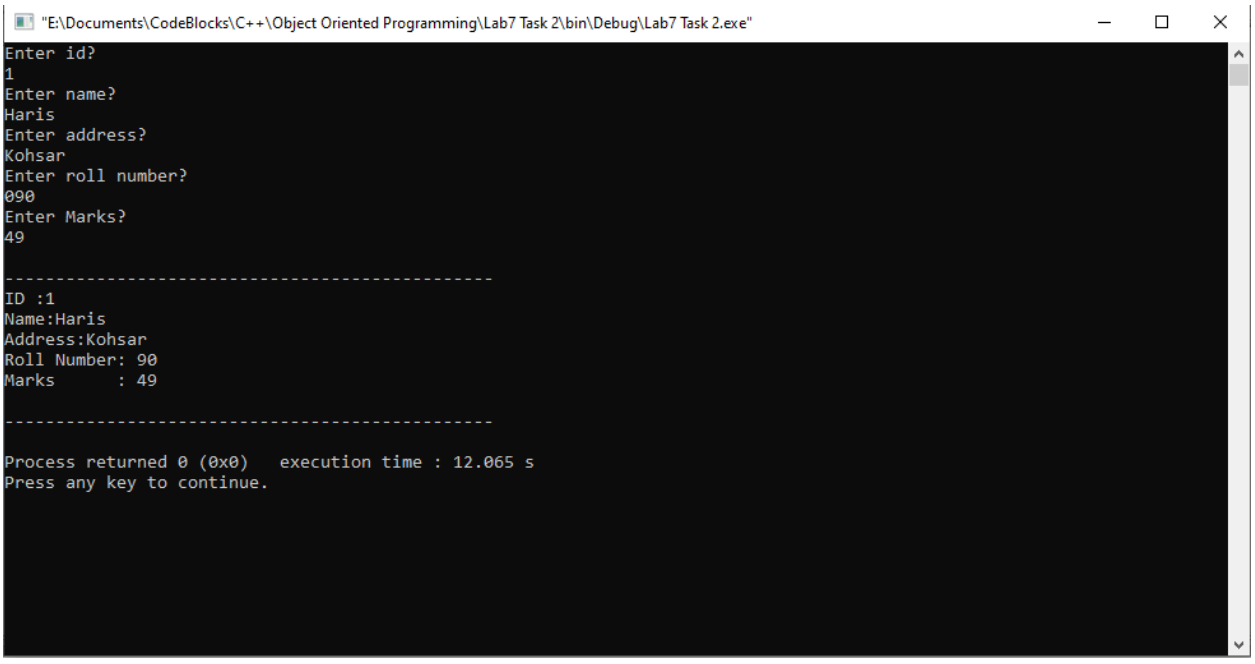
Solution:

The code is given below,

```
#include <iostream>

using namespace std;

class person
{
private:
    int id;
    string name;
    string address;

public:


    person()
    {
        id=0;
        name="name";
        address="address";
    }
    void getData()
    {
        cout<<"Enter id?"<<endl;
        cin>>id;
        cout<<"Enter name?"<<endl;
        cin>>name;
        cout<<"Enter address?"<<endl;
        cin>>address;

    }

    void showData()
    {
        cout<<"\n-----------------------------------------------\n";
        cout<<"ID :"<< id<<endl;
        cout<<"Name:"<<name<<endl;
        cout<<"Address:"<<address<<endl;

    }

};

class students:public person
{
private:
    int roll;
    int marks;

```

```
49  public:
50      void getData()
51      {
52           person::getData();
53          cout<<"Enter roll number?"<<endl;
54          cin>>roll;
55          cout<<"Enter Marks?"<<endl;
56          cin>>marks;
57      }
58       void showData()
59      {
60          person::showData();
61          cout<<"Roll Number: "<<roll<<endl;
62          cout<<"Marks      : "<<marks<<endl;
63          cout<<"\n-----------------------------------------------\n";
64      }
65
66  };
67  int main()
68  {
69
70      students one;
71
72      one.getData();
73      one.showData();
74
75
76      return 0;
77  }
```

Console Output is shown below.



5.3 Question 3:

Write a base class Computer that contains data members of wordsize(in bits), memorysize (in megabytes), storagesize (in megabytes) and speed (in megahertz). Derive a Laptop class that is a kind of computer but also specifies the object's length, width, height, and weight. Member functions for both classes should include a default constructor, a constructor to inialize all components and a function to display data members.

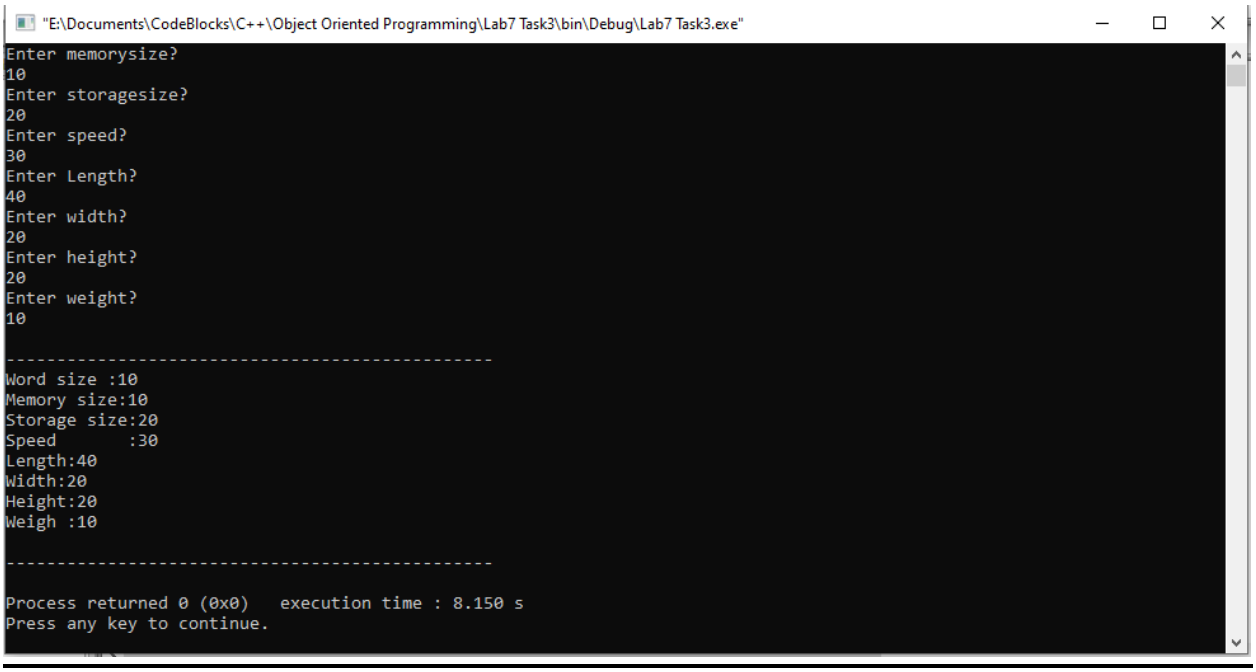
Solution:

The code is given below,

```
#include <iostream>

using namespace std;

class Computer
{
protected:
    int wordsize;
    int memorysize;
    int storagesize;
    int speed;

public:

    Computer()
    {
        wordsize=0;
        memorysize=0;
        storagesize=0;
        speed=0;
    }

    void getData()
    {
        cout<<"Enter wordsize?"<<endl;
        cin>>wordsize;
        cout<<"Enter memorysize?"<<endl;
        cin>>memorysize;
        cout<<"Enter storagesize?"<<endl;
        cin>>storagesize;
        cout<<"Enter speed?"<<endl;
        cin>>speed;
    }
    void showData()
    {
        cout<<"\n-----------------------------------------------\n";
        cout<<"Word size :"<<wordsize<<endl;
        cout<<"Memory size:"<<memorysize<<endl;
        cout<<"Storage size:"<<storagesize<<endl;
        cout<<"Speed       :"<< speed<<endl;
```

```
41
42      }
43  };
44  class laptop: public Computer
45  {
46  private:
47      int length;
48      int width;
49      int height;
50      int weight;
51  public:
52      laptop()
53      {
54          length=0;
55          width=0;
56          height=0;
57          weight=0;
58      }
59      void getData()
60      {
61         Computer:: getData();
62          cout<<"Enter Length?"<<endl;
63          cin>>length;
64          cout<<"Enter width?"<<endl;
65          cin>>width;
66          cout<<"Enter height?"<<endl;
67          cin>>height;
68          cout<<"Enter weight?"<<endl;
69          cin>>weight;
70      }
71      void showData()
72      {
73          Computer::showData();
74
75          cout<<"Length:"<<length<<endl;
76          cout<<"Width:" <<width<<endl;
77          cout<<"Height:"<<height<<endl;
78          cout<<"Weigh :"<<weight<<endl;
79          cout<<"\n-----------------------------------------------\n";
80      }
81
82  };
83
84  int main()
85  {
86      laptop l;
87      l.getData();
88      l.showData();
89      return 0;
90  }
```

Console Output is shown below.


"E:\Documents\CodeBlocks\C++\Object Oriented Programming\Lab7 Task3\bin\Debug\Lab7 Task3.exe"
Enter memorysize?
10
Enter storagesize?
20
Enter speed?
30
Enter Length?
40
Enter width?
20
Enter height?
20
Enter weight?
10
Word size :10
Memory size:10
Storage size:20
Speed :30
Length:40
Width:20
Height:20
Weigh :10
Process returned 0 (0x0) execution time : 8.150 s
Press any key to continue.

POST LAB

6.1 Question 4:

Write a program having a base class Student with data members rollno, name and Class define a member functions getdata() to input values and another function putdata() to display all values. A class Test is derived from class Student with data members T1marks, T2marks, T3marks, Sessional1, Sessional2, Assignment and Final. Also make a function getmarks() to enter marks for all variables except Final and also make a function putmarks() to display result. Make a function Finalresult() to calculate value for final variable using other marks. Then display the student result along with student data.

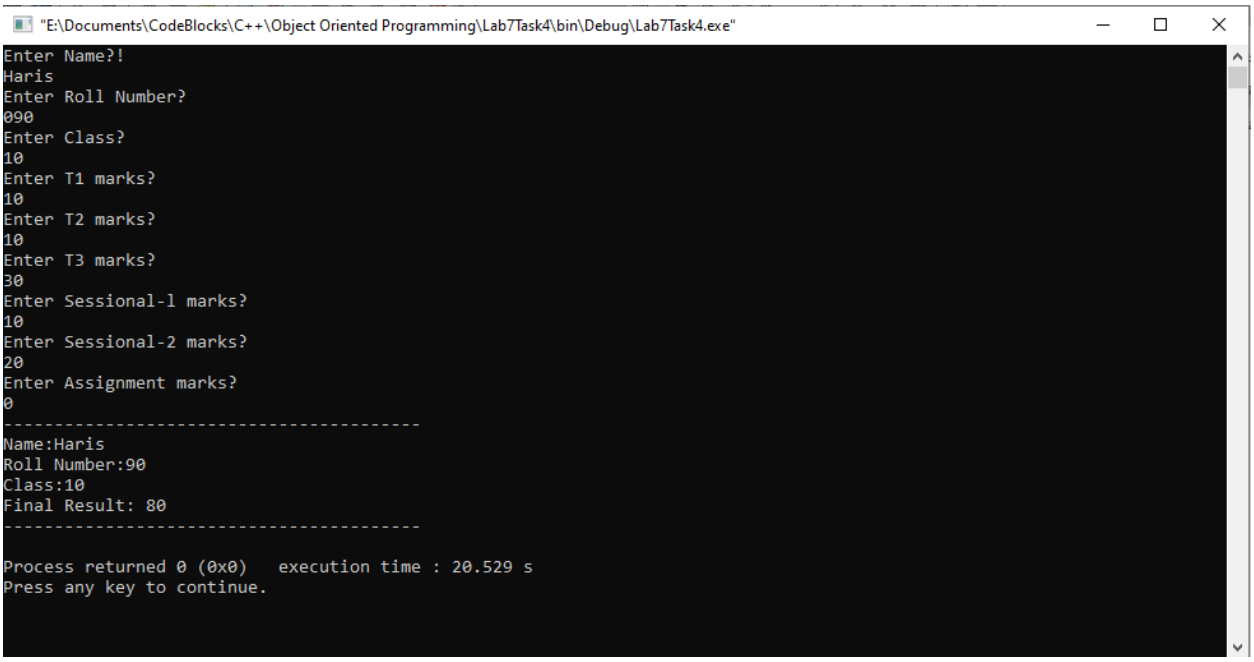
Solution:

I am attaching my code below,

```
#include <iostream>

using namespace std;

class student
{
protected:
    int roll;
    int classs;
    string name;


public:
    void getdata()
    {
        cout << "Enter Name?!" << endl;
        cin>>name;
        cout << "Enter Roll Number?" << endl;
        cin>>roll;
        cout << "Enter Class?" << endl;
        cin>>classs;

    }
    void putdata()
    {
        cout << "Name:" <<name<< endl;
        cout << "Roll Number:"<<roll << endl;
        cout << "Class:" <<classs<< endl;

    }
};

```

```
33  class test:public student
34  {
35      private:
36
37      int t1marks;
38      int t2marks;
39      int t3marks;
40      int S1;
41      int S2;
42      int asse;
43      int finall;
44
45      public:
46
47          void getmarks()
48          {
49          cout << "Enter T1 marks?" << endl;
50          cin>>t1marks;
51          cout << "Enter T2 marks?" << endl;
52          cin>>t2marks;
53          cout << "Enter T3 marks?" << endl;
54          cin>>t3marks;
55          cout << "Enter Sessional-1 marks?" << endl;
56          cin>>S1;
57          cout << "Enter Sessional-2 marks?" << endl;
58          cin>>S2;
59          cout << "Enter Assignment marks?" << endl;
60          cin>>asse;
61
62          }
63
64      void putmarks()
65      {
66          cout << "T1 Marks:" <<t1marks<< endl;
67          cout << "T2 Marks:"<<t2marks << endl;
68          cout << "T3 Marks:" <<t3marks<< endl;
69          cout << "S1 Marks:" <<S1<< endl;
70          cout << "S2 Marks:"<<S2 << endl;
71          cout << "Assignment Marks:" <<asse<< endl;
72
73      }
74
75      void finalresult()
76      {
77          finall=t1marks+t2marks+t3marks+S1+S2+asse;
78          cout<<"---------------------------------------"<<endl;
79          putdata();
80          cout<<"Final Result: "<<finall<<endl;
81          cout<<"---------------------------------------"<<endl;
82      }
83
84
85  };
86  int main()
87  {
88      test t1;
89      t1.getdata();
90      t1.getmarks();
91      t1.finalresult();
92      return 0;
93  }
```

The result for this program is shown below,



6.2 Question 5:

Write a program that declares two classes. The parent class is called Simple that has two data members num1 and num2 to store two numbers. It also has four member functions.

.

The add() function adds two numbers and displays the result.

.

The sub() function subtracts two numbers and displays the result.

.

The mul() function multiplies two numbers and displays the result.

.

The div() function divides two numbers and displays the result.

The child class is called Complex that overrides all four functions. Each function in the child class checks the value of data members. It calls the corresponding member function in the parent class if the values are greater than 0. Otherwise it displays error message.

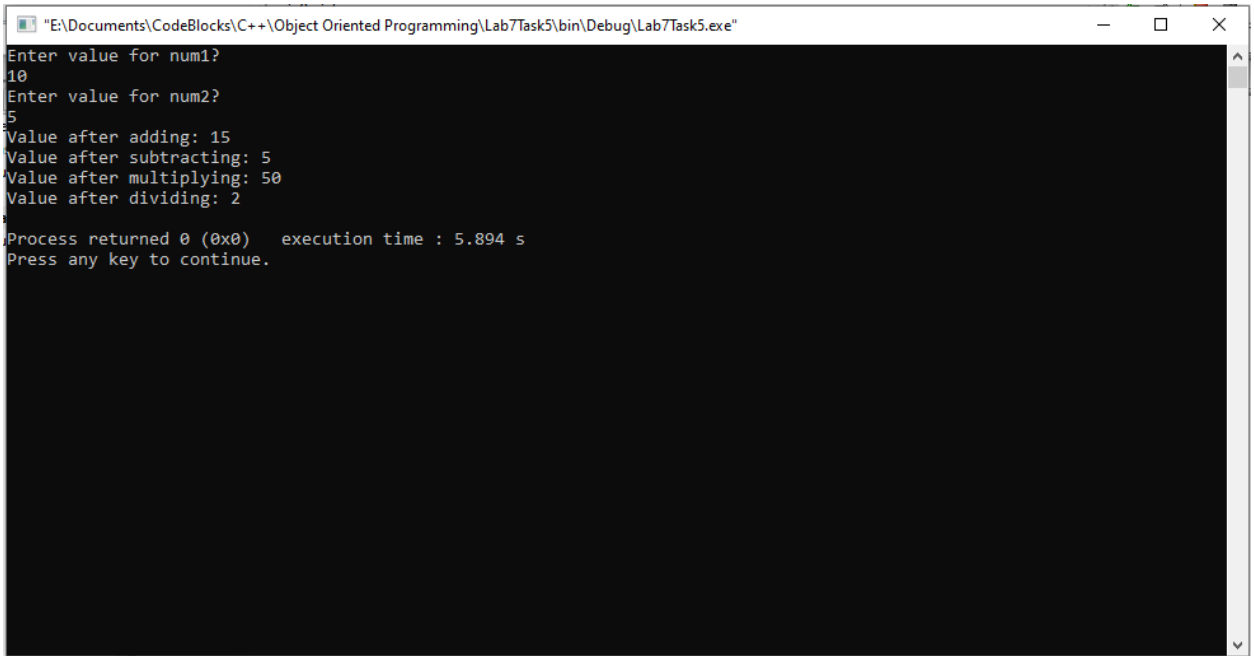
Solution:

I am attaching my code below,

```
#include <iostream>

using namespace std;

class simple
{
protected:
    int num1;
    int num2;
public:

    void get()
    {
        cout<<"Enter value for num1?"<<endl;
        cin>>num1;
        cout<<"Enter value for num2?"<<endl;
        cin>>num2;

    }
    void add()
    {
         if(num1<0 ||num2<0)
        {
            cout<<"error"<<endl;

        }
       else
            cout<<"Value after adding: "<<num1+num2<<endl;
    }
    void sub()
    {
         if(num1<0 ||num2<0)
        {
            cout<<"error"<<endl;

        }
       else
        cout<<"Value after subtracting: "<<num1-num2<<endl;
    }
    void mul()
    {
         if(num1<0 ||num2<0)
        {
            cout<<"error"<<endl;

        }
       else
       cout<<"Value after multiplying: "<<num1*num2<<endl;
    }
    void div()
    {
         if(num1<0 ||num2<0)
        {
            cout<<"error"<<endl;

        }
       else
        cout<<"Value after dividing: "<<num1/num2<<endl;
    }
};

```

```
62  class com :public simple
63  {
64  public:
65
66
67
68      void add()
69      {
70          simple::add();
71      }
72      void sub()
73      {
74           simple::sub();
75      }
76      void mul()
77      {
78          simple::mul();
79      }
80      void div()
81      {
82           simple::div();
83      }
84  };
85  int main()
86  {
87  com s1;
88  s1.get();
89  s1.add();
90  s1.sub();
91  s1.mul();
92  s1.div();
93
94
95
96
97  }
```

The result for this program is shown below,



6.3 Question 6:

An electricity board charges the following rates to domestic users to discourage large
consumption of energy.
.
For the first 100 units - 50 P per unit
.
Beyond 100 units - 60 P per unit
If the total cost is more than Rs.250.00 then an additional surcharge of 15% is added on the difference. Define a class Electricity in which the function Bill computes the cost. Define a derived class More_Electricity and override Bill to add the surcharge.

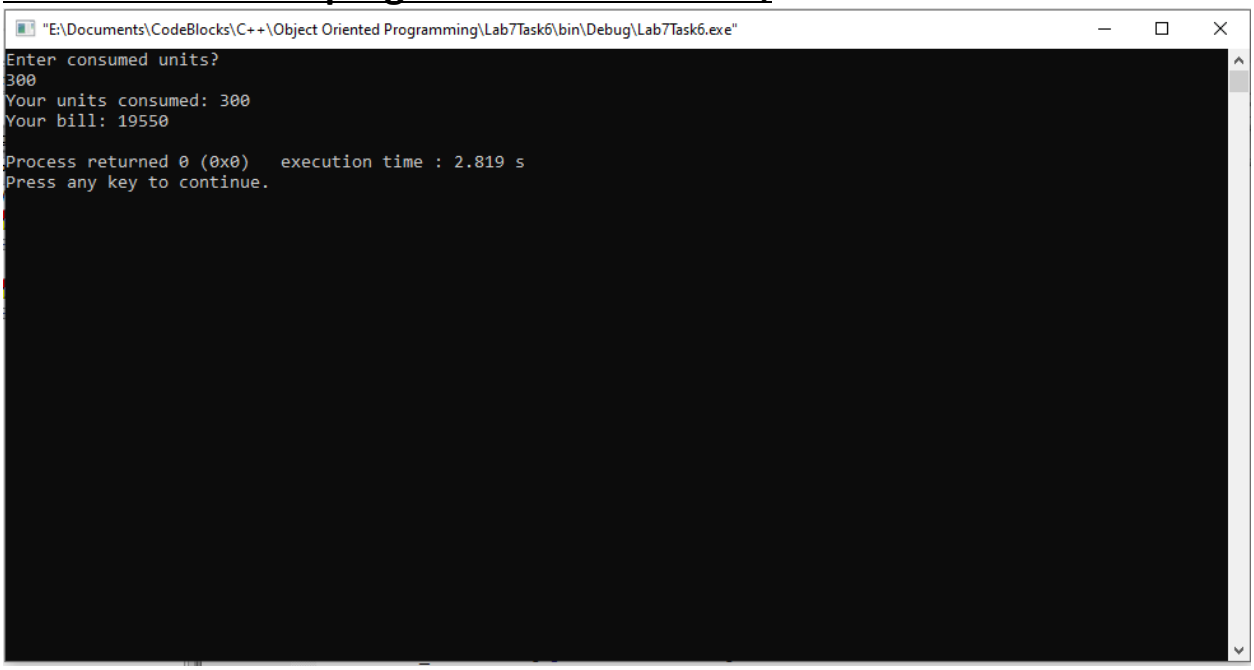
Solution:

I am attaching my code below,

```
#include <iostream>

using namespace std;

class Electricity
{
protected:
    int units=0;
    int cost=0;
    int factor;
    int surcharge=0;

public:
    void getunits()
    {
        cout<<"Enter consumed units?"<<endl;
        cin>>units;
    }
    void bill()
    {
           for(int i=0;i<=units;i++)
           {
           if(i>0 && i<=100)
           {
               factor=50;
               cost=cost+(factor);
           }
           if(i>100)
           {
               factor=60;
               cost=cost+(factor);
           }

```

```
34              }
35
36              if(cost>250)
37              {
38                  surcharge=15/100*cost;
39              }
40              cost=cost+surcharge;
41      }
42  };
43  class More_electricity:public Electricity
44  {
45
46      public:
47
48      void bill()
49      {
50          Electricity::bill();
51      }
52      void showbill()
53      {
54          cout<<"Your units consumed: "<<units<<endl;
55          cout<<"Your bill: "<<cost<<endl;
56
57      }
58  };
59  int main()
60  {
61      More_electricity m1;
62      m1.getunits();
63      m1.bill();
64      m1.showbill();
65  }
```

The result for this program is shown below,



6.4 Question 7:

(Package Inheritance Hierarchy) Package-delivery services, such as FedEx®, DHL S and UPS®, offer a number of different shipping options, each with specific costs associated. Create an inheritance hierarchy to represent various types of packages. Use Package as the base class of the hierarchy, then include classes TwoDayPackage and OvernightPackage that derive from Package. Base class Package should include data members representing the name, address, city, state and ZIP code for both the sender and the recipient of the package, in addition to data members that store the weight (in ounces) and cost per ounce to ship the package. Package's constructor should initialize these data members. Ensure that the weight and cost per ounce contain positive values. Package should provide a public member function calculateCost() that returns a double indicating the cost associated with shipping the package. Package's calculateCost() function should determine the cost by multiplying the weight by the cost per ounce. Derived class TwoDayPackage should inherit the functionality of base class Package, but also include a data member that represents a flat fee that the shipping company charges for two-day-delivery service. TwoDayPackage's constructor should receive a value to initialize this data member. TwoDayPackage should redefine member function calculateCost() so that it computes the shipping cost by adding the flat fee to the weight-based cost calculated by base class Package's calculateCost() function. Class OvernightPackage should inherit directly from class Package and contain an additional data member representing an additional fee per ounce charged for overnight-delivery service. OvernightPackage should redefine member function calculateCost() so that it adds the additional fee per ounce to the standard cost per ounce before calculating the shipping cost. Write a test program that creates objects of each type of Package and tests member function calculateCost().

Solution:

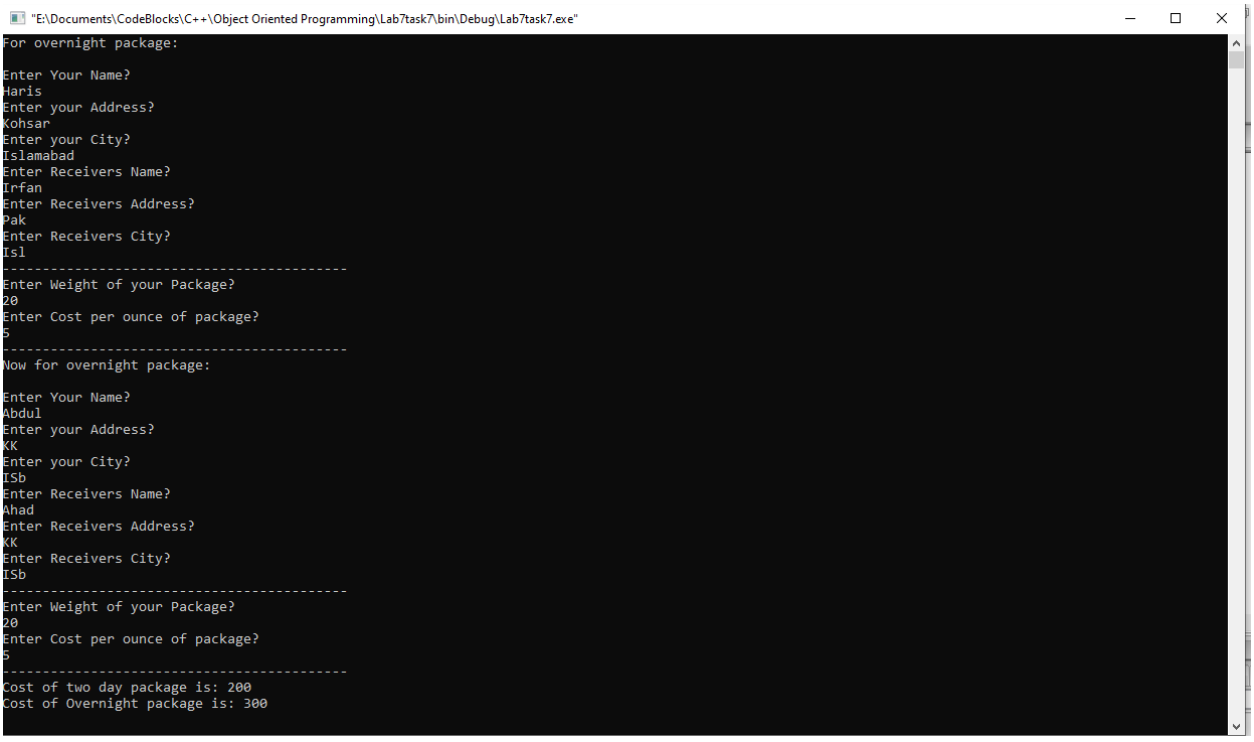
I am attaching my code below,

```
#include <iostream>

using namespace std;

class package
{
protected:
    string name;
    string address;
    string city;

```

```
12      string rname;
13      string raddress;
14      string rcity;
15
16      int weightounce;
17      int costperounce;
18      int cost;
19
20  public:
21      package()
22      {
23          cout << "Enter Your Name?" << endl;
24          cin>>name;
25          cout << "Enter your Address?" << endl;
26          cin>>address;
27          cout << "Enter your City?" << endl;
28          cin>>city;
29          cout << "Enter Receivers Name?" << endl;
30          cin>>rname;
31          cout << "Enter Receivers Address?" << endl;
32          cin>>raddress;
33          cout << "Enter Receivers City?" << endl;
34          cin>>rcity;
35
36          cout<<"----------------------------------------"<<endl;
37          cout << "Enter Weight of your Package?" << endl;
38          cin>>weightounce;
39          cout << "Enter Cost per ounce of package?" << endl;
40          cin>>costperounce;
41          cout<<"----------------------------------------"<<endl;
42
43
44      }
45
46      double calculateCost()
47      {
48          cost=weightounce*costperounce;
49          return cost;
50      }
51
52  };
53  class twodaypackage:public package
54  {
55  public:
56      int flatfee;
57      twodaypackage(int j)
58      {
59          flatfee=j;
60      }
61
62      double calculateCost()
63      {
64          package::calculateCost();
65          cost=cost+flatfee;
66          return cost;
67      }
68  };
69  class overnightpackage:public package
70  {
71  public:
72  int addchargesPerounce;
73
74  overnightpackage(int j)
75  {
76  addchargesPerounce=j;
77  }
78   double calculateCost()
79   {
80       costperounce=costperounce+addchargesPerounce;
81       package::calculateCost();
82       return cost;
```

```
 83    }
 84
 85  };
 86  int main()
 87  {
 88      int cost2day,overpkg;
 89      cout<<"For overnight package:"<<endl<<endl;
 90      twodaypackage t1(100);
 91      cout<<"Now for overnight package:"<<endl<<endl;
 92      overnightpackage o1(10);
 93      cost2day=t1.calculateCost();
 94      overpkg=o1.calculateCost();
 95
 96
 97      cout<<"Cost of two day package is: "<<cost2day<<endl;
 98
 99      cout<<"Cost of Overnight package is: "<<overpkg<<endl;
100
101
102      return 0;
103  }
```

The result for this program is shown below,



___THE END_____