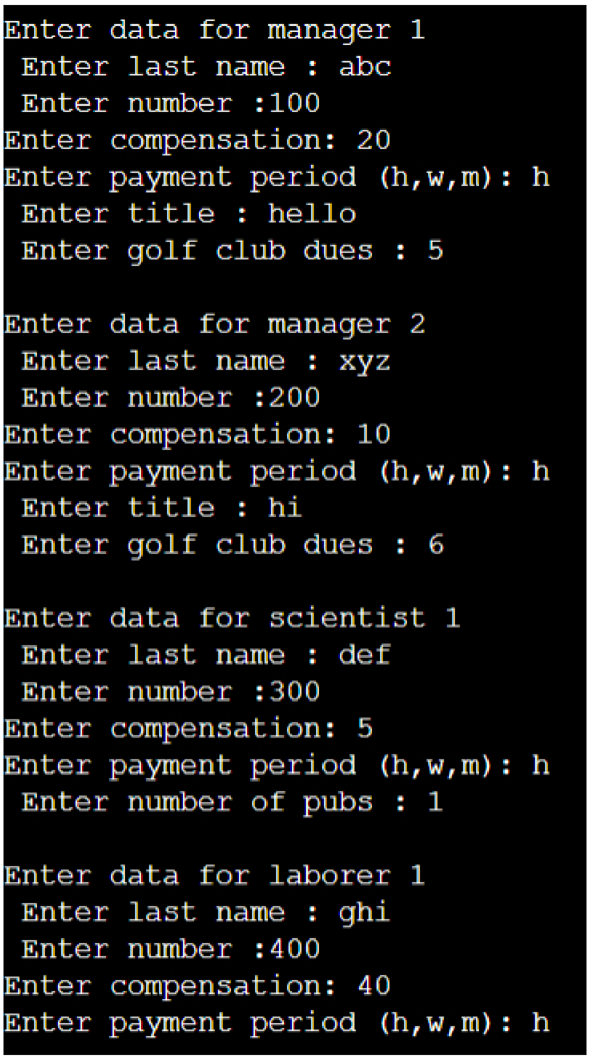
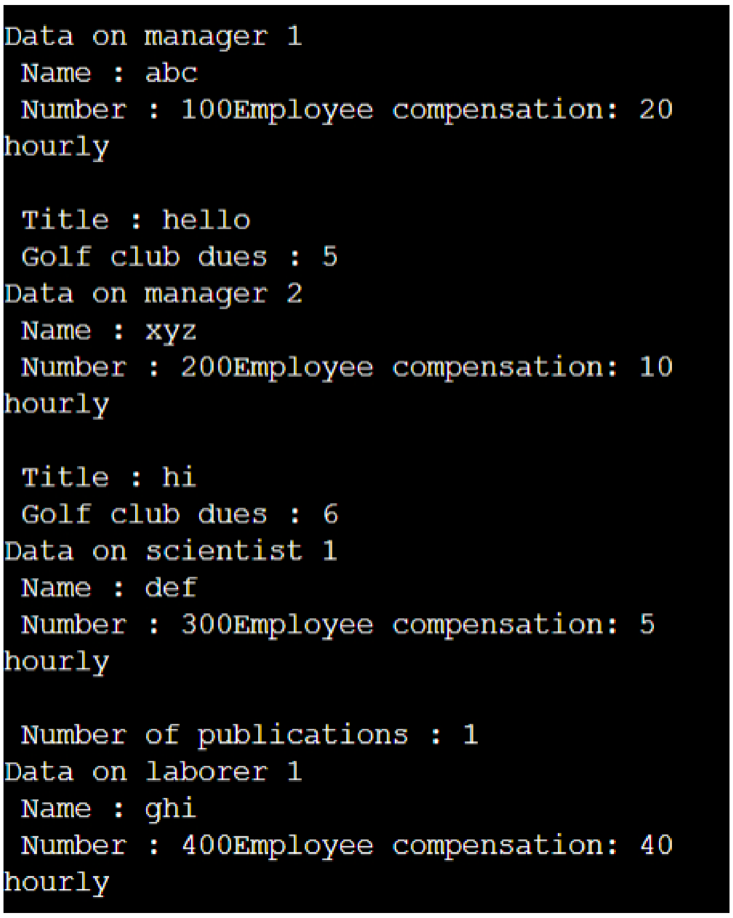
Q1. Write a C++ Program to Derive a class called employee2 from the employee class. This new class should add a type double data item called compensation and, also an enum type called period to indicate whether the employee is paid hourly, weekly, or monthly. For simplicity you can change the manager, scientist and labourer classes so they are derived from employee2 instead of employee. However, note that in many circumstances it might be more in the spirit of OOP to create a separate base class called compensation and three new class manager2, scientist2 and labour2 and use multiple inheritances to derive these classes from the original manager, scientist and labourer classes and from compensation. This way none of the original classes needs to be modified.

```
#include <iostream>

#include <conio.h>

using namespace std;

const int LEN = 80; //maximum length of names

////////////////////////////////////////////////////////////////

class employee //employee class

{

private:

 char name[LEN]; //employee name

 unsigned long number; //employee number

public:

 void getdata()

 {

  cout << "\n Enter last name : "; cin >> name;

  cout << " Enter number :"; cin >> number;

 }

 void putdata() const

 {

  cout << "\n Name : " << name;

  cout << "\n Number : " << number;

 }

};

////////////////////////////////////////////////////////////////

class employee2 :public employee

{
```

```
private:
 double compen;
 enum paytype{ hourly, weakly, monthly };
 paytype period;
public:
 void getdata(void)
 {
  char a;
  employee::getdata();
  cout << "Enter compensation: ";
  cin >> compen;
  cout << "Enter payment period (h,w,m): ";
  cin >> a;
  switch (a)
  {
  case 'h':
   period = hourly;
   break;
  case 'w':
   period = weakly;
   break;
  case 'm':
   period = monthly;
   break;
  }
 }
 void putdata(void) const
 {
  employee::putdata();
  cout << "Employee compensation: " << compen << endl;
  switch (period)
  {
  case hourly:
   cout << "hourly" << endl;
   break;
  case weakly:
   cout << "weakly" << endl;
   break;
  case monthly:
   cout << "monthly" << endl;
   break;
  }
 }
};
////////////////////////////////////////////////////////////////
class manager : public employee2 //management class
{
private:
 char title[LEN]; //"vice-president" etc.
 double dues; //golf club dues
public:
 void getdata()
 {
  employee2::getdata();
  cout << " Enter title : "; cin >> title;
  cout << " Enter golf club dues : "; cin >> dues;
 }
 void putdata() const
 {
  employee2::putdata();
  cout << "\n Title : " << title;
  cout << "\n Golf club dues : " << dues;
 }
};
////////////////////////////////////////////////////////////////
class scientist : public employee2 //scientist class
{
private:
 int pubs; //number of publications
public:
 void getdata()
 {
  employee2::getdata();
  cout << " Enter number of pubs : "; cin >> pubs;
 }
 void putdata() const
 {
  employee2::putdata();
  cout << "\n Number of publications : " << pubs;
 }
};
////////////////////////////////////////////////////////////////
class laborer : public employee2 //laborer class
{};
////////////////////////////////////////////////////////////////
int main()
{
 manager m1, m2;
 scientist s1;
 laborer l1;
 cout << endl; //get data for several employees
 cout << "\nEnter data for manager 1";
 m1.getdata();
 cout << "\nEnter data for manager 2";
 m2.getdata();
 cout << "\nEnter data for scientist 1";
 s1.getdata();
 cout << "\nEnter data for laborer 1";
 l1.getdata();
 //display data for several employees
 cout << "\nData on manager 1";
 m1.putdata();
 cout << "\nData on manager 2";
 m2.putdata();
 cout << "\nData on scientist 1";
 s1.putdata();
 cout << "\nData on laborer 1";
 l1.putdata();
 cout << endl;

}
```



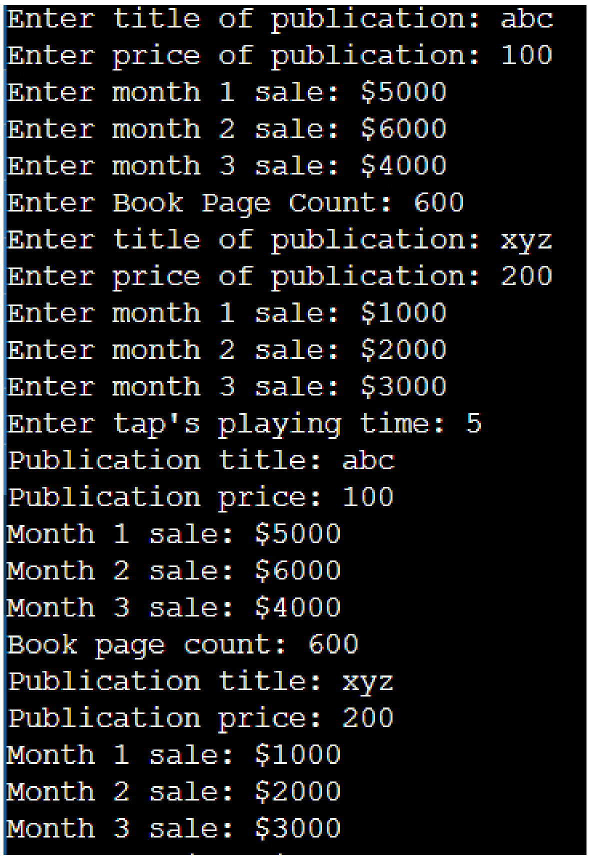
```
Enter data for manager 1
 Enter last name : abc
 Enter number :100
Enter compensation: 20
Enter payment period (h,w,m): h
 Enter title : hello
 Enter golf club dues : 5

Enter data for manager 2
 Enter last name : xyz
 Enter number :200
Enter compensation: 10
Enter payment period (h,w,m): h
 Enter title : hi
 Enter golf club dues : 6

Enter data for scientist 1
 Enter last name : def
 Enter number :300
Enter compensation: 5
Enter payment period (h,w,m): h
 Enter number of pubs : 1

Enter data for laborer 1
 Enter last name : ghi
 Enter number :400
Enter compensation: 40
Enter payment period (h,w,m): h
```



```
Data on manager 1
 Name : abc
 Number : 100Employee compensation: 20
hourly

 Title : hello
 Golf club dues : 5
Data on manager 2
 Name : xyz
 Number : 200Employee compensation: 10
hourly

 Title : hi
 Golf club dues : 6
Data on scientist 1
 Name : def
 Number : 300Employee compensation: 5
hourly

 Number of publications : 1
Data on laborer 1
 Name : ghi
 Number : 400Employee compensation: 40
hourly
```

Q2. Write a C++ program which start with the publication, book and tape classes. Add a base class sale that holds an array of three floats so that it can record the dollar sales of a particular publication for the last three months. Include a getdata( ) function to get three sales amounts from the user and a putdata( ) function to display the sales figures. After the book and tape classes so they are derived from both publication and sales. An object of class book or tape should input and output sales data along with its other data. Write a main ( ) function to create a book object and a tape object and exercise their input/output capabilities.

```
#include <iostream>

#include <string>

#include <conio.h>

using namespace std;

class publication

{

private:

 string title;

 float price;

public:
 void getdata(void)
 {
 string t;
 float p;
 cout << "Enter title of publication: ";
 cin >> t;
 cout << "Enter price of publication: ";
 cin >> p;
 title = t;
 price = p;
 }
 void putdata(void)
 {
 cout << "Publication title: " << title << endl;
 cout << "Publication price: " << price << endl;
 }
};
class sales
{
private:
 float s1, s2, s3;
public:
 void getdata(void)
 {
 cout << "Enter month 1 sale: $";
 cin >> s1;
 cout << "Enter month 2 sale: $";
 cin >> s2;
 cout << "Enter month 3 sale: $";
 cin >> s3;
 }
 void putdata(void)
 {
 cout << "Month 1 sale: $" << s1 << endl;
 cout << "Month 2 sale: $" << s2 << endl;
 cout << "Month 3 sale: $" << s3 << endl;
 }
};
class book :public publication,public sales
{
private:
 int pagecount;
public:
 void getdata(void)
 {
 publication::getdata();
 sales::getdata();
 cout << "Enter Book Page Count: ";
 cin >> pagecount;
 }
 void putdata(void)
 {
 publication::putdata();
 sales::putdata();
 cout << "Book page count: " << pagecount << endl;
 }
};
class tape :public publication,public sales
{
private:
 float ptime;
public:
 void getdata(void)
 {
 publication::getdata();
 sales::getdata();
 cout << "Enter tap's playing time: ";
 cin >> ptime;
 }
 void putdata(void)
 {
 publication::putdata();
 sales::putdata();
 cout << "Tap's playing time: " << ptime << endl;
 }
};
int main()
{
 book b;
 tape t;
 b.getdata();
 t.getdata();
 b.putdata();
 t.putdata();
}
```

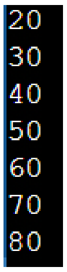


```
Enter title of publication: abc
Enter price of publication: 100
Enter month 1 sale: $5000
Enter month 2 sale: $6000
Enter month 3 sale: $4000
Enter Book Page Count: 600
Enter title of publication: xyz
Enter price of publication: 200
Enter month 1 sale: $1000
Enter month 2 sale: $2000
Enter month 3 sale: $3000
Enter tap's playing time: 5
Publication title: abc
Publication price: 100
Month 1 sale: $5000
Month 2 sale: $6000
Month 3 sale: $4000
Book page count: 600
Publication title: xyz
Publication price: 200
Month 1 sale: $1000
Month 2 sale: $2000
Month 3 sale: $3000
```

Q4. Write a C++ Program to implement the binary tree by writing the definition a class tree. This class contains various attribute of a tree and various operation on the tree like insertion, deletion, traversing. In addition to this, the class drive three new classes complete binary tree, binary search tree, and full binary tree.

```
#include <iostream>

using namespace std;


class BST

{

   int data;

   BST *left, *right;


public:

   // Default constructor.

   BST();
```

```
    // Parameterized constructor.
    BST(int);

    // Insert function.
    BST* Insert(BST*, int);

    // Inorder traversal.
    void Inorder(BST*);
};

// Default Constructor definition.
BST ::BST()
    : data(0)
    , left(NULL)
    , right(NULL)
{
}

// Parameterized Constructor definition.
BST ::BST(int value)
{
    data = value;
    left = right = NULL;
}

// Insert function definition.
BST* BST ::Insert(BST* root, int value)
{
    if (!root)
    {
        // Insert the first node, if root is NULL.
        return new BST(value);
    }

    // Insert data.
    if (value > root->data)
    {
        // Insert right node data, if the 'value'
        // to be inserted is greater than 'root' node data.

        // Process right nodes.
        root->right = Insert(root->right, value);
    }
    else
    {
        // Insert left node data, if the 'value'
        // to be inserted is greater than 'root' node data.

        // Process left nodes.
        root->left = Insert(root->left, value);
    }

    // Return 'root' node, after insertion.
    return root;
}

// Inorder traversal function.
// This gives data in sorted order.
void BST ::Inorder(BST* root)
{
    if (!root) {
        return;
    }
    Inorder(root->left);
    cout << root->data << endl;
    Inorder(root->right);
}

// Driver code
int main()
{
    BST b, *root = NULL;
    root = b.Insert(root, 50);
    b.Insert(root, 30);
    b.Insert(root, 20);
    b.Insert(root, 40);
    b.Insert(root, 70);
    b.Insert(root, 60);
    b.Insert(root, 80);

    b.Inorder(root);
    return 0;
}
```



```
20
30
40
50
60
70
80
```