Practice Problems(Lab) for Lab-9

Things we will try to learn in this lab:

- What is inheritance? Why use inheritance?
- Usages of access identifiers in terms of inheritance.
- Understand and implement the concept inheritance, multiple inheritance and solve different types of problems related to inheritance.

Exercise 1: Create two classes named Mammals and MarineAnimals. Create another class named BlueWhale which inherits both the above classes. Now, create a function in each of these classes which prints "I am mammal", "I am a marine animal" and "I belong to both the categories: Mammals as well as Marine Animals" respectively. Now, create an object for each of the above class and try calling,

- function of Mammals by the object of Mammal
- function of MarineAnimal by the object of MarineAnimal
- function of BlueWhale by the object of BlueWhale
- function of each of its parent by the object of BlueWhale

```
//Inheritance1.cpp
#include<bits/stdc++.h>
using namespace std;

class Mammals
{
public:
    void mammal_print()
    {
        cout<<"I am a Mammal"<<endl;
    }
};
class Marine_animals
{
public:
    void marine_print()
    {
        cout<<"I am a Marine animal"<<endl;
    }
};
class BlueWhale: public Mammals, public Marine_animals
{
public:
    void BlueWhale_print()
    {
```

```
        cout<<"I belong to both the categories: ";
        cout<<" Mammals as well as Marine Animals"<<endl;
    }
};
int main()
{
    Mammals m;
    Marine_animals ma;
    BlueWhale b;
    cout<<"Accessing the object of own class"<<endl;
    m.mammal_print(); ma.marine_print(); b.BlueWhale_print();

    cout<<endl<<endl<<"Accessing the object of Base class"<<endl;
    b.mammal_print(); b.marine_print();
}
```

Exercise 2: Write a C++ program to do the following,

1. 'Student' is a base class, having two data members: StudenId and Name; Student Id is an integer and name is a string.
2. 'Science' and 'Arts' are two derived classes, having respectively data items marks for Physics, Chemistry, Mathematics and marks for English, History, Economics.
3. Read appropriate data from the screen for a science and a arts students.
4. Display Student Id, name, marks for science student first and then for arts student.

```
// Student.cpp
#include<bits/stdc++.h>
using namespace std;
class student
{
protected:
    int StudentId;
    string name;
public:
    void getdata()
    {
        cout<<"Enter Student Id and Name "<<endl;;
        cin>>StudentId;
        getchar();
        getline(cin, name);
    }
    void show()
    {
        cout<<"Student Id: "<<StudentId<<endl;
        cout<<"Name "<<name<<endl<<endl;
    }
```

```
};
class science: public student
{
    int phy, chem, math;
public:
    void getdata()
    {
        cout<<"Enter the marks of Physics, Chemistry and
           Mathematics"<<endl;
        cin>>phy>>chem>>math;
    }
    void show()
    {
        cout<<"Physics mark: "<<phy<<endl;
        cout<<"Chemistry mark: "<<chem<<endl;
        cout<<"Mathematics mark: "<<math<<endl<<endl;
    }
};
class arts: public student
{
    int eng, his, eco;
public:
    void getdata()
    {
        student::getdata();// calling the base class function
        cout<<"Enter the marks of English, History and Economics"<<endl;
        cin>>eng>>his>>eco;
    }
    void show()
    {
        student::show();
        cout<<"English mark: "<<eng<<endl;
        cout<<"History mark: "<<his<<endl;
        cout<<"Economics mark: "<<eco<<endl;
    }

};
int main()
{
    science s;
   /* Important concept: As both base and derived class have same
      function name we use a method to resolve this situation. */
    s.student::getdata();
    s.getdata();
    s.student::show();
    s.show();
    arts a;
    a.getdata();
    a.show();
}
```

Practice Problems(Home) for Lab-9

These problems are designed to clear your understanding on inheritance and access identifiers

Problem:1

Define a class named **Fruit** with a data member to calculate the number of fruits in a basket. Create two other class named **Apples** and **Mangoes** to calculate the number of apples and mangoes in the basket. Print the number of fruits of each type and the total number of fruits in the basket using the concept of inheritance.

Problem:2

We want to calculate the total marks of each student of a class in Physics,Chemistry and Mathematics and the average marks of the class.The number of students in the class are entered by the user. Create a class named **Marks** with data members for roll number, name and marks. Create three other classes inheriting the Marks class, namely Physics, Chemistry and Mathematics, which are used to define marks in individual subject of each student.

*** Follow the slide provided in the theory class. It covers other topics of inheritance such as,

- hierarchical inheritance
- what is diamond problem and ways to resolve this problem
- insights on access identifiers
- and some topics of book as well.

*** This topics are important for final lab test and quiz-viva. It is good practice to read the text book. Read the text book as well please. ***

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Sample Viva-Voce Questions

- What is inheritance?
- What is Base class / super class/ parent class?
- What is Subclass/ derived class/ child class?
- Write general notation of inheritance in C++.
- Explain the concept of Inheritance vs Access with example.
- How many Access specifier are there in C++?
- What are the advantages of inheritance ?
- What are the types of inheritance ?
- Is inheritance possible in C ?
- What is the syntax of inheritance of class?
- What is private inheritance?
- What is protected inheritance?
- What is single level inheritance?
- What is multilevel inheritance?
- What is hierarchical inheritance?
- Which type of inheritance leads to diamond problem?
- What are the ways to resolve the diamond problems?
- If a derived class object is created, which constructor is called first?
- Discuss the order of constructor and destructor call in base and derived class.

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