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FACULTY OF ENGINEERING & TECHNOLOGY

CSPS103: Object Oriented Programming

Lecture-22

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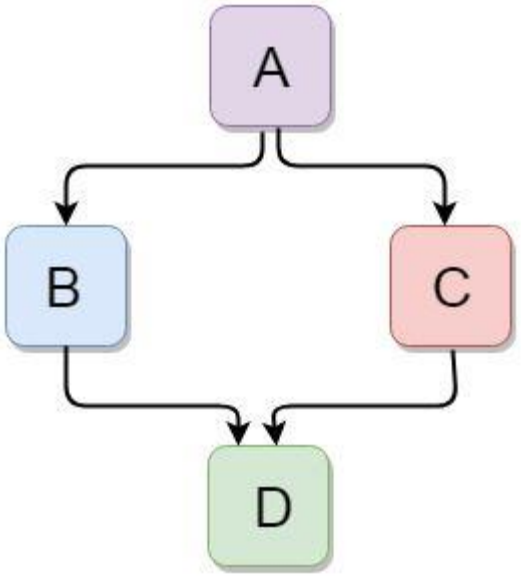
OBJECTIVES

In this lecture, you will learn to:

- ❖Hybrid Inheritance
- ❖Example Hybrid Inheritance
- ❖Hierarchical Inheritance
- ❖Example Hierarchical Inheritance

HYBRID INHERITANCE

- The inheritance hierarchy that reflects any legal combination of other types of inheritance is known as hybrid Inheritance.
- Hybrid inheritance is a combination of more than one type of inheritance.



EXAMPLE: HYBRID INHERITANCE

```
#include <iostream.h>

class A
{
    protected:
    int a;
    public:
    void get_a()
    {
       std::cout << "Enter the value of 'a' : " << std::endl;
       cin>>a;
    }
};

class B : public A
{
    protected:
    int b;
    public:
    void get_b()
    {
        std::cout << "Enter the value of 'b' : " << std::endl;
       cin>>b;
    }
};
```

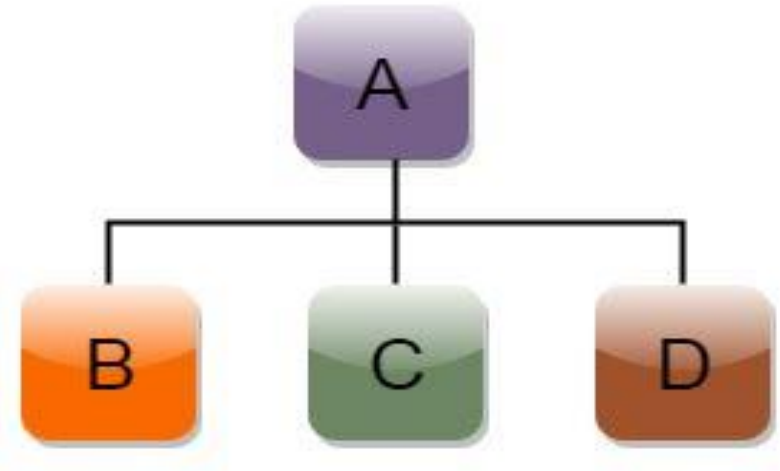
EXAMPLE : HYBRID INHERITANCE (Contd.)

```
class C
{
    protected:
    int c;
    public:
    void get_c()
    {
        std::cout << "Enter the value of c is : " << std::endl;
        cin>>c;
    }
};

class D : public B, public C
{
    protected:
    int d;
    public:
    void mul()
    {
         get_a();
         get_b();
         get_c();
         std::cout << "Multiplication of a,b,c is : " <<a*b*c<< std::endl;
    }
};
int main()
{
    D d;
    d.mul();
    return 0;
}
```

HIERARCHICAL INHERITANCE

- The process in which traits of one class can be inherited by more than one class is known as Hierarchical inheritance.
- The base class will include all the features that are common to the derived classes.
- A derived class can serve as a base class for lower level classes and so on.



HIERARCHICAL INHERITANCE (Contd.)

Syntax of Hierarchical inheritance:

```
class A
{
    // body of the class A.
}
class B : public A
{
    // body of class B.
}
class C : public A
{
    // body of class C.
}
class D : public A
{
    // body of class D.
}
```

EXAMPLE: HIERARCHICAL INHERITANCE

```
#include <iostream.h>
using namespace std;
class Shape                 // Declaration of base class.
{
    public:
    int a;
    int b;
    void get_data(int n,int m)
    {
        a= n;
        b = m;
    }
};
class Rectangle : public Shape  // inheriting Shape class
{
    public:
    int rect_area()
    {
        int result = a*b;
        return result;
    }
};
```

EXAMPLE: HIERARCHICAL INHERITANCE (Contd.)

```
class Triangle : public Shape    // inheriting Shape class
{
    public:
    int triangle_area()
    {
        float result = 0.5*a*b;
        return result;
    }
};
int main()
{
    Rectangle r;
    Triangle t;
    int length,breadth,base,height;
    std::cout << "Enter the length and breadth of a rectangle: " << std::endl;
    cin>>length>>breadth;
    r.get_data(length,breadth);
    int m = r.rect_area();
    std::cout << "Area of the rectangle is : " <<m<< std::endl;
    std::cout << "Enter the base and height of the triangle: " << std::endl;
    cin>>base>>height;
    t.get_data(base,height);
    float n = t.triangle_area();
    std::cout <<"Area of the triangle is : "  << n<<std::endl;
    return 0;
}
```

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MULTIPLE CHOICE QUESTION

Multiple Choice Question:

Q1. Which among the following is correct for the following code?

```
class A
{
   public : class B
   {
      public : B(int i): data(i)
      {
      }
      int data;
   }
};
class C: public A
{
    class D:public A::B{ };
};
```

a) Multi-level inheritance is used, with nested classes

b) Multiple inheritance is used, with nested classes

c) Single level inheritance is used, with enclosing classes

d) Single level inheritance is used, with both enclosing and nested classes

Multiple Choice Question:

Q2. Which among the following is false?

a) If one class inherits the inherited class in single level inheritance, it is multi-level inheritance

b) Hybrid inheritance always contains multiple inheritance

c) Hierarchical inheritance involves inheriting same class into more than one classes

d) Hybrid inheritance can involve any types of inheritance together

Multiple Choice Question:

Q3. If class A has two nested classes B and C. Class D has one nested class E, and have inherited class A.

If E inherits B and C, then _____

a) It shows multiple inheritance

b) It shows hierarchical inheritance

c) It shows multiple inheritance

d) Multiple inheritance among nested classes, and single level for enclosing classes

Multiple Choice Question:

Q4. Which type of inheritance cannot involve private inheritance?

a) Single level

b) Multiple

c) Hybrid

d) All types can have private inheritance

Multiple Choice Question:

Q5. How many classes can be inherited by a single class in multiple inheritance (C++)?

a) Only 2

b) Only 27

c) Only 1024

d) Any number of classes can be inherited

Summary

In this lecture, you learned that:

- Hybrid inheritance is a combination of more than one type of inheritance.
- Hierarchical inheritance is defined as the process of deriving more than one class from a base class.