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FACULTY OF ENGINEERING & TECHNOLOGY

CSPS103: Object Oriented Programming

Lecture-21

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OBJECTIVES

In this lecture, you will learn to:

- ❖ **Multilevel Inheritance**
- ❖ **Multi Level Inheritance Example**
- ❖ **Multiple Inheritance**
- ❖ **Example of multiple inheritance**

MULTILEVEL INHERITANCE

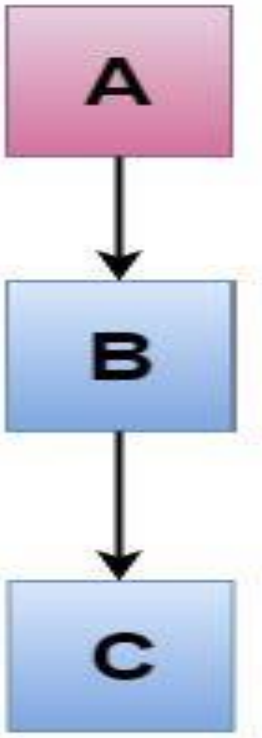
❑ The process in which a derived class inherits traits from another derived class, is called Multilevel Inheritance.

❑ A derived class with multilevel inheritance is declared as :

```
class base_class {

};

class derived_ class1 : visibility-mode base_ class {

};

class derived_ class 2: visibility-mode derived_ class1 {

};
```

Here, derived_ class 2 inherits traits from derived_ class 1 which itself inherits from base_class.

MULTILEVEL INHERITANCE (Contd.)

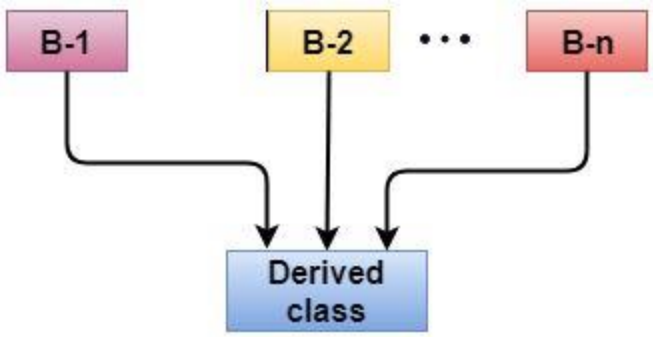


MULTI LEVEL INHERITANCE EXAMPLE

```
#include <iostream.h>
 class Animal {
   public:
 void eat() {
    cout<<"Eating..."<<endl;
 }
   };
   class Dog: public Animal
   {
       public:
     void bark(){
    cout<<"Barking..."<<endl;
     }
   };
   class BabyDog: public Dog
   {
       public:
     void weep() {
    cout<<"Weeping...";
     }
   };
int main(void) {
    BabyDog d1;
    d1.eat();
    d1.bark();
     d1.weep();
     return 0;
}
```

MULTIPLE INHERITANCE

- Multiple inheritance is the process of deriving a new class that inherits the attributes from two or more classes.



Syntax of the Derived class:

```
class D : visibility B-1, visibility B-2, ?
{
    // Body of the class;
}
```

EXAMPLE OF MULTIPLE INHERITANCE

```
#include <iostream>

class A
{
    protected:
     int a;
    public:
    void get_a(int n)
    {
        a = n;
    }
};

class B
{
    protected:
    int b;
    public:
    void get_b(int n)
    {
        b = n;
    }
};
```

EXAMPLE OF MULTIPLE INHERITANCE (Contd.)

```
class C : public A,public B
{
   public:
    void display()
    {
        std::cout << "The value of a is : " <<a<< std::endl;
        std::cout << "The value of b is : " <<b<< std::endl;
        cout<<"Addition of a and b is : "<<a+b;
    }
};
int main()
{
   C c;
   c.get_a(10);
   c.get_b(20);
   c.display();

    return 0;
}
```

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MULTIPLE CHOICE QUESTION

Multiple Choice Question:

Q1. Which type of inheritance is illustrated by the following code?

```
class student{ public: int marks; };

class topper: public student { public: char grade; };

class average{ public: int makrs_needed; };

class section: public average{ public: char name[10];  };

class overall: public average{  public: int students;  };
```

a) Single level

b) Multilevel and single level

c) Hierarchical

d) Hierarchical and single level

Multiple Choice Question:

Q2. Which among the following best describes multiple inheritance?

a) Two classes being parent of any other classes

b) Three classes being parent of other classes

c) More than one class being parent of other child classes

d) More than one class being parent of single child

Multiple Choice Question:

Q3. How many types of inheritance can be used at a time in a single program?

a) Any two types

b) Any three types

c) Any 4 types

d) Any type, any number of times

Multiple Choice Question:

Q4. Which type of inheritance results in the diamond problem?

a) Single level

b) Hybrid

c) Hierarchical

d) Multilevel

Multiple Choice Question:

Q5. If 6 classes uses single level inheritance with pair classes (3 pairs), which inheritance will this be called?

a) Single

b) Multiple

c) Hierarchical

d) Multilevel

Summary

In this lecture, you learned that:

- **Multiple inheritance** is the process of deriving a new class that inherits the attributes from two or more classes.