



International University of Business Agriculture and Technology

Department: Computer Science and Engineering

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Course Name: Visual Programming

Course Code: CSC 440

Section: A

Lab Report topic: Lab task 04

Submitted To:

Suhala Lamia

Assistant Professor

Department of Computer Science and Engineering

Submitted By:

Samiul Karim Mazumder

22303308

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Experiment No. 03: Polymorphism hierarchy in C#

Objective: The objective of this lab is to understand and implement **inheritance and polymorphism** in C#.

Algorithm:

4.1. Employee Salary Calculation

- 1. Create a base class Employee with properties Name and Salary and a virtual method CalculateSalary().**
- 2. Create two derived classes:**
 - **Manager: Overrides CalculateSalary() to include a bonus calculation.**
 - **Programmer: Overrides CalculateSalary() to be based on projects.**
- 3. In the Main() method:**
 - **Create instances of Manager and Programmer.**
 - **Call CalculateSalary() on both to demonstrate polymorphism.**

4.2. Animal Sound Behavior

- 1. Create a base class Animal with a virtual method Speak().**
- 2. Create three derived classes:**
 - **Dog: Overrides Speak() to print "Dog barks."**
 - **Cow: Overrides Speak() to print "Cow moos."**
 - **Cat: Overrides Speak() to print "Cat meows."**
- 3. In the Main() method:**

- **Create instances of Dog, Cow, and Cat.**
- **Call Speak() on each object to demonstrate polymorphism.**

Program:

Program.cs:

```
using System;
```

```
namespace lab4
```

```
{
```

```
    public class Program
```

```
    {
```

```
        static void Main()
```

```
        {
```

```
            Console.WriteLine("Employee Salary Calculation:");
```

```
            Employee manager = new Manager("Alice", 45000);
```

```
            Employee programmer = new Programmer("Bob", 5000);
```

```
            manager.CalculateSalary();
```

```
            programmer.CalculateSalary();
```

```
            Console.WriteLine("\nAnimal Sounds:");
```

```
            Animal dog = new Dog();
```

```
            Animal cow = new Cow();
```

```
            Animal cat = new Cat();
```

```
            dog.Speak();
```

```
            cow.Speak();
```

```
            cat.Speak();
```

```
        }
```

```
    }
```

```
}
```

Employee.cs:

```
using System;
```

```

namespace lab4
{
    class Employee
    {
        public string Name;
        public int Salary;

        public Employee(string name, int salary)
        {
            Name = name;
            Salary = salary;
        }

        public virtual void CalculateSalary()
        {
            Console.WriteLine("Salary calculation is based on role.");
        }
    }

    class Manager : Employee
    {
        public Manager(string name, int salary) : base(name, salary) { }

        public override void CalculateSalary()
        {
            Console.WriteLine($"Manager {Name}'s salary is calculated with bonuses:
{Salary}");
        }
    }

    class Programmer : Employee
    {
        public Programmer(string name, int salary) : base(name, salary) { }

        public override void CalculateSalary()
        {

```

```
        Console.WriteLine($"Programmer {Name}'s salary is calculated based on  
projects: {Salary}.");  
    }  
}  
}
```

Animal.cs:

```
using System;
```

```
namespace lab4
```

```
{  
    class Animal  
    {  
        public virtual void Speak()  
        {  
            Console.WriteLine("Animals make sounds.");  
        }  
    }  
}
```

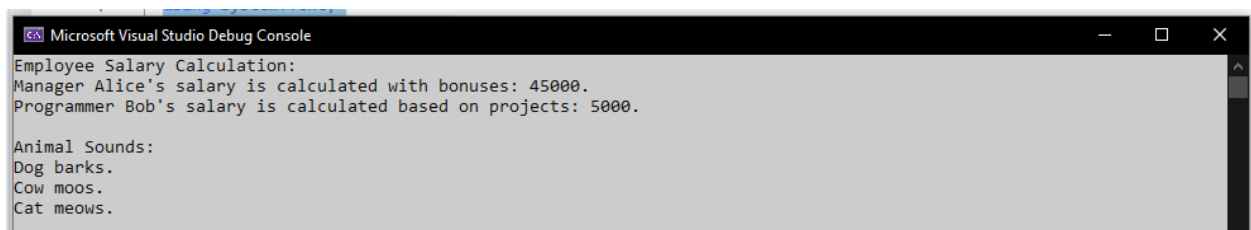
```
class Dog : Animal  
{  
    public override void Speak()  
    {  
        Console.WriteLine("Dog barks.");  
    }  
}
```

```
class Cow : Animal  
{  
    public override void Speak()  
    {  
        Console.WriteLine("Cow moos.");  
    }  
}
```

```
class Cat : Animal
```

```
{  
    public override void Speak()  
    {  
        Console.WriteLine("Cat meows.");  
    }  
}  
}
```

Output:

A screenshot of the Microsoft Visual Studio Debug Console window. The window has a title bar with the text "Microsoft Visual Studio Debug Console" and standard window controls (minimize, maximize, close). The console area is light gray and contains the following text:

```
Employee Salary Calculation:  
Manager Alice's salary is calculated with bonuses: 45000.  
Programmer Bob's salary is calculated based on projects: 5000.  
  
Animal Sounds:  
Dog barks.  
Cow moos.  
Cat meows.
```