

Lab Assignment 3 in C#

Q 1. Create a class called Employee with properties for name, age, and salary. Implement a method to display employee details.

Ans 1. `using` System;

```
namespace LabAssignment3
{
    class Employee
    {
        public string Name { get; set; }
        public int Age { get; set; }
        public double Salary { get; set; }

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

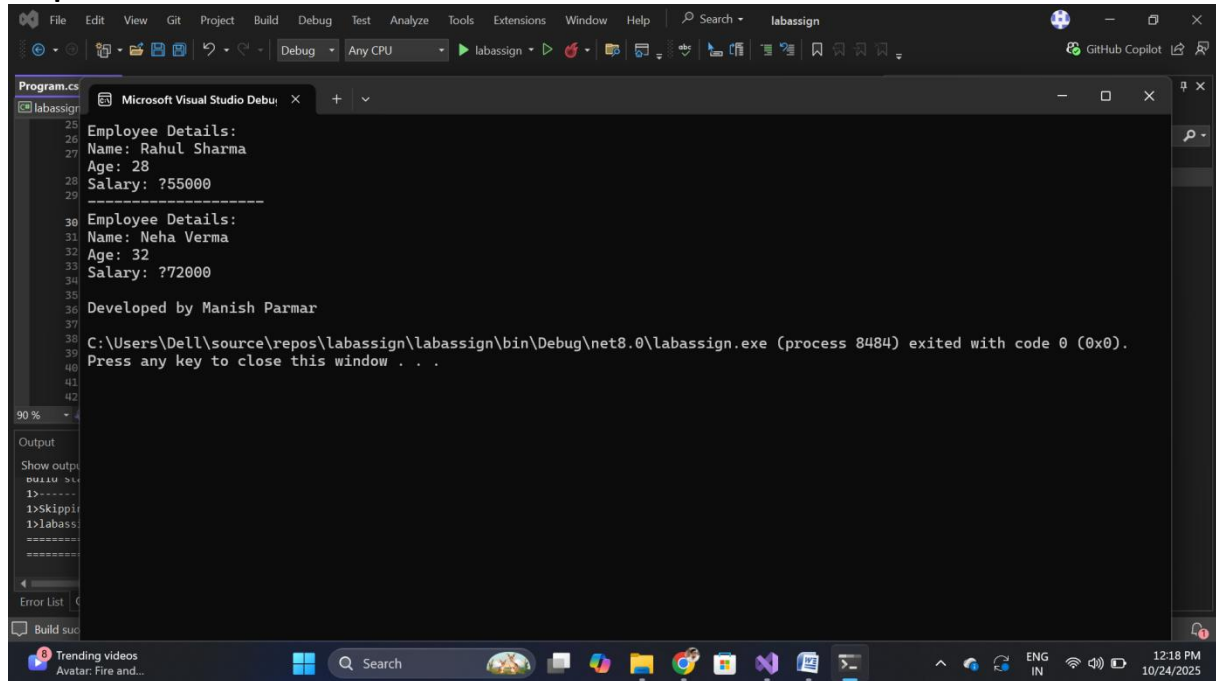
        public void DisplayDetails()
        {
            Console.WriteLine("Employee Details:");
            Console.WriteLine($"Name: {Name}");
            Console.WriteLine($"Age: {Age}");
            Console.WriteLine($"Salary: {Salary:C}");
        }
    }

    class Program
    {
        static void Main(string[] args)
        {
            Employee emp = new Employee("John Doe", 30, 55000);

            emp.DisplayDetails();

            Console.ReadLine();
        }
        Console.WriteLine("Developed by Manish Parmar.");
    }
}
```

Output:



```
25 Employee Details:
26 Name: Rahul Sharma
27 Age: 28
28 Salary: 755000
29 -----
30 Employee Details:
31 Name: Neha Verma
32 Age: 32
33 Salary: 72000
34
35 Developed by Manish Parmar
36
37 C:\Users\Dell\source\repos\labassign\labassign\bin\Debug\net8.0\labassign.exe (process 8484) exited with code 0 (0x0).
38 Press any key to close this window . . .
39
40
41
42
```

Q 2. Create a class called BankAccount with properties for account number, account holder name, and balance. Implement methods for deposit, withdrawal, and displaying the account details.

Ans 2. using System;

namespace LabAssignment3

```
{
    class BankAccount
    {
        public string AccountNumber { get; set; }
        public string AccountHolderName { get; set; }
        public double Balance { get; set; }

        public BankAccount(string accountNumber, string accountHolderName, double
balance)
        {
            AccountNumber = accountNumber;
            AccountHolderName = accountHolderName;
            Balance = balance;
        }

        public void Deposit(double amount)
        {
            Balance += amount;
        }

        public void Withdraw(double amount)
        {
            if (amount <= Balance)
                Balance -= amount;
            else
                Console.WriteLine("Insufficient balance.");
        }
    }
}
```

```

        public void DisplayAccountDetails()
        {
            Console.WriteLine($"Account Number: {AccountNumber}");
            Console.WriteLine($"Account Holder Name: {AccountHolderName}");
            Console.WriteLine($"Balance: {Balance:C}");
        }
    }

    class frogram
    {
        static void Main(string[] args)
        {
            BankAccount account = new BankAccount("123456", "Alice Johnson",
1000);

            account.Deposit(500);
            account.Withdraw(200);
            account.DisplayAccountDetails();
            Console.ReadLine();
            Console.WriteLine("Developed by Manish Parmar.");
        }
    }
}

```

Output:

```

Microsoft Visual Studio Debug Console
Account Holder Name: Manish Parmar
Balance : ?5000
-----
=== Bank Account Details ===
Account Number : ACC102
Account Holder Name: Aarti Sharma
Balance : ?10000
-----
72000 deposited successfully.
71500 withdrawn successfully.
? Insufficient balance.
75000 deposited successfully.
-----
=== Bank Account Details ===
Account Number : ACC101
Account Holder Name: Manish Parmar
Balance : ?5500
-----
=== Bank Account Details ===
Account Number : ACC102
Account Holder Name: Aarti Sharma
Balance : ?15000
-----
Developed by Manish Parmar

```

Q 3. Create a static utility class named MathHelper with a static method CalculateAverage that takes an array of integers as input and returns their average.

Ans 3. using System;

```

namespace LabAssignment3
{
    static class MathHelper
    {
        public static double CalculateAverage(int[] numbers)
        {
            if (numbers == null || numbers.Length == 0)
                return 0;

            double sum = 0;

```

```

        foreach (int num in numbers)
            sum += num;

        return sum / numbers.Length;
    }
}

class fprogram
{
    static void Main(string[] args)
    {
        int[] values = { 10, 20, 30, 40, 50 };
        double average = MathHelper.CalculateAverage(values);
        Console.WriteLine($"Average: {average}");
        Console.ReadLine();
        Console.WriteLine("Developed by Manish Parmar.");
    }
}
}

```

Output:

The screenshot shows the Microsoft Visual Studio IDE with the 'labassign' project. The console window displays the following output:

```

Average of first array: 30
Average of second array: 15

Developed by Manish Parmar

C:\Users\Dell\source\repos\labassign\labassign\bin\Debug\net8.0\labassign.exe (process 10604) exited with code 0 (0x0).
Press any key to close this window . . .

```

The bottom status bar indicates the build succeeded.

Q 4. Implement a static logger class called `Logger` that has a method `LogMessage` for writing messages on console. Demonstrate its usage in a simple console application.

Ans 4. using System;

```

namespace LabAssignment3
{
    static class Logger
    {
        public static void LogMessage(string message)
        {
            Console.WriteLine($"[{DateTime.Now}] {message}");
        }
    }

    class fprogram
    {
        static void Main(string[] args)

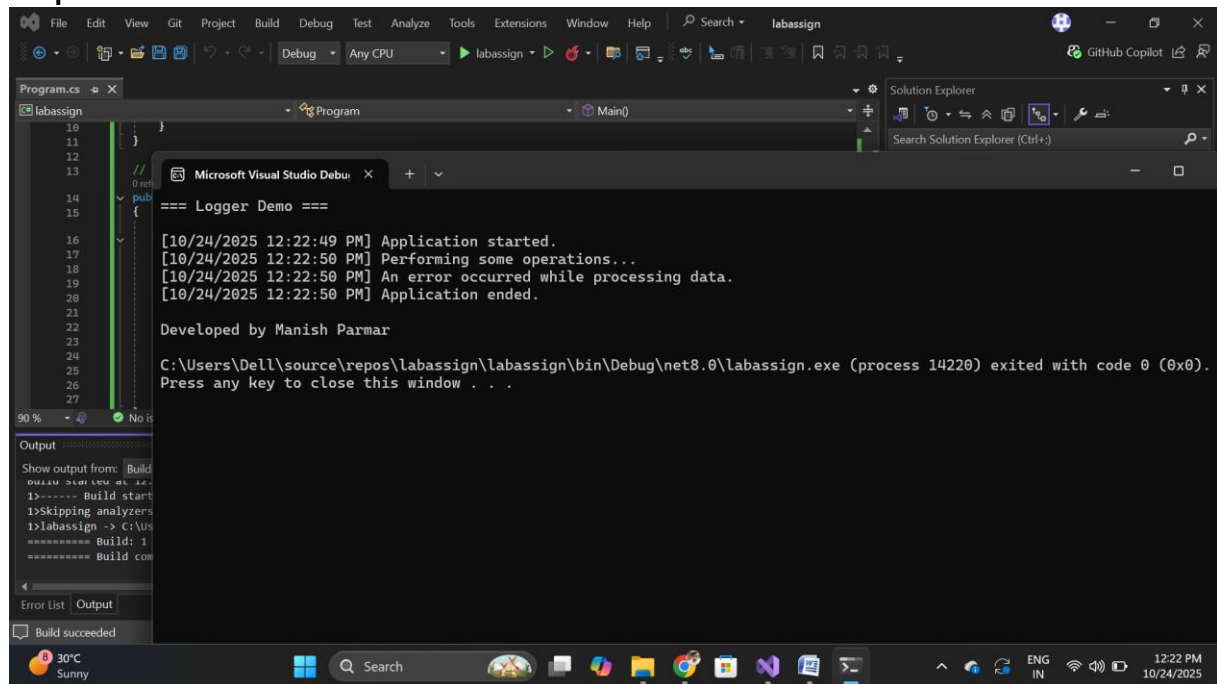
```

```

    {
        Logger.LogMessage("Application started.");
        Logger.LogMessage("frocessing data...");
        Logger.LogMessage("Application ended.");
        Console.ReadLine();
        Console.WriteLine("Developed by Manish Parmar.");
    }
}
}

```

Output:



Q 5. Define a partial class Person with one part containing properties like FirstName and LastName, and another part with methods like PrintFullName to display the full name. Implement these parts in separate files.

Ans 5. using System;

namespace LabAssignment3

```

{
    public partial class flerson
    {
        public string FirstName { get; set; }
        public string LastName { get; set; }
    }

    public partial class flerson
    {
        public void flrintFullName()
        {
            Console.WriteLine($"Full Name: {FirstName} {LastName}");
        }
    }

    class flrogram
    {
        static void Main(string[] args)
        {
            flerson person = new flerson

```

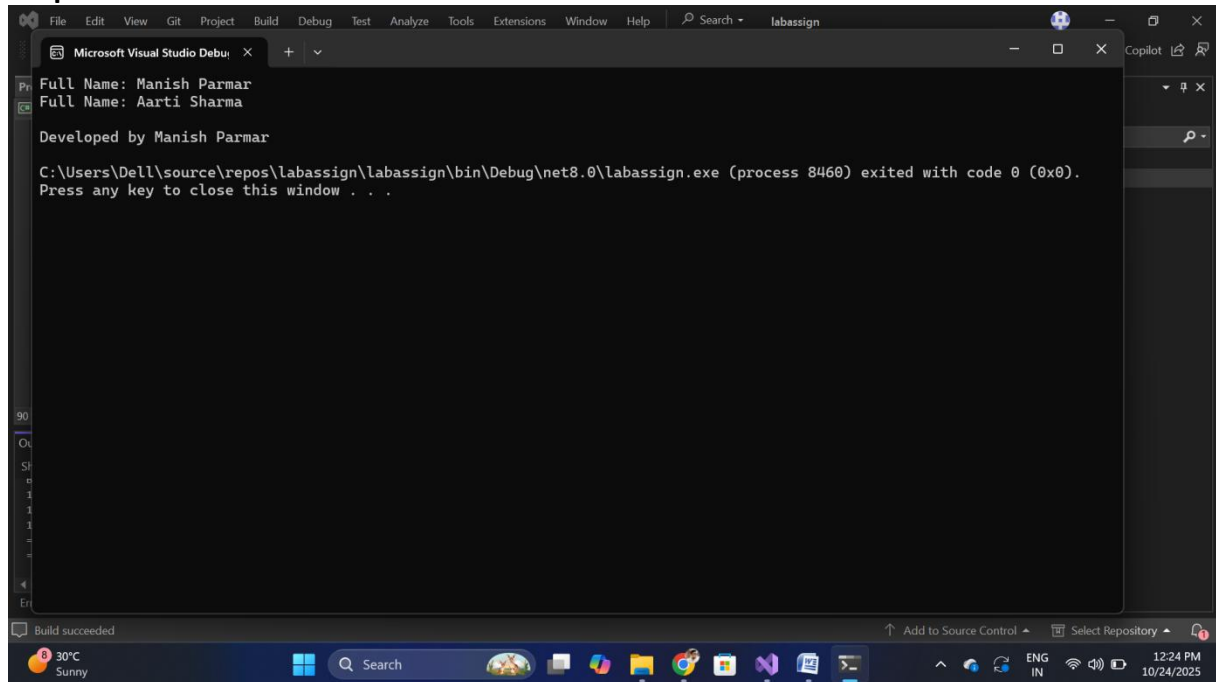
```

    {
        FirstName = "John",
        LastName = "Doe"
    };

    person.flrintFullName();
    Console.ReadLine();
    Console.WriteLine("Developed by Manish Parmar.");
}
}
}

```

Output:



Q 6. Create a partial class Employee with properties representing employee details. In another part, implement methods for calculating salary based on different factors.

Ans 6. using System;

namespace LabAssignment3

```

{
    public partial class Employee
    {
        public string Name { get; set; }
        public int Age { get; set; }
        public double BaseSalary { get; set; }
        public double Bonus { get; set; }
        public double Deduction { get; set; }
    }

    public partial class Employee
    {
        public double CalculateNetSalary()
        {
            return BaseSalary + Bonus - Deduction;
        }

        public void DisplaySalaryDetails()
        {
            Console.WriteLine($"Employee Name: {Name}");
        }
    }
}

```

```

        Console.WriteLine($"Age: {Age}");
        Console.WriteLine($"Base Salary: {BaseSalary:C}");
        Console.WriteLine($"Bonus: {Bonus:C}");
        Console.WriteLine($"Deduction: {Deduction:C}");
        Console.WriteLine($"Net Salary: {CalculateNetSalary():C}");
    }
}

class frogram
{
    static void Main(string[] args)
    {
        Employee emp = new Employee
        {
            Name = "Alice Smith",
            Age = 28,
            BaseSalary = 50000,
            Bonus = 5000,
            Deduction = 2000
        };

        emp.DisplaySalaryDetails();
        Console.ReadLine();
        Console.WriteLine("Developed by Manish Parmar.");
    }
}
}

```

Output:

```

Microsoft Visual Studio Debug Console
labassign

=== Employee Details ===
Name      : Manish Parmar
Age       : 28
BasicSalary: 750000
Bonus     : 75000
TotalSalary: 750000
Salary after 10% tax: 749500
=====

=== Employee Details ===
Name      : Aarti Sharma
Age       : 32
BasicSalary: 760000
Bonus     : 78000
TotalSalary: 768000
Salary after 10% tax: 761200
=====

Developed by Manish Parmar

C:\Users\Dell\source\repos\labassign\labassign\bin\Debug\net8.0\labassign.exe (process 14496) exited with code 0 (0x0).
Press any key to close this window . . .

```

Q 7. Define an abstract base class Shape with an abstract method CalculateArea. Derive classes like Circle and Rectangle from Shape and implement the area calculation methods for each.

Ans 7. using System;

```

namespace LabAssignment3
{
    public abstract class Shape
    {

```

```

        public abstract double CalculateArea();
    }

    public class Circle : Shape
    {
        public double Radius { get; set; }

        public Circle(double radius)
        {
            Radius = radius;
        }

        public override double CalculateArea()
        {
            return Math.PI * Radius * Radius;
        }
    }

    public class Rectangle : Shape
    {
        public double Width { get; set; }
        public double Height { get; set; }

        public Rectangle(double width, double height)
        {
            Width = width;
            Height = height;
        }

        public override double CalculateArea()
        {
            return Width * Height;
        }
    }

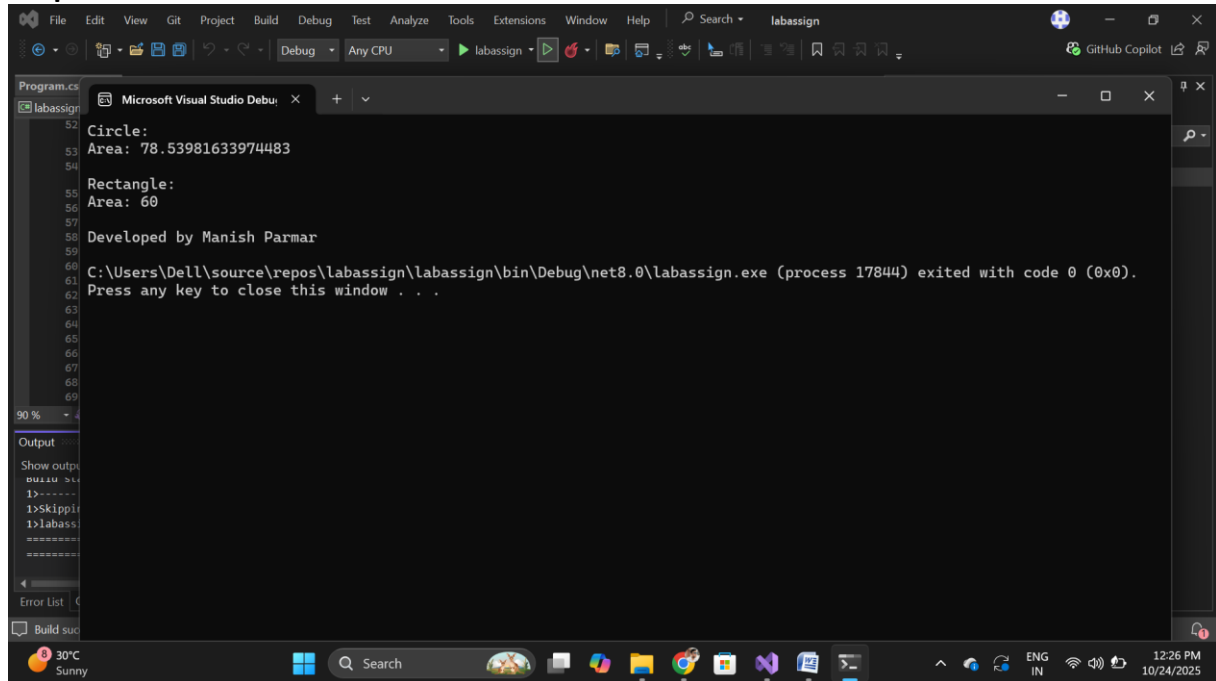
    class Program
    {
        static void Main(string[] args)
        {
            Shape circle = new Circle(5);
            Shape rectangle = new Rectangle(4, 6);

            Console.WriteLine($"Circle Area: {circle.CalculateArea():F2}");
            Console.WriteLine($"Rectangle Area: {rectangle.CalculateArea():F2}");

            Console.ReadLine();
            Console.WriteLine("Developed by Manish Parmar.");
        }
    }
}

```


Output:



```
Program.cs
labassign
52 Circle:
53 Area: 78.53981633974483
54
55 Rectangle:
56 Area: 60
57
58 Developed by Manish Parmar
59
60 C:\Users\Dell\source\repos\labassign\labassign\bin\Debug\net8.0\labassign.exe (process 17844) exited with code 0 (0x0).
61 Press any key to close this window . . .
62
63
64
65
66
67
68
69
90 %
Output
Show output
00:11:04
1>-----
1>Skippin
1>labass
=====
Error List
Build suc
```

Q 8. Design an abstract class Animal with properties like Name and Age. Derive classes like Dog and Cat from Animal with their unique methods.

Ans 8. using System;

namespace LabAssignment3

```
{
    public abstract class Animal
    {
        public string Name { get; set; }
        public int Age { get; set; }

        public abstract void MakeSound();
    }

    public class Dog : Animal
    {
        public void Fetch()
        {
            Console.WriteLine($"{Name} is fetching the ball!");
        }

        public override void MakeSound()
        {
            Console.WriteLine($"{Name} says: Woof! Woof!");
        }
    }

    public class Cat : Animal
    {
        public void Scratch()
        {
            Console.WriteLine($"{Name} is scratching the furniture!");
        }

        public override void MakeSound()
        {

```

```

        Console.WriteLine($"{Name} says: Meow!");
    }
}

class frogram
{
    static void Main(string[] args)
    {
        Dog dog = new Dog { Name = "Buddy", Age = 3 };
        Cat cat = new Cat { Name = "Whiskers", Age = 2 };

        dog.MakeSound();
        dog.Fetch();

        cat.MakeSound();
        cat.Scratch();

        Console.ReadLine();
        Console.WriteLine("Developed by Manish Parmar.");
    }
}
}

```

Output:

```

Microsoft Visual Studio Debu: x
+
-
Name: Buddy, Age: 3
Dog says: Woof! Woof!
Buddy is fetching the ball!

Name: Whiskers, Age: 2
Cat says: Meow! Meow!
Whiskers is scratching the furniture!

Developed by Manish Parmar

C:\Users\Dell\source\repos\labassign\labassign\bin\Debug\net8.0\labassign.exe (process 4040) exited with code 0 (0x0).
Press any key to close this window . . .

```

Q 9. Create a base class Vehicle with methods like StartEngine and StopEngine. Derive a class Car from Vehicle and seal it. Try to create a class that inherits from Car and observe the behavior.

Ans 9. using System;

```

namespace VLabAssignment3
{
    public class Vehicle
    {
        public void StartEngine()
        {
            Console.WriteLine("Engine started.");
        }
    }
}

```

```

        public void StopEngine()
        {
            Console.WriteLine("Engine stopped.");
        }
    }

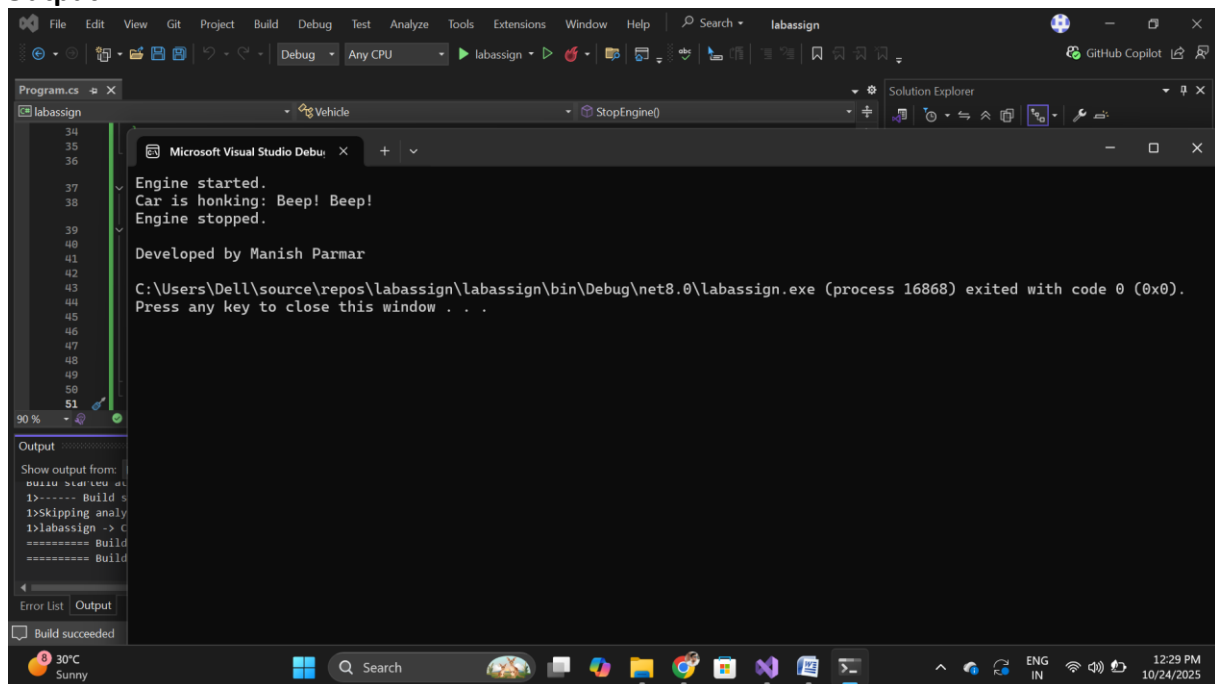
    public sealed class Car : Vehicle
    {
        public void Drive()
        {
            Console.WriteLine("Car is driving.");
        }
    }

    class fprogram
    {
        static void Main(string[] args)
        {
            Car car = new Car();
            car.StartEngine();
            car.Drive();
            car.StopEngine();

            Console.ReadLine();
            Console.WriteLine("Developed by Manish Parmar.");
        }
    }
}

```

Output:



Q 10. Design a class BankAccount with properties like AccountNumber and Balance. Implement a sealed class SavingsAccount that extends BankAccount with methods for interest calculation.

Ans 10. using System;

```

namespace LabAssignment3
{
    public class BankAccount

```

```

{
    public string AccountNumber { get; set; }
    public double Balance { get; set; }

    public BankAccount(string accountNumber, double balance)
    {
        AccountNumber = accountNumber;
        Balance = balance;
    }

    public void Deposit(double amount)
    {
        Balance += amount;
        Console.WriteLine($"Deposited: {amount:C}. New Balance:
{Balance:C}");
    }

    public void Withdraw(double amount)
    {
        if (amount <= Balance)
        {
            Balance -= amount;
            Console.WriteLine($"Withdrawn: {amount:C}. New Balance:
{Balance:C}");
        }
        else
        {
            Console.WriteLine("Insufficient balance.");
        }
    }

    public void DisplayAccountDetails()
    {
        Console.WriteLine($"Account Number: {AccountNumber}");
        Console.WriteLine($"Balance: {Balance:C}");
    }
}

public sealed class SavingsAccount : BankAccount
{
    public double InterestRate { get; set; }

    public SavingsAccount(string accountNumber, double balance, double
interestRate)
        : base(accountNumber, balance)
    {
        InterestRate = interestRate;
    }

    public void ApplyInterest()
    {
        double interest = Balance * InterestRate / 100;
        Balance += interest;
        Console.WriteLine($"Interest Applied: {interest:C}. New Balance:
{Balance:C}");
    }
}

class frogram
{
    static void Main(string[] args)
    {
        SavingsAccount savings = new SavingsAccount("SA12345", 1000, 5);
    }
}

```

```

savings.DisplayAccountDetails();
savings.Deposit(500);
savings.ApplyInterest();
savings.Withdraw(300);
savings.DisplayAccountDetails();

Console.ReadLine();
Console.WriteLine("Developed by Manish Parmar.");
}
}
}

```

Output:

```

Microsoft Visual Studio Debug Console
Account Number: SA101, Balance: 75000
72000 deposited successfully.
71000 withdrawn successfully.
Interest of 5% added: 7300
Account Number: SA101, Balance: 76300

Developed by Manish Parmar

C:\Users\Dell\source\repos\labassign\labassign\bin\Debug\net8.0\labassign.exe (process 9320) exited with code 0 (0x0).
Press any key to close this window . . .

```

Build succeeded