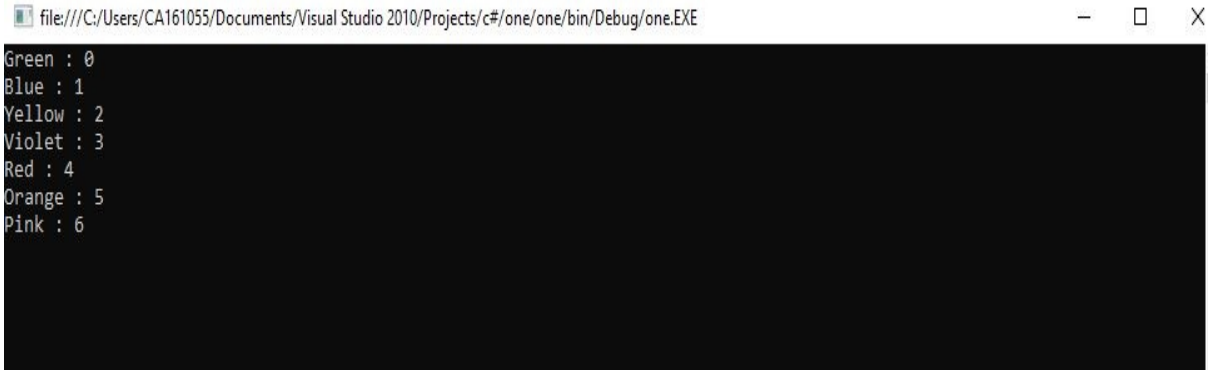
1) Describe the enumerations programming constructs, which provides a human-readable form of a series of related constant values in C#..

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;


namespace EnumerationDemo
{
   class ProgramOne
   {
      enum Colors
      {

         Green,
         Blue,
         Yellow,
         Violet,
         Red,
         Orange,
         Pink

      }

      static void Main(string[] args)
      {

         foreach (var color in Enum.GetValues(typeof(Colors)))
         {
            Console.WriteLine("{0} : {1}", color, (int)color);
         }
         Console.Read();

      }

   }

}
```

OUTPUT


file:///C:/Users/CA161055/Documents/Visual Studio 2010/Projects/c#/one/one/bin/Debug/one.EXE
Green : 0
Blue : 1
Yellow : 2
Violet : 3
Red : 4
Orange : 5
Pink : 6

2) Check Whether the Entered Year is a Leap Year or Not

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace ProgramTwo
{
   class Program
   {
      static void Main(string[] args)
      {
     try {
         Console.Write("Enter The Year : \n");
         long year = Convert.ToInt64(Console.ReadLine());
         Console.WriteLine("\n----------------------------------------");
         if (year % 400 == 0) {
            Console.WriteLine("\t{0} is a Leap Year",year);
         }
         else if (year % 100 == 0) {
            Console.WriteLine("\t{0} is not a Leap Year", year);
         }
         else if (year % 4 == 0)
         {
            Console.WriteLine("\t{0} is a Leap Year", year);
         }
         else {
            Console.WriteLine("\t{0} is not a Leap Year", year);
         }
      }
      catch(Exception ex) {
         Console.WriteLine("Enter valid year");
      }

      Console.ReadKey();
       }
   }
}
```

OUTPUT

file:///C:/Users/CA172008/Documents/c#/three/three/bin/Debug/three.EXE
Enter the year
2017
2017 is not a Leap year

file:///C:/Users/CA172008/Documents/c#/three/three/bin/Debug/three.EXE
Enter the year
2002
2002 is not a Leap year

file:///C:/Users/CA172008/Documents/c#/three/three/bin/Debug/three.EXE
Enter the year
2012
2012 is a Leap year

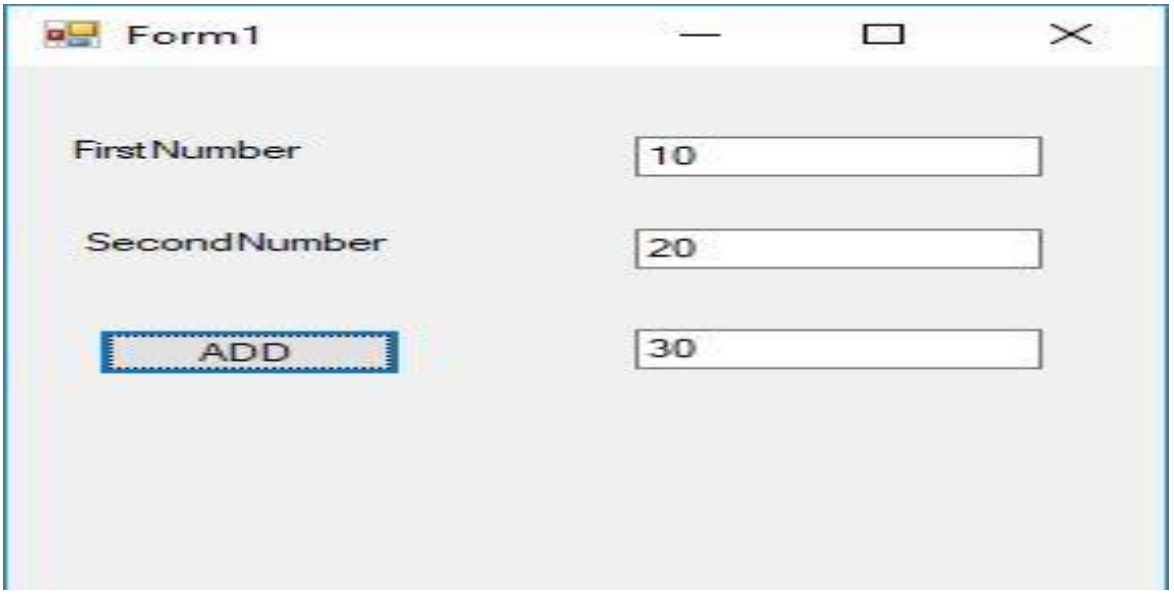
file:///C:/Users/CA172008/Documents/c#/three/three/bin/Debug/three.EXE
Enter the year
2008
2008 is a Leap year

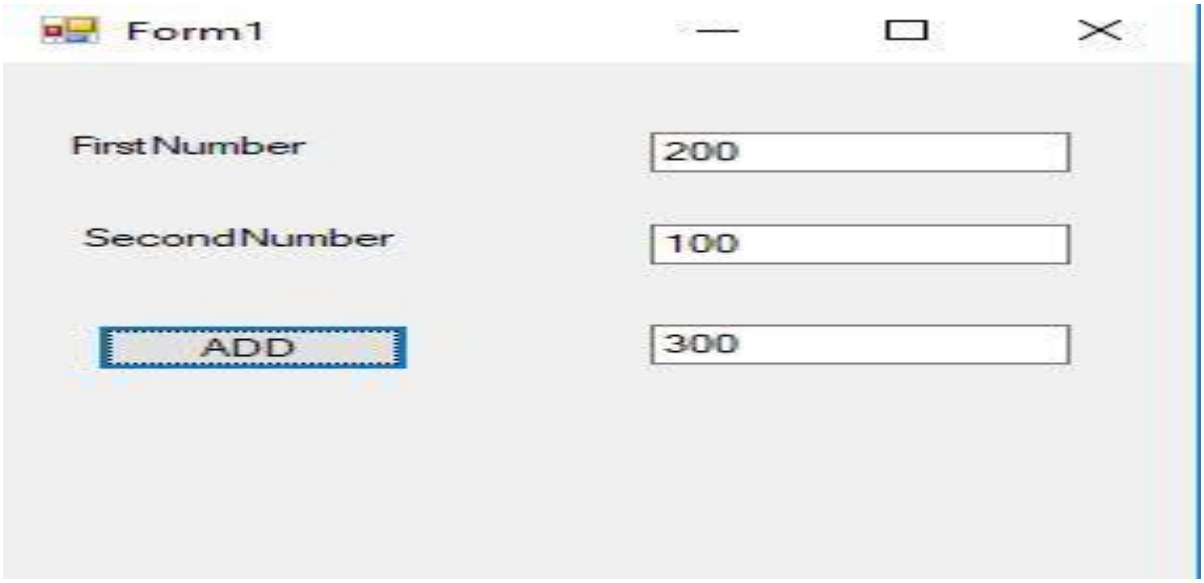
file:///C:/Users/CA172008/Documents/c#/three/three/bin/Debug/three.EXE
Enter The Year :
abcdsd
Enter valid year

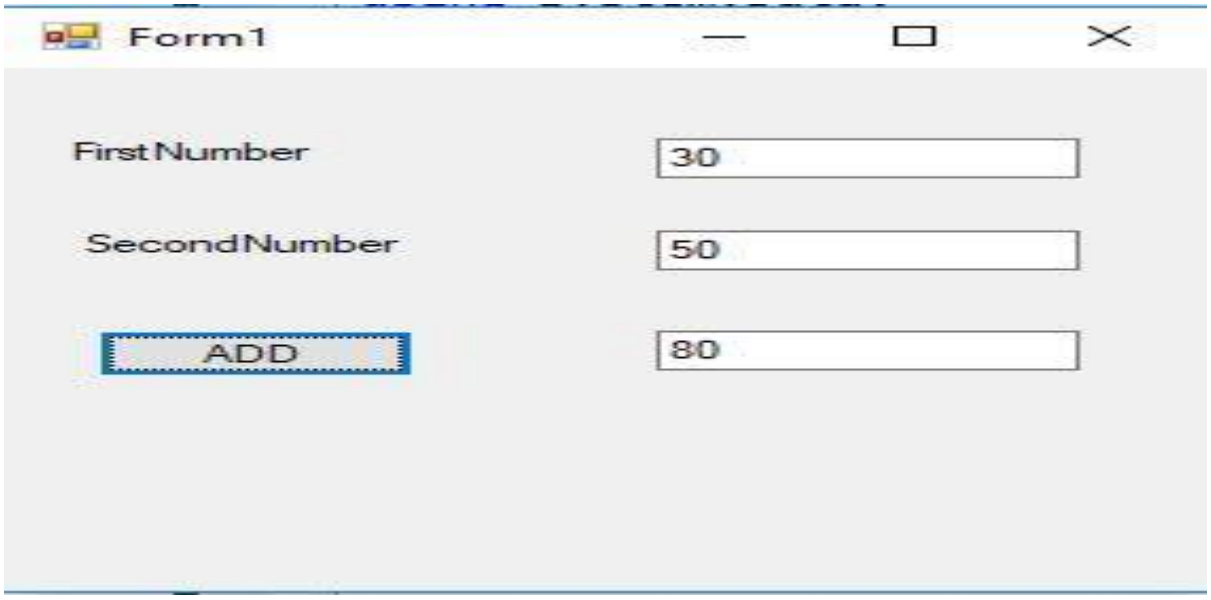
3) Program to display the addition using the windows application.

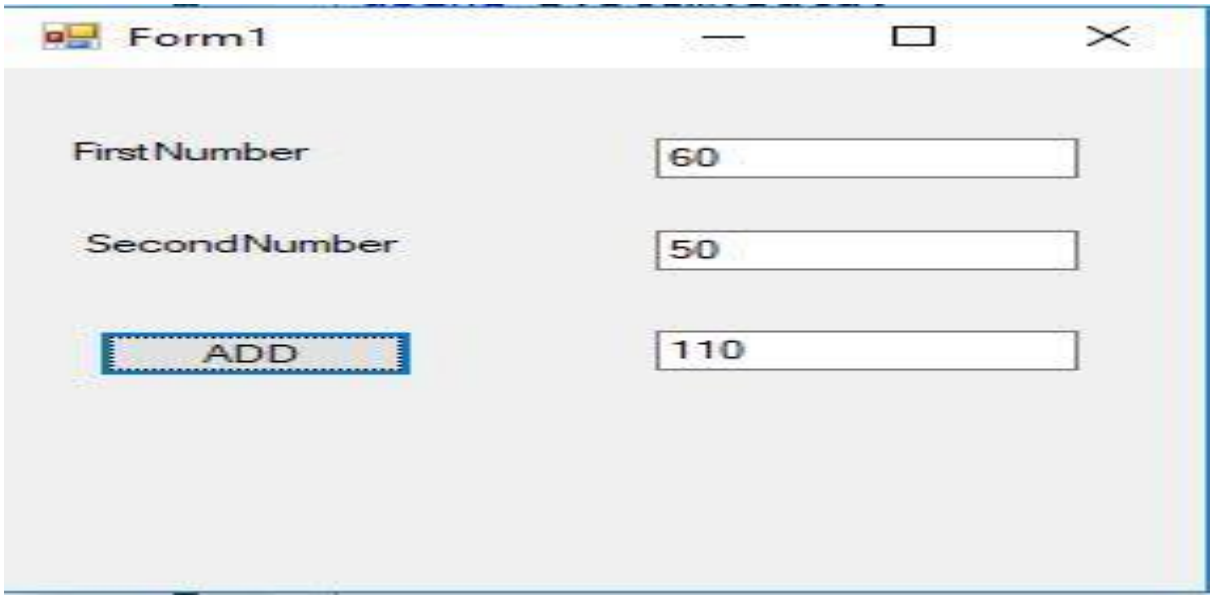
```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;

    namespace three
    {
       public partial class Form1 : Form
       {
          public Form1()
          {
             InitializeComponent();
          }

          private void button1_Click(object sender, EventArgs e)
          {
             int num1 = Int16.Parse(textBox1.Text);
             int num2 = Int16.Parse(textBox2.Text);

             int sum = num1 + num2;

             textBox3.Text = "sum of two number :" + sum;

          }
       }
    }
```

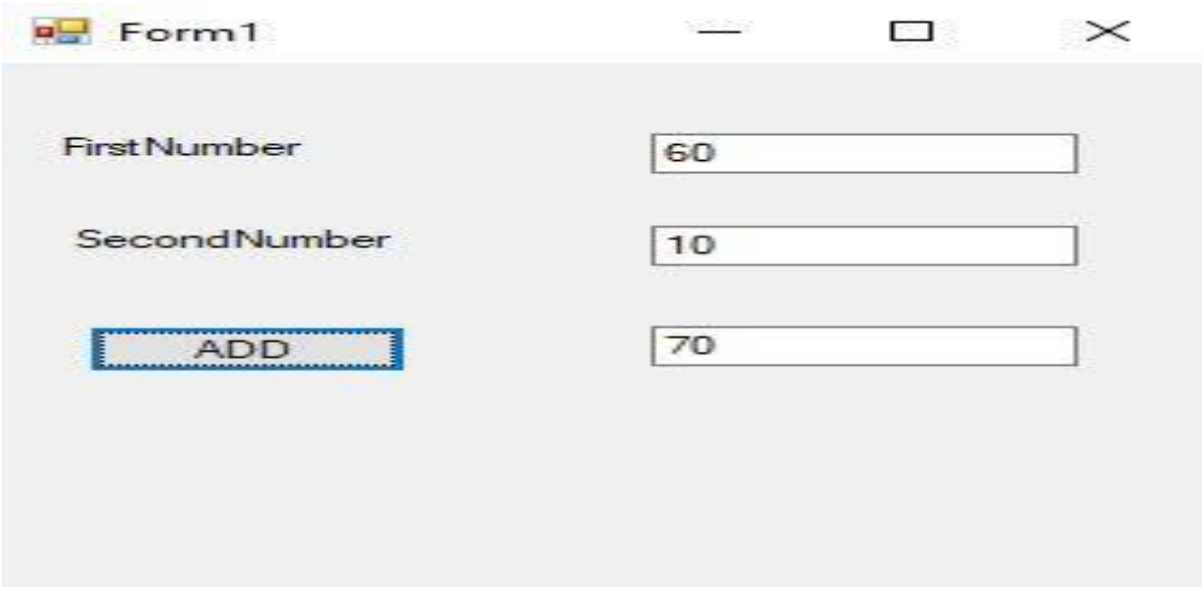
OUTPUT


Form1
First Number
10
Second Number
20
ADD
30


Form1
First Number
200
Second Number
100
ADD
300


Form1
First Number
30
Second Number
50
ADD
80

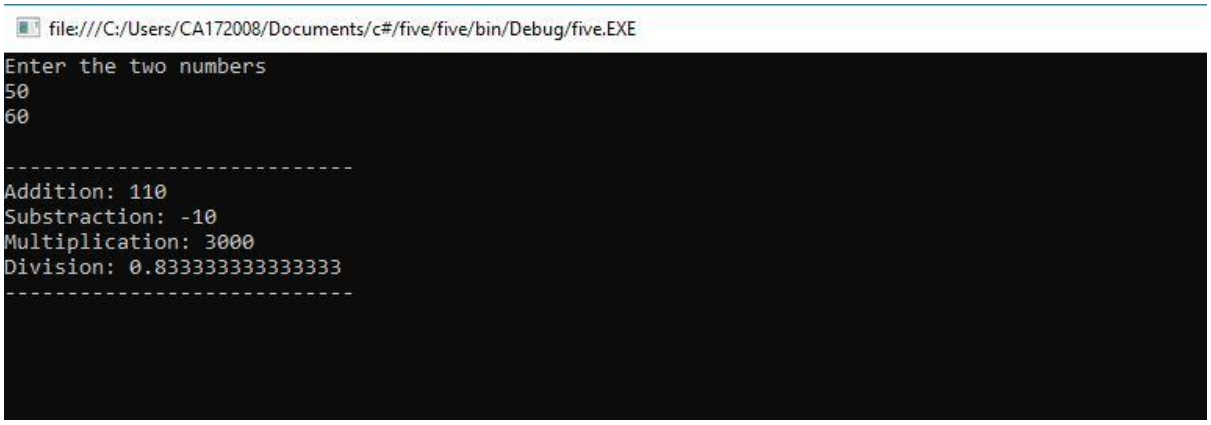

Form1
First Number
60
Second Number
50
ADD
110


Form1
First Number
60
Second Number
10
ADD
70

4) Program to display the addition, subtraction, multiplication and division of two number using console applications.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace ProgramFive
{
   class Program
   {
      static void Main(string[] args)
      {
         double num1, num2;
         double sum, sub, mul, div;

         Console.WriteLine("Enter the two numbers");
         num1 = Double.Parse(Console.ReadLine());
         num2 = Double.Parse(Console.ReadLine());

         sum = num1 + num2;
         sub = num1 - num2;
         mul = num1 * num2;
         div = num1 / num2;
         Console.WriteLine();
         Console.WriteLine("----------------------------");
         Console.WriteLine("Addition: {0}", sum);
         Console.WriteLine("Substraction: {0}", sub);
         Console.WriteLine("Multiplication: {0}", mul);
         Console.WriteLine("Division: {0}", div);
         Console.WriteLine("----------------------------");
         Console.ReadLine();
      }
   }
}
```

OUTPUT


file:///C:/Users/CA172008/Documents/c#/five/five/bin/Debug/five.EXE
Enter the two numbers
50
60

Addition: 110
Substraction: -10
Multiplication: 3000
Division: 0.833333333333333
---

file:///C:/Users/CA172008/Documents/c#/five/five/bin/Debug/five.EXE
Enter the two numbers
10
60

Addition: 70
Substraction: -50
Multiplication: 600
Division: 0.166666666666667
---

file:///C:/Users/CA172008/Documents/c#/five/five/bin/Debug/five.EXE
Enter the two numbers
80
100

Addition: 180
Substraction: -20
Multiplication: 8000
Division: 0.8
---

file:///C:/Users/CA172008/Documents/c#/five/five/bin/Debug/five.EXE
Enter the two numbers
30
40

Addition: 70
Substraction: -10
Multiplication: 1200
Division: 0.75
---

file:///C:/Users/CA172008/Documents/c#/five/five/bin/Debug/five.EXE
Enter the two numbers
20
40

Addition: 60
Substraction: -20
Multiplication: 800
Division: 0.5
---

5) Program to display the first 10 natural numbers and their sum using console application

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;


namespace ProgramSix
{
   class Program
   {
      static void Main(string[] args)
      {
         int sum = 0;
         Console.WriteLine("------------------");
         Console.WriteLine("First 10 natural numbers");
         Console.WriteLine("------------------");


         for (int i = 1; i <= 10; i++)
         {
            sum += i;
            Console.WriteLine(i);
         }
         Console.WriteLine("------------------");
         Console.WriteLine("Sum: {0}", sum);
         Console.WriteLine("------------------");
         Console.ReadLine();
      }
   }
}
```

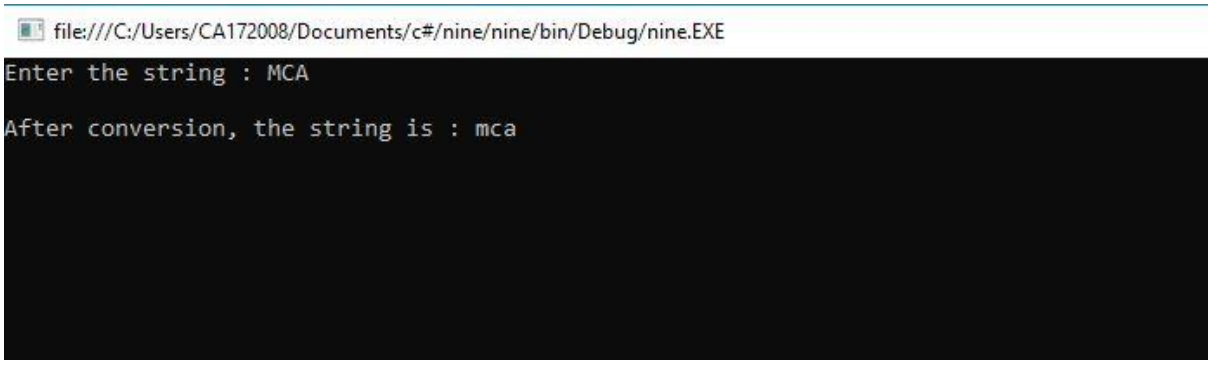
OUTPUT

file:///C:/Users/CA172008/Documents/c#/six/six/bin/Debug/six.EXE
First 10 natural numbers
1
2
3
4
5
6
7
8
9
10
Sum: 55

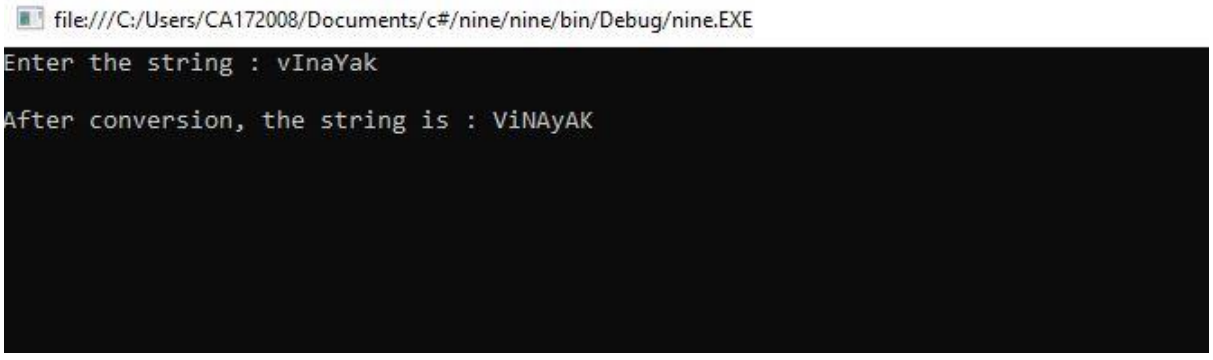
6) Write a program to convert input string from lower to upper and upper to lower case.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace LowUp
{
   class Program
   {
      static void Main(string[] args)
      {
      string str1;
      char[] arr1;
      int l,i;
      l=0;
      char ch;
      Console.Write("Input the string : ");
      str1 = Console.ReadLine();
      l=str1.Length;
      arr1 = str1.ToCharArray(0, l);

      Console.Write("\nAfter conversion, the string is : ");
      for (i = 0; i < l; i++)
      {
         ch = arr1[i];
         if (Char.IsLower(ch))
            Console.Write(Char.ToUpper(ch));
         else
            Console.Write(Char.ToLower(ch));
      }
         Console.ReadLine();
      }
   }
}
```

OUTPUT


file:///C:/Users/CA172008/Documents/c#/nine/nine/bin/Debug/nine.EXE
Enter the string : MCA
After conversion, the string is : mca

file:///C:/Users/CA172008/Documents/c#/nine/nine/bin/Debug/nine.EXE
Enter the string : hello
After conversion, the string is : HELLO


file:///C:/Users/CA172008/Documents/c#/nine/nine/bin/Debug/nine.EXE
Enter the string : vInaYak
After conversion, the string is : ViNAyAK

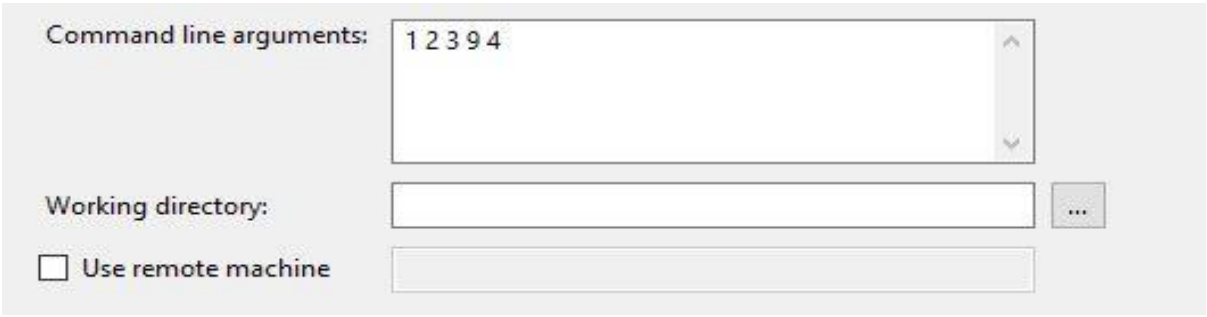
file:///C:/Users/CA172008/Documents/c#/nine/nine/bin/Debug/nine.EXE
Enter the string : ProGram
After conversion, the string is : pROgRAM

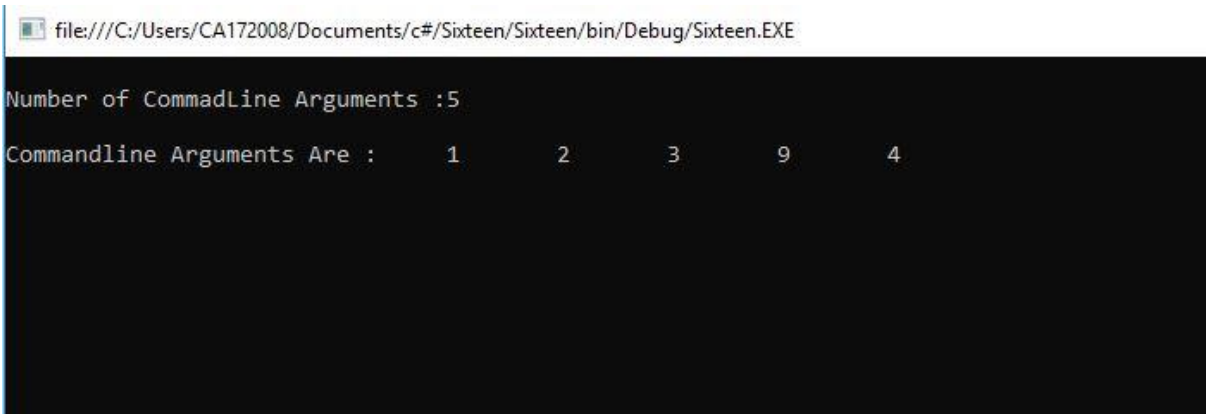
file:///C:/Users/CA172008/Documents/c#/nine/nine/bin/Debug/nine.EXE
Enter the string : C Sharp
After conversion, the string is : c sHARP

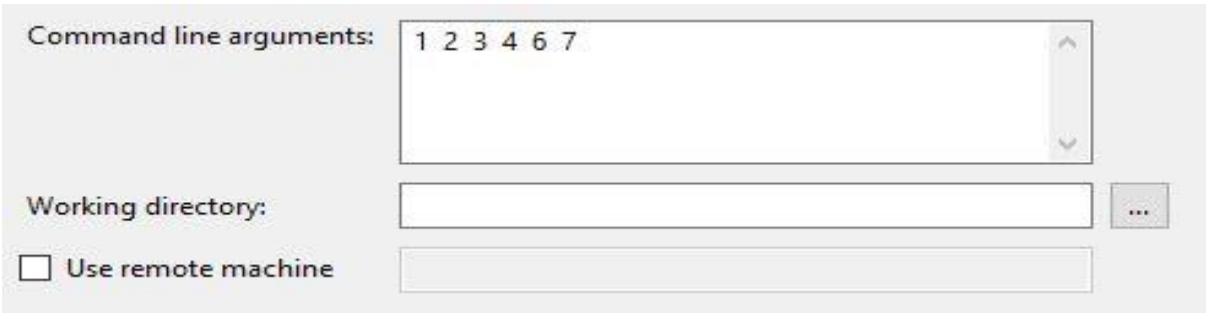
7) Demonstrate Command line arguments processing.

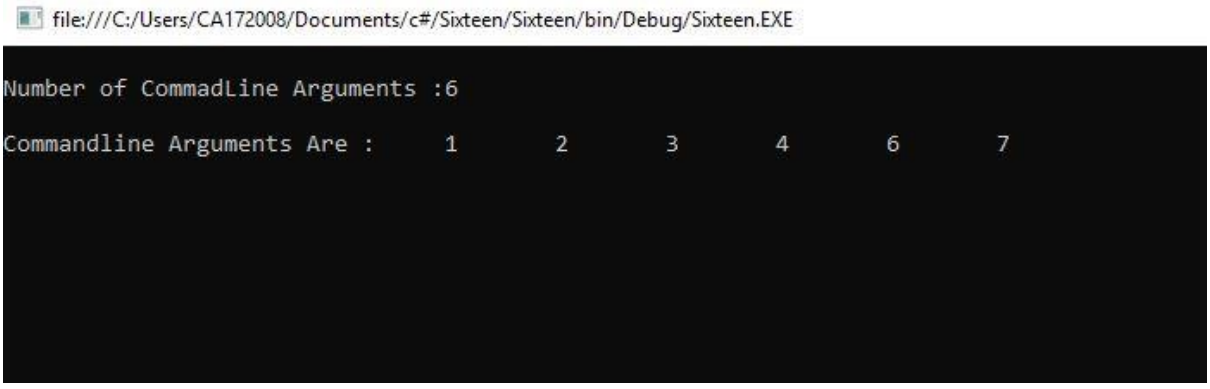
```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
namespace Sixteen
{
   class Program
   {
      static void Main(string[] args)
      {
         Console.WriteLine("\nNumber of CommadLine Arguments :" + args.Length);
         Console.Write("\nCommandline Arguments Are :\t");
         for (int i = 0; i < args.Length; i++)
         {
            Console.Write(args[i] + "\t");
         }
         Console.ReadLine();
      }
   }
}
```

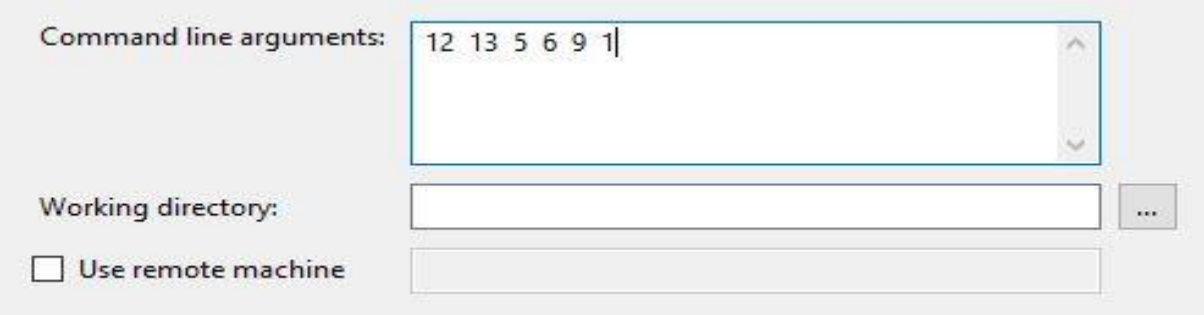
OUTPUT


Command line arguments:
1 2 3 9 4
Working directory:
...
Use remote machine


file:///C:/Users/CA172008/Documents/c#/Sixteen/Sixteen/bin/Debug/Sixteen.EXE
Number of CommadLine Arguments :5
Commandline Arguments Are : 1 2 3 9 4

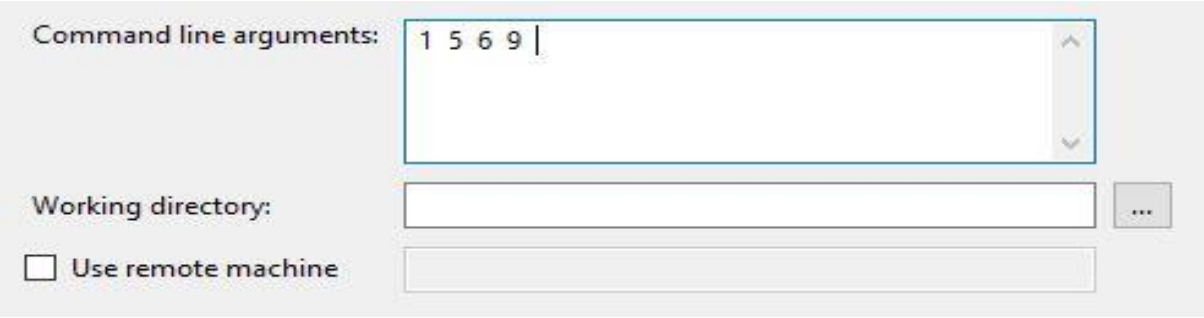

Command line arguments:
1 2 3 4 6 7
Working directory:
...
Use remote machine


file:///C:/Users/CA172008/Documents/c#/Sixteen/Sixteen/bin/Debug/Sixteen.EXE
Number of CommadLine Arguments :6
Commandline Arguments Are : 1 2 3 4 6 7



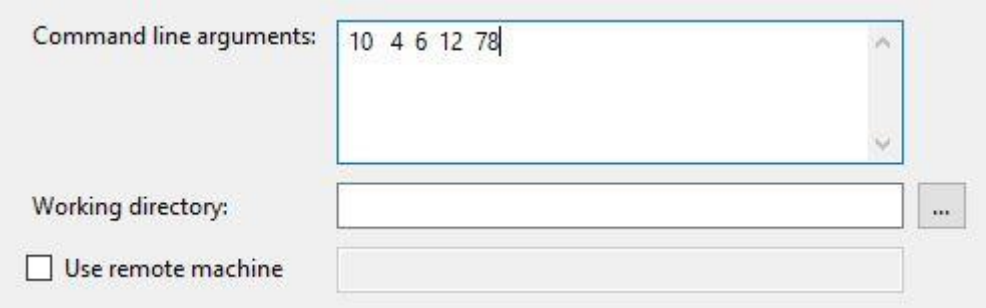
file:///C:/Users/CA172008/Documents/c#/Sixteen/Sixteen/bin/Debug/Sixteen.EXE

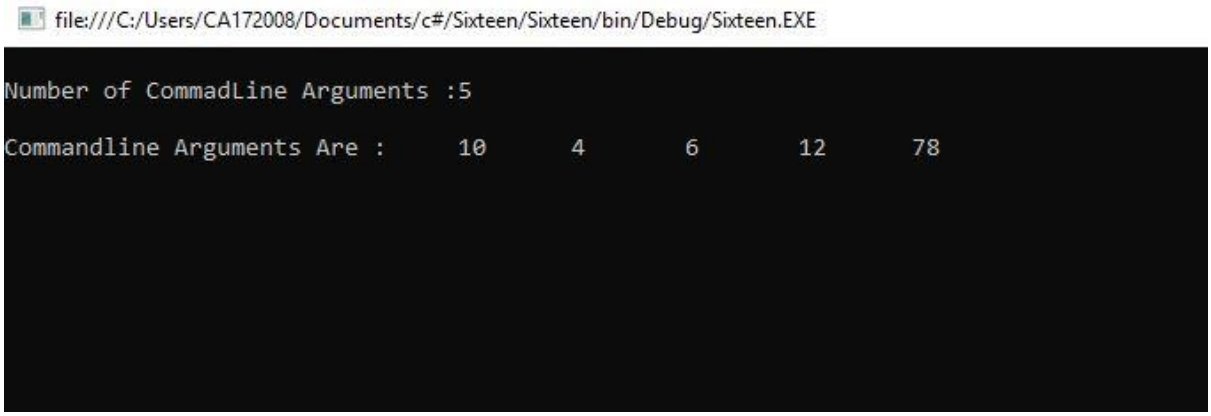
```
Number of CommadLine Arguments :6

Commandline Arguments Are :     12      13      5       6       9       1
```



file:///C:/Users/CA172008/Documents/c#/Sixteen/Sixteen/bin/Debug/Sixteen.EXE

```
Number of CommadLine Arguments :4

Commandline Arguments Are :     1       5       6       9
```

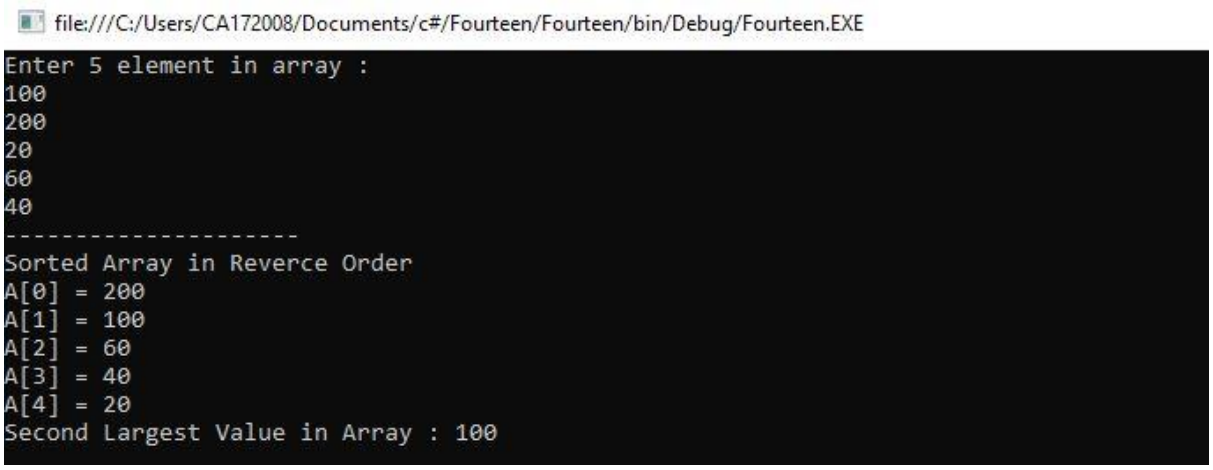

Command line arguments:
10 4 6 12 78
Working directory:
...
Use remote machine


file:///C:/Users/CA172008/Documents/c#/Sixteen/Sixteen/bin/Debug/Sixteen.EXE
Number of CommadLine Arguments :5
Commandline Arguments Are : 10 4 6 12 78

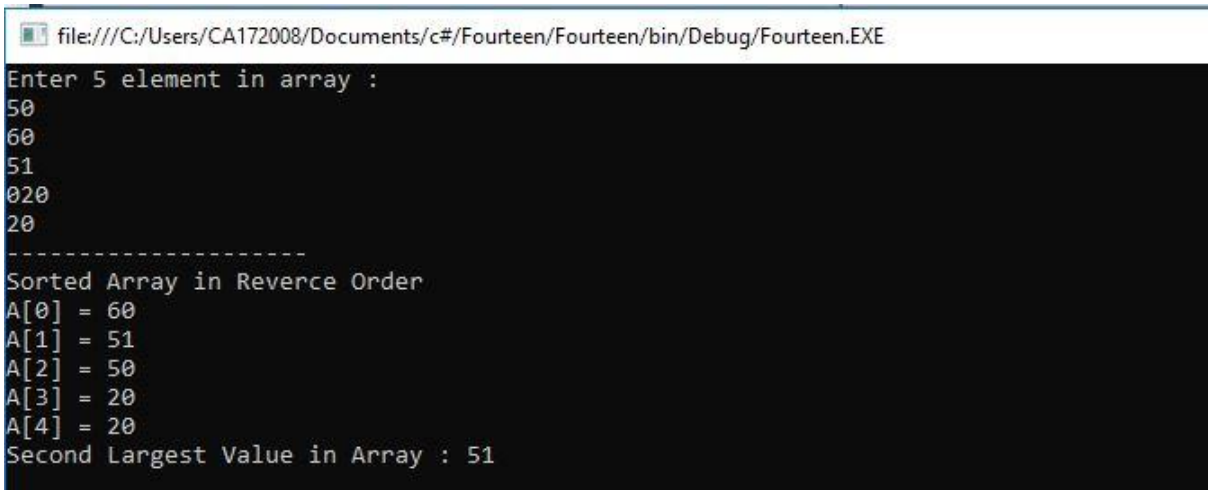
8) Find the second largest element in a single dimensional array.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;


namespace pgm14
{
   class Program
   {
      static void Main(string[] args)
      {
         try
         {
            int[] arr = new int[5];
            Console.WriteLine("Enter 5 element in array : ");
            for (int i = 0; i < 5; i++)
            {
               arr[i] = int.Parse(Console.ReadLine());
            }
            Console.WriteLine("----------------------");
            Array.Sort(arr);
            Array.Reverse(arr);
            Console.WriteLine("Sorted Array in Reverce Order");
            for (int i = 0; i < 5; i++)
            {
               Console.WriteLine("A[" + i + "] = " + arr[i]);
            }
            Console.WriteLine("Second Largest Value in Array : " + arr[1]);
         }
         catch (Exception ex) {
           Console.WriteLine("Provide Valid Array Element.\nOnly Numeric Values are
           allowed.");
         }
         Console.ReadKey();
      }
   }
}
```

OUTPUT


file:///C:/Users/CA172008/Documents/c#/Fourteen/Fourteen/bin/Debug/Fourteen.EXE
Enter 5 element in array :
100
200
20
60
40

Sorted Array in Reverce Order
A[0] = 200
A[1] = 100
A[2] = 60
A[3] = 40
A[4] = 20
Second Largest Value in Array : 100


file:///C:/Users/CA172008/Documents/c#/Fourteen/Fourteen/bin/Debug/Fourteen.EXE
Enter 5 element in array :
50
60
51
020
20

Sorted Array in Reverce Order
A[0] = 60
A[1] = 51
A[2] = 50
A[3] = 20
A[4] = 20
Second Largest Value in Array : 51

file:///C:/Users/CA172008/Documents/c#/Fourteen/Fourteen/bin/Debug/Fourteen.EXE
Enter 5 element in array :
1
20
5
5
8

Sorted Array in Reverce Order
A[0] = 20
A[1] = 8
A[2] = 5
A[3] = 5
A[4] = 1
Second Largest Value in Array : 8

file:///C:/Users/CA172008/Documents/c#/Fourteen/Fourteen/bin/Debug/Fourteen.EXE

```
Enter 5 element in array :
5
60
51
05
51
---------------------
Sorted Array in Reverce Order
A[0] = 60
A[1] = 51
A[2] = 51
A[3] = 5
A[4] = 5
Second Largest Value in Array : 51
```

file:///C:/Users/CA172008/Documents/c#/Fourteen/Fourteen/bin/Debug/Fourteen.EXE

```
Enter 5 element in array :
20
30
50
90
100
---------------------
Sorted Array in Reverce Order
A[0] = 100
A[1] = 90
A[2] = 50
A[3] = 30
A[4] = 20
Second Largest Value in Array : 90
```

9) Program to illustrate the use of different properties in C#.

```
using System;
using System.Collections.Generic;
using System.Text;

namespace Program
{
   class PropertiesDemo
   {
      private string name;
      private int age;

      public string Name
      {
         set
         {
            name = value;
         }
         get
         {
            return name;
         }
      }

      public int Age
      {
         set
         {
            if (value > 0)
               age = value;
         }

         get
         {
            return age;
         }
      }

      static void Main(string[] args)
      {
         PropertiesDemo p = new PropertiesDemo();
         p.Name = "Vinayak";
         p.Age = 23;

         PropertiesDemo d = new PropertiesDemo();
         d.Name = "Zutti";
         d.Age = 22;
```

```
            Console.WriteLine("{0} : {1}", p.Name, p.Age);
            Console.WriteLine("{0} : {1}", d.Name, d.Age);
            Console.ReadLine();
        }
    }
}
```

OUTPUT

file:///C:/Users/CA172008/Documents/c#/Fifteen/Fifteen/bin/Debug/Fifteen.EXE
Vinayak : 23
Zutti : 22

file:///C:/Users/CA172008/Documents/c#/Fifteen/Fifteen/bin/Debug/Fifteen.EXE
Akshay : 22
Shubham : 25

file:///C:/Users/CA172008/Documents/c#/Fifteen/Fifteen/bin/Debug/Fifteen.EXE
Sanjeev : 27
abhi : 21

file:///C:/Users/CA172008/Documents/c#/Fifteen/Fifteen/bin/Debug/Fifteen.EXE
Gourav : 27
Kolaki : 21

file:///C:/Users/CA172008/Documents/c#/Fifteen/Fifteen/bin/Debug/Fifteen.EXE
ranadive : 27
suraj : 21

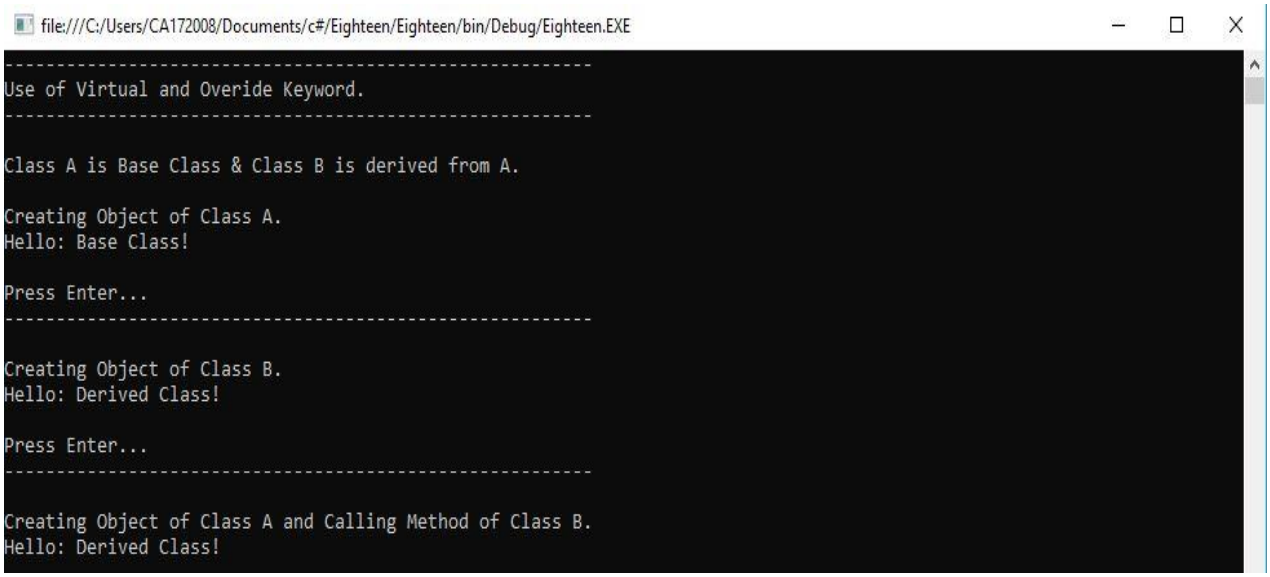
10) Demonstrate Use of Virtual and override keyword in C# with a simple Program.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace ConsoleApplication1
{
        class A
         {
                  public virtual void show()
                {
                        Console.WriteLine("Hello: Base Class!");
                        Console.Write("\nPress Enter...");
                        Console.ReadLine();
                }
        }
class Program
   {
      static void Main(string[] args)
      {
                Console.WriteLine("-----------------------------------------------------------");
                Console.WriteLine("Use of Virtual and Overide Keyword.");
                Console.WriteLine("-----------------------------------------------------------");
                Console.WriteLine("\nClass A is Base Class & Class B is derived from
                A.\n");
                Console.WriteLine("Creating Object of Class A.");
                A a1 = new A();
                a1.show();
                Console.WriteLine("-----------------------------------------------------------
                \n");
                Console.WriteLine("Creating Object of Class B.");
                B b1 = new B();
                b1.show();
                Console.WriteLine("-----------------------------------------------------------
                \n");
                Console.WriteLine("Creating Object of Class A and Calling Method of
                Class
                B.");
                A a2 = new B();
                a2.show();

                Console.ReadKey();
        }
    }
}
```

OUTPUT

file:///C:/Users/CA172008/Documents/c#/Eighteen/Eighteen/bin/Debug/Eighteen.EXE
Use of Virtual and Overide Keyword.
Class A is Base Class & Class B is derived from A.
Creating Object of Class A.
Hello: Base Class!

file:///C:/Users/CA172008/Documents/c#/Eighteen/Eighteen/bin/Debug/Eighteen.EXE
Use of Virtual and Overide Keyword.
Class A is Base Class & Class B is derived from A.
Creating Object of Class B.
Hello: Derived Class!


file:///C:/Users/CA172008/Documents/c#/Eighteen/Eighteen/bin/Debug/Eighteen.EXE
Use of Virtual and Overide Keyword.
Class A is Base Class & Class B is derived from A.
Creating Object of Class A.
Hello: Base Class!
Press Enter...
Creating Object of Class B.
Hello: Derived Class!
Press Enter...
Creating Object of Class A and Calling Method of Class B.
Hello: Derived Class!

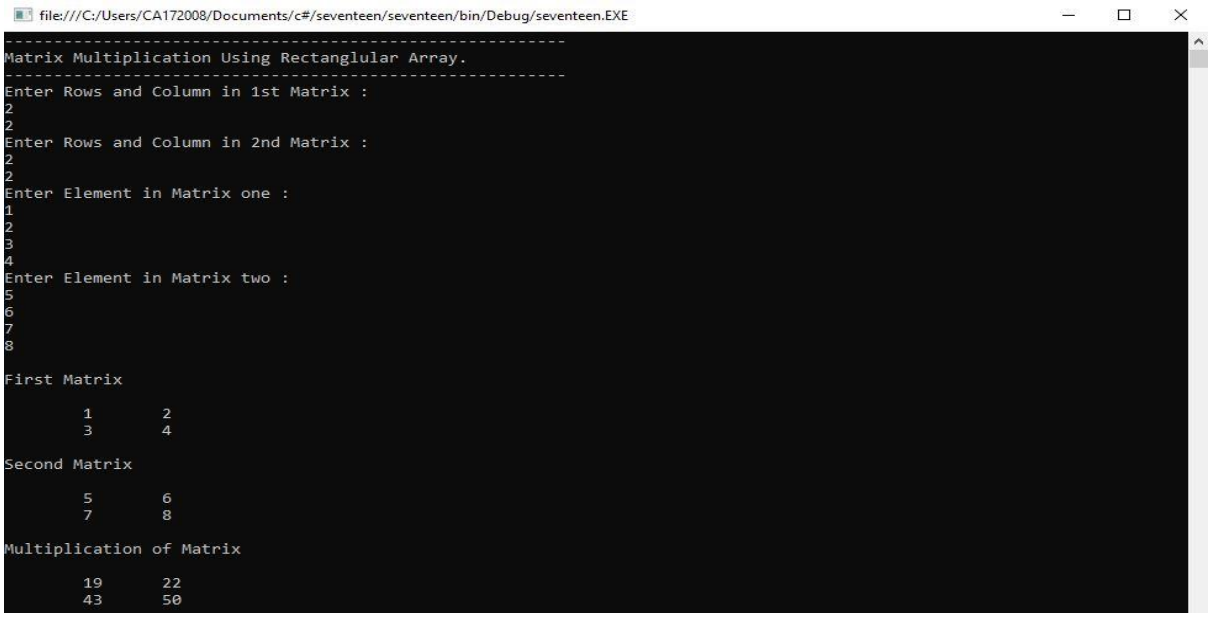
11) Program to multiply to matrices using Rectangular arrays.

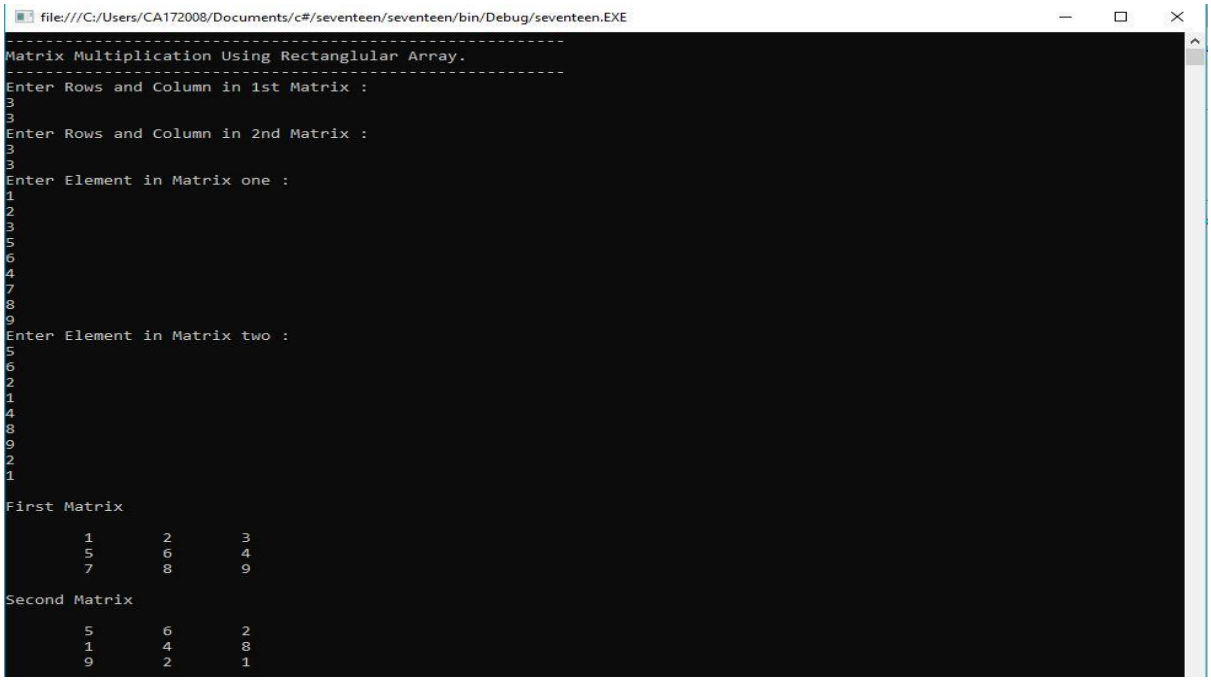
```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace ConsoleApplication2
{
   class Program
   {
      static void Main(string[] args)
      {
         Console.WriteLine("-----------------------------------------------------------");
         Console.WriteLine("Matrix Multiplication Using Rectanglular Array.");
         Console.WriteLine("-----------------------------------------------------------");

         try
         {
            Console.WriteLine("Enter Rows and Column in 1st Matrix : ");
            int r1 = Convert.ToInt16(Console.ReadLine());
            int c1 = Convert.ToInt16(Console.ReadLine());

            Console.WriteLine("Enter Rows and Column in 2nd Matrix : ");
            int r2 = Convert.ToInt16(Console.ReadLine());
            int c2 = Convert.ToInt16(Console.ReadLine());

            if (r1 != c2)
            {

                  Console.WriteLine("\n**********************************
                  *******");
                  Console.WriteLine("Matrix Multiplication Row Column Rule
                  Violated.");

                  Console.WriteLine("**********************************
                  *******");
            }
            else
            {

               int[,] mat1 = new int[r1, c1];
               int[,] mat2 = new int[r2, c2];
               int[,] mat3 = new int[r1, c2];

               Console.WriteLine("Enter Element in Matrix one : ");
               for (int i = 0; i < r1; i++)
               {
                  for (int j = 0; j < c1; j++)
                  {
```

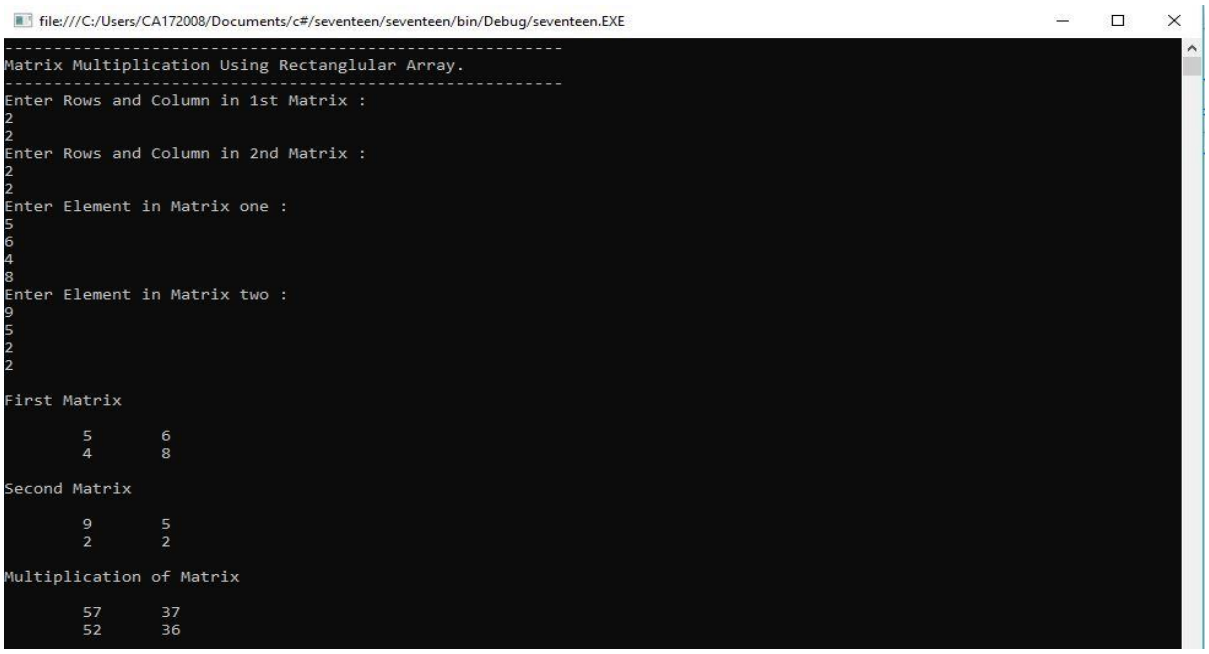
```
            mat1[i, j] = (Convert.ToInt16(Console.ReadLine()));
        }
    }


    Console.WriteLine("Enter Element in Matrix two : ");
    for (int i = 0; i < r2; i++)
    {
        for (int j = 0; j < c2; j++)
        {
            mat2[i, j] = (Convert.ToInt16(Console.ReadLine()));
        }
    }


    Console.WriteLine("\nFirst Matrix\n");
    for (int i = 0; i < r1; i++)
    {
        for (int j = 0; j < c1; j++)
        {
            Console.Write("\t" + mat1[i, j]);
        }
        Console.WriteLine();
    }

    Console.WriteLine("\nSecond Matrix\n");
    for (int i = 0; i < r2; i++)
    {
        for (int j = 0; j < c2; j++)
        {
            Console.Write("\t" + mat2[i, j]);
        }
        Console.WriteLine();
    }


    Console.WriteLine("\nMultiplication of Matrix\n");
    for (int i = 0; i < r1; i++)
    {
        for (int j = 0; j < c2; j++)
        {
            for (int k = 0; k < c1; k++)
            {
                mat3[i, j] += mat1[i, k] * mat2[k, j];
            }
        }
    }


    for (int i = 0; i < r2; i++)
```

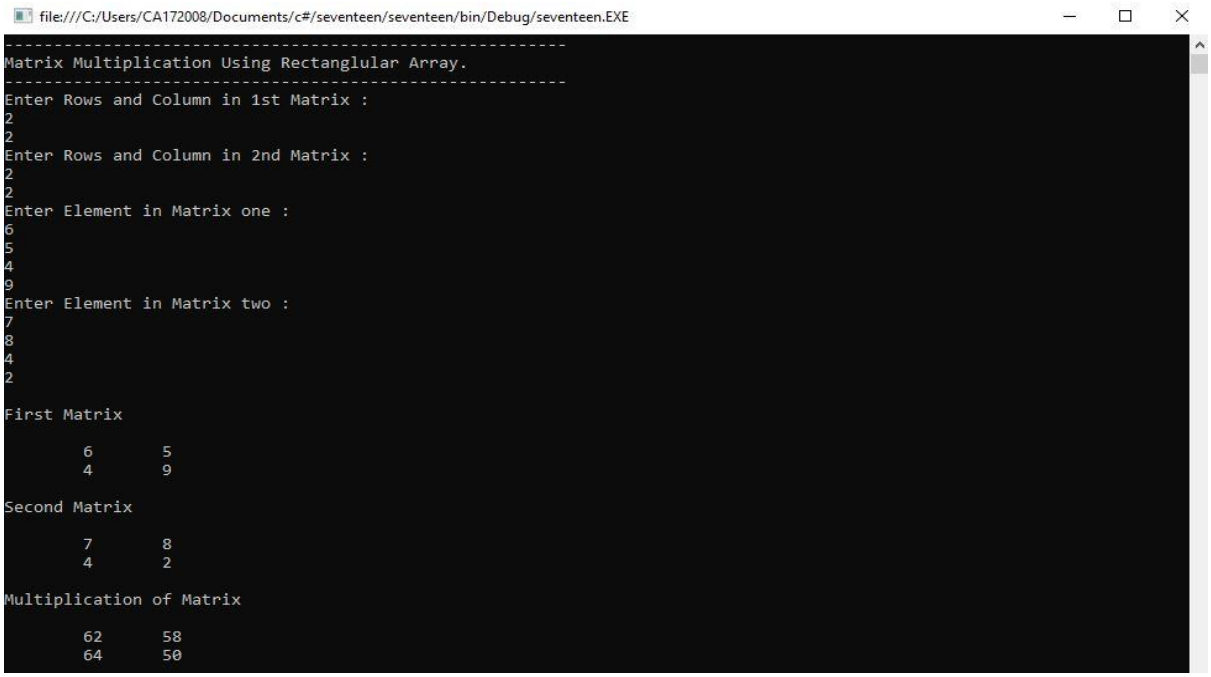
```
                {
                    for (int j = 0; j < c2; j++)
                    {
                        Console.Write("\t" + mat3[i, j]);
                    }
                    Console.WriteLine();
                }
            }
        }
        catch (Exception ex)
        {
            Console.WriteLine("\n*****************************");
            Console.WriteLine("Please Enter Numaric value.");
            Console.WriteLine("\n*****************************");
        }
        Console.ReadKey();

    }
  }
}
```

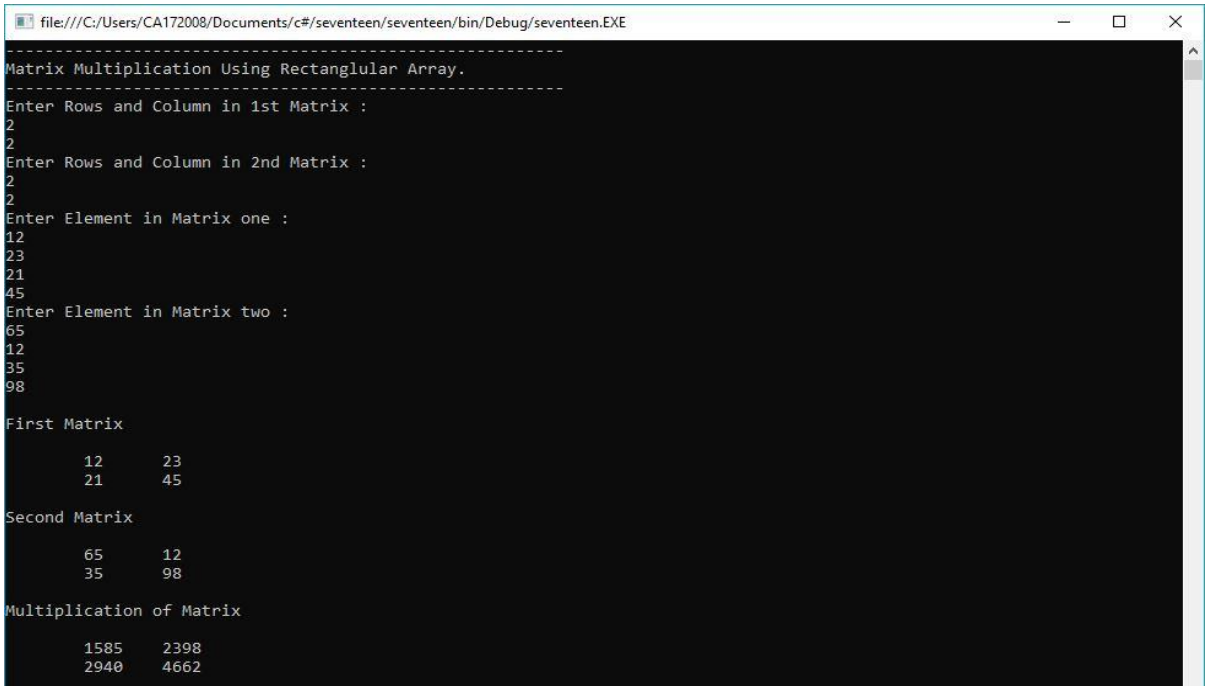
OUTPUT


file:///C:/Users/CA172008/Documents/c#/seventeen/seventeen/bin/Debug/seventeen.EXE
Matrix Multiplication Using Rectanglular Array.
Enter Rows and Column in 1st Matrix :
2
2
Enter Rows and Column in 2nd Matrix :
2
2
Enter Element in Matrix one :
1
2
3
4
Enter Element in Matrix two :
5
6
7
8
First Matrix
1 2
3 4
Second Matrix
5 6
7 8
Multiplication of Matrix
19 22
43 50


file:///C:/Users/CA172008/Documents/c#/seventeen/seventeen/bin/Debug/seventeen.EXE
Matrix Multiplication Using Rectanglular Array.
Enter Rows and Column in 1st Matrix :
3
3
Enter Rows and Column in 2nd Matrix :
3
3
Enter Element in Matrix one :
1
2
3
5
6
4
7
8
9
Enter Element in Matrix two :
5
6
2
1
4
8
9
2
1
First Matrix
1 2 3
5 6 4
7 8 9
Second Matrix
5 6 2
1 4 8
9 2 1


file:///C:/Users/CA172008/Documents/c#/seventeen/seventeen/bin/Debug/seventeen.EXE
Matrix Multiplication Using Rectanglular Array.
Enter Rows and Column in 1st Matrix :
2
2
Enter Rows and Column in 2nd Matrix :
2
2
Enter Element in Matrix one :
5
6
4
8
Enter Element in Matrix two :
9
5
2
2
First Matrix
5 6
4 8
Second Matrix
9 5
2 2
Multiplication of Matrix
57 37
52 36


file:///C:/Users/CA172008/Documents/c#/seventeen/seventeen/bin/Debug/seventeen.EXE
Matrix Multiplication Using Rectanglular Array.
Enter Rows and Column in 1st Matrix :
2
2
Enter Rows and Column in 2nd Matrix :
2
2
Enter Element in Matrix one :
6
5
4
9
Enter Element in Matrix two :
7
8
4
2
First Matrix
6 5
4 9
Second Matrix
7 8
4 2
Multiplication of Matrix
62 58
64 50


file:///C:/Users/CA172008/Documents/c#/seventeen/seventeen/bin/Debug/seventeen.EXE
Matrix Multiplication Using Rectanglular Array.
Enter Rows and Column in 1st Matrix :
2
2
Enter Rows and Column in 2nd Matrix :
2
2
Enter Element in Matrix one :
12
23
21
45
Enter Element in Matrix two :
65
12
35
98
First Matrix
12 23
21 45
Second Matrix
65 12
35 98
Multiplication of Matrix
1585 2398
2940 4662

12) Perform operator overloading.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace OperatorOverloading
{
   class Rectangle
   {
      int width;
      int height;

      Rectangle(int width, int height)
      {
         this.width = width;
         this.height = height;
      }

      public static Rectangle operator +(Rectangle a, Rectangle b)
      {
         int totalWidth = a.width + b.width;
         int totalHeight = a.height + b.height;
         return new Rectangle(totalWidth, totalHeight);

      }

      static void Main(string[] args)
      {

         Rectangle r1 = new Rectangle(40, 60);
         Rectangle r2 = new Rectangle(60, 40);
         Console.WriteLine("------------------");
         Console.WriteLine("First Rectangle");
         Console.WriteLine("------------------");
         Console.WriteLine("");
         Console.WriteLine("Rectangle Width: {0}", r1.width);
         Console.WriteLine("Rectangle Height: {0}", r1.height);

         Console.WriteLine();

         Console.WriteLine("------------------");
         Console.WriteLine("Second Rectangle");
         Console.WriteLine("------------------");
         Console.WriteLine("");
         Console.WriteLine("Rectangle Width: {0}", r2.width);
         Console.WriteLine("Rectangle Height: {0}", r2.height);

         Console.WriteLine();
```

```
            Rectangle r3 = r1 + r2;
            Console.WriteLine("Total Width: {0}", r3.width);
            Console.WriteLine("Total Height: {0}", r3.height);
            Console.ReadKey();
        }
    }
}
```

OUTPUT

file:///C:/Users/CA172008/Documents/c#/twelve/twelve/bin/Debug/twelve.EXE

First Rectangle

Rectangle Width: 40
Rectangle Height: 60

Second Rectangle

Rectangle Width: 60
Rectangle Height: 40
Total Width: 100
Total Height: 100

13) Create classes, they are reference types in C# and hence are allocated on the heap. Classes provide object-oriented constructs such as encapsulation, polymorphism, and inheritance. For instance, the program should print John. Doe twice, illustrating that objects are reference types, allocated on the heap implement the same using C#

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace ProgramTwo
{
   class Program
   {
      class User
      {
         private string name;
         private string email;

         public User(String name)
         {
            this.name = name;
         }

         public User(String name, String email)
         {
            this.name = name;
            this.email = email;
         }

         public string getName()
         {
            return name;
         }

         public string getEmail()
         {
            return email;
         }

         public void setName(string name)
         {
            this.name = name;
         }

         public void setEmail(string email)
         {
            this.email = email;
```

```
        }
    }

    class Admin : User
    {
        private string password;
        public Admin(string name, string email, string password)
            : base(name, email)
        {
            this.password = password;
        }

        public void setPassword(string password)
        {
            this.password = password;
        }

        public string getPassword()
        {
            return password;
        }


        static void Main(string[] args)
        {
            User user1 = new User("vinoo");
            Admin user2 = new Admin("vinayak", "vinoo160496@gmail.com",
              "vinu007");

            Console.WriteLine("User 1:");
            Console.WriteLine("Name: {0}", user1.getName());
            Console.WriteLine("Email: {0}", user1.getEmail());

            Console.WriteLine();

            Console.WriteLine("User 2 (Admin):");
            Console.WriteLine("Name: {0}", user2.getName());
            Console.WriteLine("Email: {0}", user2.getEmail());
            Console.WriteLine("Password: {0}", user2.getPassword());

            Console.Read();
        }
    }
  }
}
```

OUTPUT

Select file:///C:/Users/CA172008/Documents/c#/second/second/bin/Debug/second.EXE
User 1:
Name: vinoo
Email:
User 2 (Admin):
Name: vinayak
Email: vinoo160496@gmail.com
Password: vinu007

14) Work with Page using ASP.Net.

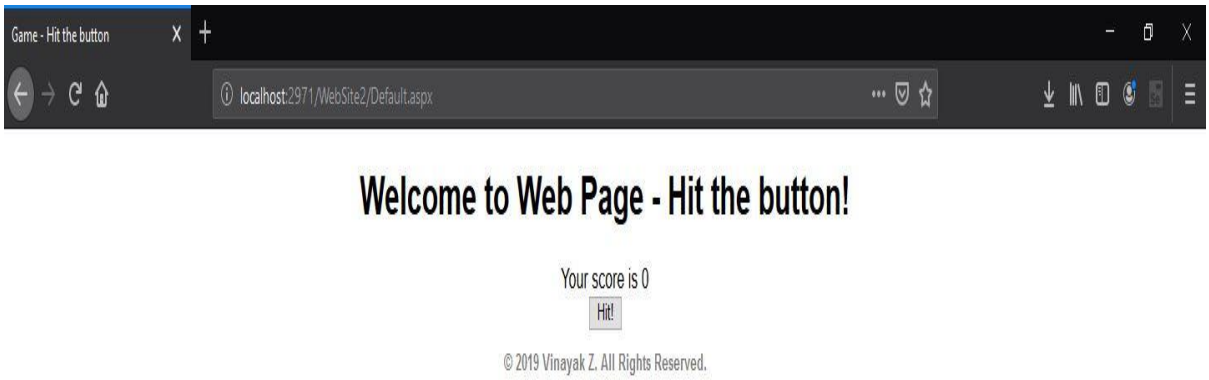
ASP.NET Page.

```
<%@ Page Language="C#" AutoEventWireup="true" CodeFile="Default.aspx.cs"
Inherits="_Default" %>

<!DOCTYPE html>

<html xmlns="http://www.w3.org/1999/xhtml">
<head id="Head1" runat="server">
   <title>Game - Hit the button</title>
   <style>
      html{
         height: 100%;
      }
      body{
         min-height: 100%;
         padding: 0;
         margin: 0;
      }
      *{
         font-family: Arial;
      }
      .container{
         height: 100vh;
         display: flex;
         flex-direction: column;
         align-items:center;
      }

      h2{
         font-size: 0.8em;
         color: gray;
      }
   </style>
</head>
<body>
   <form id="form1" runat="server">
   <div class="container">
      <h1>Welcome to Web Page - Hit the button!</h1>
      <asp:Label ID="lblOutput" Text="Your score is 0" runat="server" />
      <asp:button id="clickMeButton" runat="server" text="Hit!"
onClick="clickMeButton_Click" />
      <br/>
      <h2>&copy; 2019 Vinayak Z. All Rights Reserved.</h2>
   </div>
   </form>
</body>
</html>
```

C# Page.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.UI;
using System.Web.UI.WebControls;

public partial class _Default : System.Web.UI.Page
{
    protected void Page_Load(object sender, EventArgs e)
    {

    }
    protected void clickMeButton_Click(object sender, EventArgs e)
    {
        object value = ViewState["HitCount"];
        int i = (value == null) ? 1 : (int)value + 1;
        lblOutput.Text = string.Format("You score is: {0}", i);
        ViewState["HitCount"] = i;
    }
}
```

OUTPUT


Game - Hit the button
localhost:2971/WebSite2/Default.aspx
Welcome to Web Page - Hit the button!
Your score is 0
Hit!
© 2019 Vinayak Z. All Rights Reserved.

Game - Hit the button
localhost:2971/WebSite2/Default.aspx
Welcome to Web Page - Hit the button!
You score is: 1
Hit!
© 2019 Vinayak Z. All Rights Reserved.

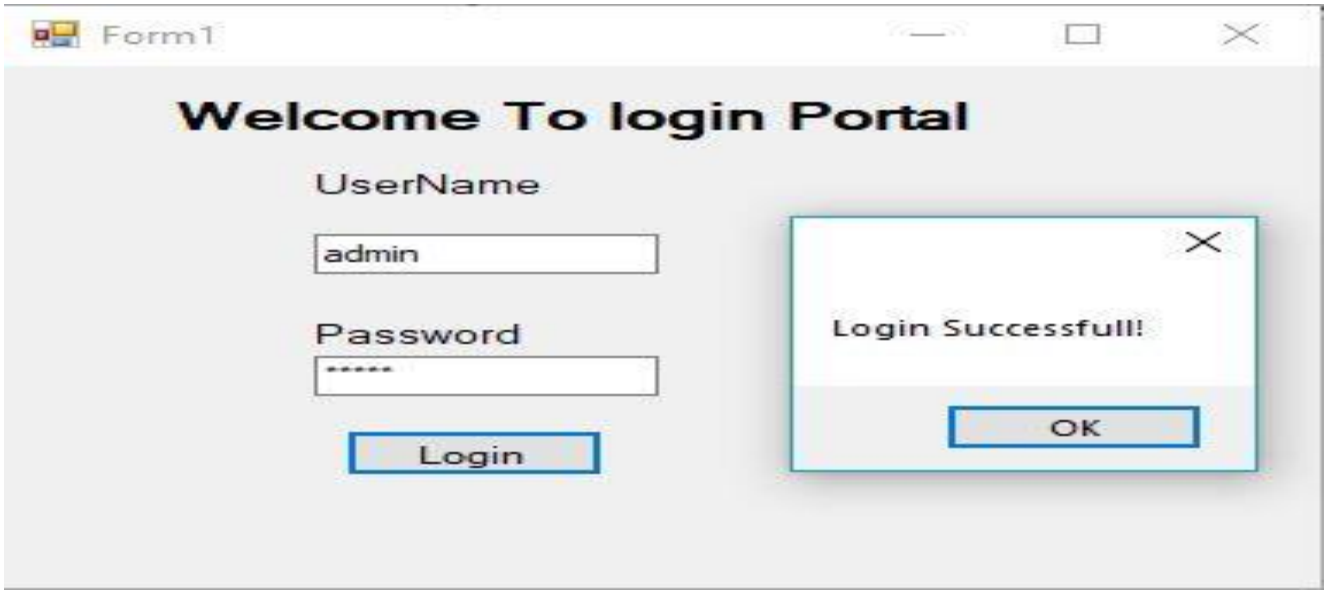
15) Work with forms using ASP.NET.

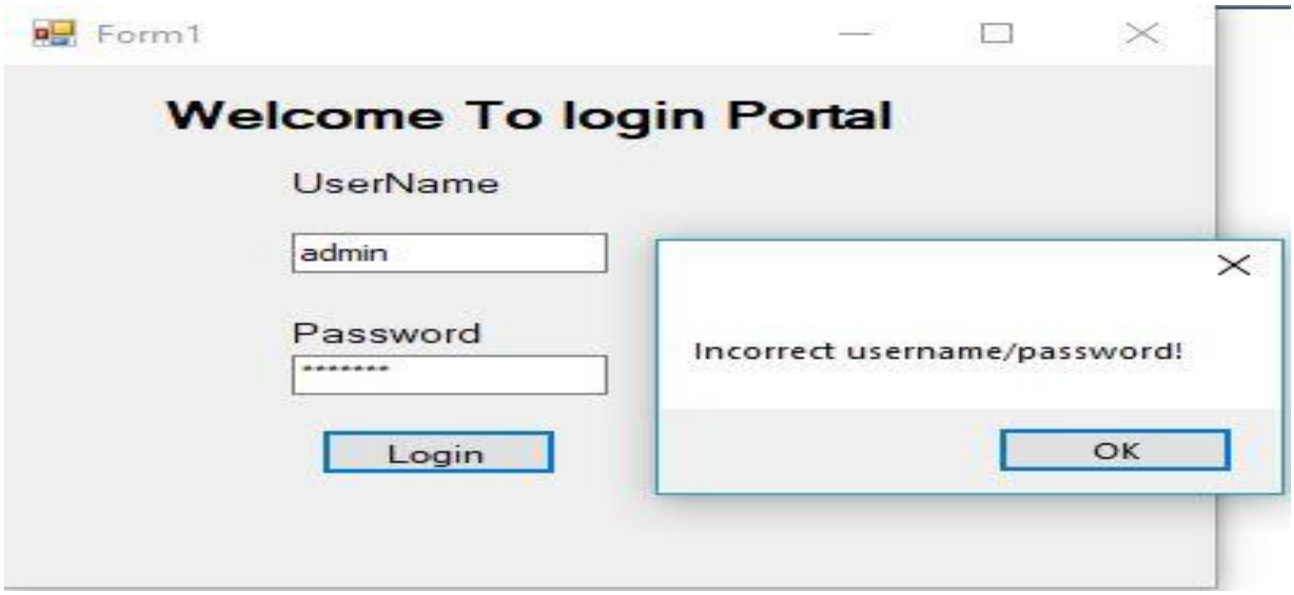
```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;

namespace WindowsFormsApplication2
{
   public partial class Form1 : Form
   {
      string[] names;
      string[] passs;
      int rows;

      public Form1()
      {
         InitializeComponent();
         names = new string[10];
         passs = new string[10];

         names[0] = "admin";
         names[1] = "user";
         names[2] = "vinoo";

         passs[0] = "admin";
         passs[1] = "user";
         passs[2] = "zutti";
         rows = 3;

      }


      private void button1_Click(object sender, EventArgs e)
      {

         string username = textBox1.Text.Trim();
         string password = textBox2.Text.Trim();

         if (username.Equals("") || password.Equals(""))
         {
            MessageBox.Show("Fields cannot be empty!");
            return;
         }
         for (int i = 0; i < rows; i++)
         {
```

```
                if (names[i].Equals(username) && passs[i].Equals(password))
                {
                    MessageBox.Show("Login Successfull!");
                    return;
                }
            }
            MessageBox.Show("Incorrect username/password!");

        }

    }
}
```

OUTPUT

Form1
Welcome To login Portal
UserName
Password
Login


Form1
Welcome To login Portal
UserName
admin
Password
Login
Login Successfull!
OK

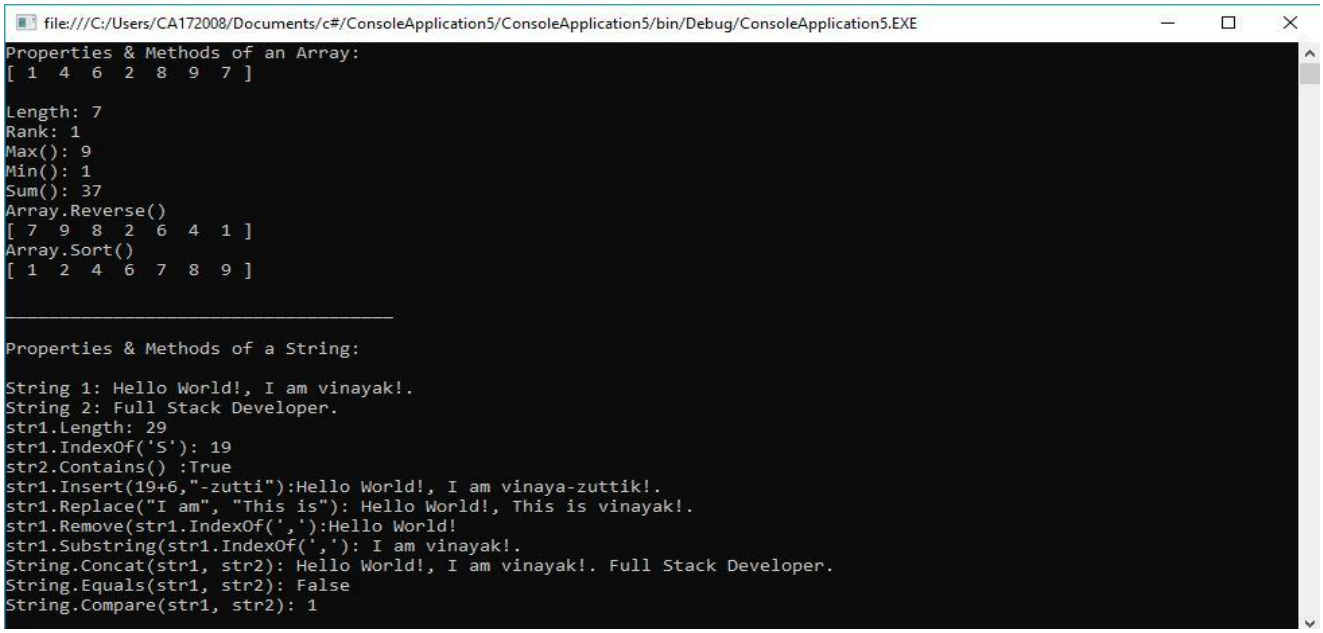

Form1
Welcome To login Portal
UserName
admin
Password
Login
Incorrect username/password!
OK

16) Describe Arrays and Strings methods with suitable C# program.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
    namespace ConsoleApplication5
    {
      class Program
      {
        static void Main(string[] args)
        {
          int[] array = { 1, 4, 6, 2, 8, 9, 7 };
          Console.WriteLine("Properties & Methods of an Array: ");
          displayArray(array);
          Console.WriteLine();
          Console.WriteLine("Length: {0}", array.Length);
          Console.WriteLine("Rank: {0}", array.Rank);
          Console.WriteLine("Max(): {0}", array.Max());
          Console.WriteLine("Min(): {0}", array.Min());
          Console.WriteLine("Sum(): {0}", array.Sum());

          Console.WriteLine("Array.Reverse()");
          Array.Reverse(array);
          displayArray(array);

          Console.WriteLine("Array.Sort()");
          Array.Sort(array);
          displayArray(array);

          Console.WriteLine();
          Console.WriteLine("_____");
          Console.WriteLine();

          Console.WriteLine("Properties & Methods of a String: ");
          String str1 = "Hello World!, I am vinayak!. ";
          Console.WriteLine();
          String str2 = "Full Stack Developer.";
          Console.WriteLine("String 1: {0}", str1);
          Console.WriteLine("String 2: {0}", str2);
          Console.WriteLine("str1.Length: {0}", str1.Length);
          Console.WriteLine("str1.IndexOf('S'): {0}", str1.IndexOf('v'));
          Console.WriteLine("str2.Contains() :{0}",
          str2.Contains("Developer"));
          Console.WriteLine("str1.Insert(19+6,\"-zutti\"):{0}",
          str1.Insert(str1.IndexOf('v') + 6, "-zutti"));

          Console.WriteLine("str1.Replace(\"I am\", \"This is\"): {0}",
          str1.Replace("I am", "This is"));
          Console.WriteLine("str1.Remove(str1.IndexOf(','):{0}",
          str1.Remove(str1.IndexOf(',')));
```

```
            Console.WriteLine("str1.Substring(str1.IndexOf(','):{0}",
            str1.Substring(str1.IndexOf(',') + 1));

            Console.WriteLine("String.Concat(str1, str2): {0}", String.Concat(str1,
            str2));
            Console.WriteLine("String.Equals(str1, str2): {0}", String.Equals(str1,
            str2));
            Console.WriteLine("String.Compare(str1, str2): {0}",
            String.Compare(str1, str2));


            Console.ReadLine();
        }

        static void displayArray(int[] a)
        {
            Console.Write("[");
            for (int i = 0; i < a.Length; i++)
            {
                Console.Write(" {0} ", a[i]);
            }
            Console.WriteLine("]");

        }
    }
}
```

OUTPUT

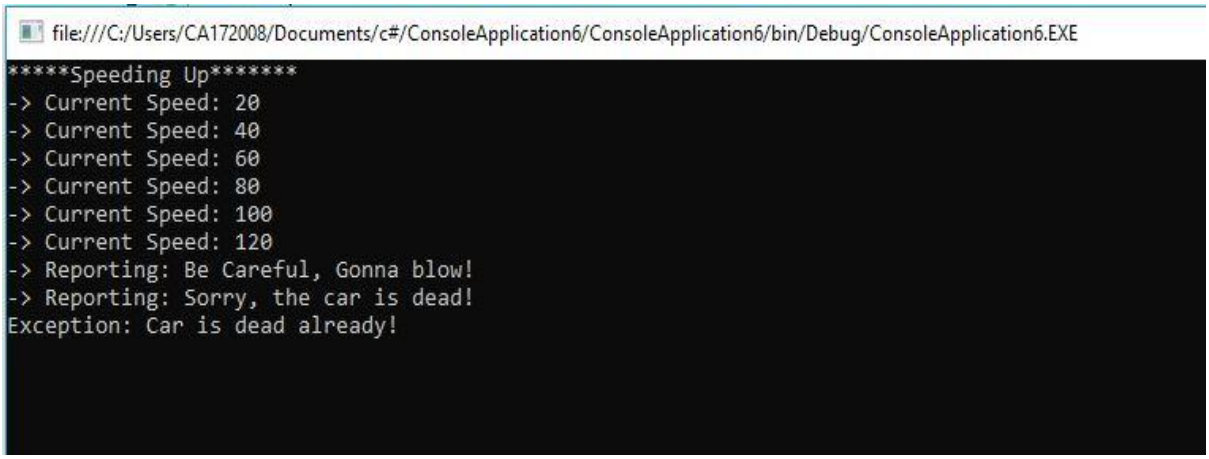

file:///C:/Users/CA172008/Documents/c#/ConsoleApplication5/ConsoleApplication5/bin/Debug/ConsoleApplication5.EXE
Properties & Methods of an Array:
[1 4 6 2 8 9 7]
Length: 7
Rank: 1
Max(): 9
Min(): 1
Sum(): 37
Array.Reverse()
[7 9 8 2 6 4 1]
Array.Sort()
[1 2 4 6 7 8 9]
Properties & Methods of a String:
String 1: Hello World!, I am vinayak!.
String 2: Full Stack Developer.
str1.Length: 29
str1.IndexOf('S'): 19
str2.Contains() :True
str1.Insert(19+6,"-zutti"):Hello World!, I am vinaya-zuttik!.
str1.Replace("I am", "This is"): Hello World!, This is vinayak!.
str1.Remove(str1.IndexOf(','):Hello World!
str1.Substring(str1.IndexOf(',')): I am vinayak!.
String.Concat(str1, str2): Hello World!, I am vinayak!. Full Stack Developer.
String.Equals(str1, str2): False
String.Compare(str1, str2): 1

17) Describe delegates, events, errors and exceptions.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
namespace ConsoleApplication6
{
   class Car
   {
      public delegate void EventHandler(string msg);

      public event EventHandler exploadListener;
      public event EventHandler aboutToBlowListener;

      private string name;
      private bool isExhausted;
      private int currentSpeed;
      private const int maxSpeed = 140;

      public Car(String name)
      {
         this.name = name;
      }
      public void accelerate(int delta)
      {
         if (isExhausted)
         {
            if (exploadListener != null)
               exploadListener("Sorry, the car is dead!");
         }
         else
         {
            currentSpeed += delta;

            if (10 >= maxSpeed - currentSpeed && aboutToBlowListener != null)
            {
               aboutToBlowListener("Be Careful, Gonna blow!");
            }

            if (currentSpeed >= maxSpeed)
               isExhausted = true;
            else
               Console.WriteLine("-> Current Speed: {0}", currentSpeed);
         }
      }
   }
   class Program
   {
      static void Main(string[] args)
```

```
        {
            Car car = new Car("Tesla");
            car.aboutToBlowListener += new Car.EventHandler(aboutToBlow);

            car.exploadListener += new Car.EventHandler(exploded);
            Console.WriteLine("******Speeding Up********");

            try
            {
                for (int i = 0; i < 20; i++)
                {
                    car.accelerate(20);
                }
            }
            catch (Exception e)
            {
                Console.WriteLine("Exception: Car is dead already!");
            }
            Console.ReadLine();
        }
        public static void aboutToBlow(string msg)
        {
            Console.WriteLine("-> Reporting: {0}", msg);
        }
        public static void exploded(string msg)
        {
            Console.WriteLine("-> Reporting: {0}", msg);
            throw new Exception("Car dead");
        }
    }
}
```

OUTPUT


file:///C:/Users/CA172008/Documents/c#/ConsoleApplication6/ConsoleApplication6/bin/Debug/ConsoleApplication6.EXE
*****Speeding Up*******
-> Current Speed: 20
-> Current Speed: 40
-> Current Speed: 60
-> Current Speed: 80
-> Current Speed: 100
-> Current Speed: 120
-> Reporting: Be Careful, Gonna blow!
-> Reporting: Sorry, the car is dead!
Exception: Car is dead already!

18) Describe access data source through ADO.NET.

Form1.cs

```
using System;
using System.Collections.Generic;
using System.Data;
using System.Windows.Forms;

namespace ProgramEleven
{
   public partial class Form1 : Form
   {
      public Form1()
      {
         InitializeComponent();
      }

      private void btnFetch_Click(object sender, EventArgs e)
      {
         UserAccessLayer uAL = new UserAccessLayer();
         List<User> users = uAL.getAllUsers();
         if(users.Count == 0)
            lblStatus.Text = "No data!";
         else
            lblStatus.Text = "Data Fetched!";

         dGV.DataSource = users;

      }
   }
}
```

Users.cs

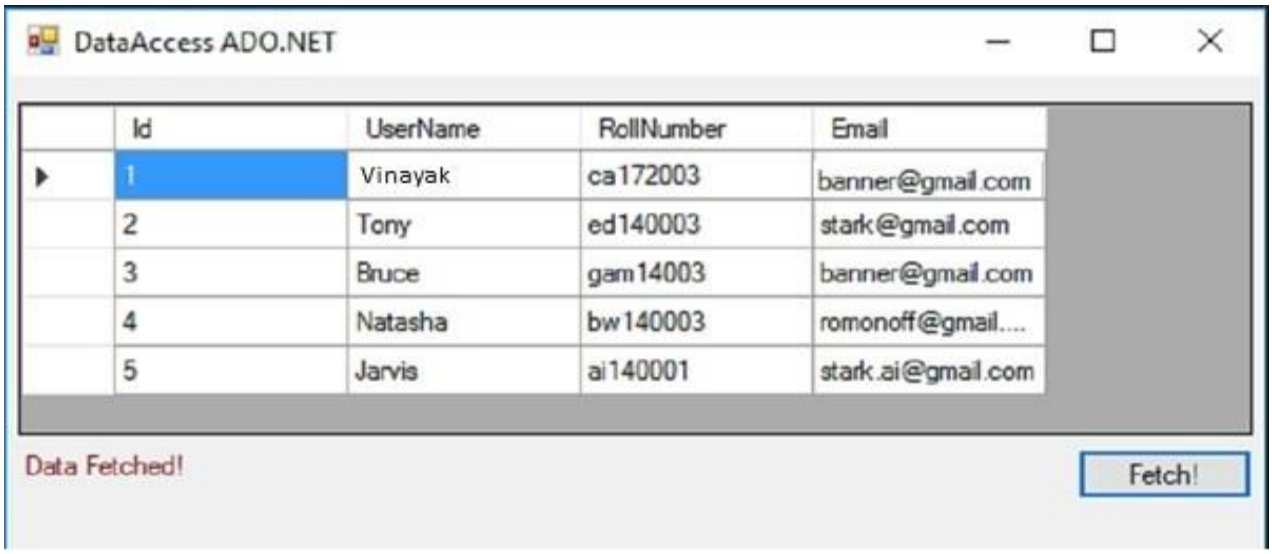
```
using System;

namespace ProgramEleven
{
   class User
   {
      public int Id
      {
         get;
         set;
      }
      public string UserName
      {
         get;
         set;
      }
      public string RollNumber
      {
         get;
         set;
      }
      public string Email
      {
         get;
         set;
      }
   }
}
```

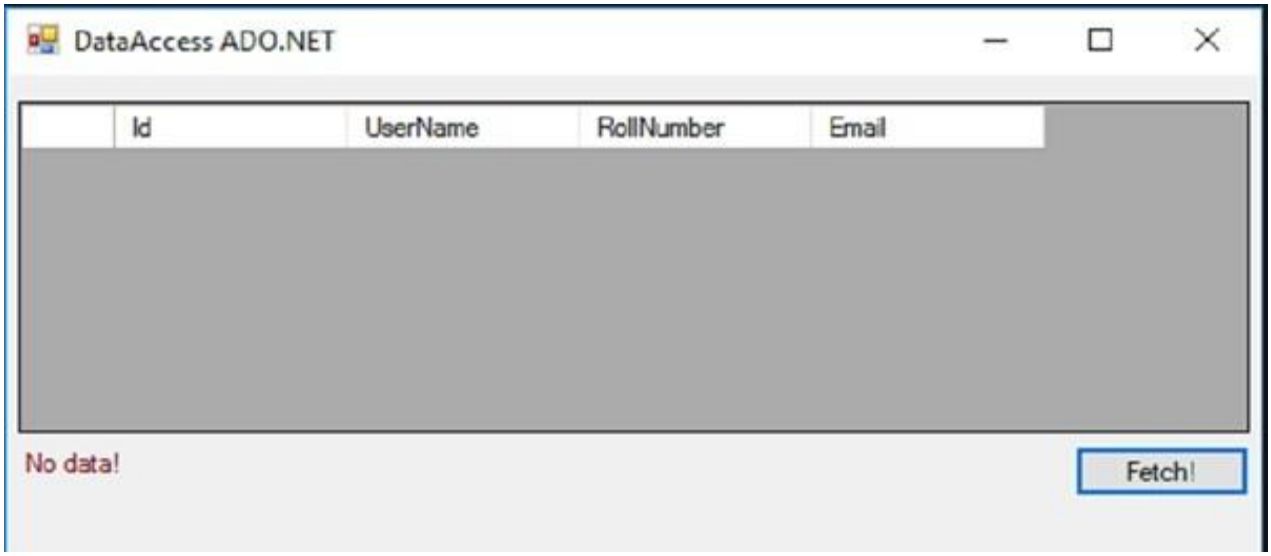
UserAccessLayer.cs

```
using System;
using System.Data;
using System.Data.SqlClient;

namespace ProgramEleven
{
   class UserAccessLayer
   {
      private List<User> users;
      private string connectionString = @"Data Source=.\SQLEXPRESS/PSELF;Initial
      Catalog=TestDB; Integrated Security=True";
      private SqlConnection connection;
      private SqlCommand command;
      private string query;
      public List<User> getAllUsers()
      {
         users = new List<User>();
         try
         {
            connection = new SqlConnection(connectionString);
            connection.Open();
            query = "SELECT * FROM  user";
            command = new SqlCommand(query, connection);
            SqlDataReader reader = command.ExecuteReader();
            while (reader.Read())
            {
               User user = new User();
               user.Id = Convert.ToInt16(reader.GetValue(0));
               user.UserName = reader.GetValue(1).ToString();
               user.Email = reader.GetValue(2).ToString();
               user.RollNumber = reader.GetValue(3).ToString();
               users.Add(user);
            }
         }
         catch (SqlException ex)
         {
            Console.WriteLine("Error in fetching database!: " + ex.Message);
         }
         return users;
      }
   }
}
```

OUTPUT

DataAccess ADO.NET
Fetch!


DataAccess ADO.NET
Id
UserName
RollNumber
Email
1
Vinayak
ca172003
banner@gmail.com
2
Tony
ed140003
stark@gmail.com
3
Bruce
gam14003
banner@gmail.com
4
Natasha
bw140003
romonoff@gmail....
5
Jarvis
ai140001
stark.ai@gmail.com
Data Fetched!
Fetch!


DataAccess ADO.NET
Id
UserName
RollNumber
Email
No data!
Fetch!