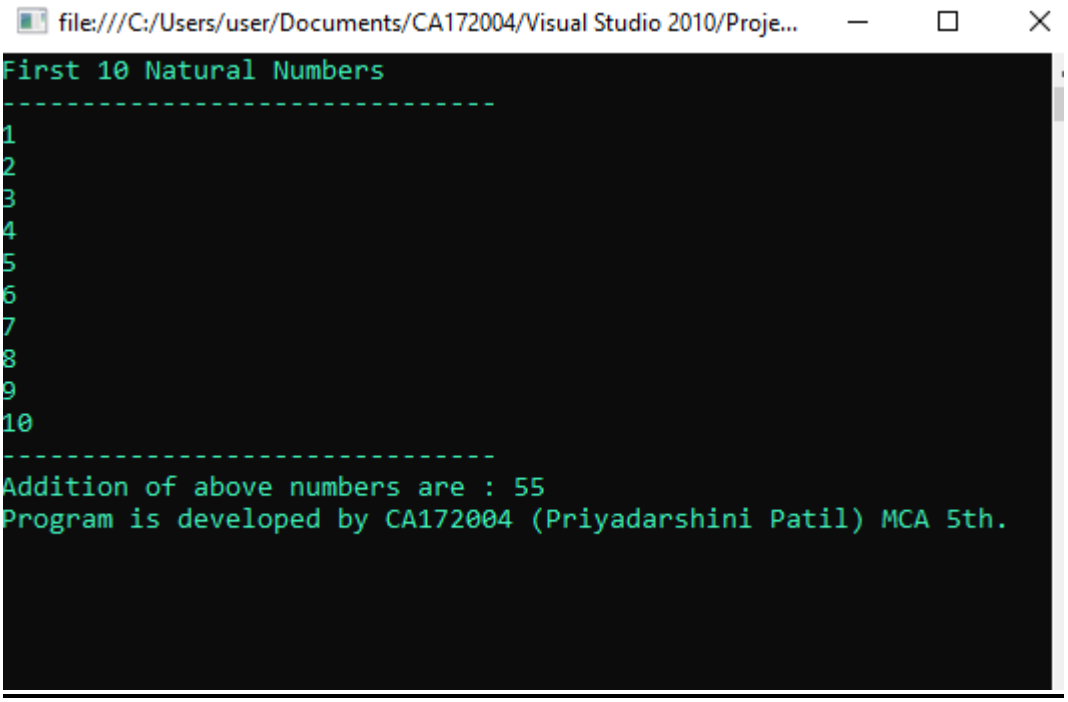
1) Program to display the first 10 natural numbers and their sum using console application.

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

namespace Natural_Number
{
   class Program
   {
      static void Main(string[] args)
      {
            int add=0;
            Console.WriteLine("First 10 Natural Numbers");
            Console.WriteLine("-------------------------------");
            for(int i=1; i<=10; i++){
                  Console.WriteLine(+i);
                  add = add + i;
                  if (i == 10) {
                        Console.WriteLine("-------------------------------");
                        Console.WriteLine("Addition of above numbers are : "+add);
            }
       }
       Console.WriteLine("Program is developed by CA172004 (Priyadarshini Patil) MCA
    5th.");
       Console.ReadKey();
      }
   }
}
```

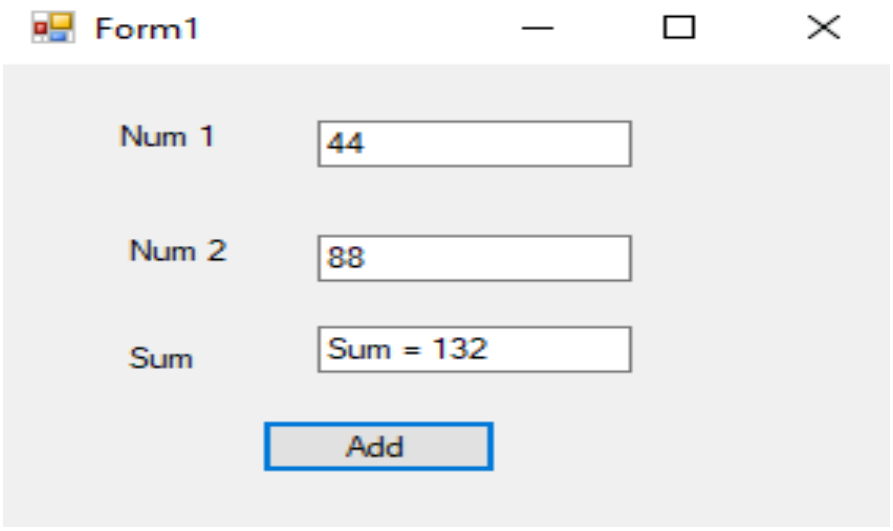
OUTPUT

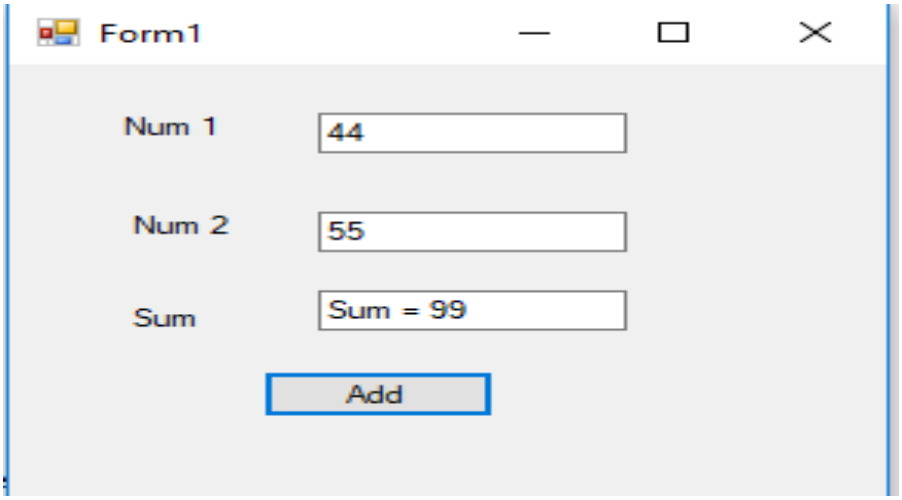

file:///C:/Users/user/Documents/CA172004/Visual Studio 2010/Proje...
First 10 Natural Numbers
1
2
3
4
5
6
7
8
9
10
Addition of above numbers are : 55
Program is developed by CA172004 (Priyadarshini Patil) MCA 5th.

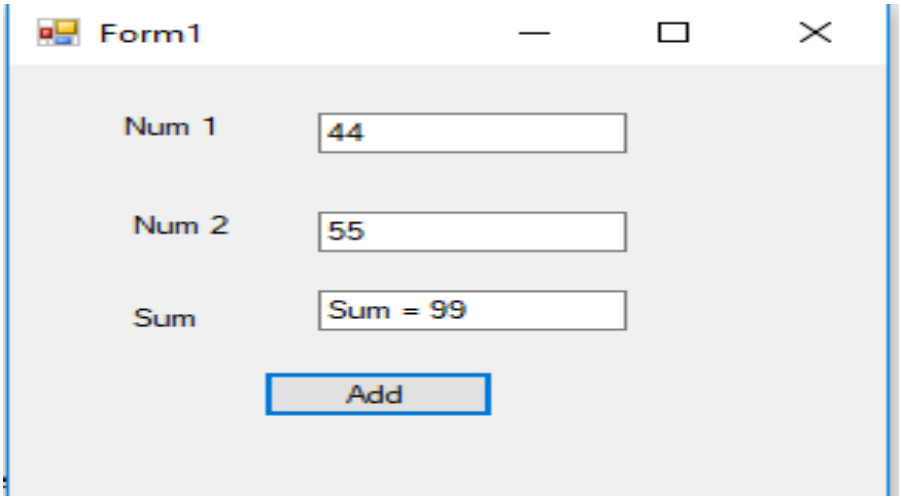
2) Program to display the addition using the windows application.

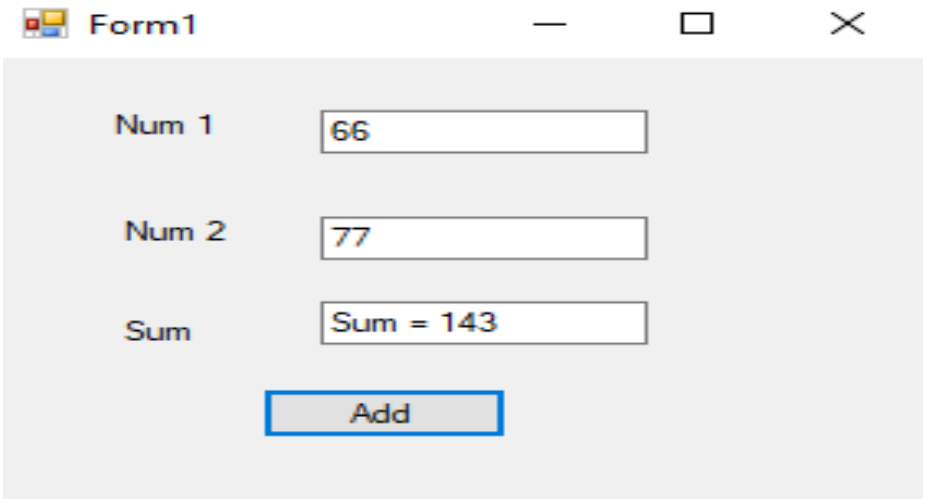
```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;

namespace WindowsFormsApplication6
{
   public partial class Form1 : Form
   {
      public Form1()
      {
         InitializeComponent();
      }

      private void button1_Click(object sender, EventArgs e)
      {
         try
         {
            int a = Convert.ToInt16(textBox1.Text);
            int b = Convert.ToInt16(textBox2.Text);

            int sum = a + b;

            textBox3.Text = "Sum = " + sum;
         }
         catch (Exception ex)
         {
            textBox3.Text = "Error";
         }
      }
   }
}
```

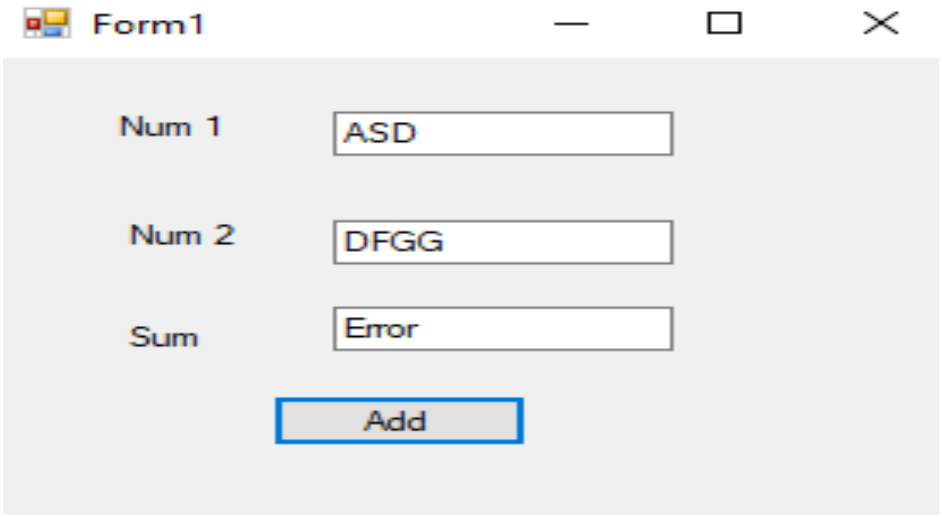
OUTPUT


Form1
Num 1
44
Num 2
88
Sum
Sum = 132
Add


Form1
Num 1
44
Num 2
55
Sum
Sum = 99
Add


Form1
Num 1
44
Num 2
55
Sum
Sum = 99
Add

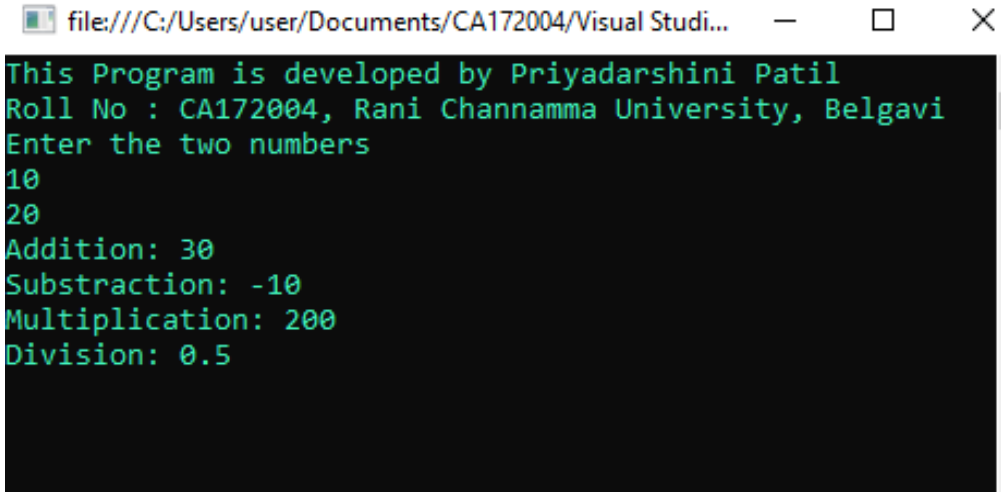

Form1
Num 1
66
Num 2
77
Sum
Sum = 143
Add

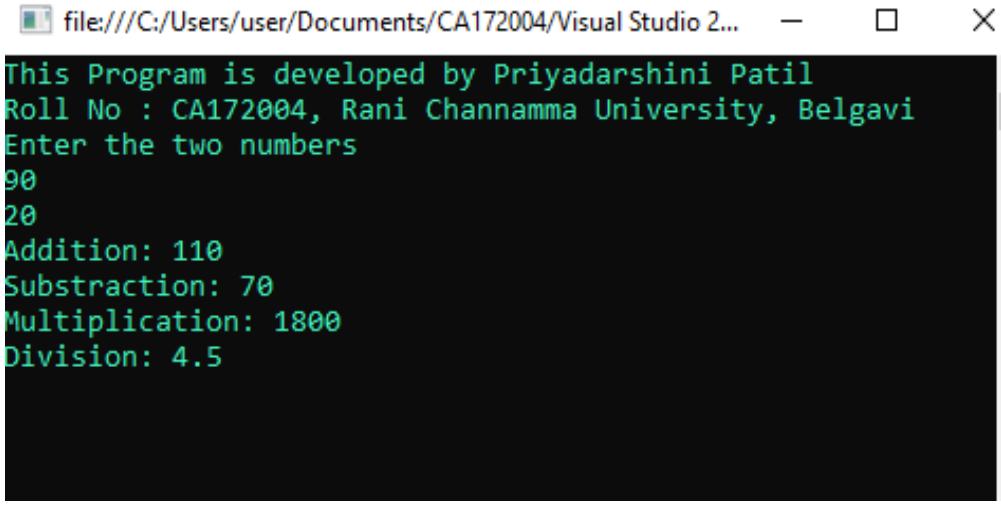

Form1
Num 1
ASD
Num 2
DFGG
Sum
Error
Add

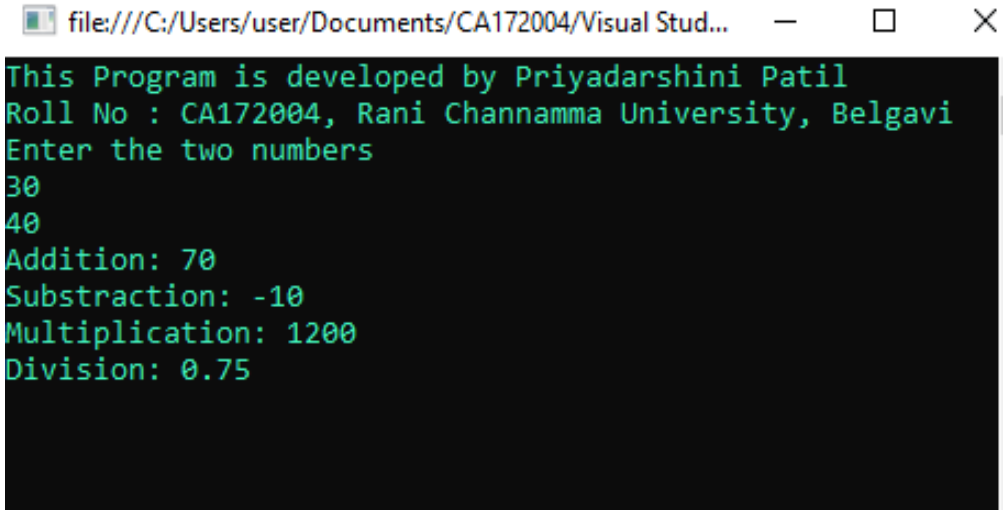
3) Program to display the addition, subtraction, multiplication and division of two number using console applications.

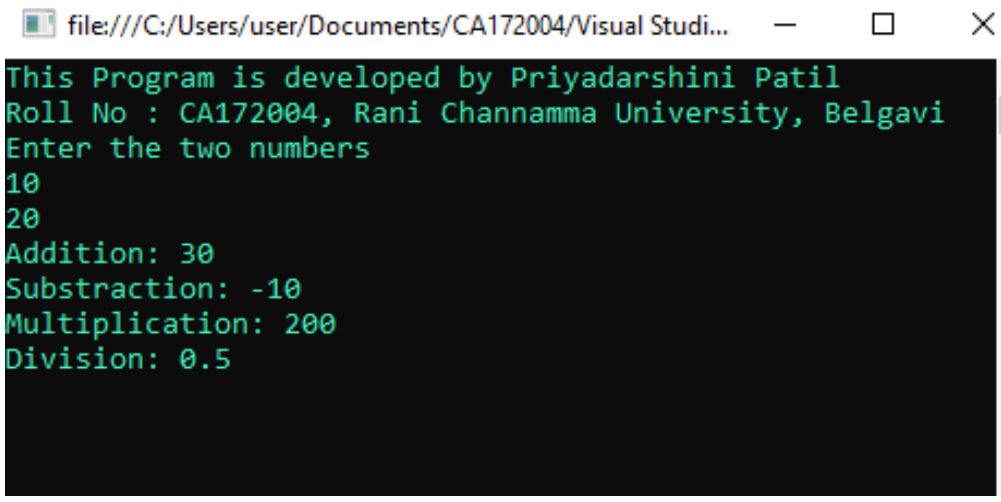
```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace program
{
   class Program
   {
      static void Main(string[] args)
      {
         double num1, num2;
         double sum, sub, mul, div;
         Console.WriteLine("This Program is developed by Priyadarshini Patil ");
         Console.WriteLine("Roll No : CA172004, Rani Channamma University,
    Belgavi");
         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("Addition: {0}", sum);
         Console.WriteLine("Substraction: {0}", sub);
         Console.WriteLine("Multiplication: {0}", mul);
         Console.WriteLine("Division: {0}", div);
         Console.ReadLine();
      }
   }
}
```

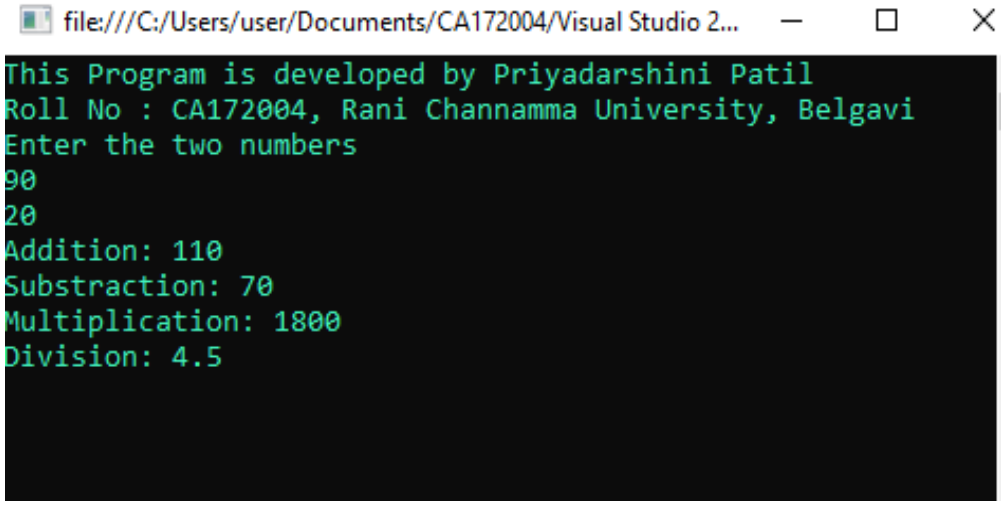
OUTPUT

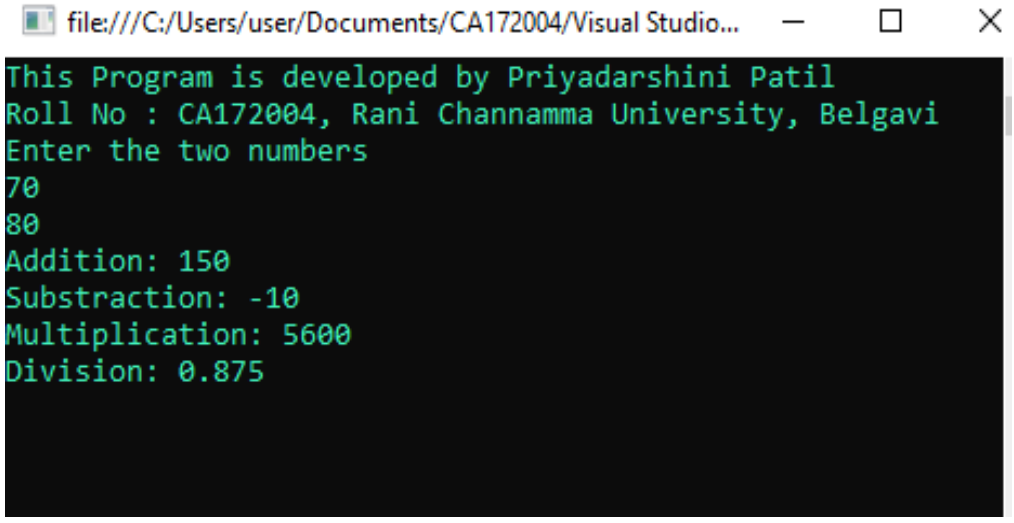

file:///C:/Users/user/Documents/CA172004/Visual Studi...
This Program is developed by Priyadarshini Patil
Roll No : CA172004, Rani Channamma University, Belgavi
Enter the two numbers
10
20
Addition: 30
Substraction: -10
Multiplication: 200
Division: 0.5


file:///C:/Users/user/Documents/CA172004/Visual Studio 2...
This Program is developed by Priyadarshini Patil
Roll No : CA172004, Rani Channamma University, Belgavi
Enter the two numbers
90
20
Addition: 110
Substraction: 70
Multiplication: 1800
Division: 4.5


file:///C:/Users/user/Documents/CA172004/Visual Stud...
This Program is developed by Priyadarshini Patil
Roll No : CA172004, Rani Channamma University, Belgavi
Enter the two numbers
30
40
Addition: 70
Substraction: -10
Multiplication: 1200
Division: 0.75


file:///C:/Users/user/Documents/CA172004/Visual Studi...
This Program is developed by Priyadarshini Patil
Roll No : CA172004, Rani Channamma University, Belgavi
Enter the two numbers
10
20
Addition: 30
Substraction: -10
Multiplication: 200
Division: 0.5

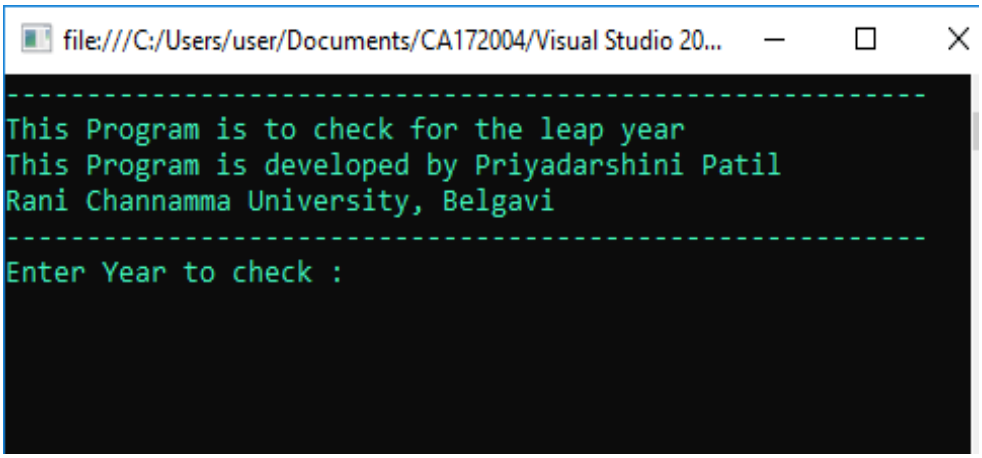

file:///C:/Users/user/Documents/CA172004/Visual Studio 2...
This Program is developed by Priyadarshini Patil
Roll No : CA172004, Rani Channamma University, Belgavi
Enter the two numbers
90
20
Addition: 110
Substraction: 70
Multiplication: 1800
Division: 4.5

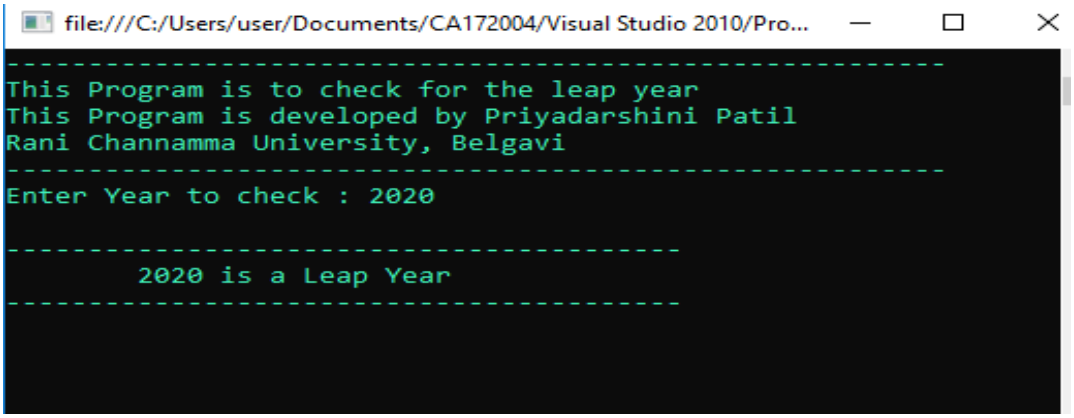

file:///C:/Users/user/Documents/CA172004/Visual Studio...
This Program is developed by Priyadarshini Patil
Roll No : CA172004, Rani Channamma University, Belgavi
Enter the two numbers
70
80
Addition: 150
Substraction: -10
Multiplication: 5600
Division: 0.875

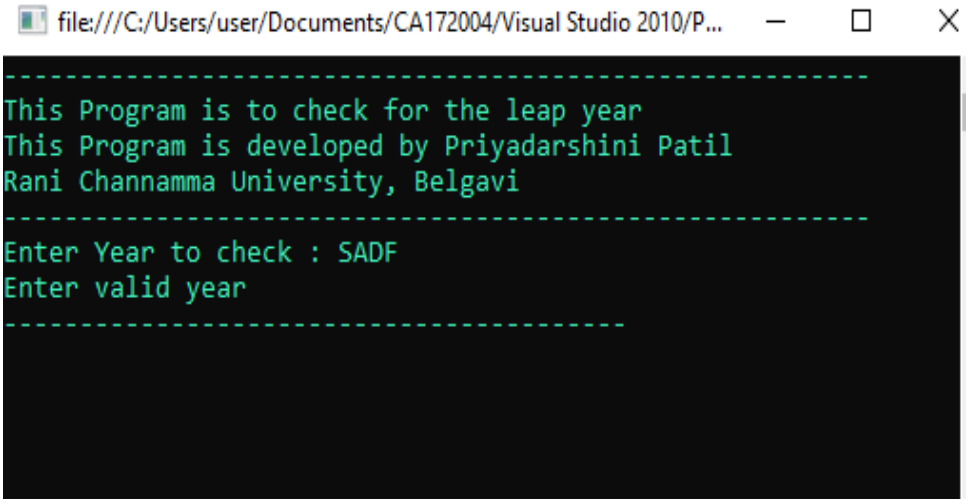
4) Check whether the Entered Year is a Leap or Not.

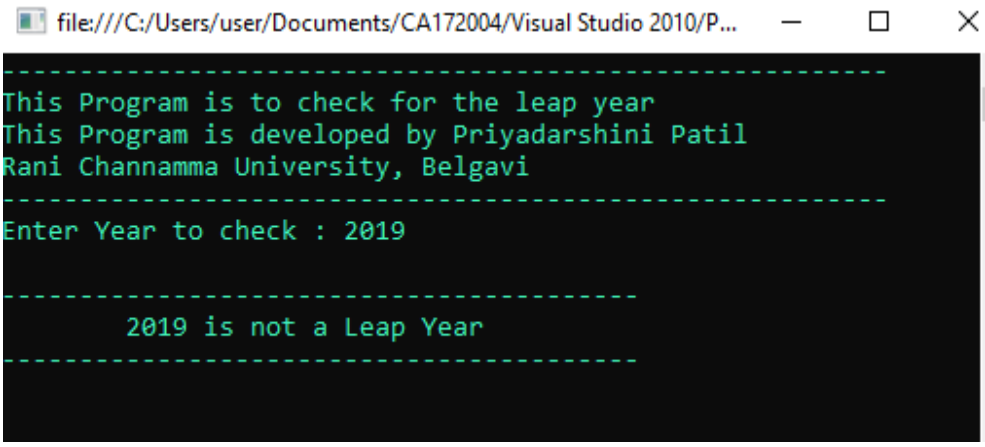
```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace LeapYear
{
   class Program
   {
      static void Main(string[] args)
      {
         Console.WriteLine("-----------------------------------------------------");
         Console.WriteLine("This Program is to check for the leap year");
         Console.WriteLine("This Program is developed by Priyadarshini Patil ");
         Console.WriteLine("Rani Channamma University, Belgavi");
         Console.WriteLine("-----------------------------------------------------");
         try {
            Console.Write("Enter Year to check : ");
            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.WriteLine("---------------------------------------");
         Console.ReadKey();
      }
   }
}
```

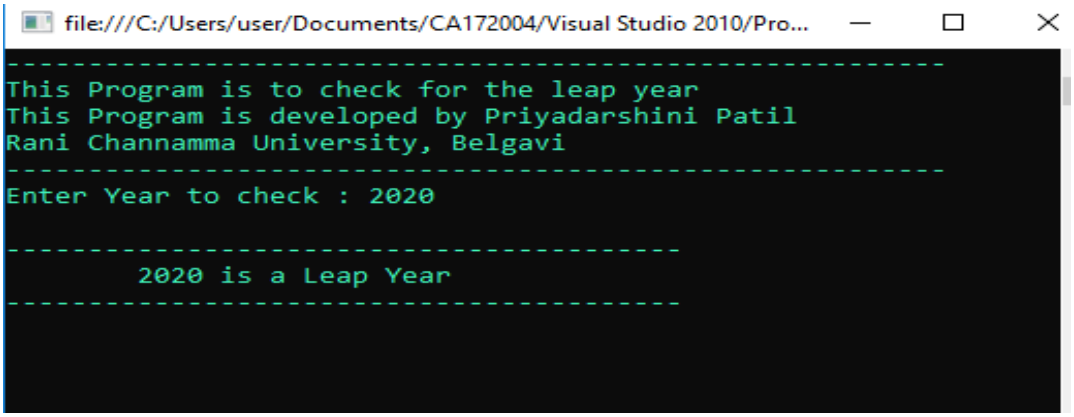
OUTPUT


file:///C:/Users/user/Documents/CA172004/Visual Studio 20...
This Program is to check for the leap year
This Program is developed by Priyadarshini Patil
Rani Channamma University, Belgavi
Enter Year to check :


file:///C:/Users/user/Documents/CA172004/Visual Studio 2010/Pro...
This Program is to check for the leap year
This Program is developed by Priyadarshini Patil
Rani Channamma University, Belgavi
Enter Year to check : 2020
2020 is a Leap Year


file:///C:/Users/user/Documents/CA172004/Visual Studio 2010/P...
This Program is to check for the leap year
This Program is developed by Priyadarshini Patil
Rani Channamma University, Belgavi
Enter Year to check : SADF
Enter valid year


file:///C:/Users/user/Documents/CA172004/Visual Studio 2010/P...
This Program is to check for the leap year
This Program is developed by Priyadarshini Patil
Rani Channamma University, Belgavi
Enter Year to check : 2019
2019 is not a Leap Year

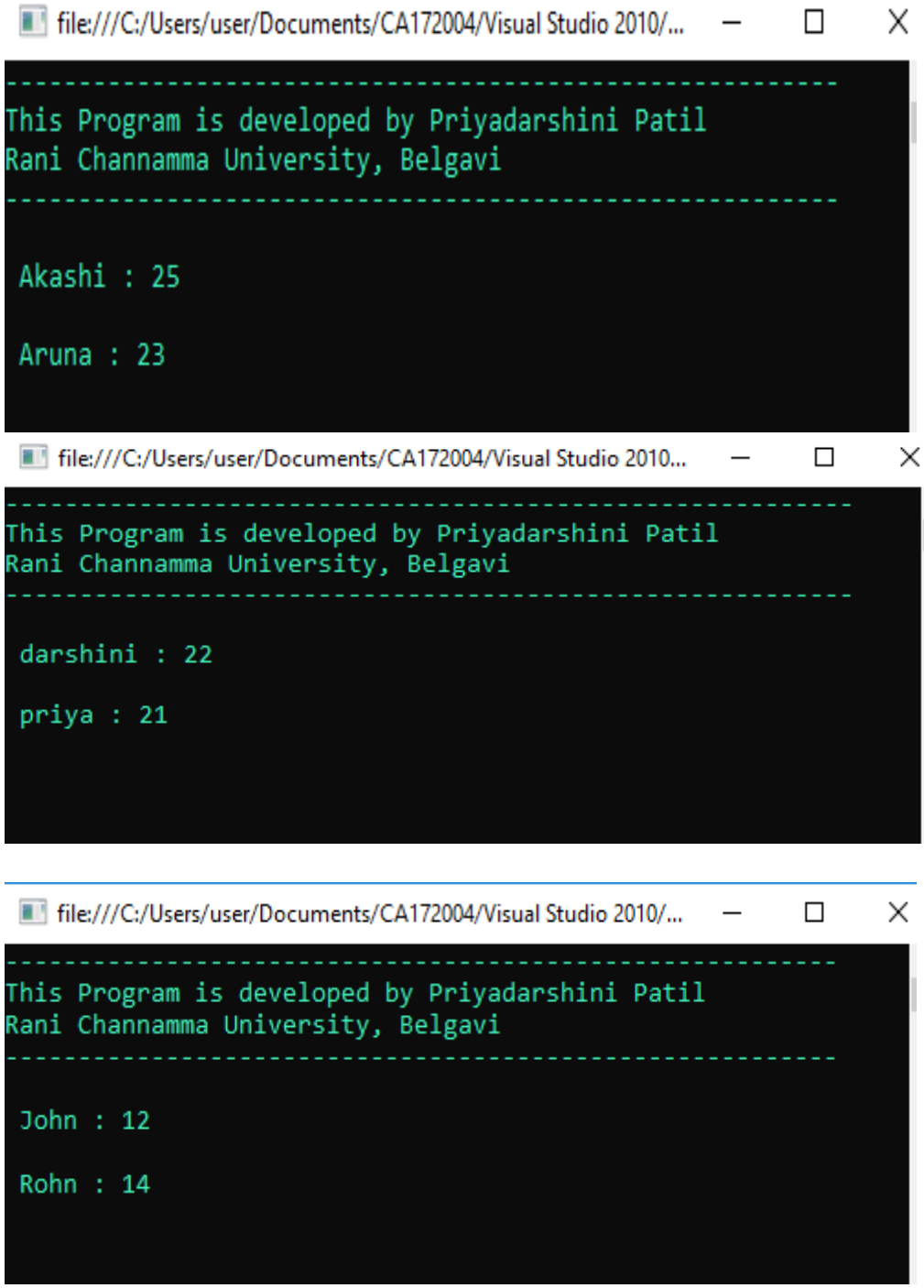

file:///C:/Users/user/Documents/CA172004/Visual Studio 2010/Pro...
This Program is to check for the leap year
This Program is developed by Priyadarshini Patil
Rani Channamma University, Belgavi
Enter Year to check : 2020
2020 is a Leap Year

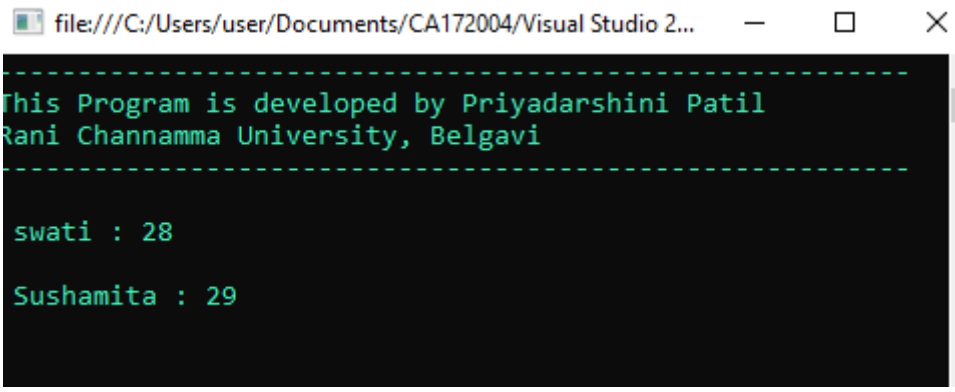
5) Program to illustrate the use of different properties in C#.

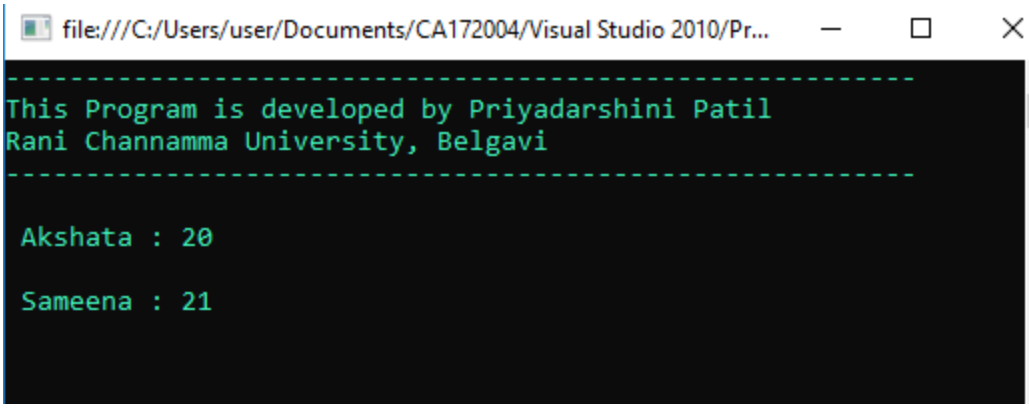
```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace ConsoleApplication1
{
   class 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)
        {
            Console.WriteLine("-----------------------------------------------------------");
            Console.WriteLine("This Program is developed by Priyadarshini patil");
            Console.WriteLine("Roll No : CA172004, Rani Channamma University,
            Belgavi");
            Console.WriteLine("-----------------------------------------------------------");
            PropertiesDemo p = new PropertiesDemo();
            p.Name = "John";
            p.Age = 12;

            PropertiesDemo d = new PropertiesDemo();
            d.Name = "Rohn";
            d.Age = 14;

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

            Console.ReadLine();

        }
    }
  }
}
```

OUTPUT


file:///C:/Users/user/Documents/CA172004/Visual Studio 2010/...
This Program is developed by Priyadarshini Patil
Rani Channamma University, Belgavi
Akashi : 25
Aruna : 23
file:///C:/Users/user/Documents/CA172004/Visual Studio 2010...
This Program is developed by Priyadarshini Patil
Rani Channamma University, Belgavi
darshini : 22
priya : 21
file:///C:/Users/user/Documents/CA172004/Visual Studio 2010/...
This Program is developed by Priyadarshini Patil
Rani Channamma University, Belgavi
John : 12
Rohn : 14

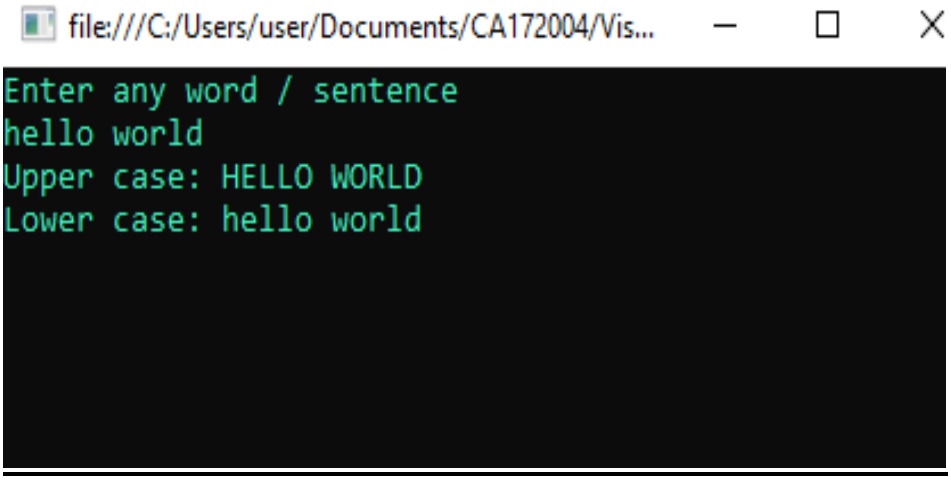

file:///C:/Users/user/Documents/CA172004/Visual Studio 2...
This Program is developed by Priyadarshini Patil
Rani Channamma University, Belgavi
swati : 28
Sushamita : 29

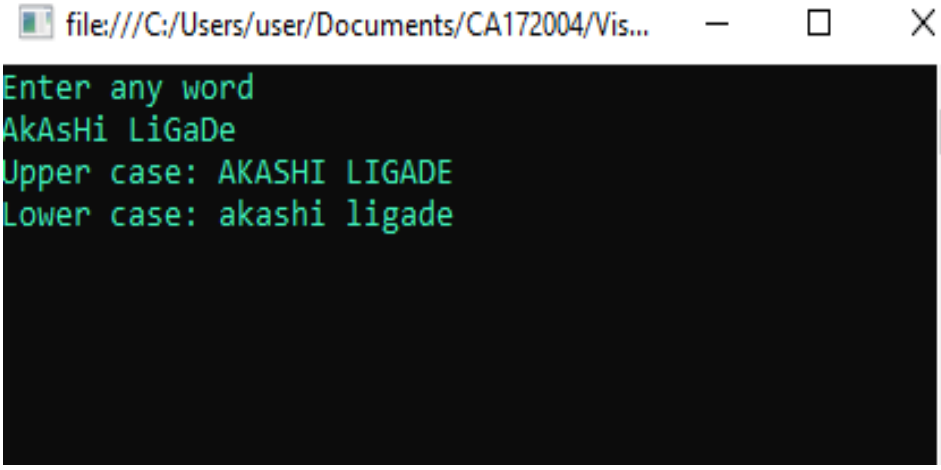

file:///C:/Users/user/Documents/CA172004/Visual Studio 2010/Pr...
This Program is developed by Priyadarshini Patil
Rani Channamma University, Belgavi
Akshata : 20
Sameena : 21

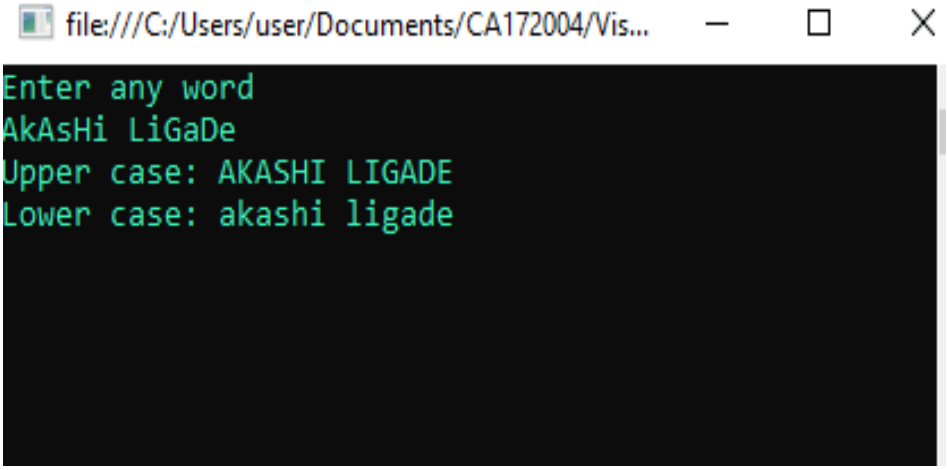
6) Write a program to convert input string from lower to upper and upper to lower case.

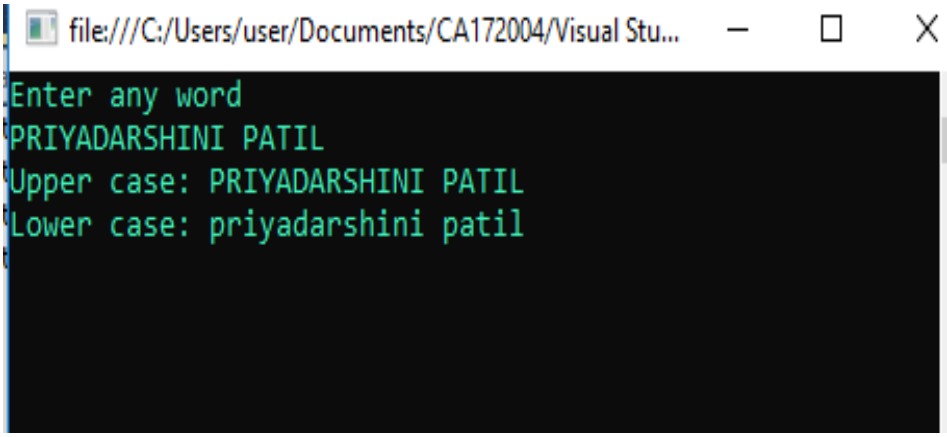
```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace labpgm9
{
   class Program
   {
      static void Main(string[] args)
      {
         string input;
         Console.WriteLine("Enter any word");
         input = Console.ReadLine();
         Console.WriteLine("Upper case: {0}", input.ToUpper());
         Console.WriteLine("Lower case: {0}", input.ToLower());
         Console.ReadLine();
      }
   }
}
```

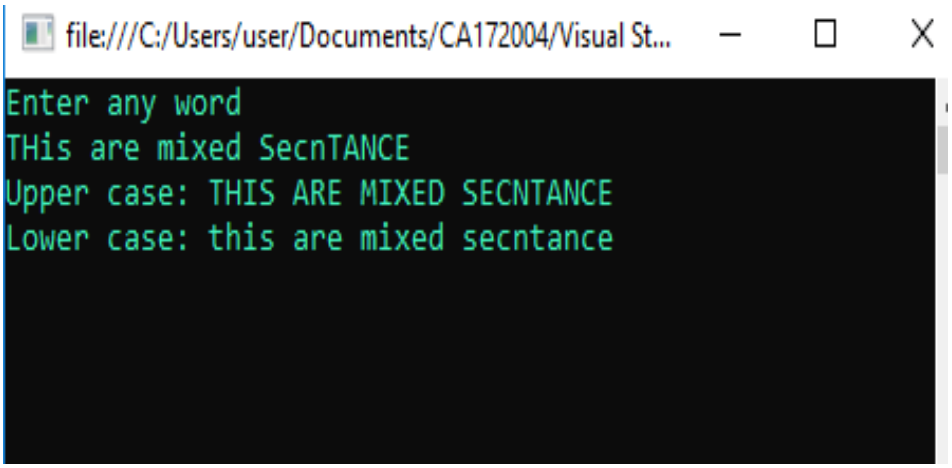
OUTPUT


file:///C:/Users/user/Documents/CA172004/Vis...
Enter any word / sentence
hello world
Upper case: HELLO WORLD
Lower case: hello world


file:///C:/Users/user/Documents/CA172004/Vis...
Enter any word
AkAsHi LiGaDe
Upper case: AKASHI LIGADE
Lower case: akashi ligade


file:///C:/Users/user/Documents/CA172004/Vis...
Enter any word
AkAsHi LiGaDe
Upper case: AKASHI LIGADE
Lower case: akashi ligade

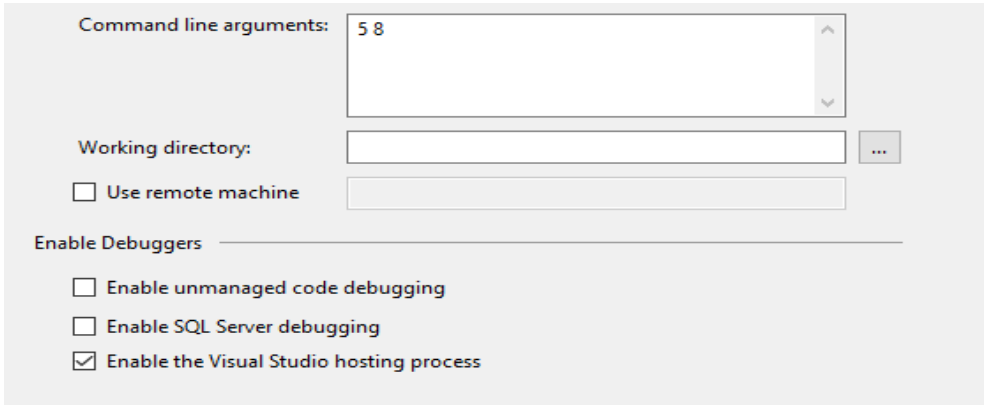

file:///C:/Users/user/Documents/CA172004/Visual Stu...
Enter any word
PRIYADARSHINI PATIL
Upper case: PRIYADARSHINI PATIL
Lower case: priyadarshini patil

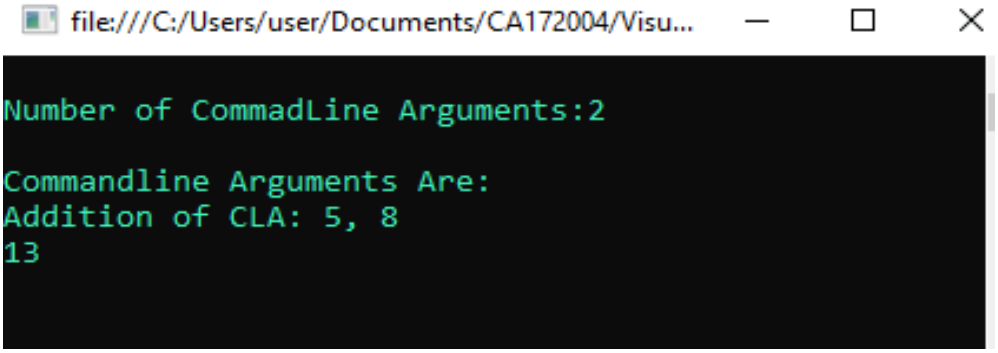

file:///C:/Users/user/Documents/CA172004/Visual St...
Enter any word
THis are mixed SecnTANCE
Upper case: THIS ARE MIXED SECNTANCE
Lower case: this are mixed secntance

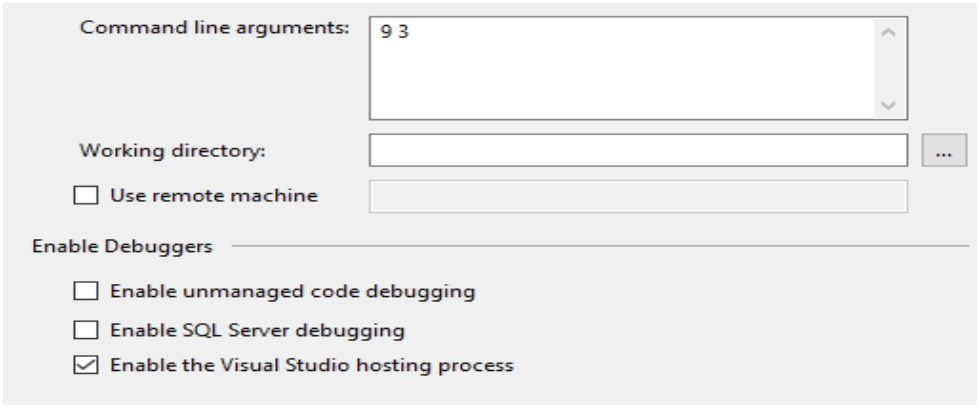
7) Demonstrate Command line arguments processing.

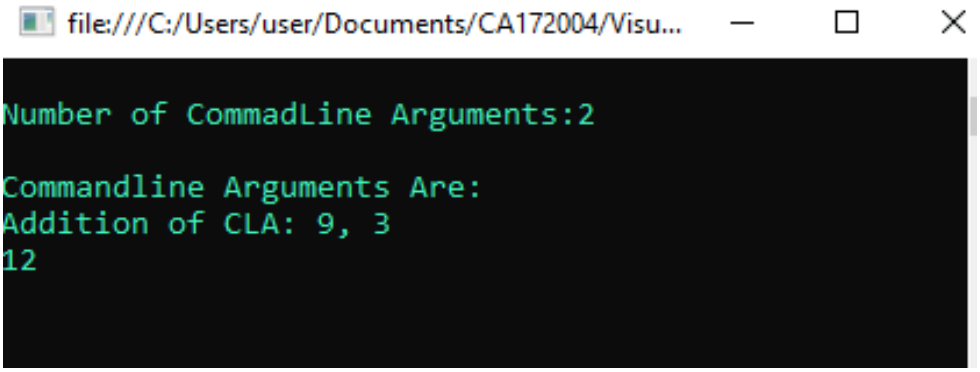
```
using System;

namespace ProgramSixteen
{
   class Program
   {
      static void Main(string[] args)
      {
         if (args.Length >= 2)
         {
            int num1 = Int32.Parse(args[0]);
            int num2 = Int32.Parse(args[1]);
            int sum = num1 + num2;
            Console.WriteLine("\nNumber of CommadLine Arguments:" +  args.Length);
            Console.WriteLine("\nCommandline Arguments Are:\t");
            Console.WriteLine("Addition of CLA: {0}, {1}", num1, num2);
            Console.WriteLine("{0}", sum);
         } else
         {
            Console.WriteLine("No command line arguments to process");
         }
         Console.ReadLine();
      }
   }
   }
```

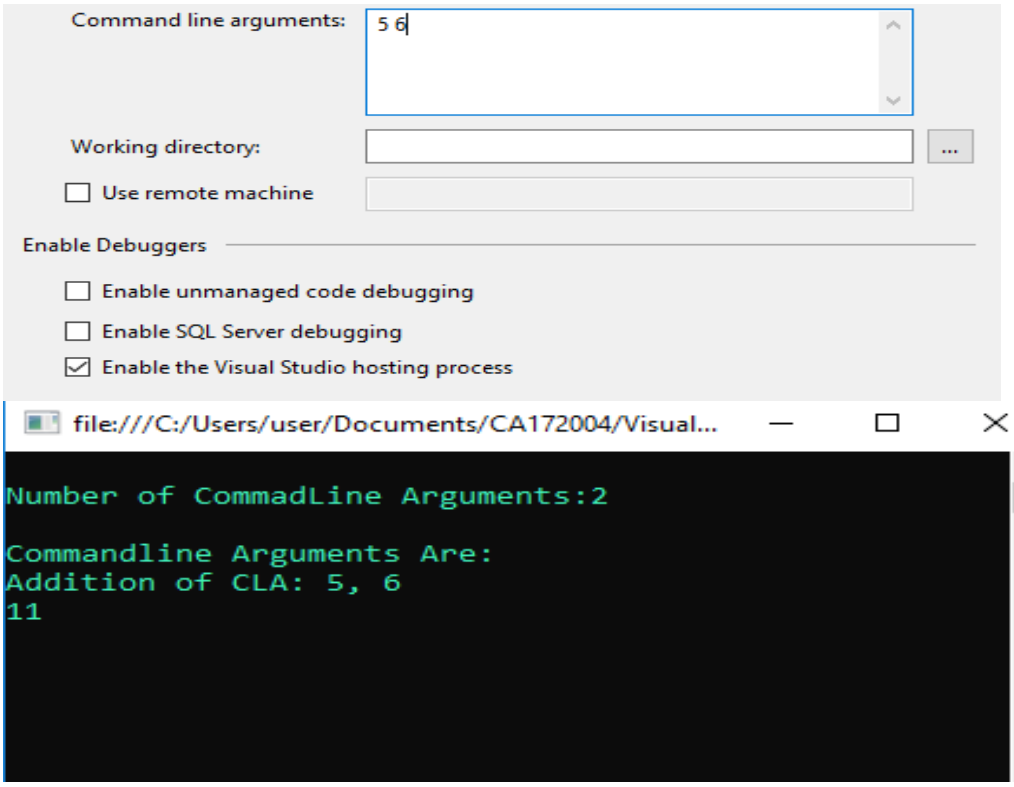
OUTPUT

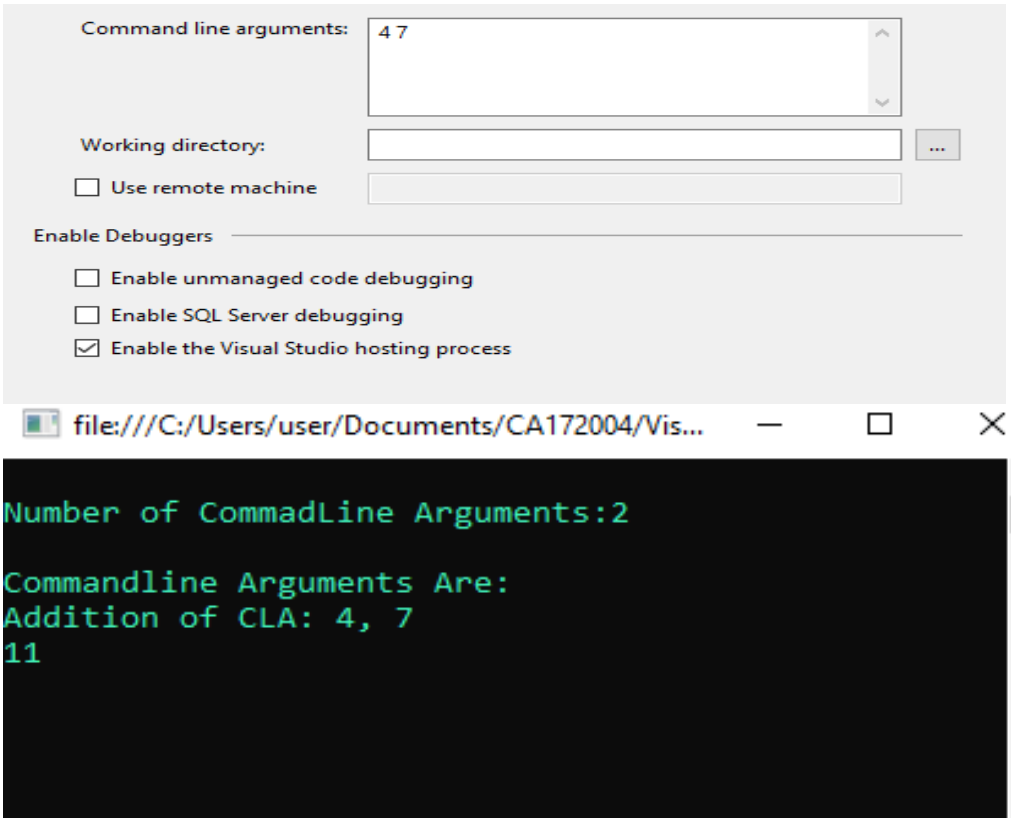

Command line arguments:
5 8
Working directory:
...
Use remote machine
Enable Debuggers
Enable unmanaged code debugging
Enable SQL Server debugging
Enable the Visual Studio hosting process

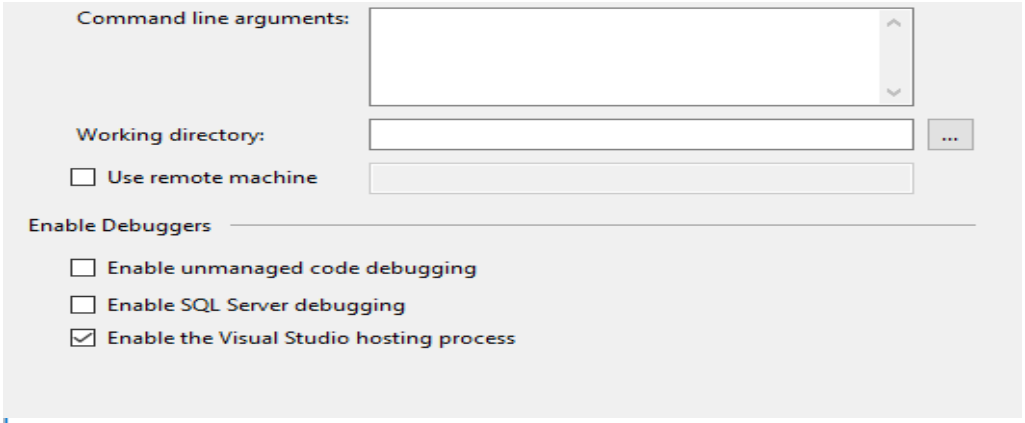

file:///C:/Users/user/Documents/CA172004/Visu...
Number of CommadLine Arguments:2
Commandline Arguments Are:
Addition of CLA: 5, 8
13

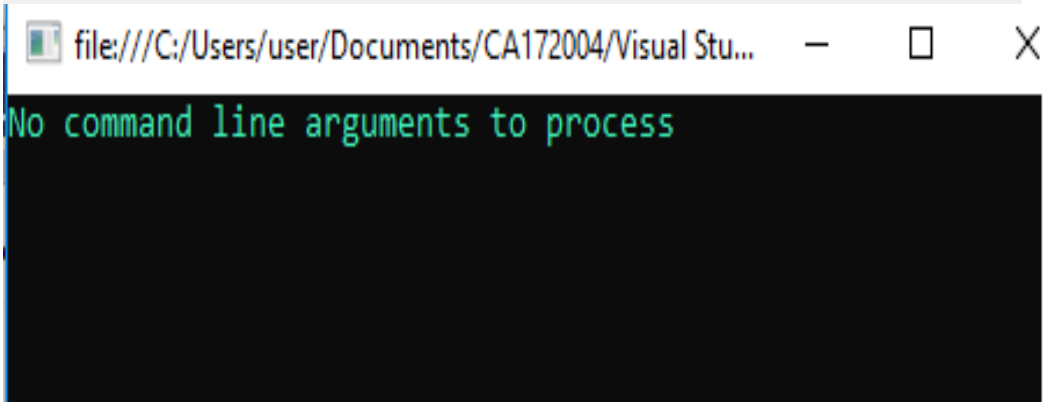

Command line arguments:
9 3
Working directory:
...
Use remote machine
Enable Debuggers
Enable unmanaged code debugging
Enable SQL Server debugging
Enable the Visual Studio hosting process


file:///C:/Users/user/Documents/CA172004/Visu...
Number of CommadLine Arguments:2
Commandline Arguments Are:
Addition of CLA: 9, 3
12


Command line arguments:
5 6
Working directory:
...
Use remote machine
Enable Debuggers
Enable unmanaged code debugging
Enable SQL Server debugging
Enable the Visual Studio hosting process
file:///C:/Users/user/Documents/CA172004/Visual...
Number of CommadLine Arguments:2
Commandline Arguments Are:
Addition of CLA: 5, 6
11


Command line arguments:
4 7
Working directory:
...
Use remote machine
Enable Debuggers
Enable unmanaged code debugging
Enable SQL Server debugging
Enable the Visual Studio hosting process
file:///C:/Users/user/Documents/CA172004/Vis...
Number of CommadLine Arguments:2
Commandline Arguments Are:
Addition of CLA: 4, 7
11

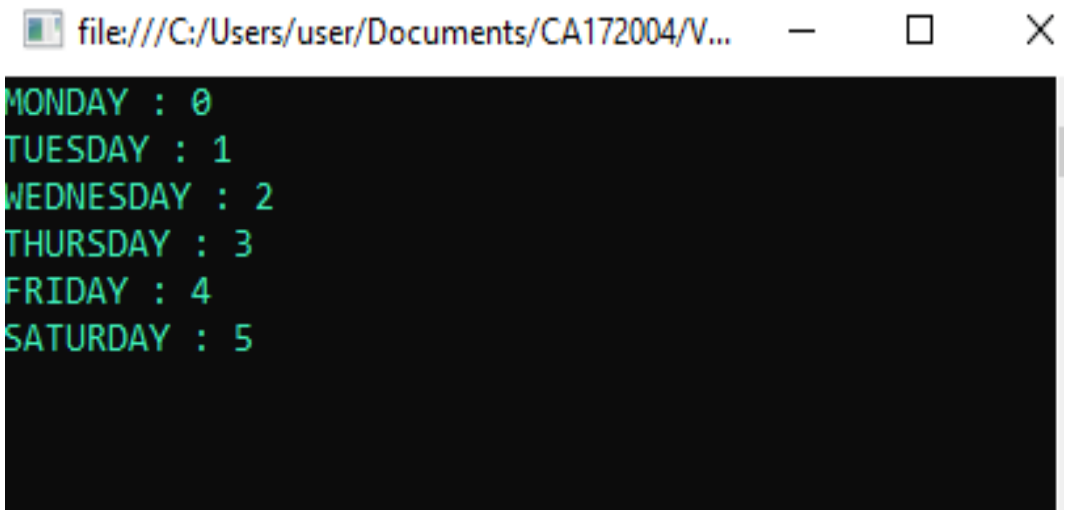

Command line arguments:
Working directory:
...
Use remote machine
Enable Debuggers
Enable unmanaged code debugging
Enable SQL Server debugging
Enable the Visual Studio hosting process


file:///C:/Users/user/Documents/CA172004/Visual Stu...
No command line arguments to process

8) 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 labpgm1
{
   class Program
      {
          enum CollegeDays
      {
         MONDAY, TUESDAY, WEDNESDAY, THURSDAY, FRIDAY,
SATURDAY
      }

      static void Main(string[] args)
      {

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

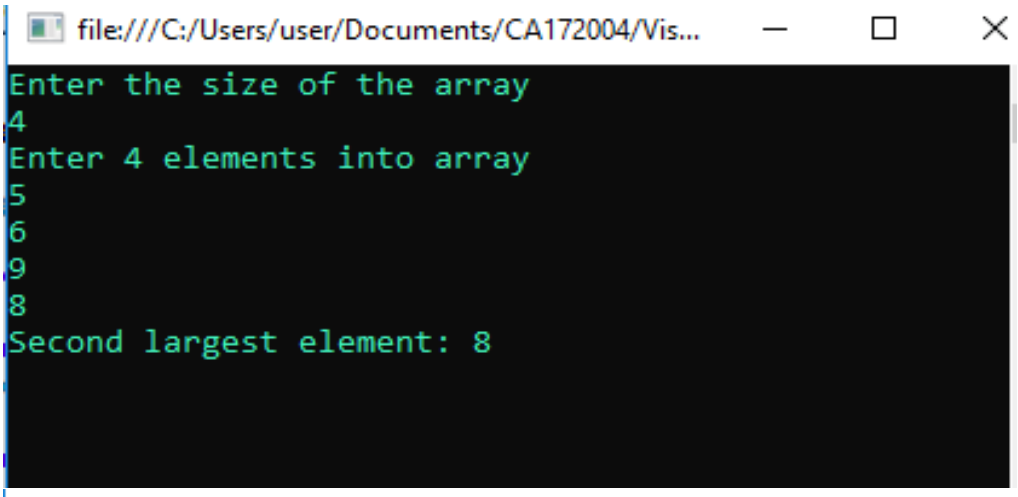
OUTPUT

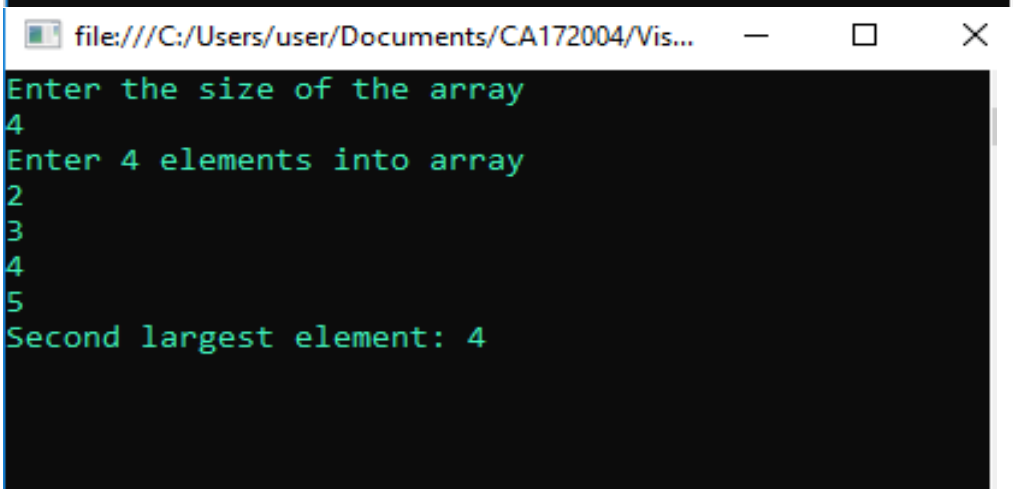

file:///C:/Users/user/Documents/CA172004/V...
MONDAY : 0
TUESDAY : 1
WEDNESDAY : 2
THURSDAY : 3
FRIDAY : 4
SATURDAY : 5

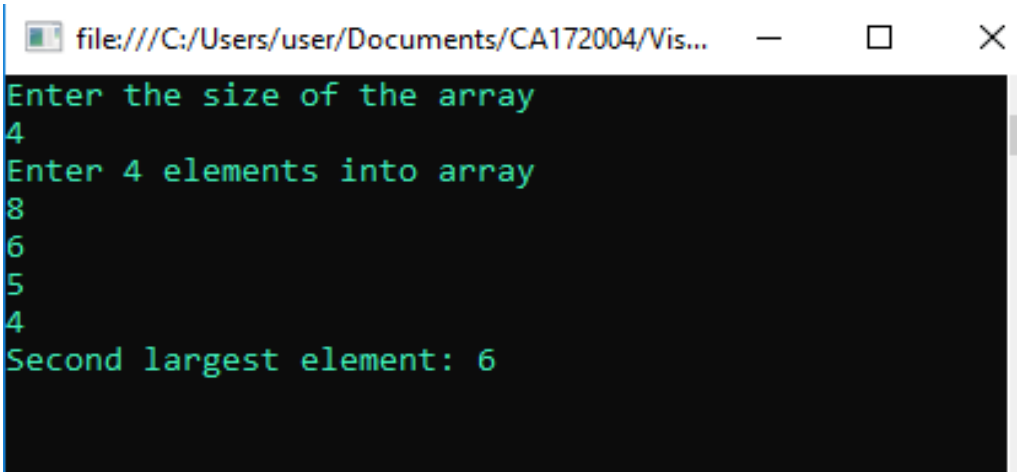
9) Find the second largest element in single dimensional array.

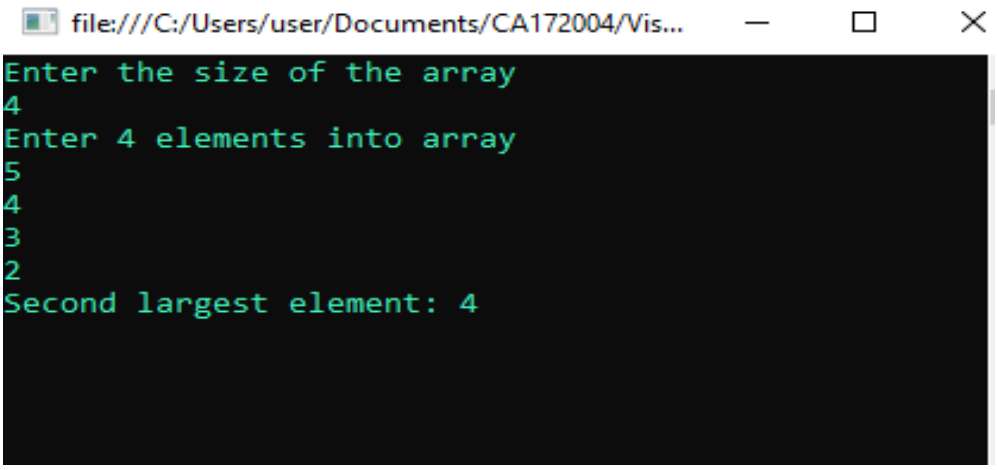
```
using System;

namespace ProgramFourteen
{
   class Program
   {
      static void Main(string[] args)
      {
         int n;
         Console.WriteLine("Enter the size of the array");
         n = Int16.Parse(Console.ReadLine());
         int[] array = new int[n];
         Console.WriteLine("Enter {0} elements into array", n);

         for (int i = 0; i < n; i++)
            array[i] = Int16.Parse(Console.ReadLine());


         for (int i = 0; i < n; i++) {
            int max = array[i];
            for (int j = 0; j < n; j++) {
                  if (array[j] > max) {
                     int t = array[j];
                     array[j] = array[i];
                     array[i] = t;
                  }

            }
         }

         Console.WriteLine("Second largest element: {0}", array[n - 2]);

         Console.ReadLine();
      }
   }
}
```

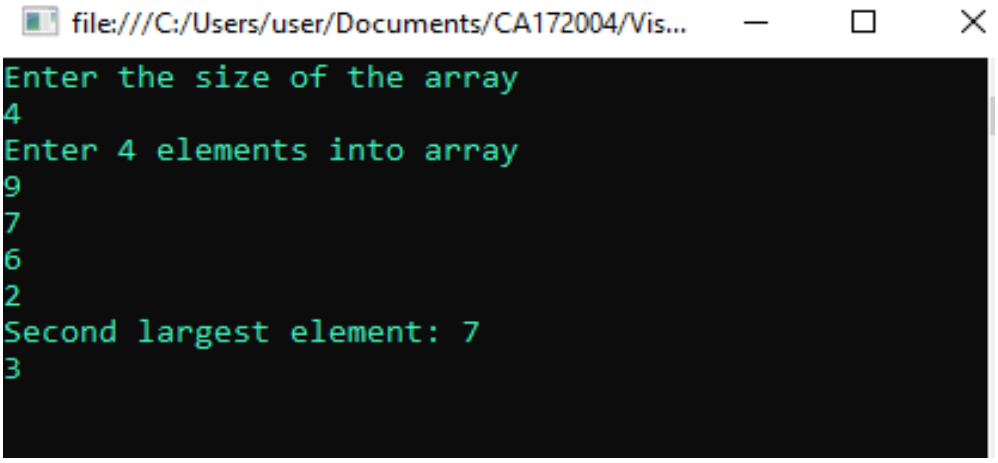
OUTPUT


file:///C:/Users/user/Documents/CA172004/Vis...
Enter the size of the array
4
Enter 4 elements into array
5
6
9
8
Second largest element: 8


file:///C:/Users/user/Documents/CA172004/Vis...
Enter the size of the array
4
Enter 4 elements into array
2
3
4
5
Second largest element: 4


file:///C:/Users/user/Documents/CA172004/Vis...
Enter the size of the array
4
Enter 4 elements into array
8
6
5
4
Second largest element: 6


file:///C:/Users/user/Documents/CA172004/Vis...
Enter the size of the array
4
Enter 4 elements into array
5
4
3
2
Second largest element: 4

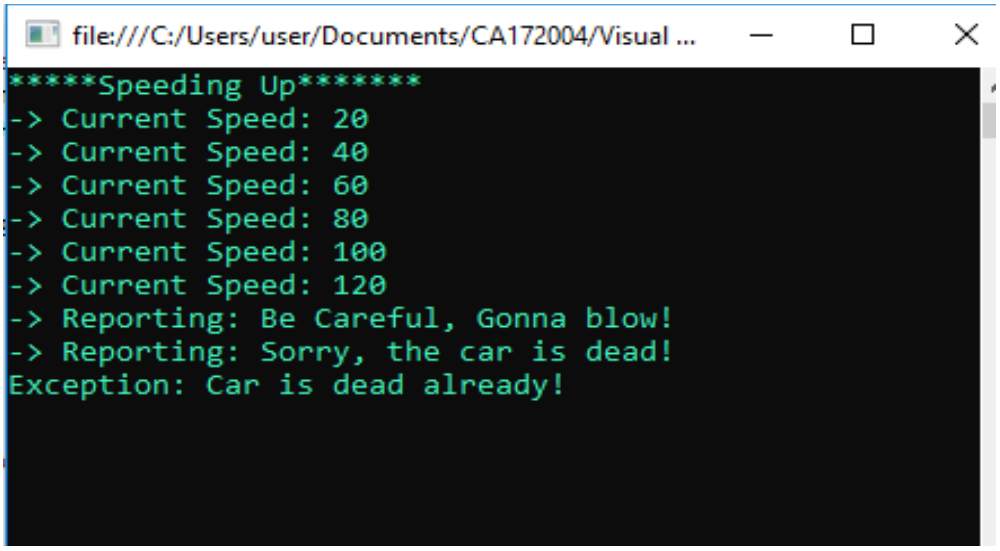

file:///C:/Users/user/Documents/CA172004/Vis...
Enter the size of the array
4
Enter 4 elements into array
9
7
6
2
Second largest element: 7
3

10) Describe delegates, events, errors and exceptions.

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

namespace ConsoleApplication26
{
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

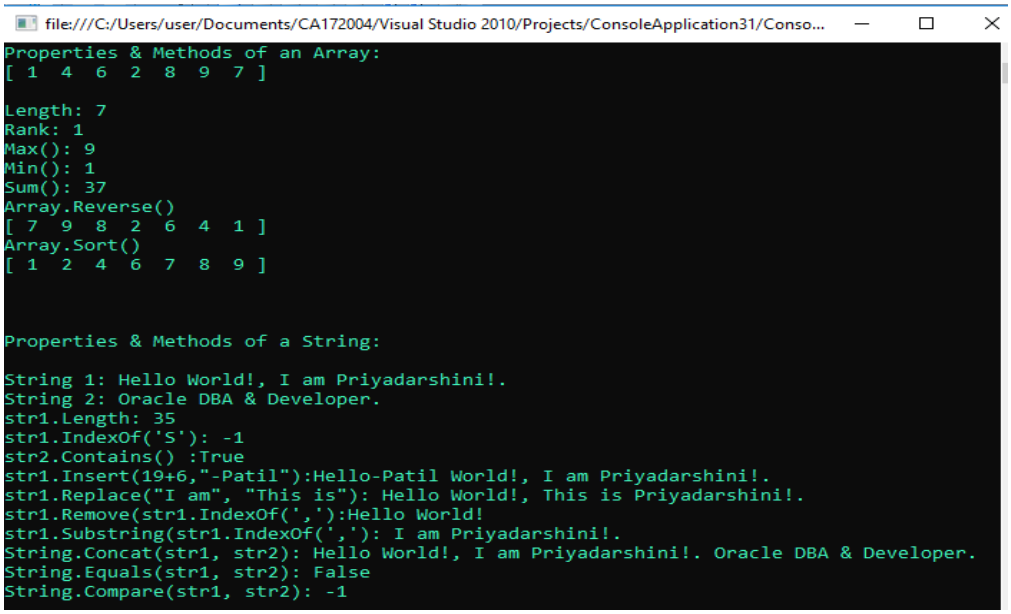

file:///C:/Users/user/Documents/CA172004/Visual ...
*****Speeding Up*******
-> Current Speed: 20
-> Current Speed: 40
-> Current Speed: 60
-> Current Speed: 80
-> Current Speed: 100
-> Current Speed: 120
-> Reporting: Be Careful, Gonna blow!
-> Reporting: Sorry, the car is dead!
Exception: Car is dead already!

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

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
namespace ConsoleApplication31
{
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 Priyadarshini!. ";
      Console.WriteLine();
      String str2 = "Oracle DBA & 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('B'));
      Console.WriteLine("str2.Contains() :{0}",str2.Contains("Developer"));
       Console.WriteLine("str1.Insert(19+6,\"-Patil\"):{0}", str1.Insert(str1.IndexOf('J') + 6,
      "-Patil"));
      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

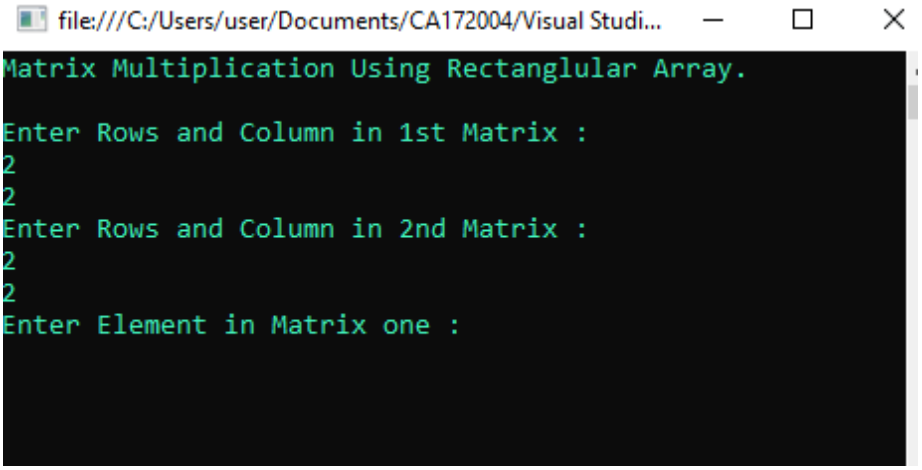

file:///C:/Users/user/Documents/CA172004/Visual Studio 2010/Projects/ConsoleApplication31/Conso...
Properties & Methods of an Array:
[1 4 6 2 8 9 7]
Length: 7
Rank: 1
Max(): 9
Min(): 1
Sum(): 37
Array.Reverse()
[7 9 8 2 6 4 1]
Array.Sort()
[1 2 4 6 7 8 9]
Properties & Methods of a String:
String 1: Hello World!, I am Priyadarshini!.
String 2: Oracle DBA & Developer.
str1.Length: 35
str1.IndexOf('S'): -1
str2.Contains() :True
str1.Insert(19+6,"-Patil"):Hello-Patil World!, I am Priyadarshini!.
str1.Replace("I am", "This is"): Hello World!, This is Priyadarshini!.
str1.Remove(str1.IndexOf(','):Hello World!
str1.Substring(str1.IndexOf(',')): I am Priyadarshini!.
String.Concat(str1, str2): Hello World!, I am Priyadarshini!. Oracle DBA & Developer.
String.Equals(str1, str2): False
String.Compare(str1, str2): -1

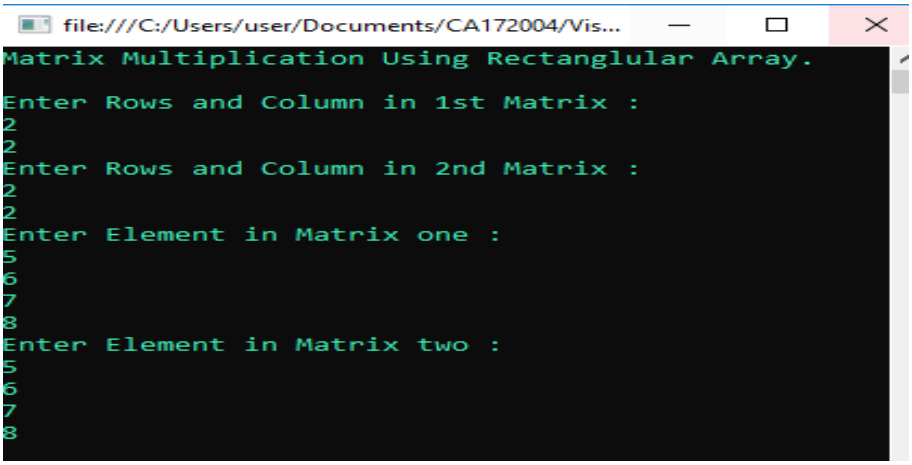
12) Program to multiply to matrices using Rectangular array.

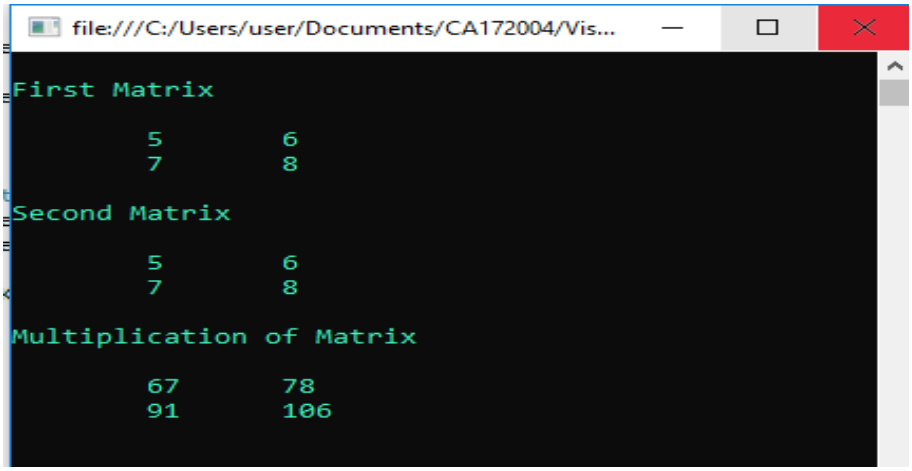
```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
namespace ConsoleApplication30
{
   class Program
   {
      static void Main(string[] args)
      {
      Console.WriteLine("Matrix Multiplication Using Rectanglular Array.");
      Console.WriteLine("      ");
      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("Matrix Multiplication Row Column Rule Violated.");
      }
      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++)
```

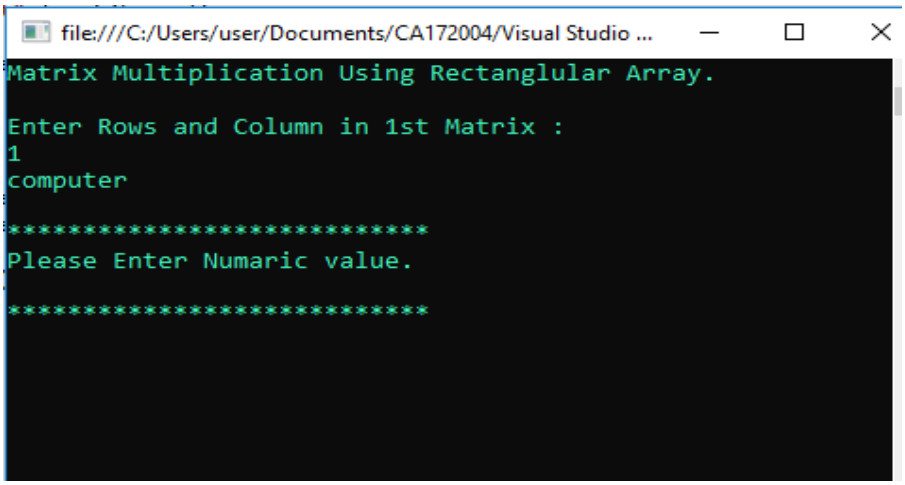
```
{
Console.Write("\t" + mat1[i, j]);
}
Console.WriteLine();
}
Console.WriteLine("\nSecond Matrix\n");
for (int i = 0; i < r2; i++)
{
for (int j = 0; j < c2; j++)
{
Console.Write("\t" + mat2[i, j]);
}
Console.WriteLine();
}
Console.WriteLine("\nMultiplication of Matrix\n");
for (int i = 0; i < r1; 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/user/Documents/CA172004/Visual Studi...
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 :


file:///C:/Users/user/Documents/CA172004/Vis...
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
7
8
Enter Element in Matrix two :
5
6
7
8

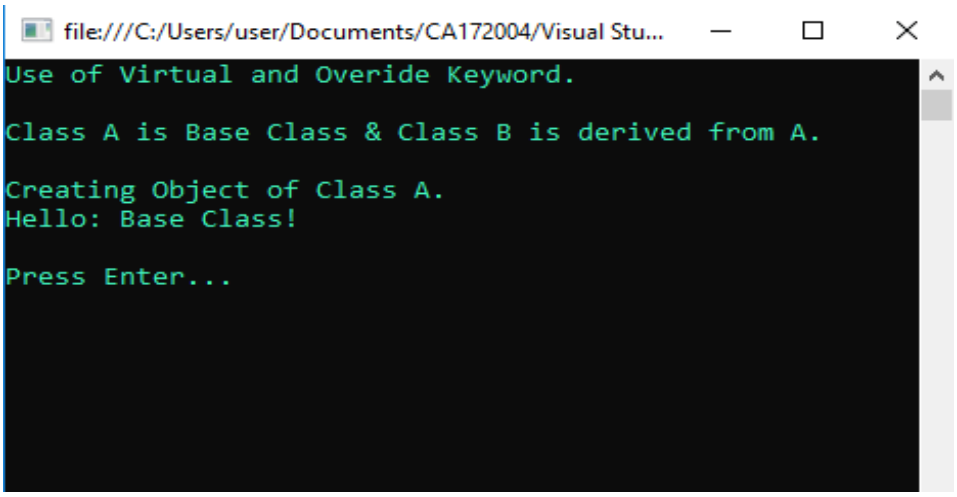

file:///C:/Users/user/Documents/CA172004/Vis...
First Matrix
5 6
7 8
Second Matrix
5 6
7 8
Multiplication of Matrix
67 78
91 106

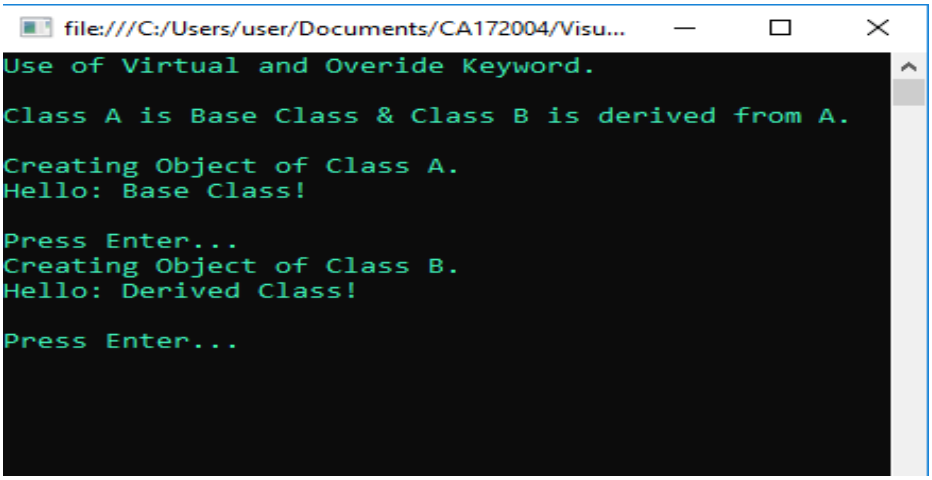

file:///C:/Users/user/Documents/CA172004/Visual Studio ...
Matrix Multiplication Using Rectanglular Array.
Enter Rows and Column in 1st Matrix :
1
computer
****
Please Enter Numaric value.
****

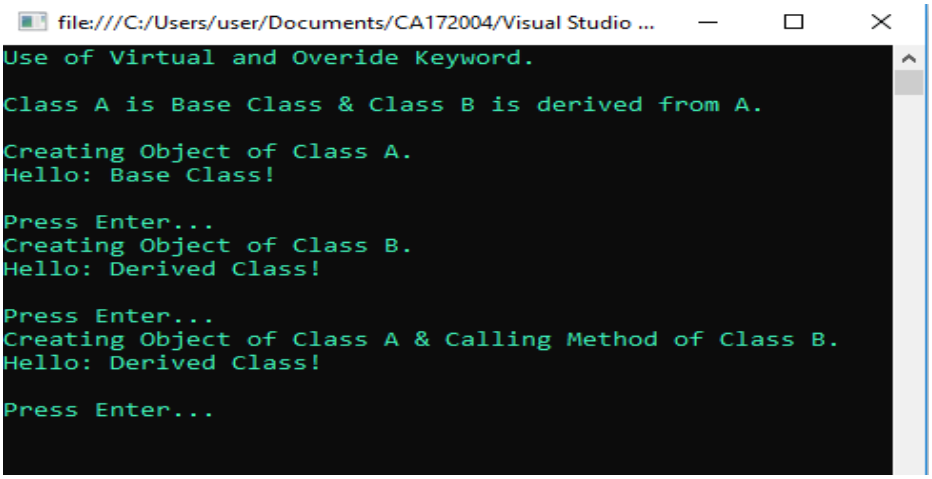
13) Demonstrate Use of Virtual and override keyword in C# with a simple Program.

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

namespace ConsoleApplication19
{
    class Program
    {
        class A
        {
            public virtual void show()
            {
                Console.WriteLine("Hello: Base Class!");
                Console.Write("\nPress Enter...");
                Console.ReadLine();
            }
        }

        class B : A
        {
            public override void show()
            {
                Console.WriteLine("Hello: Derived Class!");
                Console.Write("\nPress Enter...");
                Console.ReadLine();
            }
        }
      static void Main(string[] args)
      {
       Console.WriteLine("Use of Virtual and Overide Keyword.");
       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("Creating Object of Class B.");
        B b1 = new B();
        b1.show();
       Console.WriteLine("Creating Object of Class A & Calling Method of Class B.");
       A a2 = new B();
        a2.show();
       Console.ReadKey();
         }
      }
}
```

OUTPUT


file:///C:/Users/user/Documents/CA172004/Visual Stu...
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...

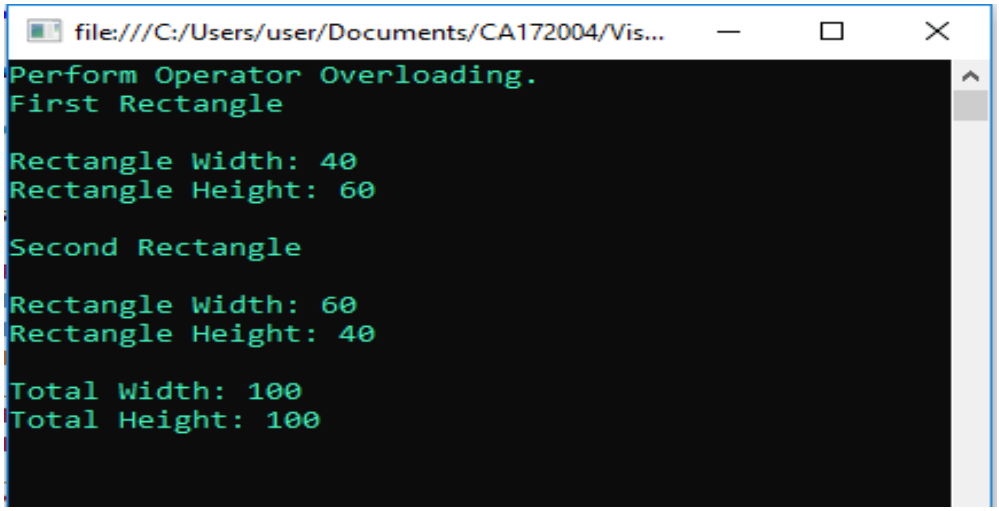

file:///C:/Users/user/Documents/CA172004/Visu...
Use of Virtual and Overide Keyword.
Class A is Base Class & Class B is derived from A.
Creating Object of Class A.
Hello: Base Class!
Press Enter...
Creating Object of Class B.
Hello: Derived Class!
Press Enter...

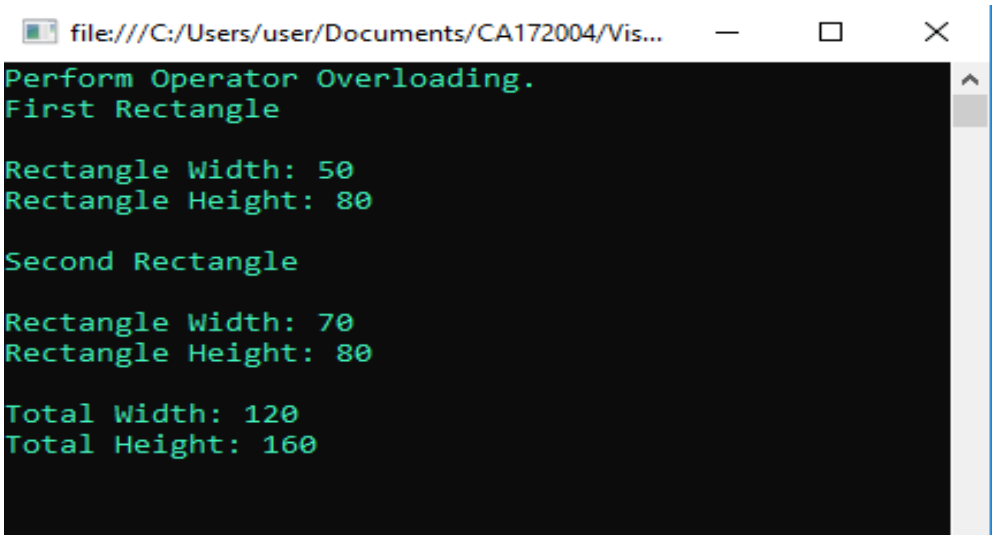

file:///C:/Users/user/Documents/CA172004/Visual Studio ...
Use of Virtual and Overide Keyword.
Class A is Base Class & Class B is derived from A.
Creating Object of Class A.
Hello: Base Class!
Press Enter...
Creating Object of Class B.
Hello: Derived Class!
Press Enter...
Creating Object of Class A & Calling Method of Class B.
Hello: Derived Class!
Press Enter...

14) Perform operator overloading.

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

namespace ConsoleApplication18
{
   class Program
   {
      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)
         {
            Console.WriteLine("Perform Operator Overloading.");
            Rectangle r1 = new Rectangle(40, 60);
            Rectangle r2 = new Rectangle(60, 40);
            Console.WriteLine("First Rectangle");
            Console.WriteLine();
            Console.WriteLine("Rectangle Width: {0}", r1.width);
            Console.WriteLine("Rectangle Height: {0}", r1.height);
            Console.WriteLine();
            Console.WriteLine("Second Rectangle");
            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/user/Documents/CA172004/Vis...
Perform Operator Overloading.
First Rectangle
Rectangle Width: 40
Rectangle Height: 60
Second Rectangle
Rectangle Width: 60
Rectangle Height: 40
Total Width: 100
Total Height: 100

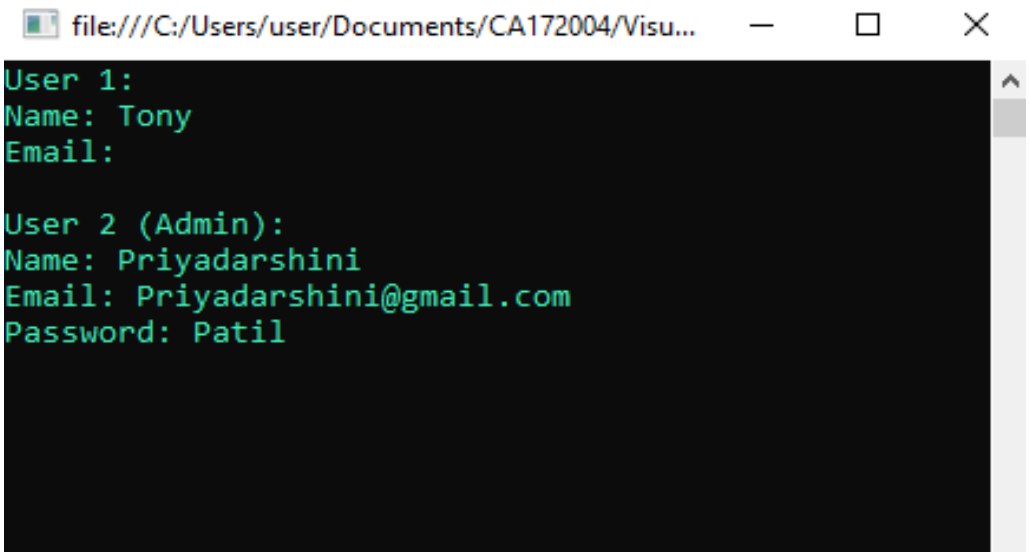

file:///C:/Users/user/Documents/CA172004/Vis...
Perform Operator Overloading.
First Rectangle
Rectangle Width: 50
Rectangle Height: 80
Second Rectangle
Rectangle Width: 70
Rectangle Height: 80
Total Width: 120
Total Height: 160

15) 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 ProgramTwoo
 {
 class Program
{
 static void Main(string[] args)
 {
    User user1 = new User("Tony");
    Admin user2 = new Admin("Priyadarshini", "Priyadarshini@gmail.com", "Patil");

            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();
        }
    }

    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;
        }
    }
}
```

OUTPUT


file:///C:/Users/user/Documents/CA172004/Visu...
User 1:
Name: Tony
Email:
User 2 (Admin):
Name: Priyadarshini
Email: Priyadarshini@gmail.com
Password: Patil

16) Work with page using ASP.NET.

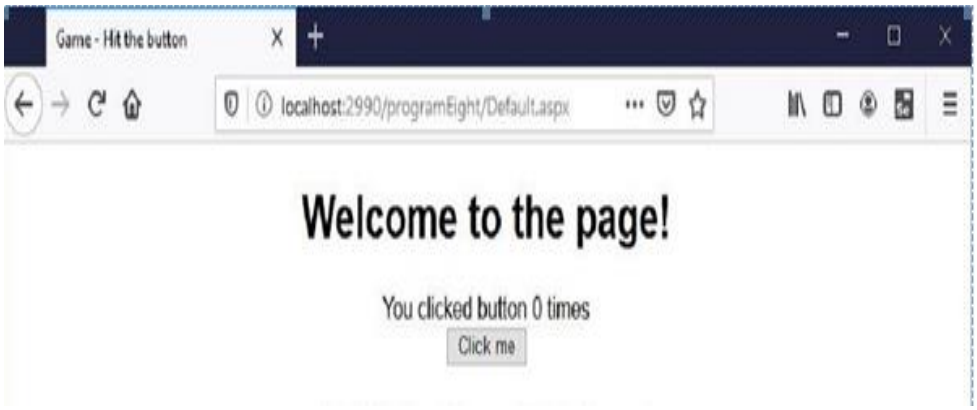
ASP.NET Page

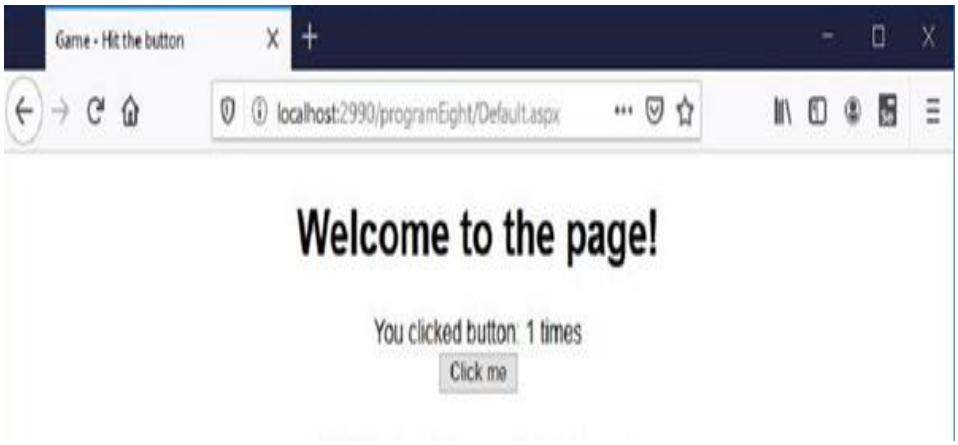
```
<%@ Page Language="C#" AutoEventWireup="true" CodeFile="Default.aspx.cs" Inherits="_Default" %>

<!DOCTYPE html>

<html xmlns="http://www.w3.org/1999/xhtml">

<head runat="server">

    <title>Game - Hit the button</title>

</head>

<body>

    <form id="form1" runat="server">

    <div class="container">

        <h1>Welcome to the page!</h1>

        <asp:Label ID="lblOutput" Text="You clicked button 0 times" runat="server" />

        <asp:button id="clickMeButton" runat="server" text="Click me"

            onClick="clickMeButton_Click" />

            <div class="space"> <br /> <footer>&copy; 2019 Priyadarshini Patil. All Rights Reserved.</footer></div>


    </div>

    </form>

</body>

</html>
```

C#.NET Page

```
using System;
using System.Web;


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 clicked button: {0} times", i);
        ViewState["HitCount"] = i;
    }
}
```

OUTPUT


Game - Hit the button
localhost:2990/programEight/Default.aspx
Welcome to the page!
You clicked button 0 times
Click me


Game - Hit the button
localhost:2990/programEight/Default.aspx
Welcome to the page!
You clicked button 1 times
Click me

17) 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

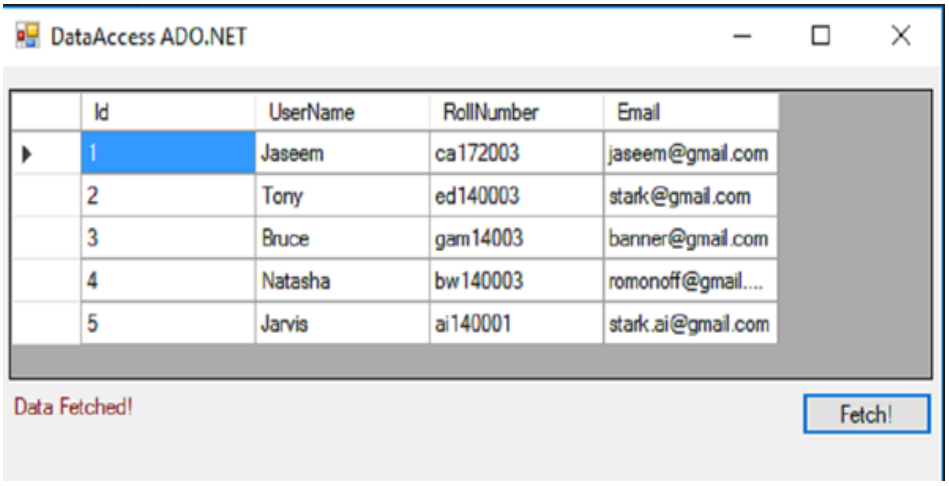
```
using System;

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

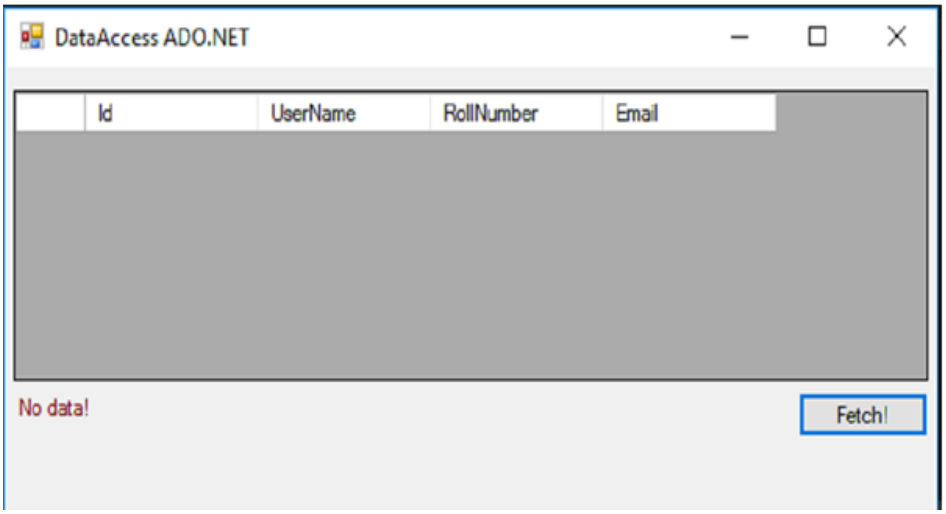
UserAccessLayer.cs

```
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
Jaseem
ca172003
jaseem@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!

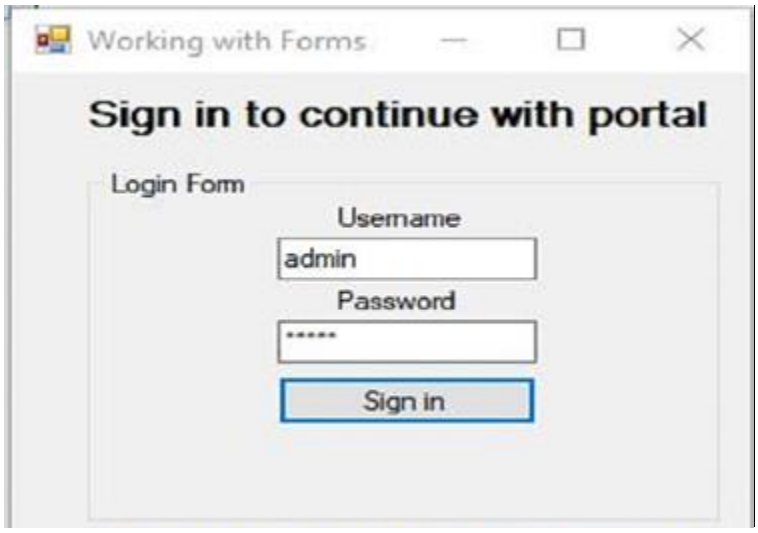
18) Work with Forms using ASP.NET.

```
using System;
namespace WindowsFormsApplication1
{
 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] = "tony";

         passs[0] = "admin";
         passs[1] = "user";
         passs[2] = "stark";
         rows = 3;
      }
      private void button1_Click(object sender, EventArgs e)
```

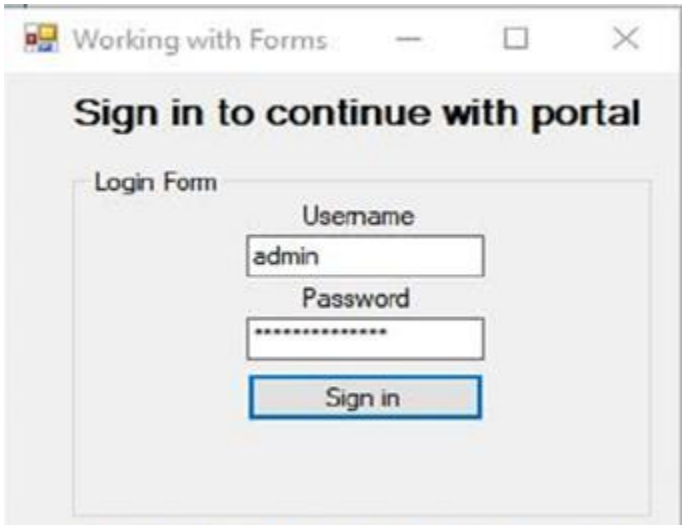
```
        {
            string username = textBox1.Text.Trim();
            string password = textBox2.Text.Trim();

            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


Working with Forms
Sign in to continue with portal
Login Form
Username
Password
Sign in


Working with Forms
Sign in to continue with portal
Login Form
Username
admin
Password
Sign in


Login Successfull!
OK


Working with Forms
Sign in to continue with portal
Login Form
Username
admin
Password
Sign in


Incorrect username/password!
OK