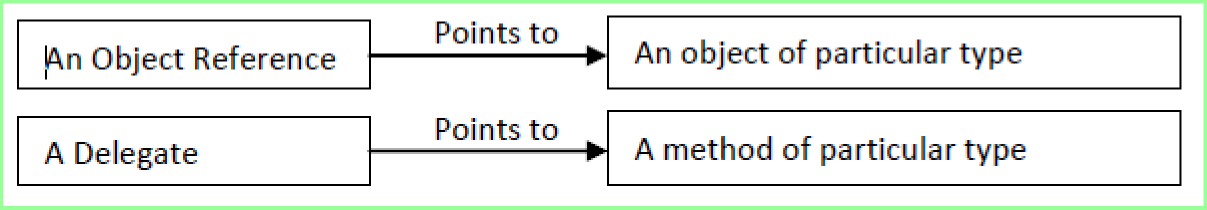
Chapter-4
ADVANCED C#

DELEGATES

☞ A delegate is an object that knows how to call a method. A delegate type defines the kind of method that delegate instances can call. Specifically, it defines the method's return type and its parameter types. C# delegates are similar to pointers to functions, in C or C++. A **delegate** is a reference type variable that holds the reference to a method. The reference can be changed at runtime. All delegates are implicitly derived from the **System.Delegate** class



Syntax:
<Access Modifier> Delegate <Return Type> <Name of Delegate> (<Parameters>)

☞ Delegate declaration determines the methods that can be referenced by the delegate. A delegate can refer to a method, which has the same signature as that of the delegate. To handle delegate type we must follow following five steps.

Step1: Create some method that we want to call
Step2: Create a delegate type.
Step3: Create delegate instance
Step4: Point the delegate to method.
Step5: Call a method via delegate.

Why use Delegate?

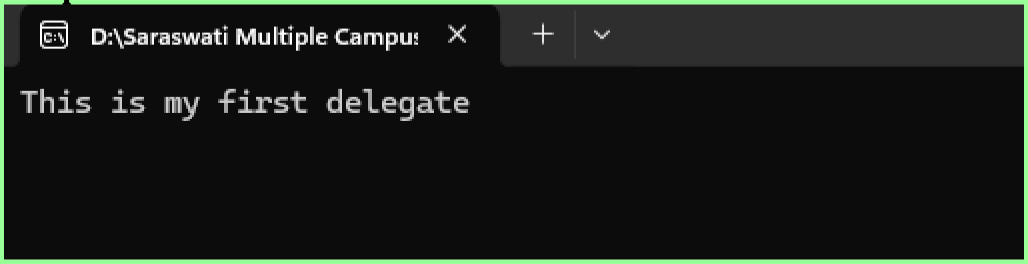
1. Provides a good way to encapsulate the methods.
2. Delegates are the library class in System namespace.
3. These are the type-safe pointer of any method.
4. Delegates are mainly used in implementing the call-back methods and events.
5. Delegates can be chained together as two or more methods can be called on a single event.
6. It doesn't care about the class of the object that it references.
7. Delegates can also be used in "anonymous methods" invocation.

8. Anonymous Methods(C# 2.0) and Lambda expressions(C# 3.0) are compiled to delegate types in certain contexts. Sometimes, these features together are known as anonymous functions.

Example:

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

namespace SimpleExampleDelegate
{
   class Program
   {
         // Step2: Create delegate Type
      public delegate void delegateMethod();
      static void Main(string[] args)
      {
         //Step3 Create Delegate instance
         //Step4: Points the delegate to method
         delegateMethod del = new delegateMethod(printString);
         //Step5: Call a method via Dlegate
         del.Invoke();
         Console.ReadKey();
      }
         //Step1. Create method to be called via delegate
      public static void printString()
      {
         Console.WriteLine("This is my first delegate");
      }
   }
}
```

Output:



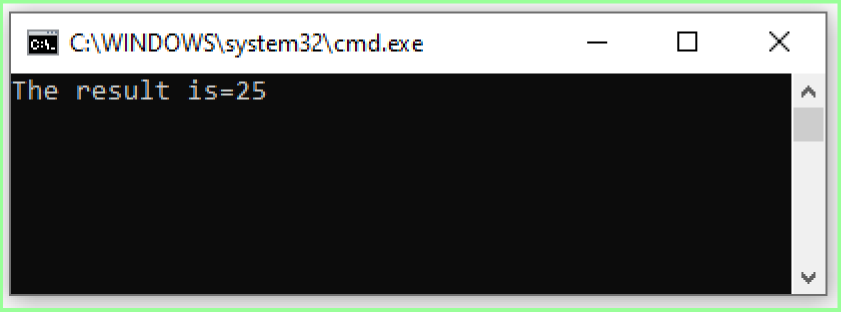
```
This is my first delegate
```

Example-2:

Example program to demonstrate the delegate.

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

namespace TestDelegate
{
    public delegate int MyDelegate(int x);
    internal class DelegateTest
    {
        public int MyMethod(int x)
        {
            return x * x;
        }
        static void Main(string[] args)
        {
            DelegateTest dt = new DelegateTest();

              int res= dt.MyMethod(5);
            Console.WriteLine("The result is=" + res);
            Console.ReadKey();
        }

    }
}
```

Out Put:

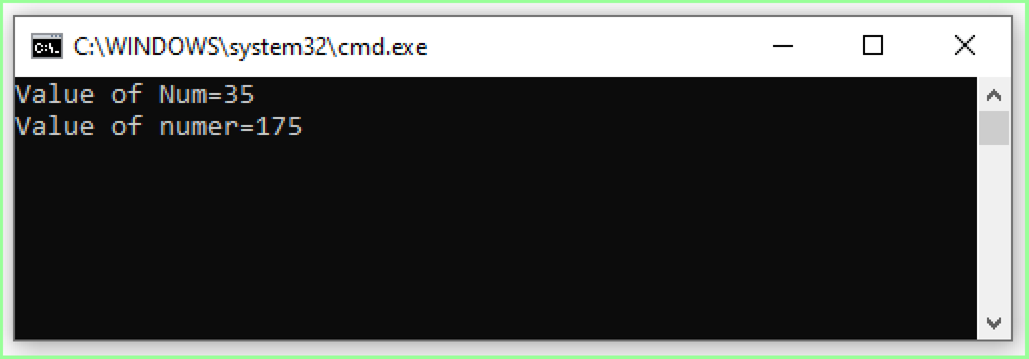


```
The result is=25
```

Example-3

```
using System;
using System.Collections.Generic;
using System.Data;
using System.Linq;
using System.Text;
using System.Threading;
using System.Threading.Tasks;

namespace TestDelegate
{
    delegate int NumberChanger(int n);
    internal class DelegateTest
    {
        static int num = 10;
        public static int AddNum(int p)
        {
            num = num + p;
            return num;
        }
        public static int MultNum(int q)
        {
            num = num * q;
            return num;
        }
        public static int getNum()
        {
            return num;
        }

        static void Main(string[] args)
        {
            NumberChanger nc1 = new NumberChanger(AddNum);//Create delegate instance
            NumberChanger nc2 = new NumberChanger(MultNum);
             //calling the method using delegate object
            nc1(25);
            Console.WriteLine("Value of Num={0}", getNum());
            nc2(5);
            Console.WriteLine("Value of numer={0}", getNum());
            Console.ReadKey();

        }

    }
}
```

Out Put:

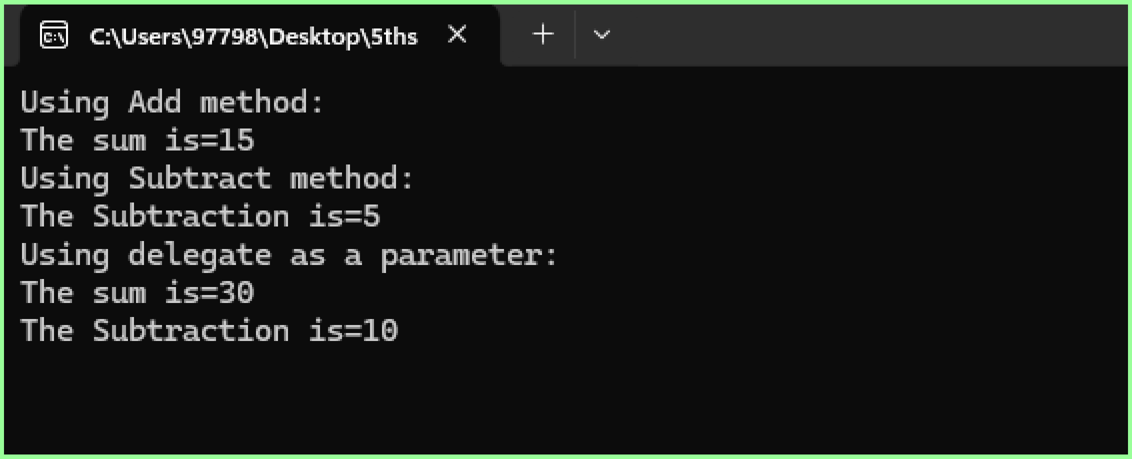


```
Value of Num=35
Value of numer=175
```

Example-4 Example program to demonstrate delegate as parameter.

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

namespace DelegateExample
{
    // Step 1: Define a delegate
    public delegate void Operation(int a, int b);
    class Program
    {
        // Methods matching the delegate signature
        public static void Add(int x, int y)
        {
            /// Console.WriteLine($"Addition: {x + y}");//String interpolation
            Console.WriteLine("The sum is=" + (x + y));
        }

        public static void Subtract(int x, int y)
        {
            //Console.WriteLine($"Subtraction: {x - y}");
            Console.WriteLine("The Subtraction is=" + (x - y));
        }

        static void Main(string[] args)
        {
            // Step 2: Instantiate the delegate
            Operation operation;

            // Step 3: Assign a method to the delegate
            operation = Add;
            Console.WriteLine("Using Add method:");
            operation(10, 5); // Invoke the delegate

            // Change the method the delegate points to
            operation = Subtract;
            Console.WriteLine("Using Subtract method:");
            operation(10, 5); // Invoke the delegate

            // Step 4: Pass delegate as a parameter
            Console.WriteLine("Using delegate as a parameter:");
            ExecuteOperation(20, 10, Add);
            ExecuteOperation(20, 10, Subtract);
            Console.ReadKey();
        }

        // Method that accepts a delegate as a parameter
        public static void ExecuteOperation(int a, int b, Operation op)
        {
            op(a, b);
        }
    }
}
```

Output:



```
Using Add method:
The sum is=15
Using Subtract method:
The Subtraction is=5
Using delegate as a parameter:
The sum is=30
The Subtraction is=10
```

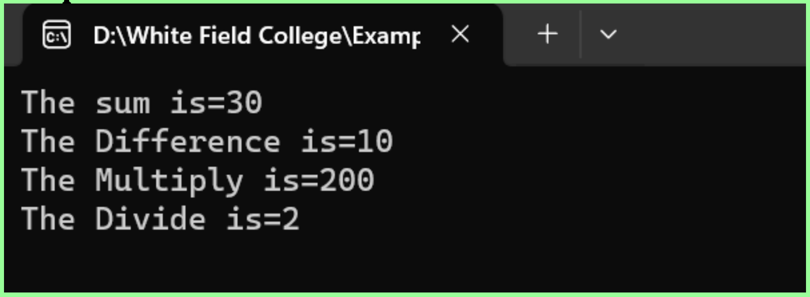
Multicast Delegates

- When a delegate is wrapped with more than one method that is known as multicast delegate.
- In c#, delegates are multicast, which means that they can point to more than one function at a time. They are derived from **System.MulticastDelegate** class.
- We can use **+= and -=** assignment operators to implement multi cast delegates.
- Delegate objects can be composed using the "+" operator. A composed delegate calls the two delegates it was composed from. Only delegates of the same type can be composed. The "-" operator can be used to remove a component delegate from a composed delegate.
- Using this property of delegates you can create an invocation list of methods that will be called when a delegate is invoked. This is called **multicasting** of a delegate. The following program demonstrates multicasting of a delegate:

Example: 1

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

namespace MulticastDelegate
{
    public delegate void Calculate(int n1, int n2);
    internal class Program
    {
        public static void Addition(int n1, int n2)
        {
            int result = n1 + n2;
            Console.WriteLine("The sum is={0}", result);
        }
        public static void Subtraction(int n1, int n2)
        {
            int result = n1 - n2;
            Console.WriteLine("The Difference is={0}", result);
        }
        public static void Multiply(int n1, int n2)
        {
            int result = n1  * n2;
            Console.WriteLine("The Multiply is={0}", result);
        }
        public static void Division(int n1, int n2)
        {
            int result = n1 / n2;
            Console.WriteLine("The Divide is={0}", result);
        }
        static void Main(string[] args)
        {
            Calculate obj = new Calculate(Addition);
            obj += Subtraction;
            obj += Multiply;
            obj += Division;
            obj(20, 10);
            Console.ReadKey();

        }
    }
}
```

Output:

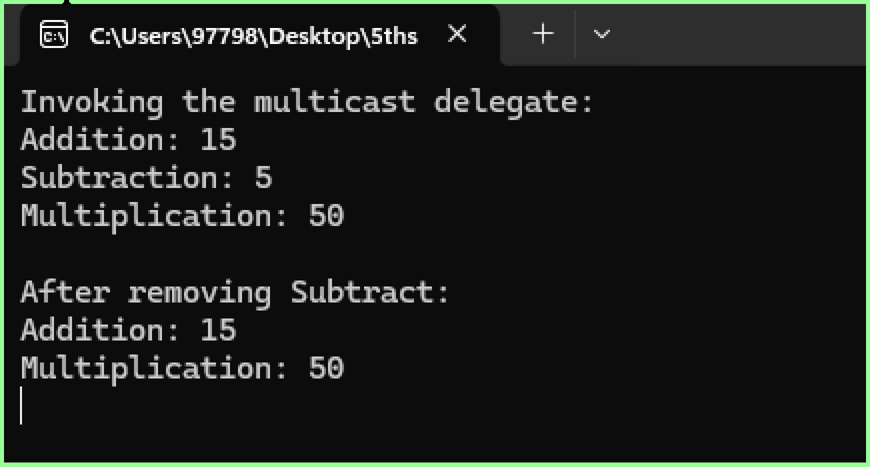


```
The sum is=30
The Difference is=10
The Multiply is=200
The Divide is=2
```

Example-2:

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

namespace MulticastDelegateExample
{
    // Define a delegate
    public delegate void Operation(int x, int y);

    class Program
    {
        // Methods matching the delegate signature
        public static void Add(int x, int y)
        {
            Console.WriteLine($"Addition: {x + y}");
        }

        public static void Subtract(int x, int y)
        {
            Console.WriteLine($"Subtraction: {x - y}");
        }

        public static void Multiply(int x, int y)
        {
            Console.WriteLine($"Multiplication: {x * y}");
        }

        static void Main(string[] args)
        {
            // Create a delegate instance and assign methods to it
            Operation operations = Add; // Add the first method
            operations += Subtract;     // Add the second method
            operations += Multiply;     // Add the third method

            Console.WriteLine("Invoking the multicast delegate:");
            operations(10, 5); // Invoke the delegate

            // Removing a method from the invocation list
            operations -= Subtract;

            Console.WriteLine("\nAfter removing Subtract:");
            operations(10, 5); // Invoke the delegate again
            Console.ReadKey();
        }
    }
}
```

Output:



```
Invoking the multicast delegate:
Addition: 15
Subtraction: 5
Multiplication: 50

After removing Subtract:
Addition: 15
Multiplication: 50
```

Delegates Vs Interface in C#

☞ The difference between delegates and interface are as follows:

DELEGATE	INTERFACE
It could be a method only	It contains both methods and parameters.
It can be applied to one method at a time	If a class implements an interface, then it will implement all the methods related to that interface.
If a delegate available in your scope you can use it.	Interface is used when your class implements that interface, otherwise not.
Delegate can be implemented any number of time.	Interface can be implemented only one time.
It is used to handle event.	It is not used to handle event.
When you access the method using delegates you do not require any access to the object of the class where the method is defined.	When you access the method you need the object of the class which implemented an interface.
It does not support inheritance	It supports inheritance.
It created at run time.	It created at compile time.
It can implement any method that provides the same signature with the given delegate.	It the method of interface implemented, then the same name and signature method override.
It can wrap any method whose signature is similar to the delegate and does not consider which from class it belongs.	A class can implement any number of interfaces, but can only override those methods which belongs to the interfaces.

EVENTS

➢ Events are user actions such as key press, clicks, mouse movements, etc., or some occurrence such as system generated notifications.

➢ Applications need to respond to events when they occur. For example, interrupts. Events are used for inter-process communication.

➢ The class that sends or raises an event is called a **publisher** and a class that receives or handle the event is called "**Subscriber**".

➢ Following are the key points about Event,

- ❖ Event handler in C# return void and take two parameters.
- ❖ The first parameter of Event- Source of Event means publishing object.
- ❖ The second parameters of Event- Object derived from EventArgs.

- ❖ The publishers determines when an event is raised and the subscribe determines what action is taken in response.
- ❖ An event can have so many subscribers.
- ❖ Events are basically used for the single user action like button click.
- ❖ If an Event has multiple subscribers then event handlers are invoked synchronously.

How to declaring Events

- ☞ To declare an event inside a class, first of all, you must declare a delegate type for the even as:

  public delegate string MyDelegate(string str);

then, declare the event using the **event** keyword –

event MyDelegate delg;

The preceding code defines a delegate named **MyDelegate** and an event named **delg,** which invokes the delegate when it is raised.

- ☞ To declare an event inside a class, first a delegate type for the Event must be declared like below:

  public delegate void MyEventHandler(**object** sender, EventArgs e);

Defining an event is a two-step process.

- ❖ First you need to defining a delegate type that will hold the list of methods to be called when the event is fired.
- ❖ Next, you declare an event using the event keyword.

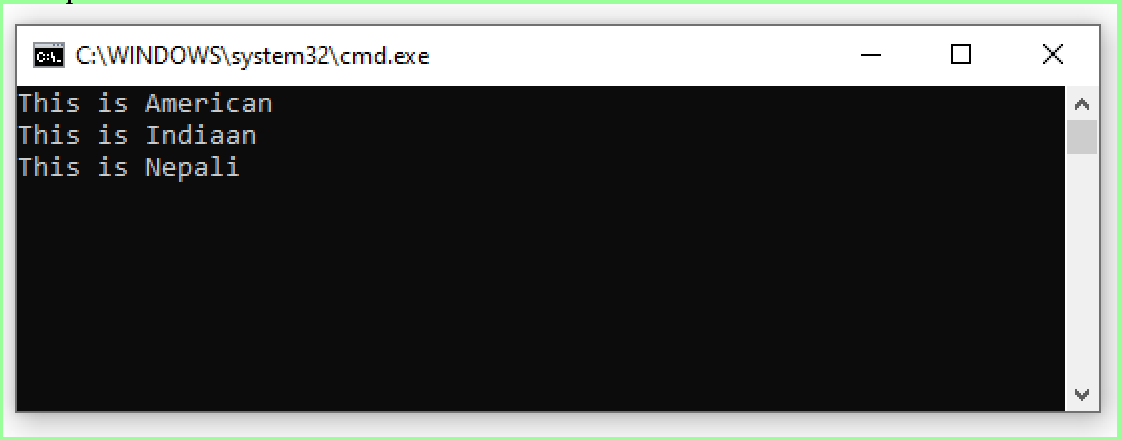
Example:

Example program to demonstrate an event to add that is associated to a single delegate **DelEventHandler**.

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

namespace Events
{
    public delegate void DelEventHandler();//Declaration of delegate
    internal class Program
    {
        public static event DelEventHandler add;//Event declaration
        static void USA()
        {
            Console.WriteLine("This is American");
        }
        static void NEPAL()
        {
            Console.WriteLine("This is Nepali");

        }
        static void INDIA()
        {
            Console.WriteLine("This is Indiaan");

        }
        static void Main(string[] args)
        {
            add += new DelEventHandler(USA);//subscribe
            add += new DelEventHandler(INDIA);
            add += new DelEventHandler(NEPAL);
            add.Invoke();
            Console.ReadKey();



        }
    }
}
```

Note: You can just subscribe or unsubscribe the event by += or -= operators and nothing else.

Out put:

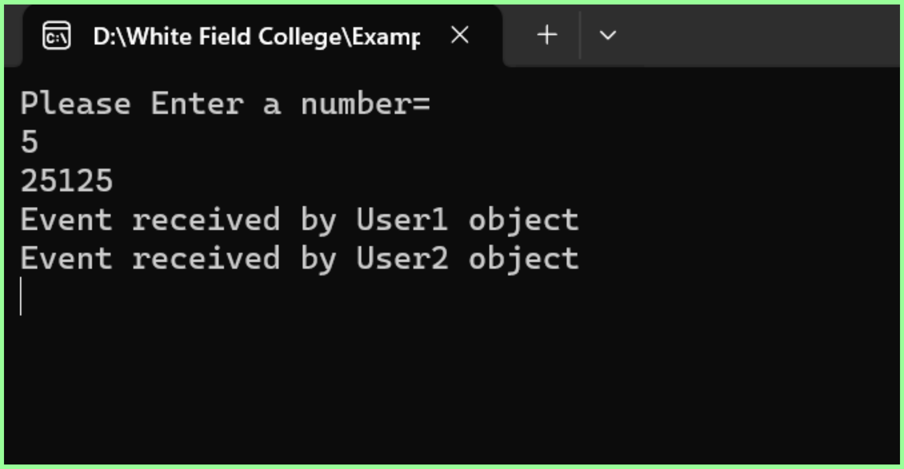


```
This is American
This is Indiaan
This is Nepali
```

Example-2

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

namespace DelegateEvent
{
    public delegate void Transformer(int x);
    internal class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("Please Enter a number=");
            int i = int.Parse(Console.ReadLine());
            Transformer t; //Create instance
            t = Square;//point to the function
            t += Cuber;//two methods till now
            t.Invoke(i);//invoking the delegate
            NotificationofMethods obj = new NotificationofMethods();
            obj.transformerEvent += User1.Xhandler;
            obj.transformerEvent += User2.Yhandler;
            obj.NotifyOnCell(i);

            Console.ReadKey();
        }
        static void Square(int x)
        {
            Console.Write(x * x);
        }
        static void Cuber(int x)
        {
            Console.WriteLine(x * x * x);
        }

    }
    class NotificationofMethods
    {
        public event Transformer transformerEvent;
        public void NotifyOnCell(int x)
        {
            if(transformerEvent != null)
            {
                transformerEvent(x);
            }
        }
    }
    class User1
    {
        public static void Xhandler(int x)
        {
            Console.WriteLine("Event received by User1 object");
        }
    }
    class User2
    {
        public static void Yhandler(int x)
        {
            Console.WriteLine("Event received by User2 object");
        }
    }
}
```

Output:



```
Please Enter a number=
5
25125
Event received by User1 object
Event received by User2 object
```

Anonymous Method in C#

- An anonymous method is a method which doesn't contain any name which is introduced in C# 2.0.
- It is useful when the user wants to create an **inline method** and also wants to pass parameter in the anonymous method like other method.
- An anonymous method is defined using the delegate keyword and the user can assign this method to a variable of the delegate type.

  Syntax:

  ```
  delegate(parameter_list)
  {
          //code here
  };
  ```

Important Features of Anonymous Method

- Anonymous method can be defined using the delegate keyword
- Anonymous method must be assigned to a delegate.
- Anonymous method can access outer variables or functions.
- Anonymous method can be passed as a parameter.
- Anonymous method can be used as event handlers.

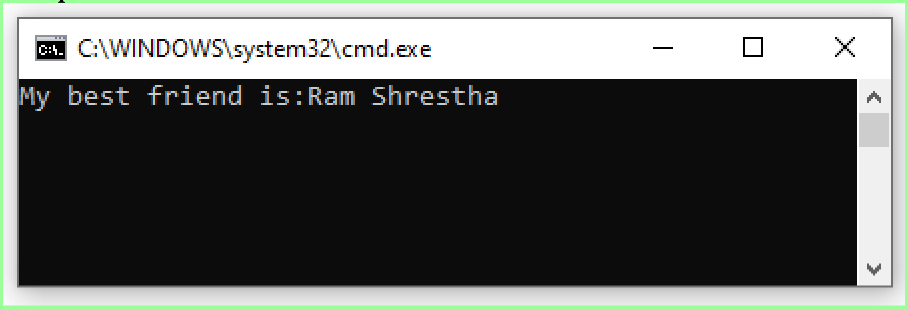
Example-1:

Example program to demonstrate anonymous method in C#.

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

namespace Anonymous
{
```

```
    internal class Program
    {
        public delegate void Besite(string name);
        static void Main(string[] args)
        {
            Besite best = delegate (string name)
            {
                Console.WriteLine("My best friend is:{0}",name);

            };
            best("Ram Shrestha");//anonymous method
            Console.ReadKey();



        }
    }
}
```

Output:

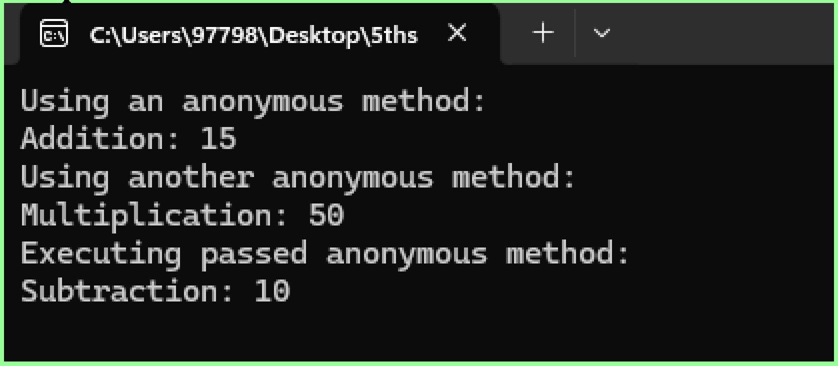


```
C:\WINDOWS\system32\cmd.exe
My best friend is:Ram Shrestha
```

Example-2

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

namespace AnonymousMethodExample
{
    // Define a delegate
    public delegate void Operation(int x, int y);

    class Program
    {
        static void Main(string[] args)
        {
            // Using an anonymous method
            Operation operation = delegate (int x, int y)
            {
                Console.WriteLine($"Addition: {x + y}");
            };

            // Invoke the delegate
            Console.WriteLine("Using an anonymous method:");
            operation(10, 5);

            // Assigning another anonymous method
            operation = delegate (int x, int y)
            {
                Console.WriteLine($"Multiplication: {x * y}");
            };

            // Invoke the updated delegate
            Console.WriteLine("Using another anonymous method:");
            operation(10, 5);

            // Passing an anonymous method to another method
            ExecuteOperation(20, 10, delegate (int a, int b)
            {
                Console.WriteLine($"Subtraction: {a - b}");
            });
            Console.ReadKey();
        }

        // Method that accepts a delegate as a parameter
        public static void ExecuteOperation(int x, int y, Operation op)
        {
            Console.WriteLine("Executing passed anonymous method:");
            op(x, y);
        }
    }
}
```

Output:



```
Using an anonymous method:
Addition: 15
Using another anonymous method:
Multiplication: 50
Executing passed anonymous method:
Subtraction: 10
```

LAMBDA EXPRESSIONS

☞ Lambda expression in C# are used like anonymous functions, with the difference that in Lambda expressions you don't need to specify the type of the value that you input thus making it more flexible to use.

☞ **The '=>' is the lambda operator which is used in all lambda expressions.** The Lambda expression is divided into two parts, the left side is the input and the right is the expression.

☞ The Lambda Expressions can be of two types:

- ❖ **Expression Lambda:** Consists of the input and the expression.
  Syntax:

Input=>expression;

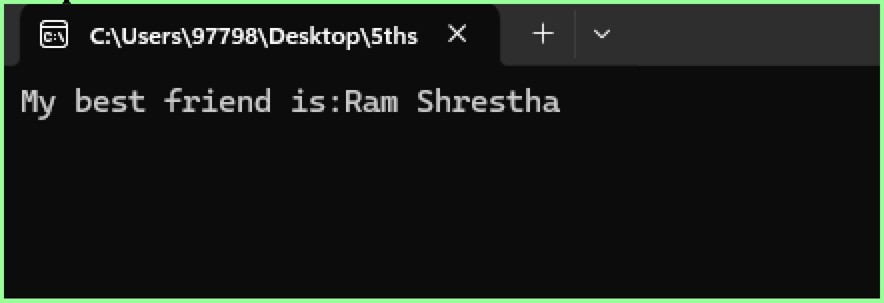
- **Statement Lambda:** Consists of the input and a set of statements to be executed. It can be used along the delegates.

  Syntax:
  Input =>{statements};

Example-1:

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

namespace Anonymous
{
    internal class Program
    {
        public delegate void Besite(string name);
        static void Main(string[] args)
        {
            // Using a lambda expression
            Besite best = (name) => Console.WriteLine("My best friend is:{0}",
name);

            // Invoke the delegate
            best("Ram Shrestha");

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

Output:

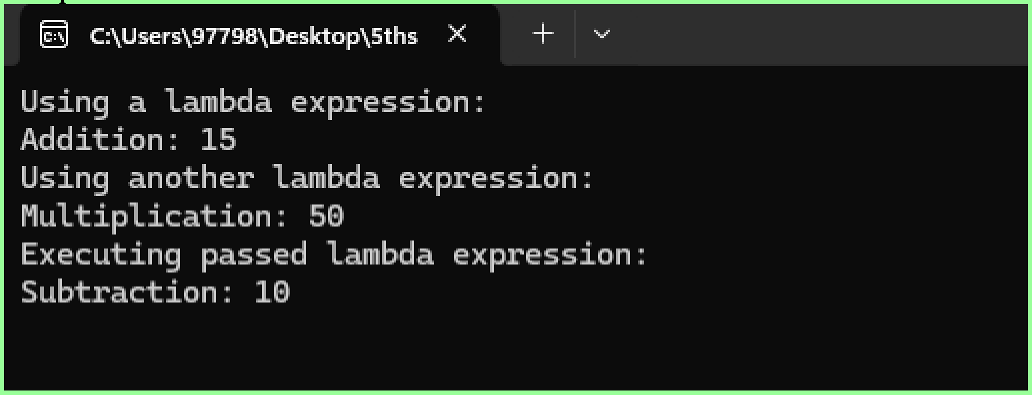


```
My best friend is:Ram Shrestha
```

Example-2

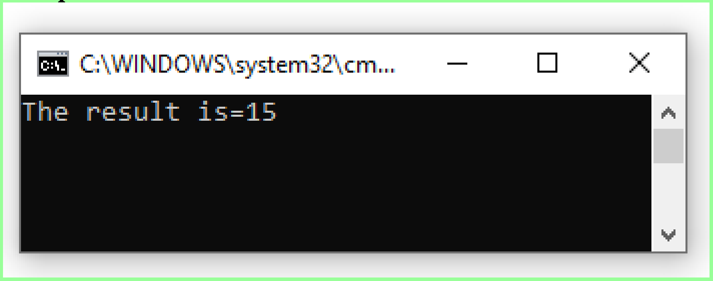
```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace LambdaExpressionExample
{
    // Define a delegate
    public delegate void Operation(int x, int y);

    class Program
    {
        static void Main(string[] args)
        {
            // Using a lambda expression for addition
            Operation operation = (x, y) => Console.WriteLine($"Addition: {x + y}");

            // Invoke the delegate
            Console.WriteLine("Using a lambda expression:");
            operation(10, 5);

            // Using another lambda expression for multiplication
            operation = (x, y) => Console.WriteLine($"Multiplication: {x * y}");

            // Invoke the updated delegate
            Console.WriteLine("Using another lambda expression:");
            operation(10, 5);

            // Passing a lambda expression to another method
            ExecuteOperation(20, 10, (a, b) => Console.WriteLine($"Subtraction: {a -
b}"));

            Console.ReadKey();
        }

        // Method that accepts a delegate as a parameter
        public static void ExecuteOperation(int x, int y, Operation op)
        {
            Console.WriteLine("Executing passed lambda expression:");
            op(x, y);
        }
    }
}
```

Output:



```
Using a lambda expression:
Addition: 15
Using another lambda expression:
Multiplication: 50
Executing passed lambda expression:
Subtraction: 10
```

Example:
Example program to demonstrate lambda expression.
```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace Lambda
{

    internal class LambdaTest
    {
        static int test1() => 5;
        static int test2(int x) => x + 10;
        static void Main(string[] args)
        {
            int x = test1();
            int res = test2(x);
            Console.WriteLine("The result is=" + res);
            Console.ReadKey();



        }
    }
}
```

Output:


```
The result is=15
```

EXCEPTION HANDLING

- An exception is a problem that arises during the execution of a program.
- A C# exception is a response to an exceptional circumstance that arises while a program is running, such as an attempt to divide by zero.
- Exceptions provide a way to transfer control from one part of a program to another. C# exception handling is built upon four keywords: **try, catch, finally and throw.**
    - **try:** A try block identifies a block of code for which particular exception is activated. It is followed by one or more catch blocks.
    - **catch:** A program catches an exception with an exception handler at the place in a program where you want to handle the problem. The catch keyword indicates the catching of an exception.

- ❖ **finally:** The finally block is used to execute a given set of statements, whether an exception is thrown or not thrown.
- ❖ **throw:** A program throws an exception when a problem shows up. This is done using **throw** keyword.

Exception Class in C#

- ☞ The exception classes in C# are mainly directly or indirectly derived from the **System.Exception** class. Some of the exception classes derived from the System.Exception class are the System.ApplicationException and System.SystemException classes.
- ☞ The System.ApplicationException class supports exception generated by application programs. Hence the exceptions defined by the programmers should derived from this class.
- ☞ The System.SystemException class is the base class for all predefined system exception.
- ☞ Some predefined exception classes derived from the System.SystemException class are:

SN	**Exception Class**	**Description**
1	**System.IO.IOException**	It is used to handle I/O error
2	**System.IndexOutOfRangeException**	It is used to handles error generated when method refers to an array index out of range.
3	**System.ArrayTypeMismatchException**	It is used to handle errors generated when type is mismatched with the array type.
4	**System.NullReferenceException**	It handles errors generated from referencing a null object.
5	**System.DivideByZeroException**	It is used to handles error generated from dividing a dividend with zero.
6	**System.InvalidCastException**	It is used to handle errors generated during typecasting.
7	**System.OutOfMemoryException**	It is used to handles errors generated from insufficient free memory.
8	**System.StackOverflowException**	It is used to handle errors generated from stack overflow.

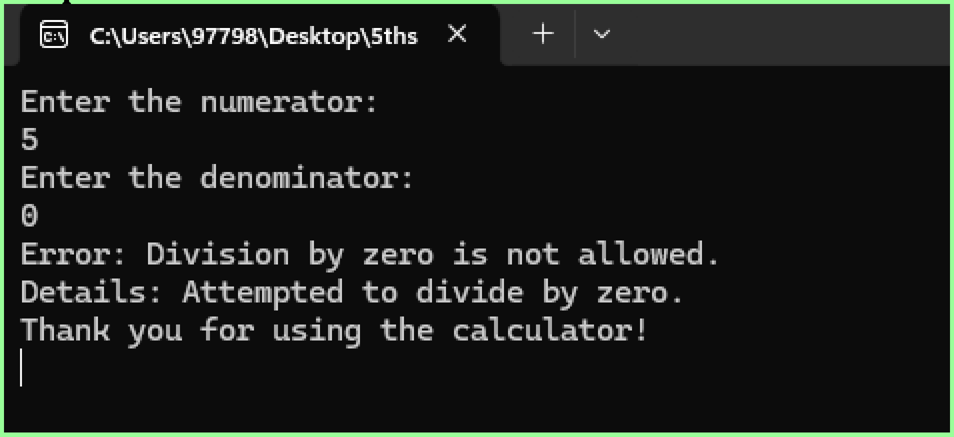
Syntax for exception handling

```
try
{
        //exception may get thrown within execution of this block.
}
catch(ExceptionA ex)
{
     //handling exception of type ExceptionA
}
catch(ExceptionB ex)
{
      //handle exception of type ExceptionB
}
finally
{
   //clean up code

}
```

Exmple-1:

```csharp
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace ExceptionHandlingExample
{
    class Program
    {
        static void Main(string[] args)
        {
            try
            {
                Console.WriteLine("Enter the numerator:");
                int numerator = int.Parse(Console.ReadLine());

                Console.WriteLine("Enter the denominator:");
                int denominator = int.Parse(Console.ReadLine());

                // Attempt to perform division
                int result = numerator / denominator;

                Console.WriteLine($"Result: {result}");
            }
            catch (DivideByZeroException ex)
            {
                // Handle divide by zero exception
                Console.WriteLine("Error: Division by zero is not allowed.");
                Console.WriteLine($"Details: {ex.Message}");
            }
            catch (FormatException ex)
            {
                // Handle invalid input format
                Console.WriteLine("Error: Please enter a valid integer.");
                Console.WriteLine($"Details: {ex.Message}");
            }
            catch (Exception ex)
            {
                // Handle any other exceptions
                Console.WriteLine("An unexpected error occurred.");
                Console.WriteLine($"Details: {ex.Message}");
            }
            finally
            {
                // Execute code regardless of an exception
                Console.WriteLine("Thank you for using the calculator!");
            }

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

Output:

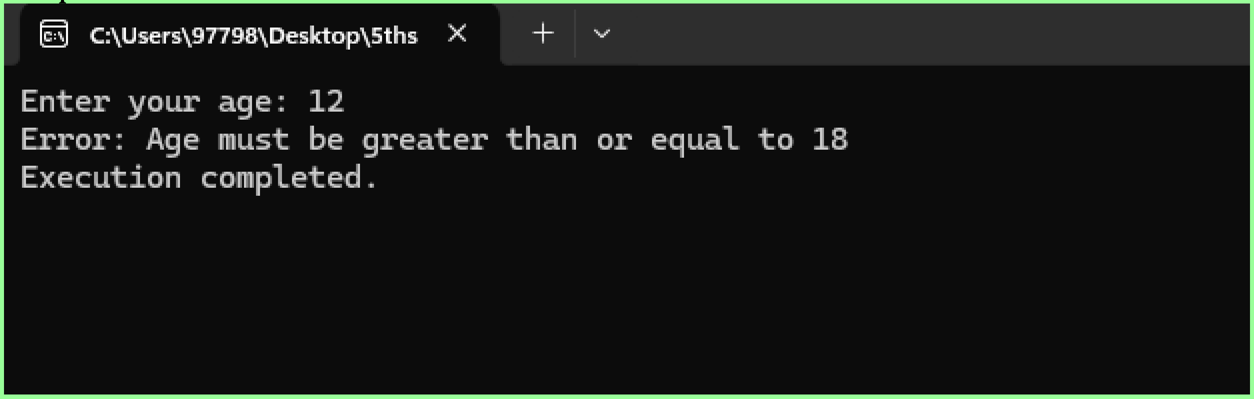

C:\Users\97798\Desktop\5ths

```
Enter the numerator:
5
Enter the denominator:
0
Error: Division by zero is not allowed.
Details: Attempted to divide by zero.
Thank you for using the calculator!
```

Example: Example program to demonstrate user defined exception class.

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



namespace UserDefinedException
{
    //Create a user-defined exception class
    public class InvalidAgeException : Exception
    {
        public InvalidAgeException(string message) : base(message)
        {
        }
    }

    class Program
    {
        static void ValidateAge(int age)
        {
            // Throw user-defined exception if age is invalid
            if (age < 18)
            {
                throw new InvalidAgeException("Age must be greater than or equal to 
18");
            }
            Console.WriteLine("Age is valid. Proceeding...");
        }

        static void Main(string[] args)
        {
            try
            {
                Console.Write("Enter your age: ");
                int age = int.Parse(Console.ReadLine());
                ValidateAge(age); // Call validation method
            }
            catch (InvalidAgeException ex)
            {
                // Handle the user-defined exception
                Console.WriteLine($"Error: {ex.Message}");
            }
            catch (FormatException)
            {
                // Handle invalid input format
                Console.WriteLine("Error: Please enter a valid numeric age.");
            }
            finally
            {
                Console.WriteLine("Execution completed.");
            }
            Console.ReadKey();
        }
    }
}
```

Output:

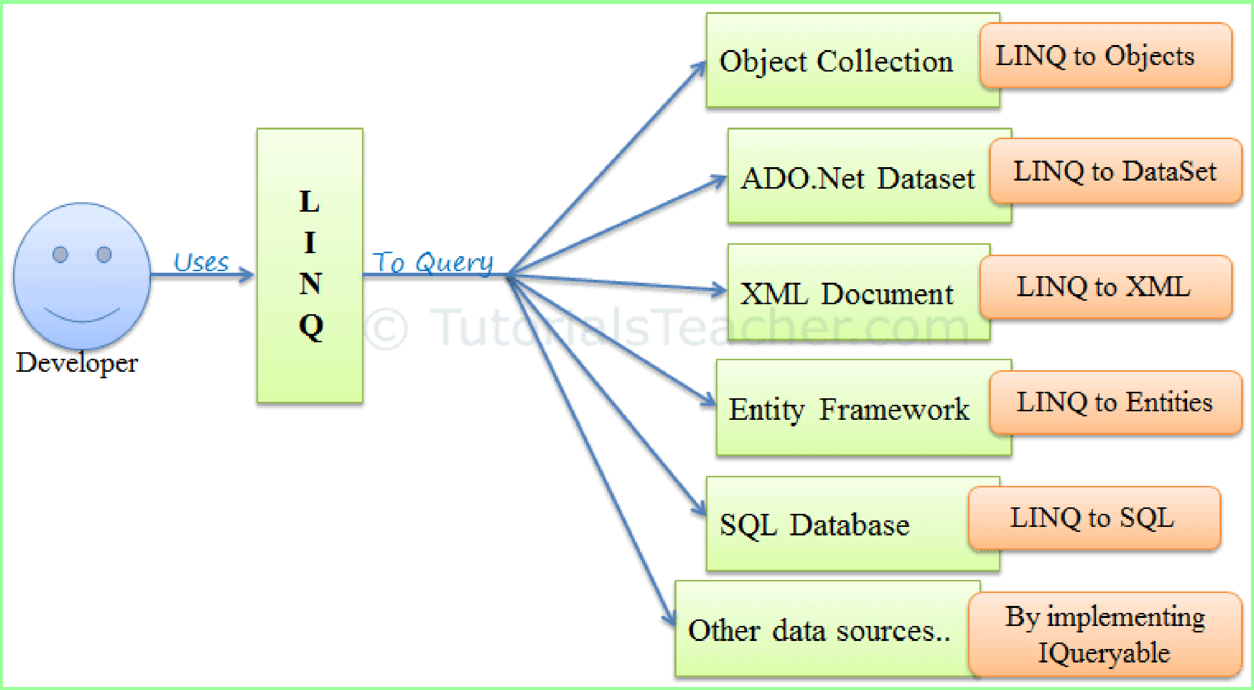


C:\Users\97798\Desktop\5ths

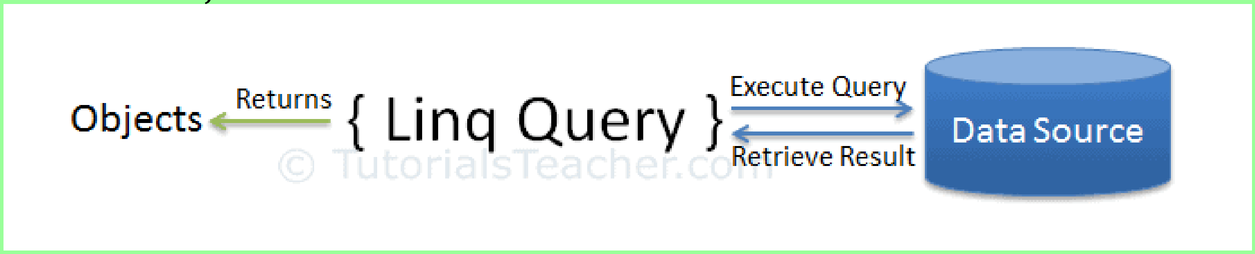
```
Enter your age: 12
Error: Age must be greater than or equal to 18
Execution completed.
```

INTRODUCTION TO LINQUE

- LINQ stands for Language Integrated Query Language.
- LINQ introduced in .NET 3.0 as a major part of .Net Framework 3.5 in 2007.
- LINQ in C# is used to work with data access from data sources such as objects, data set, SQL Server, and XML etc.
- LINQ is a data querying API with SQL like query syntaxes.
- Microsoft's query language is fully integrated and offers easy data access from in-memory objects, collections, database, XML documents and many more.
- LINQ allows writing queries even without the knowledge of query language like SQL, XML etc.
- It is through a set of extensions, LINQ ably integrates queries in C# and Visual Basic.
- LINQ provides function to query cached data from all kinds of data source.
- The data source could be a collection of objects, database or XML files.
- There are four standard query operators in LINQ. i.e. FROM, SELECT, WHERE, ORDER BY.
- It enables you to query the data from the various data source like SQL databases, XML documents, ADO.NET Datasets, Web Services, any other objects such as collections, Generics etc.



☞ LINQ queries return results as objects. It enables you to uses object-oriented approach on the result set and not to worry about transforming different formats of results into objects.



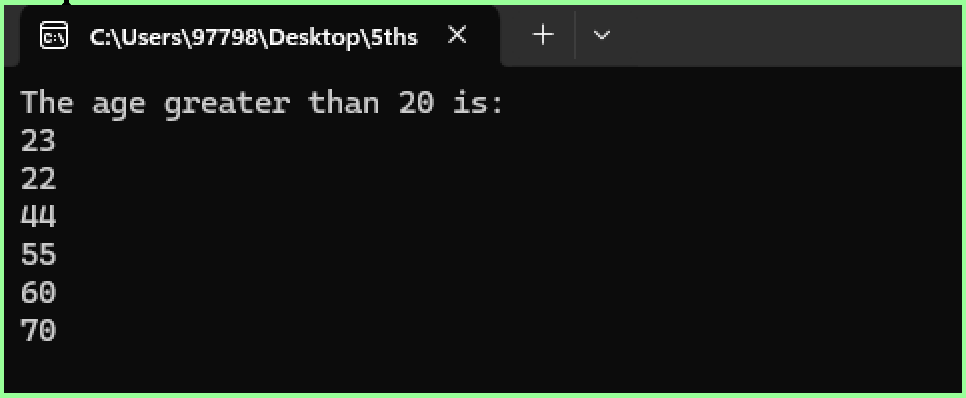
❖ **From point of view of SQL**
SELECT * FROM table_name WHERE age>20

❖ **From point of view of LINQ**
FROM i in age WHERE i>20 SELECT i

Example: Example program to demonstrate LINQ operation with help of data collection.

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

namespace LINQ_Demo
{
    internal class Program
    {
        static void Main(string[] args)
        {
            int[] age = { 15, 20, 23, 22, 44, 55, 60, 70 };
            var a = from i in age where i > 20 select i;
            Console.WriteLine("The age greater than 20 is:");
            foreach (int item in a)
            {
                Console.WriteLine(item);
            }
            Console.ReadKey();
        }
    }
}
```

Output:

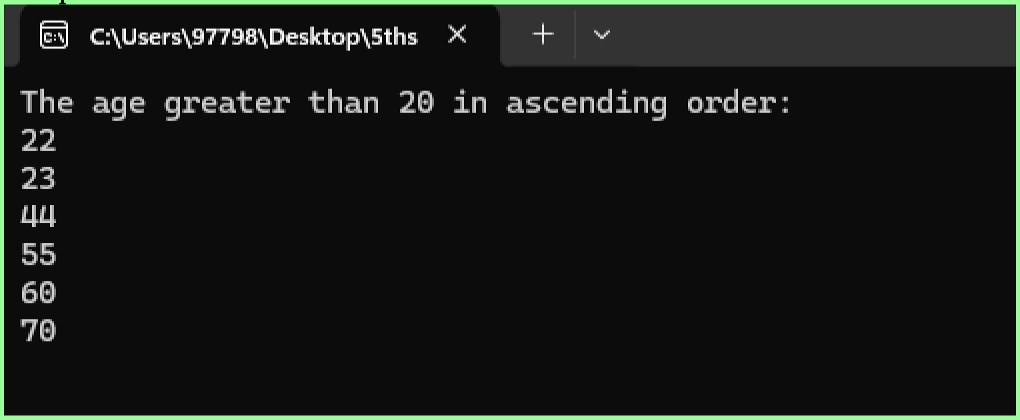


```
The age greater than 20 is:
23
22
44
55
60
70
```

❖ **Orderby Age in ascending order**

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

namespace LINQ_Demo
{
    internal class Program
    {
        static void Main(string[] args)
        {
            int[] age = { 15, 20, 23, 22, 44, 55, 60, 70 };
            var a = from i in age where i > 20 orderby i select i;
            Console.WriteLine("The age greater than 20 in ascending order:");
            foreach (int item in a)
            {
                Console.WriteLine(item);
            }
            Console.ReadKey();
        }
    }
}
```

Output:

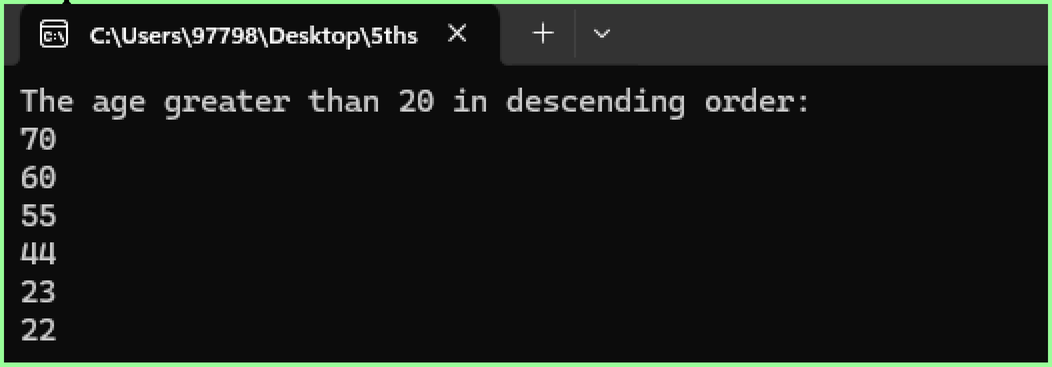


```
The age greater than 20 in ascending order:
22
23
44
55
60
70
```

❖ **Orderby age in descending order**

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

namespace LINQ_Demo
{
    internal class Program
    {
        static void Main(string[] args)
        {
            int[] age = { 15, 20, 23, 22, 44, 55, 60, 70 };
            var a = from i in age where i > 20 orderby i descending select i;
            Console.WriteLine("The age greater than 20 in descending order:");
            foreach (int item in a)
            {
                Console.WriteLine(item);
            }
            Console.ReadKey();
        }
    }
}
```

Output:

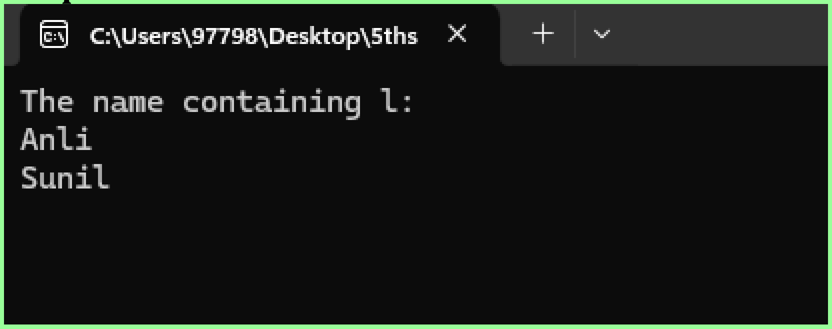


```
The age greater than 20 in descending order:
70
60
55
44
23
22
```

❖ LINQ in String

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

namespace LINQ_Demo
{
    internal class Program
    {
        static void Main(string[] args)
        {

            string[] names = { "Anli", "Sunil", "Ram", "Hari", "Binod" };
            var a = from name in names where name.Contains("l") select name;
            Console.WriteLine("The name containing l:");
            foreach (string item in a)
            {
                Console.WriteLine(item);
            }
            Console.ReadKey();
        }
    }
}
```

Output:

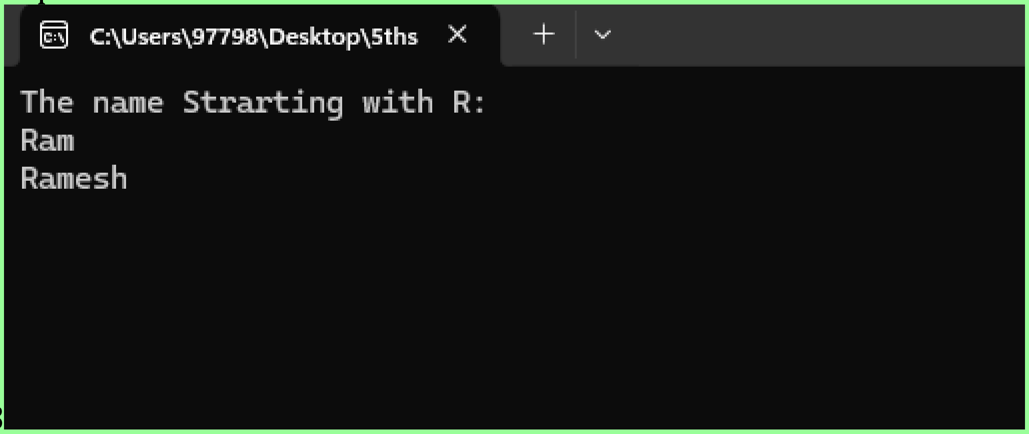


```
The name containing l:
Anli
Sunil
```

Example: String starting with R.

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

namespace LINQ_Demo
{
    internal class Program
    {
        static void Main(string[] args)
        {

            string[] names = { "Anli", "Sunil", "Ram", "Hari", "Binod","Ramesh" };
            var a = from name in names where name.StartsWith("R") select name;
            Console.WriteLine("The name Strarting with R:");
            foreach (string item in a)
            {
                Console.WriteLine(item);
            }
            Console.ReadKey();
        }
    }
}
```

Output:



```
The name Strarting with R:
Ram
Ramesh
```

B

❖ LINQ to SQL in C#

- It is a query language used in C# programming language, introduced in Dot Net Framework 3.0.
- It is used for working with relational database management system e.g. SQL-Server.
- But when we talk about LINQ To Entities then we can use different relational database management system like SQL Server, Oracle and so on.
- It is not just only about querying the data but it also allows us to perform CRUD Operations like insert, update, delete and read operations from database.
  C-Create-INSERT
  R-Read-SELECT
  U-Update-UPDATE
  D-Delete-DELETE
- By using LINQ TO SQL we can also work with stored procedures.
- We have already a concept of ADO.NET by which we can interact with SQL Server with the help of ADO.NET.

USING ADO.NET WITH SQL SERVER

1. SQL queries are checked during run time.

- ✍ Your SQL query defined by ADO.NET's SqlCommand is executed by Sql Server Database Engine not by C# compiler.
- ✍ When we writing SQL Queries using ADO.NET you might have noted that we write queries in double quotes. It means we have write them as a string.
- ✍ Strings are not compiled by C#, that string is sent to database engine and executed by that SQL server database engine.
- ✍ Then database engine is going to verify that query is right or wrong, if query is wrong it will raise exception because exceptions are raised during run time.
- ✍ As C# developer, it is not a best practice to put the extra burden to database engine.

2. LINQ Queries are checked during compile time.

- ✍ LINQ Queries are not compiled by database engine, it is compiled by C# because LINQ is integrated in C#.
- ✍ LINQ Queries are executed and verified by LINQ query engine which is provided in our Dot Net Framework.
- ✍ LINQ is purely defined in our Dot Net language like C# or VB. Net, it means you write LINQ queries in C# syntax.
- ✍ It means LINQ queries are compiled in native language of a developer like C# or VB .Net.

How to implement LINQ to SQL

- ✍ There are three steps to implement LINQ to SQL in windows.
  1. We have to perform ORM by adding OR Designer.
  2. We have to add a reference i.e **System.Data.Linq**
  3. We have to write the **connection string** into the configuration

☞ The following example demonstrates a simple LINQ query that gets all strings from an array which contains 'a'.

Example: LINQ Query to Array

```
// Data source
string[] names = {"Bill", "Steve", "James", "Mohan" };

// LINQ Query
var myLinqQuery = from name in names
            where name.Contains('a')
            select name;

// Query execution
```

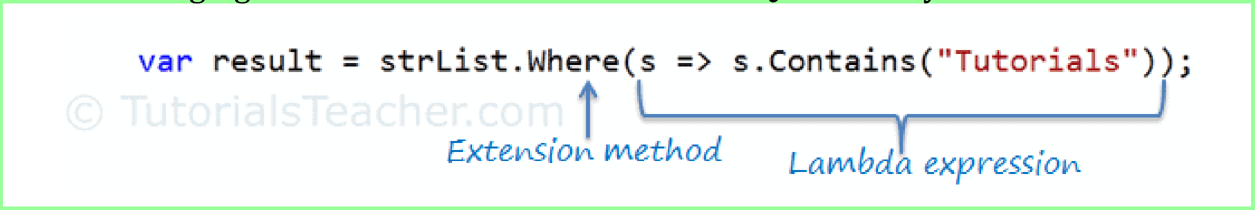
```
foreach(var name in myLinqQuery)
   Console.Write(name + " ");
```

LINQ Method

☞ The following is a sample LINQ method syntax query that returns a collection of strings which contains a word "Tutorials". We use lambda expression for this purpose.

```
Example: LINQ Method Syntax in C#
// string collection
IList<string> stringList = new List<string>() {
   "C# Tutorials",
   "VB.NET Tutorials",
   "Learn C++",
   "MVC Tutorials" ,
   "Java"
};

// LINQ Method Syntax
var result = stringList.Where(s => s.Contains("Tutorials"));
```

The following figure illustrates the structure of LINQ method syntax.



```
var result = strList.Where(s => s.Contains("Tutorials"));
```

FORM HANDLING

☞ A form is a section of an HTML document where you put user-input controls, like text boxes, check boxes, radio buttons, and pull-down lists. You use forms when you want to collect and process user input.

☞ ASP.NET provides important feature event handling to Web Forms. It let us to implement event-based model for our application. As a simple example, we can add a button to an ASP.NET Web Forms page and then write an event handler for the button's click event. ASP.NET Web Forms allows events on both client and server sides.

☞ In ASP.NET Web Forms pages, however, events associated with server controls originate on the client but are handled on the Web server by the ASP.NET.

☞ ASP.NET Web Forms follow a standard .NET Framework pattern for event-handler methods. All events pass two arguments: an object representing the object that raised the event, and an event object containing any event-specific information.

ASP.Net Web Form Features

- ☞ ASP.NET has multiple features and provides many tools to create and develop web applications. Here are some of the features of web forms:
  i. Server Controls
  ii. Master Pages
  iii. Working with data
  iv. Membership
  v. Client Script and Client Frameworks
  vi. Routing
  vii. State Management
  viii. Security
  ix. Performance
  x. Error Handling

i. Server Control

- ☞ It provides a vast set of server controls. These controls are like objects, and they run when they are requested and rendered to the browser. Some web pages are similar to HTML elements like text-box, button, checkbox, and hyperlink.

ii. Master Pages

- ☞ Mater Pages is responsible for the consistent layout of our web applications. It gives a proper appearance and standard to different pages.

iii. Routing

- ☞ URL routing can be configured to a web application. A request URL is a URL that a user enters in a browser to browse in a specific place.

iv. Security

- ☞ Security always plays a crucial role in software development. ASP.NET provides different configuration options and extensibility points to make our systems more secure.

ASP .NET FORM LABEL

- ☞ This control is used to display textual information on the web forms.
- ☞ It is mainly used to create caption for the other controls like: textbox.
- ☞ This is server side control, asp provides own tag to create label.
  Example:
  <asp: labelID = “label1” runat= “server” Text = “label1”></asp: label>

Property	Description
Access Key	It is used to set a keyboard shortcut for the label.

Tab Index	The tab order of the control.
Back Color	It is used to set the background color of the label.
Border Color	It is used to set border color of the label.
Border width	It is used to set the width of the border of the label.
Font	It is used to set the font for the label text.
Fore Color	It is used to set the color of the label text.
Text	It is used to set text to be shown for the label.
ToolTip	It displays the text when the mouse is over the label.
Visible	To set the visibility of control on the form
Height	It is used to set the height of the control.
Width	It is used to set the width of the control.

ASP .Net WEB FORM TEXTBOX

- ☞ This is an input control which is used to take user input.
- ☞ To create a textbox either we can write a code or use the drag and drop facility of visual studio IDE.
- ☞ This is server side control, run asp provides own tag to create it.

<asp:TextBoxID= “TextBox1” runat= “server”></asp:TextBox>

Property	Description
Access Key	It is used to set keyboard shortcut for the control.
Tab Index	The tab order of the control.
Back Color	It is used to set the background color of the control.
Border Color	It is used to set the border color of the control.
Border Width	It is used to set width of border of the control.
Font	It is used to set font for the control text.
Fore Color	It is used to set color of the control.
Text	It is used to set text to be shown for the control.
ToolTip	It displays the text when mouse is over the control.
Visible	To set the visibility of control on the form.
Height	It is used to set height of the control.
Width	It is used to set width of the control
Max length	It is used to set maximum number of characters that can be entered.
Read Only	It is used to make control read only.

ASP .NET DROP DOWN LIST

- ☞ The DropDownList is a web server control which is used to create an HTML Select component.
- ☞ It allows us to select an option from the dropdown list.
- ☞ It can contain any number of items ASP.Net provides a tag to crate DropDownList for web application.

Example:

```
<asp:DropDownlist id= “DropDownlist1” runat = “server” DataSource = “<%
databindingexpression %>”

DataTextField = “DataSourceField”

DataValueField = “DataSourceField”

AutoPostBack = “True | False”

OnSelectedIndexChanged = “OnSelectedIndexChangedMethod”>

<asp: ListItem Value = “value” selected = “True | False”>

Text

</asp: ListItem>

</asp: DropDownList>
```

CODE:

```
protected void Button1_click(object sender, EventArgs e)

{

        if(DropDownlist1.SelectedValue == “ ”)

        {

                Label1.Text = “Please Select a City”;

        }

        else

        {

                Label1.Text = “ Your Choice is:” + DropDownList1.SelectedValue;

        }

}
```

ASP .NET WEB FORMS RADIO BUTTON

- ☞ It is an input control which is used to take input from the user. It allows user to select a choice from the group of choices.

<asp: RadioButtonID = "RadioButton1" runat = "server" Text = "Male" GroupName = "Gender"/>

Property	Description
Access key	It is used to set a keyboard shortcut for the control.
TabIndex	It is used to set Tab order of the control.
BackColor	It is used to set the background color of the control.
BorderColor	It is used to set the border color of the control.
BorderWidth	It is used to set the width of the border of the control.
Font	It is used to set the font for the control text.
ForeColor	It is used to set the color of the control text.
Text	It is used to set text to be shown for the control.
ToolTip	It display the text when the mouse is over the control.
Visible	To set visibility of control on the form.
Height	It is used to set the height of the control.
Width	It is used to set the width of the control.
GroupName	It is used to set the name of the radio button group.

FORM CHECKBOX

- ☞ Form CheckBox is used to get multiple inputs from the user.
- ☞ It allows user to select choices from the set of choices.
- ☞ It takes user input in yes or no format.
- ☞ It is useful when we want multiple choices from the user.

Property	Description
Access Key	It is used to set a keyboard shortcut for the control.
Tab Index	The tab order of the control
Back Color	It is used to set the background color of the control.
Border Color	It is used to set the border color of the control.
Border Width	It is used to set the border width of the control
Font	It is used to set the font for the control text.
Fore Color	It is used to set the color of the control text.
Text	It is used to set text to be shown for the control.
ToolTip	It displays the text when the mouse is over the control

Visible	To set visibility of control on the form
Height	It is used to set height of the control
Width	It is used to set width of the control.
Checked	It is used to set check state of the control either true or false.

Example:

<asp: checkbox ID = “CheckBox1” runat = “server” Text = “MVC” />

<asp: checkbox ID = “CheckBox2” runat = “server” Text = “CORE” />

<asp: checkbox ID = “CheckBox3” runat = “server” Text = “ASP.NET” />

ASP .NET FORM BOTTON

- ☞ This control is used to perform events. It is also used to submit client request to the server.

Property	Descriptions
Access Key	It is used to set a keyboard shortcut for the control.
Tab Index	It is used to set Tab order of the control.
Back Color	It is used to set the background color of the control.
Border Color	It is used to set the background color of the control.
Border Width	It is used to set the width of the border of the control.
Font	It is used to set the font for the control text.
Fore Color	It is used to set the color of the control text.
Text	It is used to set text to be shown for the control.
ToolTip	It displays the text when the mouse is over the control.
Visible	To set visibility of control on the form.
Height	It is used to set the height of the control.
Width	It is used to set the width of the control.

Example:

<asp: ButtonID = “Button1” runat= “server” Text = “Submit” BorderStyle = “Solid” ToolTip = “Submit”/>

<asp: Button ID = “Button1” runat = “server” Text = “Click here” OnClick = “Button1_Click”/>

VALIDATION CONTROL IN ASP.NET

- ☞ ASP.NET validation controls validate the user input data to ensure that useless, unauthenticated, or contradictory data don't get stored.

- ☞ ASP.NET provides a set of validation controls that provide an easy to use but powerful way to check for errors and if necessary, display messages to the user.
- ☞ There are six types of validation control in ASP.Net:
- ❖ RequiredFieldValidator
- ❖ RangeValidator
- ❖ CompareValidator
- ❖ RegularExpressionValidator
- ❖ CustomValidator
- ❖ ValidationSummary

Validation Control	**Description**
RequiredFieldValidator	It is used to make a control required.
CompareValidator	It is used to compare the value of an input control against a value of another input control.
RangeValidator	It is used to compare the value of an input control against a value of another input control.
RegularExpressionValidator	It evaluates the value of an input control to determine whether it matches a pattern defined by a regular expression.
CustomValidator	Allows you to write a method to handle the validation of the value entered.
ValidationSummary	It displays a list of all validation errors on the Web page.

Example:

Example program to demonstrate validator

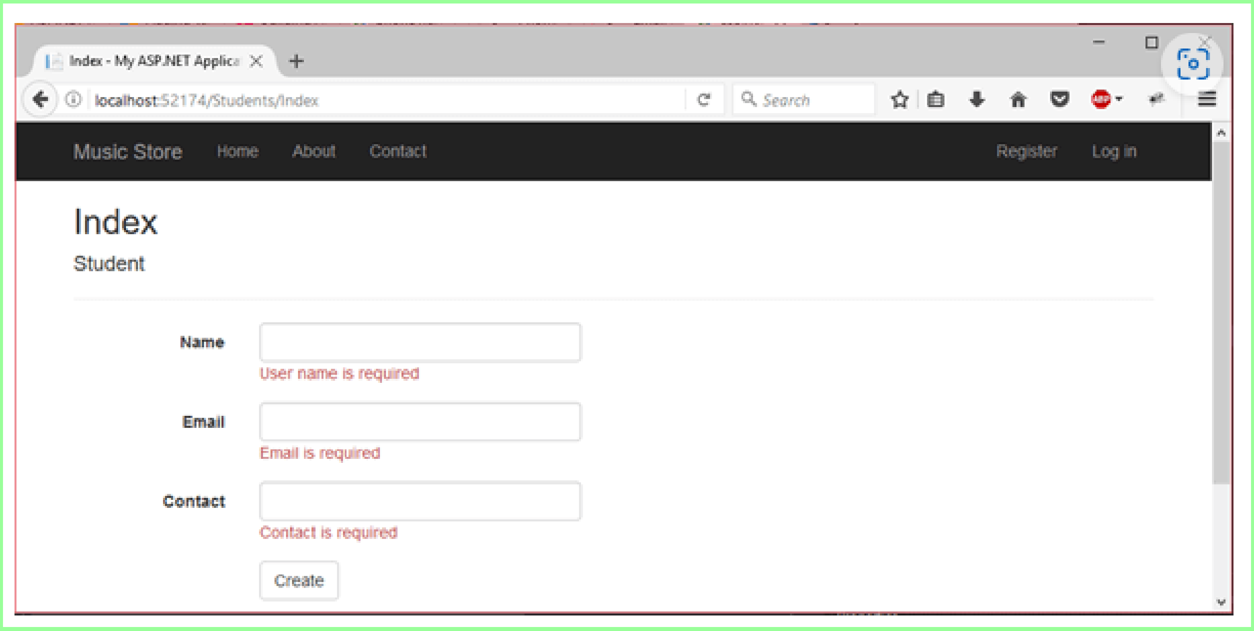
Code:

```
<%@ Page Language="C#" AutoEventWireup="true"
CodeBehind="compare_validator_demo.aspx.cs"

Inherits="asp.netexample.compare_validator_demo" %>

<!DOCTYPE html>
```

```
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
<title></title>
<style type="text/css">
.auto-style1 {
width: 100%;
        }
.auto-style2 {
height: 26px;
        }
.auto-style3 {
height: 26px;
width: 93px;
        }
.auto-style4 {
width: 93px;
        }
</style>
</head>
<body>
<form id="form1" runat="server">
<table class="auto-style1">
<tr>
<td class="auto-style3">
                First value</td>
<td class="auto-style2">
```

```
<asp:TextBox ID="firstval" runat="server" required="true"></asp:TextBox>
</td>
</tr>
<tr>
<td class="auto-style4">
    Second value</td>
<td>
<asp:TextBox ID="secondval" runat="server"></asp:TextBox>
     It should be greater than first value</td>
</tr>
<tr>
<td class="auto-style4"></td>
<td>
<asp:Button ID="Button1" runat="server" Text="save"/>
</td>
</tr>
</table>
< asp:CompareValidator ID="CompareValidator1" runat="server"
ControlToCompare="secondval"
ControlToValidate="firstval" Display="Dynamic" ErrorMessage="Enter valid value"
ForeColor="Red"
Operator="LessThan" Type="Integer"></asp:CompareValidator>
</form>
</body>
</html>
```

Output:



Index

Student

Name

User name is required

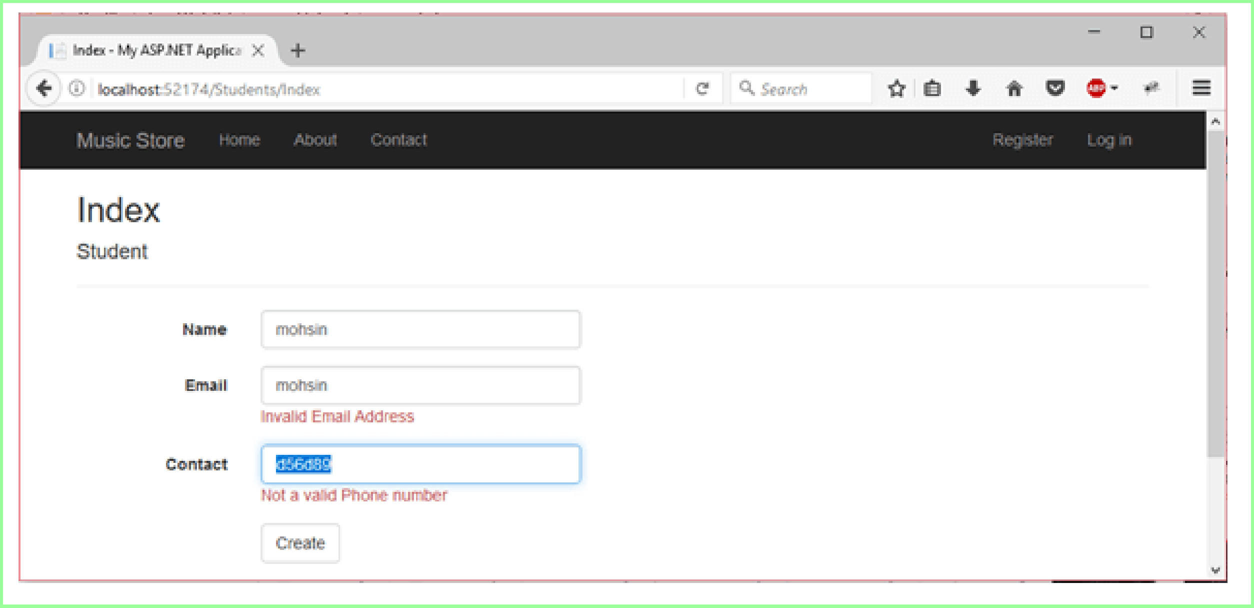
Email

Email is required

Contact

Contact is required

Create



Index

Student

Name mohsin

Email mohsin

Invalid Email Address

Contact d56d89

Not a valid Phone number

Create

DATABASE CONNECTIVITY

☞ A database connection is a facility in computer science that allows client software to communicate with database server software, whether on the same machine or not. A connection is required to send commands and receive answers.

ADO.NET

☞ ADO.NET is a module of .Net Framework which is used to establish a connection between application and data sources. Data sources can be such as SQL Server and XML. ADO.NET consist of classes that can be used to connect, retrieve, insert and delete data.

ADO.NET CLASSES

☞ Some important ADO.NET objects that are responsible for the CRUD operations is as follows:

- ❖ **DataSet:**
  Think about DataSet as a copy of a database stored in server's memory. It is used only for querying multiple SQL tables at once.
- ❖ **SqlDataReader:**
  It is used for querying data from a single SQL table.
- ❖ **DataTable**
  Data Table is a sub item of a DataSet and represents a database table stored in the memory.
- ❖ **SqlConnection**
  Object responsible with storing the data.
- ❖ **SqlCommand**
  Object responsible with sending the SQL query to the server and returning the results.
- ❖ **SqlDataAdapter**
  SqlDataAdapter is responsible with filling a DataSet with the data returned from the database.
- ❖ **DataReader**
  This retrieve data in forward only and read only form.
- ❖ **DataAdapter**
  This acts as a bridge between dataset and data source to load the dataset and reconcile changes made in dataset back to the source.

Web.config file with the new connection string

Syntax:

<connectionStrings>

<add name = "your connectionStringName" connectionString = "Data Source = DatabaseServerName; Integrated Security = true; Internal Catalog =

YouDatabaseName; uid= YourUserName; Password=yourpassword;” providerName= “System.Data.SqlClient”/>

</connectionStrings>

Example:

<connectionStrings>

<add name = “myconnection” connectionString = “ Data Source = miniproject; Integreated Security = true; Internal Catalog = MyWebDatabase” providerName = “System.Data.SqlClient”/>

</connectionStrings>

Database Connection into .cs file:

SqlConnection con = new SqlConnection(ConfigurationManager.ConnectionStrings[“connectionstrings”].ToString());

Example:

SqlConnection con = new SqlConnection(ConfigruationManager.ConnectionStrings[“myconnection”].ToString());

Here **myconnection** is connection string that we create into Web.config file.

Creating SQL Statements

1. **How to create database**
   CREATE DATABASE database_neme;
   USE Database_name;

   Eg. CREATE   DATABASE   imsdb;
   USE   imsdb;
2. **Dropping the Database (Deleting the database)**
   Syntax: DROP DATABASE database_name;
   Eg. DROP DATABASE imsdb;
3. **How to create Table**

```
CREATE TABLE Table_name
(
        ID INT NOT NULL IDENTITY(1,1),
        FirstName  VARCHAR(50),
        SecondName VARCHAR(50)
)
```

4. **Adding Column on Table**

   Syntax: ALTER TABLE table_name
   ADD column_name datatype;

   Eg. ALTER TABLE tbl_user
   ADD Email varchar(255);

5. **Deleting Column from Table**

   Syntax: ALTER TABLE table_name
   DROP COLUMN column_name;

   Eg. ALTER TABLE tbl_user
   DROP COLUMN Email;

6. **Modifying Column (changing the data type of a column in a table)**

   Syntax: ALTER TABLE table_name
   MODIFY COLUMN column_name datatype;

   Eg. ALTER TABLE tbl_user
   MODIFY COLUMN class int;

7. **Deleting Table**

   Syntax: DROP TABLE table_name;

   Eg. DROP TABLE tbl_user;

SQL Statement to insert, select, update and delete data

8. **Inserting data into table**

   Syntax: INSERT INTO table_name(column1, column2, column3….)VALUES(value1, value2, value3,……….);

   Eg. INSERT INTO tbl_user(uid, uname, upassword)VALUES(01,'Saroj', 'singh');

9. **SELECT QUERY**

   SELECT * FROM Table_name;

   Eg. SELECT * FROM tbl_user;

10. **Selecting data using condition**

Syntax: SELECT column1, column2,...
FROM table_name
WHERE condition;
Eg. SELECT uname, upassword FROM tbl_user WHERE uid=2;

11. Updating data (modifying the existing record in a table)

Syntax: UPDATE table_name
SET column1=value1 , column2=value2
WHERE condition;
[:. WHERE condition is optional]

Eg. UPDATE tbl_user SET uname='Ram'
WHERE uid=01;

12. Deleting data

Syntax: DELETE FROM table_name WHERE condition;

Eg. DELETE FROM tbl_user WHERE uname='Ram';

Write a C# program to make simple calculator using asp.net with C#.

Calculator.aspx

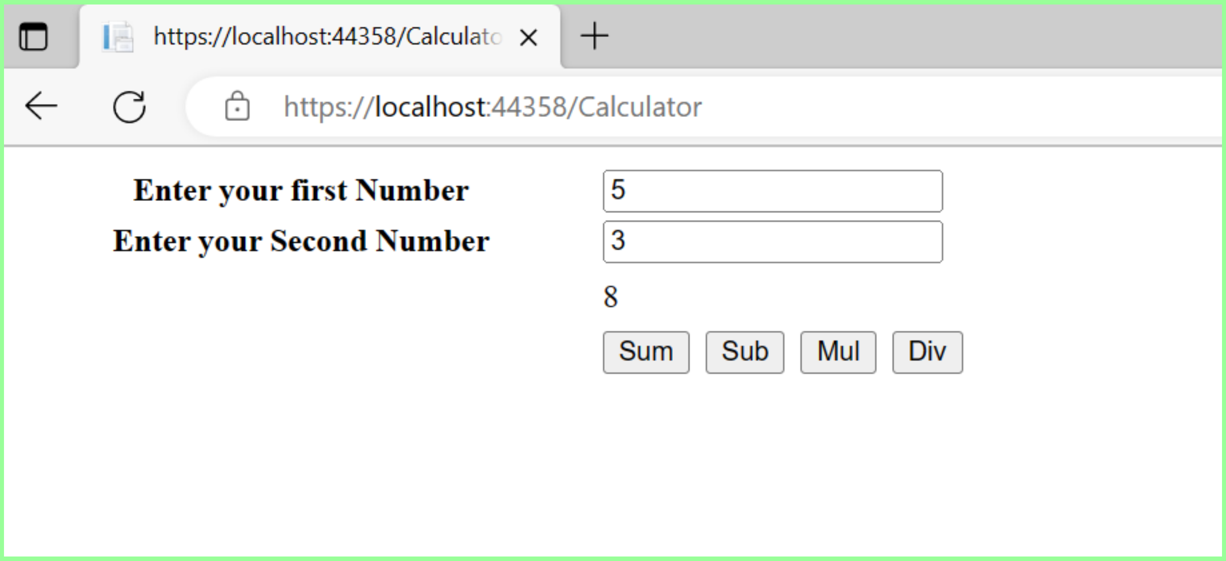
```
<%@ Page Language="C#" AutoEventWireup="true" CodeBehind="Calculator.aspx.cs"
Inherits="NabKshitijCollege.WebForm1" %>

<!DOCTYPE html>

<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title></title>
</head>
<body>
    <form id="form1" runat="server">
        <div>
            <table width="600">
                <tr><th width="300">Enter your first Number</th><td
width="300"><asp:TextBox ID="TextBox1" runat="server"></asp:TextBox></td></tr>
                <tr><th width="300">Enter your Second Number</th><td width="300">
                    <asp:TextBox ID="TextBox2runat="server"></asp:TextBox></td></tr>
                <tr><th width="300"></th><td width="300"></td></tr>
                 <tr><th width="300"> </th><td width="300"><asp:Label ID="result"
runat="server" Text="Result"></asp:Label>
                    </td></tr><tr><th width="300"></th><td width="300">
                    </td></tr>
                 <tr><th width="300">
                     </th><td width="300">
```

```
                         <asp:Button ID="Button1" runat="server" Text="Sum"
OnClick="Button1_Click" />&nbsp&nbsp<asp:Button ID="Button2" runat="server"
Text="Sub" OnClick="Button2_Click" />&nbsp&nbsp<asp:Button ID="Button3"
runat="server" Text="Mul" OnClick="Button3_Click" />&nbsp&nbsp<asp:Button
ID="Button4" runat="server" Text="Div" OnClick="Button4_Click" />
                    </td></tr>
            </table>
        </div>
    </form>
</body>
</html>
```

Calculator.aspx.cs

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

namespace NabKshitijCollege
{
    public partial class WebForm1 : System.Web.UI.Page
    {
        protected void Page_Load(object sender, EventArgs e)
        {

        }

        protected void Button1_Click(object sender, EventArgs e)
        {
            int res = int.Parse(TextBox1.Text) + int.Parse(TextBox2.Text);
            result.Text = res.ToString();
        }

        protected void Button2_Click(object sender, EventArgs e)
        {
            int res = int.Parse(TextBox1.Text) - int.Parse(TextBox2.Text);
            result.Text = res.ToString();
        }

        protected void Button3_Click(object sender, EventArgs e)
        {
            int res = int.Parse(TextBox1.Text) * int.Parse(TextBox2.Text);
            result.Text = res.ToString();
        }

        protected void Button4_Click(object sender, EventArgs e)
        {
            int res = int.Parse(TextBox1.Text) / int.Parse(TextBox2.Text);
                 result.Text = res.ToString();
        }
    }
}
```

Output:



Example program to display form data in another page.

RegistrationForm.aspx

```
<%@ Page Language="C#" AutoEventWireup="true" CodeBehind="RegistrationForm.aspx.cs"
Inherits="NabKshitijCollege.RegistrationForm" %>

<!DOCTYPE html>

<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title></title>
</head>
<body>
    <center><h1>Registration Form</h1></center>
    <hr />
    <center>
    <table width="500">
    <form id="form1" runat="server">
        <div>
            <tr><th></th><th></th></tr>
             <tr><th></th><th></th></tr>
            <tr><th></th><th></th></tr>
             <tr><th></th><th></th></tr>
            <tr>
           <th width="200"><asp:Label runat="server" Text="First Name"
ID="Label1"></asp:Label></th> <td width="300"><asp:TextBox ID="fname"
runat="server"></asp:TextBox></td>
                </tr>
            <tr>
            <th width="200"><asp:Label ID="Label2" runat="server" Text="Last
Name"></asp:Label></th><td width="300"><asp:TextBox ID="lname"
runat="server"></asp:TextBox></td>
             </tr>
            <tr>
            <th width="200"><asp:Label ID="Label3" runat="server"
Text="Contact"></asp:Label></th><td width="300"><asp:TextBox ID="contact"
runat="server"></asp:TextBox></td>
            </tr>
            <tr><th></th><th></th></tr>
             <tr><th></th><th></th></tr>
            <tr>
            <th width="200"></th><td width="300"><asp:Button ID="Button1"
runat="server" Text="Save" OnClick="Button1_Click" /></td>
            </tr>
        </div>
    </form>
        </table></center>
</body>
</html>
```

RegistrationForm.aspx.cs

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

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

        }

        protected void Button1_Click(object sender, EventArgs e)
        {
            Response.Redirect("Report.aspx?fname="+
                this.fname.Text + "lname"+
                this.lname.Text + "contact"+
                this.contact.Text

                );
        }
    }
}
```

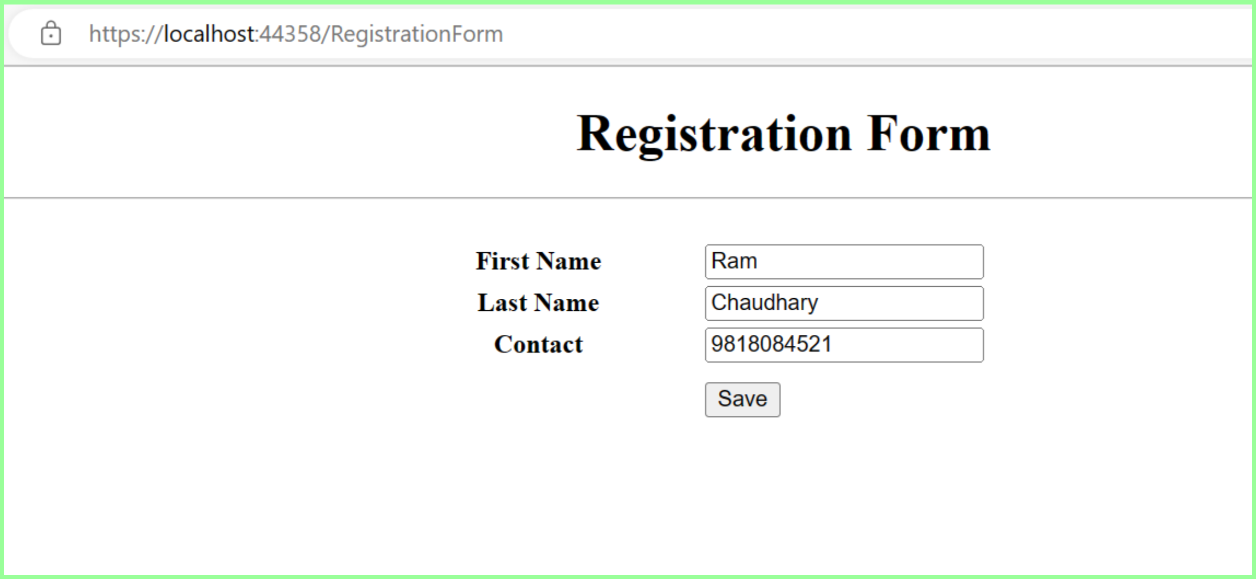
Report.aspx

```
<%@ Page Language="C#" AutoEventWireup="true" CodeBehind="Report.aspx.cs"
Inherits="NabKshitijCollege.Report" %>

<!DOCTYPE html>

<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title></title>
</head>
<body>
    <form id="form1" runat="server">
        <div>


                    <asp:Label ID="Label1" runat="server" Text="Label"></asp:Label>

                     <asp:Label ID="Label2" runat="server" Text="Label"></asp:Label>

                     <asp:Label ID="Label3" runat="server" Text="Label"></asp:Label>

        </div>
    </form>
</body>
</html>
```

Report.aspx.cs

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

namespace NabKshitijCollege
{
    public partial class Report : System.Web.UI.Page
    {
        protected void Page_Load(object sender, EventArgs e)
        {
            Label1.Text = Request.QueryString["fname"];
            Label2.Text = Request.QueryString["lname"];
            Label3.Text = Request.QueryString["contact"];

        }
    }
}
```

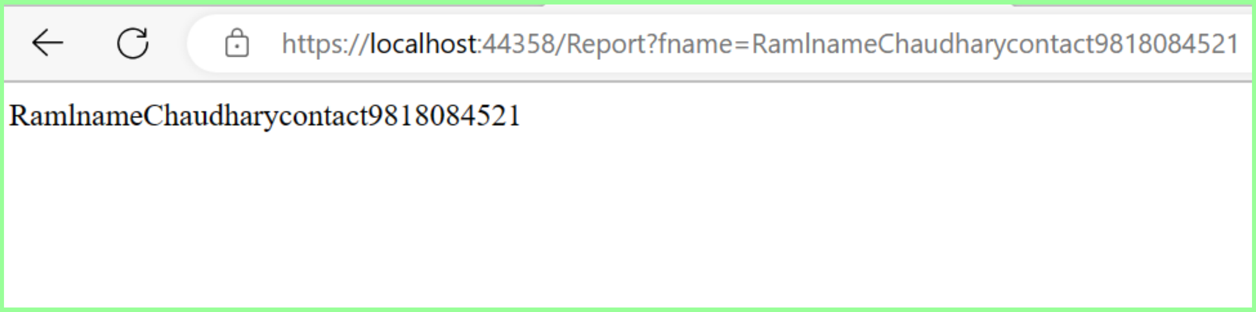
Output:



https://localhost:44358/RegistrationForm

Registration Form

First Name	Ram
Last Name	Chaudhary
Contact	9818084521



https://localhost:44358/Report?fname=RamlnameChaudharycontact9818084521

```
RamlnameChaudharycontact9818084521
```