PROJECT TRAINING WORKSHOP

TECHNICAL .NET and SQL

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UNDERSTANDING .NET

- **What is this?**

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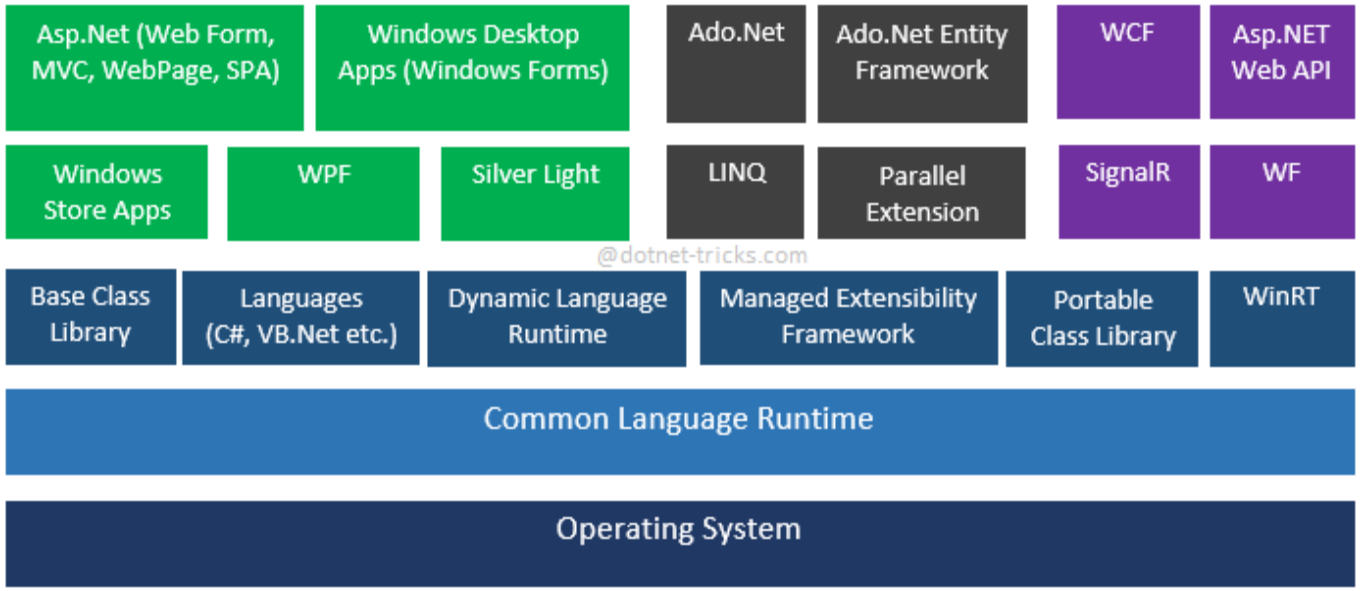
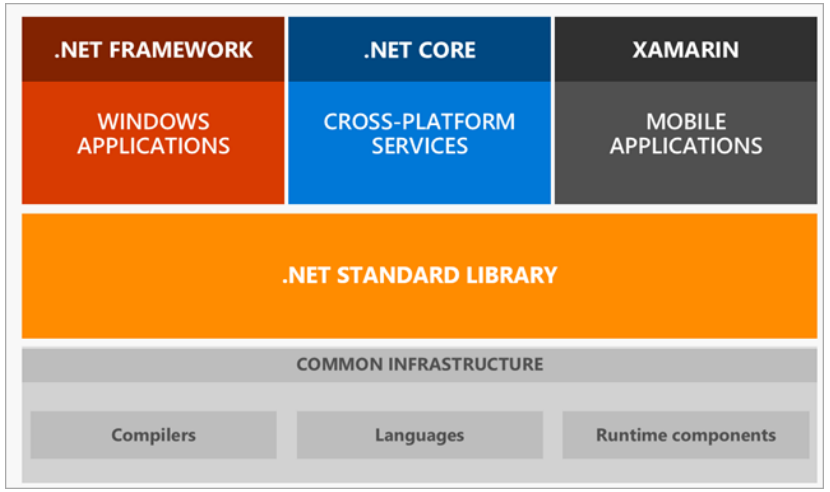
UNDERSTANDING .NET

- **What is .NET Framework?**
  - **It is software** development framework (**tools, libraries, and runtime environments for building and running various types of applications**)





UNDERSTANDING .NET

- **What is role of .NET Framework?**

Cross-Platform Development	Language Versatility	Application Types	Common Language Runtime (CLR)
Base Class Libraries (BCL)	Integrated Development Environment (IDE)	ASP.NET and Web Development	Cloud and Microservices
Open Source	Performance		

- **What can be built with .NET?**

Web Application	Console Application	Windows Services	Windows Application
Internet Enabled Applications (Cloud)	Web Services	Extensions or Components	Libraries

COMPONENTS OF .NET

- **Common Language Runtime (CLR)**

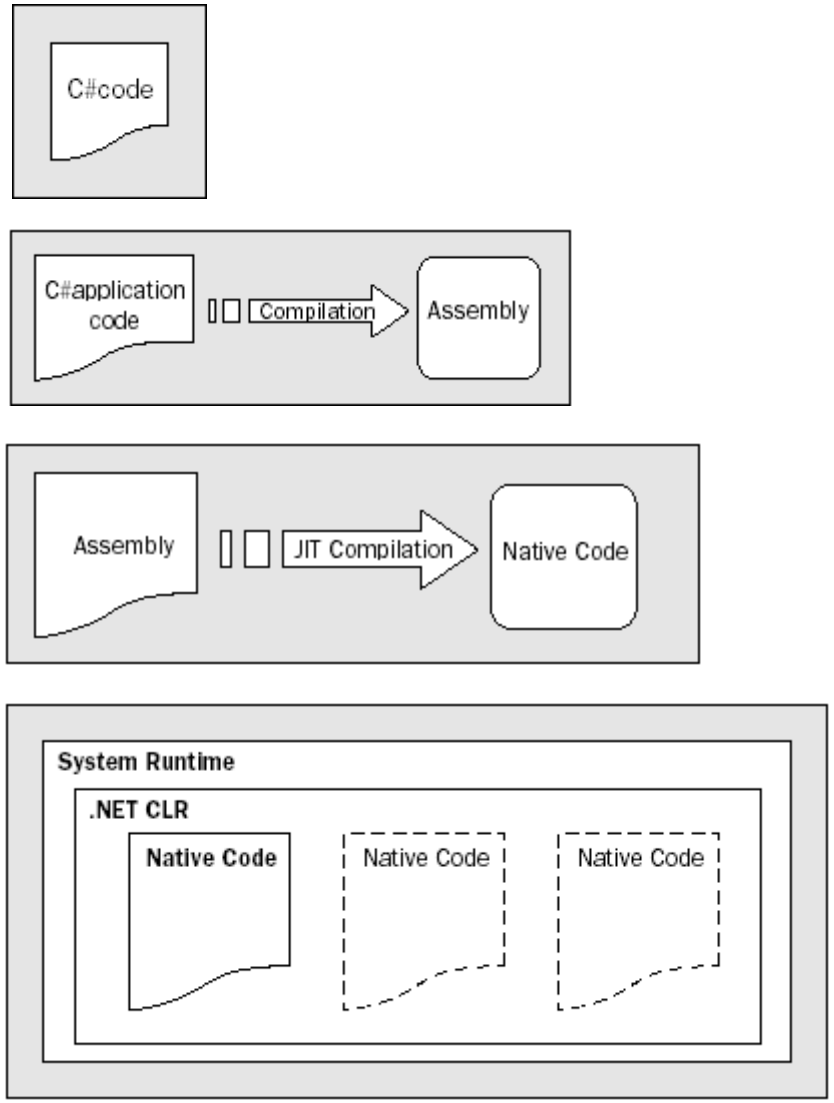
Garbage Collector	Code Manager	Common Type System	Common Language Specification
Class Loader			

- **Base Class Library (BCL)**

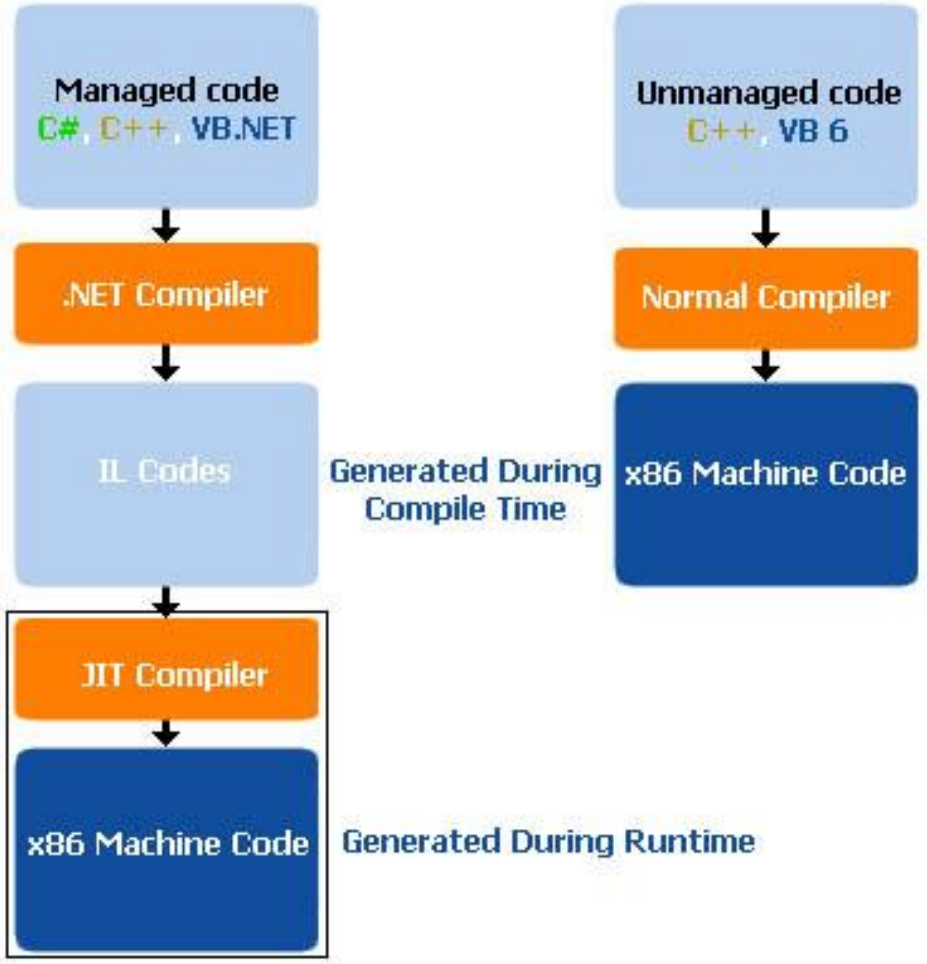
ADO.NET	Remoting	Reflection	Diagnostics
Threading	I/O		

- **Portable Class Library (PCL) , Dynamic Language Runtime (DLR) , Language Integrated Query (LINQ)**
- **Entity Framework (EF), Parallel Extention, Workflow Foundation (WF), Windows Communication Foundation (WCF)**

CODE EXECUTION PROCESS



MANAGED vs. UNMANAGED EXECUTION



UNDERSTANDING CLASS

SqlConnection Class

.NET Framework 4.6 and 4.5 | Other Versions

Namespace: System.Data.SqlClient
Assembly: System.Data (in System.Data.dll)

Inheritance Hierarchy

System.Object
System.MarshalByRefObject
System.ComponentModel.Component
System.Data.Common.DbConnection
System.Data.SqlClient.SqlConnection

Syntax

C# | C++ | F# | VB

```
public sealed class SqlConnection : DbConnection, ICloneable
```

Constructors

Name	Description
SqlConnection()	Initializes a new instance of the SqlConnection class.
SqlConnection(String)	Initializes a new instance of the SqlConnection class when given a string that contains the connection string.
SqlConnection(String, SqlCredential)	Initializes a new instance of the SqlConnection class given a connection string, that does not use **Integrated Security** = **true** and a SqlCredential object that contains the user ID and password.

Properties

Name	Description
AccessToken	Gets or sets the access token for the connection.
ClientConnectionId	The connection ID of the most recent connection attempt, regardless of whether the attempt succeeded or failed.
ColumnEncryptionTrustedMasterKeyPaths	Allows you to set a list of trusted key paths for a database server. If while processing an application query the driver receives a key path that is not on the list, the query will fail. This property provides additional protection against security attacks that involve a compromised SQL Server providing fake key paths, which may lead to leaking key store credentials.
ConnectionString	Gets or sets the string used to open a SQL Server database. (Overrides DbConnection.ConnectionString.)

Methods

Name	Description
BeginTransaction()	Starts a database transaction.
BeginTransaction(IsolationLevel)	Starts a database transaction with the specified isolation level.
BeginTransaction(IsolationLevel, String)	Starts a database transaction with the specified isolation level and transaction name.

Events

Name	Description
Disposed	Occurs when the component is disposed by a call to the Dispose method. (Inherited from Component.)
InfoMessage	Occurs when SQL Server returns a warning or informational message.
StateChange	Occurs when the state of the event changes.(Inherited from DbConnection.)

Explicit Interface Implementations

Name	Description
IDbConnection.BeginTransaction()	Begins a database transaction.(Inherited from DbConnection.)
IDbConnection.BeginTransaction(IsolationLevel)	Begins a database transaction with the specified IsolationLevel value.(Inherited from DbConnection.)

Remarks

A SqlConnection object represents a unique session to a SQL Server data source. With a client/server database system, it is equivalent to a network connection to the server. SqlConnection is used together with SqlDataAdapter and SqlCommand to increase performance when connecting to a Microsoft SQL Server database. For all third-party SQL Server products, and other OLE DB-supported data sources, use OleDbConnection.

When you create an instance of SqlConnection, all properties are set to their initial values. For a list of these values, see the SqlConnection constructor.

See ConnectionString for a list of the keywords in a connection string.

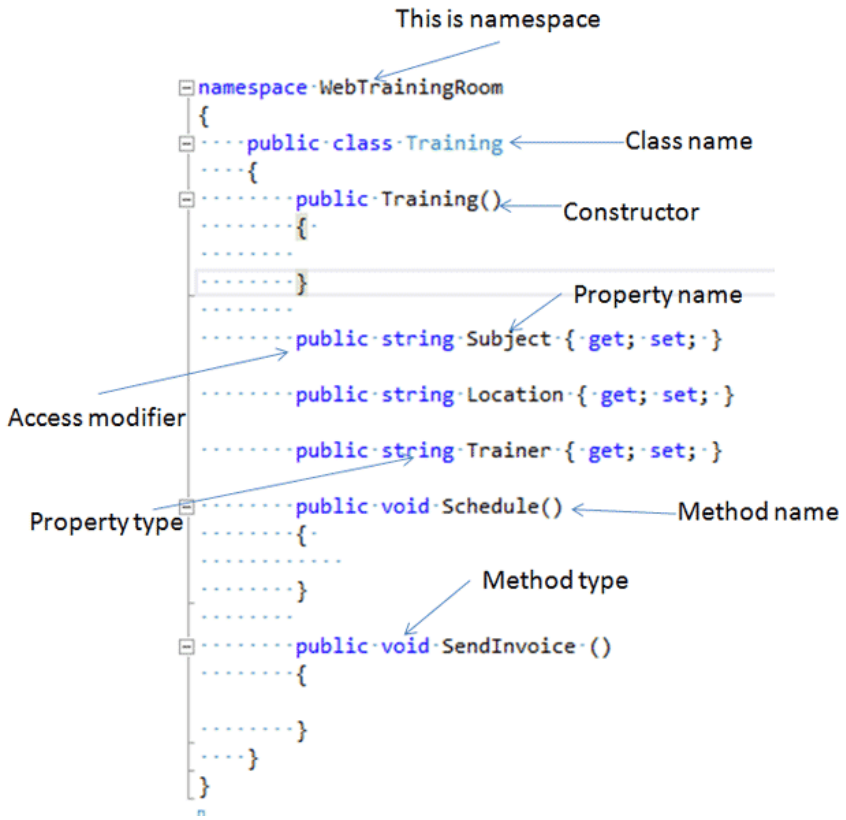
If the SqlConnection goes out of scope, it won't be closed. Therefore, you must explicitly close the connection by calling **Close** or **Dispose**. **Close** and **Dispose** are functionally equivalent. If the connection pooling value **Pooling** is set to **true** or **yes**, the underlying connection is return

UNDERSTANDING C#

- **What are the key concepts of C#?**

Object-Oriented Programming (OOP)	Strongly Typed	C# Syntax	.NET Framework
Common Language Infrastructure (CLI)	Managed Code	Garbage Collection	Assemblies
Namespace	Exception Handling	Generics	Delegates and Events
LINQ (Language Integrated Query)	Properties and Indexers	Attributes	Interfaces
Inheritance and Polymorphism	Value Types and Reference Types	Nullable Types	Async/Await
Task Parallel Library	Collections		

UNDERSTANDING C# - SYNTAX, GARBAGE COLLECTOR

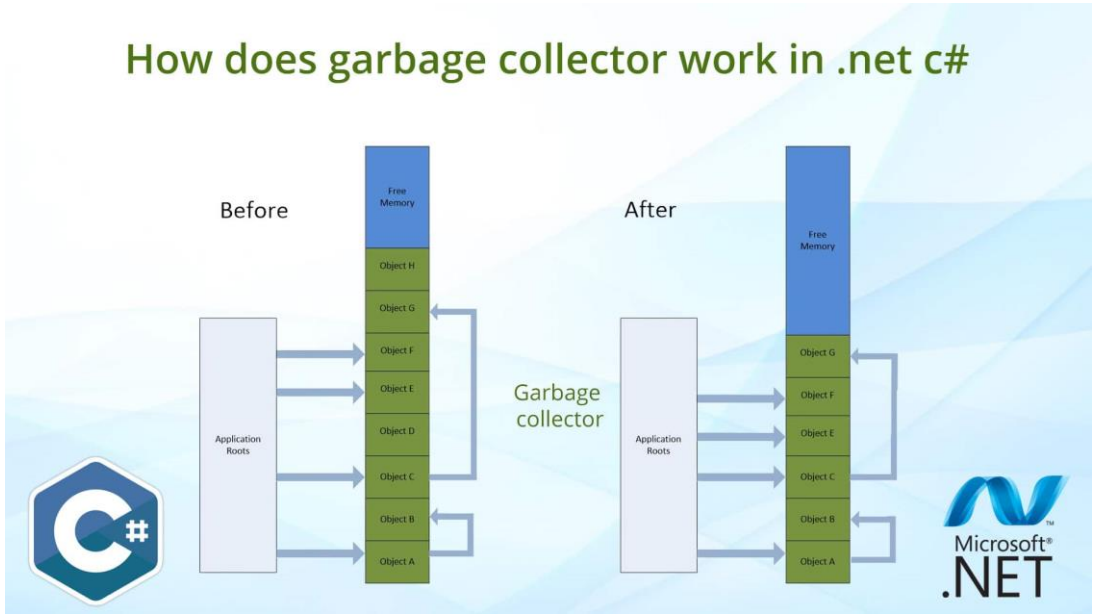



```
using System;
namespace Pragim
{
    class Sample
    {
        static void Main()
        {
            int[] Numbers = new int[3];

            Numbers[0] = 10;
            Numbers[1] = 20;
            Numbers[3] = "Name";
        }
    }
}
```

class System.String
Represents text as a series of Unicode characters.

Error:
Cannot implicitly convert type 'string' to 'int'



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UNDERSTANDING C# - EXCEPTION HANDLING, GENERICS, EVENTS

```
public static void Main()
{
    try
    {
        LevelOne();
    }
    catch (ArgumentException ex)
    {
        Console.WriteLine(ex);
    }
}

static void LevelOne()
{
    LevelTwo();
}

static void LevelTwo()
{
    LevelThree();
}

static void LevelThree()
{
    throw new ArgumentException("Exception in level three!");
}
```

Try-catch block found. Exception is handled.

No try-catch, going one level up.

No try-catch, going one level up.

An exception occured. No try-catch, going up.

```
using System;

public class Program
{
    public static void Swap<T>(ref T a, ref T b)
    {
        T temp = a;
        a = b;
        b = temp;
    }

    public static void Main(string[] args)
    {
        int num1 = 5;
        int num2 = 10;

        Console.WriteLine($"Before Swap: num1 = {num1}, num2 = {num2}");

        Swap(ref num1, ref num2);

        Console.WriteLine($"After Swap: num1 = {num1}, num2 = {num2}");

        string str1 = "Hello";
        string str2 = "World";

        Console.WriteLine($"Before Swap: str1 = {str1}, str2 = {str2}");

        Swap(ref str1, ref str2);

        Console.WriteLine($"After Swap: str1 = {str1}, str2 = {str2}");
    }
}
```

```
class Publisher
{
    // Declare an event using EventHandler delegate
    public event EventHandler MyEvent;

    public void RaiseEvent()
    {
        MyEvent?.Invoke(this, EventArgs.Empty);
    }
}

class Subscriber
{
    public void OnEvent(object sender, EventArgs e)
    {
        Console.WriteLine("Event raised!");
    }
}

class Program
{
    static void Main(string[] args)
    {
        Publisher publisher = new Publisher();
        Subscriber subscriber = new Subscriber();

        // Subscribe to the event
        publisher.MyEvent += subscriber.OnEvent;

        // Raise the event
        publisher.RaiseEvent();
    }
}
```

UNDERSTANDING C# - LINQ, INTERFACE, INDEXERS

```
class Program
{
    static void Main(string[] args)
    {
        // Sample data: a list of Person objects
        List<Person> people = new List<Person>
        {
            new Person { Name = "Alice", Age = 28 },
            new Person { Name = "Bob", Age = 35 },
            new Person { Name = "Charlie", Age = 22 },
            new Person { Name = "David", Age = 30 },
            new Person { Name = "Eve", Age = 25 }
        };

        // Using LINQ to query the list of people
        var youngAdults = from person in people
                          where person.Age >= 18 && person.Age <= 30
                          select person;

        // Display the result
        Console.WriteLine("Young adults (age 18-30):");
        foreach (var person in youngAdults)
        {
            Console.WriteLine($"{person.Name}, Age: {person.Age}");
        }
    }
}

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

```
class Program
{
    class Team
    {
        private string[] players = new string[11];

        // Indexer to access players by jersey number
        public string this[int jerseyNumber]
        {
            get => players[jerseyNumber - 1];
            set => players[jerseyNumber - 1] = value;
        }

        // Property for the team name
        public string TeamName { get; set; }
    }

    static void Main()
    {
        Team soccerTeam = new Team();

        // Setting the team name using the property
        soccerTeam.TeamName = "Reds";

        // Using the indexer to assign player names
        soccerTeam[7] = "David Beckham";
        soccerTeam[10] = "Lionel Messi";

        // Accessing the team name and player names
        Console.WriteLine($"Team Name: {soccerTeam.TeamName}");
        Console.WriteLine($"Player 7: {soccerTeam[7]}");
        Console.WriteLine($"Player 10: {soccerTeam[10]}");
    }
}
```

```
interface IShape
{
    double CalculateArea();
}

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

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

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

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

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

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

class Program
{
    static void Main()
    {
        IShape circle = new Circle(5);
        IShape rectangle = new Rectangle(4, 6);

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

UNDERSTANDING C# - Parallel Programming

```csharp
class Program
{
    0 references
    static async Task Main()
    {
        Console.WriteLine("Start of the program.");

        // Simulate an asynchronous operation
        int result = await PerformAsyncOperation();

        Console.WriteLine($"Result of the async operation: {result}");

        Console.WriteLine("End of the program.");
    }

    1 reference
    static async Task<int> PerformAsyncOperation()
    {
        Console.WriteLine("Start of PerformAsyncOperation.");

        // Simulate a delay of 2 seconds asynchronously
        await Task.Delay(12000);

        Console.WriteLine("End of PerformAsyncOperation.");

        // Return a result
        return 42;
    }
}
```

```csharp
class Program
{
    static void Main()
    {
        // Value type example
        int value1 = 5;
        int value2 = value1; // Copy the value of 'value1' to 'value
        value2 = 10;         // Modify 'value2'

        Console.WriteLine("Value type example:");
        Console.WriteLine($"value1: {value1}"); // Output: value1: 5
        Console.WriteLine($"value2: {value2}"); // Output: value2: 1

        // Reference type example
        MyClass obj1 = new MyClass(1);
        MyClass obj2 = obj1; // 'obj2' references the same object as
        obj2.Value = 10;     // Modify 'obj2'

        Console.WriteLine("\nReference type example:");
        Console.WriteLine($"obj1.Value: {obj1.Value}"); // Output: o
        Console.WriteLine($"obj2.Value: {obj2.Value}"); // Output: o
    }
}

class MyClass
{
    public int Value { get; set; }

    public MyClass(int value)
    {
        Value = value;
    }
}
```

```csharp
class Program
{
    static async Task Main()
    {
        Console.WriteLine("Start of the program.");

        // Start multiple tasks in parallel
        Task task1 = Task.Run(() => DoWork(1));
        Task task2 = Task.Run(() => DoWork(2));

        await Task.WhenAll(task1, task2); // Wait for both tasks to c

        Console.WriteLine("End of the program.");
    }

    static void DoWork(int id)
    {
        Console.WriteLine($"Task {id} is working...");
        Task.Delay(2000).Wait(); // Simulate work
        Console.WriteLine($"Task {id} completed.");
    }
}
```

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UNDERSTANDING C# - COLLECTIONS

```csharp
class Program
{
    static void Main()
    {
        List<string> names = new List<string>();

        // Adding elements to the list
        names.Add("Alice");
        names.Add("Bob");
        names.Add("Charlie");

        // Iterating through the list
        foreach (string name in names)
        {
            Console.WriteLine(name);
        }

        // Accessing elements by index
        Console.WriteLine("First name: " + names[0]);

        // Removing an element
        names.Remove("Bob");
        Console.WriteLine("After removing 'Bob':");
        foreach (string name in names)
        {
            Console.WriteLine(name);
        }
    }
}
```

```csharp
class Program
{
    static void Main()
    {
        Dictionary<string, int> ages = new Dictionary<string, int>();

        // Adding key-value pairs to the dictionary
        ages["Alice"] = 30;
        ages["Bob"] = 25;
        ages["Charlie"] = 35;

        // Accessing values by key
        Console.WriteLine("Age of Alice: " + ages["Alice"]);

        // Iterating through the dictionary
        foreach (var pair in ages)
        {
            Console.WriteLine($"{pair.Key}: {pair.Value} years old");
        }

        // Checking if a key exists
        if (ages.ContainsKey("David"))
        {
            Console.WriteLine("David's age: " + ages["David"]);
        }
        else
        {
            Console.WriteLine("David's age not found.");
        }
    }
}
```

```csharp
class Program
{
    static void Main()
    {
        HashSet<string> uniqueNames = new HashSet<string>();

        // Adding elements to the hash set
        uniqueNames.Add("Alice");
        uniqueNames.Add("Bob");
        uniqueNames.Add("Alice"); // Duplicate, won't be added

        // Iterating through the hash set
        foreach (string name in uniqueNames)
        {
            Console.WriteLine(name);
        }

        // Checking if an element exists
        bool containsBob = uniqueNames.Contains("Bob");
        Console.WriteLine($"Contains 'Bob': {containsBob}");
    }
}
```

TECHNICAL .NET

- **ASSESSMENT**
  - **Make a calculator program using Console/Windows/Web application as group**