



# Access Modifiers

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.NET CORE

*Access modifiers are keywords used to specify which parts of the program structure can access the data of a member or type.*

[HTTPS://DOCS.MICROSOFT.COM/EN-US/DOTNET/CSHARP/LANGUAGE-REFERENCE/KEYWORDS/ACCESS-MODIFIERS](https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/access-modifiers)

# Access Modifiers - Class Accessibility

<https://docs.microsoft.com/en-us/dotnet/csharp/programming-guide/classes-and-structs/access-modifiers>

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- **Classes** and **structs** declared directly within a namespace (not nested within other classes or structs) can only be either **public** or **internal**.
- **Internal** is the default.
- **Derived** classes can't have greater accessibility than their **base** classes.

# Access Modifiers - Class Member Accessibility

<https://docs.microsoft.com/en-us/dotnet/csharp/tour-of-csharp/classes-and-objects#accessibility>

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Access Modifiers control which regions of program text can access the member.

- [public](#) - Access isn't limited.
- [private](#) (default)- This class only.
- [internal](#) - current assembly (.exe, .dll).
- [protected](#) - Derived classes only.
- [protected internal](#) - Child classes, or classes within the same assembly.
- [private protected](#) - This class or derived classes only.

# Access Modifiers – Public

<https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/public>

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The ***public*** keyword is an access modifier for:

- types and
- type members.

There are no restrictions on accessing public members.

```
class PointTest
{
    public int x;
    public int y;
}

class MainClass4
{
    static void Main()
    {
        var p = new PointTest();
        // Direct access to public members.
        p.x = 10;
        p.y = 15;
        Console.WriteLine($"x = {p.x}, y = {p.y}");
    }
}

// Output: x = 10, y = 15
```

# Access Modifiers – Private

<https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/private>

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- ***Private*** access is the least permissive access level. ***Private*** members are accessible only within the body of the ***class*** or the ***struct*** in which they are declared.
- Nested types in the same body can also access those ***private*** members.

```
class Employee
{
    private int i;
    double d;    // private access by default
}
```

# Access Modifiers – Private Example

<https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/private>

This Employee class contains two **private** data members. As **private** members, they can only be accessed by member methods.

**Public** methods, GetName() and Salary(), are added to allow controlled access to the **private** members.

```
class Employee2
{
    private string name = "FirstName, LastName";
    private double salary = 100.0;

    public string GetName()
    {
        return name;
    }

    public double Salary
    {
        get { return salary; }
    }
}

class PrivateTest
{
    static void Main()
    {
        var e = new Employee2();

        // The data members are inaccessible (private), so
        // they can't be accessed like this:
        //     string n = e.name;
        //     double s = e.salary;

        // 'name' is indirectly accessed via method:
        string n = e.GetName();

        // 'salary' is indirectly accessed via property
        double s = e.Salary;
    }
}
```

# Access Modifiers – Internal

<https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/internal>

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*Internal* types and members are accessible only within files in the same assembly.

A common use of *internal* access is in component-based development because it enables a group of components to cooperate in a private manner without being exposed to the rest of the application code.

```
public class BaseClass
{
    // Only accessible within the same assembly.
    internal static int x = 0;
}
```



# Access Modifiers – Protected Internal

<https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/protected-internal>

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- A ***protected internal*** member of a base class is accessible from any type within its containing assembly.
- It is also accessible in a derived class located in another assembly only if the access occurs through a variable of the derived class type.
- Struct members cannot be ***protected internal*** (because the struct cannot be inherited).

# Access Modifiers – Protected Internal

<https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/protected-internal>

**BaseClass** and **TestAccess** are in the same assembly. **TestAccess** can access **myValue**. In the second file, an attempt to access **myValue** through an instance of **BaseClass** will produce an error, while an access to this member through **DerivedClass** succeeds.

```
// Assembly1.cs
// Compile with: /target:library
public class BaseClass
{
    protected internal int myValue = 0;
}

class TestAccess
{
    void Access()
    {
        var baseObject = new BaseClass();
        baseObject.myValue = 5;
    }
}
```

```
// Assembly2.cs
// Compile with: /reference:Assembly1.dll
class DerivedClass : BaseClass
{
    static void Main()
    {
        var baseObject = new BaseClass();
        var derivedObject = new DerivedClass();

        // Error CS1540, because myValue can only be accessed by
        // classes derived from BaseClass.
        // baseObject.myValue = 10;

        // OK, because this class derives from BaseClass.
        derivedObject.myValue = 10;
    }
}
```

# Access Modifiers – Protected

<https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/protected>

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A *protected* member is accessible through *derived* class instances only.

```
class A
{
    protected int x = 123;
}

class B : A
{
    static void Main()
    {
        var a = new A();
        var b = new B();

        // Error CS1540, because x can only be accessed by
        // classes derived from A.
        // a.x = 10;

        // OK, because this class derives from A.
        b.x = 10;
    }
}
```

# Access Modifiers – Private Protected

<https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/private-protected>

- A **private protected** member is accessible by types derived from the containing class, but only within its containing assembly.
- Assembly1.cs contains **public** BaseClass, and **derived**, DerivedClass1.
- BaseClass owns a **private protected** myValue, which DerivedClass1 tries to access in two ways.
- Accessing myValue through an instance of BaseClass will produce an error.
- Using it as an inherited member in DerivedClass1 succeeds.
- In Assembly2.cs, accessing myValue as an inherited member of DerivedClass2 produces an error, because it's in a different assembly.

```
// Assembly1.cs
// Compile with: /target:library
public class BaseClass
{
    private protected int myValue = 0;
}

public class DerivedClass1 : BaseClass
{
    void Access()
    {
        var baseObject = new BaseClass();

        // Error CS1540, because myValue can only be accessed by
        // classes derived from BaseClass.
        // baseObject.myValue = 5;

        // OK, accessed through the current derived class instance
        myValue = 5;
    }
}
```

C#

```
// Assembly2.cs
// Compile with: /reference:Assembly1.dll
class DerivedClass2 : BaseClass
{
    void Access()
    {
        // Error CS0122, because myValue can only be
        // accessed by types in Assembly1
        // myValue = 10;
    }
}
```