



Learning C#



What is C#

- A new object oriented language
 - Syntax based on C
 - Similar to C++ and Java
 - Used to write .NET software
 - Software that targets the .NET Framework is called managed code
 - C# gains much from the .NET Framework
 - Internet oriented platform
 - JIT compilation
 - Automatic memory management
 - Security, type-safety
 - Framework Class Library

C#: Rich Software Development

- Provides access to the .NET Framework
 - Great language for targeting .NET
 - Access the features of the framework
 - For example, the FCL
 - Create Web-based apps, GUI, apps, etc.
- Offers access to the underlying OS
 - Full access to Windows (or host OS)
 - Enables creation of rich applications
- Object oriented
 - Create component based applications
 - Gain the benefits of OO design, with no compromises

Defining the .NET Framework

- The .NET Framework is
 - A software development environment
 - A runtime engine for *Managed Code*
 - A platform designed for Internet-Distributed software
- The .NET Framework is an exciting new computing platform

Hello World a-la C#

HelloGUI.cs

```
using System.Windows.Forms;
using System.Drawing;

class MyForm:Form{
    public static void Main(){
        Application.Run(new MyForm());
    }

    protected override void OnPaint(PaintEventArgs e){
        e.Graphics.DrawString("Hello World!",
            new Font("Arial", 35), Brushes.Blue, 10, 100);
    }
}
```

```
c:\> csc /target:winexe HelloGui.cs
```

Types of Applications

- Managed code is packaged as *Assemblies*
- The three kinds of assemblies that you can create with C# are the following.
 - Console applications
 - GUI applications
 - Libraries of Types
- Libraries of Types are especially important because
 - Applications are going to consist of more and more reusable component code
 - Web Forms and Web Service applications are published as libraries

Creating a Console Application

Rabbits.cs

```
using System;
class App{
    public static void Main(String[] args){
        try{
            Int32 iterations = Convert.ToInt32(args[0]);
            if(iterations > 138){
                throw new Exception();
            }
            Decimal lastNum = 1;
            Decimal secondToLastNum = 0;
            while(iterations-- > 0){
                Decimal newNum = lastNum+secondToLastNum;
                Console.WriteLine(newNum);
                secondToLastNum = lastNum;
                lastNum = newNum;
            }
        }catch{
            Console.WriteLine(
                "Usage: Rabbits [Fib Index]\n"+
                "\n[Fib Index] < 139");
        }
    }
}
```

```
c:\> csc Rabbits.cs
```

Creating a GUI Application

Tribbles.cs

```
using System;
using System.Drawing;
using System.Windows.Forms;

class App{
    public static void Main(){
        Application.Run(new TribbleForm());
    }
}

class TribbleForm:Form{
    TextBox generationsTextBox;
    ListBox fibList;

    // ...
}
```

```
c:\> csc /target:winexe Tribbles.cs
```

Creating a Code Library

FibObj.cs

```
using System;
public class Fib{
    Decimal current;
    Decimal last;
    public Fib(){
        current = 1;
        last = 0;
    }
    private Fib(Decimal last, Decimal secondToLast){
        current = last+secondToLast;
        this.last = last;
    }
    public Fib GetNext(){
        return new Fib(current, last);
    }
    public Decimal Value{
        get{return current;}
    }
}
```

```
c:\> csc /target:library FibObj.cs
```

Code that Uses a Code Library

FibTest.cs

```
using System;
class App{
    public static void Main(){
        Int32 index = 50;
        Fib obj = new Fib();
        do{
            Console.WriteLine(obj.Value);
            obj = obj.GetNext();
        }while(index-- != 0);
    }
}
```

```
c:\> csc /r:FibObj.dll FibTest.cs
```

Language Concepts

- Syntax based on C/C++
 - Case-sensitive
 - White space means nothing
 - Semicolons (;) to terminate statements
 - Code blocks use curly braces {}
- Some features
 - Can create methods with a variable number of arguments
 - Parameters are passed by value (by default)
 - Can create methods that take parameters by reference
 - Can create methods with out-only parameters
 - Operator overloading and type converters
 - Type-safety and code verification
- Object oriented, code is structured using the `class` keyword

Primitive Types

- Signed Numeric Primitive Types
 - `Int32`, `Int16`, `Int64`, `SByte`, `Double`, `Single`, `Decimal`
- Unsigned Numeric Primitive Types
 - `UInt32`, `UInt16`, `UInt64`, `Byte`
- Other Primitives
 - `Boolean`, `String`, `Char`, `Object`
- Primitive Types are FCL Types
 - C# Aliases the primitives
 - Example: `Int32 == int`

Conditional Statements

- C# uses **if**

```
if(y == x){  
    Console.WriteLine("y equals x");  
}else{  
    Console.WriteLine("y does not equal x");  
}
```

- C# uses **switch**

```
switch(x){  
    case 2:  
        Console.WriteLine("x equals 2");  
        break;  
    default:  
        Console.WriteLine("x does not equal 2");  
        break;  
}
```

C# Loops...

- C# uses **for**

```
for(index = 0;index<100;index++){  
    Console.Write(index);  
    Console.Write("\t");  
}
```

- C# uses **while**

```
index = 10;  
while(index != 0){  
    Console.WriteLine(index);  
    index--;  
}
```

C# Loops (continued)

- C# uses **do-while**

```
index = 0;
do{
    Console.WriteLine("Happens at least once");
}while(index < 0);
```

- C# uses **foreach**

```
Int32[] myArray = new Int32[]{10, 20, 30, 40};
foreach(Int32 i in myArray){
    Console.WriteLine(i);
}
```

C# Error Handling

- C# uses **try-catch**

```
try{
    Int32 index = 10;
    while(index-- != 0){
        Console.WriteLine(100/index);
    }
}catch(DivideByZeroException){
    Console.WriteLine(
        "Caught division by zero exception");
}
Console.WriteLine(
    "Caught; code keeps running");
```


C# Assured Cleanup

- C# uses **try-finally**

```
try{
    // Perhaps an exception is thrown or
    // return statement is hit
    return;
}finally{
    Console.WriteLine(
        "Code in finally always runs");
}
```

Using Types

- You will often use types from
 - The Framework Class Library (FCL)
 - Third party libraries

TypeFile.cs

```
using System;
using System.IO;
class App{
    public static void Main(String[] args){
        StreamReader reader =
            new StreamReader(args[0]);
        Console.WriteLine(reader.ReadToEnd());
    }
}
```



Demo C#Pad.cs