Module 01

"Introduction to C#, .NET and VS"

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Agenda

- C# and The .NET Framework
- Anatomy of a C# Program
- Basic Input and Output in C#
- Best Practices

The .NET Platform

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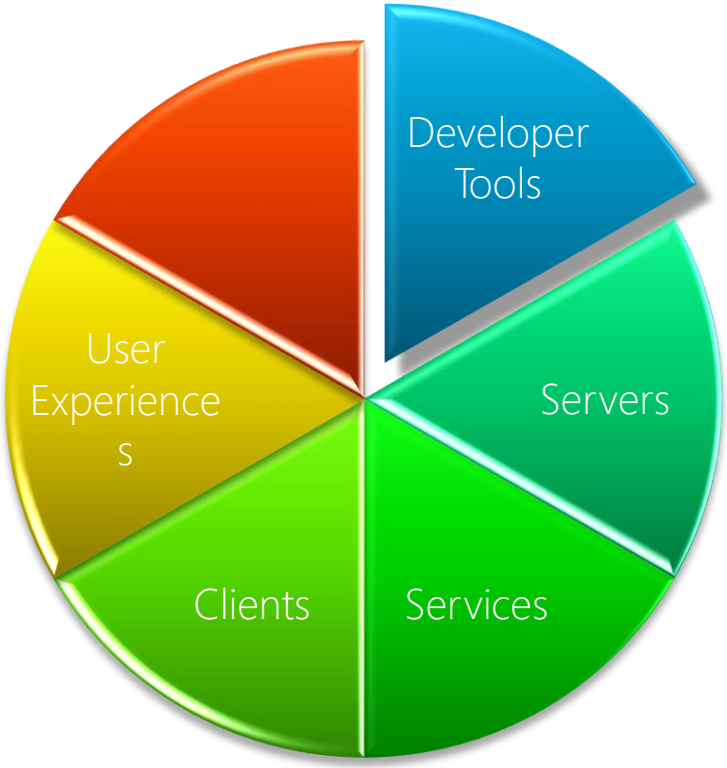
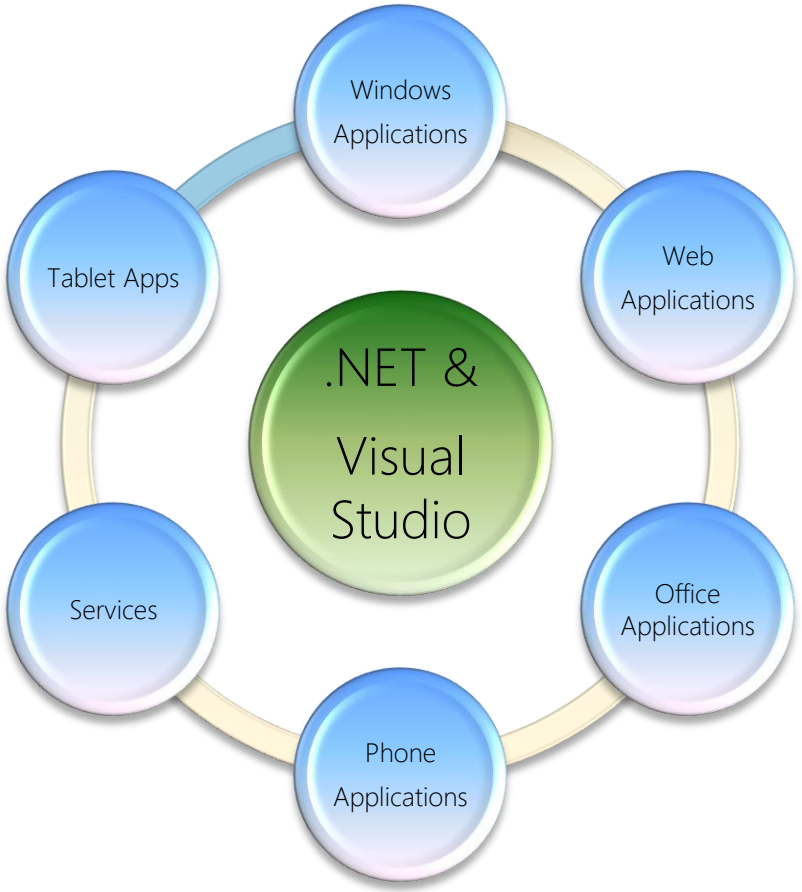
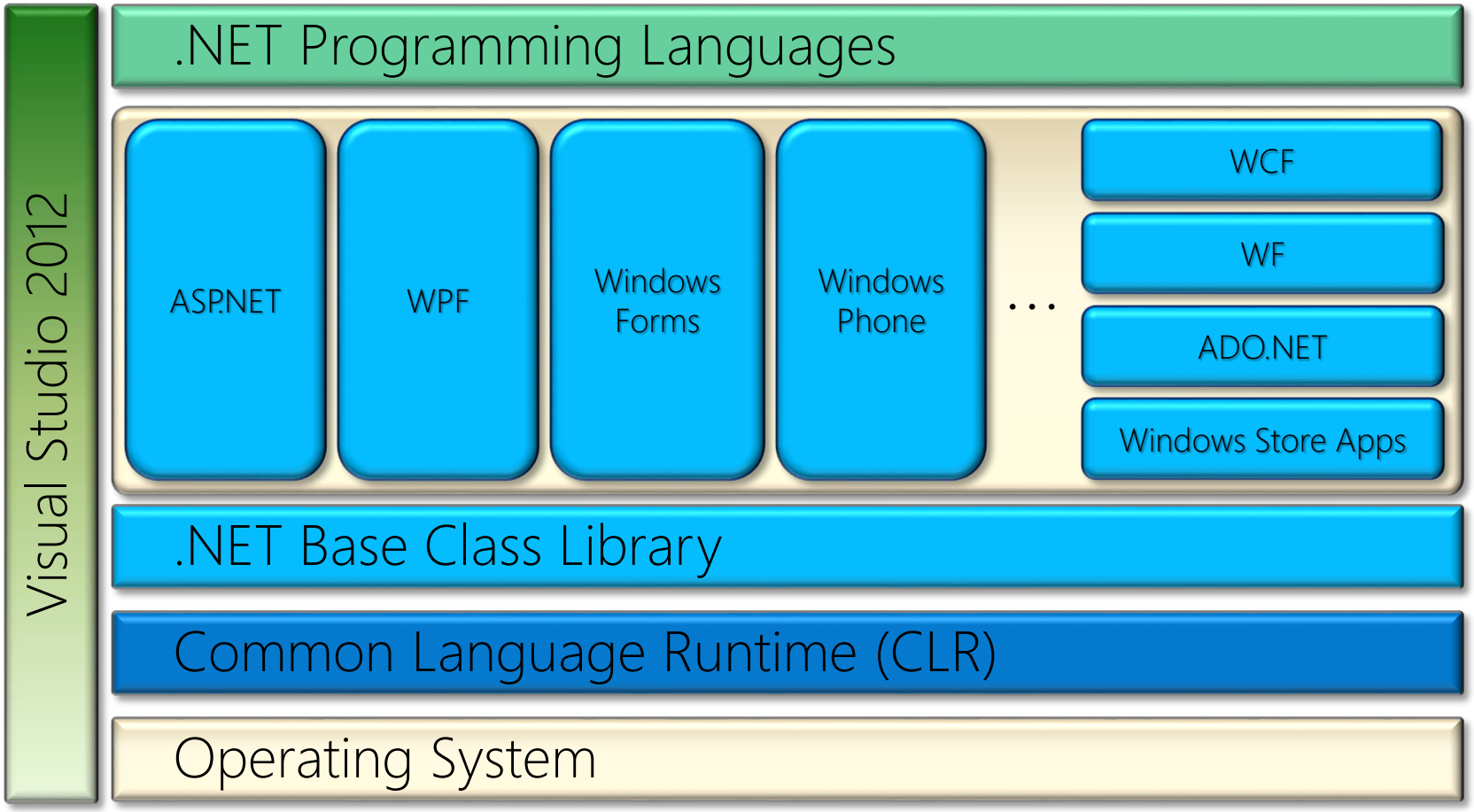


The .NET Framework



.NET 4.5 Framework Components



Visual Studio 2012 Features

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Compilation and Execution

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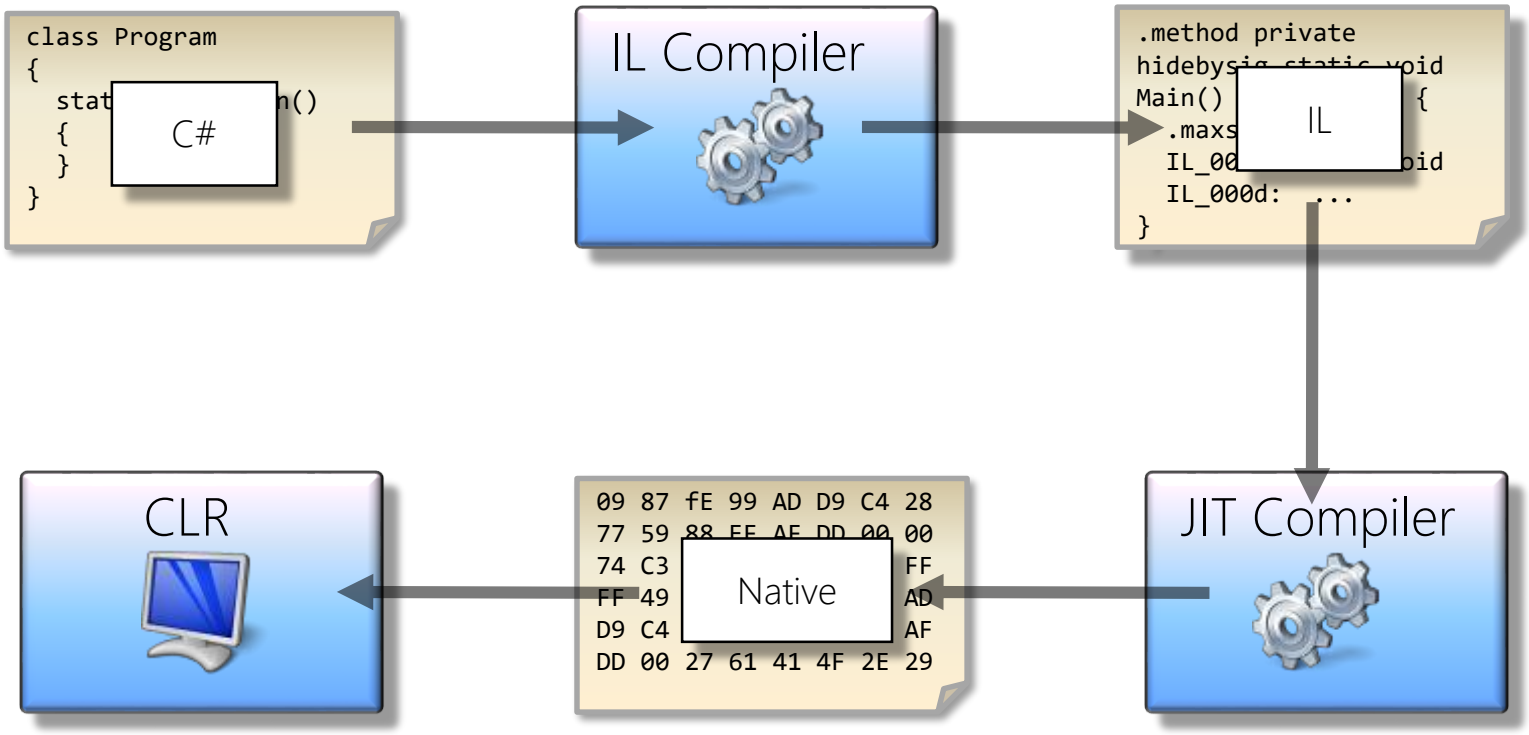
- The compilation and execution happen in multiple steps



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.NET Programming Languages

- C#
- VB.NET
- C++/CLI
- F#

- Third-party languages

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The C# Language

- The language for the .NET Framework!
- New and very powerful object-oriented language inspired by C, C++, and Java
  - C/C++ syntax
  - Java paradigms
- Type-safe, easy-to-use, and very elegant

- Created exclusively for the .NET Framework by Anders Hejlsberg
- Evolves all the time with the trends of the development community

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The Evolution of .NET and C#

- Major .NET and C# releases

Year	.NET	Visual Studio	C#
2002	1.0	Visual Studio .NET	1.0
2003	1.1	Visual Studio 2003	-
2005	2.0	Visual Studio 2005	2.0
2006	3.0	-	-
2007	3.5	Visual Studio 2008	3.0
2010	4.0	Visual Studio 2010	4.0
2012	4.5	Visual Studio 2012	5.0

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“Hello, World” in C#

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```
using System;

namespace SimpleCSharpApp
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine( "Hello, World from C#" );
        }
    }
}
```

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Basic Structure

- A C# application can consist of many files, usually **`.cs`**-files
- A C# program consists of classes, structures, and other types
- The '**`{`**' and '**`}`**' characters are the foundational block delimiters
- The '**`;`**' character separates statements of the language, if needed
- A class is a unit of data members and "methods"
- *Classes will be treated in much more details later*

The `Main()` Method

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- The **`Main()`** method has a special meaning
  - When the program starts, **`Main()`** is executed
  - When **`Main()`** finishes execution, the program terminates
- Multiple classes can each have a **`Main()`** method
  - Designate a unique **`Main()`** as the entry point
- Declare **`Main()`** to be **`static void Main`**
- Note that C# is
  - Case-sensitive!
  - Whitespace-insensitive!

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Namespaces and `using`

- .NET comes equipped with thousands of classes organized into namespaces
  - **`System`** is the main namespace with core functionality
- Classes are referred to by their namespace

```
System.Console.WriteLine( "Hello, World from C#" );
```

- Using statements brings classes into scope

```
using System;

Console.WriteLine( "Hello, World from C#" );
```

Creating a C# Project in Visual Studio 2012

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- Projects and Solutions in Visual Studio 2012
  - Solution Explorer
    - Solutions
    - Projects
    - Files
- A brief overview of Visual Studio 2012 features and contents
  - Common development environment for
    - Programming languages
    - Project types
    - Data sources
    - …
- Compiling a simple C# program
- Locating errors
- Running programs with or without the Visual Studio debugger

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Introducing the `System.Console` Class

- Appropriate for "Console Applications"
- Write output to the screen by
  - `Console.Write()`
  - `Console.WriteLine()`
- These methods are overloaded
- Read from the keyboard via
  - `Console.Read()`
  - `Console.ReadLine()`
- Console in fact supports colors!

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Formatting Console Output

- Use **{0}**, **{1}**, **{2}** etc. as placeholders for **Console.WriteLine()**

```
Console.WriteLine(
   "My favorite number is {0}. Not {1}",
   87, 42
);
```

```
My favorite number is 87. Not 42
```

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Formatting Numerical Data

- The placeholder can be further refined by
  - '**C** 'or '**c**' Currency
  - '**D**' or '**d**' Decimal numbers
  - '**E**' or '**e**' Exponential notation
  - '**F**' or '**f**' Floating point
  - '**N**' or '**n**' Number
  - '**X**' or '**x**' Hexadecimal

```
Console.WriteLine(
   "My favorite number
    is {0:x}",
   87);
```

```
My favorite number is 57
```

- Precision of formatting can be specified after the format character

```
Console.WriteLine( "Pi is {0:f2}", Math.PI );
```

- Strings can be formatted in a similar fashion using **`string.Format()`**

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Comments

- Remember to write your comments when you write your code!
- Single-line comments

```
// Input the user's name
Console.WriteLine( "Please input your name: " );
string name = Console.ReadLine();
```

- Multi-line comments

```
/* In the section below, we iterate through the
  list of all the elements. We then compute their
  values one-by-one before returning the overall
  value */
DoStuff();
```

XML Documentation

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- Use /// to generate XML comments

```
/// <summary>
/// This is an example program for use with
/// the “Programming in C# 5.0" course.
/// </summary>
class Program
{
   /// <summary>
   /// This is the entry point of the application.
   /// </summary>
   /// <param name="args">Command-line arguments
   /// supplied to the application</param>
   static void Main( string[] args )
   {
      Console.WriteLine( ... );
   }
}
```

The Integrated .NET Framework Documentation System

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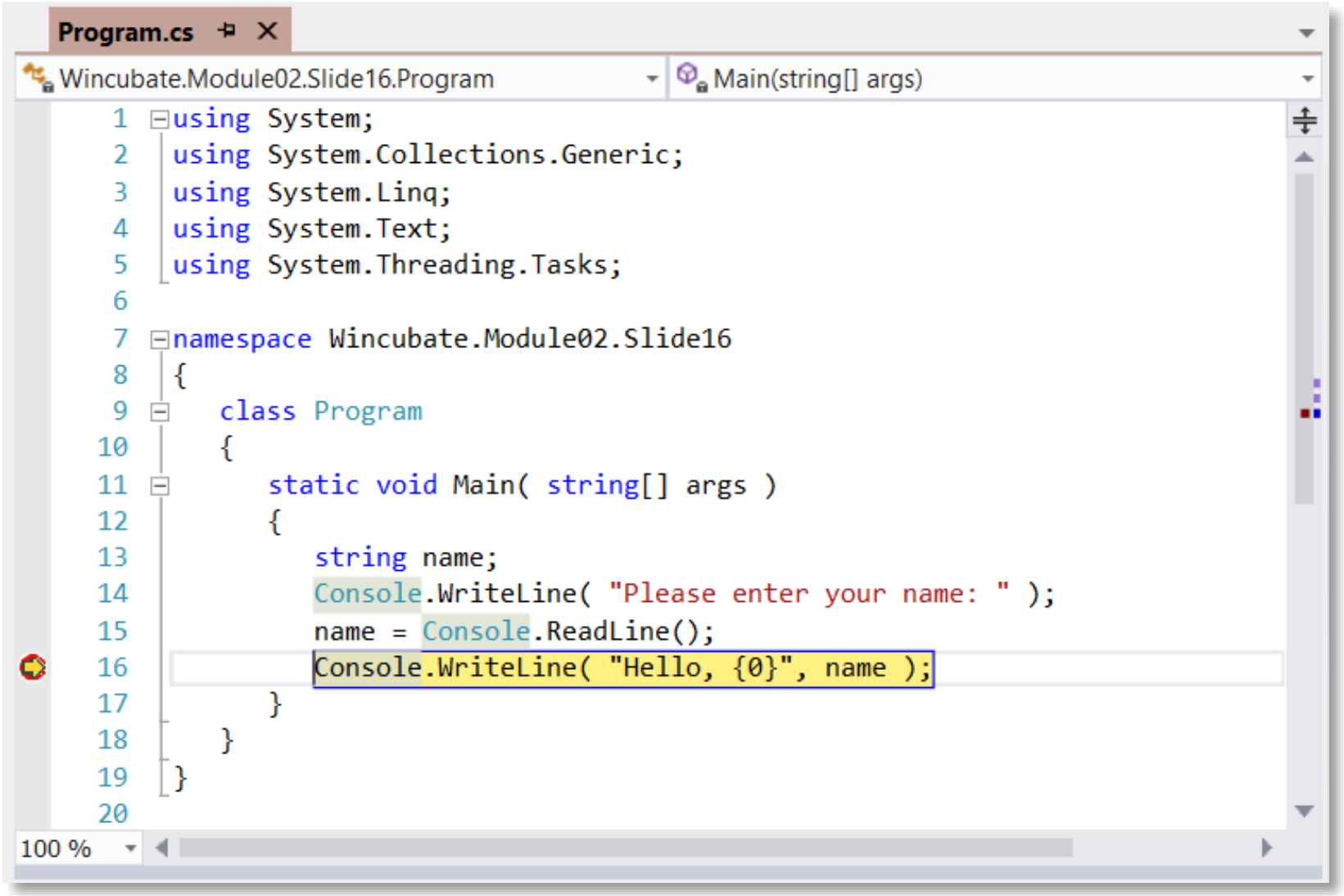
- Extremely valuable documentation while programming
- A must to use for any programmer!

- "HELP" menu item in Visual Studio 2012
- Press F1 on C# keyword or .NET type

Using the Visual Studio 2012 Debugger



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Customizing Visual Studio 2012

- Tools -> Options
- Millions of commands and shortcuts
  - Shortcuts can be (re)defined at will
- Customizations
- Code Snippets
- Extensions and Updates

- Old, but still very good: "Sara Ford's Tips 'n Tricks"
  - http://channel9.msdn.com/Blogs/NicFill/Sara-Fords-101-Visual-Studio-Tips-in-55-Minutes-Challenge

- Reset everything(!) with
  - devenv /ResetSettings

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Summary

- C# 5.0 and The .NET 4.5 Framework
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Question

- What will be written to the Console when executing the following statements?

```
string s = "\"Hello\"";
Console.WriteLine( @"{0}, {1}", s, "world!" );
```

a) Compile-time error
b) Runtime error
c) `"Hello", world!`
d) `\"Hello\", world!`

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