



Introduction to Programming

Creating and Running Your First C# Program

C# Fundamentals

Telerik Software Academy

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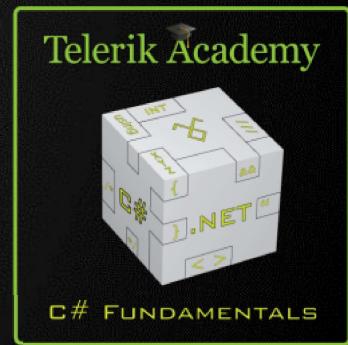
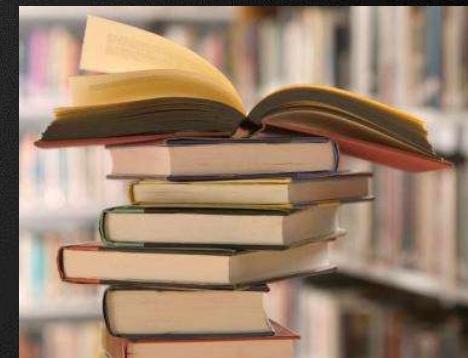




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- What is Computer Programming?
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- What is .NET Framework?
- What is Visual Studio?
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What is Computer Programming?



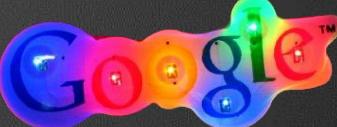
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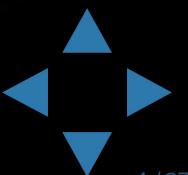
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Define: Computer Programming

- Computer programming: creating a sequence of instructions to enable the computer to do something
 - Definition by The Google logo, which consists of the word "Google" in its signature multi-colored, rounded font, with a small "TM" symbol at the end.

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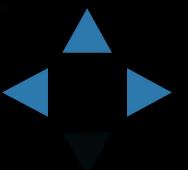
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Programming Phases

- Define a task/problem = Specification
- Plan your solution = Design
 - Find suitable algorithm to solve it
 - Find suitable data structures to use
- Write code = Implementation
- Fix program error (bugs) = Testing & Debugging
- Make your customer happy = Deployment

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Your First C# Program



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First Look at C# Language

- Sample C# program:

```
using System;

class HelloCSharp
{
    static void Main()
    {
        Console.WriteLine("Hello, C#");
    }
}
```

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C# Code – How It Works?

```
using System;
```

Include the standard namespace System

```
class HelloCSharp
```

```
{
```

```
    static void Main()
```

```
{
```

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

```
}
```

```
}
```

Define a class called HelloCSharp

Define the Main() method – the program entry point

Print a text on the console by calling the method WriteLine of the class Console

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Telerik Academy C# Code Should Be Well Formatted

```
using System;

class HelloCSharp
{
    static void Main()
    {
        Console.WriteLine("Hello, C#");
    }
}
```

1. The { symbol should be alone on a new line
2. The block after the { symbol should be indented by a TAB
3. The } symbol should be under the corresponding {
4. Class names should use **PascalCase** and start with a **CAPITAL** letter

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Example of Bad Formatting

- Don't do this!

```
using
System
;

class      HelloCSharp
{
    static
void   Main()
{
    WriteLine("Hello, C#")
    WriteLine(
        ) { Console.
        "Hello again"
    }
}
```

Such formatting makes the source code unreadable.

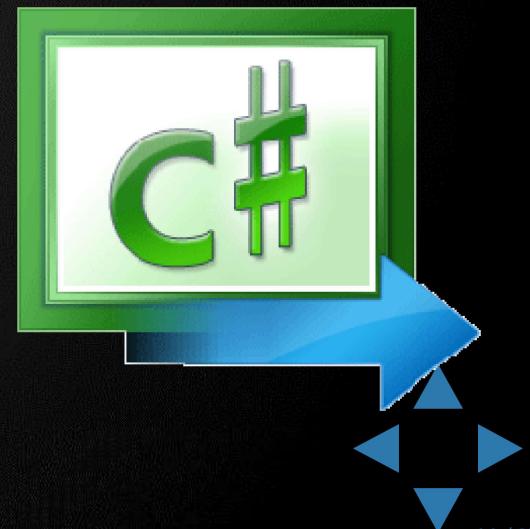
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What is "C#"?

- A programming language
 - A syntax that allow to give instructions to the computer
- C# features:
 - Cutting edge language
 - Extremely powerful
 - Easy to learn
 - Easy to read and understand
 - Object-oriented



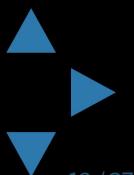
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What You Need to Program?

- Knowledge of a programming language
 - C#, Javascript, C++, Java, Python, etc
- Task to solve
- Development environment, compilers, SDK
 - For C# - VisualStudio, .NET Framework SDK
- Set of useful standard classes
 - Microsoft .NET Framework FCL
- Help documentation
 - MSDN Library



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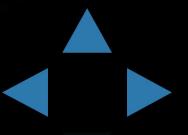




Your First C# Program

Demo

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What is .NET Framework?



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What is .NET Framework?

- Environment for execution of .NET programs
- Powerful library of classes
- Programming model
- Common execution engine for many programming languages
 - C#
 - F#
 - Visual Basic .NET
 - Managed C++
 - ... and many others



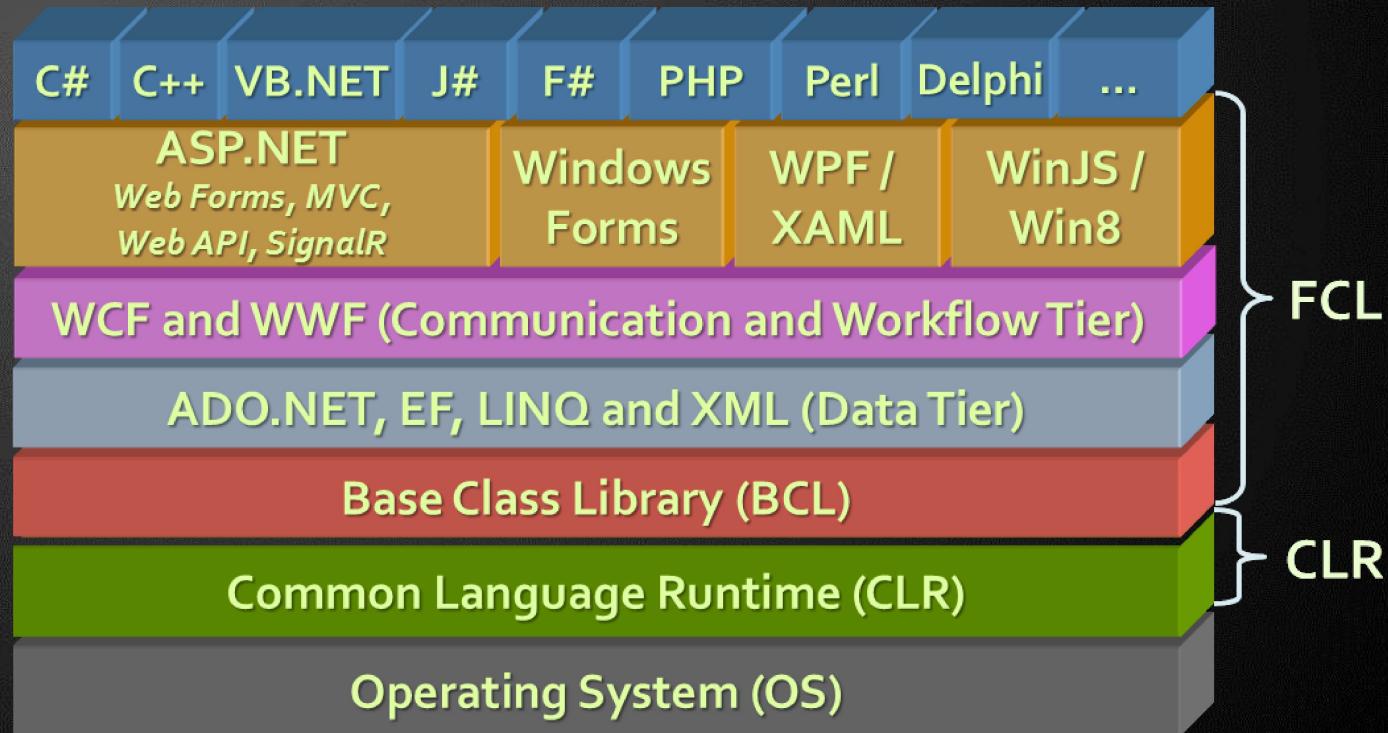
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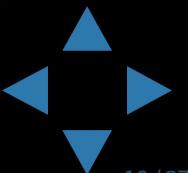


Inside .NET Framework

- Building blocks of .NET Framework



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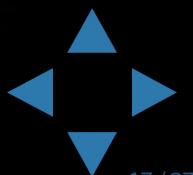


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CLR – The Heart of .NET Framework

- Common Language Runtime (CLR)
 - Managed execution environment
 - Executes .NET applications
 - Controls the execution process
 - Automatic memory management (garbage collection)
 - Programming languages integration
 - Multiple versions support for assemblies
 - Integrated type safety and security



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Framework Class Library

- Framework Class Library (FCL)
 - Provides basic functionality to developers:
 - Console applications
 - WPF and Silverlight rich-media applications
 - Windows Forms GUI applications
 - Web applications (dynamic Web sites)
 - Web services, communication and workflow
 - Server & desktop applications
 - Applications for mobile devices

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What is Visual Studio?

Compiling, Running and Debugging C# Programs

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Visual Studio

- Visual Studio is an Integrated Development Environment (IDE)
- Development tool that helps us to:
 - Write code
 - Design user interface
 - Compile code
 - Execute / test / debug applications
 - Browse the help
 - Manage project's files



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Benefits of Visual Studio

- Single tool for:
 - Writing code in many languages (C#, VB, ...)
 - Using different technologies (Web, WPF, ...)
 - For different platforms (.NET CF, Silverlight, ...)
- Full integration of most development activities (coding, compiling, testing, debugging, deployment, version control, ...)
- Very easy to use!



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Visual Studio - Example

The screenshot shows the Microsoft Visual Studio interface during a debugging session. The main window displays the C# code for a program named 'IsPrime'. The code prompts the user to enter a positive integer, initializes variables, and then uses a while loop to check if the number is divisible by any integer from 2 to its square root. If it finds a divisor, it sets a boolean flag to false and exits the loop. The current line of code being executed is highlighted at line 17: `prime = false;`. The 'Solution Explorer' pane on the right shows the project structure for 'Loops-Demos' with multiple files listed under '02. IsPrime'. The 'Call Stack' window at the bottom indicates that the program is currently executing at line 17 of the Main() method.

```
02. IsPrime
static void Main()
{
    Console.WriteLine("Enter a positive integer number: ");
    string numberAsString = Console.ReadLine();
    uint number = uint.Parse(numberAsString);
    uint divider = 2;
    uint maxDivider = (uint) Math.Sqrt(number);
    bool prime = true;
    while (prime && (divider <= maxDivider))
    {
        if (number % divider == 0)
        {
            prime = false;
        }
        divider++;
    }
}
```

Name	Type	Value
divider	uint	3
number	uint	255
prime	bool	true

Call Stack

Name	Language
IsPrime.exe!IsPrime.Main() Line 17	C#
[External Code]	

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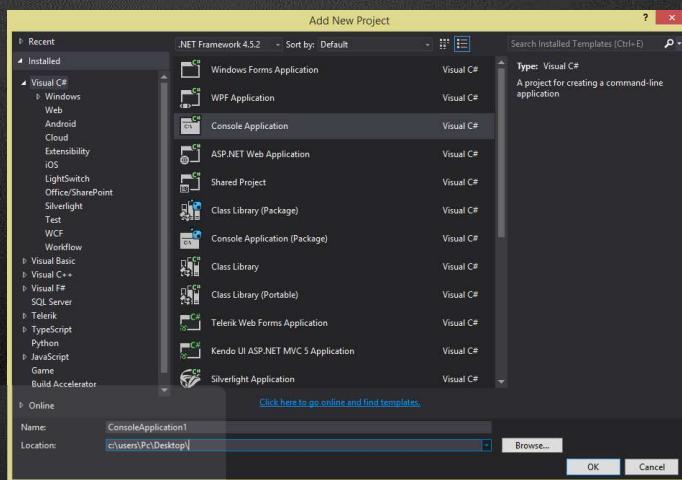


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Creating New Console Application

1. File → New → Project ...
2. Choose C# console application
3. Choose project directory and name



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Creating New Console Application

- Visual Studio creates some source code for you

A screenshot of Microsoft Visual Studio showing a new console application project named "FirstConsoleApp". The "Program.cs" file is open in the editor, displaying the following C# code:

```
1  using System;
2  using System.Collections.Generic;
3  using System.Linq;
4  using System.Text;
5  using System.Threading.Tasks;
6
7  namespace FirstConsoleApp
8  {
9      class Program
10     {
11         static void Main(string[] args)
12         {
13         }
14     }
15 }
16
```

A callout bubble with the text "Namespace not required" points to the line "namespace FirstConsoleApp". Another callout bubble with the text "Some usings are not required" points to the lines "using System;" through "using System.Threading.Tasks;". A third callout bubble with the text "Class name should be changed" points to the line "class Program".

FirstConsoleApp - Microsoft Visual Studio

File Edit View Telerik Project Build Debug Team Tools Test Analyze Window Help

Program.cs

FirstConsoleApp

Main(string[] args)

Some usings are not required

Namespace not required

Class name should be changed

References
App.config
Program.cs

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Compiling Source Code

- The process of **compiling** includes:
 - Syntactic checks
 - Type safety checks
 - Translation of the source code to lower level language (MSIL)
 - Creating of executable files (assemblies)
- You can start compilation by
 - Using **Build->Build Solution/Project**
 - Pressing **[F6]** or **[Shift+Ctrl+B]**

```
0. 0      eax_0.4, v2.4
1. 0      mov    #0xFFFFFFFF.4, v1.4
2. 0      jz     v1.4, @5
3. 0      setz   [es.2:v2.4]-1, v4.1
3. 1      add    v2.4, #1.4, v2.4
3. 2      sub    v1.4, #1.4, v1.4
3. 3      jz     v4.1, @5
4. 0      goto   @2
5. 0      bnot   v1.4, result.4
6. 0
```



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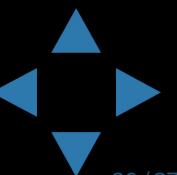




Running Programs

- The process of running application includes:
 - Compiling (if project not compiled)
 - Starting the application
- You can run application by:
 - Using Debug->Start menu
 - By pressing [F5] or [Ctrl+F5]
 - Note: Not all types of projects are startable!

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Debugging The Code

- The process of **debugging** application includes:
 - Spotting an error
 - Finding the lines of code that cause the error
 - Fixing the code
 - Testing to check if the error is gone and no errors are introduced
- Iterative and continuous process

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Telerik Academy Debugging in Visual Studio

- Visual Studio has built-in debugger
- It provides:
 - Breakpoints
 - Ability to trace the code execution
 - Ability to inspect variables at runtime

The screenshot shows the Visual Studio IDE during debugging. The code editor displays a C# program with a breakpoint at line 16. The Autos window shows variables n (Value: 10) and number (Value: 1). The Call Stack window shows the current call stack entry: Sum.exe!Sum.Main() Line 16 [External Code]. The Solution Explorer and Team Explorer tabs are visible at the bottom.

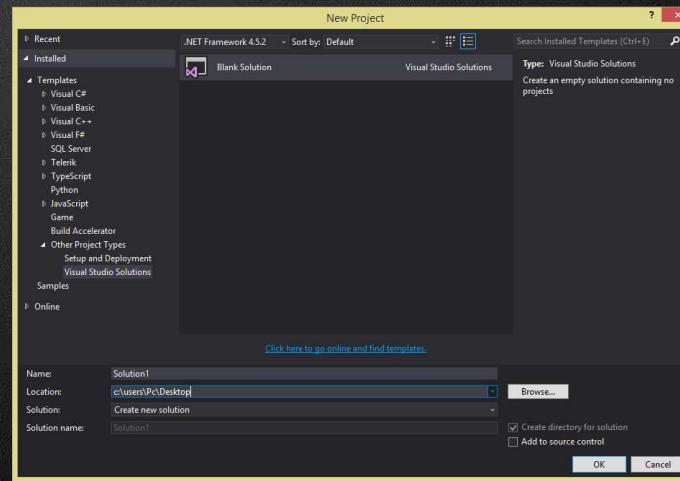
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Visual Studio Blank Solution

Creating a Solution Without Projects



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What Is a Blank Solution?

- A Visual Studio blank solution
 - Solution with no projects in it
 - Projects to be added later
- What is the point?
 - Not making a project just to give proper name
 - And not working in this project

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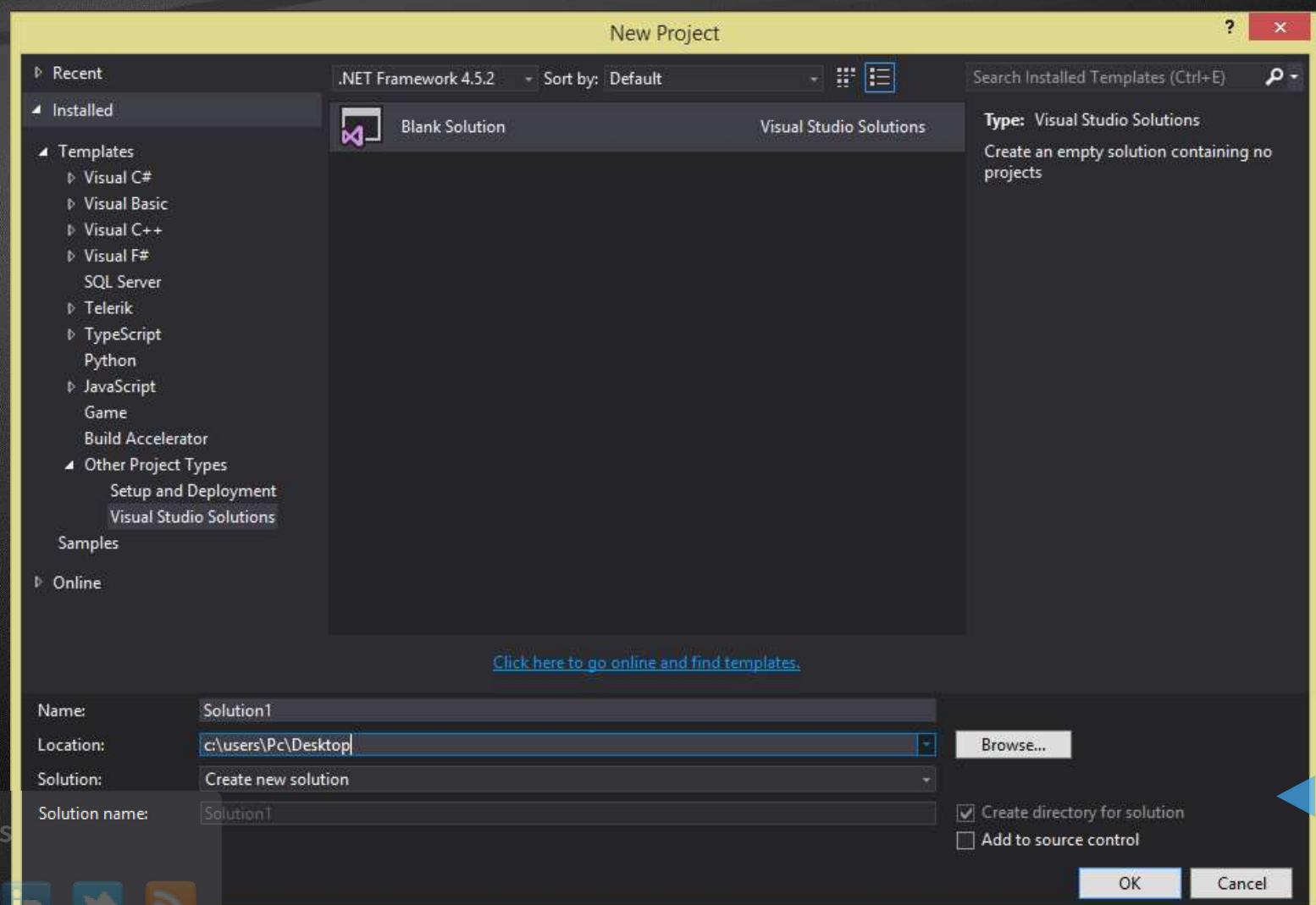


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VS Blank Solution



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What is MSDN Library?

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What is MSDN Library?

- Complete documentation of all classes and their functionality
 - With descriptions of all methods, properties, events, etc.
 - With code examples
- Related articles
- Library of samples
- Use local copy or the Web version at
<http://msdn.microsoft.com/>



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The screenshot shows the homepage of the MSDN Library website. At the top left is the Telerik Academy logo. On the right, the word "MSDN Library" is displayed in large, bold, yellow-green letters. The main navigation bar includes links for Microsoft, Developer Network, Technologies, Downloads, Programs, Community, Documentation, Samples, Sign in, MSDN subscriptions, and Get tools. A search bar is also present.

A large banner on the left features a blue illustration of the Golden Gate Bridge over clouds. Below it, text reads "Build 2016: Live stream next week" and "Mark your calendars: It all starts March 30th".

On the right side, there are two sections: "Downloads and tools for Windows 10" (with a link to "Get the tools you need to build for Windows 10") and "Introduction to the Universal Windows Platform" (with a link to "Read the guide to learn more about UWP apps").

Below these sections are five categories with icons: App Development (monitor and smartphone), Game Development (game controller), Web Development (book icon), Dev Centers (gears), and MSDN Subscriptions (checkmark). Each category has a corresponding link below it.

At the bottom, there are three video thumbnail sections labeled "Resources": one showing two men talking, another showing two men looking at a screen, and a third showing a person interacting with a 3D city model on a tablet. A "Training" section is also visible.

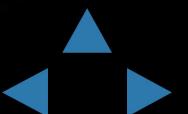
The footer features a "Follow us" section with social media icons for Facebook, YouTube, Google+, LinkedIn, Twitter, and RSS, along with a graduation cap icon. A navigation arrow icon is located in the bottom right corner, and the page number "34 / 37" is shown.



How to Use MSDN Library?

- Offline version (obsolete)
 - Use the table of contents
 - Use the alphabetical index
 - Search for phrase or keyword
 - Filter by technology
 - Browse your favorite articles
- Online version
 - Use the built-in search: [F1]

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