KHARKIV NATIONAL UNIVERSITY OF RADIO ELECTRONICS

# INFORMATICS

# LABORATORY WORK #2

## SIMPLE C# PROGRAMS

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# Simple C# programs

**Objective**: writing and compiling simple C# programs[1].

For creation a source code[2] files use:

- ✓ **MS NotePad;**
- ✓ **MS Visual C# 2010 Express;**
- ✓ **MS Visual Studio 2010;**
- ✓ **SharpDevelop.**

***Theory part***

## WHAT IS VISUAL STUDIO 2010? WHAT ABOUT VISUAL C#?

The first "Visual" language from Microsoft was Visual Basic. The first popular C-based language from Microsoft was Visual C++. Like Visual Basic, it had Visual in its name because it had a built-in **graphical user interface** (**GUI** — pronounced "GOO-ee"). This GUI included everything you needed to develop C++ programs.

Eventually, Microsoft rolled all its languages into a **single environment** — **Visual Studio**. As Visual Studio 6.0 started getting a little long in the tooth, developers anxiously awaited version 7. Shortly before its release, however, Microsoft decided to rename it Visual Studio .NET to highlight this new environment's relationship to .NET.

Visual Studio .NET differed quite a bit from its predecessors — enough to warrant a new name. **Visual Studio 2010 is the third-generation successor to the original Visual Studio .NET**.

[1] A **computer program** (or just a **program**) is a sequence of instructions written to perform a specified task with a computer. A computer requires programs to function, typically executing the program's instructions in a central processor. The program has an **executable form** that the computer can use directly to execute the instructions. The same program in its human-readable source code form, from which executable programs are derived (e.g., compiled), enables a programmer to study and develop its algorithms.

[2] In computer science, **source code** is any collection of computer instructions (possibly with comments) written using some human-readable computer language, usually as text. The source code is automatically translated at some point to machine code that the computer can directly read and execute.

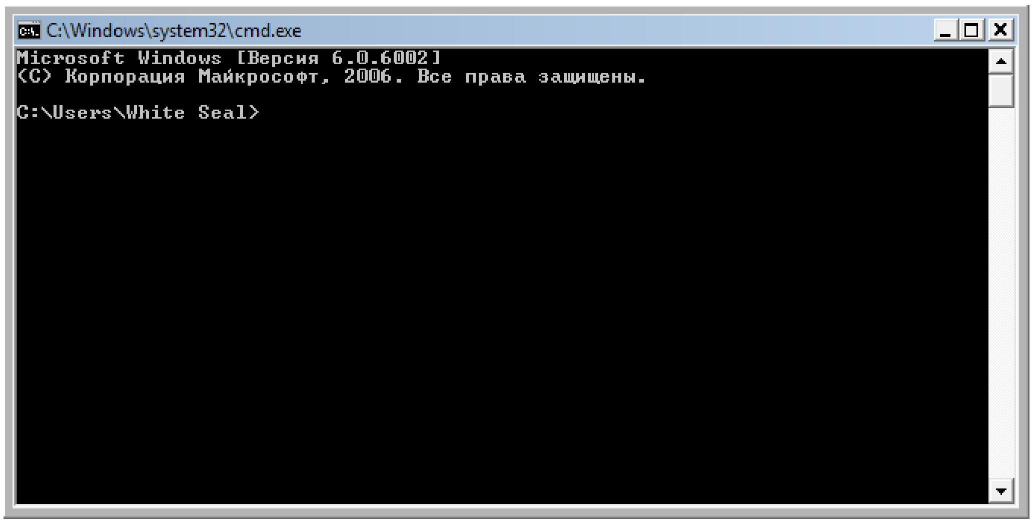
Microsoft calls its implementation of the language **Visual C#**. In reality, Visual C# is nothing more than the **C# component of Visual Studio**. C# is C#, with or without Visual Studio.

## Creating Your First Console Application

**Visual Studio 2010** includes an **Application Wizard** that builds template programs and saves you a lot of the dirty work you'd have to do if you did everything from scratch.

Typically, starter programs don't really do anything — at least, not anything useful. However, they do get you beyond that initial hurdle of getting started. Some starter programs are reasonably sophisticated. In fact, you'll be amazed at how much capability the App Wizard can build on its own, especially for graphical programs.

This starter program isn't even a graphical program, though. **A *console* application**[3] is one that runs in the **"console" within Windows**, usually referred to as the DOS prompt or command window. If you press **Ctrl+R** and then type `cmd`, you see a **command window**. **It's the console where the application will run (see Fig.1)**.



```
Microsoft Windows [Версия 6.0.6002]
(C) Корпорация Майкрософт, 2006. Все права защищены.

C:\Users\White Seal>
```

**Figure 1 Command window**

[3] A ***console application*** is a computer program designed to be used via a text-only computer interface, such as a text terminal, the command line interface of some operating systems (Unix, DOS, etc.) or the text-based interface included with most GUI operating systems, such as the Win32 console in Microsoft Windows, the Terminal in Mac OS X, and xterm in Unix. A user typically interacts with a console application using only a keyboard and display screen, as opposed to GUI applications, which normally require the use of a mouse or other pointing device.

The following instructions are for Visual Studio. If you use anything other than Visual Studio, you have to refer to the documentation that came with your environment. Alternatively, you can just type the source code directly into your C# environment.

## CREATING THE SOURCE PROGRAM

To start Visual Studio, choose **Start** ➪ **All Programs** ➪ **Microsoft Visual Studio 2010** ➪ **Microsoft Visual Studio 2010**.

Complete these steps to create your C# console app:

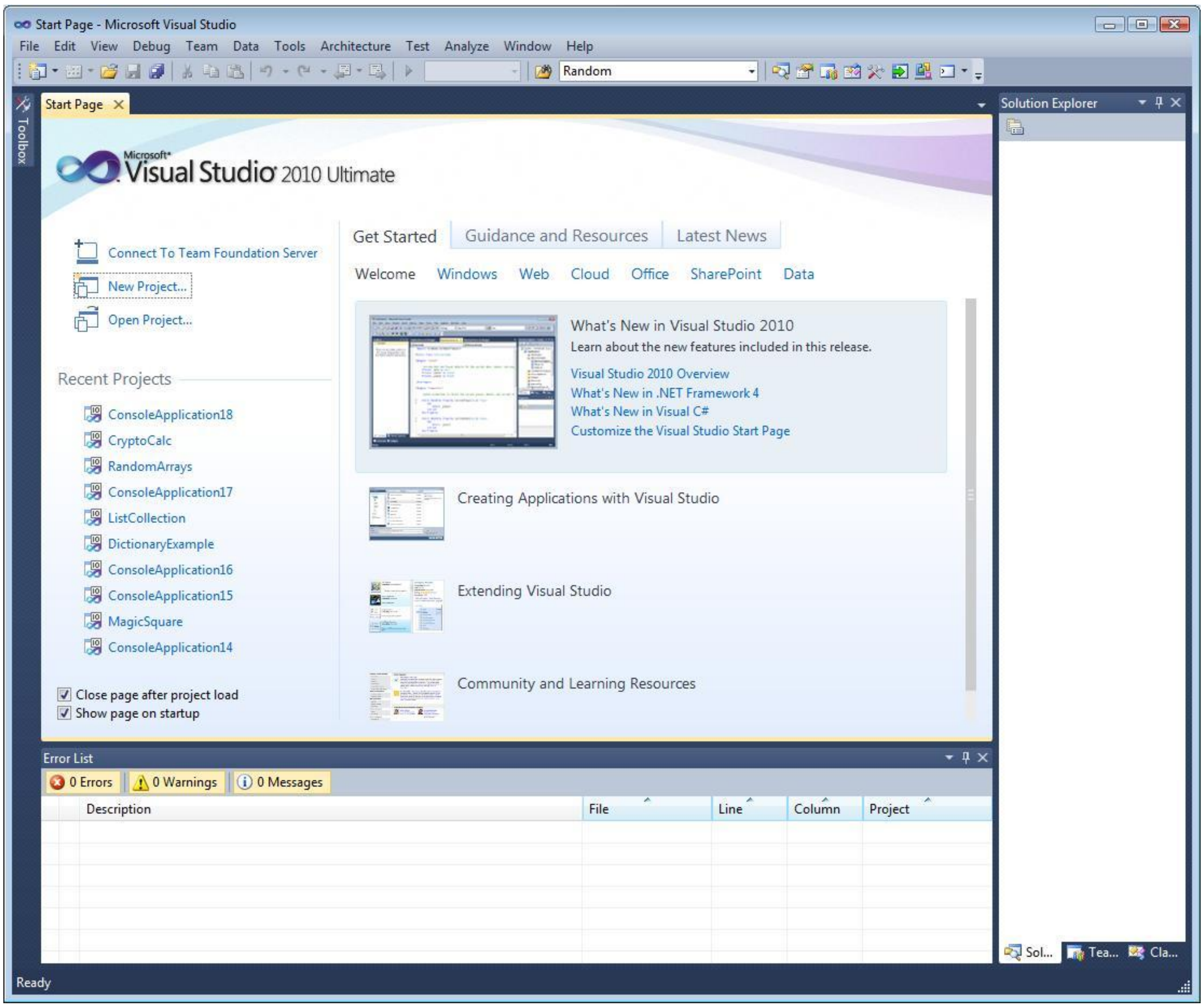
1. **Open Visual Studio 2010 and click the <u>New Project icon</u>, shown in Figure 2.** Visual Studio presents you with lots of icons representing the different types of applications you can create, as shown in **Figure 3**.

2. **In this New Project window, click the Console Application icon.** Make sure that you select **Visual C#** — and under it, Windows — in the Project Types pane; otherwise Visual Studio may create something like a Visual Basic or Visual C++ application. Then click the **Console Application icon** in the **Templates pane**.

Visual Studio requires you to create **a project** before you can start entering your C# program.

A **<u>project</u>** is a folder in which you throw all the files that go into making your program. It has a set of configuration files that help the compiler do its work. When you tell your compiler to build (***compile***) the program, it sorts through the project to find the files it needs in order to re-create the executable program.

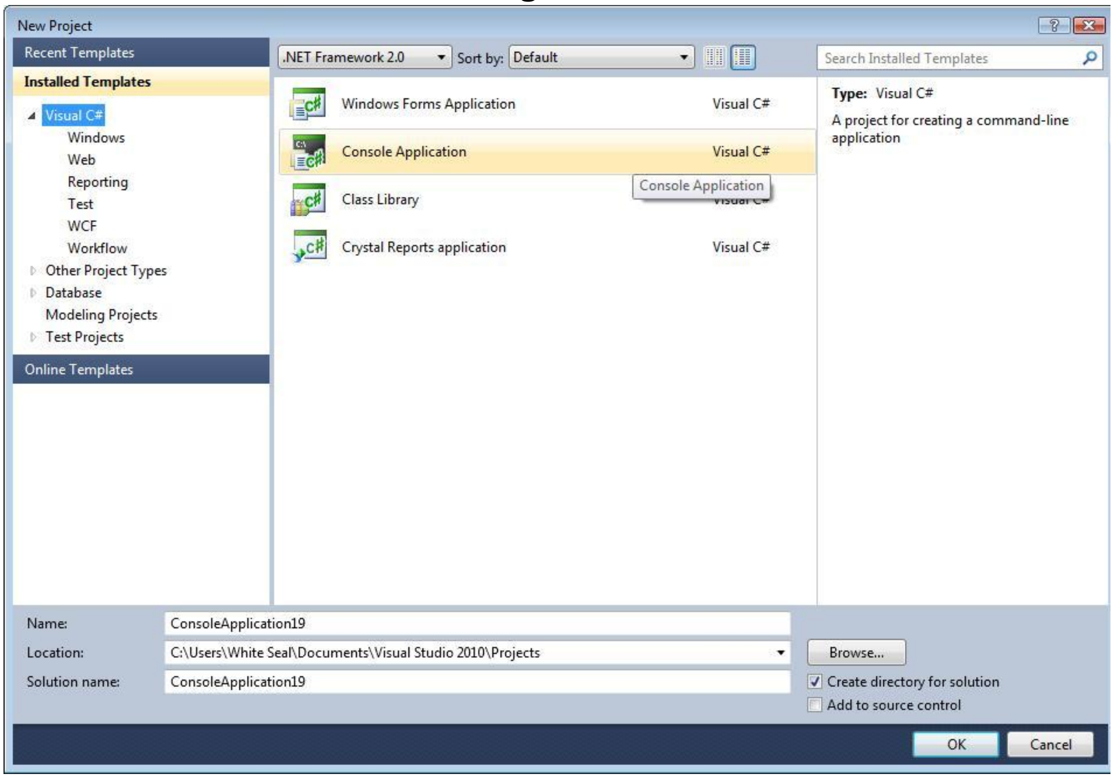
3. **The default name for your first application is ConsoleApplication1, but <u>change</u> it this time to** Program1 **by typing in the Name field.**


Start Page - Microsoft Visual Studio
File Edit View Debug Team Data Tools Architecture Test Analyze Window Help
Random
Toolbox
Start Page
Solution Explorer
Microsoft Visual Studio 2010 Ultimate
Connect To Team Foundation Server
New Project...
Open Project...
Get Started
Guidance and Resources
Latest News
Welcome Windows Web Cloud Office SharePoint Data
What's New in Visual Studio 2010
Learn about the new features included in this release.
Visual Studio 2010 Overview
What's New in .NET Framework 4
What's New in Visual C#
Customize the Visual Studio Start Page
Creating Applications with Visual Studio
Extending Visual Studio
Community and Learning Resources
Recent Projects
ConsoleApplication18
CryptoCalc
RandomArrays
ConsoleApplication17
ListCollection
DictionaryExample
ConsoleApplication16
ConsoleApplication15
MagicSquare
ConsoleApplication14
Error List
Description File Line Column Project
Sol... Tea... Cla...
Ready

[✓] Close page after project load
[✓] Show page on startup

0 Errors | 0 Warnings | 0 Messages

**Figure 2**



.NET Framework 2.0 Sort by: Default

Type: Visual C#

A project for creating a command-line application

Name: ConsoleApplication19
Location: C:\Users\White Seal\Documents\Visual Studio 2010\Projects
Solution name: ConsoleApplication19

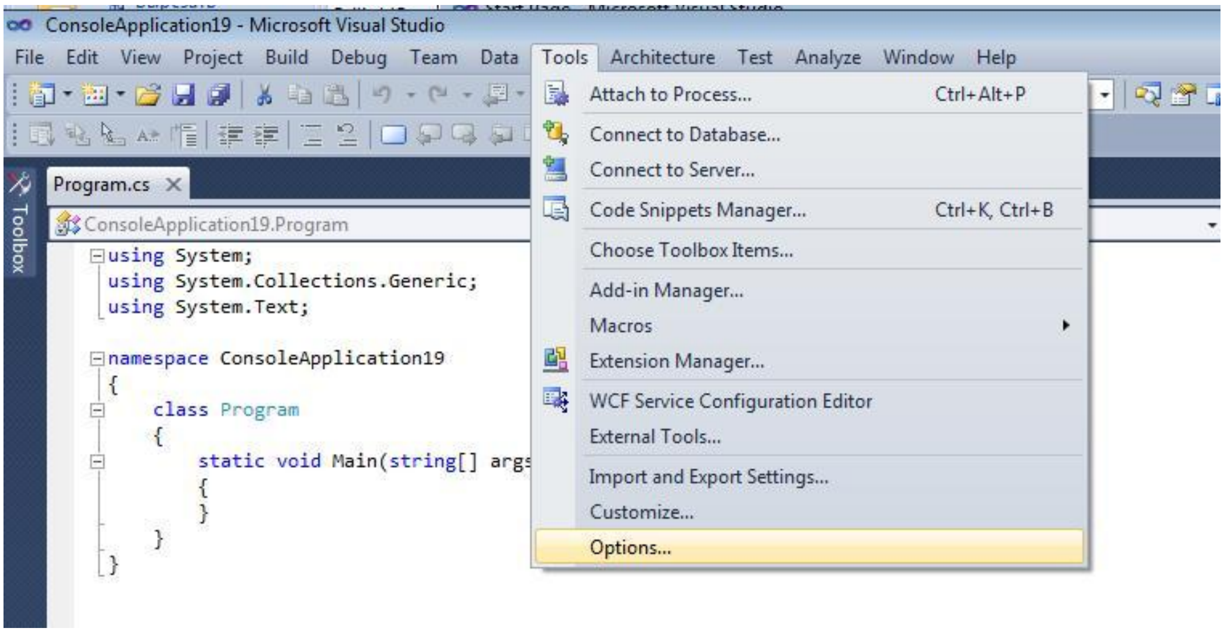
[✓] Create directory for solution
[ ] Add to source control

**Figure 3**

The default place to store this file is somewhere deep in your **Documents** directory. Put your programs where you want them to go, not necessarily where Visual Studio wants them. To simplify working, **you can change the default program location**. Follow these steps to make that happen:

*a. Choose* ***Tools➪Options****.*

The Options dialog box opens.

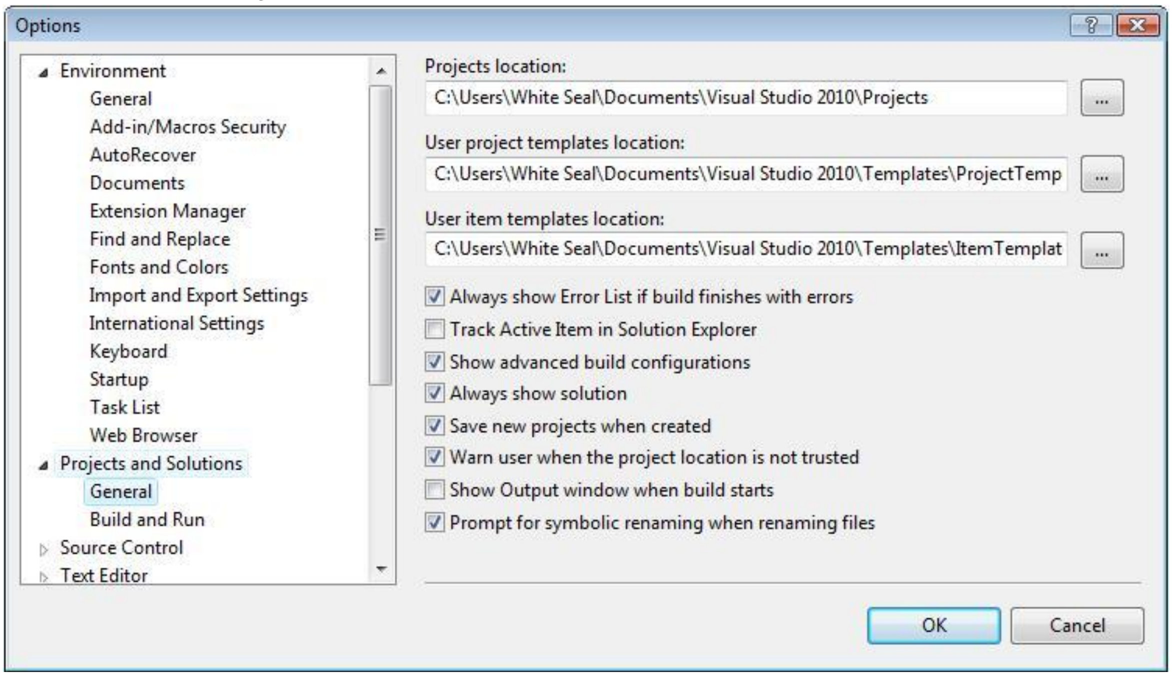


```
using System;
using System.Collections.Generic;
using System.Text;

namespace ConsoleApplication19
{
    class Program
    {
        static void Main(string[] args
        {
        }
    }
}
```

**Figure 4**

*b. Choose* ***Projects and Solutions➪General****.*



Projects location:
C:\Users\White Seal\Documents\Visual Studio 2010\Projects

User project templates location:
C:\Users\White Seal\Documents\Visual Studio 2010\Templates\ProjectTemp

User item templates location:
C:\Users\White Seal\Documents\Visual Studio 2010\Templates\ItemTemplat

- [✓] Always show Error List if build finishes with errors
- [ ] Track Active Item in Solution Explorer
- [✓] Show advanced build configurations
- [✓] Always show solution
- [✓] Save new projects when created
- [✓] Warn user when the project location is not trusted
- [ ] Show Output window when build starts
- [✓] Prompt for symbolic renaming when renaming files

**Figure 5**

*c. Select the new location in the* ***Projects Location field****, and click* ***OK****.*

(I recommend **C:\temp** for lab work in class.)

You can create the new directory in the **Projects Location** dialog box at the same time. Click the folder icon with a small sunburst at the top of the dialog box.

CLICK THE OK BUTTON

After these Visual Studio generates a file named `Program.cs`. (If you look in the window labeled **Solution Explorer**, you see some other files; ignore them for now. If Solution Explorer isn't visible, choose View➪Solution Explorer.)

**C# source files carry the extension[4] `.cs`**. The name `Program` is the default name assigned for the program file.

The contents of your first console app appear this way:

```
using ...
namespace Program1
{
    class Program
    {
        static void Main(string[] args)
        {

        }
    }
}
```

Along the left edge of the code window, you see several small plus (+) and minus (–) signs in boxes. Click the + sign next to `using` .... This expands a *code region,* a handy Visual Studio feature that minimizes clutter. Here are the directives that appear when you expand the region in the default console app:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
```

To execute the program, choose **Debug[5]➪Start**. The program brings up a **black console window and terminates immediately**. (If you have a fast computer, the appearance of this window is just a flash on the screen.)

[4] A **filename extension** is a suffix (separated from the base filename by a dot) to the name of a computer file applied to indicate the encoding (file format) of its contents or usage. Examples of filename extensions are .png, .jpeg, .exe, .dmg and .txt.

An alternative command, **Debug➪Start Without Debugging**.

## WHAT IS THE SHARPDEVELOP?

**SharpDevelop** (also styled as **#develop**) is a free and open source integrated development environment (IDE) for the Microsoft .NET, Mono, Gtk# and Glade# platforms, and supports development in C#, Visual Basic .NET, Boo, F#, IronPython and IronRuby programming languages.

**It was designed as a free and lightweight alternative to Microsoft Visual Studio**, **and contains an equivalent feature for almost every essential Visual Studio Express feature**, including features for project management, code editing, application compiling[6] and debugging. To allow for easy project migration, SharpDevelop works natively with Visual Studio project and code files. It is able to compile applications for .NET Framework version 2.0, 3.0, 3.5, 4.0 and the .NET Compact Framework 2.0 and 3.5.

Although not as widespread as the Visual Studio line of products, SharpDevelop is fairly popular and has been downloaded at least 6 million times worldwide.

SharpDevelop is written entirely in C# and consists of about 20 components that integrate to form the application. The source code editor component is known as AvalonEdit and can be utilized by others applications. Early in its development the project was split for Mono and Gtk# development into the MonoDevelop project.

### Features

SharpDevelop includes features very similar to those found in Visual Studio, or Delphi/Kylix, including a GUI Designer, Code/Design views, Syntax highlighting, Auto completion menus (similar to IntelliSense) the ability to compile and debug form/console .NET Framework applications, the **New Project** wizard, **Toolbars**, **Menus**, **Panels**, and a **Panel docking system**.

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[5] **Debugging** is a methodical process of finding and reducing the number of bugs, or defects, in a computer program or a piece of electronic hardware, thus making it behave as expected.

[6] A **compiler** is a computer program (or set of programs) that transforms source code written in a programming language (the source language) into another computer language (the target language, often having a binary form known as object code). **The most common reason for wanting to transform source code is to create an executable program**.

SharpDevelop integrates **Graphic User Interface Designers** for the C#, VB.NET, Boo, and the IronPython and IronRuby languages, using the following GUI technologies:

- ✓ Windows Forms;
- ✓ Windows Presentation Foundation (WPF);
- ✓ Entity Framework.

## ***Practice part***

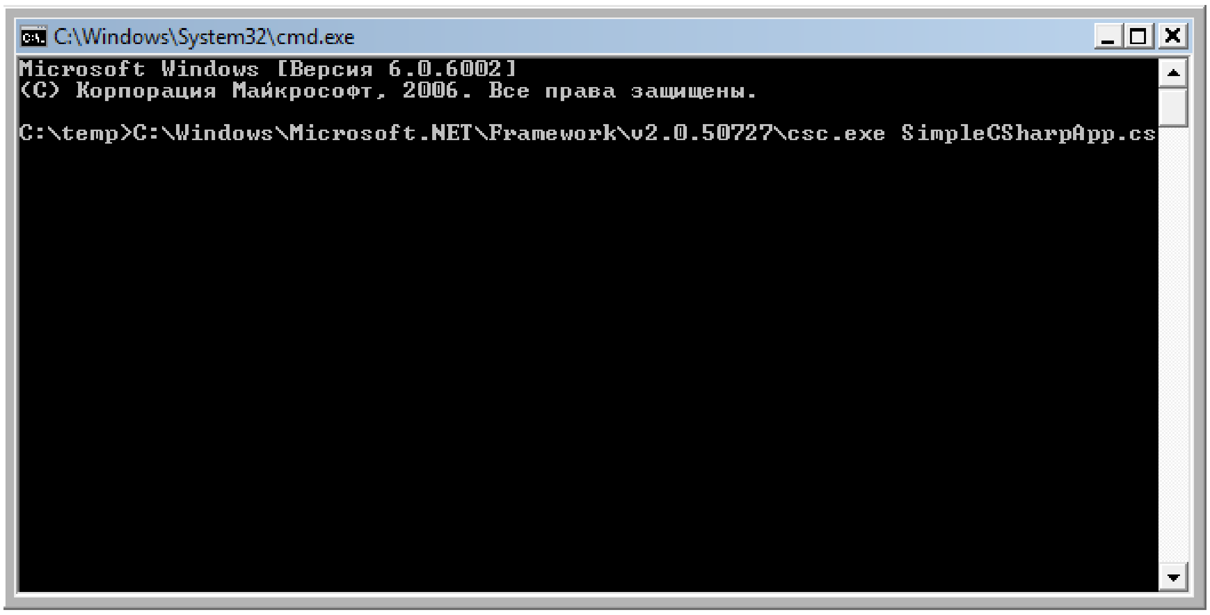
1. First program create using **MS NotePad** and save in **C:\temp** directory with new name (change default name to another with `.cs` extension):

```
using System;
using System.Collections.Generic;
using System.Text;

namespace SimpleCSharpApp
{
    class Program
    {
        static void Main()
        {
        //Display a simple message to the user.
        Console.WriteLine("***** My First C# App *****");
        Console.WriteLine("Hello World!");
        Console.WriteLine();

        //Wait for Enter key to be pressed before shutting down.
        Console.ReadLine();
        }
    }
}
```

Step by step:

1. Source code creation (Visual Studio or NotePad).
2. Compile your code with C# compiler **csc.exe** (check Environment Variable **path**, if you need specify **path**).
3. Run program.

After source code creation open **command window** (`cmd`) in directory you work in **(C:\temp)**.
Path to compiler:
**C:\Windows\Microsoft.NET\Framework\v2.0.50727\csc.exe**
**How to compile**: type path to compiler in command window and full name of source code file (see **Fig. 6**) and press **Enter** key.

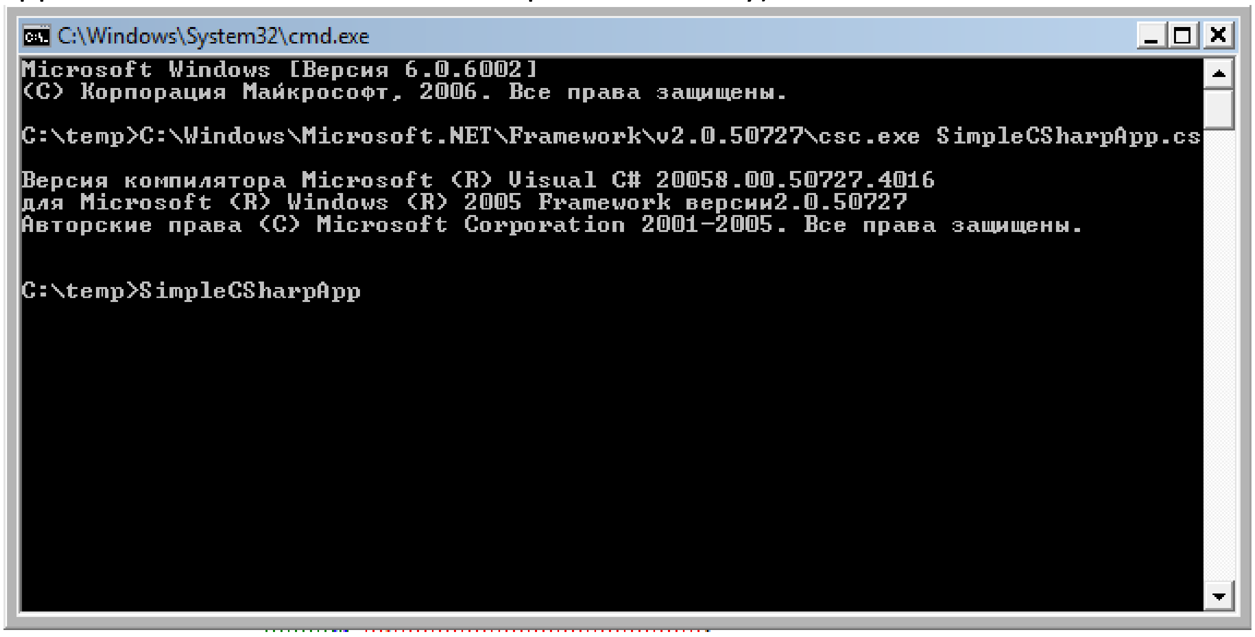


```
C:\Windows\System32\cmd.exe
Microsoft Windows [Версия 6.0.6002]
(C) Корпорация Майкрософт, 2006. Все права защищены.

C:\temp>C:\Windows\Microsoft.NET\Framework\v2.0.50727\csc.exe SimpleCSharpApp.cs
```

**Figure 6**

If you don’t have any errors in **C:\temp** directory will be created **.exe** file – your application that can be executed.

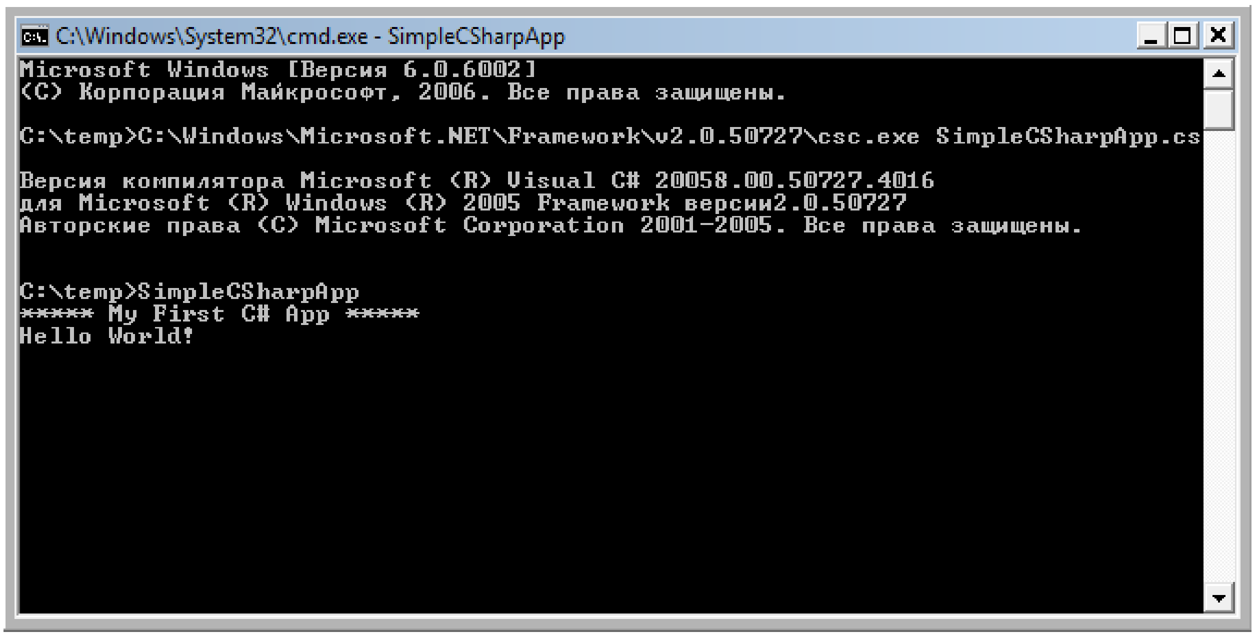
Execute your program in command window (type the name of your console application without extension and press **Enter** key):



```
C:\Windows\System32\cmd.exe
Microsoft Windows [Версия 6.0.6002]
(C) Корпорация Майкрософт, 2006. Все права защищены.

C:\temp>C:\Windows\Microsoft.NET\Framework\v2.0.50727\csc.exe SimpleCSharpApp.cs

Версия компилятора Microsoft (R) Visual C# 20058.00.50727.4016
для Microsoft (R) Windows (R) 2005 Framework версии2.0.50727
Авторские права (C) Microsoft Corporation 2001-2005. Все права защищены.


C:\temp>SimpleCSharpApp
```

**Figure 7**

Final screenshot:



```
Microsoft Windows [Версия 6.0.6002]
(C) Корпорация Майкрософт, 2006. Все права защищены.

C:\temp>C:\Windows\Microsoft.NET\Framework\v2.0.50727\csc.exe SimpleCSharpApp.cs

Версия компилятора Microsoft (R) Visual C# 20058.00.50727.4016
для Microsoft (R) Windows (R) 2005 Framework версии2.0.50727
Авторские права (C) Microsoft Corporation 2001-2005. Все права защищены.


C:\temp>SimpleCSharpApp
***** My First C# App *****
Hello World!
```

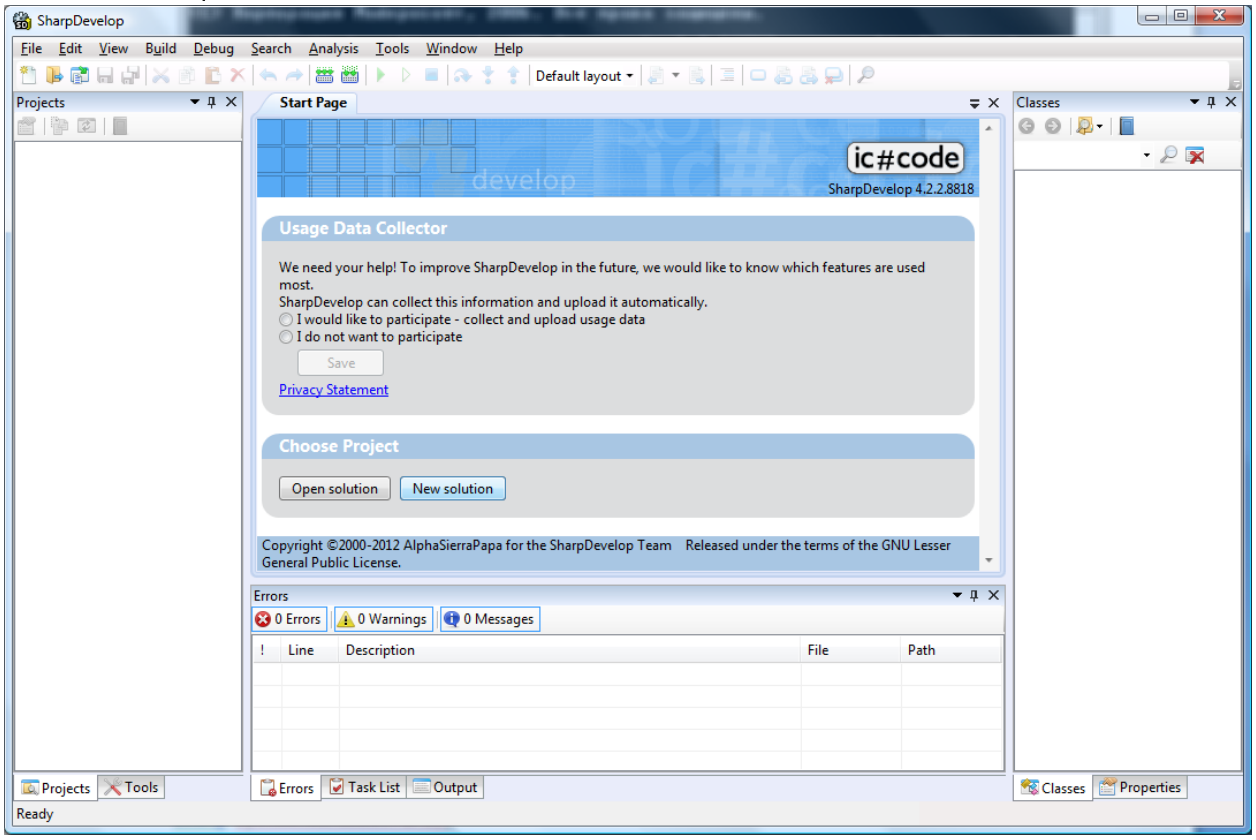
**Figure 8**

2. Second Program: display message (using **Visual Studio** or **SharpDevelop**)

Copy the **SharpDevelop folder** to **C:\temp** directory. Find in **C:\temp\SharpDevelop\4.2\bin\** executable file **SharpDevelop.exe** and run it.

Usage of **SharpDevelop** tool:

1. Run on your computer **`SharpDevelop.exe`** file.
2. In opened window **click `New solution` button**.



Usage Data Collector

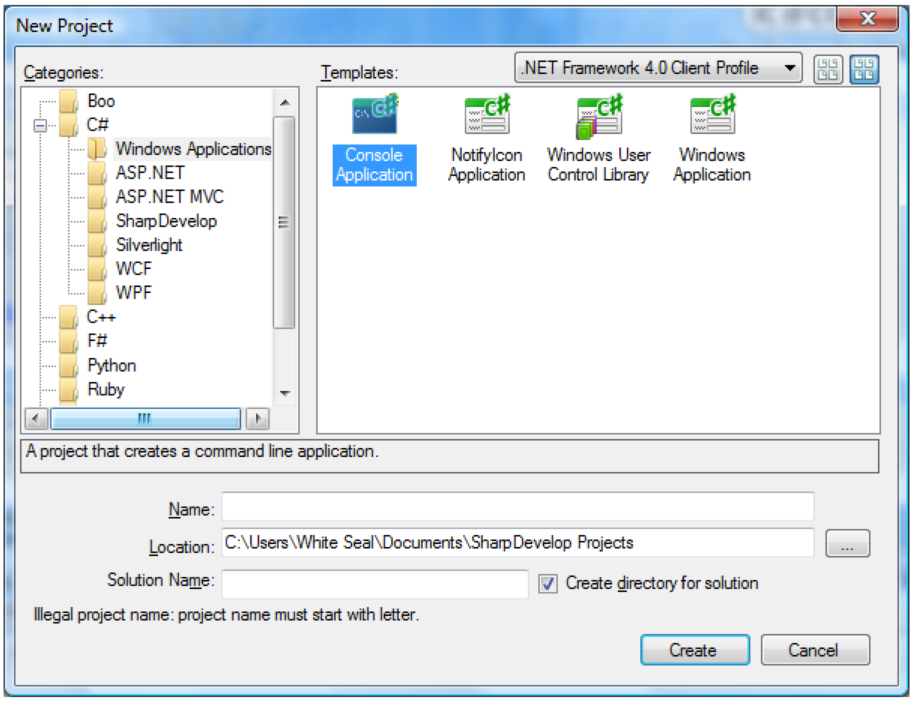
We need your help! To improve SharpDevelop in the future, we would like to know which features are used most.
SharpDevelop can collect this information and upload it automatically.
○ I would like to participate - collect and upload usage data
○ I do not want to participate
Save
Privacy Statement

Choose Project

Copyright ©2000-2012 AlphaSierraPapa for the SharpDevelop Team Released under the terms of the GNU Lesser General Public License.

| ! | Line | Description | File | Path |
|---|---|---|---|---|

3. In **`New Project`** window choose the creation of **`Console Application`**, appropriate **`Location`** (**C:\temp**) and **`Name`** for your project.



A project that creates a command line application.

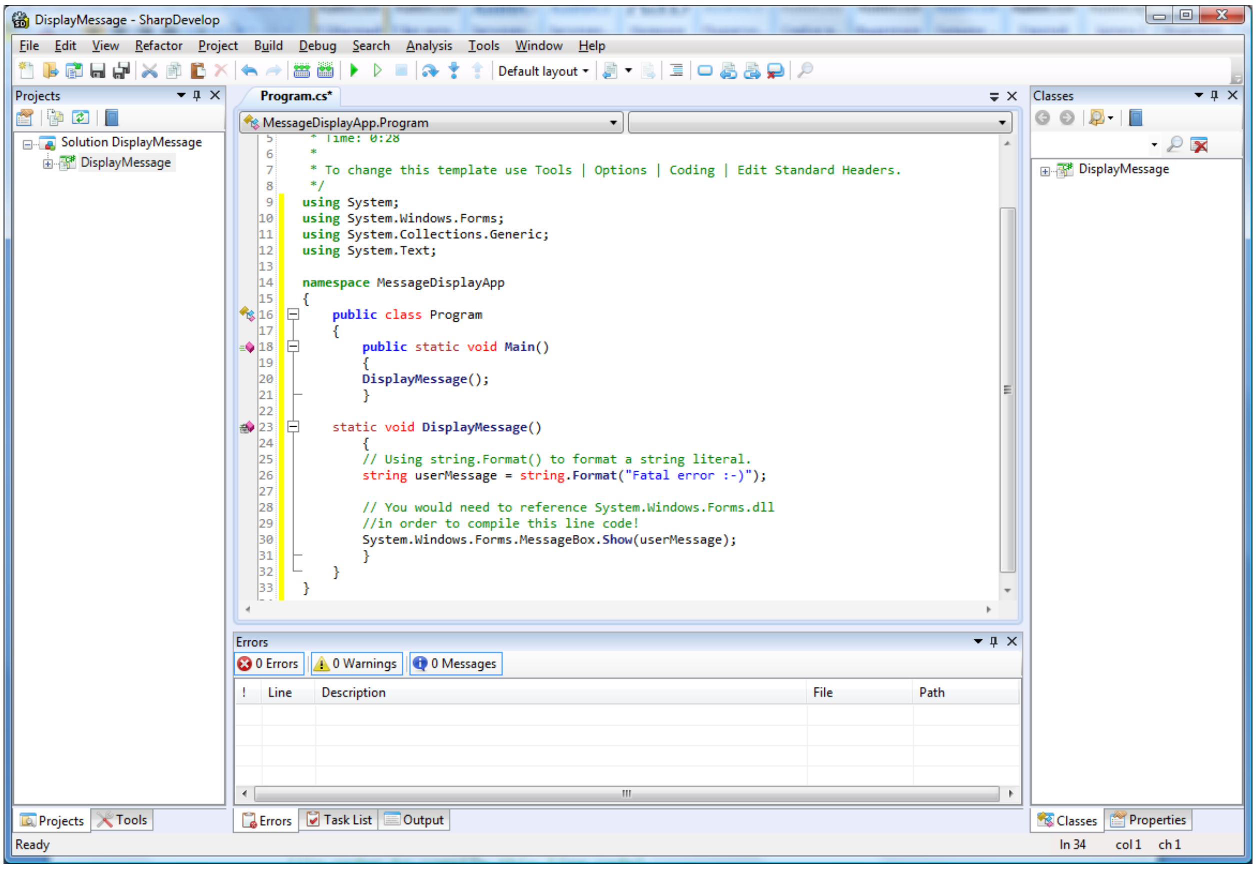
Location: C:\Users\White Seal\Documents\SharpDevelop Projects

☑ Create directory for solution

Illegal project name: project name must start with letter.

4. In **`Program.cs`** file write the following code:

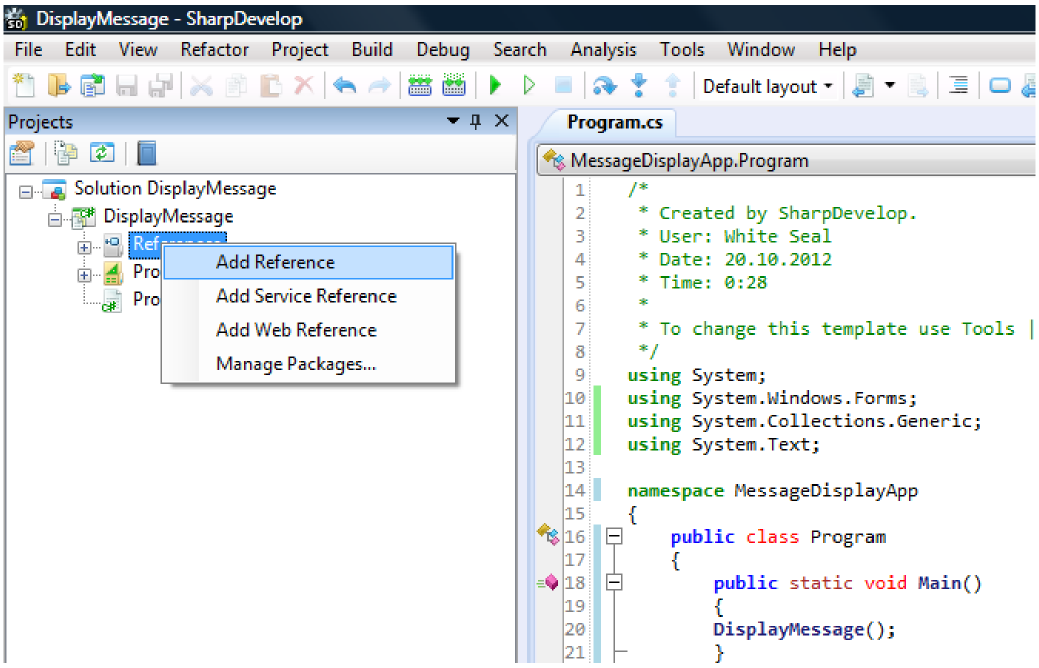
```
using System;
using System.Windows.Forms;
using System.Collections.Generic;
using System.Text;

namespace MessageDisplayApp
{
    public class Program
    {
        public static void Main()
        {
         DisplayMessage();
        }

     static void DisplayMessage()
        {
        // Using string.Format() to format a string literal.
        string userMessage = string.Format("Fatal error :-)");

        // You would need to reference System.Windows.Forms.dll
        //in order to compile this line code!
        System.Windows.Forms.MessageBox.Show(userMessage);
        }
    }
}
```



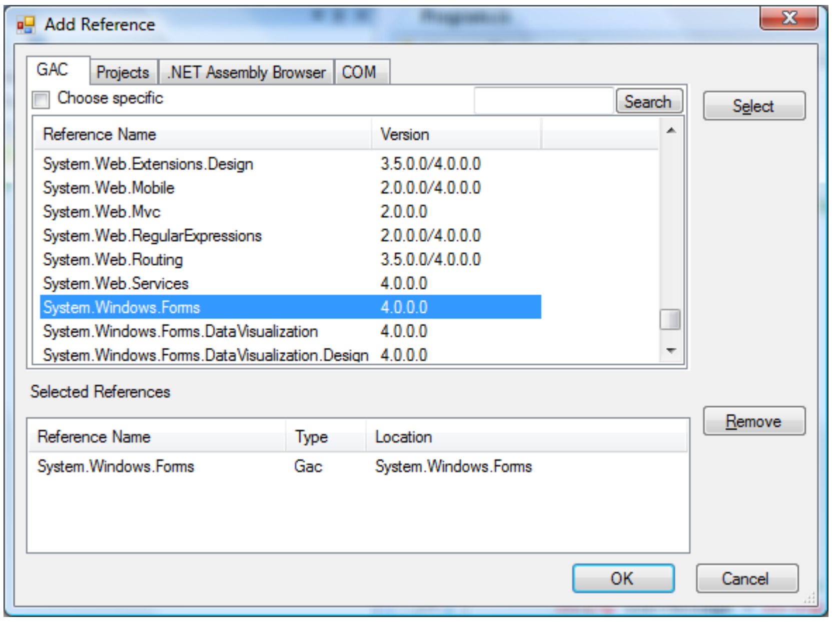
```
 * Time: 0:28
 *
 * To change this template use Tools | Options | Coding | Edit Standard Headers.
 */
using System;
using System.Windows.Forms;
using System.Collections.Generic;
using System.Text;

namespace MessageDisplayApp
{
    public class Program
    {
        public static void Main()
        {
        DisplayMessage();
        }

    static void DisplayMessage()
        {
        // Using string.Format() to format a string literal.
        string userMessage = string.Format("Fatal error :-)");

        // You would need to reference System.Windows.Forms.dll
        //in order to compile this line code!
        System.Windows.Forms.MessageBox.Show(userMessage);
        }
    }
}
```

| ! | Line | Description | File | Path |
|---|---|---|---|---|

5. **Add Reference** to **System.Windows.Forms**.



```
/*
 * Created by SharpDevelop.
 * User: White Seal
 * Date: 20.10.2012
 * Time: 0:28
 *
 * To change this template use Tools |
 */
using System;
using System.Windows.Forms;
using System.Collections.Generic;
using System.Text;

namespace MessageDisplayApp
{
    public class Program
    {
        public static void Main()
        {
        DisplayMessage();
        }
```

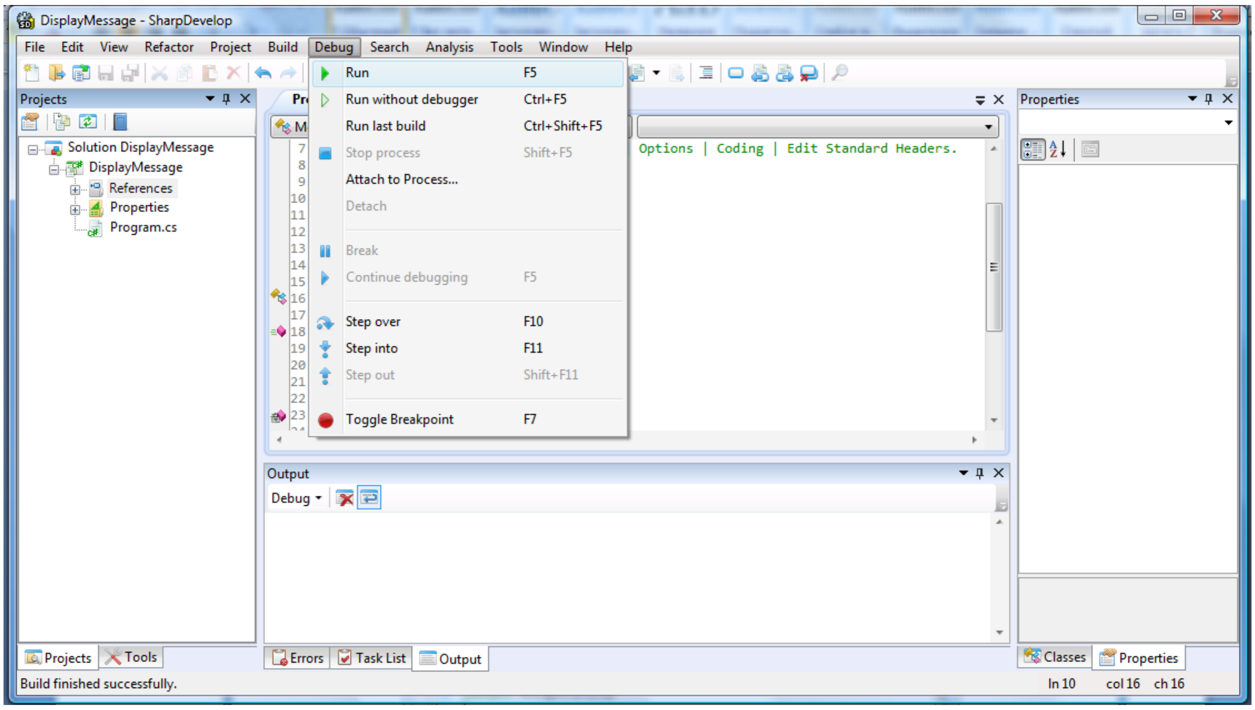


| Reference Name | Version |
|---|---|
| System.Web.Extensions.Design | 3.5.0.0/4.0.0.0 |
| System.Web.Mobile | 2.0.0.0/4.0.0.0 |
| System.Web.Mvc | 2.0.0.0 |
| System.Web.RegularExpressions | 2.0.0.0/4.0.0.0 |
| System.Web.Routing | 3.5.0.0/4.0.0.0 |
| System.Web.Services | 4.0.0.0 |
| System.Windows.Forms | 4.0.0.0 |
| System.Windows.Forms.DataVisualization | 4.0.0.0 |
| System.Windows.Forms.DataVisualization.Design | 4.0.0.0 |

Selected References

| Reference Name | Type | Location |
|---|---|---|
| System.Windows.Forms | Gac | System.Windows.Forms |

6. **Debug** and **Run** your code.



3. Arguments (using **Visual Studio** or **SharpDevelop** in analogy to previous tasks):

```
using System;
using System.Collections.Generic;
using System.Text;

namespace ProcessingCLArgs
{
    class Program
    {
        static int Main(string[] args)
```

```
            {
            //Process any incoming args.
            for(int i=0; i<args.Length; i++)
            Console.WriteLine("Arg: {0}", args[i]);
            Console.ReadLine();
            return -1;
            }
        }
}
```