.NET Club University Of Cyprus
presents:

Microsoft® C#® .NET Crash Course

Creating Windows Applications

Course contents

Overview of the Microsoft .NET Platform

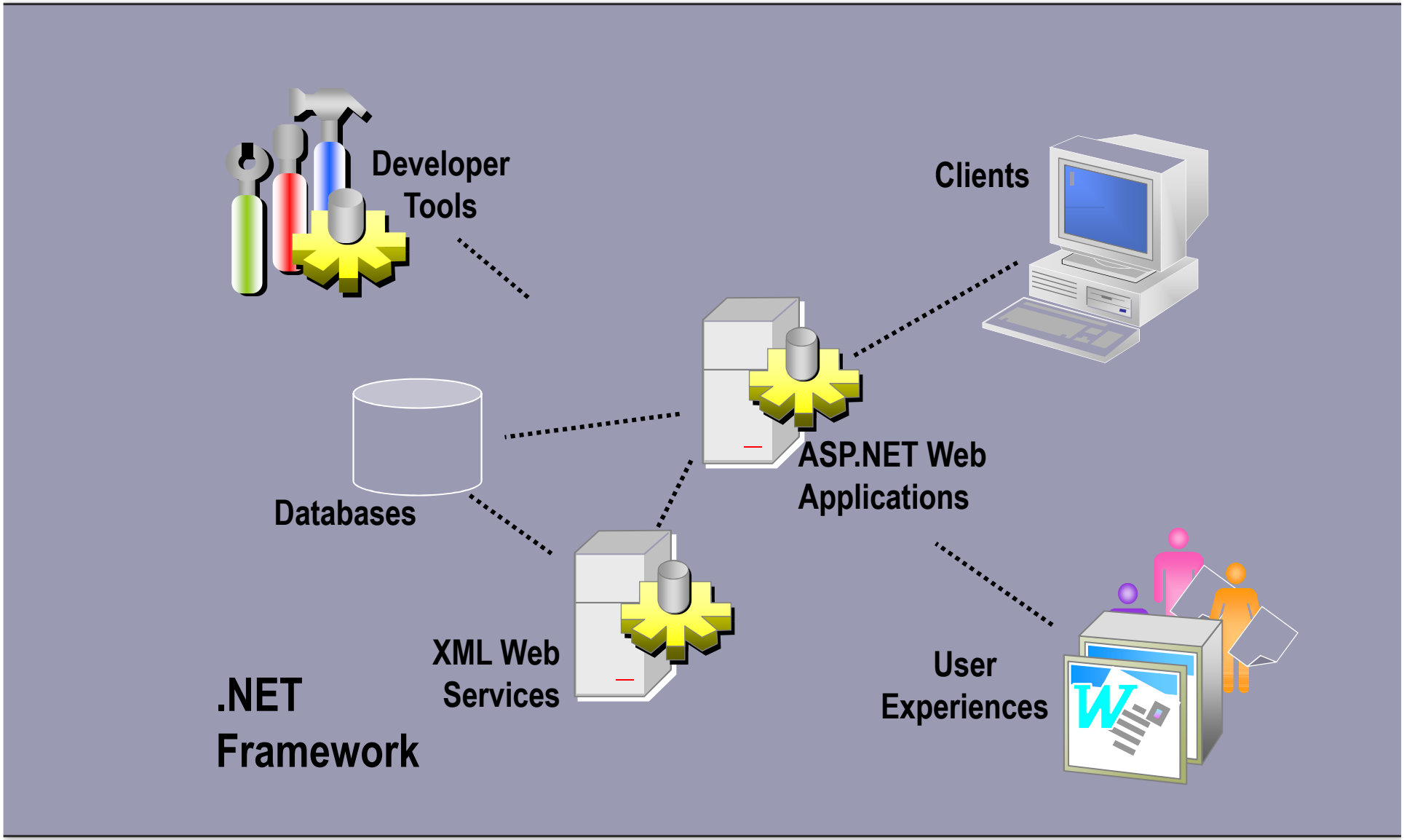
- Lesson 1: Creating a new Windows Application
- Lesson 2: Introduction to Windows Forms
- Lesson 3: Adding Controls to a Form
- Lesson 4: Working with Controls
- Lesson 5: Creating MDI Applications
- Lesson 6: Introduction to Visual Basic
- Lesson 7: Building Mobile Applications
- Lesson 8: Deploying Applications

Course goals

- Create a new Windows application
- Create Windows Forms and add controls to them
- Learn about different types of controls
- Organize controls on a form
- Create MDI (Multiple Document Interface) applications

Overview of the Microsoft .NET Platform

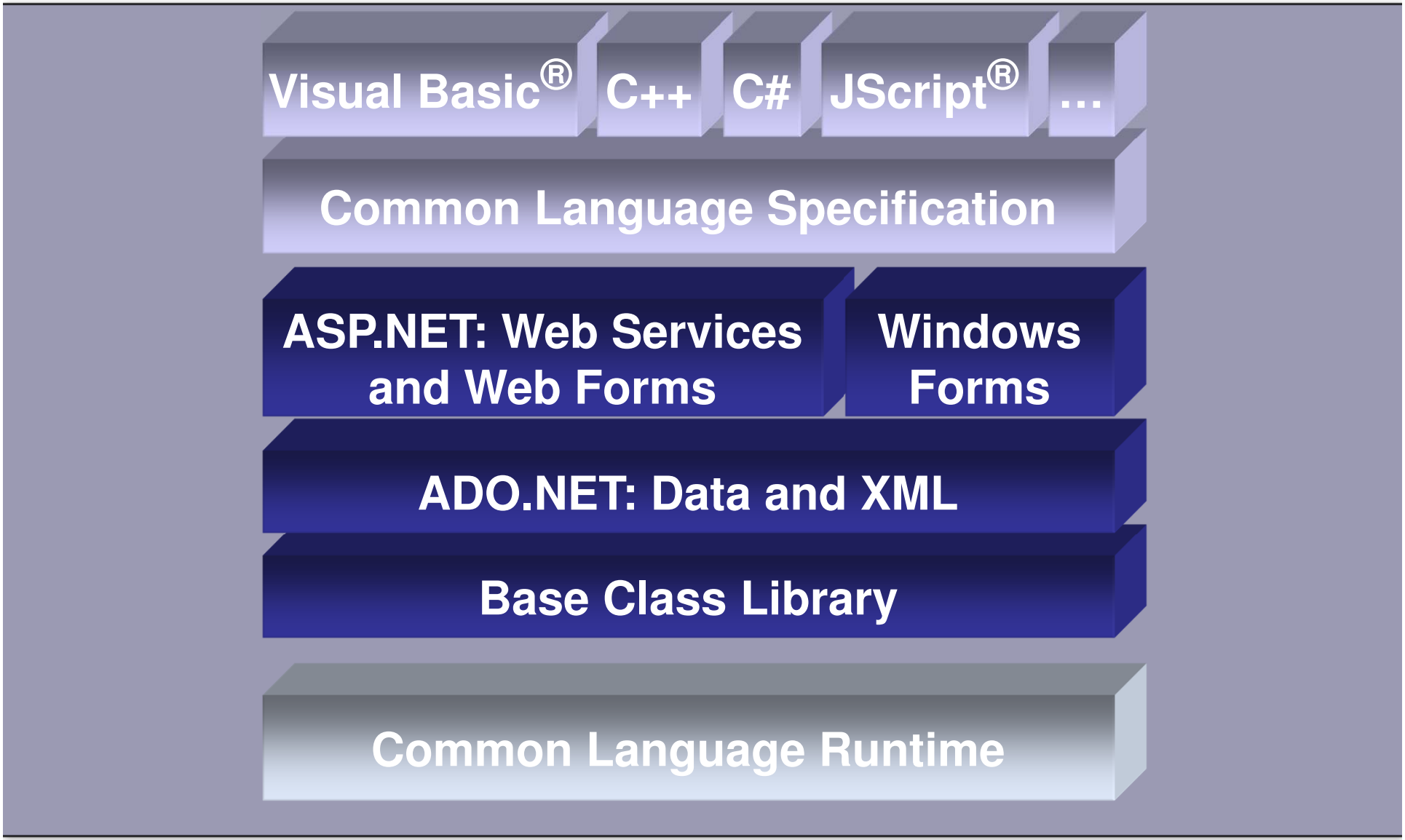
What is the Microsoft .NET Platform



Core Technologies in the .NET Platform

- .NET Framework
- .NET Building Block Services
- Visual Studio .NET
- .NET Enterprise Servers

Components του .NET Framework



Overview of C# .NET

Syntax

Comments

Single-line comments are marked with (//) at the start

```
//These are single-line comments
```

Multiple-line comments are marked with

```
/*
 * These are
 * multi-line comments
*/
```

Variables

Access Modifiers

public The type or member can be accessed by any other code in the same assembly or another assembly that references it.

private The type or member can only be accessed by code in the same class or struct.

protected The type or member can only be accessed by code in the same class or struct, or in a derived class.

internal The type or member can be accessed by any code in the same assembly, but not from another assembly.

protected internal The type or member can be accessed by any code in the same assembly, or by any derived class in another assembly.

Variables

Variable Declaration

Class Variables

```
private        string        name;
```

Access Modifier | Type | Variable name

Method Variables

- Value Types

```
string name;
int x=5;
```

- Reference Types

```
object obj;
object obj=new object();
```

Variables - Arrays

Variable Declaration

Class Variables

```
private        string[]        names;
```

Access Modifier | Type | Variable name

Method Variables

- Value Types

```
string[] names = new string[4];
int[] x={1,2,3,4};
```

- Reference Types

```
object[] obj;
object[] obj=new object[4];
```

If statement

```
if (<condition>) {
...
}
else if {
...
}
else {
...
}
```

Single line if statement

```
if (<condition>)
```

For statement

FOR statement

```
for (int I = 1; I<=10; I++) {
   for (int J = 1; I<=10; J=J+2) {
      for (int K = 10 K>=1; K--) {
         // Statements to operate with current values of I, J, and K.
      }
   }
}
```

FOR each statement

```
bool Found = false;
List<Object> objectList = new List<Object>();
foreach (Object obj in objectList) {   // Iterate through elements.
   if (obj.Name == “Hello”) {    // If Name equals "Hello"
      Found = true;   // Set Found to True.
      break;   // Exit loop.
   }
   else continue; }
```

While and Do Loop statements

While statement

```
int Counter = 0;
while (Counter < 20) {   // Test value of Counter.
    //Your code
   Counter++;   // Increment Counter.
    // break;   // Exit loop.
}   // End While loop when Counter > 19.
```

DO DoLOOP statement

```
        [ statements ]
        [ break ]
        [ statements ]
    While condition
```

Select Case (switch)

```
Using using System.Diagnostics;
int Number = 4;
// ...
switch(Number) {   // Evaluate Number.
   case 1:   // Number between 1 and 3, inclusive.
   case 2:
   case 3:
      Debug.WriteLine("Between 1 and 3");
      break;

   // The following is the only Case clause that evaluates to True.
   case 4:
      Debug.WriteLine("Number 4");
      break;
    default:   // Other values.
      Debug.WriteLine("Not between 1 and 4");
}
```

Void Methods

Void Methods do not return a value

Function Name

Parameters

```
void ComputeArea(double Length, double Width) {
   double Area;   // Declare local variable.
   if (Length == 0 || Width == 0) { }
   else {
       Area = Length * Width;   // Calculate area of rectangle.
       Debug.WriteLine(Area);   // Print Area to Immediate window.
   }
}
```

Non-Void Methods

Non-Void Methods return a value

Return type: `double`

Function Name: `CalcSum`

Parameters: `(double[] Args)`

```
{
    int I;
    double sum = 0;
    if (Args.Length > 0) {   // Check if arguments passed.
        for (I = 0; I < Args.Length; I++)
        {
            sum += Args[I];
        }
    }
return sum; // Returns latest value of sum.
 }
```

Mechanisms for Passing Parameters

Three ways to pass parameters

in	Pass by value
in out	Pass by reference
out	Output parameters

Pass by Value

Default mechanism for passing parameters:

- Parameter value is copied
- Variable can be changed inside the method
- Has no effect on value outside the method
- Parameter must be of the same type or compatible type

```
static void AddOne(int x)
{
   x++; // Increment x
}
static void Main( )
{
   int k = 6;
   AddOne(k);
   Console.WriteLine(k); // Display the value 6, not 7
}
```

Pass by Reference

Reference parameters are references to memory locations

Using reference parameters

- Use the **ref** keyword in method declaration and call
- Match types and variable values
- Changes made in the method affect the caller
- Assign parameter value before calling the method

```
static void AddOne(ref int x)
{
   x++; // Increment x
}
static void Main( )
{
   int k = 6;
   AddOne(ref k);
   Console.WriteLine(k); // Display the value 7
}
```

Output Parameters

Output parameters: Values are passed out but not in

Using output parameters

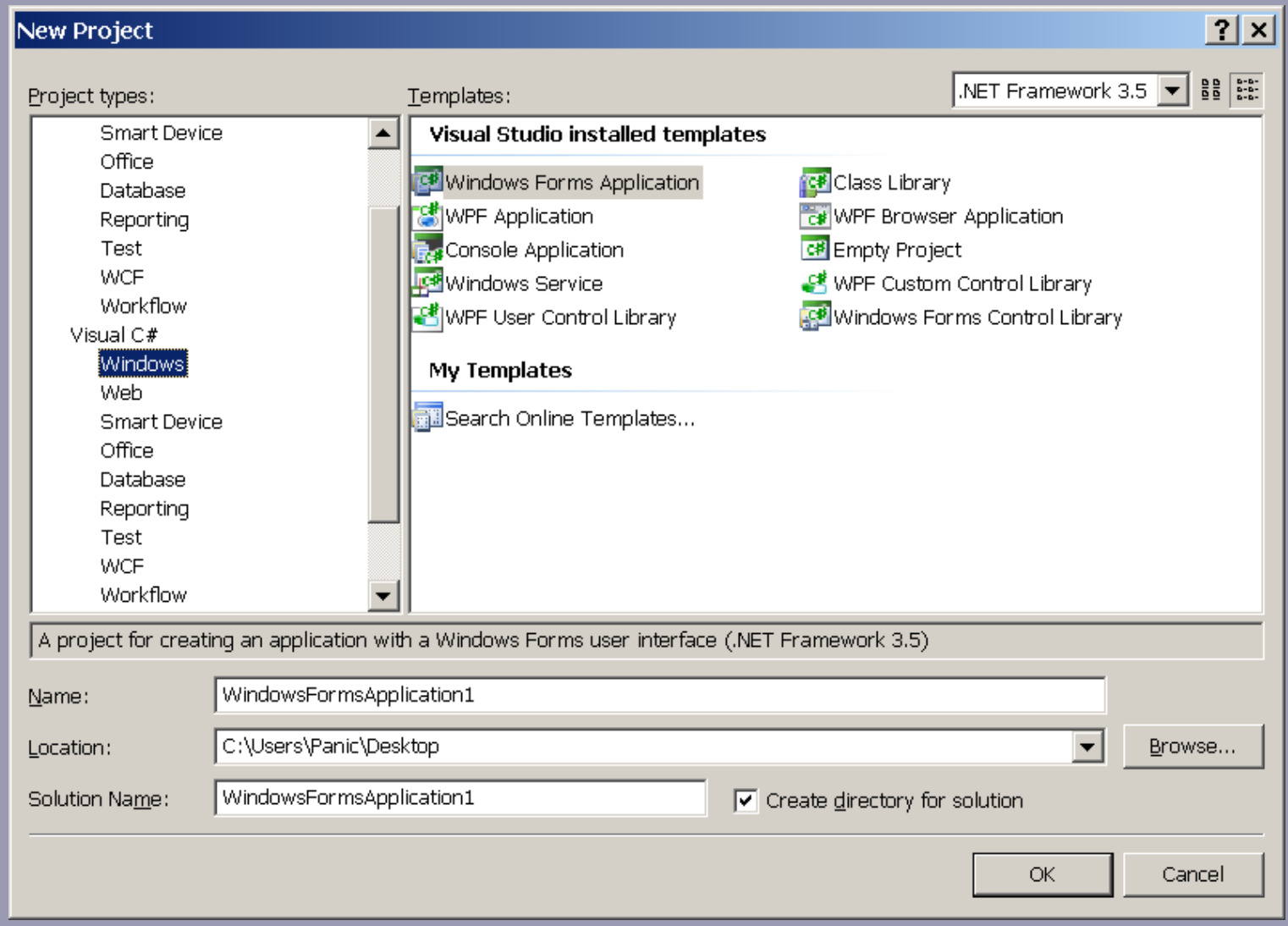
- **Like ref, but values are not passed into the method**
- Use **out** keyword in method declaration and call

```
static void AddOne(out int x)
{
   x++; // This produces an error
    x=5;
}
static void Main( )
{
   int k = 6;
   AddOne(out k);
   Console.WriteLine(k); // Display the value 5
}
```

Lesson 1

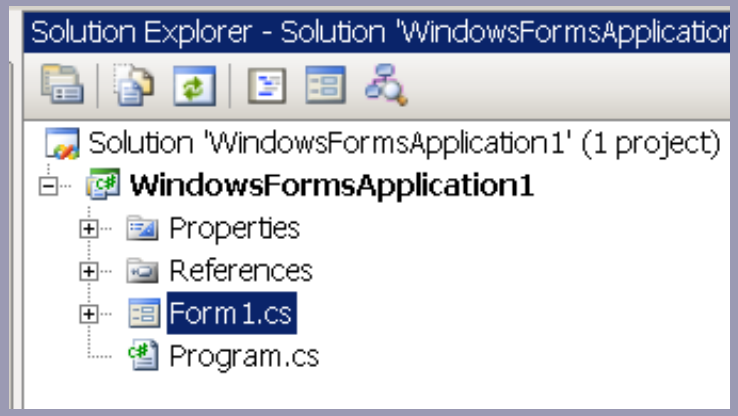
Creating a new C# Windows Application

Creating a new C# Project

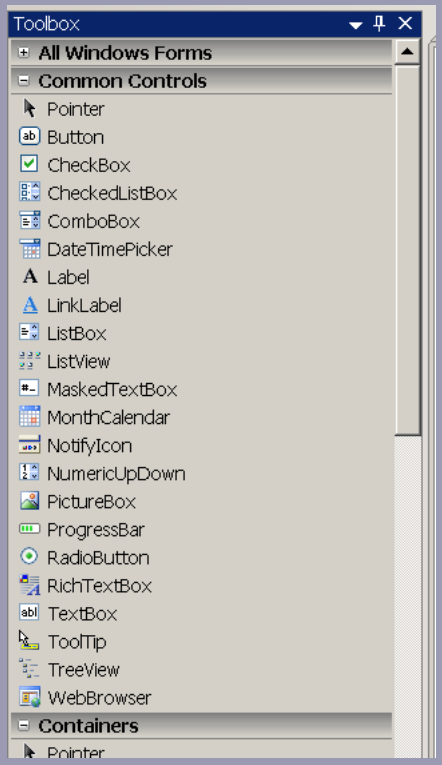


Visual Studio .NET Windows

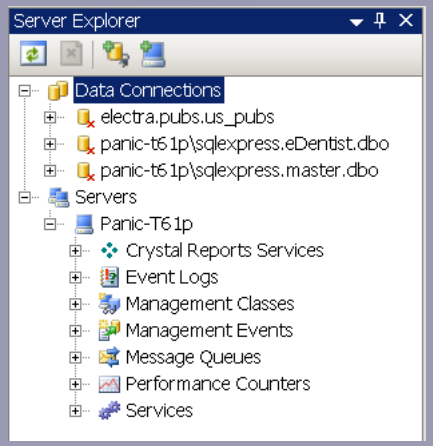
View the solution/project files



View controls that can be added in forms and project



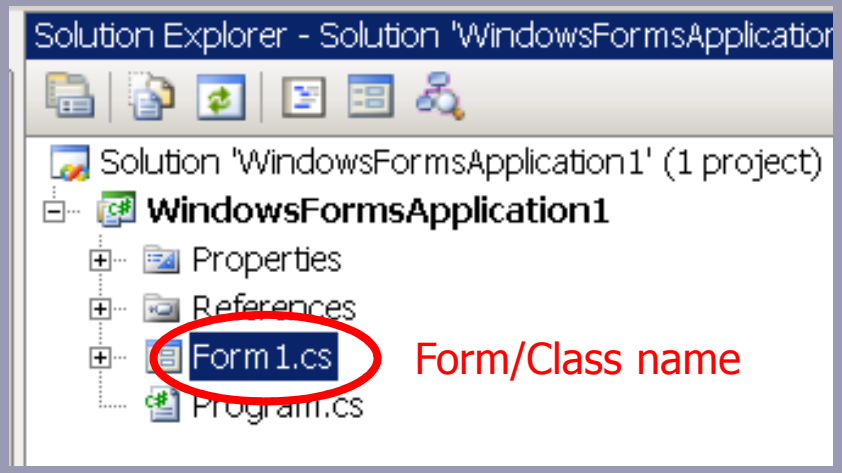
Manage Database/Server connections

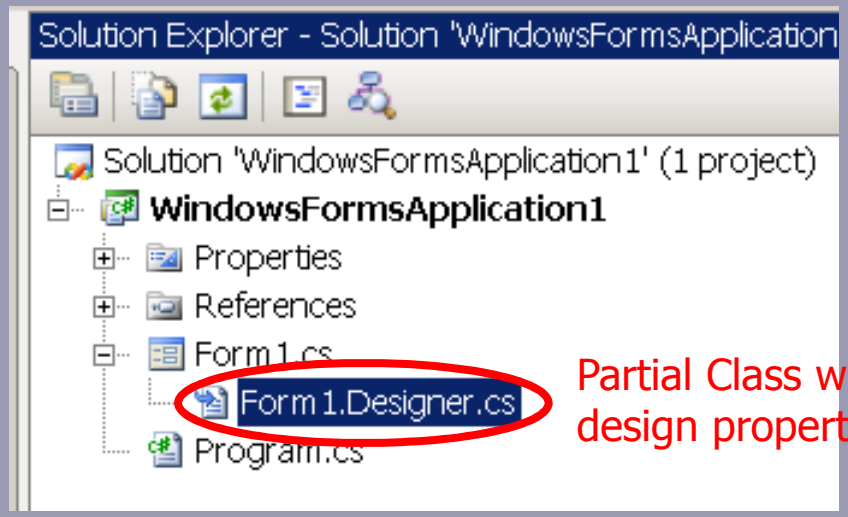


Lesson 2

Introduction to Windows Forms

Forms in Solution Explorer





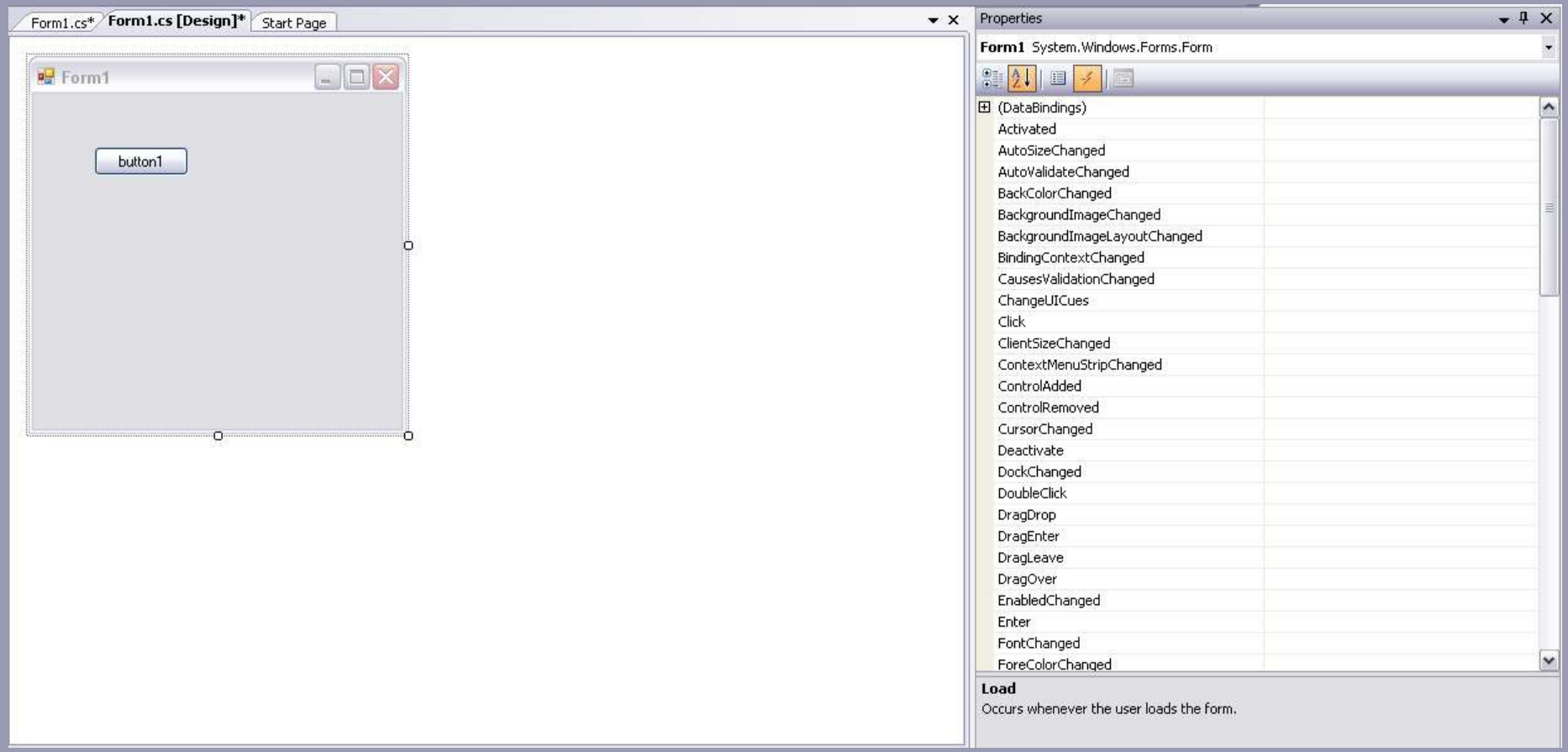
Maintaining two separate files for the design and code simplifies form development.

Form Life Cycle

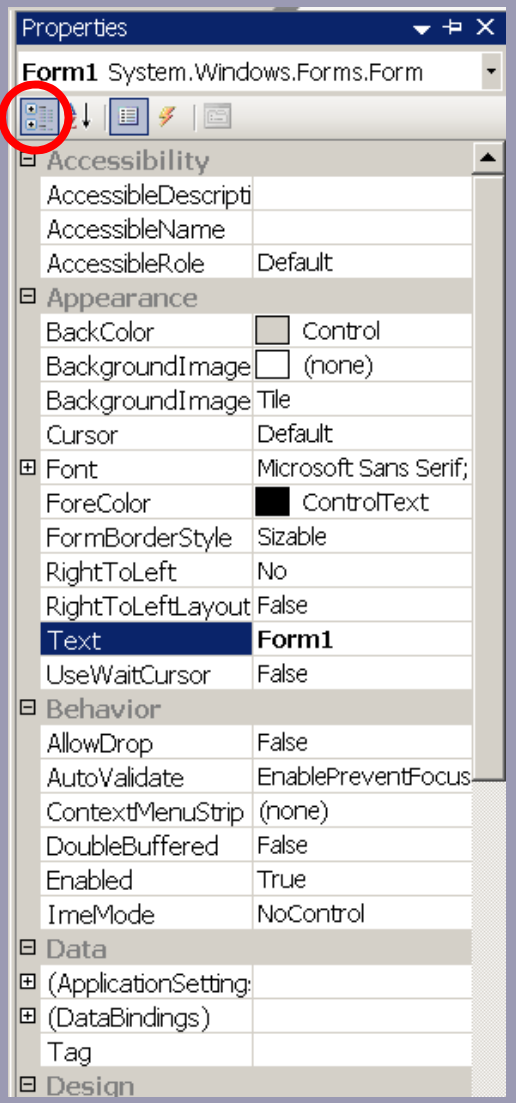
1. Load
2. Activated
3. FormClosing
4. FormClosed
5. Deactivate

How to handle Form Events

Double click on a form to view the Load and other events

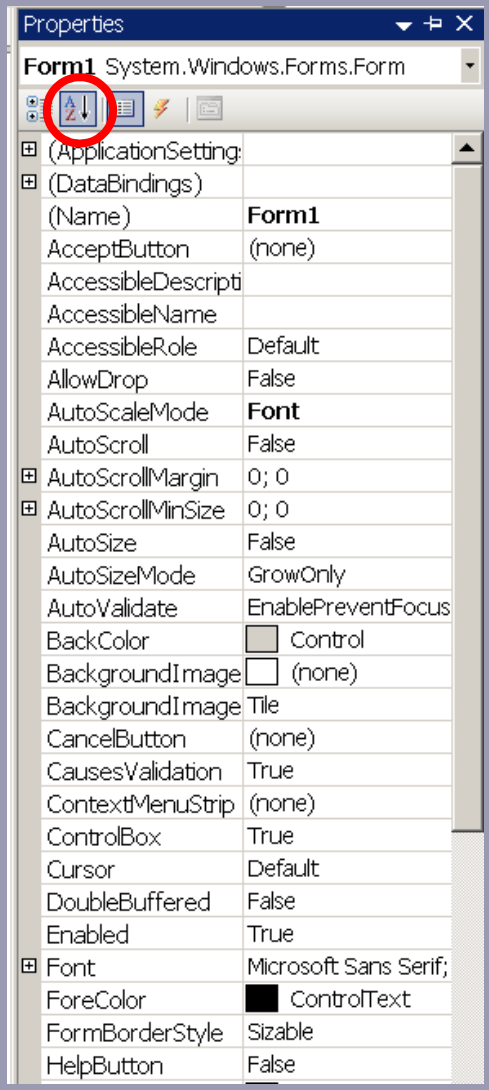


How to set a Form's Properties



← Categorized View

Alphabetical View→



TODO: Set the following properties on Form1

To build and start your project:

- Press F5 or
- Press the Play () button

Set the following properties and build your project each time:

- Set MaximizeBox to False
- Set FormBorderStyle to Fixed3D
- Set Size → Width to 150
- Set Size → Height to 150
- Set WindowState to Maximized
- Set Text to MyFirstForm

Lesson 3

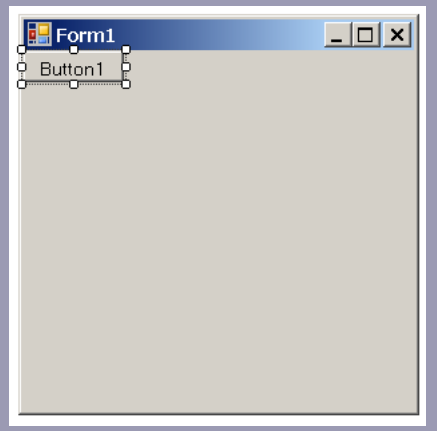
Adding Controls to a Form

How to add Controls to a Form

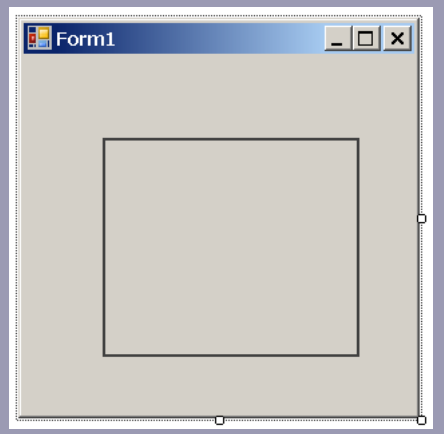
Open the Toolbox

With a Form open:

- Double click on a control



- Click on the control and
  - Move the mouse over the form
  - Click and drag to create the desired size of the control



Practice (Adding Controls)

Open Form1's design and

- Add 1 TextBox
  - Set the (Name) Property to txtFirstNumber
  - Set the Text property to "Add first number"
- Add 1 ComboBox
  - Set the (Name) Property to cboOperation
  - Set the Text property to ""

Practice (continued)

- Add 1 TextBox
  - Set the (Name) Property to txtSecondNumber
  - Set the Text property to “Add second number”
- Add 1 Label
  - Set the (Name) Property to lblEquals
  - Set the Text property to “=”

Practice (continued)

- Add 1 TextBox
  - Set the (Name) Property to txtResult
  - Set the Text property to “”
- Add 1 Button
  - Set the (Name) Property to btnCalculate
  - Set the Text property to “Calculate”

Practice (continued)

Next we need to resize each control

(hint: resize one control and use the Format menu to make each other control follow the same properties)

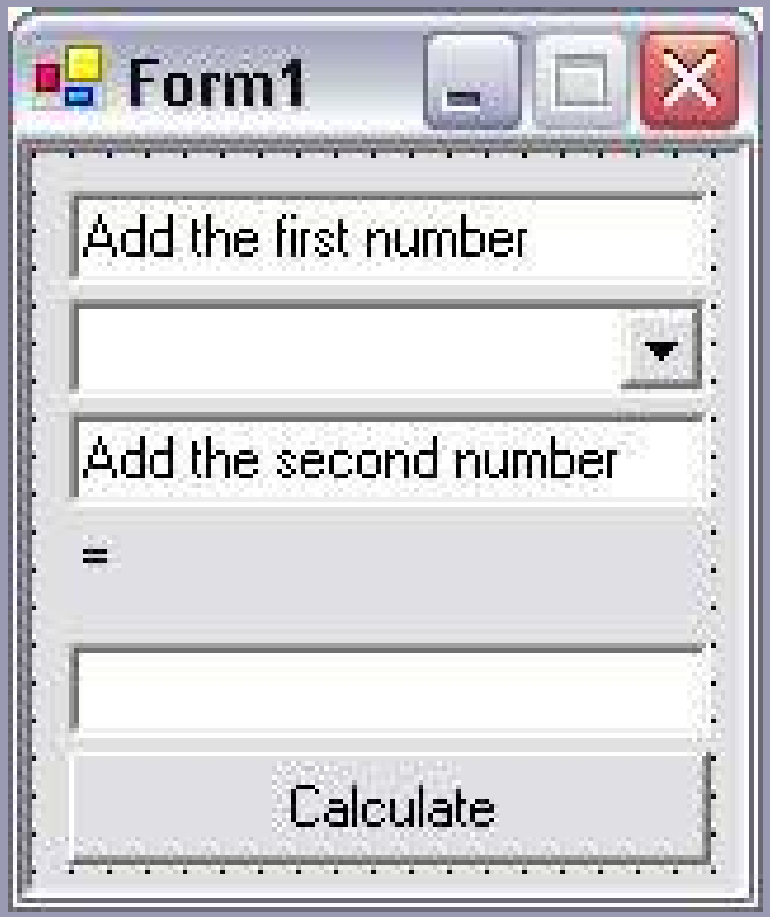
- Set the Form1's Size Property to 160,192
- Set each control's Size Property to 136,20
  - To resize Labels you need to set the AutoSize property to False
- Set each control's Location→X Property to 8

Practice (continued)

- Set the Location→Y Property to
  - txtFirstNumber 8
  - cboOperation 31
  - txtSecondNumber 55
  - lblEquals 78
  - txtResult 104
  - btnCalculate 127

Practice (continued)

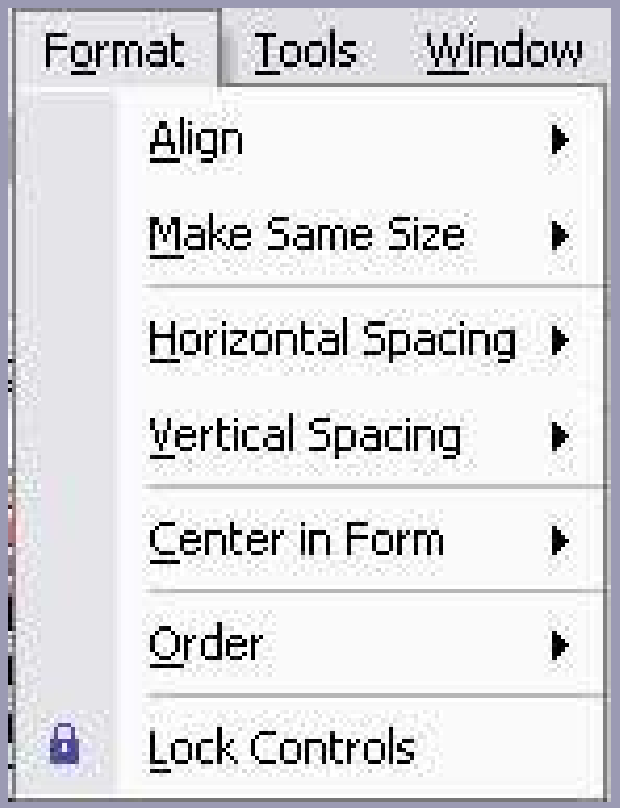
When you have finished your Form1 should look like this



Let’s talk about controls

- TextBox
- Label
- MainMenu
- CheckBox
- RadioButton
- GroupBox
- ListBox
- CheckedListBox
- ComboBox
- TreeView
- TabControl
- …and so much more!!!

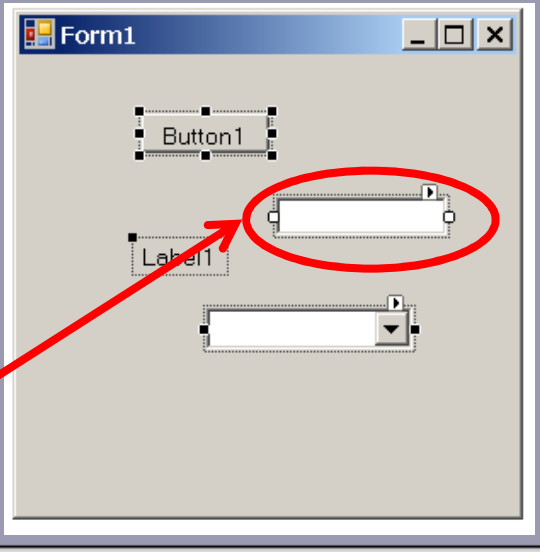
Using the Format Menu



Use the format menu to automatically align/resize controls.

After Selecting multiple controls single click on the leader control that will be used to format all other controls

The leader control is marked with white squares



Lesson 4

Working with Controls

What is an event?

- Event is a message sent by an object to signal the occurrence of an action
- An example event is when clicking a button which triggers the (Click event) called Click
- Other events (e.g., for a TextBox)
  - Click
  - TextChanged
  - LostFocus
  - MouseHover
  - …

Event Handling

```
private void btnCalculate_Click(
        object sender,
        EventArgs e) {

        … MessageBox.Show("This button will perform the
  calculation");

   }
```

Practices

- A simple example
- Build a simple calculator
- Working with various controls

Practice: A simple example

Create a new form

To do this:

- Open Solution Explorer
- right click on your project (CSharpCrashCourse)
- Select Add→Add Windows Form
- Name the Form frmSimpleExample
- Add a TextBox and a Button to frmSimpleExample

Practice (continued)

- We need to change the name of the Button each time we click on it and set it to whatever the user writes in the TextBox
- Firstly we need to configure the project to start from frmSimpleExample
- To do this right click on the project and select properties
- In the Startup object select frmSimpleExample

Practice (continued)

Next we need write code to the Click event of the Button1

- Double Click on Button1
- We need to change the Button1's Text Property to whatever is written in the TextBox1's Text.
- Button1.Text = TextBox1.Text;
- Run your project

Questions

Practice: Build a simple calculator

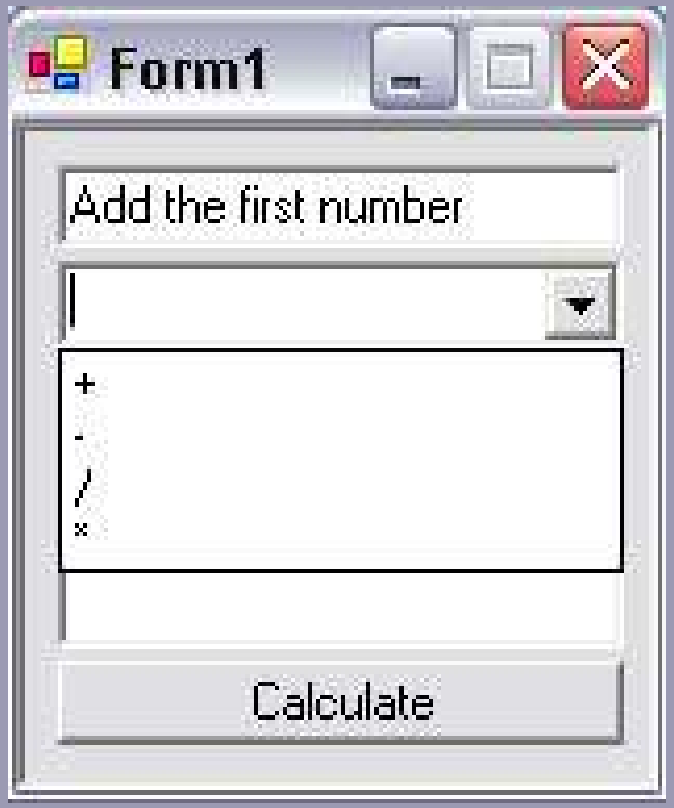
Open Form1

cboOperations must contain the basic mathematical operations

- +
- -
- /
- *

Use the Items property of cboOperations to add the symbols above

Practice: Continued



Practice: Continued

We assume that the user input will be integers. (next we are going to check if they really are!)

So when we press the button we need to produce a result, according to the cboOperations selected operation, and display it to the user via the txtResult

Practice: Continued

Inside the btnCalculate_Click

We need to assign the values of the two TextBoxes to 2 integer variables.

- Let's name the a, b
- int a = int.Parse(txtFirstNumber.Text);
- int b = int.Parse(txtSecondNumber.Text);

Practice: Continued

Next we need to check what operation is selected in cboOperation and calculate the result accordingly

To get the comboBox selected item use the SelectedItem Property

- switch(cboOperation.SelectedItem.ToString())
- case “+”:
- txtResult.Text = a + b;
- …

Practice: Continued

Now, we want that each time the user clicks on one of the input textboxes to set the Text Property to “” (empty)

We need to add code to the Click event

```
private void txtFirstNumber_Click(object sender, EventArgs e) {
    txtFirstNumber.Text = string.empty;
}
private void txtSecondNumber_Click(object sender, EventArgs e) {
    txtSecondNumber.Text = string.empty;
}
```

Practice: Continued

Can we use one function to handle both TextBox Click events?

Yes

```
private void txtNumber_Click(object sender, EventArgs e) {
    //The sender is either txtFirstNumber or txtSecondNumber
    System.Windows.Forms.TextBox txt = (TextBox)sender;
    txt.Text = string.Empty;
}
```

Practice: Continued

What if the user enters String values in the two textboxes and not Integers???

Try…Catch

```
int a, b;
try {
    a = int.Parse(txtFirstNumber.Text);
}
catch (Exception ex) {
      MessageBox.Show(…);
      txtFirstNumber.Focus();
      txtFirstNumber.SelectAll();
      }
```

Questions

Practice: Working with various controls

Practice: Continued

Create a new Form (frmWorkingWithControls)

- Change its **(Name)** Property to **frmWorkingWithControls**
- Change its **Text** Property to **Working With Controls**
- Change its **Size** Property to **518, 494**
- Change its **MinimizeBox** and **MaximizeBox** to **False**
- Change its **FormBorderStyleProperty** Property to **FixedSingle**

To set frmWorkingWithControls as the startup object

- Open Solution Explorer
- Right-Click on project CSharpCrashCourse
- Select Properties
- Under Startup Object select frmWorkingWithControls

Practice: Continued

Create a 5 CheckBoxes

- Change their **(Name)** Property to **chkRed, chkGreen, chkBlue, chkYellow, chkBlack**
- Change their Text Property to **Red, Green, Blue, Yellow, Black** accordingly
- Change their **Size** Property to **104, 24**
- Change their **Location** Property to
  - **chkRed 8, 32**
  - **chkGreen 8, 64**
  - **chkBlue 8, 96**
  - **chkYellow 8,128**
  - **chkBlack 8,160**
- You may change their BackColor Property to match each CheckBox's Name

Practice: Continued

Create a 2 RadioButtons

- Change their **(Name)** Property to **rdbMale, rdbFemale**
- Change their Text Property to **Male**, **Female** accordingly
- Change their **Size** Property to 64, 24
- Change their **Location** Property to
  - **rdbMale 136, 32**
  - **rdbFemale 136, 64**

Practice: Continued

Create a 1 ListBox

- Change its **(Name)** Property to **lstCity**
- Click on the Items Property, (collection) button and add the following values
  - Leykosia
  - Larnaka
  - Lemesos
  - Pafos
  - Ammohostos
- Change its **Size** Property to **120, 82**
- Change its **Location** Property to **224, 32**

Practice: Continued

Create a 1 DateTimePicker

- Change its **(Name)** Property to **dtpDateOfBirth**
- Change its **Size** Property to **152, 20**
- Change its **Location** Property to **352, 32**

Create 1 Label

- Change its **(Name)** Property to **lblChoose**
- Change its **Size** Property to **496, 24**
- Change its **Location** Property to **8, 8**
- Change its **Text** Property to

  Choose your colors Gender City
  Date Of Birth

Practice: Continued

Create a 1 Button

- Change its **(Name)** Property to **btnInfo**
- Change its **Text** Property to **Summary**
- Change its **Size** Property to **496, 23**
- Change its **Location** Property to **8, 192**

Create 1 TextBox

- Change its **(Name)** Property to **txtInfo**
- Change its **Multiline** Property to **True**
- Change its **Size** Property to **496, 232**
- Change its **Location** Property to **8, 224**
- Change its **Text** Property to “”

Practice: Continued

Now we need to add code to btnInfo.Click event to display what we have selected in the other controls to the txtInfo

Double click on btnInfo

We need one variable to store the result.

```
string summary = "Your favorite colors are:";
string colors;
int i = 0;
```

Practice: Continued

We need to check each CheckBox and if it is Checked then we need to add it to the favorite colors.

- To check if a CheckBox is Checked use the **Checked** Property
  - if (CheckBox1.Checked==true) …, or
  - if (CheckBox1.Checked)

```
if (chkRed.Checked) {
    if (i == 0)
        colors = chkRed.Text;
    else
        colors = colors + "," + chkRed.Text;
    i += 1;
}
```

Practice: Continued

Wouldn't it be nice if we could say For each checkbox do …?
Think again →with C# .NET WE CAN!!!

```
List<Control> controlList = new List<Control>();
    controlList.Add(chkRed);
    controlList.Add(chkGreen);
    controlList.Add(chkBlue);
    controlList.Add(chkYellow);
    controlList.Add(chkBlack);
```

Practice: Continued

```
foreach (System.Windows.Forms.CheckBox checkbox in controlList) {
            if (checkbox.Checked) {
                if (i == 0)
                    colors = checkbox.Text;
                else
                    colors = colors + "," + checkbox.Text;
                i++;
            }
        }
        if (i == 0) colors = "None!“;

        summary += colors;
```

Practice: Continued

```
summary += "\nAnd your gender is:";
        if (rdbMale.Checked)
            summary += "Male";
        else
            summary += "Female";

        summary += "\n And your city is:" + lstCity.SelectedItem.ToString();

summary += "\nAnd your birthdate is:" +
    dtpDateOfBirth.Value.ToShortDateString();

        txtInfo.Text = summary;
```

Practice: Continued

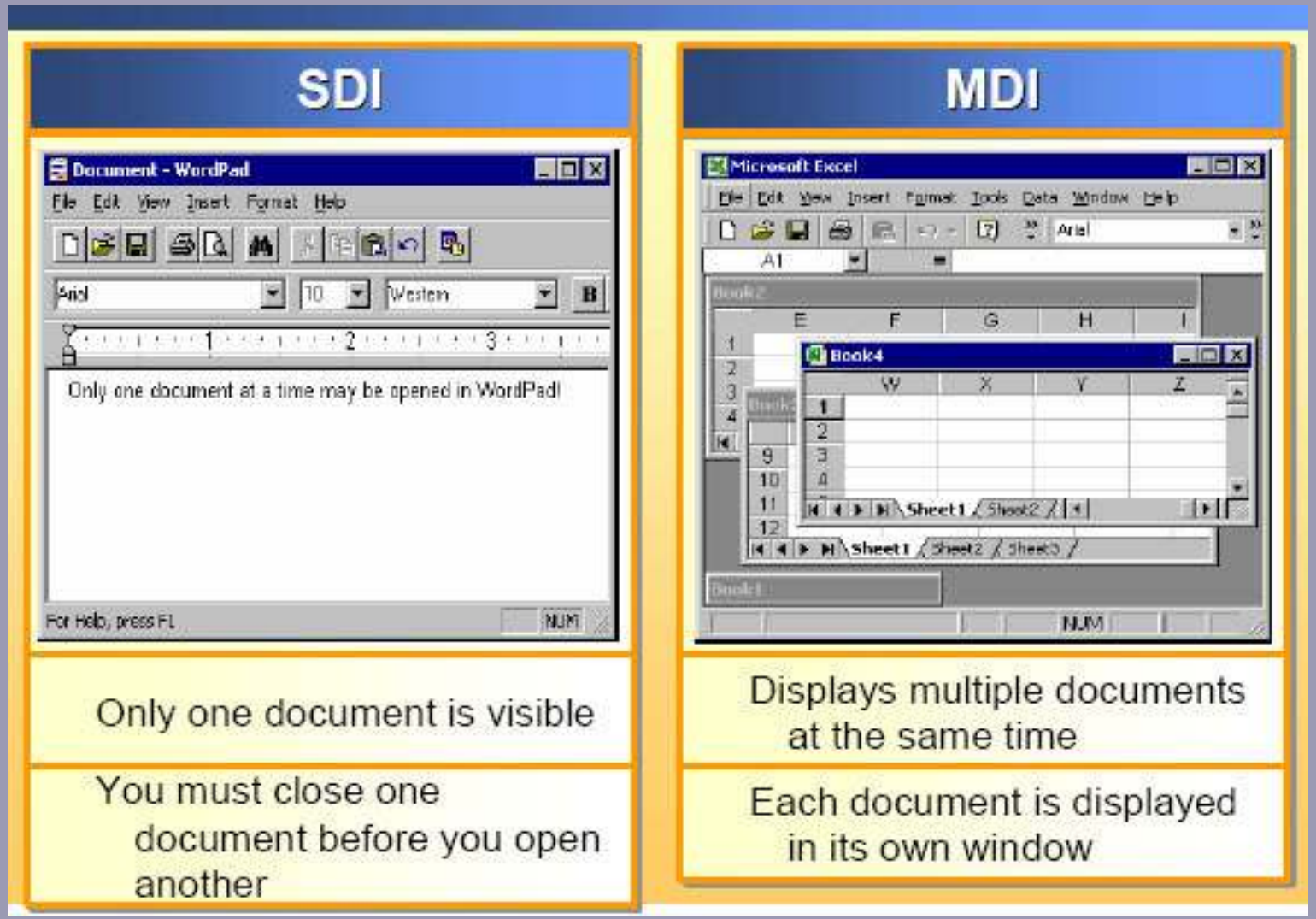
Run your project and test it

Questions

Lesson 5

Creating MDI Applications

SDI vs. MDI Applications



How to Create MDI Applications

First of all we need to specify a parent form

- Add two new Forms to your project and name them frmParent and frmChild.
- Set frmParent as your project's startup object
- Open frmParent's design and set its IsMdiContainer to True

Let's add a menu to frmParent

- Open the Toolbox
- Double-Click on MenuStrip
- Add the first menu item and name it &File (&→Alt Shortcut)
- Under File add another menu item and name it &New

How to Create MDI Applications (continued)

- Add the second menu item next to File and name it **&Window**
- Under **Window** add the following menu items
  - **Tile &Vertical**
  - **Tile &Horizontical**
  - **&Cascade**
- Set the **MdiWindowListItem** property of the **MenuStrip** to **WindowToolStripMenuItem**

Create a new Child Form

To call a child form from the parent form

- Double Click on menu item New
- Add the following code

```
frmChild newChild = new frmChild();
// Set the parent form
newChild.MdiParent = this;
// Display the form
newChild.Show();
```

Organizing child forms on the parent form

To organize child forms on the parent form

- Double Click on menu item Tile Vertical
  this.LayoutMdi(MdiLayout.TileVertical);
- Double Click on menu item Tile Horizontical
  this.LayoutMdi(MdiLayout.TileHorizontal);
- Double Click on menu item Cascade
  this.LayoutMdi(MdiLayout.Cascade);

Build and run your project

Build and Run your project

Create 3 new child forms and try the Tile and Cascade menu items under windows

Lesson 6

VB.NET → C#

C# to VB.NET comparison

C#	VB
1. int i;	1. Dim i As Integer
2. int array[6];	2. Dim array(5) As Integer
3. for(i=0;i<6;i++){…}	3. For i=0 To 5…Next I
4. while(cond){…}	4. While <cond>…End While
5. private void test()…	5. Private Sub test()…
6. private int test() …	6. Private Function test() As Integer …
7. return/break;	7. Exit …

Practice

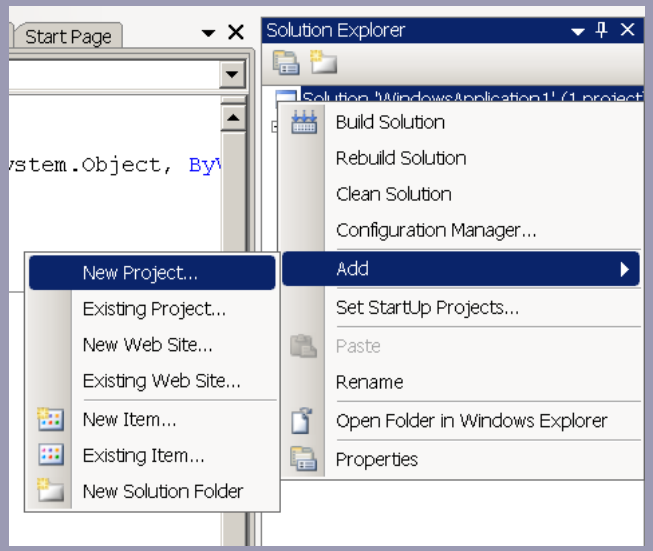
Interacting with Visual Basic and C#

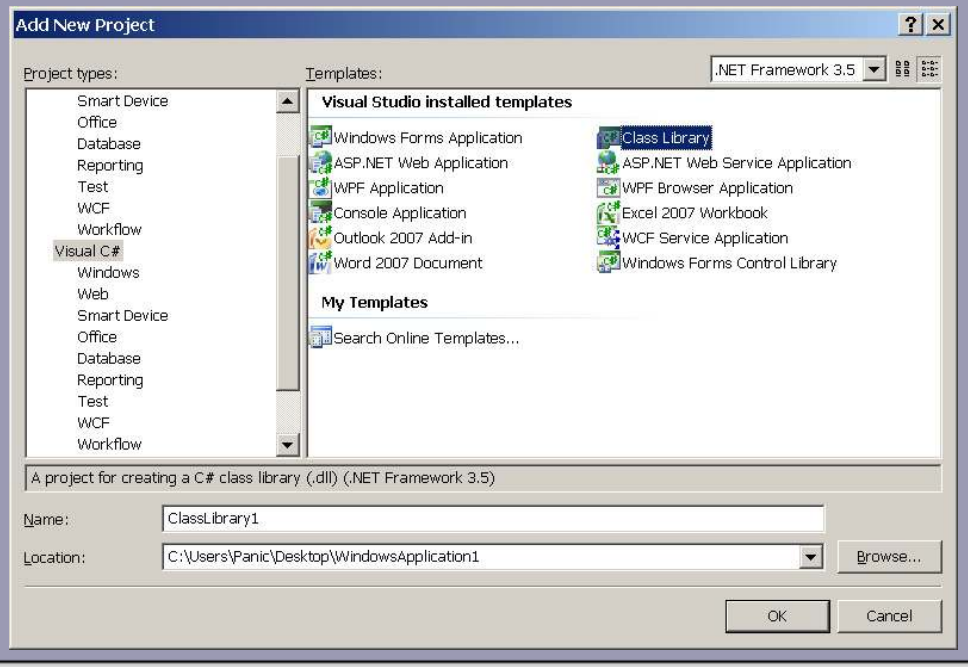
Practice

Create a new Visual Basic Windows Application

Add a new C# Class Library

- Right click on your Solution and Select Add→New Project
- Select C# Project Type
- Select Class Library from the Tempaltes

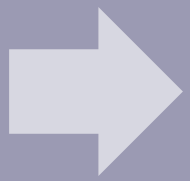




Practice

In the ClassLibrary1 project, edit Class1.cs and create a new method

- Method name: add
- Input Parameters: int a, int b
- Return type: int
- Your code should look like this



Build ClassLibrary1

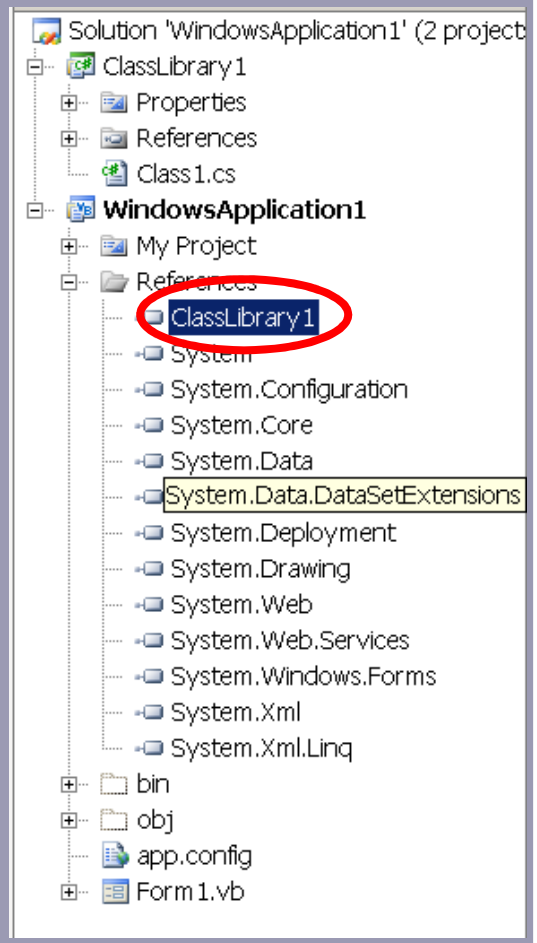
```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace ClassLibrary1
{
    public class Class1
    {
        public int add(int a, int b)
        {
            return a + b;
        }
    }
}
```

Practice

Add a reference to ClassLibrary1 from your Windows Application

- Right Click on WindowsApplication1 project and choose Add Reference
- From the Projects tab, select ClassLibrary1
- Review your WindowsApplication1's references



Practice

In your WindowsApplication1 do the following:

- Add a button in Form1 (button1)
- Double-click on the button and create a new object of ClassLibrary1.Class1

```
Dim obj As New ClassLibrary1.Class1
```

- Initialize two integers a and b with values 3,5

```
Dim a As Integer = 3
Dim b As Integer = 5
```

- Create a messagebox that displays the added value of a and b by calling the add method of obj

```
MessageBox.Show(obj.add(a, b).ToString)
```

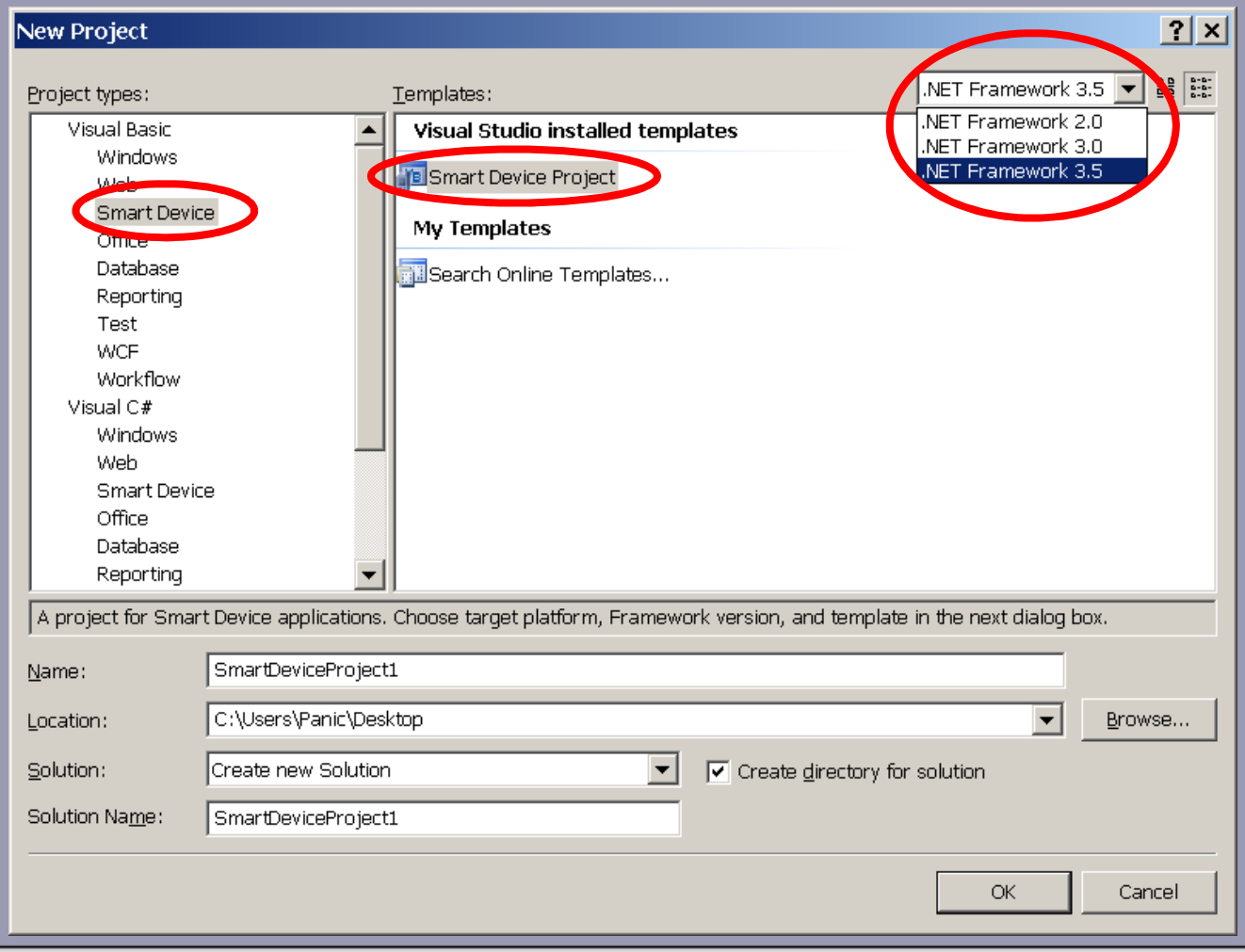
Questions

Lesson 7

Building Mobile Applications

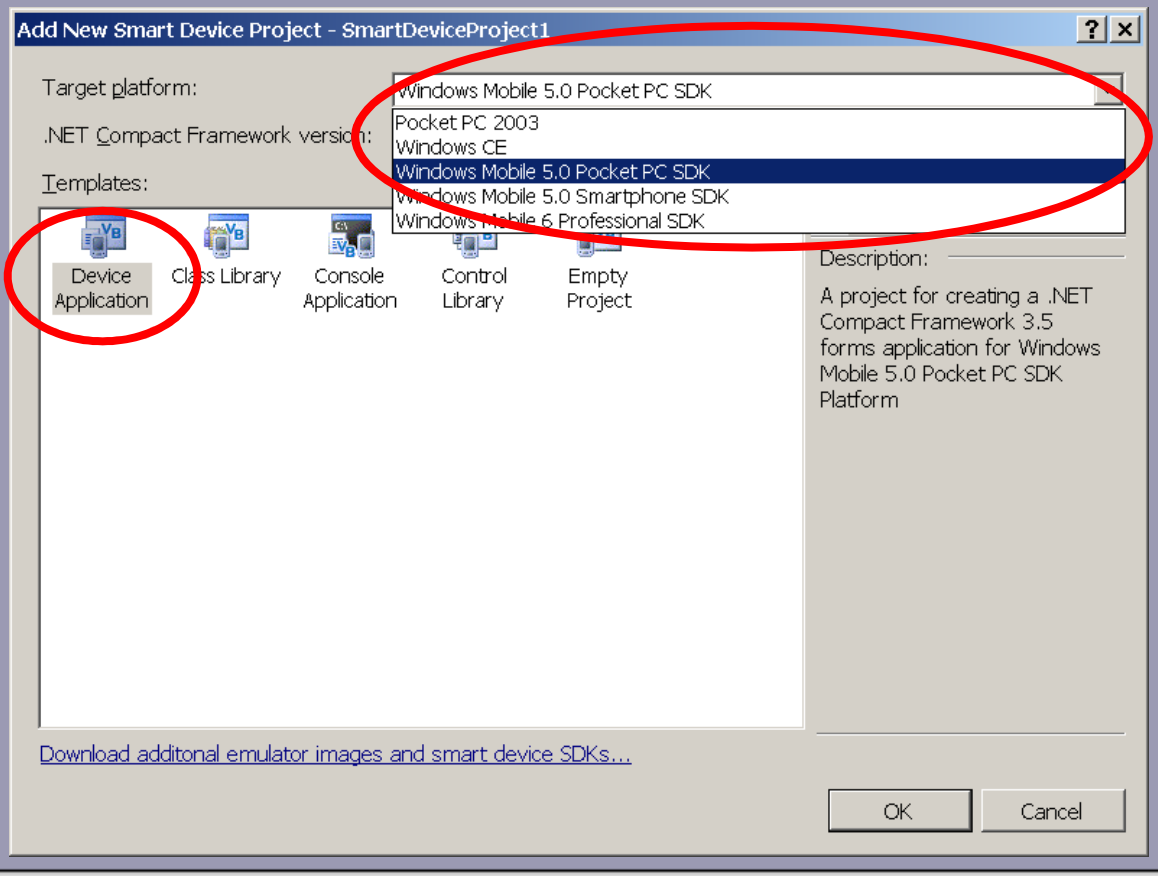
Mobile Applications made easy ☺

Create a new Smart Device Project



Mobile Applications made easy ☺

- Select Device Application for building a windows mobile application
- Select the correct SDK suitable for your device



Practice

Run all previous practices on the Smart Device Project

Lesson 8

Deploying Applications

Overview

1. Describing Assemblies
   - Assemblies Overview
   - Benefits of Strong-Named Assemblies
   - Creating Strong-Named Assemblies
   - Versioning Strong-Named Assemblies
   - Using the Global Assembly Cache

2. Choosing a Deployment Strategy
   - Deployment Overview
   - Copying Projects
   - Deploying Projects
   - Types of Deployment Projects

3. Deploying Applications

Assemblies Overview

- Contains code, resources, and metadata
- Provides security, type, and reference scope
- Forms a deployment unit
- Versionable
- Side-by-side execution allows multiple installed versions
- Global assembly cache allows assembly sharing

Benefits of Strong-Named Assemblies

- Guaranteed uniqueness
  - No two strong names can be the same
- Protected version lineage
  - Only legitimate assembly versions can be loaded
- Enforced assembly integrity
  - Assemblies are tested for unauthorized modification before loading

Creating Strong-Named Assemblies

Requires identity, public key, and digital signature

Generating the public-private key pair

Create a .snk file

Modify AssemblyInfo.vb

```
<Assembly: AssemblyKeyFile("KeyFile.snk")>
```

Versioning Strong-Named Assemblies

When a client makes a binding request, the runtime checks:

- The original binding information inside the assembly
- Configuration files for version policy instructions

Use a publisher policy file to redirect the binding request

```
<bindingRedirect oldVersion="1.0.0.0"
                 newVersion="1.0.1.0"/>
```

Using the Global Assembly Cache

- Performance
  - Quicker binding
  - Only one instance ever loaded
- Shared location
  - Can use machine configuration file to redirect bindings
- File security
  - Only administrators can delete files
- Side-by-side versioning
  - Can install multiple copies using different version information

Deployment Overview

- No-impact applications
- Private components
- Side-by-side versioning
- XCOPY deployment
- On-the-fly updates
- Global assembly cache

Copying Projects

- Copying a project
  - There is an extra menu command for Web applications
  - You can copy a project directly to a Web server
- Using the XCOPY command
  - Use the DOS command
  - You can use it for any type of application

Deploying Projects

- Windows Installer
  - Is used for Windows-based and Web-based deployment
  - Copies all required files and registers components
  - Configures IIS for Web-based applications
- Merge modules
  - Are used for reusable components
  - Are included in an .msi file

Types of Deployment Projects

- Cab Project
  for downloading from Web server
- Merge Module Project
  for shared components
- Setup Project
  for Windows-based applications
- Setup Wizard
  to walk through deployment project creation
- Web Setup Project
  for Web-based applications

Deploying Applications

- Creating a Merge Module Project
- Creating a Setup Project
- Using the Editors
- Creating Installation Components
- Deploying the Application

Creating a Merge Module Project

- Never installed directly

  included in client application deployment project
- Contains
  - DLL
  - Any dependencies and resources
  - Information for the Windows Installer
- Store one component only in one merge module

  If component changes, create a new merge module

Creating a Setup Project

Creates a blank setup project with relevant folders in File System Editor

- **Windows-based application**
  - Application Folder
  - User's Desktop
  - User's Programs Menu
- **Web-based application**
  - Web Application Folder

Using the Editors

- Registry
- File types
- User interface
- Custom actions
- Launch conditions

Creating Installation Components

- EventLog
- MessageQueue
- PerformanceCounter
- Service
- ServiceProcess

Deploying the Application

- Windows-based setup project
  - Copies all files
  - Registers components
  - Performs other installation tasks
- Web setup project
  - Copies all files
  - Registers components
  - Creates a Web application

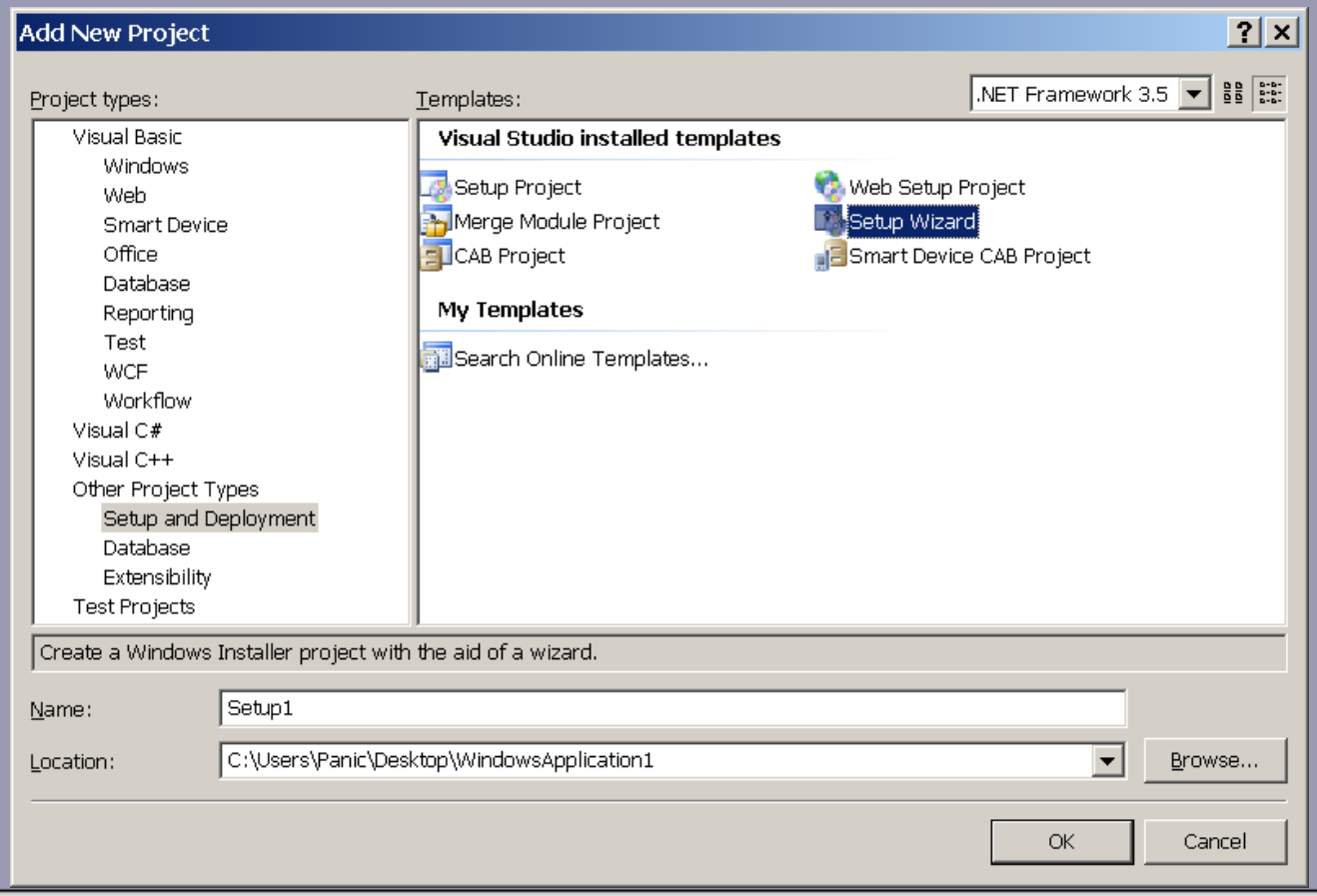
Practice

Create a setup project for a windows application

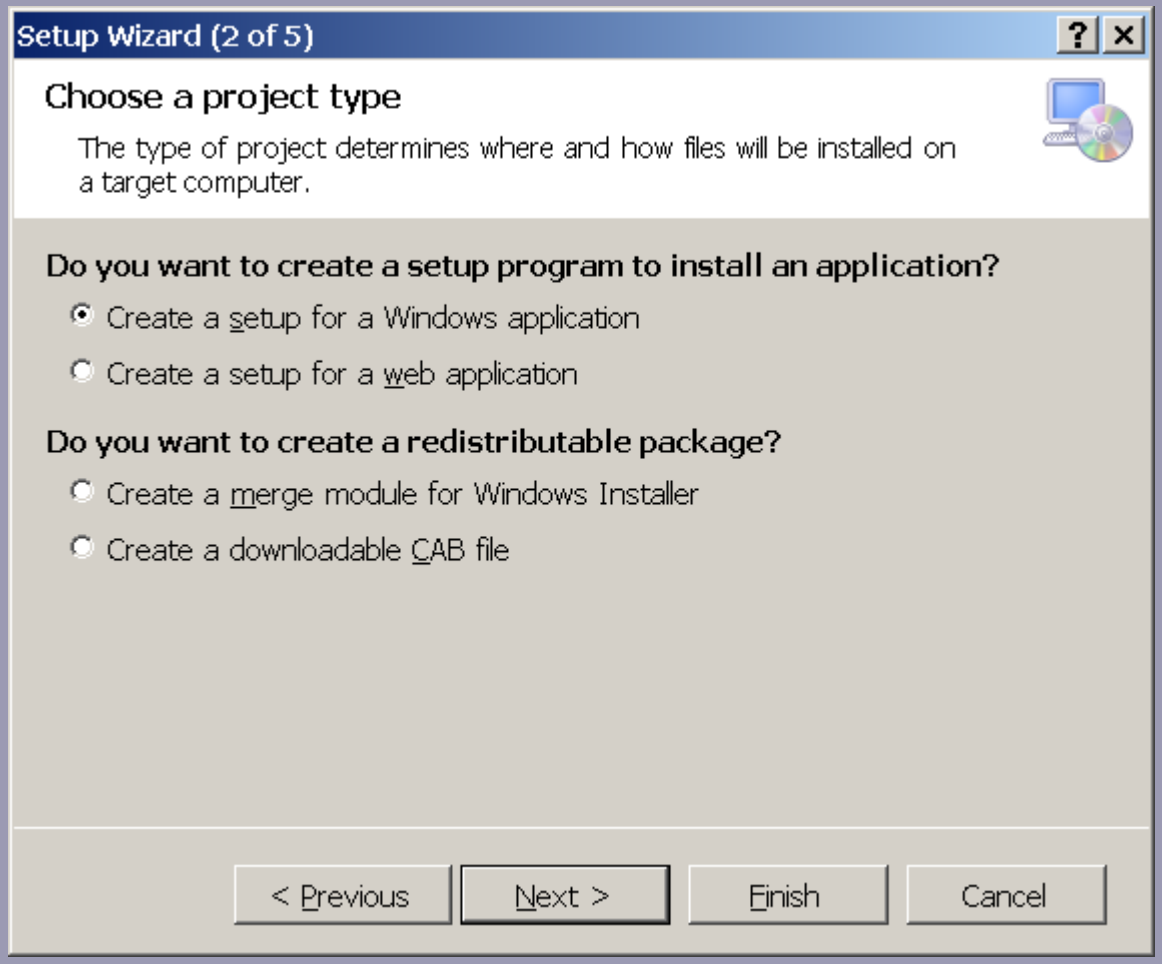
Practice

Add a new Setup Project to your solution

Select the Setup Wizard template

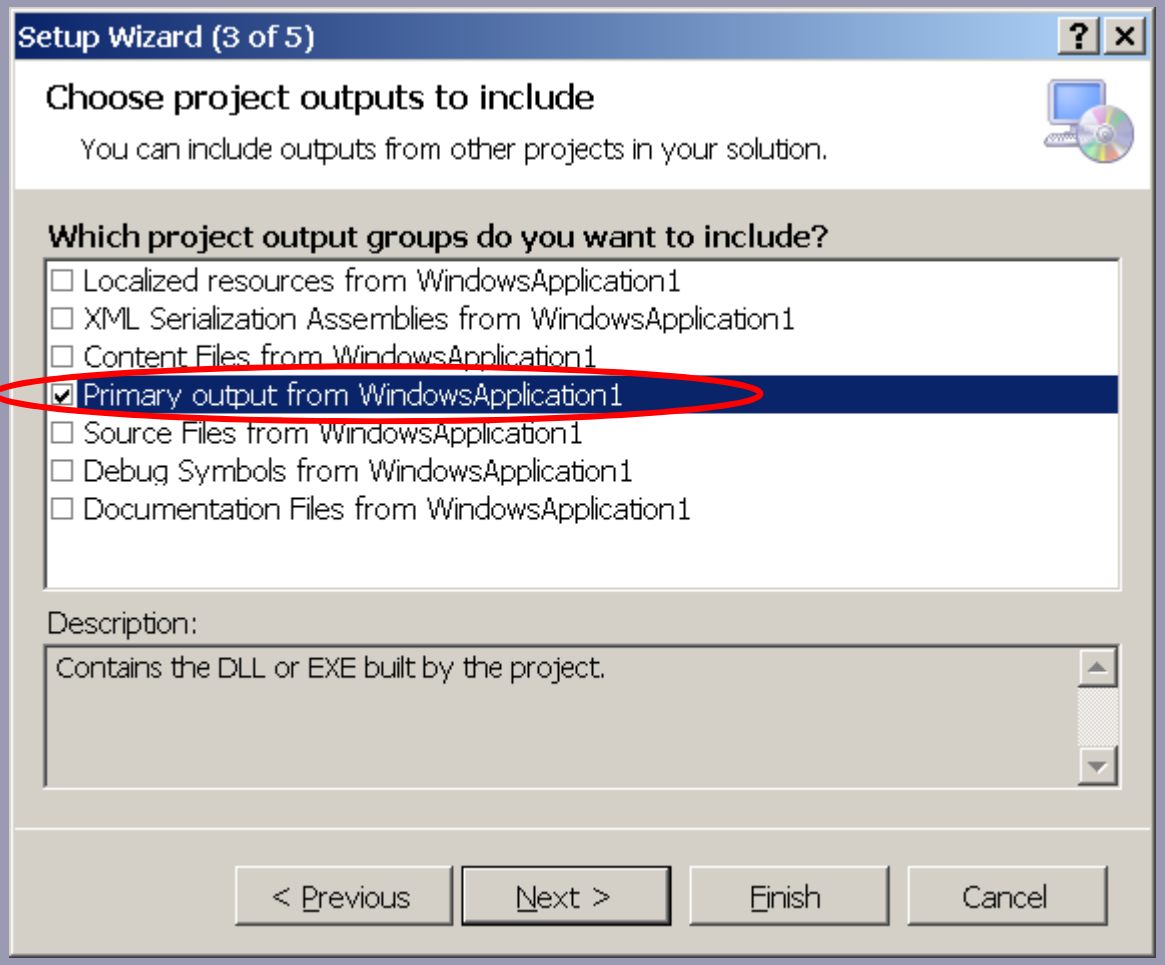


Practice


Setup Wizard (2 of 5)
Choose a project type
The type of project determines where and how files will be installed on a target computer.
Do you want to create a setup program to install an application?
Create a setup for a Windows application
Create a setup for a web application
Do you want to create a redistributable package?
Create a merge module for Windows Installer
Create a downloadable CAB file
< Previous
Next >
Finish
Cancel

Practice

This is the .exe file of your application



Press Finish when you are done

Practice

Build your project

Using explorer, go to
%Solution Folder%\Setup1\Debug

Check out the files

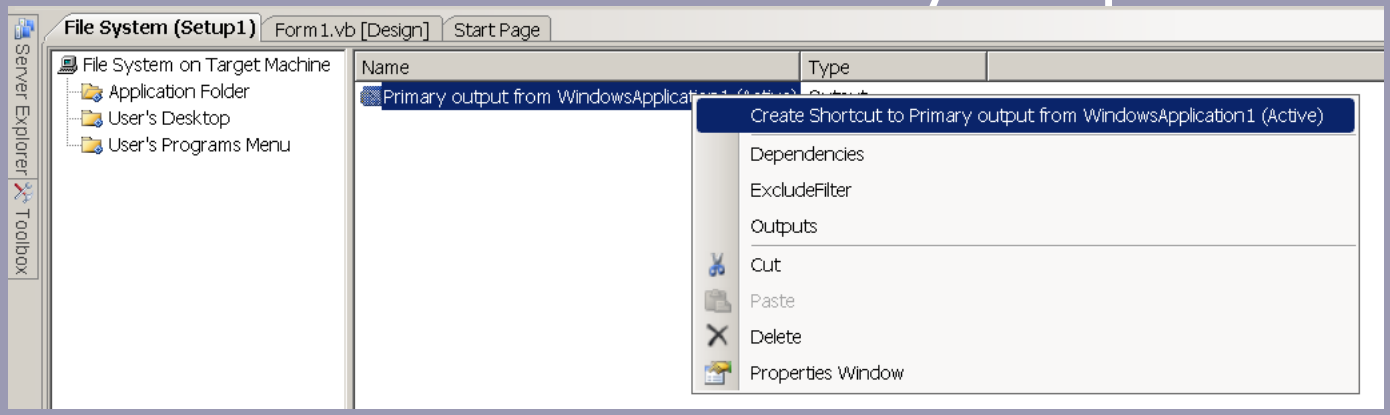
- Setup1.msi
- setup.exe

Run setup.exe and install your application

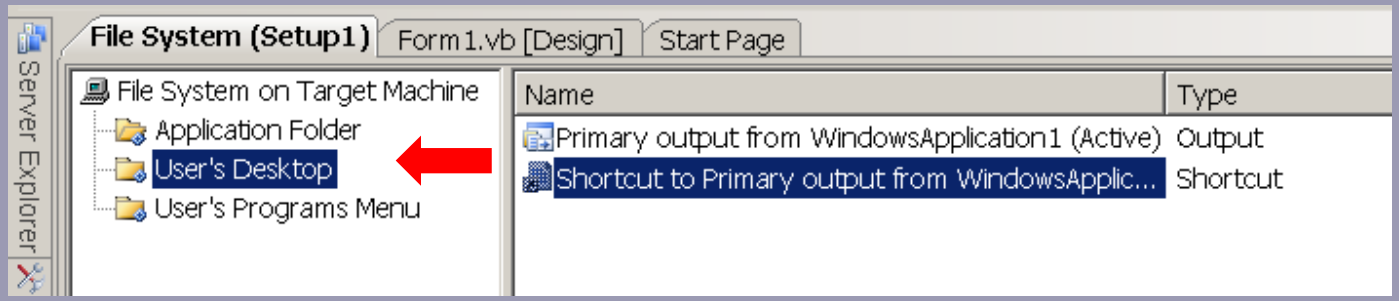
Practice

Creating a shortcut to Desktop of your application

Create a Shortcut to Primary Output



Move it on the User's Desktop Folder



Lesson 9

Miscellaneous Topics

System.IO

System.Drawing

System.Diagnostics.Process

System.IO: File/Directory Operations

IO.File: File Operations

- Copy, Delete, Exists, Move, Replace, …
- Open(path, FileMode), Close,…

  IO.FileMode: File mode when opening a file
  - Append,Create,CreateNew,Open,OpenOrCreate,Truncate

IO.Stream

- FileStream, StreamReader/Writer, TextReader/Writer,…

IO.Directory: Directory Operations

- CreateDirectory, Exists, Move, …
- GetDirectories(path), GetFiles(path), GetParent(path)

System.IO: File/Directory Operations

Example: Reading all files in a directory

```
// Directory Path
string dirPath = "c:\tmp";

// stream reader for each file
StreamReader sr = null;

// String for reading each line
    of the file
string strLine = string.Empty;
```

```
foreach (string file in
    Directory.GetFiles(dirPath)) {
    //Create a new StreamReader for this file
    sr = new StreamReader(file);

    // OPTION 1: read line by line
    while (!sr.EndOfStream)
        strLine = sr.ReadLine();
    // OPTION 2: read all
    strLine = sr.ReadToEnd();

    // Close stream reader (otherwise file is
    locked)
    sr.Close();
}
```

System.Drawing: Drawing custom shapes

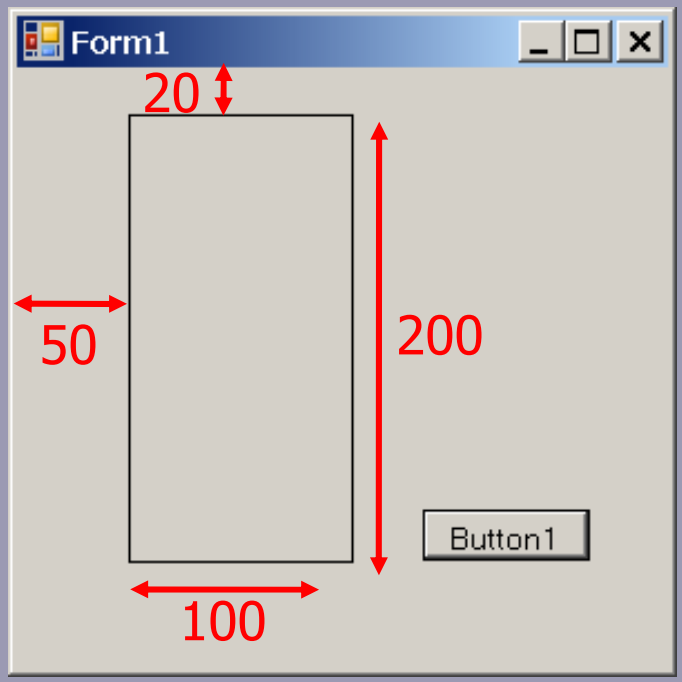
System.Drawing.Graphics: graphic objects used for drawing
CreateGraphics method: gets the graphics object for a control
Draw methods: Draw the outline of a shape (e.g., DrawRectangle)
Fill methods: Draw the fill of a shape (.e.g., Fill Rectangle)

Example: Drawing a custom rectangle on a Form

```
// Create a graphics object
Graphics g;

// Get the Forms graphics object
g = this.CreateGraphics();

// Draw the outline of a rectangle
g.DrawRectangle(Pens.Black, _
50, 20, 100, 200);
 X,  Y,   Width, Height
```



System.Diagnostics.Process

To launch an external process (e.g., Windows Calculator)

```
System.Diagnostics.Process.Start("Calc.exe");
```

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