# Lecture 1

## Lecture 1

See Module one for PDF copy of this lecture

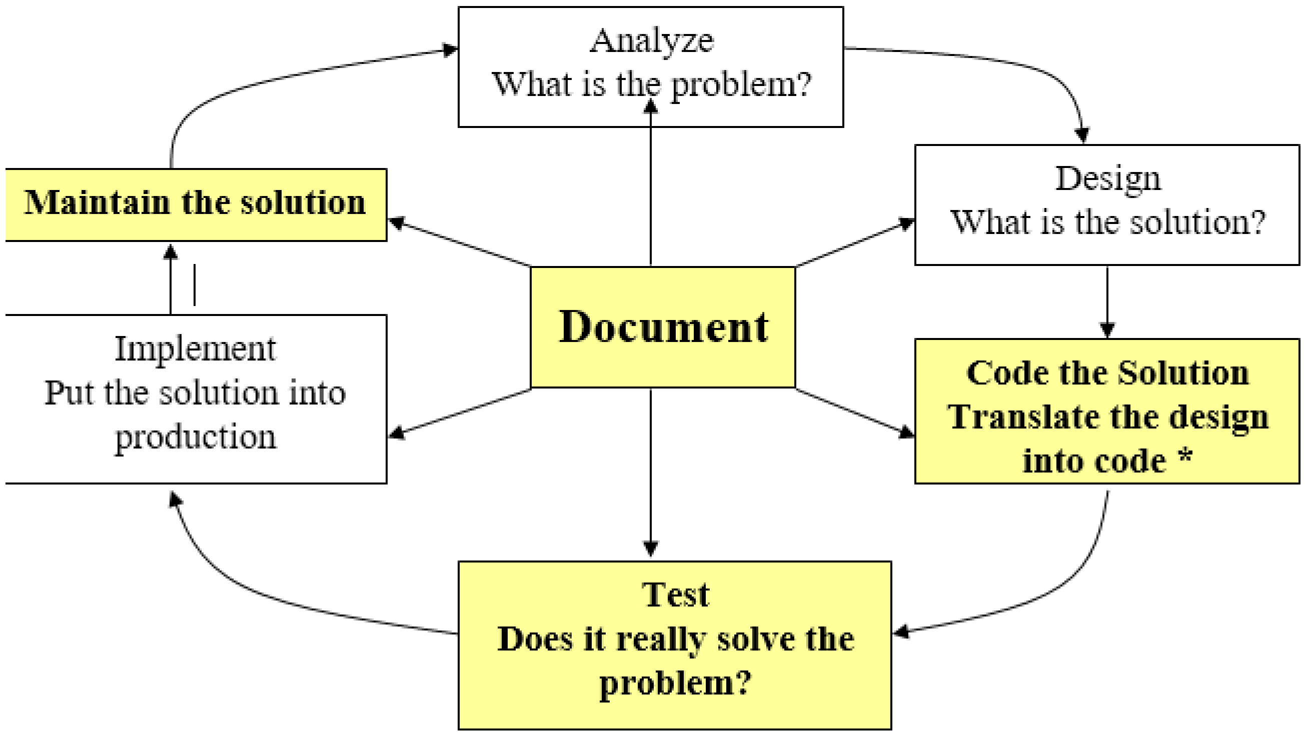
This is the summary of Chapter One and two of your book. You need to read your book for more details

Introduction to Programming in C#

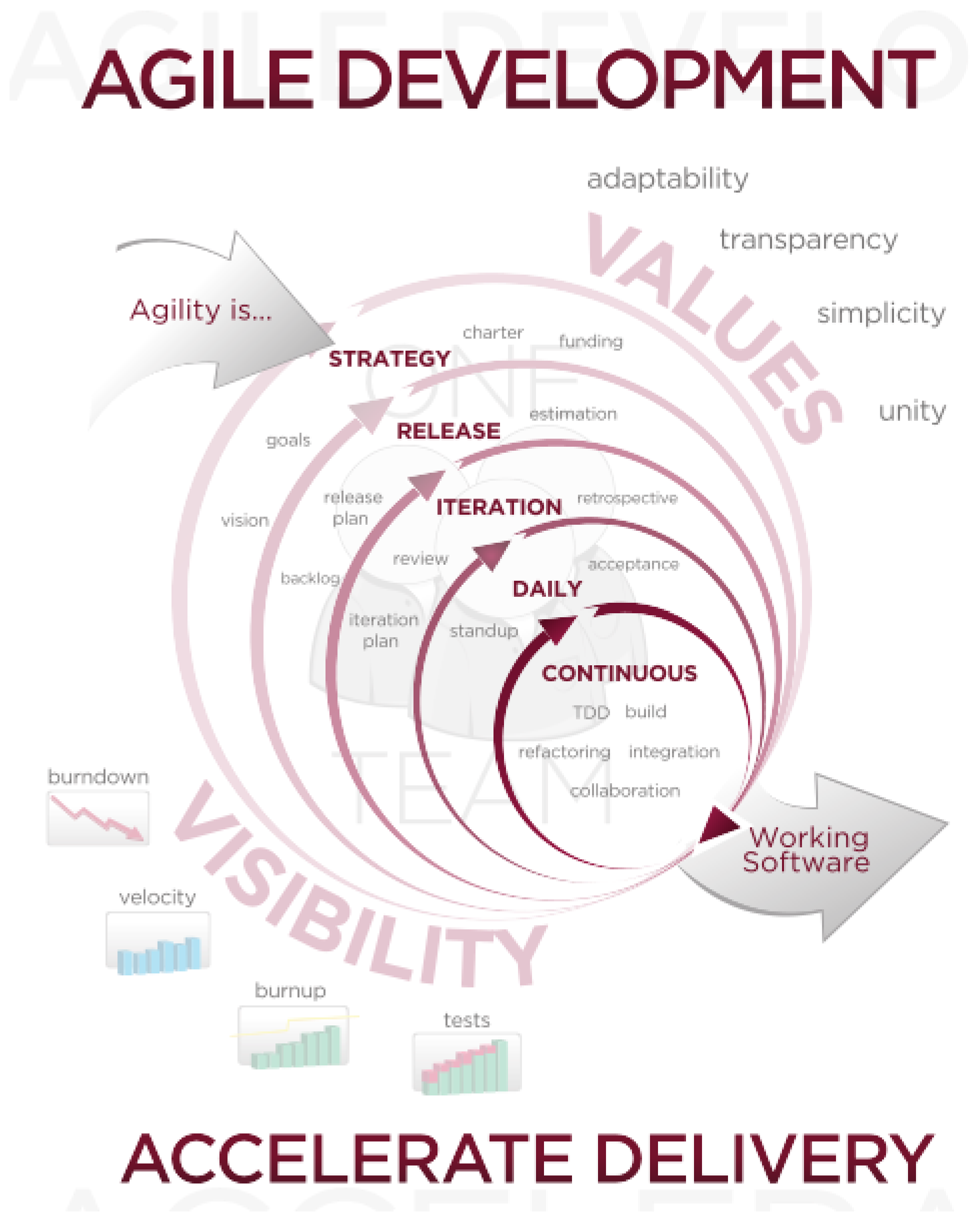
## program (pro'-gram) [vi]

To engage in a pastime like banging one's head against a wall but with fewer opportunities for reward.

## SOFTWARE DEVELOPMENT LIFE CYCLE(SDLC)



**code** = writing the software which provides the solution to the problem



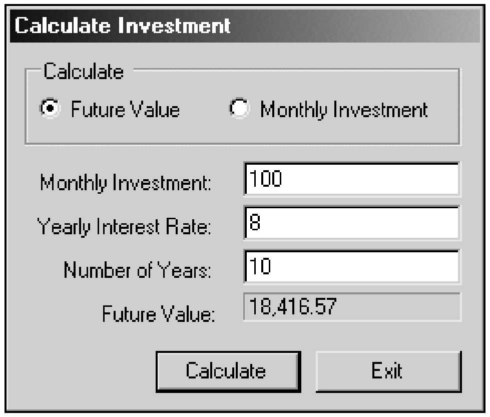
By Agile-Software-Development-Poster-En.pdf: The original uploader was Dbenson at English Wikipedia and VersionOne, Inc. *derivative work: Devon Fyson (This file was derived from:  Sample.svg) [CC-BY-SA-3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons

**Agile development** is a methodology for developing software that is incremental and iterative. It breaks tasks into small increments that last one to four weeks. At the end of the increment, a working product is produced that is demonstrated to the stakeholders. Daily status meetings, called "stand ups" because developers report standing up to discourage lengthy discussions, keep the project on track.

Agile is replacing the traditional Waterfalls SDLC in the workplace.

## Programming

### Program Example



Calculate: (● Future Value) ○ Monthly Investment

Monthly Investment: 100
Yearly Interest Rate: 8
Number of Years: 10
Future Value: 18,416.57

## Program – definition

A set of instructions that tell the computer what to do

A set of instructions that tell the computer what to do

## Machine Code

Computers respond to binary instructions called **machine code**:
0110 0011 1100 1110 0100 1111

## High Level Languages

While a computer is happy with 0s and 1s, people are not,
so **high level languages** (languages easier for humans to understand) have been invented.

Several high level-languages exist, such as c#, JAVA, COBOL, etc.
High level-languages provide the resources for writing programs in a way we can understand. Once written, a special program called a **compiler**, takes the program instructions and converts them into machine code.
As we stated earlier, machine code is a series of binary instruction that the computer can understand.

## Object Oriented Programming

### Objects

Objects are things (nouns),
for example a **ball** or a **book**, a **customer** or a **student**

In programming, an object packages data and actions
that operate on that data together as one unit

## Properties

**Characteristics** of an object are called properties.
For example, a ball has a **shape** and a **color**.
A book has **number of pages**.
Customer and student both share **name** and **address** properties
but have unique properties as well. (Can you name some?)

It's important to distinguish between a **property** (color)
and the **value of the property** (red)

## Methods

Methods are actions (verbs) associated with an object

For example you might **throw** or **bounce** a ball
**Read** might be a method of book.
Can you think of possible methods of customer or student?

## Events

Events are signals from an object that something has occurred

A ball might signal that it has been **moved**
A book might signal that **end of book** has been reached.
A customer might signal **exceeds credit limit**

Events can be triggered by the user or the system

The programmer can write code (called **event handlers**)
which are triggered when the event occurs.
Not every event needs to be handled.
In real life, relatively few events have handlers

For example, if the ball has been moved, I can write an event handler
that causes the ball that was moved to glow

## Classes

A class is a template or blueprint for an object.
Classes define all properties methods and events.
Objects are called **instances** of a class.

Each instance, while sharing the same class properties,
can have different values of those properties

**Example**: suppose I define a **Ball** class with properties **Color** and **Size**
I can create 3 objects from this class

| **Object** | **Ball 1** | **Ball 2** | **Ball 3** |
|---|---|---|---|
| **Color** | Red | Yellow | Blue |

| | | | |
|---|---|---|---|
| **Color** | Red | Yellow | Blue |
| **Size** | Big | Small | Big |

## Objects in c#

C# is an Object Oriented Programming Language

### Examples of c# Classes

Any control in the toolbox (label, textbox, button, etc.) represents a class

When you use a control in the toolbox,
you are using a class to create an object

### Examples of c# Objects

You can place many buttons on the form.
Each button on the form is an object.

### Examples of c# Properties

Controls have properties like:

- **Name** (what the programmer calls the control)
- **Text** (what the user sees)

## Examples of c# Methods

Some important methods of controls:

- **Focus** – put the cursor on a particular control
- **Show** – display a control

## Examples of c# Events

The most important event for new programmers is:

- **Click –** user has clicked on a control

But there are very many more

## Steps for Developing a c# Application

## 1. Define What the Program is to Do

This is the step where many programmers go wrong.
Unless you clearly know what the program is supposed to do,
how can you solve the problem?

Define:

- Purpose
- Output

- Output
- Input
- Process

**Note:** I list output before input and process because your **design** should be driven by the output – what the user wants

## 2. Design the User Interface

Make a quick sketch of what the screen look like
A lot of times these are done on napkins or notepads.
Before you waste computer time,
be sure you and your user agree on the interface

## 3. Make a list of the Controls needed and
define the values of each Control's relevant properties

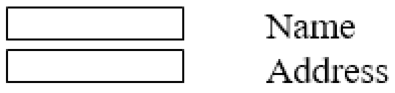
Choose the best controls to accomplish what you want to do
We'll outline the controls we'll be using in the course later in this lesson
and discuss the controls in more detail starting next week.

This week, we're only interested in 2 properties:

- **Name** – what the programmer calls each control
- **Text** – what the user sees displayed in the control

Follow naming conventions for significant objects, outlined below
By "significant", I mean an object that will be used by the programmer or in all likelihood will be used by maintenance programmers.

Labels that only identify textboxes (so the user knows what to enter) are typically NOT significant. Example:



Here, "Name" and "Address" are labels that aren't significant
The textboxes are significant and would be given names like txtName and txtAddress

I believe that every **form** IS significant, and should be given a name (in this I disagree with the book)

## 4. Make a List of the Methods Needed for Each Control

Right now we're only concerned with one event, Click, but we'll learn more as we go on.

You need to briefly describe what each control will do.
This brief description of the method should be used in the comment that describes the method. We'll discuss comments next week.

## 5. Create a Flowchart or Pseudo Code for Each Method

I only define an algorithm for really difficult problems.
This is a waste of time for simple methods
Of course, what I call simple (after 20 years of programming)
and what you call simple could be 2 different things.

I don’t require this step, but strongly advise it if you’re feeling uncertain

## 6. Start Visual Studio and Create the User Interface

Use steps 2 and 3 to build your forms and other controls
The design steps make this very easy

## 7. Write the Code for the Event Procedures and Other Methods

Use step 4 to create event procedures
Use step 5 as a guide for the algorithms to nontrivial methods

## 8. Correct Syntax Errors

A syntax error results from misspelling or other incorrect use of a programming language element.

Typically, these are identified with “blue squiggly” lines, but if you miss them, the system identifies them when you try to run the application.

If it finds syntax errors, Visual Studio asks if you want to continue.
Take a clue from Nancy Reagan and "**Just say NO**"

**Until you fix all syntax errors, the program won't run as you expect**
Some people think that the program will just skip those parts with syntax errors. **This is incorrect.** If you continue, Visual Studio will run your last "clean" compile (without syntax errors). I don't know how many times students have sent me a few lines of code and asked why they don't work. The code looks perfectly fine. Eventually, we discover that the problem lies in a syntax error in another part of the program.

## 9. Test and Correct Logic Errors

After you correct all the syntax errors, Visual Studio will produce a program, normally called an executable. You must test this to ensure that it produces the correct results (what the user wants).

This is the heart of the programming process,
and is frequently quite lengthy.

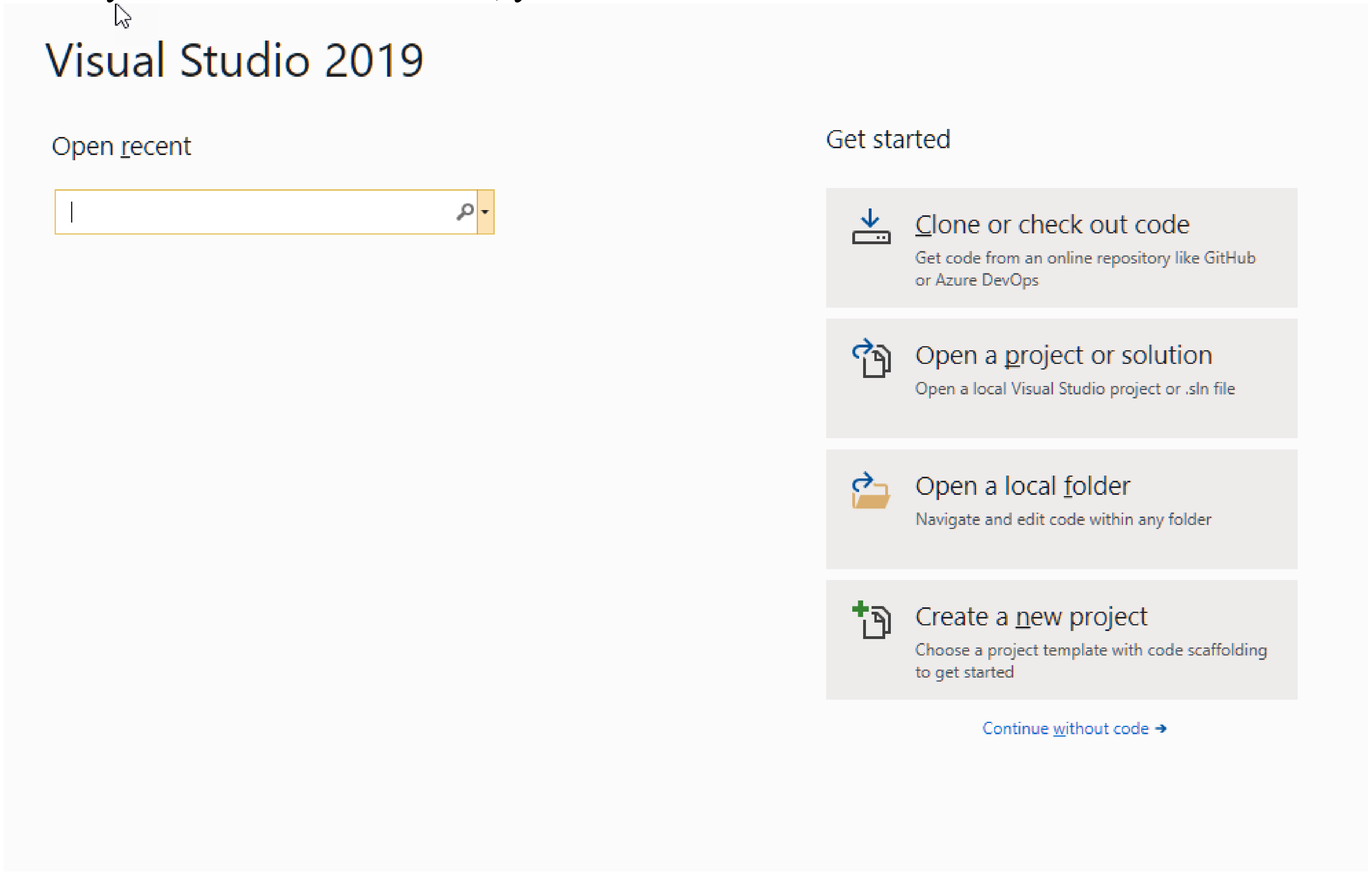
## Visual Studio IDE

## Integrated Development Environment (IDE)

In the old days, you had to edit a program using one tool,
compile using another, link using a third, test using another.
Most languages today have an **integrated** development environment
where you can accomplish all of these things in one tool

For c# (and other .NET languages) this IDE is called **Visual Studio**

When you launch Visual Studio, you should see a screen similar to this:


Visual Studio 2019

Open recent

Get started

Clone or check out code
Get code from an online repository like GitHub or Azure DevOps

Open a project or solution
Open a local Visual Studio project or .sln file

Open a local folder
Navigate and edit code within any folder

Create a new project
Choose a project template with code scaffolding to get started

Continue without code →

See the Video in Lecture Vide section for more details.

## User Interface Design

## Overview

This week, we learn about more Controls It's nice to know about additional controls,

But it's more important to have an idea about how we're going to use them

## User Interface - Definition

How the application will look How it will interact with the user

## Good Interface – Bad Interface

### Good interface

· allows users to perform their daily tasks

· allows users to accomplish their business needs

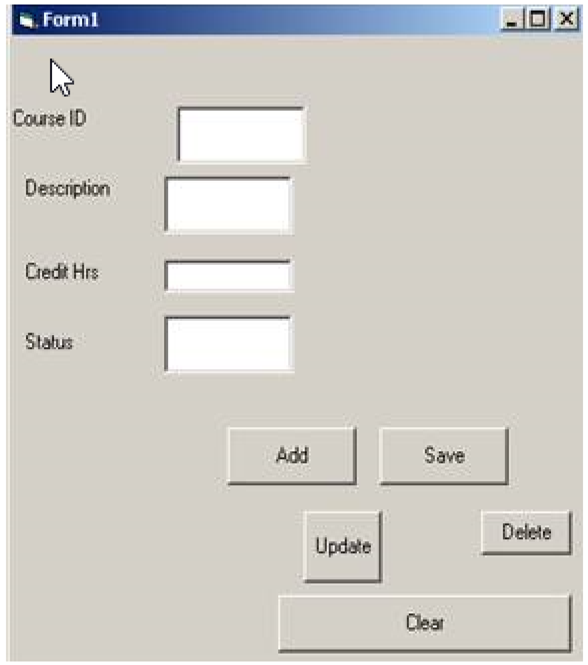
### Bad interface

· distracts user with excess information or unnecessary functionality

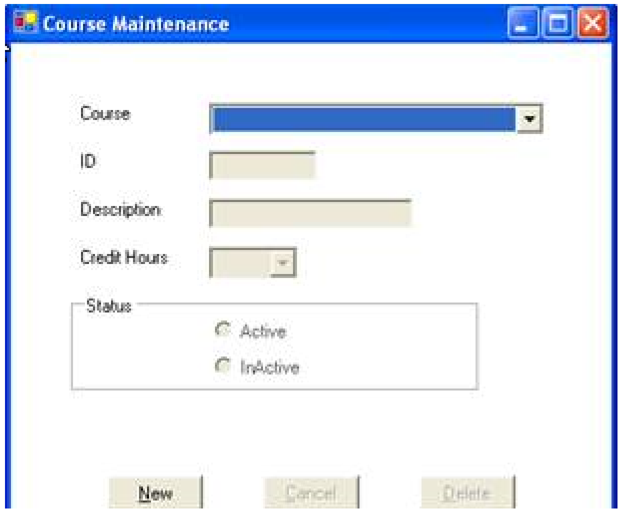
· hides critical functionality

· in any way detracts from users' ability to accomplish tasks

## What’s wrong with this interface?



## Why is this better? Can it be improved?



## Forms

### When to Use

A **form** is a container that holds other controls

Whenever you create a Windows Application, you create a form You can have more than one form per project

(but for now we’ll limit ourselves to one)

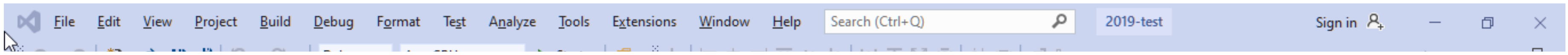
Windows applications compile into executables (.exe)

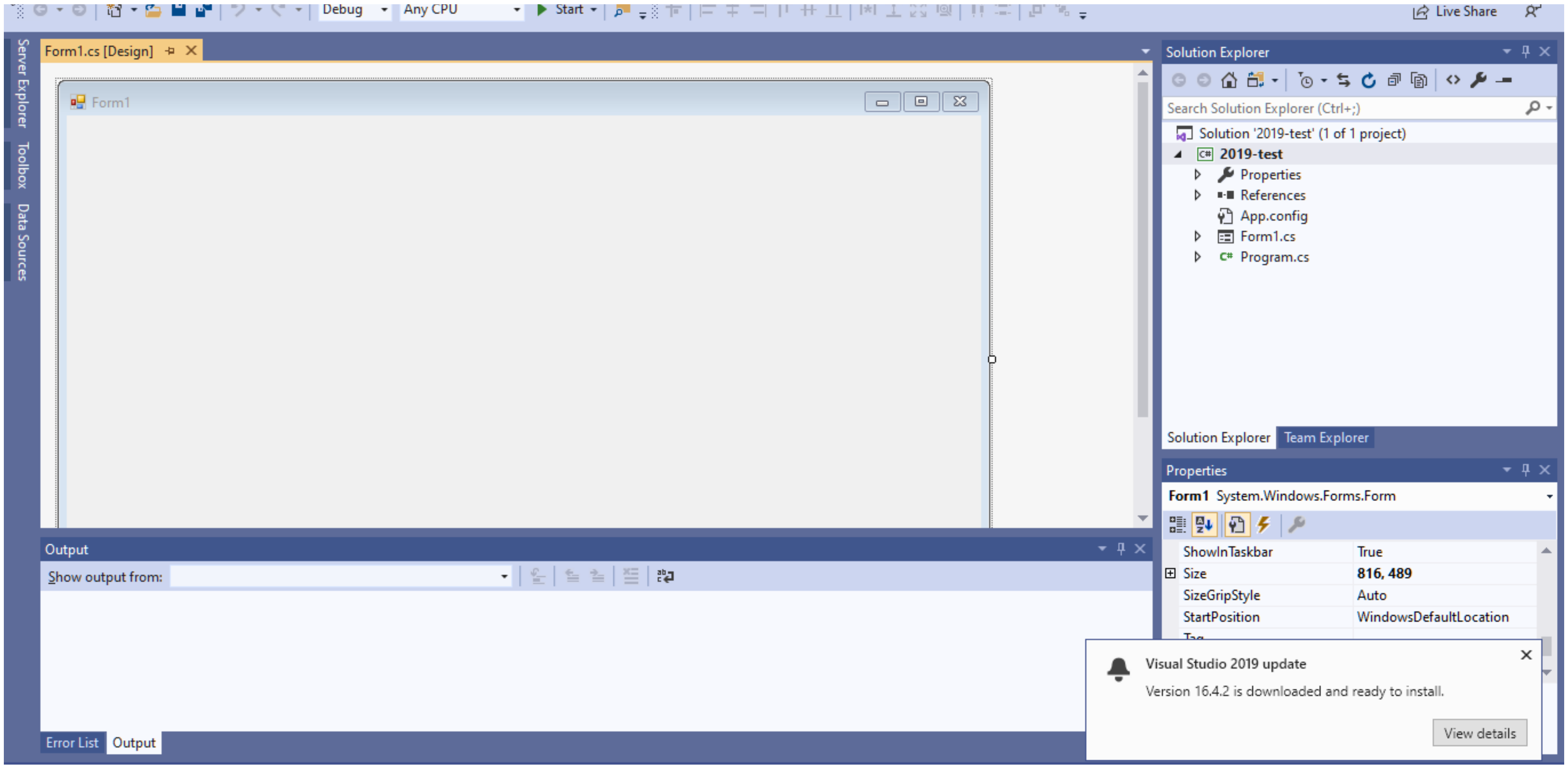
### When not to Use

When you want to write code that is portable – easily used by other projects (This term, every project will have a **form**)

Class libraries (which have no form) compile into dynamic link libraries (.dll)

### Most Important Properties





Form1 System.Windows.Forms.Form

| | |
|---|---|
| ShowInTaskbar | True |
| Size | 816, 489 |
| SizeGripStyle | Auto |
| StartPosition | WindowsDefaultLocation |

Visual Studio 2019 update

Version 16.4.2 is downloaded and ready to install.

**Text** – identifier that appears at the top of the form

This should always meaningfully describe the form to the user **AcceptButton** – when the user presses Enter, this button is “clicked” **CancelButton -** when the user presses Esc, this button is “clicked” **StartPosition** – Where the form appears, relative to the screen

## Labels

### When to Use

Use a **label** control when you want

- to display output
- to identify other controls on the form

Notice in the good example on page 3, these literals are **labels:**

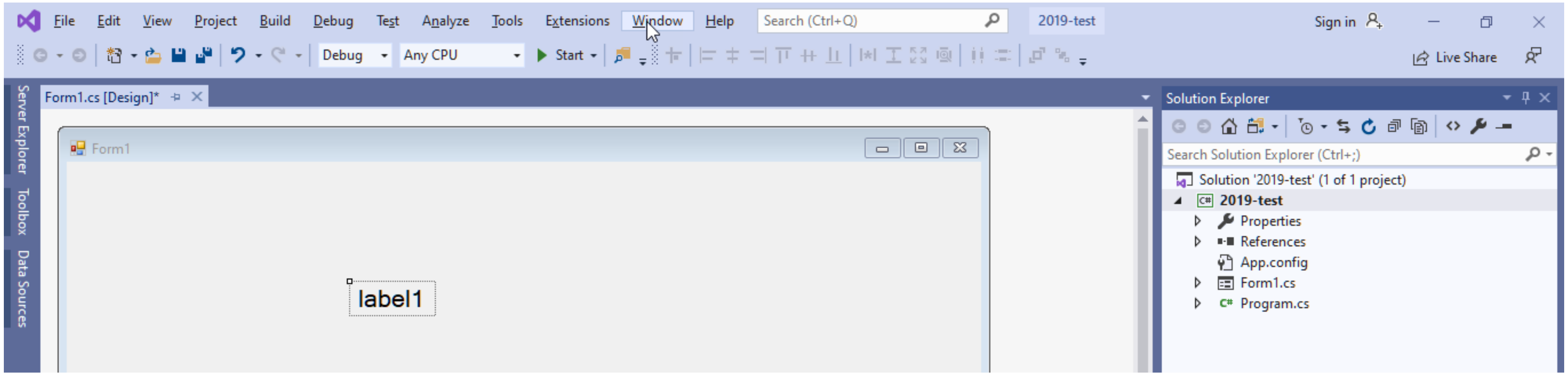
- Course, ID, Description, Credit Hours

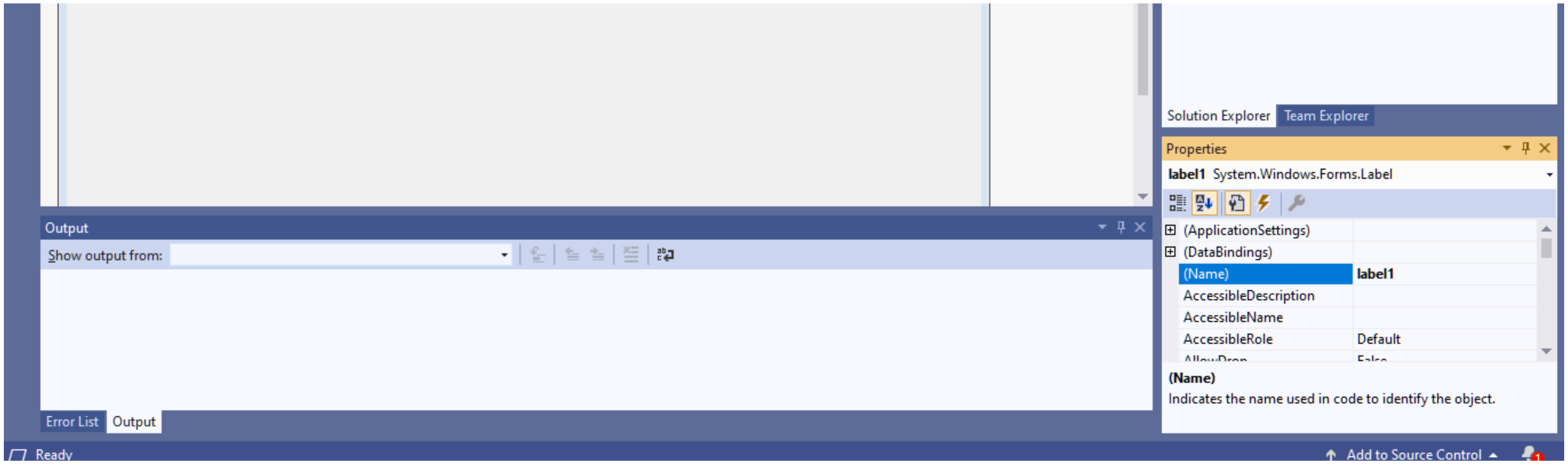
### When not to use

If you need direct user interaction with the control

Only the programmer can change the contents of a **label**

### Most Important Properties





Properties
label1 System.Windows.Forms.Label

| | |
|---|---|
| (ApplicationSettings) | |
| (DataBindings) | |
| (Name) | label1 |
| AccessibleDescription | |
| AccessibleName | |
| AccessibleRole | Default |

(Name)
Indicates the name used in code to identify the object.

**Text** – contents of the **label**

**Autosize** – set to False if you want a blank label to appear

**BorderStyle** – set to other than none if you want a blank label to appear

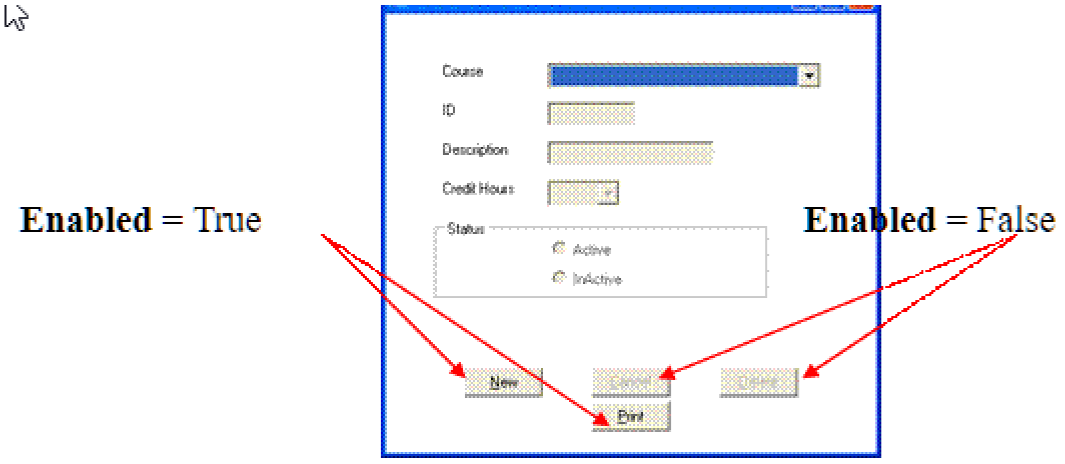
## Buttons

### When to Use

Use a **button** control when you want user to initiate an action

Notice in the good example on page 3, these are **buttons:**

- New, Cancel, Delete, Print



Notice Cancel and Delete are disabled (their **Enabled** property is set to **False**)

The general rule is: if pressing a button at a particular time can only lead to an error message, disable the button at that time

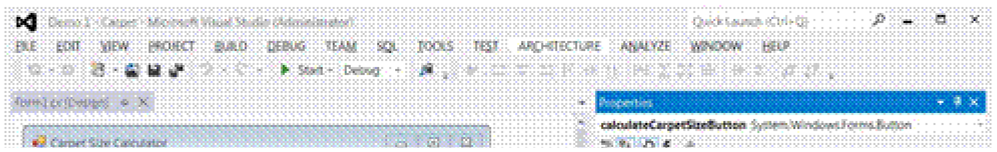
## When not to use

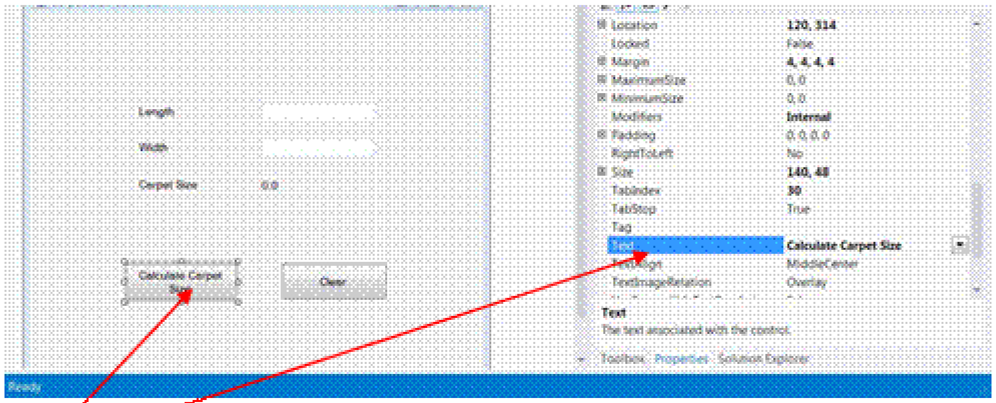
Don't just add buttons to a form.

Have a clear idea what each button does.

Make sure the **text** property clearly defines the button's purpose

## Most Important Properties


FILE EDIT VIEW PROJECT BUILD DEBUG TEAM SQL TOOLS TEST ARCHITECTURE ANALYZE WINDOW HELP
Quick Launch (Ctrl+Q)
Start
Debug
Properties
calculateCarpetSizeButton System.Windows.Forms.Button
Carpet Size Calculator



| | |
|---|---|
| Location | 120, 314 |
| Locked | False |
| Margin | 4, 4, 4, 4 |
| MaximumSize | 0, 0 |
| MinimumSize | 0, 0 |
| Modifiers | Internal |
| Padding | 0, 0, 0, 0 |
| RightToLeft | No |
| Size | 140, 48 |
| TabIndex | 30 |
| TabStop | True |
| Tag | |
| Text | Calculate Carpet Size |
| TextAlign | MiddleCenter |
| TextImageRelation | Overlay |

**Text**
The text associated with the control.

**Text** – what displays in the button
**Enabled** – when **True** User can click on the button

## Picture Boxes

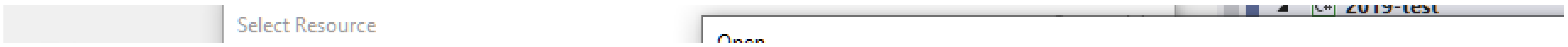
### When to Use Picture Boxes

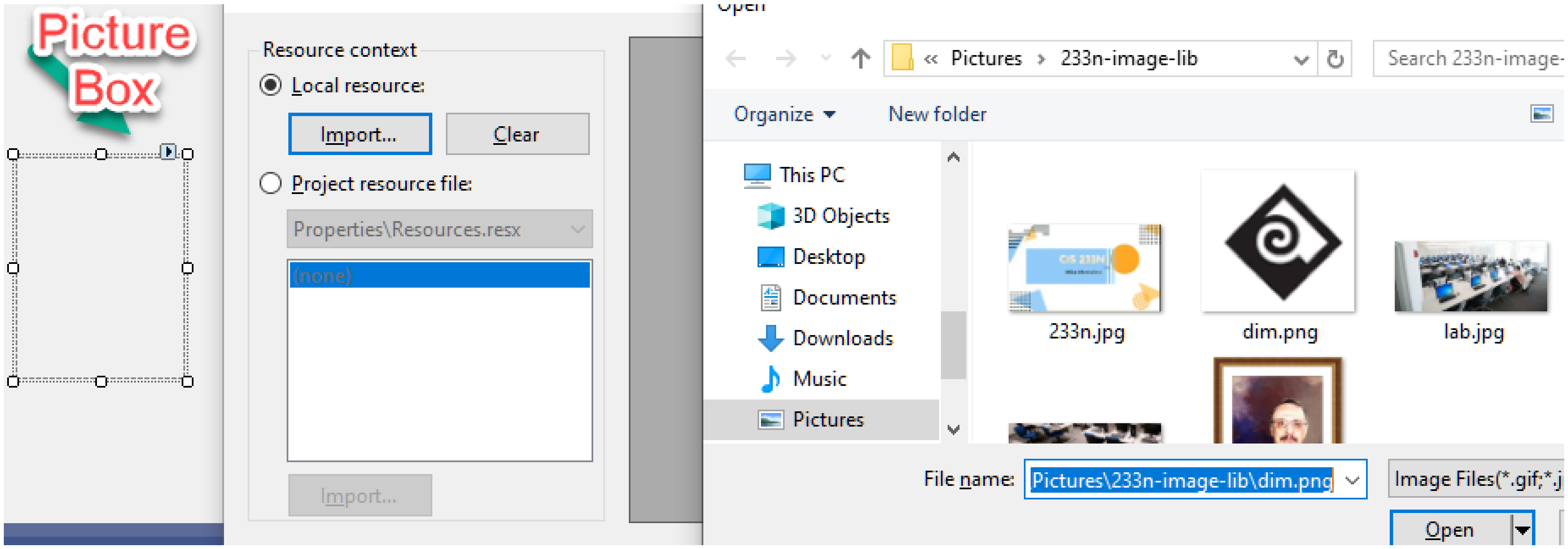
Picture boxes are used to hold images

### Most Important Properties

Image – can be set to any graphic file with and extension of .bmp, .gif, .jpg, .jpeg, .png, .ico, .emf, .wmf

Sizemode – set to Zoom to make picture fit in space and preserve aspect ratio set to StretchImage to make picture fit in space exactly



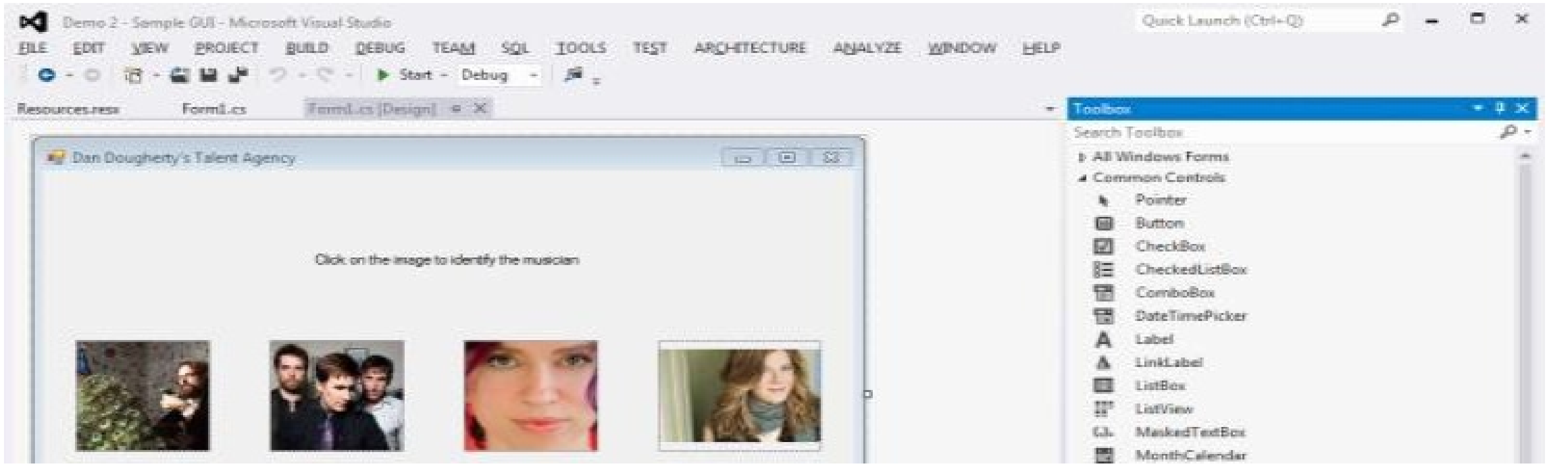


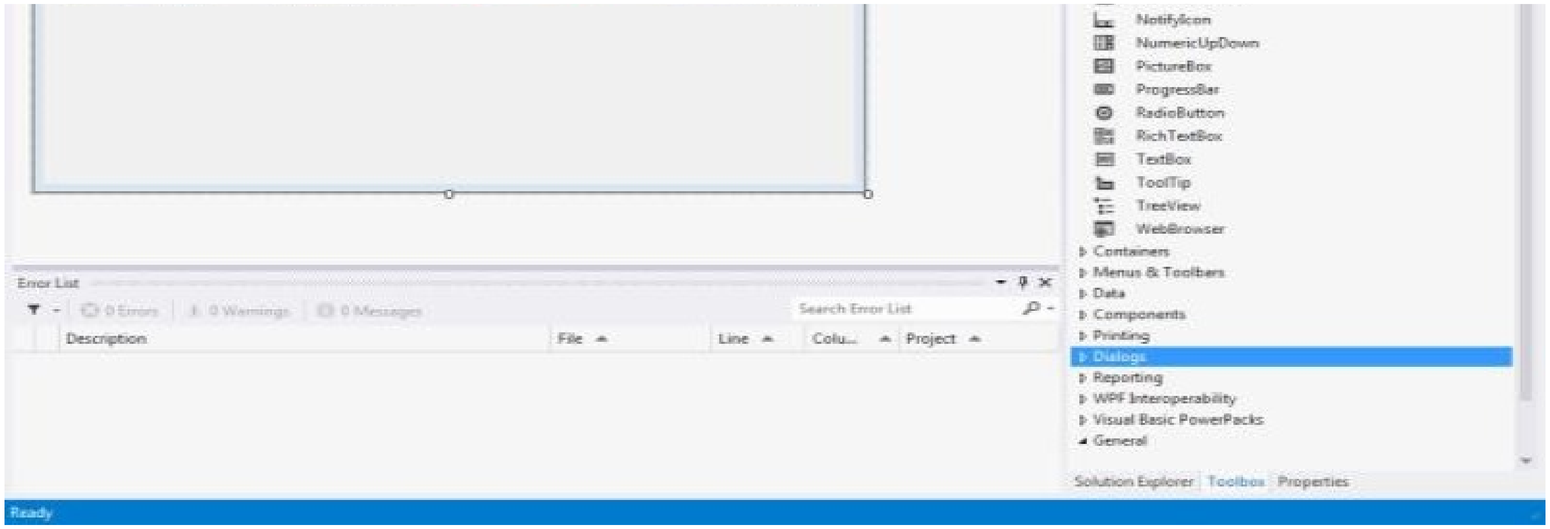
Pictures\233n-image-lib\dim.png

If the file is already imported, you can just select it from the list box

## Working with Controls

### What is a Control?


Demo 2 - Sample GUI - Microsoft Visual Studio
FILE EDIT VIEW PROJECT BUILD DEBUG TEAM SQL TOOLS TEST ARCHITECTURE ANALYZE WINDOW HELP
Quick Launch (Ctrl+Q)
Start Debug
Resources.resx Form1.cs Form1.cs [Design]
Dan Dougherty's Talent Agency
Click on the image to identify the musician
Toolbox
Search Toolbox
All Windows Forms
Common Controls
Pointer
Button
CheckBox
CheckedListBox
ComboBox
DateTimePicker
Label
LinkLabel
ListBox
ListView
MaskedTextBox
MonthCalendar



A control is a visual object. Controls are listed on the **Toolbox** when a Form is visible.

You can display the Toolbox, by:

- Choosing View – Toolbox
- Pressing Ctrl – Alt – X

The objects discussed on the previous pages (forms, labels, buttons, etc.) are all controls

## How to select and work with controls

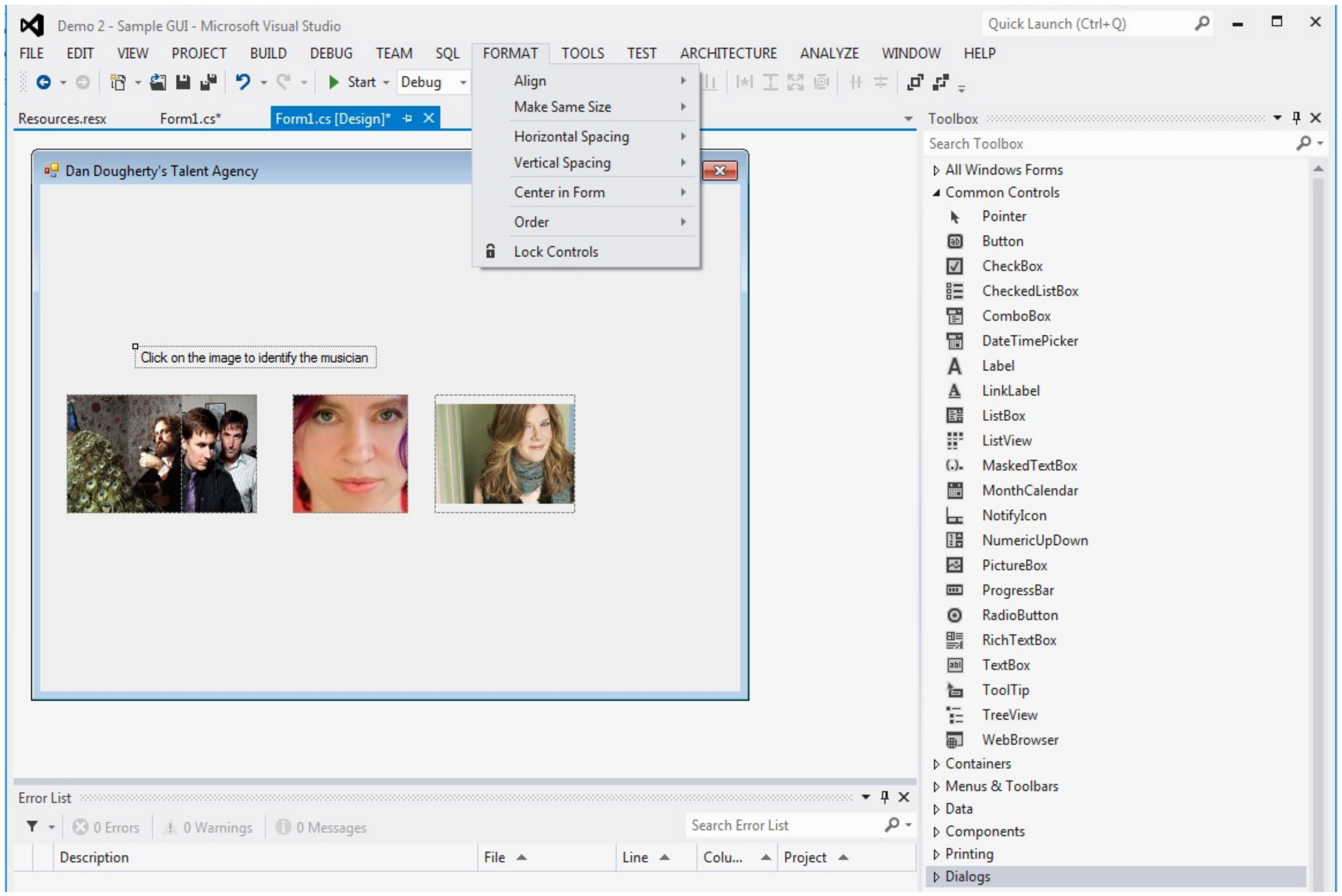
To select a control on the form, click on it.
It then becomes the *primary control* (i.e. the control you're working with) To move a control, drag it.
To size a selected control, drag one of its handles.

## Two ways to select more than one control

Hold down the Shift or Ctrl key as you click on each control.
Click on a blank spot in the form and then drag around the controls.

## How to align, size or space a group of controls

To size all of the controls in a group, size the primary control. To move all of the controls in a group, move the primary control.
Use the commands in the **Format menu** or the buttons on the **Layout toolbar** to align, size, or space all the controls.



# Format Menu

## Purpose

As you can see, the above is not a very good interface. There’s too much white space in the upper right.
Spacing between picture boxes is inconsistent The interface isn’t centered.

The Format menu can easily fix all this

## Align

If you select two or more controls, you can align them

- Vertically (lefts, centers, right)
- Horizontally (tops, middles, bottoms)

## Make Same Size

If you select two or more controls, you can make them the same

- Height
- Width
- Both

## Center in Form

If you select two or more controls, you can center them in the form

- Vertically
- Horizontally

You should always be sure to center all your controls at the end of the design process

## For further information

Refer to the **Format Menu** video

# Text Boxes

## When to Use

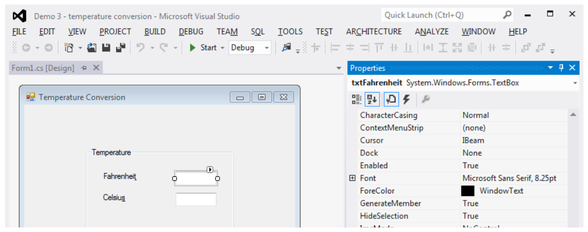
Use a **text box** control when you want the user to type some input You can also use a text box to display output.
In this case, set the **Enabled** property to **False.**

Typically, **text boxes** are used for free form input
Notice in the good example on page 3, ID and description use text boxes

## When not to use

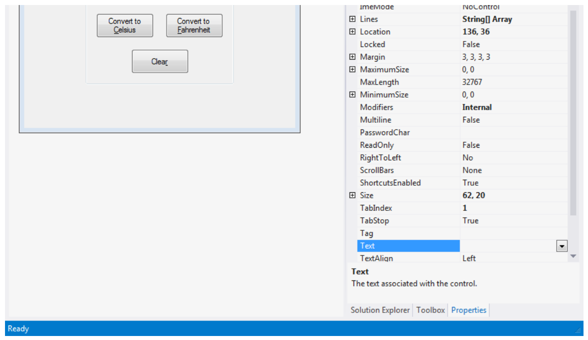
If the user's choices are limited
In the good example on page 3, status choices don't use text boxes That's because the choices are limited to Active or Inactive

## Most Important Properties


Demo 3 - temperature conversion - Microsoft Visual Studio
Quick Launch (Ctrl+Q)
FILE EDIT VIEW PROJECT BUILD DEBUG TEAM SQL TOOLS TEST ARCHITECTURE ANALYZE WINDOW HELP
Start
Debug
Form1.cs [Design]
Temperature Conversion
Temperature
Fahrenheit
Celsius
Properties

txtFahrenheit System.Windows.Forms.TextBox

| | |
|---|---|
| CharacterCasing | Normal |
| ContextMenuStrip | (none) |
| Cursor | IBeam |
| Dock | None |
| Enabled | True |
| ⊞ Font | Microsoft Sans Serif, 8.25pt |
| ForeColor | ■ WindowText |
| GenerateMember | True |
| HideSelection | True |



| | |
|---|---|
| ImeMode | NoControl |
| ⊞ Lines | **String[] Array** |
| ⊞ Location | **136, 36** |
| Locked | False |
| ⊞ Margin | 3, 3, 3, 3 |
| ⊞ MaximumSize | 0, 0 |
| MaxLength | 32767 |
| ⊞ MinimumSize | 0, 0 |
| Modifiers | **Internal** |
| Multiline | False |
| PasswordChar | |
| ReadOnly | False |
| RightToLeft | No |
| ScrollBars | None |
| ShortcutsEnabled | True |
| ⊞ Size | **62, 20** |
| TabIndex | **1** |
| TabStop | True |
| Tag | |
| Text | |
| TextAlign | Left |

**Text**
The text associated with the control.

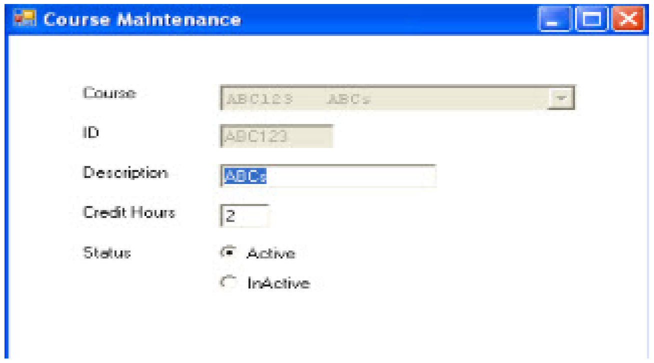
**Text –** contents of the text box (typically blank at design time)
**Enabled** – when False use for output only
**MaxLength** – the maximum number of characters the user can enter

## Sizing, Focus and Tab Order

### How to change the size of the form

Click on the  form. Drag one of its handles.

### Focus



| | |
|---|---|
| Course | ABC123 ABCs |
| ID | ABC123 |
| Description | ABCs |
| Credit Hours | 2 |
| Status | [✓ Active] InActive |

When a user runs a program,
one control on the form is highlighted This control is said to have **focus**

For example, the description textbox in the example on the right has focus.

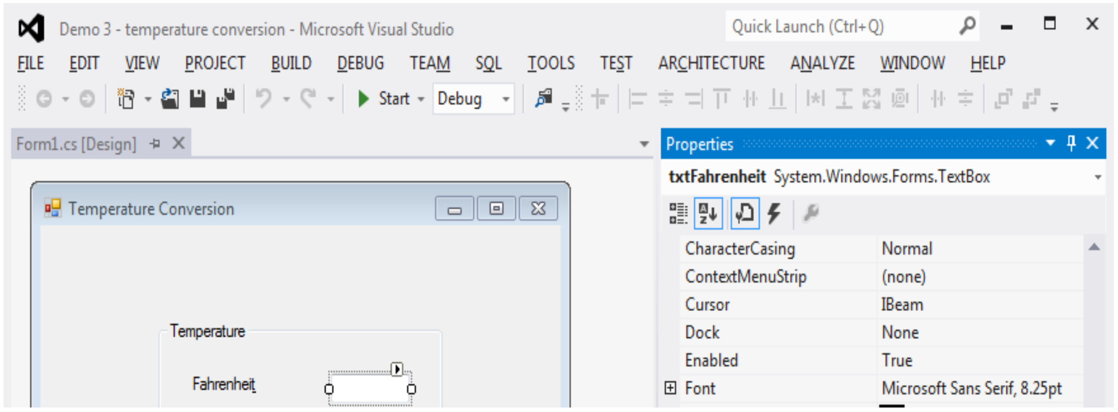
Textboxes, buttons, etc. can receive focus. Not all controls can receive focus.
For example, **labels never receive focus**.

## What is Tab Order?

Tab Order is the way the cursor moves when the user presses the Tab key Typically, Tab Order is from top to bottom, from left to right

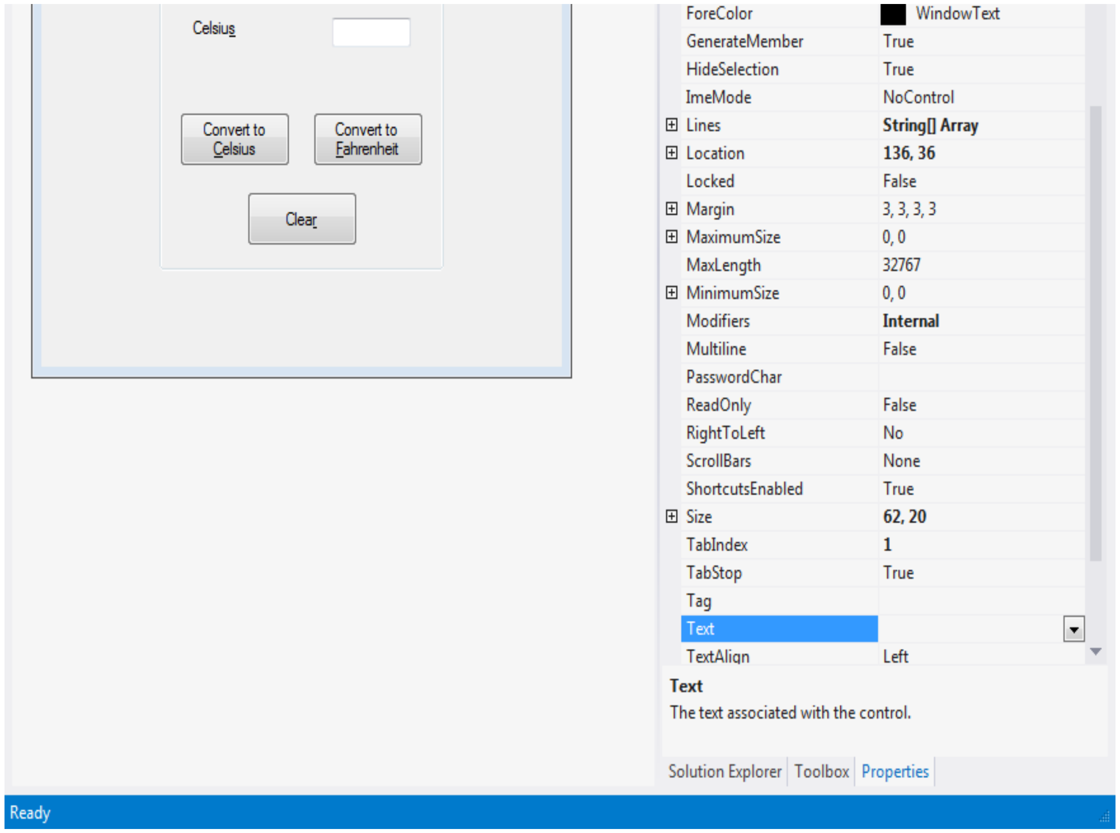
**Buttons** typically are the last to receive focus in a tab sequence.

## How to adjust the tab order at Design Time



txtFahrenheit System.Windows.Forms.TextBox

| | |
|---|---|
| CharacterCasing | Normal |
| ContextMenuStrip | (none) |
| Cursor | IBeam |
| Dock | None |
| Enabled | True |
| Font | Microsoft Sans Serif, 8.25pt |



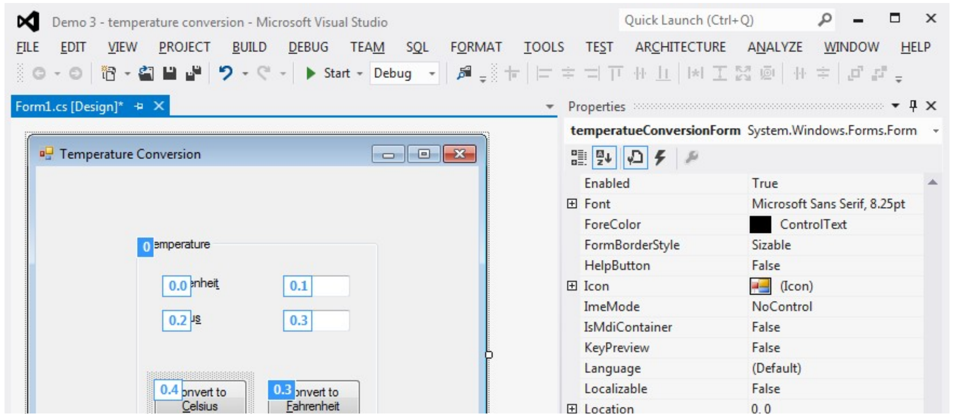
| | |
|---|---|
| ForeColor | ■ WindowText |
| GenerateMember | True |
| HideSelection | True |
| ImeMode | NoControl |
| ⊞ Lines | **String[] Array** |
| ⊞ Location | **136, 36** |
| Locked | False |
| ⊞ Margin | 3, 3, 3, 3 |
| ⊞ MaximumSize | 0, 0 |
| MaxLength | 32767 |
| ⊞ MinimumSize | 0, 0 |
| Modifiers | **Internal** |
| Multiline | False |
| PasswordChar | |
| ReadOnly | False |
| RightToLeft | No |
| ScrollBars | None |
| ShortcutsEnabled | True |
| ⊞ Size | **62, 20** |
| TabIndex | **1** |
| TabStop | True |
| Tag | |
| Text | |
| TextAlign | Left |

**Text**
The text associated with the control.

Set the **TabIndex** property of each control.

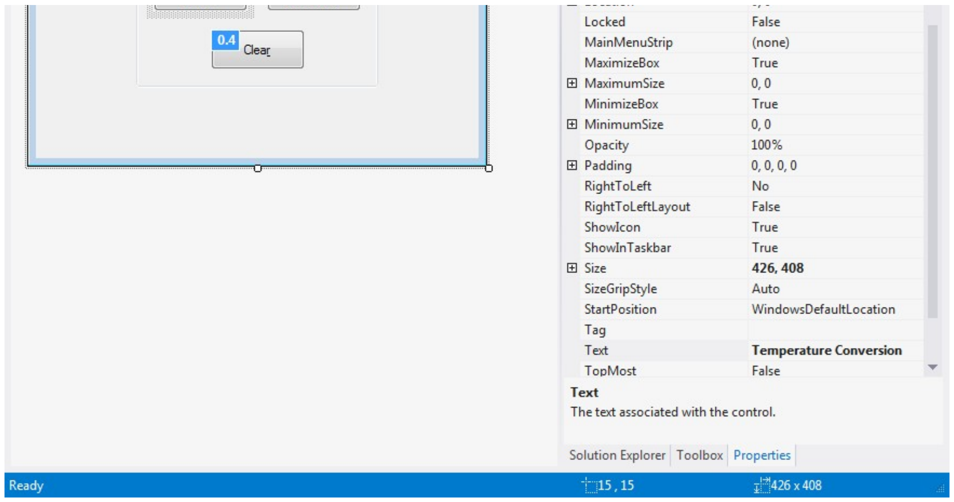
## An easier way to set Tab Order is View – TabOrder

This sets Tab Order on all controls at once



temperatueConversionForm System.Windows.Forms.Form

| | |
|---|---|
| Enabled | True |
| ⊞ Font | Microsoft Sans Serif, 8.25pt |
| ForeColor | ■ ControlText |
| FormBorderStyle | Sizable |
| HelpButton | False |
| ⊞ Icon | (Icon) |
| ImeMode | NoControl |
| IsMdiContainer | False |
| KeyPreview | False |
| Language | (Default) |
| Localizable | False |
| ⊞ Location | 0, 0 |



| | |
|---|---|
| Locked | False |
| MainMenuStrip | (none) |
| MaximizeBox | True |
| ⊞ MaximumSize | 0, 0 |
| MinimizeBox | True |
| ⊞ MinimumSize | 0, 0 |
| Opacity | 100% |
| ⊞ Padding | 0, 0, 0, 0 |
| RightToLeft | No |
| RightToLeftLayout | False |
| ShowIcon | True |
| ShowInTaskbar | True |
| ⊞ Size | **426, 408** |
| SizeGripStyle | Auto |
| StartPosition | WindowsDefaultLocation |
| Tag | |
| Text | **Temperature Conversion** |
| TopMost | False |

**Text**
The text associated with the control.

Just click on the controls from left to right, from top to bottom
Include labels. The TabIndex for identifying label for a text box should immediately precede the TabIndex for the text boxText.

In the above, the identifying label for the

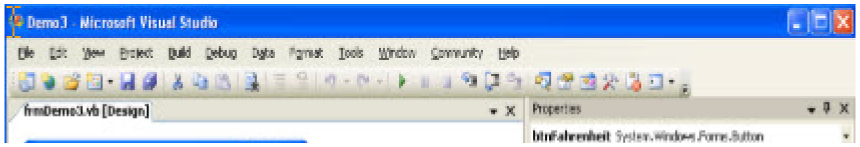
## How to set the tab order at Run Time

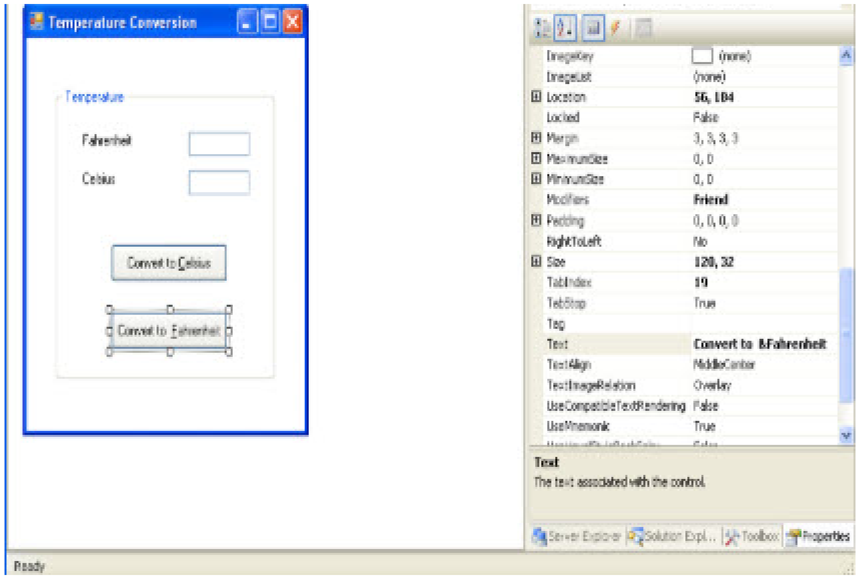
The **Focus** method puts the cursor on the specified control A control like a **label** can have the input focus
while not displaying any visual cues of having the focus.

Focus works best for **text boxes** and **buttons nameTextBox.Focus cancelButton.Focus**

## Access Keys

### How to set access keys


Demo3 - Microsoft Visual Studio
File Edit View Project Build Debug Data Format Tools Window Community Help
frmDemo3.vb [Design]
Properties
btnFahrenheit System.Windows.Forms.Button



| | |
|---|---|
| ImageKey | (none) |
| ImageList | (none) |
| Location | 56, 184 |
| Locked | False |
| Margin | 3, 3, 3, 3 |
| MaximumSize | 0, 0 |
| MinimumSize | 0, 0 |
| Modifiers | Friend |
| Padding | 0, 0, 0, 0 |
| RightToLeft | No |
| Size | 120, 32 |
| TabIndex | 19 |
| TabStop | True |
| Tag | |
| Text | Convert to &Fahrenheit |
| TextAlign | MiddleCenter |
| TextImageRelation | Overlay |
| UseCompatibleTextRendering | False |
| UseMnemonic | True |

**Text**
The text associated with the control.

Professional keyboard users normally hate to use the mouse.

An **access key** (sometimes called a **hot** key)
is an underlined character in the text of a menu, menu item, or the label of a control
such as a button.

It allows the user to "click" a button by pressing the ALT key in combination with the predefined access key.

For example, if a button runs a procedure to “Convert to Fahrenheit”, adding an ampersand (&) before the letter "F" causes the letter "F" to be underlined in the button text at run time.* The user can run the command associated with the button by pressing ALT+F.

## How to set access keys

When you set the **Text** property for a control, place an ampersand immediately before the letter you want to use for the access key.

Since the access keys are **not** case sensitive, &N and &n set the same
access key

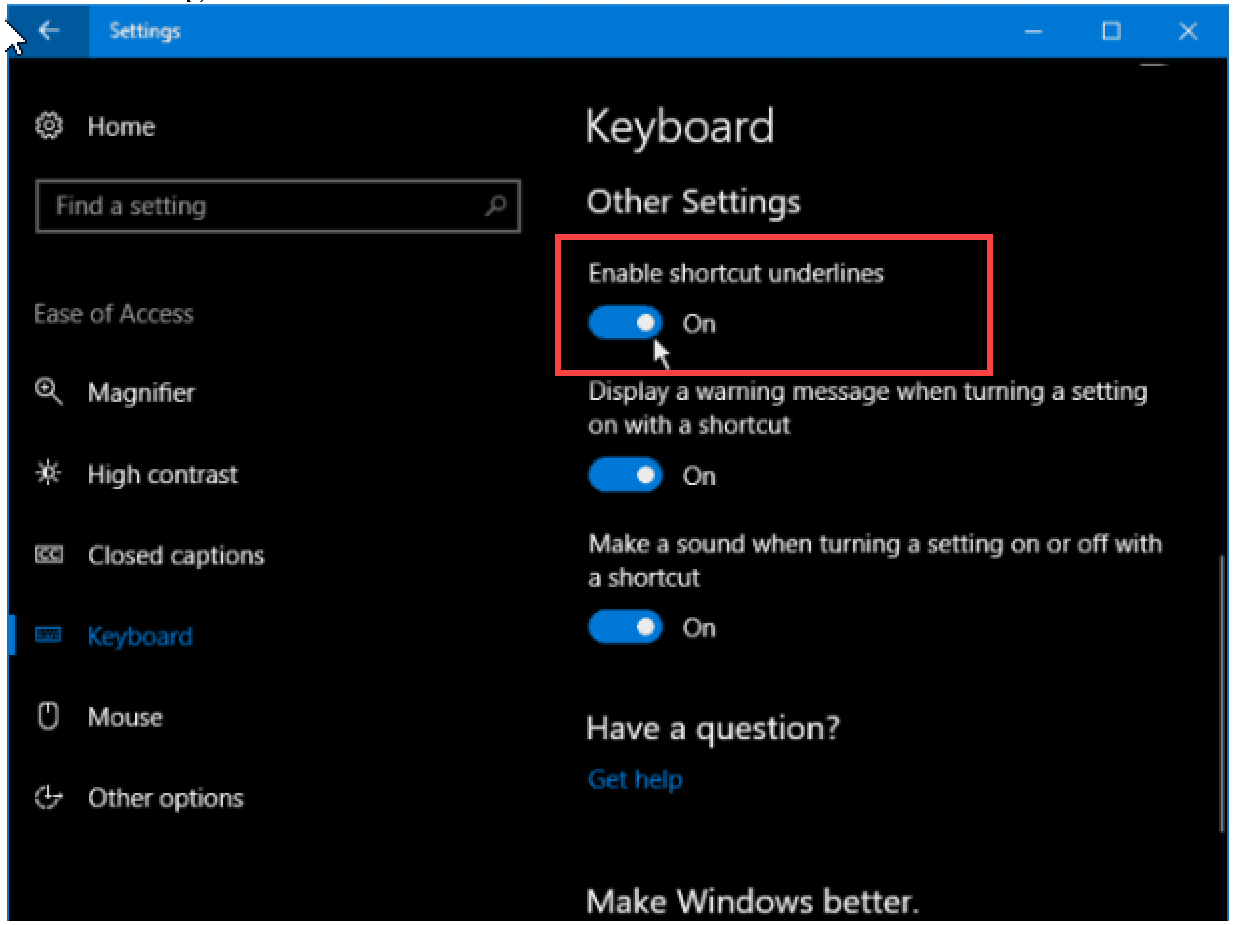
access key.

If you set an access key for a label that immediately precedes a text box in the tab order, the access key will take the user to the text box.

## I can’t see the underline at run time

An access key may always be underlined or only underlined when you press Alt. How to change this depends on the operating system.

To change this setting in Windows 10: Open Settings and select Ease of Access from the main menu. Select Keyboard in the left panel and scroll down in the right pane and turn on Enable shortcut underline under the Other Settings section.



Keyboard

Other Settings

Enable shortcut underlines
On

Display a warning message when turning a setting on with a shortcut
On

Make a sound when turning a setting on or off with a shortcut
On

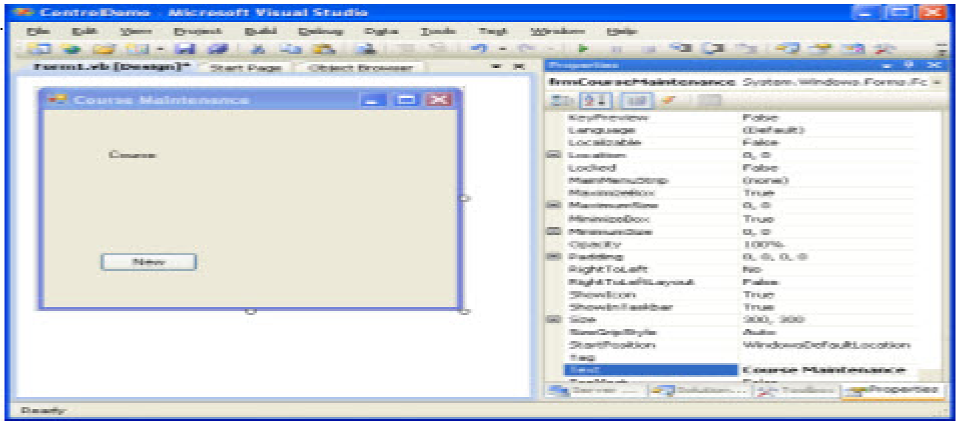
Have a question?
Get help

Make Windows better.

Working with Properties

Working with Properties

## Properties Window


ControlDemo - Microsoft Visual Studio
File Edit View Project Build Debug Data Tools Test Window Help
Form1.vb [Design]* Start Page Object Browser
Course Maintenance
Course
New
Properties
Server ... Solution... Toolbox Properties
Ready

frmCourseMaintenance System.Windows.Forms.Fo

| | |
|---|---|
| KeyPreview | False |
| Language | (Default) |
| Localizable | False |
| Location | 0, 0 |
| Locked | False |
| MainMenuStrip | (none) |
| MaximizeBox | True |
| MaximumSize | 0, 0 |
| MinimizeBox | True |
| MinimumSize | 0, 0 |
| Opacity | 100% |
| Padding | 0, 0, 0, 0 |
| RightToLeft | No |
| RightToLeftLayout | False |
| ShowIcon | True |
| ShowInTaskbar | True |
| Size | 300, 300 |
| SizeGripStyle | Auto |
| StartPosition | WindowsDefaultLocation |
| Tag | |
| Text | Course Maintenance |
| TopMost | False |

Change property values; Get to by:

- Pressing F4
- Clicking on Window
- Clicking on Icon

Can List in alphabetical or category order

Again there are many properties. For now, we’ll explore:

- **Name** – identifies control; all controls have Name property
- **Text** – What displays in the Control
- **Font** – How Text property displays
- **ForeColor** – the color of Text property
- **BackColor** – the background color behind Text

## How to display the properties for an object

Click on that object or select the object
from the drop-down list at the top of the Properties window.

## How to change a property

Enter a value.
Select a value from a drop-down list.
Click on an ellipsis to display a dialog box that lets you set the options.

## How to change the properties of two or more controls

Select the controls so the common properties are displayed
in the Properties window. A brief explanation of the selected property appears in a pane at the bottom of the Prop
For more information, press F1 to display the help information

## How to adjust the Properties list

Use the first two buttons at the top of the Properties window to sort the properties by category or alphabetically.
Use the plus and minus signs to the left of some of the properties and categories to expand and collapse the list.

## The Name property

Sets the name you use to identify a control in your Visual C # code.
Don't need to be renamed if you don't intend to refer to the control in your code

For example, buttons and textboxes will always be renamed. But labels can either:

- Hold output (they must be renamed)
- As an identifier for a textbox
  (they can just stay as Label1, Label2, etc.)

### The Text property

Sets the text that is displayed on the form or control. For a form, the Text value is displayed in the title bar.
For controls, the Text value is displayed directly on the control.
For a text box, the Text value changes when the user types text into it If you want a text box to be initially blank, be sure to clear its Text property

## C#.NET Events

### Event Handlers (Event Procedures)

As explained in lesson 1, an **event** is a signal to the programmer that something has happened during run time.

An **event handler** is code written by the programmer that is executed when the event occurs.

There are many events that can occur,
but the one we'll concentrate on for now is the **Click** event. This occurs when the user clicks on a control (usually a button,
but we learn that Picture Boxes can have Click events too in this lesson).

So the event handler for the Click event is code that will be executed when the user clicks on the control.

Example of an event handler:

```
private void darWilliamsPicture_Click(object sender, EventArgs e)
{
        // Displays "Dar Williams" when this picture is selected musicianNameLabel.Text = "Dar
        Williams";
}
```

The first line is created by the system when you double click on the control. (We'll learn how to create other events later in the term.)
The braces { } also appear at the same time. All your code must be typed

The braces { } also appear at the same time. All your code must be typed between the braces

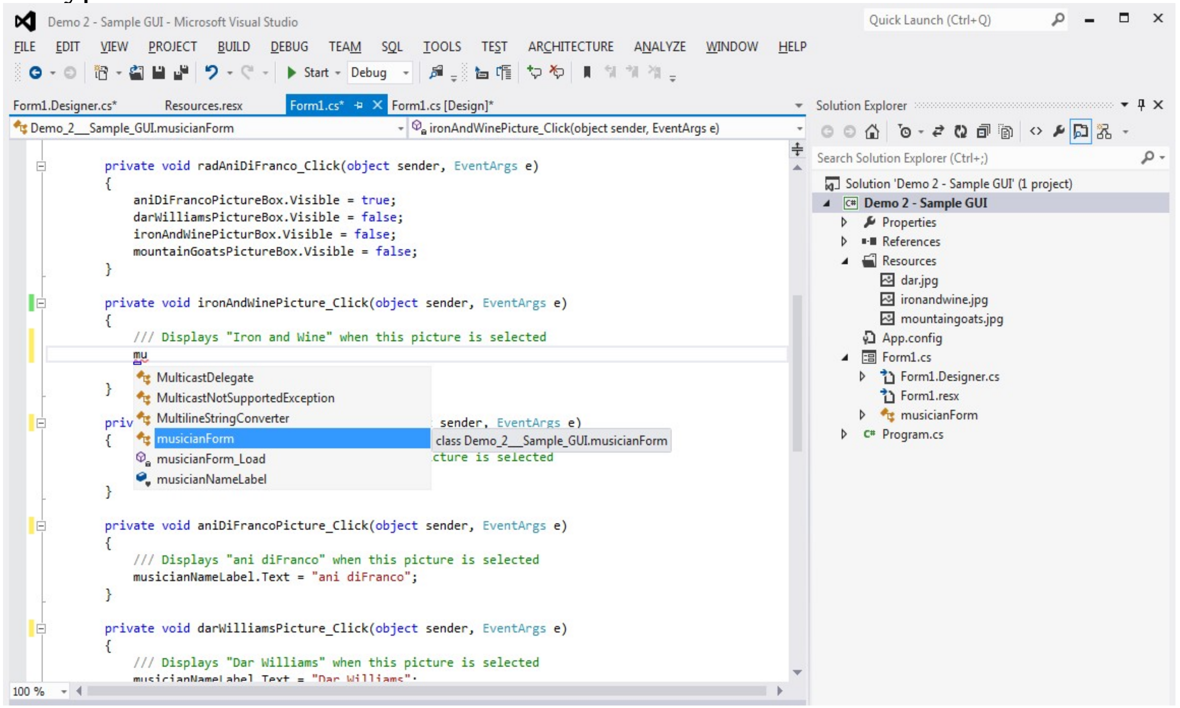
The line in green `/// Displays "Dar Williams" when this picture is selected`
is a comment. Our standards require comments at the start of each method. (More on this later)

The other line `musicianNameLabel.Text = "Dar Williams";`
defines what the method does (is the actual code). Normally, there will be more than one line of code, but we'll keep things simple to start out.

## Entering Code

### How to Enter Control Names

As you type the first few letters of the control name,
a feature called **Intellisense** selects possible words that you may intend to type



Demo 2 - Sample GUI - Microsoft Visual Studio
Quick Launch (Ctrl+Q)
FILE EDIT VIEW PROJECT BUILD DEBUG TEAM SQL TOOLS TEST ARCHITECTURE ANALYZE WINDOW HELP
Start Debug
Form1.Designer.cs* Resources.resx Form1.cs* Form1.cs [Design]*
Demo_2__Sample_GUI.musicianForm
ironAndWinePicture_Click(object sender, EventArgs e)
100 %
Solution Explorer
Search Solution Explorer (Ctrl+;)
Solution 'Demo 2 - Sample GUI' (1 project)
Demo 2 - Sample GUI
Properties
References
Resources
dar.jpg
ironandwine.jpg
mountaingoats.jpg
App.config
Form1.cs
Form1.Designer.cs
Form1.resx
musicianForm
Program.cs

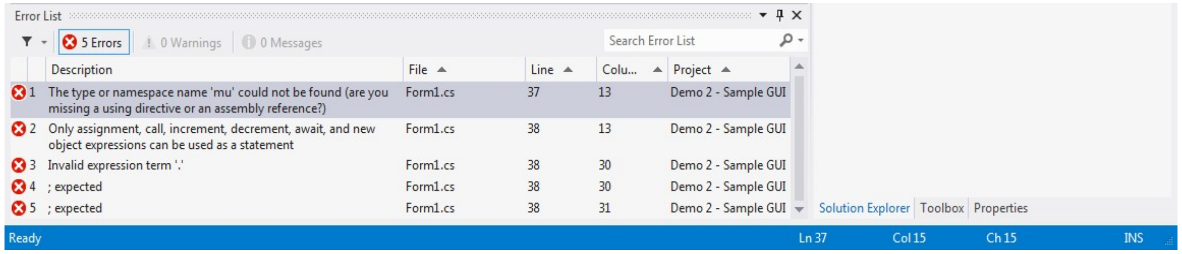
```
        private void radAniDiFranco_Click(object sender, EventArgs e)
        {
            aniDiFrancoPictureBox.Visible = true;
            darWilliamsPictureBox.Visible = false;
            ironAndWinePicturBox.Visible = false;
            mountainGoatsPictureBox.Visible = false;
        }

        private void ironAndWinePicture_Click(object sender, EventArgs e)
        {
            /// Displays "Iron and Wine" when this picture is selected
            mu
              MulticastDelegate
              MulticastNotSupportedException
        }     MultilineStringConverter
              musicianForm          class Demo_2__Sample_GUI.musicianForm
        priv  musicianForm_Load     sender, EventArgs e)
        {     musicianNameLabel     cture is selected

        }

        private void aniDiFrancoPicture_Click(object sender, EventArgs e)
        {
            /// Displays "ani diFranco" when this picture is selected
            musicianNameLabel.Text = "ani diFranco";
        }

        private void darWilliamsPicture_Click(object sender, EventArgs e)
        {
            /// Displays "Dar Williams" when this picture is selected
            musicianNameLabel.Text = "Dar Williams";
```



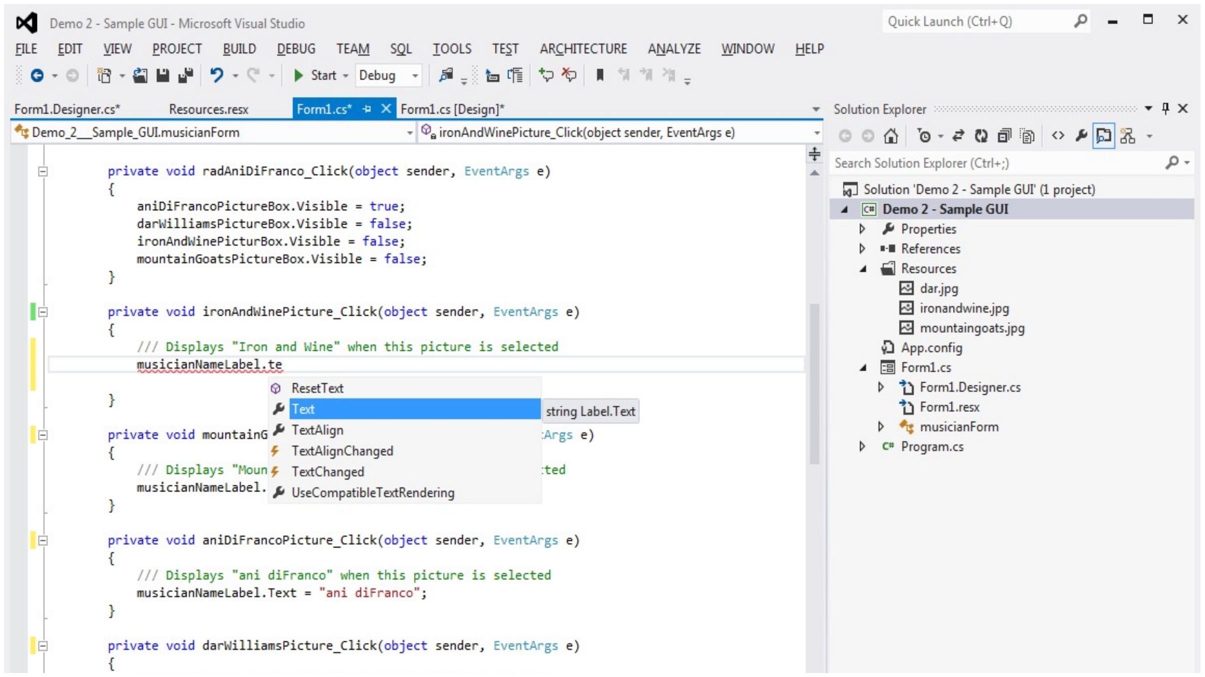
| | Description | File | Line | Colu... | Project |
|---|---|---|---|---|---|
| 1 | The type or namespace name 'mu' could not be found (are you missing a using directive or an assembly reference?) | Form1.cs | 37 | 13 | Demo 2 - Sample GUI |
| 2 | Only assignment, call, increment, decrement, await, and new object expressions can be used as a statement | Form1.cs | 38 | 13 | Demo 2 - Sample GUI |
| 3 | Invalid expression term '.' | Form1.cs | 38 | 30 | Demo 2 - Sample GUI |
| 4 | ; expected | Form1.cs | 38 | 30 | Demo 2 - Sample GUI |
| 5 | ; expected | Form1.cs | 38 | 31 | Demo 2 - Sample GUI |

When it highlights the control you want you can select the control by pressing the **Tab** key.

You can use the arrow keys to select the appropriate control or just continue typing until the appropriate control is selected.

## How to enter member names in the Code Editor

Once you enter the control name, type *dot* (.) to display a list of the available members (properties and methods) for an object.



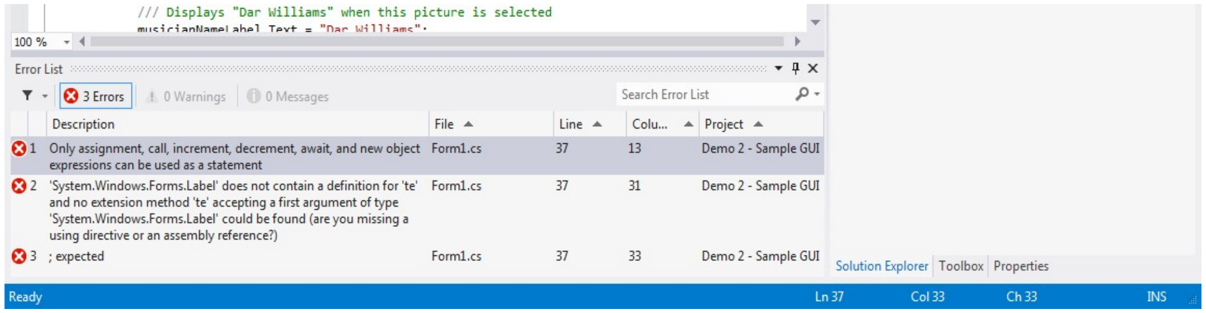
```
        private void radAniDiFranco_Click(object sender, EventArgs e)
        {
            aniDiFrancoPictureBox.Visible = true;
            darWilliamsPictureBox.Visible = false;
            ironAndWinePicturBox.Visible = false;
            mountainGoatsPictureBox.Visible = false;
        }

        private void ironAndWinePicture_Click(object sender, EventArgs e)
        {
            /// Displays "Iron and Wine" when this picture is selected
            musicianNameLabel.te
        }

        private void mountainG                              Args e)
        {
            /// Displays "Moun                              ted
            musicianNameLabel.
        }

        private void aniDiFrancoPicture_Click(object sender, EventArgs e)
        {
            /// Displays "ani diFranco" when this picture is selected
            musicianNameLabel.Text = "ani diFranco";
        }

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



```
/// Displays "Dar Williams" when this picture is selected
musicianNameLabel.Text = "Dar Williams";
```

Error List — 3 Errors | 0 Warnings | 0 Messages

| | Description | File | Line | Column | Project |
|---|---|---|---|---|---|
| 1 | Only assignment, call, increment, decrement, await, and new object expressions can be used as a statement | Form1.cs | 37 | 13 | Demo 2 - Sample GUI |
| 2 | 'System.Windows.Forms.Label' does not contain a definition for 'te' and no extension method 'te' accepting a first argument of type 'System.Windows.Forms.Label' could be found (are you missing a using directive or an assembly reference?) | Form1.cs | 37 | 31 | Demo 2 - Sample GUI |
| 3 | ; expected | Form1.cs | 37 | 33 | Demo 2 - Sample GUI |

Ready — Ln 37 Col 33 Ch 33 INS

Type the first few letters of the member name, so the Code Editor selects the
first entry
in list that matches those letters.

Once the correct member name is selected,
press the **Tab** key to insert the member into your code.

Note: as you type, you'll notice errors appear in the Error list. Ignore these until you're finished typing.

## The purpose of the semicolon (;)

The semicolon (;) is required at the end of each line of code

## The purpose of the Dot (.)

The Dot (.) separates the control name from the member name. It can also separate the member name from the submember name (if the member has a submember.)

**Example:**

`musicianNameLabel.Font.Bold` tells you whether or not musicianNameLabel is bold

## How to create a Click event procedure for a Button or PictureBox

In the **Form Designer**, double-click the Button or PictureBox for which you want to create an

In the **Form Designer**, double-click the Button or PictureBox for which you want to create an event procedure.

Type the C# code for the event procedure between the { and }.

To return to the Form Designer, click on the \ab for the Design.

## Changing Properties at Run Time

object.property = value Examples:

```
musicianNameLabel.Text = "Iron and Wine";
musicianNameLabel.BackColor = Color.Yellow;
musicianNameLabel.Visible = false;
```

## Changing Properties of the Form

When you are referring to the form,
use the keyword **this**, instead of the form name.
(The form name is a **class** name; **this** is an **object** name. We'll discuss later in the term)

Use

```
this.Text = "Demo Name Changed";
  frmDemo.Text = "Demo Name Changed";
```

## Now You See Me

You can set the visibility of a control at run time

```
musicianNameLabel.Visible = false; musicianNameLabel.Visible
= true;
```

## Comments

### Use of Comments

I can’t stress enough how important good comments are to a program Comments help programmers maintain programs
by making it more understandable

There are 2 extremes: both of which are bad

- No comments
- Every line commented

Focus on **what** a program or procedure does, not **how** it does it

### Line Comments

Line comments start with //
Use line comments when you have only a line or two of comments

```
// Displays "Iron and Wine" when this picture is selected
```

### Block comments

Block comments start with /* and end with */
Use block comments when you have a lot of comments

```
/*
   Project      Musicians

   Date         Sept 2013

                Display name of selected musician
*/
```

## Comment standards

**Comment header**

Every form’s code begins with a block comment
that defines Project, Programmer, Date and what the form does This can be at the very top or before the name space declaration

```
using System.Windows.Forms;
/*
   Project      Musicians Programmer   mike
   mostafavi Date         Sept 2013


                Display name of selected musician
*/
 namespace Demo_2___Sample_GUI
```

### Method Comments

Every method should have a comment at the start explaining what the method does.
These should be short so use line comments It’s OK to use block comments if you must

```
private void radAniDiFranco_Click(object sender, EventArgs e)
{
   // Displays "ani diFranco" when this picture is selected
```

## Types of Errors

### Syntax Errors

Program does not compile **Typically, spelling mistakes** Can also be “grammatical” errors Easy to spot and correct

### Runtime Errors

Program compiles, but produces an error when run Easy to identify Typically, simple syntax fixes or exception handling solves the problem

### Logic Errors

Program compiles and runs successfully, but doesn’t produce the correct result These are harder to trace down, But Visual Studio provides a host of debugging tools.

Edit HTML Reflect in ePortfolio Download Print

Activity Details Learning Objectives Completion Summary

✓ Visible

**Required: Automatic**

View this topic to complete the activity

The lecture materials highlights some of the significant topics from Chapter 1-2 of the text plus additional materials

**Options**

Reflecting in ePortfolio is enabled

Lecture 1.html - Last Modified Dec 26, 2019 12:56 PM