

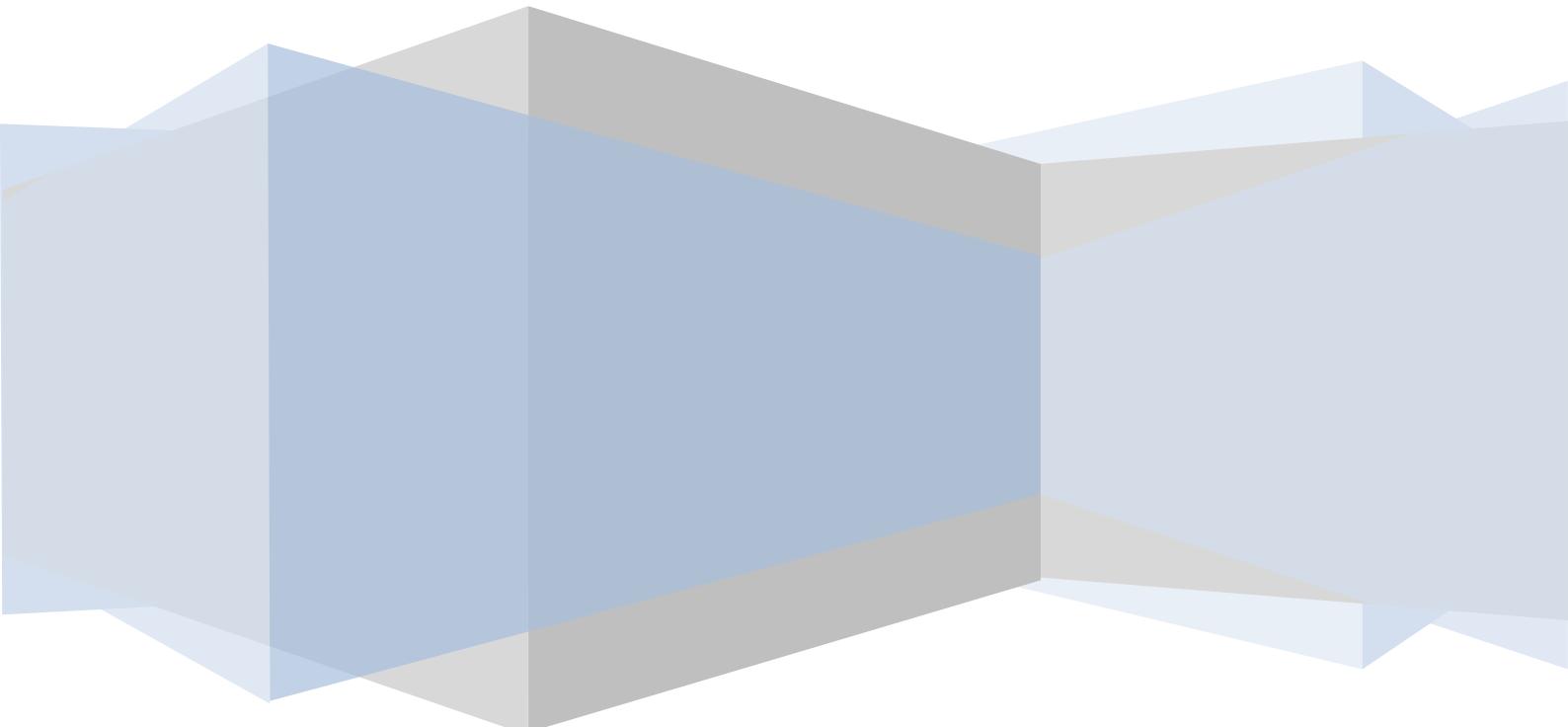
INFORMATICS

LABORATORY WORK #3

PICTURE VIEWER CREATION

Associate Professor A.S. Eremenko,

Associate Professor A.V. Persikov



Informatics LAB 3

Picture viewer creation

In this lab, you build a program that loads a picture from a file and displays it in a window. You learn how to drag controls like buttons and picture boxes on your form, set their properties, and use containers to smoothly resize the form. You also get started writing code. You learn how to:

- Create a new project.
- Test (debug) an application.
- Add basic controls like check boxes and buttons to a form.
- Position controls on a form using layouts.
- Add Open File and Color dialog boxes to a form.
- Write code using IntelliSense and code snippets.
- Write event handler methods.

When you finish, your program will look like the following picture.

Step 1: Create a Windows Forms Application Project

To create a Windows Forms application project:

1. On the **File** menu, click **New Project**.
2. If you're not using Visual Studio Express, you need to select a language first. From the **Installed Templates** list, select **C#**.
3. Click the **Windows Forms Application** icon, enter PictureViewer as the name, and then click **OK**. Visual Studio automatically creates the solution for you.
4. On the **File** menu, click **Save All**, or on the toolbar, click the **Save All** button, which appears as follows.
5. Make sure the project is saved in a folder under your My Documents folder.
6. Verify that the Create Directory for Solution check box is selected.
7. Click Save.
8. If your screen doesn't look like figure 1, on the Window menu, click Reset Window Layout. If any of the windows are missing, on the View menu, click Properties Window or Solution Explorer. If there's an extra window open, click the Close (x) button in the upper right.
9. Look at the figure 1. From the upper left and going clockwise, the figure shows:
 - **Main window**. This is where you do most of your work. You use this window to work with forms and edit code. Currently, it shows a form in the Form Editor. At the top of the window, there are two tabs: the Start Page tab and the Form1.cs [Design] tab.
 - **Solution Explorer window**. This is where all the files in your solution appear. If you click a file, the information inside the Properties window changes. If you

double-click a code file (which ends in .cs in Visual C#), the code file or a designer for the code file opens.

- **Properties window.** This is where you change the properties of items that you select in the other windows.

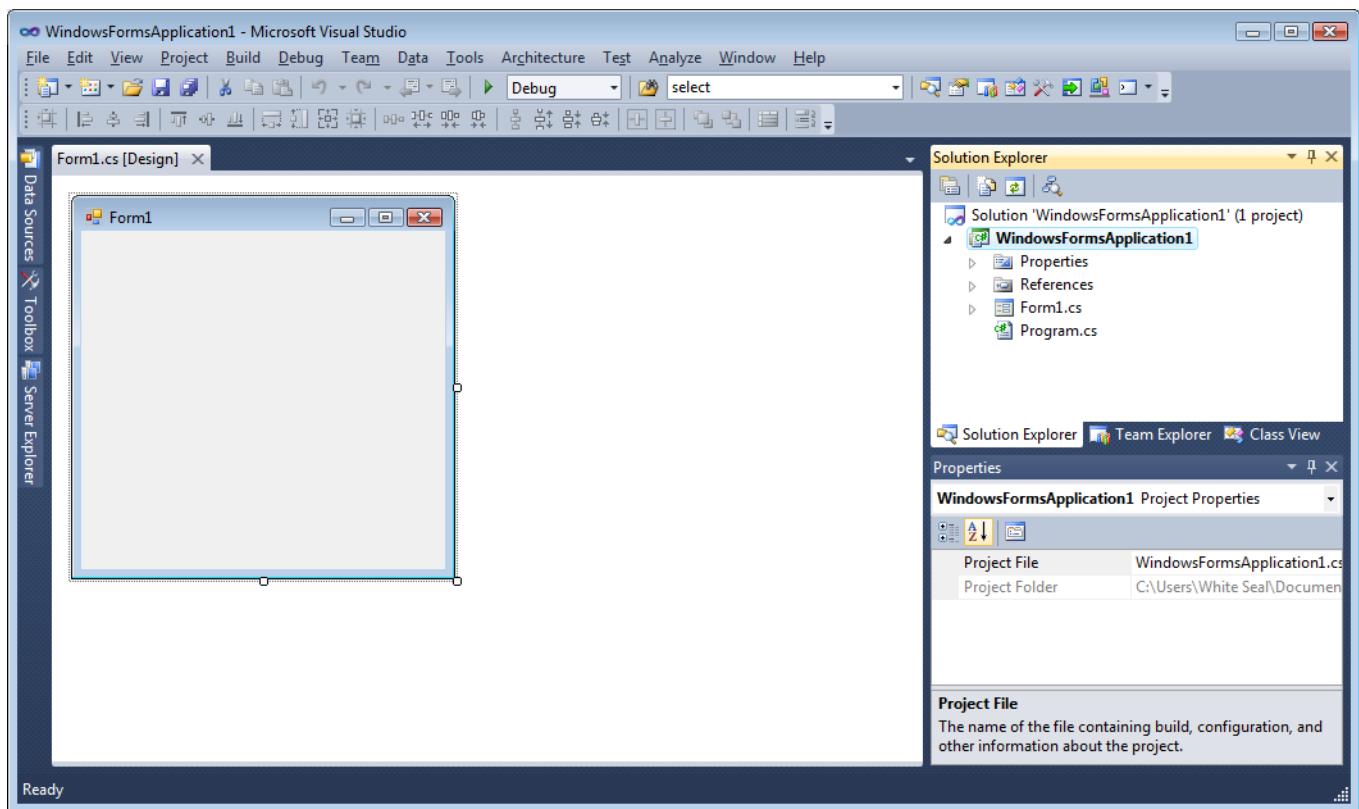


Figure 1 – IDE window

Step 2: Run your program

When you created a new solution, you actually built a program that runs. It doesn't do much yet –it just displays an empty window that shows **Form1** in the title bar. But it does run, as you're about to find out.

To run your program

1. Press the F5 key or click the **Start Debugging** toolbar button.
2. The IDE runs your program, and a window appears. The following picture shows the program you just built. The program is running, and you will soon add to it.

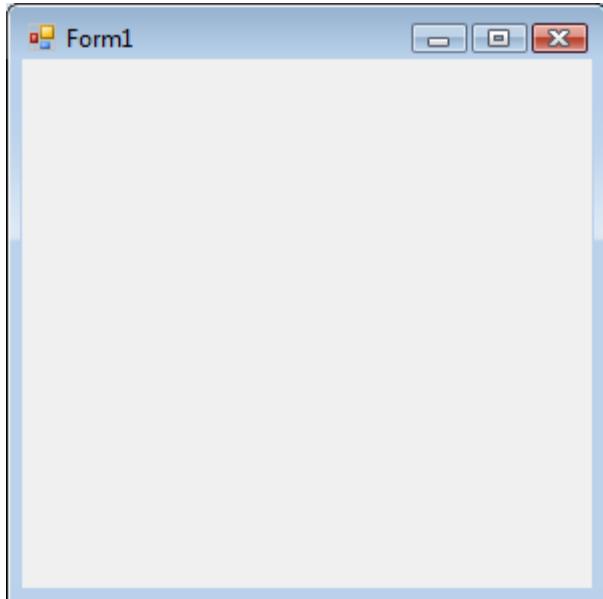


Figure 2 – Windows Form application program running

3. Go back to the IDE, and look at the new toolbar.

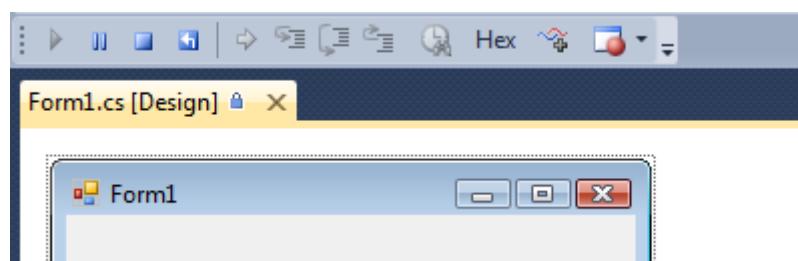


Figure 3 – Debugging toolbar

4. Click the square **Stop Debugging** button or from the **Debug** menu, click **Stop Debugging**. The program stops running, and the window closes. You can also just close the open window to stop debugging.

Step 3: Set your form properties

To set your form properties

1. Be sure you're looking at Windows Forms Designer. In the IDE, click the **Form1.cs [Design]** tab.
2. Click anywhere inside the form to select it. Look at the **Properties** window, which should now be showing the properties for the form. Forms have various properties. For example, you can set the foreground and background color, title text that appears at the top of the form, size of the form, and other properties.
3. After the form is selected, scroll down to the bottom of the **Properties** window, and find the **Text** property. Click **Text**, type Picture Viewer, and then press ENTER. Your form

should now have the text **Picture Viewer** in its title bar, and the **Properties** window should look like the following picture.

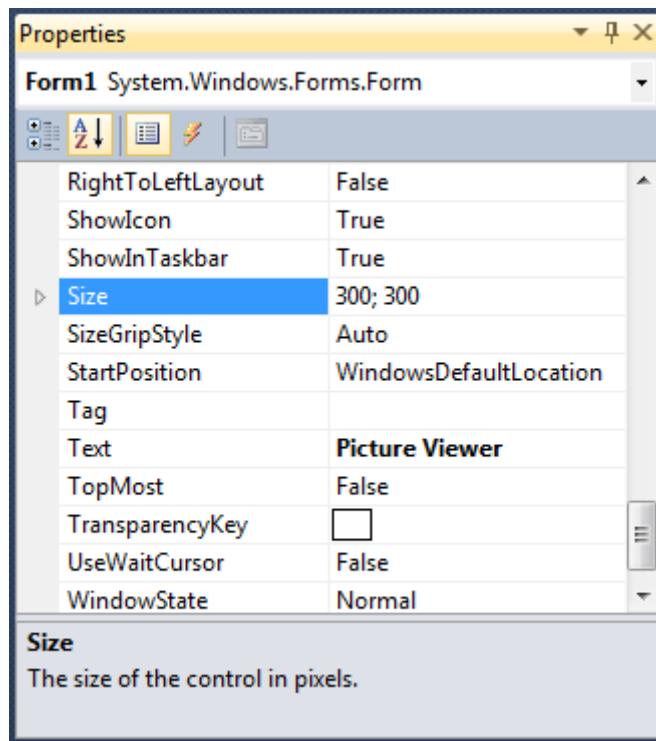


Figure 4 – Properties window

4. Go back to Windows Forms Designer. Click the form's lower-right drag handle, which is the small white square in the lower-right of the form and appears as follows.

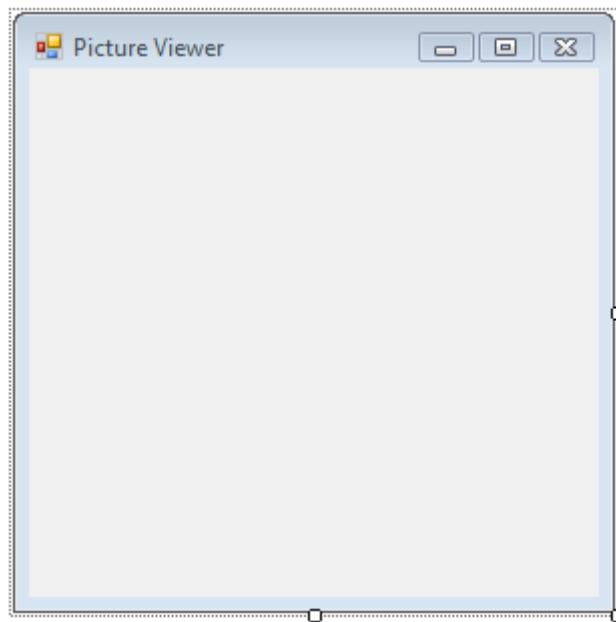


Figure 5 – Drag handle

Drag it to resize the form so the form is wider and a bit taller.

5. Look at the **Properties** window, and notice that the **Size** property has changed. The **Size** property changes each time you resize the form. Try dragging the form to resize it to a form size of approximately 550, 350, which should work well for this project.

6. Run your program again. Press the F5 key or click the **Start Debugging** toolbar button.

Just like before, the IDE builds and runs your program, and a window appears.

7. Before going to the next step, stop your program, because the IDE won't let you change your program while it's running.

Step 4: Lay out your form with a TableLayoutPanel control

In this step, you add a TableLayoutPanel control to your form.

To lay out your form with a TableLayoutPanel control:

1. Go to Windows Forms Designer. Look at the left side of the form and locate the Toolbox tab. Point to and pause on the Toolbox tab, and the Toolbox appears. (or, from the View menu, click Toolbox.)
2. Click the plus sign next to the Containers group to open it, as shown in the following picture.

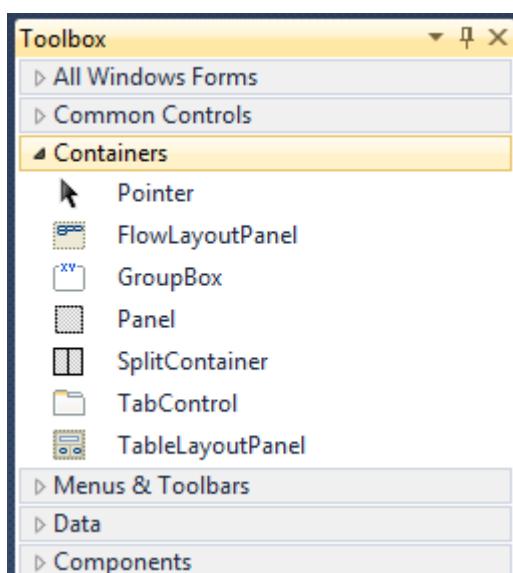


Figure 6 – Containers group

3. You can add controls like buttons, check boxes, and labels to your form. Double-click the TableLayoutPanel control in the Toolbox. When you do this, the IDE adds a TableLayoutPanel control to your form, as shown in the following picture.

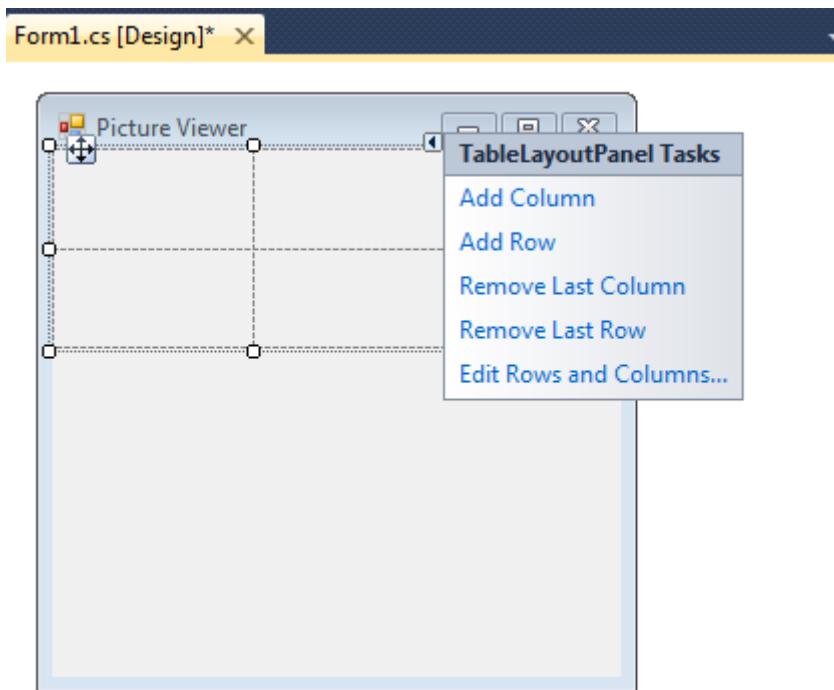


Figure 7 – TableLayoutPanel control

4. Be sure TableLayoutPanel is selected by clicking it. You can verify what control is selected by looking at the drop-down list at the top of the Properties window, as shown in the following picture.

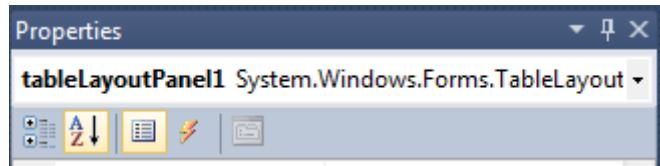


Figure 8 – Properties window showing TableLayoutPanel control

5. The control selector is a drop-down list at the top of the **Properties** window. In this example, it shows that a control called tableLayoutPanel1 is selected. You can select controls either by clicking in Windows Forms Designer or by choosing from the control selector. Now that TableLayoutPanel is selected, find the **Dock** property and click **Dock**, which should be set to **None**. Notice that a drop-down arrow appears next to the value. Click the arrow, and then select the **Fill** button (the large button in the middle), as shown in the following picture.

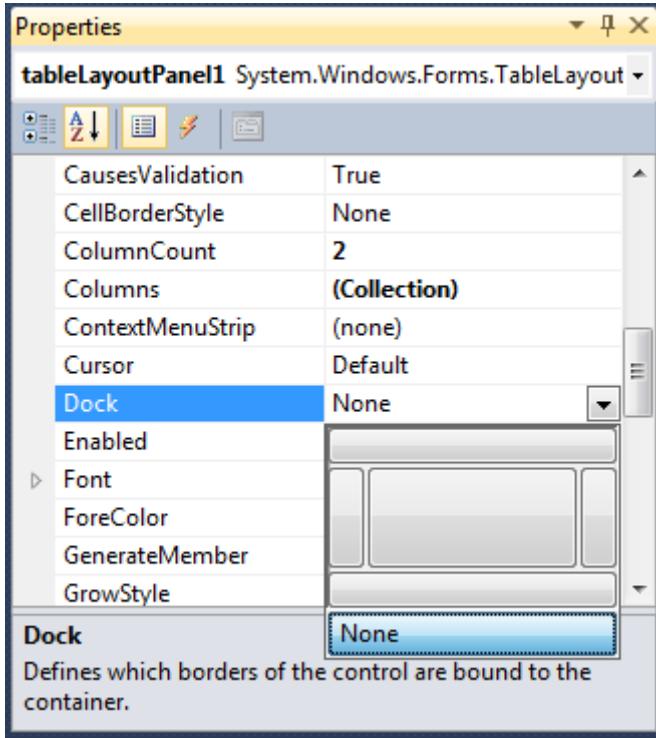


Figure 9 – Properties window with Fill selected

6. After you set the TableLayoutPanel **Dock** property to **Fill**, the panel fills the entire form. If you resize the form again, the TableLayoutPanel stays docked, and resizes itself to fit.
7. Currently, the TableLayoutPanel has two equal-size rows and two equal-size columns. You need to resize them so the top row and right column are both much bigger. In Windows Forms Designer, select the TableLayoutPanel. In the upper-right corner, there is a small black triangle button, which appears as follows.
8. Click the triangle to display the control's task list, as shown in the following picture.

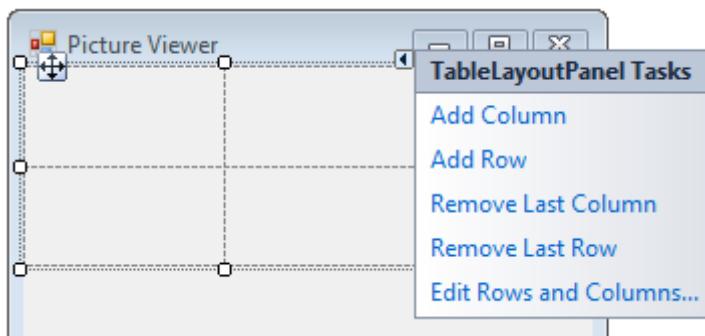


Figure 10 – TableLayoutPanel tasks

9. Click the **Edit Rows and Columns** task to display the **Column and Row Styles** window. Click **Column1**, and set its size to 15 percent by being sure the **Percent** button is selected and entering 15 in the **Percent** box. Click **Column2** and set it to 85 percent. Don't click

the OK button yet, because the window will close. (But if you do, you can reopen it using the task list.)

10. From the **Show** drop-down list at the top of the window, click **Rows**. Set **Row1** to 90 percent and **Row2** to 10 percent.

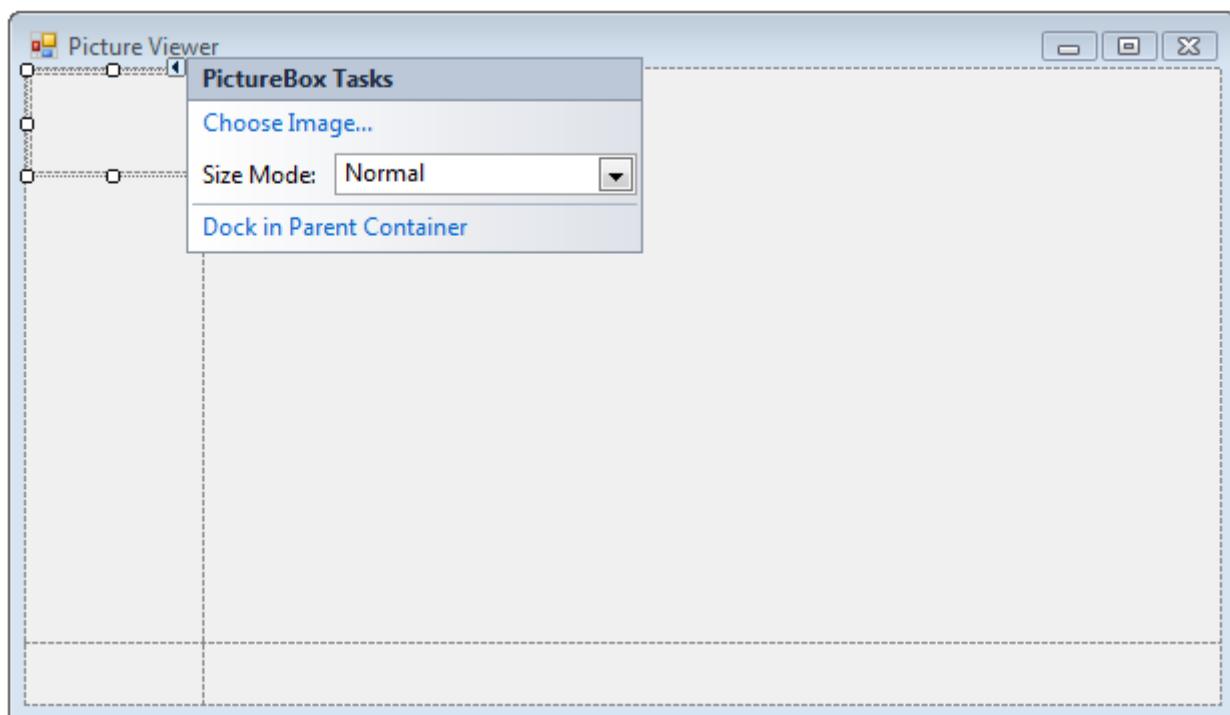
11. Click **OK**. Your TableLayoutPanel should now have a large top row, a small bottom row, a small left column, and a large right column. You can resize the rows and columns in the TableLayoutPanel by dragging their borders.

Step 5: Add Controls to Your Form

In this step, you add controls, such as a PictureBox control and a CheckBox control, to your form. You then add buttons to your form.

To add controls to your form:

1. Go to the Toolbox and expand the **Common Controls** group. This shows the most common controls that you see on forms.
2. Double-click the PictureBox control. The IDE adds a PictureBox control to your form. Because the TableLayoutPanel is docked to fill your form, the IDE adds the PictureBox control to the first empty cell.
3. Click the black triangle on the new PictureBox control to display its task list, as shown in the following picture.



<http://msdn.microsoft.com/en-us/library/dd492173.aspx>

Figure 11 – PictureBox tasks

4. Click the **Dock in parent container** link. This automatically sets the PictureBox **Dock** property to **Fill**. To see this, click the PictureBox control to select it, go to the **Properties** window, and be sure that the **Dock** property is set to **Fill**.
5. Make the PictureBox span both columns by changing its **ColumnSpan** property. Select the PictureBox control and set its **ColumnSpan** property to **2**. Also, when the PictureBox is empty, you want to show an empty frame. Set its **BorderStyle** property to **Fixed3D**.
6. Add the **CheckBox** control to the form. Double-click the CheckBox item in the Toolbox to make the IDE add a new CheckBox control to the next free cell in your table. Because a PictureBox takes up the first two cells, a CheckBox control is added to the lower-left cell. Select the new CheckBox control and set its **Text** property to **Stretch**, as shown in the following picture.

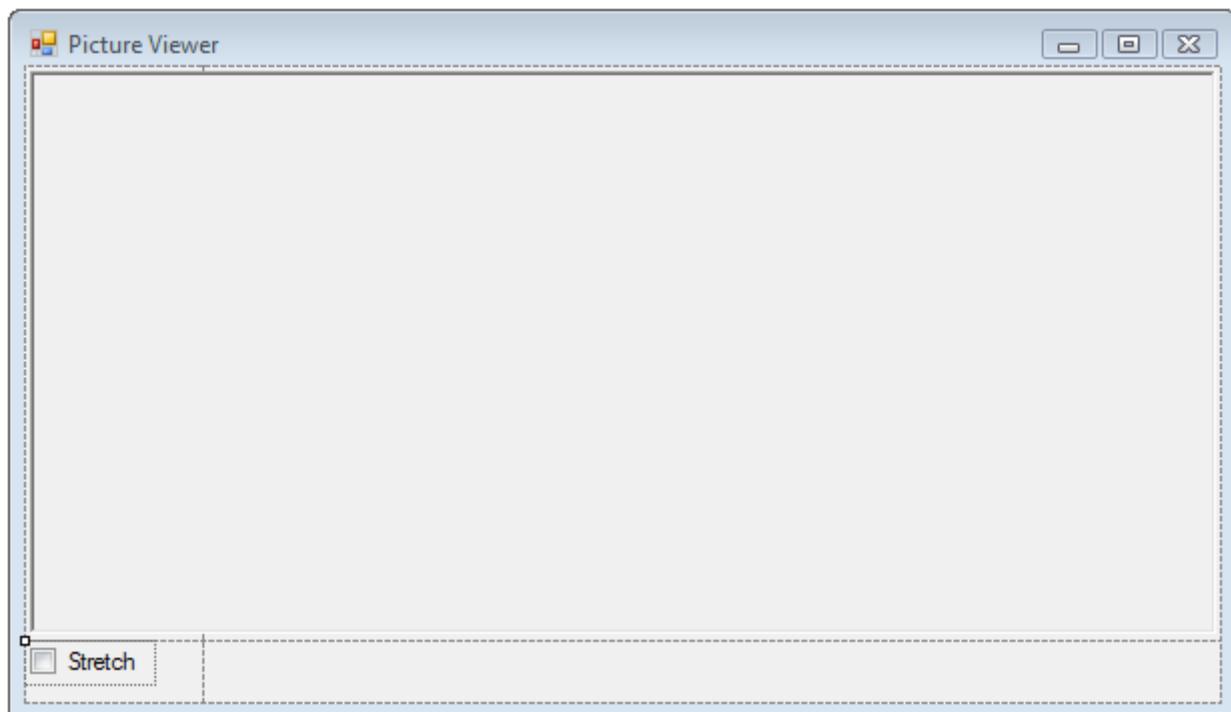


Figure 12 – TextBox control with Stretch property

7. Go to the **Containers** group in the Toolbox (where you got your TableLayoutPanel control) and double-click the **FlowLayoutPanel** item to add a new control to the last cell in the PictureBox. Then dock it in the parent container (either by choosing **Dock in parent container** from the task list, or by setting its **Dock** property to **Fill**).

To add buttons:

1. Select the FlowLayoutPanel that you added. Go to **Common Controls** in the Toolbox and double-click the **Button** icon to add a button called **button1** to your FlowLayoutPanel. Repeat to add another button. The IDE determines that there's already a button called **button1** and calls the next one **button2**.

2. Typically, you add the other buttons using the Toolbox. This time, click **button2**, and then on the **Edit** menu, click **Copy** (or press **Ctrl+C**). On the **Edit** menu, click **Paste** (or press **Ctrl+V**) to paste a copy of your button. Now paste it again. The IDE has now added **button3** and **button4**.

3. Select the first button and set its **Text** property to **Show a picture**. Then set the **Text** properties of the next three buttons to **Clear the picture**, **Set the background color**, and **Close**.

4. The next step is to size the buttons and arrange them so they align to the left side of the panel. Select the **FlowLayoutPanel** and look at its **FlowDirection** property. Change it so it's set to **RightToLeft**. As soon as you do, the buttons should align themselves to the right side of the cell, and reverse their order so that the **Show a picture** button is on the right.

5. Click the **Close** button to select it. Hold down the **CTRL** key and click the other three buttons, so that they are all selected. While all the buttons are selected, go to the **Properties** window and scroll up to the **AutoSize** property. This property tells the button to automatically resize itself to fit all of its text. Set it to **true**. Your buttons should now be sized properly and be in the right order. (As long as all four buttons are selected, you can change all four **AutoSize** properties at the same time.) The following picture shows the four buttons.

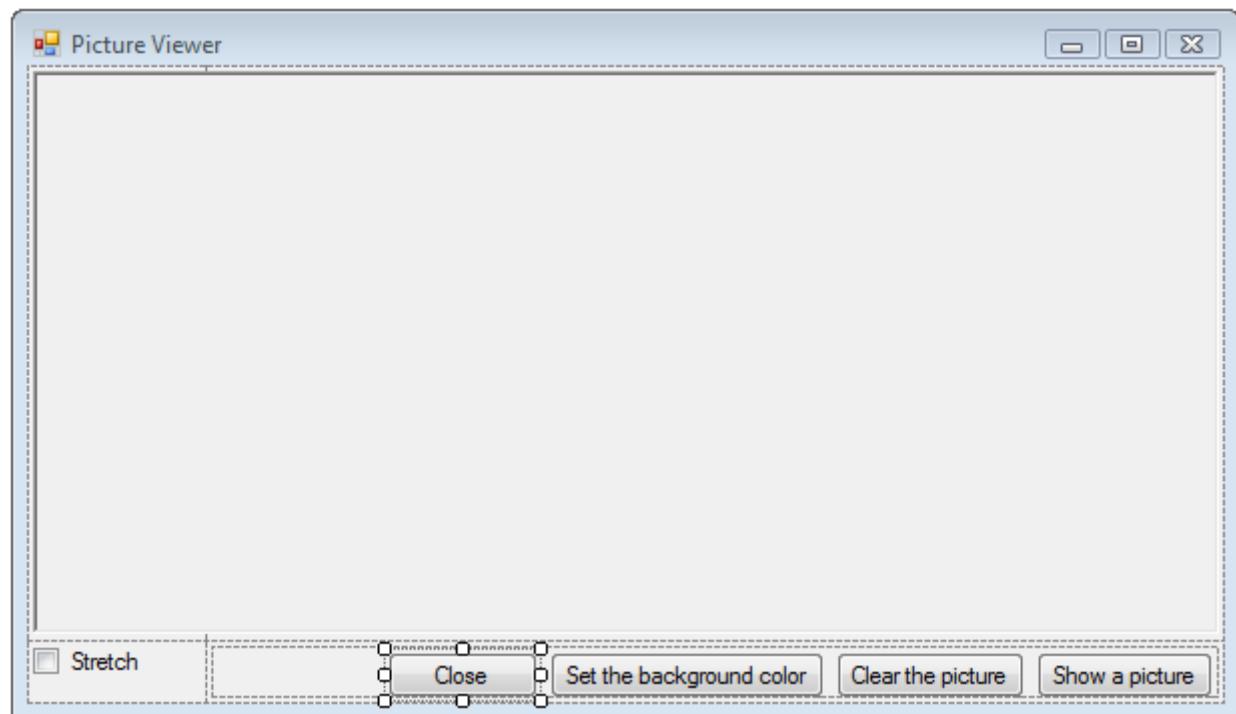


Figure 13 – Picture Viewer with four buttons

6. Now run your program again to see your newly laid out form. Clicking the buttons and the check box doesn't do anything yet, but it will work soon.

Step 6: Name Your Button Controls

There's only one PictureBox on your form. When you added it, the IDE automatically named it **pictureBox1**. There's only one CheckBox, which is named **checkBox1**. Soon, you will write some code, and that code will refer to the CheckBox and PictureBox. Because there's only one of each of these controls, you will know what it means when you see **pictureBox1** or **checkBox1** in your code.

There are four buttons on your form, and the IDE named them **button1**, **button2**, **button3**, and **button4**. By just looking at their current names, you don't know which button is the **Close** button and which one is the **Show a picture** button. That's why naming your button controls is helpful.

To name your button controls:

1. Click the **Close** button. (If you still have all the buttons selected, press the ESC key to cancel the selection.) Scroll in the **Properties** window until you see the **(Name)** property. (The **(Name)** property is near the top when the properties are alphabetical.) Change the name to **closeButton**, as shown in the following picture.

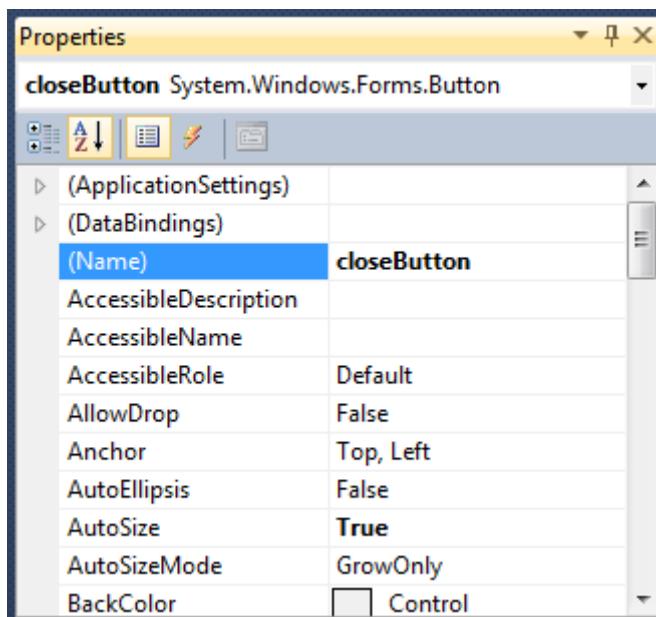


Figure 14 – Properties window with closeButton name

2. Rename the other three buttons to **backgroundButton**, **clearButton**, and **showButton**. You can verify the names by clicking the control selector drop-down list in the **Properties** window. The new button names appear.
3. Double-click the **Show a picture** button in Windows Forms Designer. When you do, the IDE opens a new tab in the main window called the **Form1.cs** tab, as shown in the following picture.

The screenshot shows the Visual Studio IDE with the 'Form1.cs' tab selected. The code editor displays the following C# code:

```
Form1.cs* X Form1.cs [Design]*  
WindowsFormsApplication1.Form1  
closeButton_Click(object sender, EventArgs e)  
using System;  
using System.Collections.Generic;  
using System.ComponentModel;  
using System.Data;  
using System.Drawing;  
using System.Linq;  
using System.Text;  
using System.Windows.Forms;  
  
namespace WindowsFormsApplication1  
{  
    public partial class Form1 : Form  
    {  
        public Form1()  
        {  
            InitializeComponent();  
        }  
  
        private void closeButton_Click(object sender, EventArgs e)  
        {  
        }  
    }  
}
```

Figure 15 – Form1.cs tab with Visual C# code

4. Focus on this part of the code.

```
private void closeButton_Click(object sender, EventArgs e)  
{  
}  
}
```

You are looking at a method called **showButton_Click()**. The IDE added this when you double-clicked the **Show a picture** button. This method contains code that runs when the **Show a picture** button is clicked.

5. Go to the designer tab (the **Form1.cs [Design]** tab in Visual C#) and double-click the **Clear the picture** button. Repeat this for the last two buttons. Each time, the IDE adds a new method to the form's code.

6. To add one more method, double-click the CheckBox control in Windows Forms Designer to make the IDE add a **checkBox1_CheckedChanged()** method. That method gets called whenever the user selects or clears the check box.

The following shows the new code that you see in the code editor.

```

private void closeButton_Click(object sender, EventArgs e)
{
}

private void backgroundButton_Click(object sender, EventArgs e)
{
}

private void clearButton_Click(object sender, EventArgs e)
{
}

```

Step 7: Add Dialog Components to Your Form

To prepare for setting up the **Open File** dialog box and **Color** dialog box (to choose a background color), in this step, you add an **OpenFileDialog** component and a **ColorDialog** component to your form.

A component is like a control in some ways. You use the Toolbox to add a component to your form, and you set its properties using the Properties window. But unlike a control, adding a component to your form doesn't add a visible item that the user can see on the form. Instead, it provides certain behaviors that you can trigger with code. It's a component that opens an Open File dialog box.

To add dialog components to your form:

1. Go to Windows Forms Designer and open the Dialogs group in the Toolbox.
2. To add a component called **openFileDialog1** to your form, double-click **OpenFileDialog**. To add a component called **colorDialog1** to your form, double-click **ColorDialog** in the Toolbox. (You use that one in the next tutorial step.) You should see a gray box at the bottom of Windows Forms Designer that has an icon for each of the two dialog components that you added, as shown in the following picture.

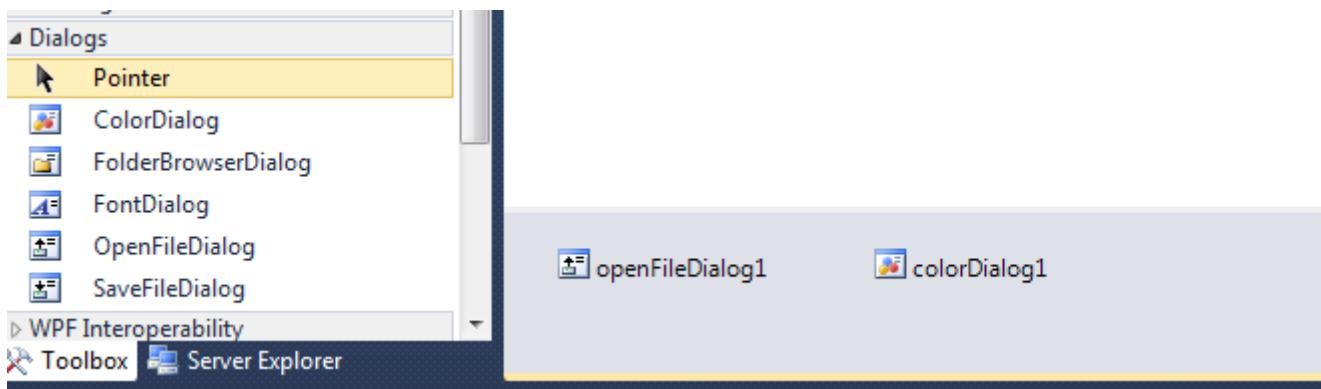


Figure 16 – Dialog components

3. Go to Windows Forms Designer and click the **openFileDialog1** icon in the gray box at the bottom of the designer. Set two properties:

- Set the **Filter** property to the following (you can copy and paste it): JPEG Files (*.jpg)|*.jpg|PNG Files (*.png)|*.png|BMP Files (*.bmp)|*.bmp|All files (*.*)|*.*
- Set the **Title** property to the following: Select a picture file

Step 8: Write Code for the Show a Picture Button Event Handler

In this step, you make the **Show a picture** button work like this:

- When a user clicks that button, the program opens an **Open File** dialog box.
- If a user chooses a picture file, the program shows that picture in the PictureBox.

The IDE has a powerful tool called IntelliSense that helps you write code. As you enter code, the IDE opens a box with suggested completions for partial words that you enter. It tries to determine what you want to do next, and automatically jumps to the last item you choose from the list. You can use the up or down arrows to move in the list, or you can keep typing letters to narrow the choices. When you see the choice you want, press the TAB key to select it. Or, you can ignore the suggestions, if not needed.

To write code for the Show a picture button event handler:

1. Go to Windows Forms Designer and double-click the **Show a picture** button. The IDE immediately goes to the code designer and moves your cursor so it's inside the **showButton_Click()** method that you added previously.

2. Type an i on the empty line between the two braces { }. An **IntelliSense** window opens, as shown in the following picture.

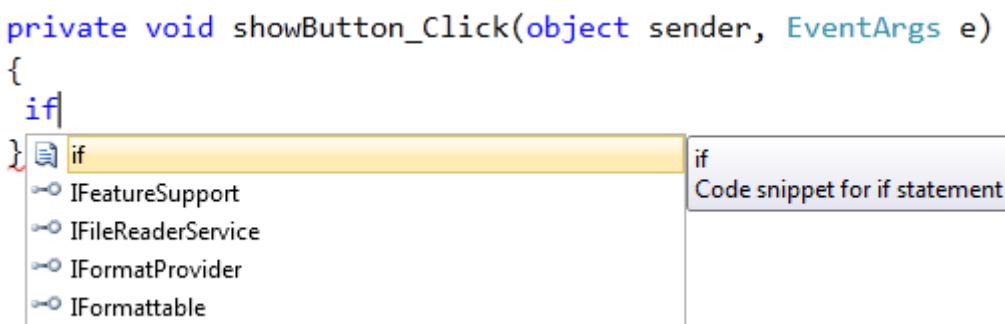


Figure 17 – IntelliSense with Visual C# code

3. The **IntelliSense** window should be highlighting the word **if**. (If not, enter a lowercase f, and it will.) Notice how the yellow tooltip next to the **IntelliSense** window shows **Code snippet for if statement**. You want to use that snippet. Press the TAB key to insert **if** into

your code. Then press the TAB key again to use the **if** snippet. (If you clicked somewhere else and your **IntelliSense** window disappeared, backspace over the i and retype it, and the **IntelliSense** window opens again.)

```
private void showButton_Click(object sender, EventArgs e)
{
    if (true)
    {

    }
}
```

Figure 18 – Visual C# code

4. Next, you use IntelliSense to enter more code to open an **Open File** dialog box. If the user clicked the **OK** button, the **PictureBox** loads the file that the user selected. The following steps show how to enter the code, and although it's numerous steps, it's just a few keystrokes:

- a. Start with the selected text **true** in the snippet. Type op to overwrite it. (In Visual Basic, you start with an initial cap, so type Op.)
- b. The **IntelliSense** window opens and displays **openFileDialog1**. Press TAB to select it.
- c. Type a period (.) (Many programmers call this a dot.) Because you typed a dot right after **openFileDialog1**, an IntelliSense window opens, filled in with all of the **OpenFileDialog** component's properties and methods. These are the same properties that appear in the **Properties** window when you click it in Windows Forms Designer. There are also methods that can tell the component to do things (like open a dialog box).
- d. Start to type **ShowDialog** (capitalization is unimportant to IntelliSense). The **ShowDialog()** method will show the **Open File** dialog box. After the window has highlighted **ShowDialog**, press TAB.
- e. When you use a method on a control or a component (referred to as calling a method), you need to add parentheses. So enter opening and closing parentheses: ()
- f. For Visual C#, add a space, and then add two equal signs (==). For Visual Basic, add a space, and then use a single equal sign (=). (Visual C# and Visual Basic use different equality operators.)
- g. Add another space. As soon as you do, another **IntelliSense** window opens. Start to type **DialogResult** and press TAB to add it.
- h. Type a dot to open the **DialogResult** value **IntelliSense** window. Enter the letter O and press TAB to insert **OK**.

i. Now add one more line of code. You can type it (or copy and paste it), but consider using IntelliSense to add it. The more familiar you are with IntelliSense, the more quickly you can write your own code. Your final `showButton_Click()` method looks like the following.

```
private void showButton_Click(object sender, EventArgs e)
{
    if (openFileDialog1.ShowDialog() == System.Windows.Forms.DialogResult.OK)
    {
        pictureBox1.Load(openFileDialog1.FileName);
    }
}
```

Step 9: Review, Comment, and Test Your Code

Before you add a comment to your code and test it, take time to review the code concepts, because you will use these concepts frequently:

- When you double-clicked the **Show a picture** button in Windows Forms Designer, the IDE automatically added a method to your program's code.
- Methods are how you organize your code: It's how your code is grouped together.
- Most of the time, a method does a small number of things in a specific order, like how your `showButton_Click()` method shows a dialog box and then loads a picture.
- A method is made up of *statements*. Think of a method as a way to bundle statements together.
- When a method is executed, or *called*, the statements in the method are executed in order, one after another, starting with the first one.

The following is an example of a statement:

```
pictureBox1.Load(openFileDialog1.FileName);
```

Statements are what make your programs do things. In Visual C#, a statement always ends in a semicolon.

You next add a comment to your code. A comment is a note that doesn't change the way the program behaves. It makes it easier for someone to understand what your code does. In Visual C#, two forward slashes (//) mark a line as a comment.

After you add a comment, you test your program. You just built something that works, and although it's not done yet, it can already load a picture.

To add comments

1. Add the following.

```
private void showButton_Click(object sender, EventArgs e)
{
    // Show the Open File dialog. If the user clicks OK, load the
```

```

// picture that the user chose.

if (openFileDialog1.ShowDialog() == System.Windows.Forms.DialogResult.OK)
{
    pictureBox1.Load(openFileDialog1.FileName);
}
}

```

2. Before you run your program, save your program by clicking the **Save All** toolbar button, which appears as follows.

Alternatively, to save your program, from the **File** menu, click **Save All**. It's a best practice to save early and often.

To test your program:

1. Press the F5 key or click the **Start Debugging** toolbar button.
2. Click the **Show a picture** button to run the code you just wrote. First, the program opens an **Open File** dialog box. Verify that your filters appear in the **Files of type** drop-down list at the bottom of the dialog box. Then navigate to a picture and open it. You can usually find sample pictures that ship with the Windows operating system in your **My Documents** folder, inside the **My Pictures\Sample Pictures** folder.
3. Load a picture, and it appears in your PictureBox. Then try resizing your form. Because you have your PictureBox docked inside a TableLayoutPanel, which itself is docked inside the form, your picture area will resize itself so that it's as wide as the form, and fills the top 90 percent of the form. That's why you used the TableLayoutPanel and FlowLayoutPanel containers: They keep your form sized correctly when the user resizes it.

Step 10: Write Code for Additional Buttons and a Check Box

Now you're ready to complete the other four methods. You could copy and paste this code, but if you want to learn the most from this tutorial, type the code and use IntelliSense.

```

private void closeButton_Click(object sender, EventArgs e)
{
    // Close the form.
    this.Close();
}

private void backgroundButton_Click(object sender, EventArgs e)
{
    // Show the color dialog box. If the user clicks OK, change the
    // PictureBox control's background to the color the user chose.
    if (colorDialog1.ShowDialog() == DialogResult.OK)
        pictureBox1.BackColor = colorDialog1.Color;
}

```

```

private void clearButton_Click(object sender, EventArgs e)
{
    // Clear the picture.
    pictureBox1.Image = null;
}

private void checkBox1_CheckedChanged(object sender, EventArgs e)
{
    // If the user selects the Stretch check box,
    // change the PictureBox's
    //SizeMode property to "Stretch". If the user clears
    //the check box, change it to "Normal".
    if (checkBox1.Checked)
        pictureBox1.SizeMode = PictureBoxSizeMode.StretchImage;
    else
        pictureBox1.SizeMode = PictureBoxSizeMode.Normal;
}

```

Step 11: Run Your Program and Try Other Features

Your program is finished and ready to run. You can run your program and set the background color. To learn more, try to improve the program by changing the color of the form, customizing the buttons and check box, and changing the properties of the form.

To run your program and set the background color:

1. Press F5 or click the **Start Debugging** toolbar button.
2. Before you open a picture, click the **Set the background color** button. The **Color** dialog box opens.

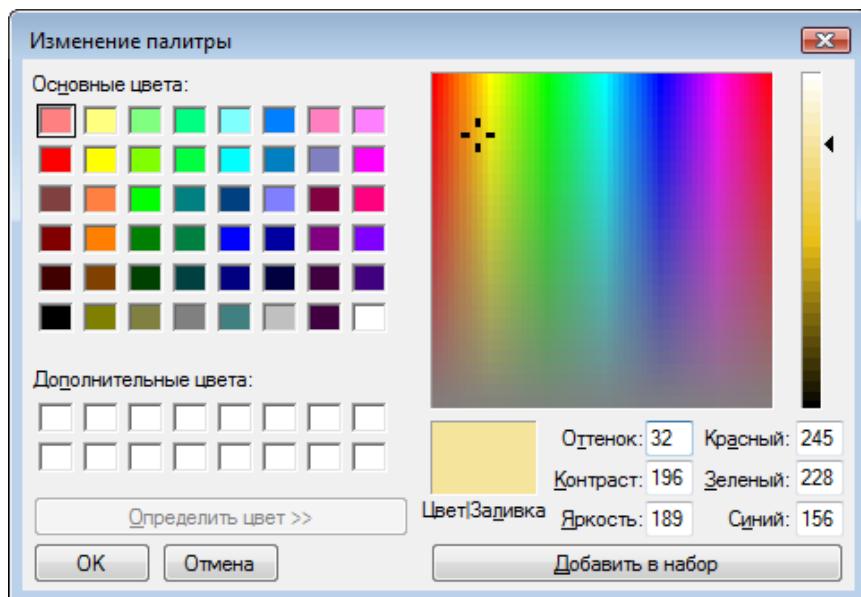


Figure 19 – Color dialog box

To try other features:

- Change the color of the form and the buttons using the **BackColor** property.
- Customize your buttons and check box using the **Font** and **ForeColor** properties.
- Change your form's **FormBorderStyle** and **ControlBox** properties.
- Use your form's **AcceptButton** and **CancelButton** properties so that buttons are automatically clicked when the user presses the ENTER or ESC key. Make the program open the Open File dialog box when the user presses ENTER and close the box when the user presses ESC.