Chapter 20: Web App Development with ASP.NET in C#

Internet & World Wide Web
How to Program, 5/e

Note: This chapter is a copy of Chapter 19 of our book *Visual C# 2010 How to Program*. For that reason, we simply copied the PowerPoint slides for this chapter and *did not* re-numb er them

OBJECTIVES

In this chapter you'll learn:

- Web application development using ASP.NET.
- To handle the events from a Web Form's controls.
- To use validation controls to ensure that data is in the correct format before it's sent from a client to the server.
- To maintain user-specific information.
- To create a data-driven web application using ASP.NET and LINQ to SQL.

19.2 Web Basics

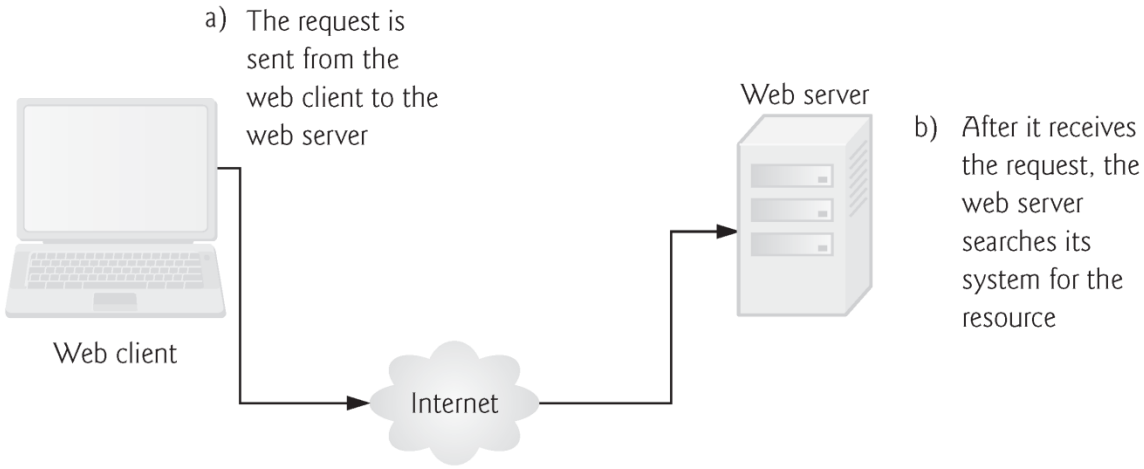


Fig. 19.1 | Client requesting a resource from a web server.

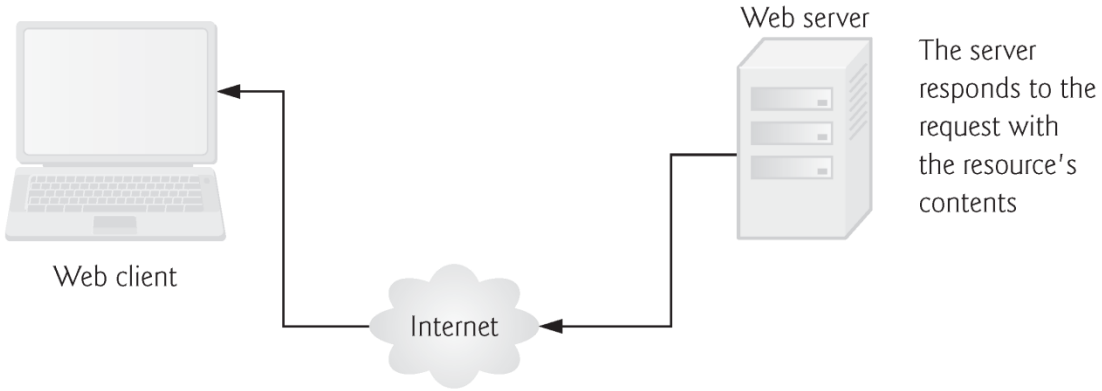


Fig. 19.2 | Client receiving a response from the web server.

19.3 Multitier Application Architecture

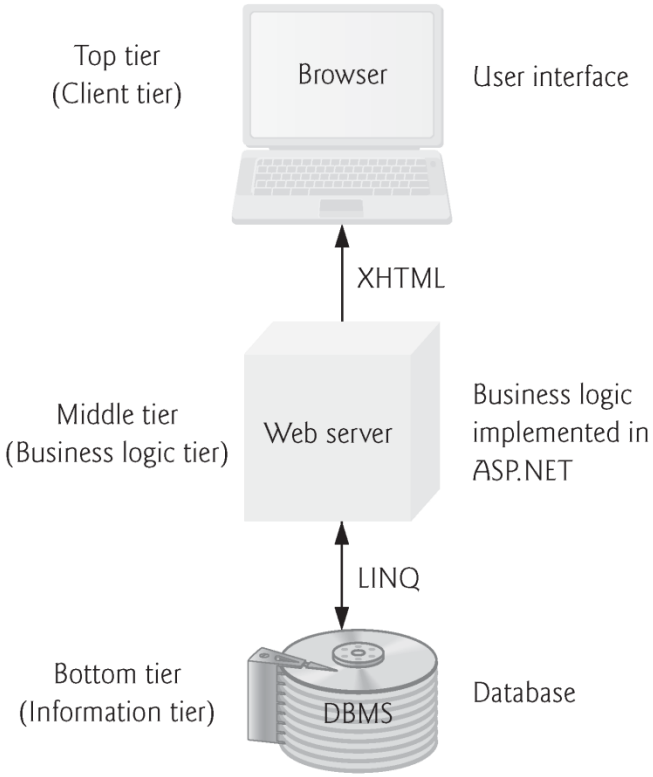


Fig. 19.3 | Three-tier architecture.

19.4 Your First Web Application

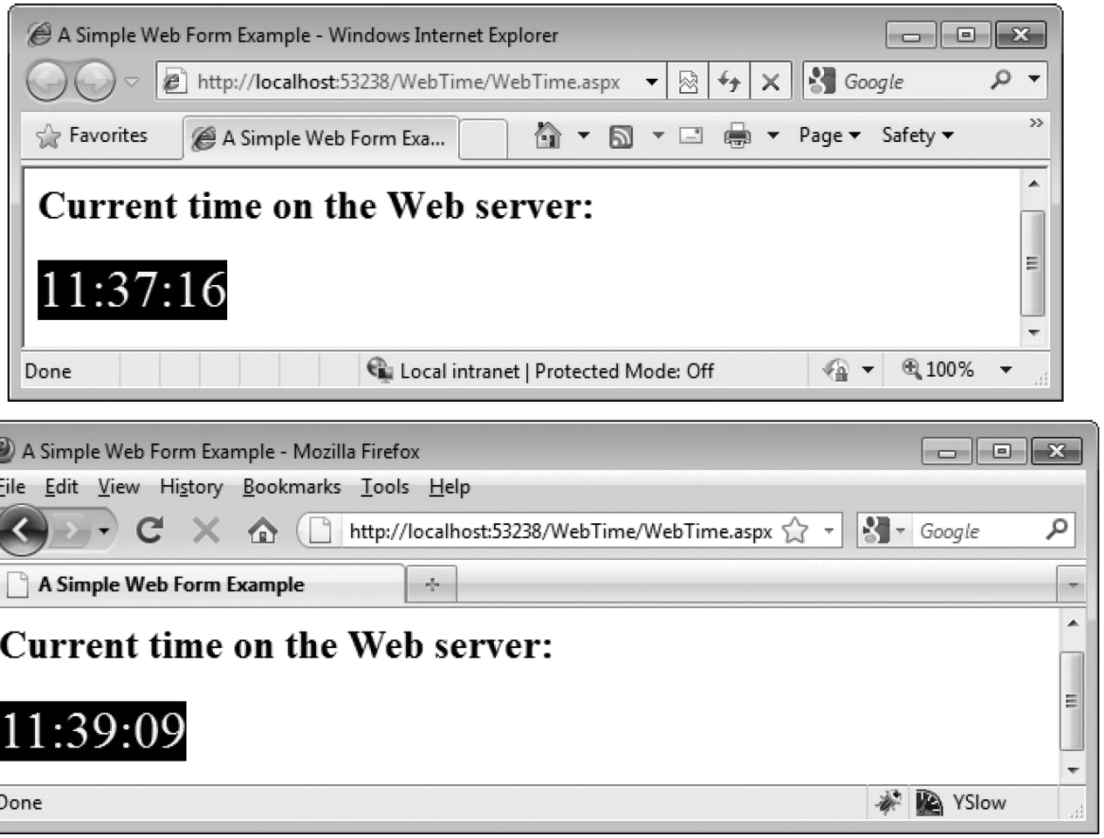


Fig. 19.4 | `WebTime` web application running in both Internet Explorer and Firefox.

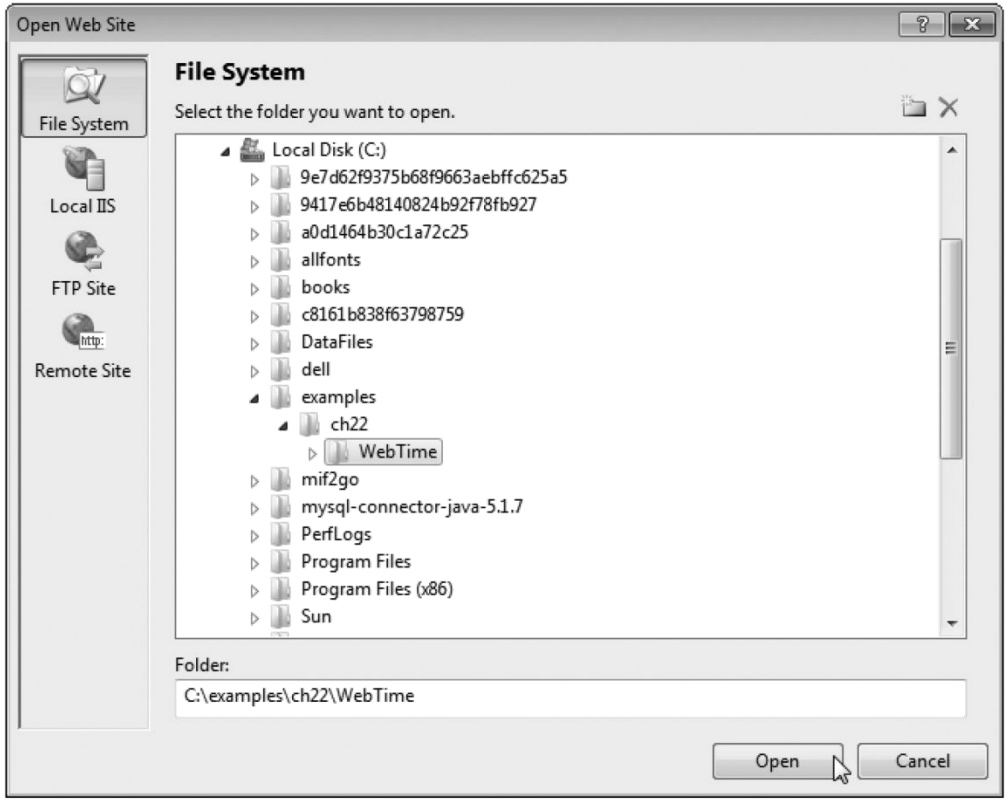


Fig. 19.5 | Open Web Site dialog.

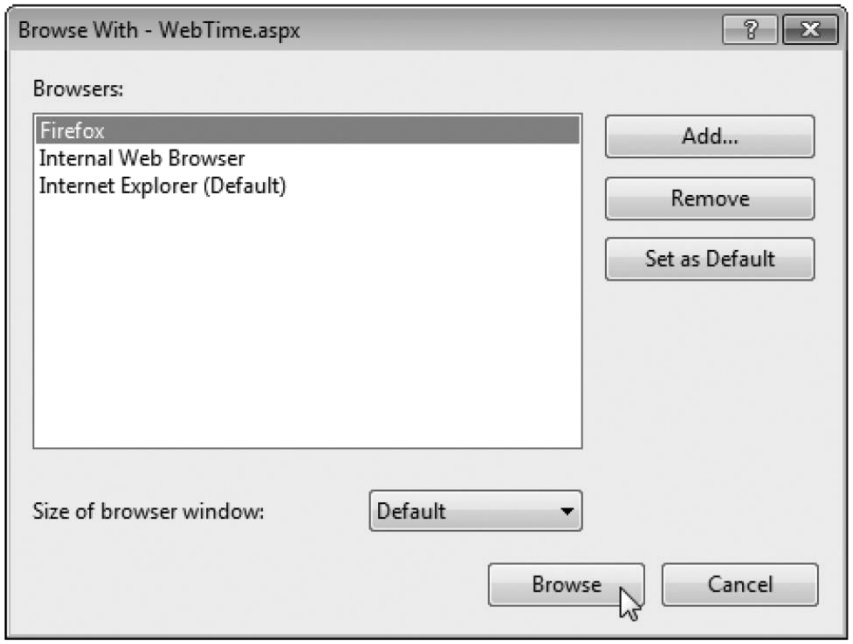


Fig. 19.6 | Selecting another web browser to execute the web application.

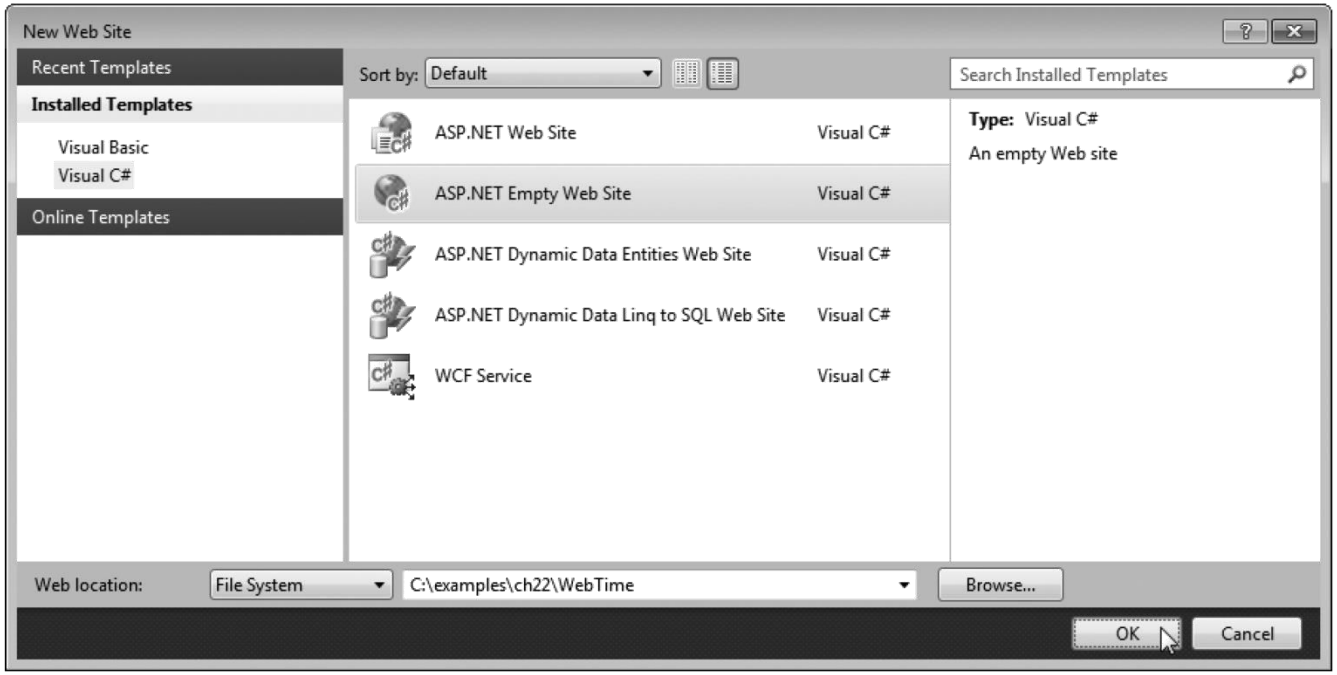


Fig. 19.7 | Creating an **ASP.NET Web Site** in Visual Web Developer.

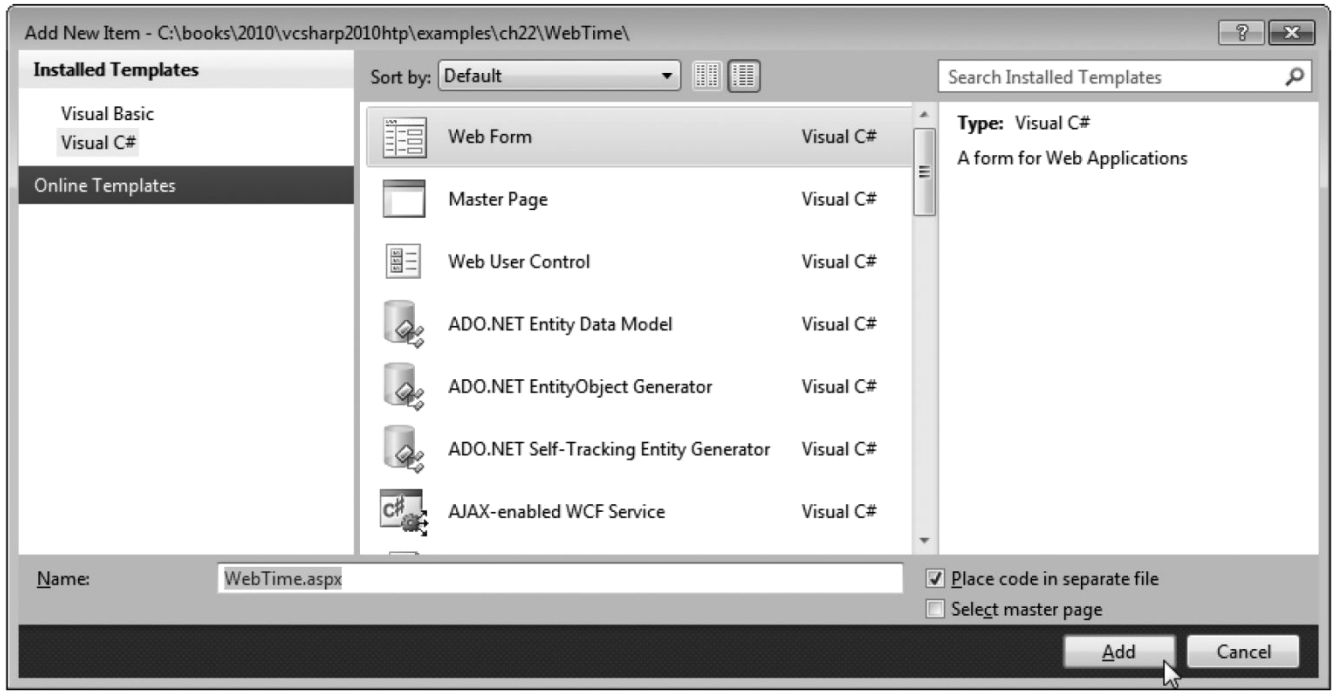


Fig. 19.8 | Adding a new **Web Form** to the website with the **Add New Item** dialog.

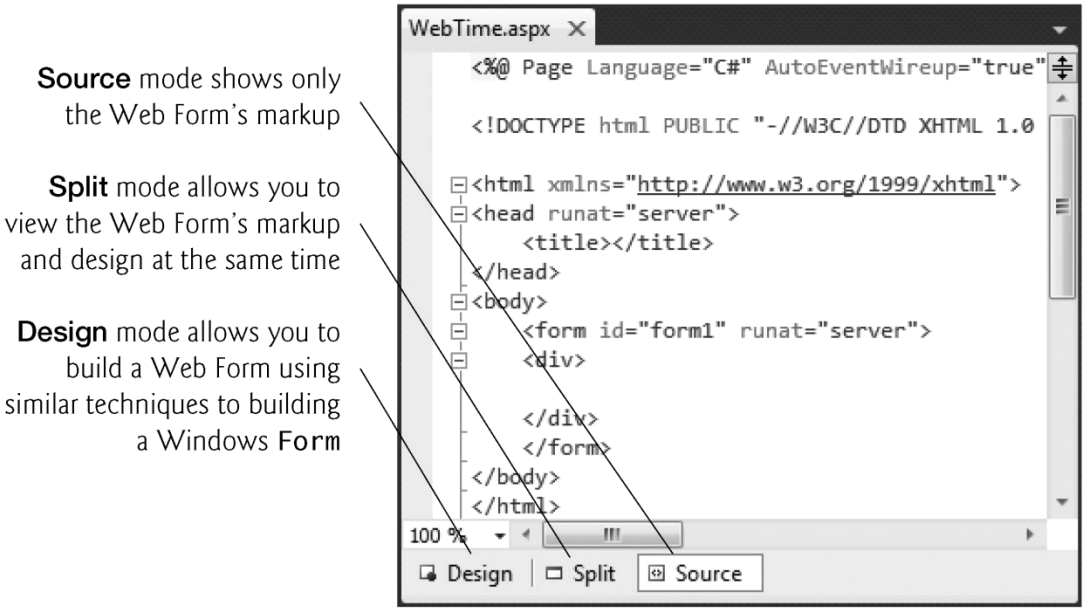


Fig. 19.9 | Web Form in **Source** view.

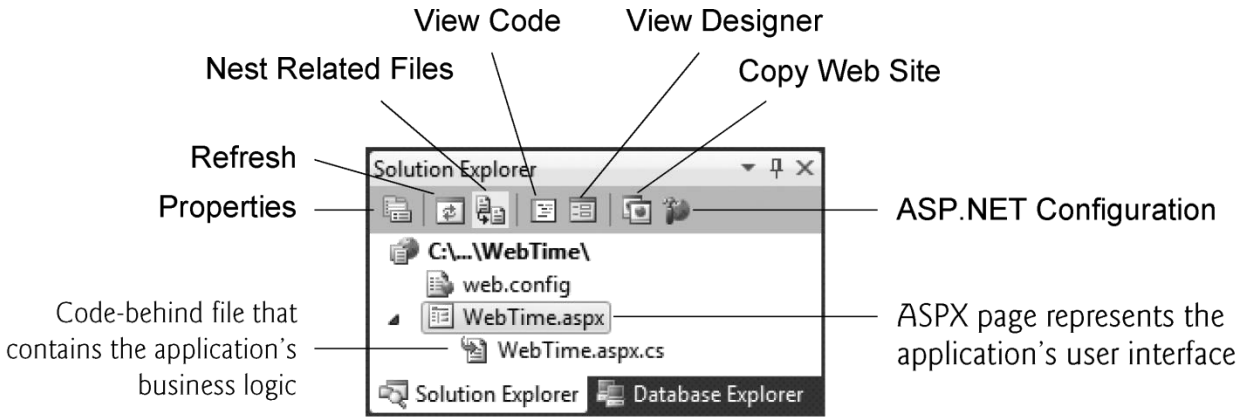


Fig. 19.10 | **Solution Explorer** window for an **Empty Web Site** project after adding the Web Form `WebTime.aspx`.

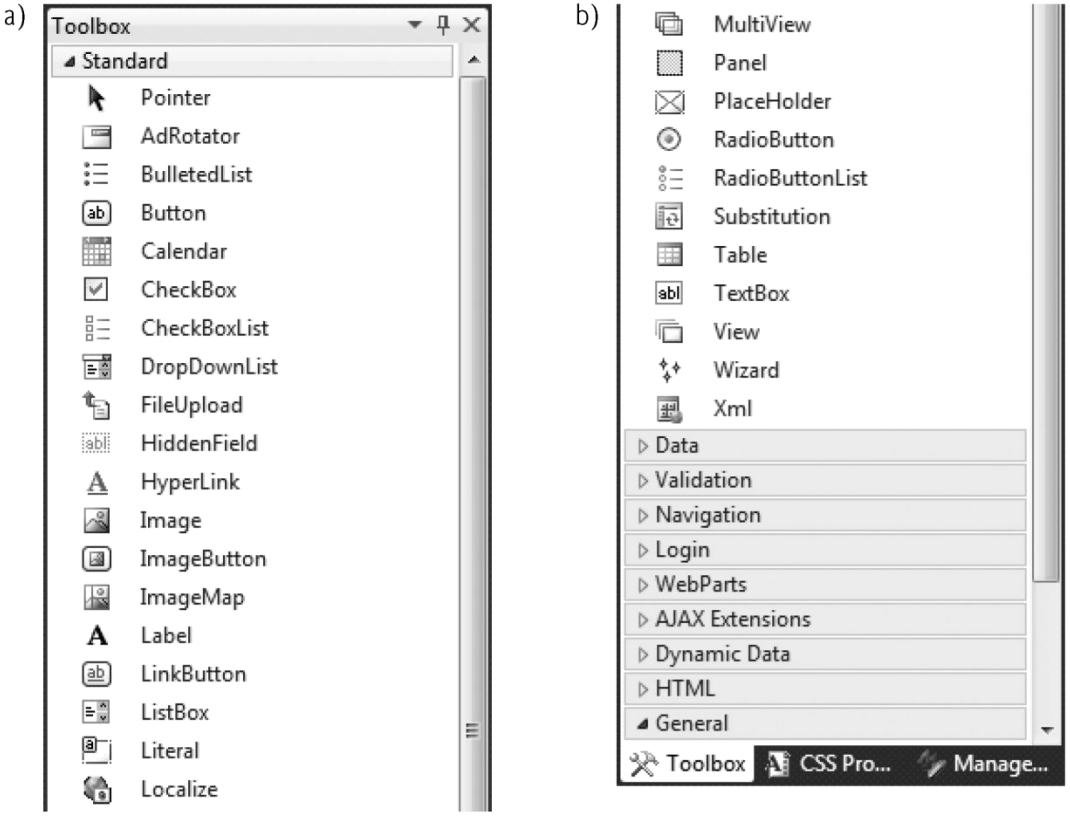


Fig. 19.11 | **Toolbox** in Visual Web Developer.

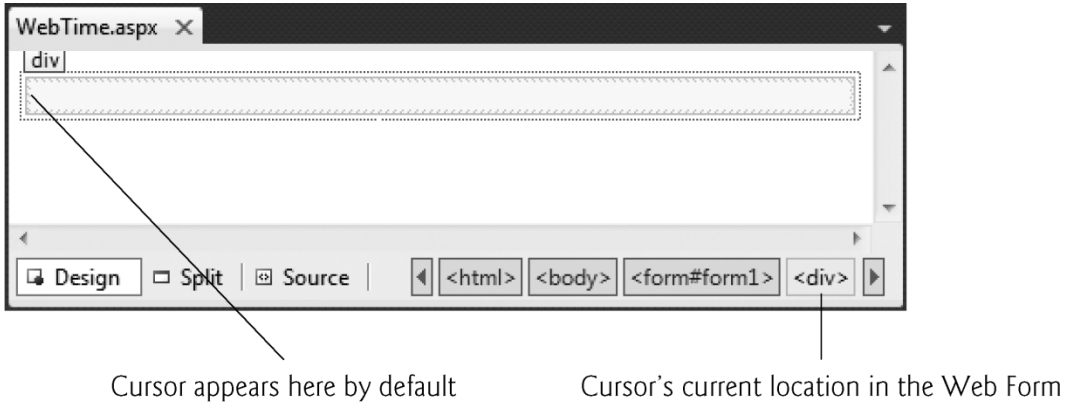


Fig. 19.12 | **Design** mode of the Web Forms Designer.

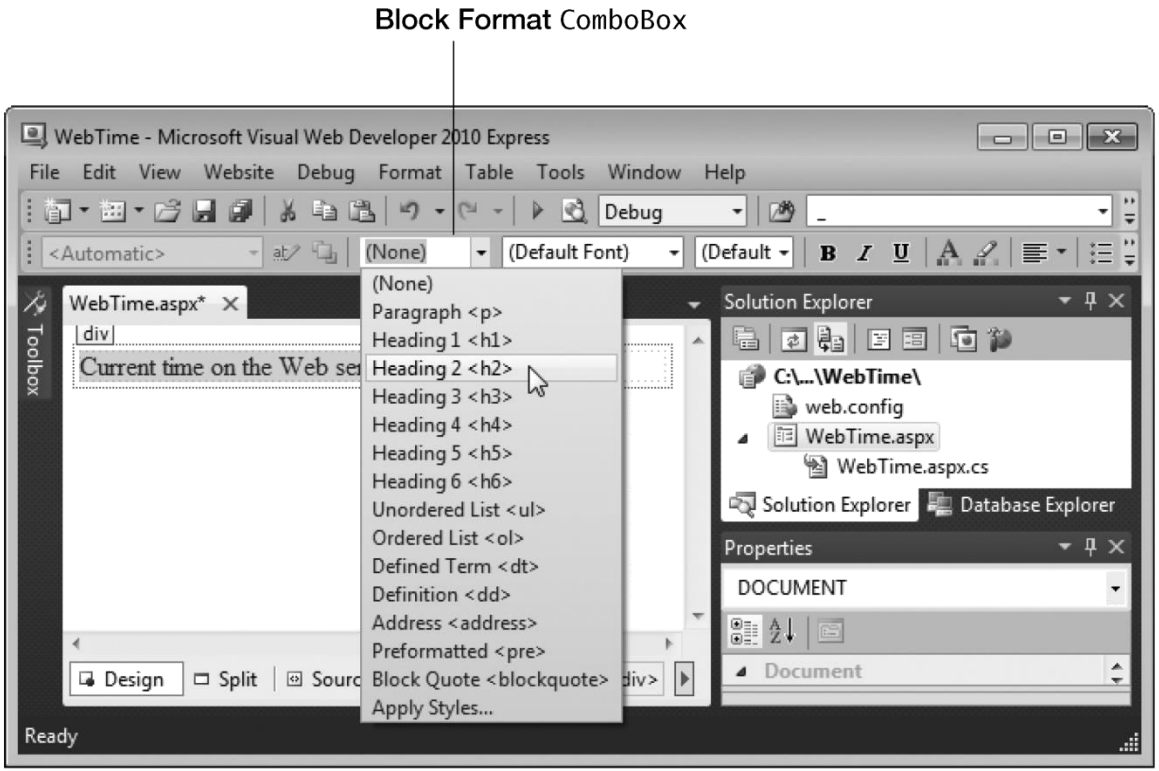


Fig. 19.13 | Changing the text to **Heading 2** heading.

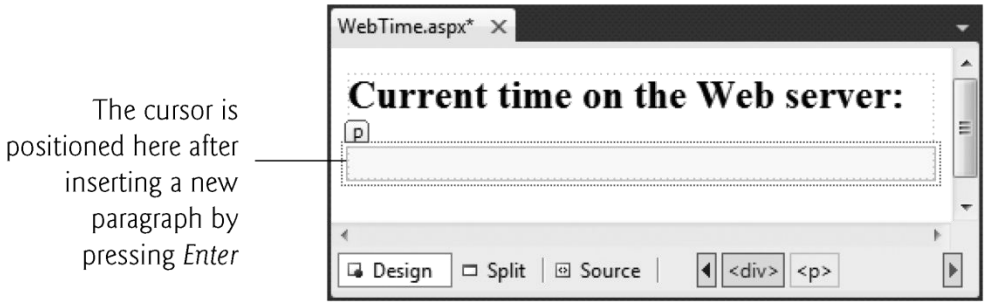


Fig. 19.14 | `WebTime.aspx` after inserting text and a new paragraph.

Fig. 19.15 | `WebTime.aspx` after adding a `Label`.

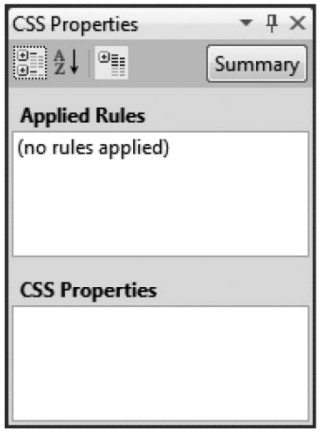


Fig. 19.16 | CSS Properties window.

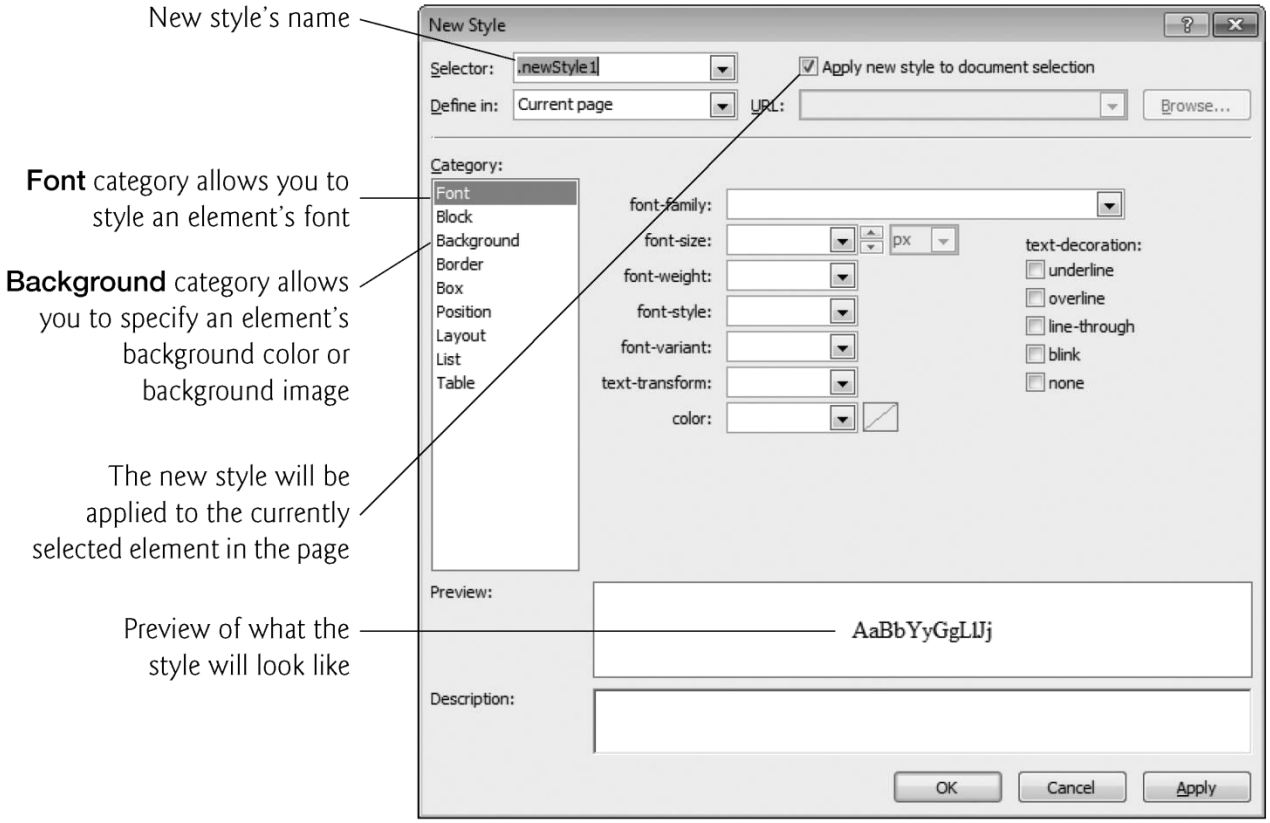


Fig. 19.17 | New Style dialog.

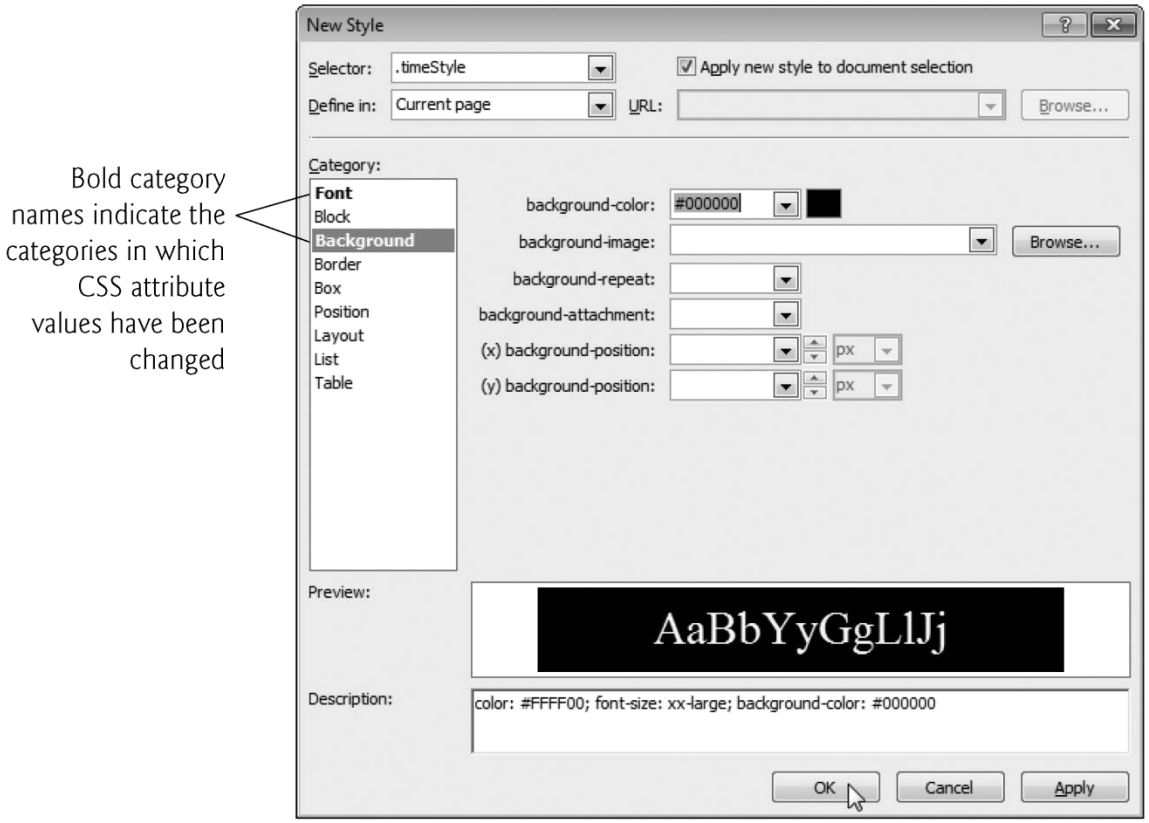


Fig. 19.18 | New Style dialog after changing the Label's style.

Fig. 19.19 | **Design** view after changing the `Label`'s style.

```
1  // Fig. 19.20: WebTime.aspx.cs
2  // Code-behind file for a page that displays the web server's time.
3  using System;
4
5  public partial class WebTime : System.Web.UI.Page
6  {
7     // initializes the contents of the page
8     protected void Page_Init( object sender, EventArgs e )
9     {
10       // display the server's current time in timeLabel
11       timeLabel.Text = DateTime.Now.ToString( "hh:mm:ss" );
12    } // end method Page_Init
13 } // end class WebTime
```

Fig. 19.20 | Code-behind file for a page that displays the web server's time.

19.5 Standard Web Controls: Designing a Form

Web control	Description
`TextBox`	Gathers user input and displays text.
`Button`	Triggers an event when clicked.
`HyperLink`	Displays a hyperlink.
`DropDownList`	Displays a drop-down list of choices from which a user can select an item.
`RadioButtonList`	Groups radio buttons.
`Image`	Displays images (for example, PNG, GIF and JPG).

Fig. 19.21 | Commonly used web controls.

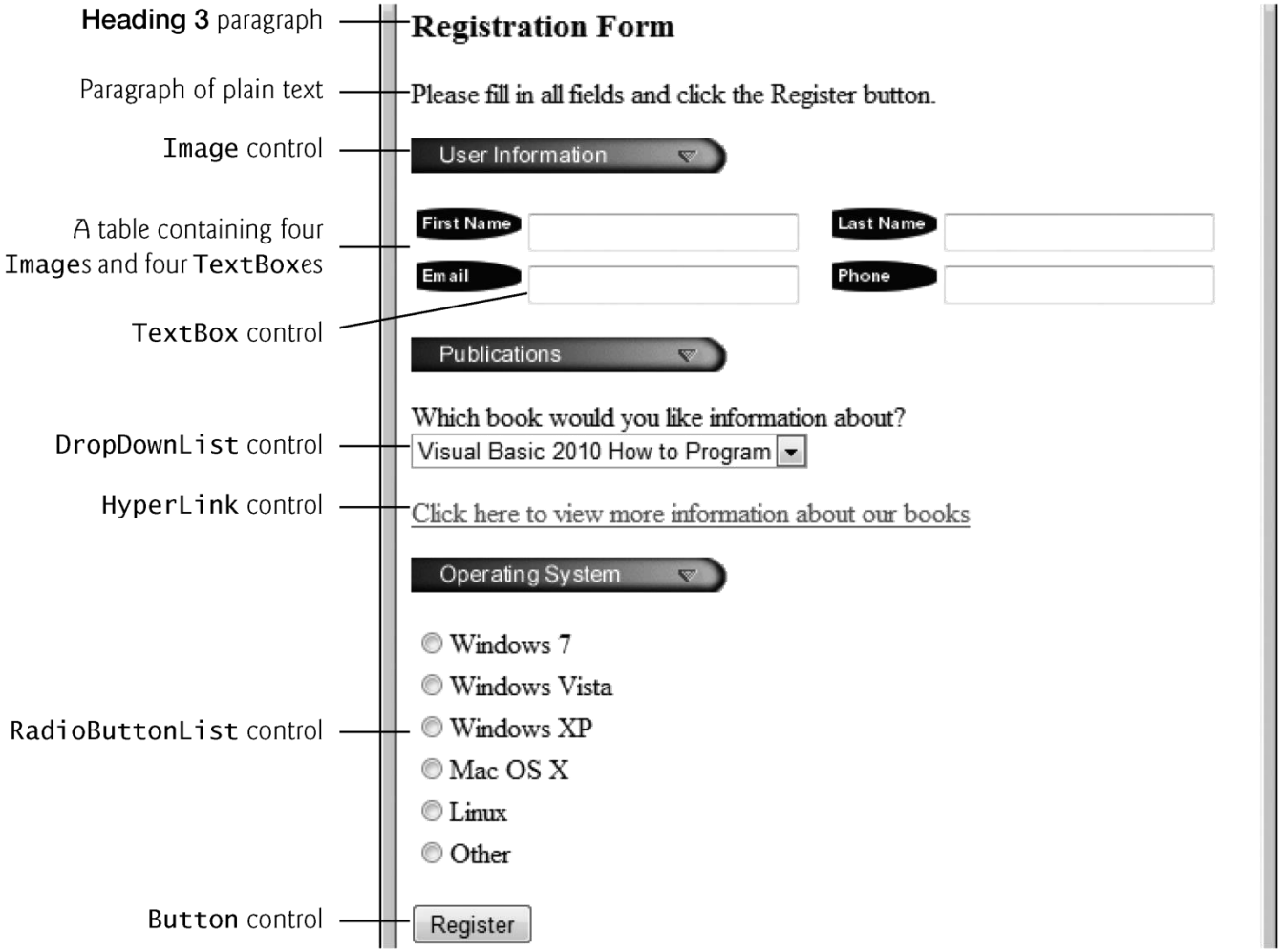
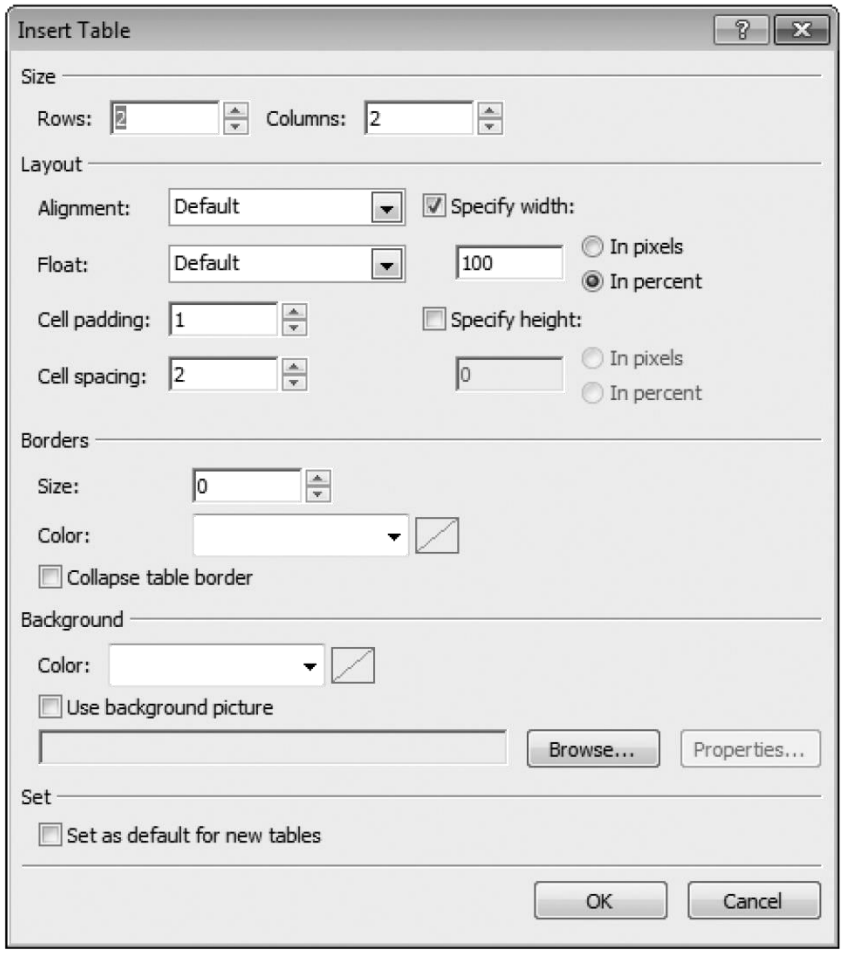


Fig. 19.22 | Web Form that demonstrates web controls.



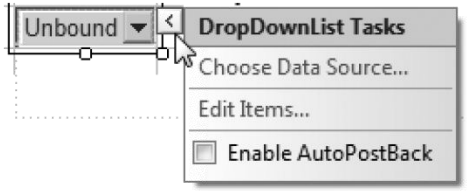


Fig. 19.24 | **DropDownList Tasks** smart-tag menu.

19.6 Validation Controls

a) Initial Web Form

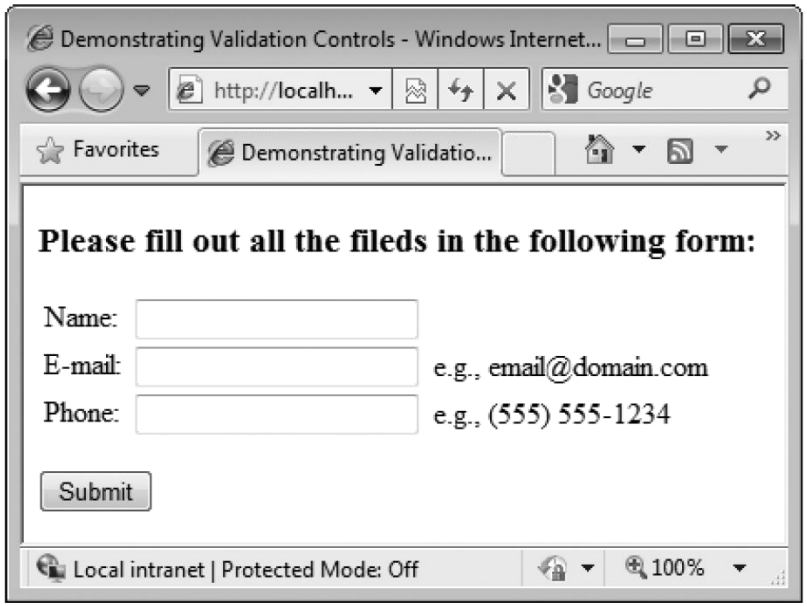


Fig. 19.25 | Validators in a Web Form that retrieves user contact information. (Part 1 of 4.)

b) Web Form after the user presses the **Submit** `Button` without having entered any data in the `TextBox`es; each `TextBox` is followed by an error message that was displayed by a validation control

`RequiredFieldValidator` controls

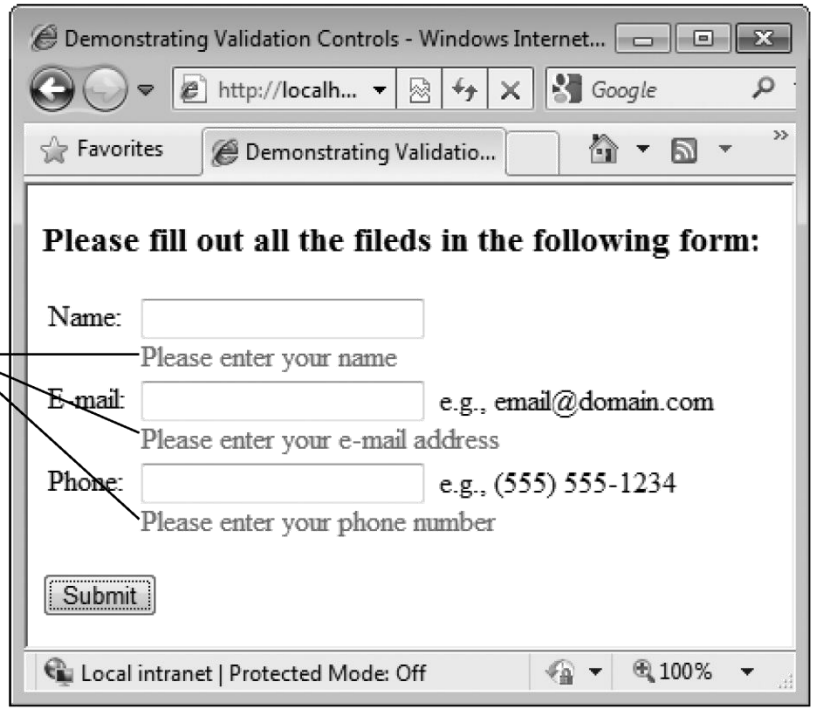


Fig. 19.25 | Validators in a Web Form that retrieves user contact information. (Part 2 of 4.)

c) Web Form after the user enters a name, an invalid e-mail address and an invalid phone number in the `TextBox`es, then presses the **Submit** `Button`; the validation controls display error messages in response to the invalid e-mail and phone number values

`RegularExpressionValidator` controls

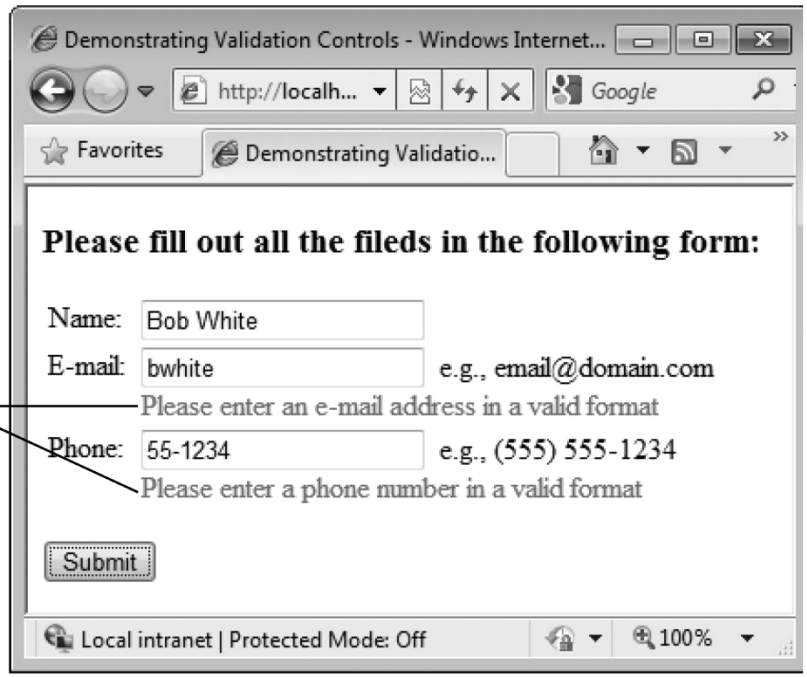


Fig. 19.25 | Validators in a Web Form that retrieves user contact information. (Part 3 of 4.)

d) The Web Form after the user enters valid values for all three `TextBox`es and presses the **Submit** `Button`

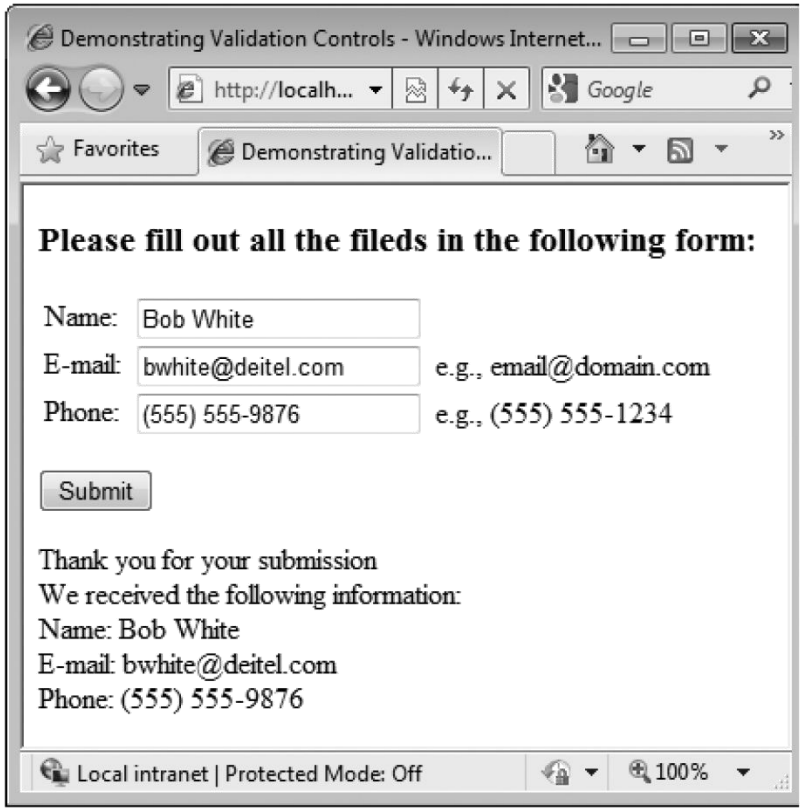


Fig. 19.25 | Validators in a Web Form that retrieves user contact information. (Part 4 of 4.)

```
1  // Fig. 19.26: Validation.aspx.cs
2  // Code-behind file for the form demonstrating validation controls.
3  using System;
4
5  public partial class Validation : System.Web.UI.Page
6  {
7     // Page_Load event handler executes when the page is loaded
8     protected void Page_Load( object sender, EventArgs e )
9     {
10       // if this is not the first time the page is loading
11       // (i.e., the user has already submitted form data)
12       if ( IsPostBack )
13       {
14          Validate(); // validate the form
15
16          // if the form is valid
17          if ( IsValid )
18          {
19             // retrieve the values submitted by the user
20             string name = nameTextBox.Text;
21             string email = emailTextBox.Text;
22             string phone = phoneTextBox.Text;
23
```

Fig. 19.26 | Code-behind file for the form demonstrating validation controls. (Part 1 of 2.)

```
            // show the the submitted values
            outputLabel.Text = "Thank you for your submission<br/>" +
               "We received the following information:<br/>";
            outputLabel.Text +=
               String.Format( "Name: {0}{1}E-mail:{2}{1}Phone:{3}",
                  name, "<br/>", email, phone);
            outputLabel.Visible = true; // display the output message
         } // end if
      } // end if
   } // end method Page_Load
} // end class Validation
```

Fig. 19.26 | Code-behind file for the form demonstrating validation controls. (Part 2 of 2.)

19.7 Session Tracking

Portability Tip 19.1

Users may disable cookies in their web browsers to help ensure their privacy. Such users will experience difficulty using web applications that depend on cookies to maintain state information.

a) User selects a language from the `Options.aspx` page, then presses **Submit** to send the selection to the server

Fig. 19.27 | ASPX file that presents a list of programming languages. (Part 1 of 5.)

d) The Web Form after the user enters valid values for all three `TextBox`es and presses the **Submit** `Button`

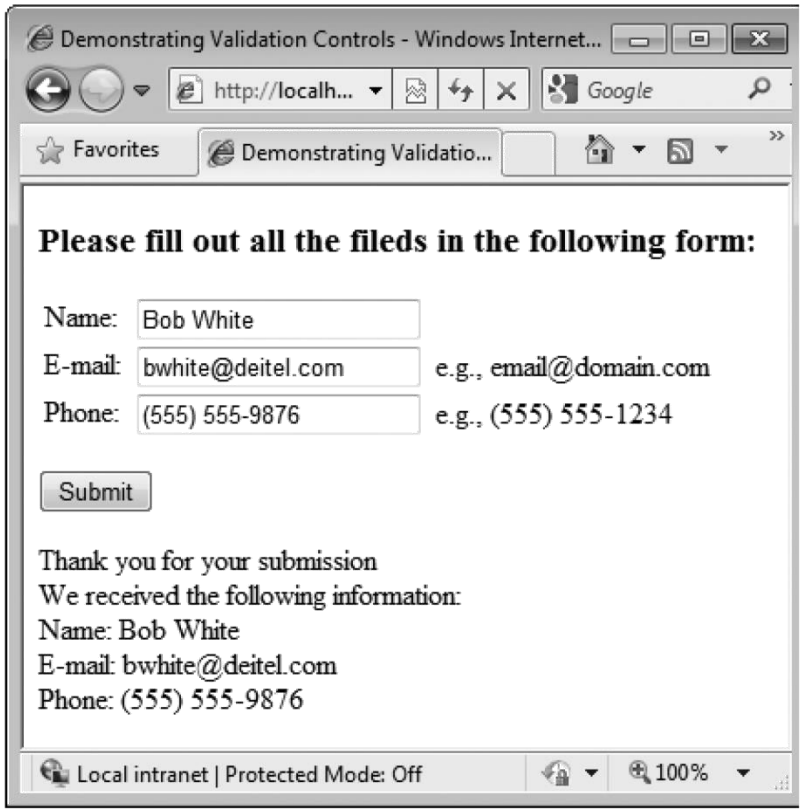


Fig. 19.27 | ASPX file that presents a list of programming languages. (Part 2 of 5.)

c) User selects another language from the `Options.aspx` page, then presses **Submit** to send the selection to the server

Fig. 19.27 | ASPX file that presents a list of programming languages. (Part 3 of 5.)

d) `Options.aspx` page is updated to hide the controls for selecting a language and to display the user's selection; the user clicks the hyperlink to get a list of book recommendations

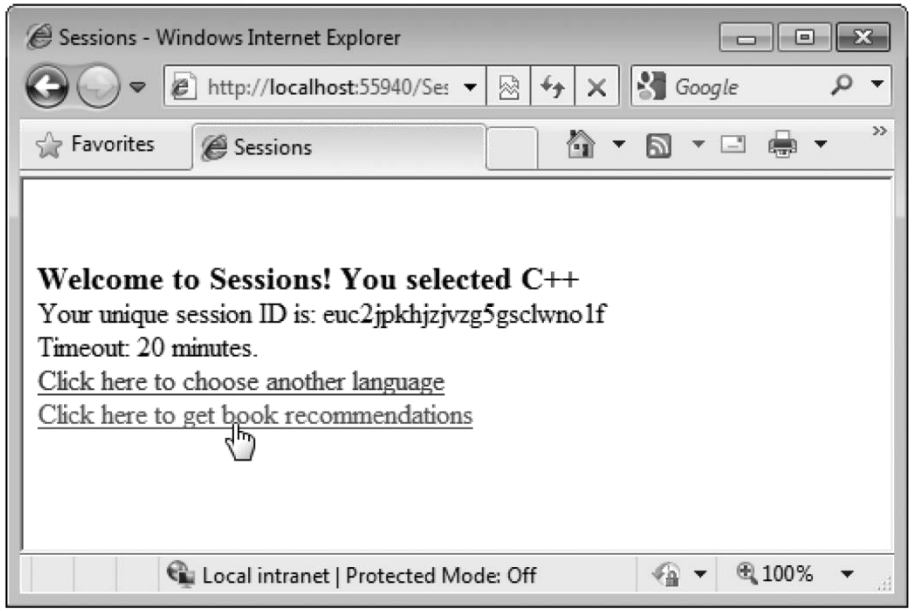


Fig. 19.27 | ASPX file that presents a list of programming languages. (Part 4 of 5.)

e) `Recommendations.aspx` displays the list of recommended books based on the user's selections

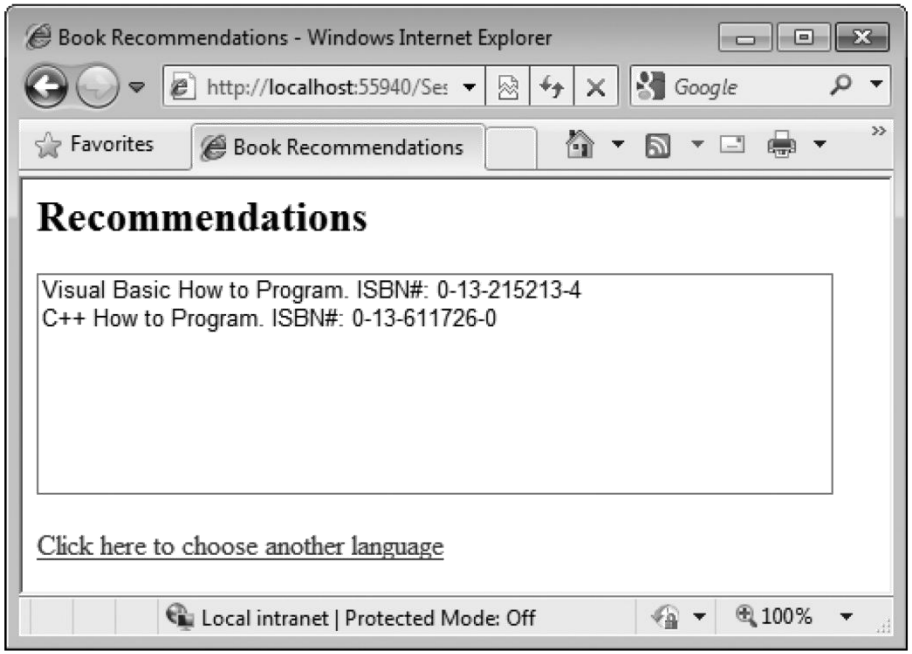


Fig. 19.27 | ASPX file that presents a list of programming languages. (Part 5 of 5.)

```
1  // Fig. 19.28: Options.aspx.cs
2  // Processes user's selection of a programming language by displaying
3  // links and writing information in a Session object.
4  using System;
5
6  public partial class Options : System.Web.UI.Page
7  {
8     // if postback, hide form and display links to make additional
9     // selections or view recommendations
10    protected void Page_Load( object sender, EventArgs e )
11    {
12       if ( IsPostBack )
13       {
14          // user has submitted information, so display message
15          // and appropriate hyperlinks
16          responseLabel.Visible = true;
17          idLabel.Visible = true;
18          timeoutLabel.Visible = true;
19          languageLink.Visible = true;
20          recommendationsLink.Visible = true;
21
```

Fig. 19.28 | Process user's selection of a programming language by displaying links and writing information in an `HttpSessionState` object. (Part 1 of 3.)

```
22            // hide other controls used to make language selection
23            promptLabel.Visible = false;
24            languageList.Visible = false;
25            submitButton.Visible = false;
26
27            // if the user made a selection, display it in responseLabel
28            if ( languageList.SelectedItem != null )
29               responseLabel.Text += " You selected " +
30                  languageList.SelectedItem.Text;
31            else
32               responseLabel.Text += " You did not select a language.";
33
34            // display session ID
35            idLabel.Text = "Your unique session ID is: " + Session.SessionID;
36
37            // display the timeout
38            timeoutLabel.Text = "Timeout: " + Session.Timeout + " minutes.";
39         } // end if
40      } // end method Page_Load
41
```

Fig. 19.28 | Process user's selection of a programming language by displaying links and writing information in an `HttpSessionState` object. (Part 2 of 3.)

```
42      // record the user's selection in the Session
43      protected void submitButton_Click( object sender, EventArgs e )
44      {
45         // if the user made a selection
46         if ( languageList.SelectedItem != null )
47            // add name/value pair to Session
48            Session.Add( languageList.SelectedItem.Text,
49               languageList.SelectedItem.Value );
50      } // end method submitButton_Click
51   } // end class Options
```

Fig. 19.28 | Process user's selection of a programming language by displaying links and writing information in an `HttpSessionState` object. (Part 3 of 3.)

Properties	Description
`Count`	Specifies the number of key/value pairs in the `Session` object.
`IsNewSession`	Indicates whether this is a new session (that is, whether the session was created during loading of this page).
`Keys`	Returns a collection containing the `Session` object's keys.
`SessionID`	Returns the session's unique ID.
`Timeout`	Specifies the maximum number of minutes during which a session can be inactive (that is, no requests are made) before the session expires. By default, this property is set to 20 minutes.

Fig. 19.29 | `HttpSessionState` properties.

Software Engineering Observation 19.1

A Web Form should not use instance variables to maintain client state information, because each new request or postback is handled by a new instance of the page. Instead, maintain client state information in `HttpSessionState` objects, because such objects are specific to each client.

Software Engineering Observation 19.2

A benefit of using `HttpSessionState` objects (rather than cookies) is that they can store any type of object (not just `String`s) as attribute values. This provides you with increased flexibility in determining the type of state information to maintain for clients.

```
1  // Fig. 19.30: Recommendations.aspx.cs
2  // Creates book recommendations based on a Session object.
3  using System;
4
5  public partial class Recommendations : System.Web.UI.Page
6  {
7     // read Session items and populate ListBox with recommendations
8     protected void Page_Init( object sender, EventArgs e )
9     {
10       // determine whether Session contains any information
11       if ( Session.Count != 0 )
12       {
13          // display Session's name-value pairs
14          foreach ( string keyName in Session.Keys )
15             booksListBox.Items.Add( keyName +
16                " How to Program. ISBN#: " + Session[ keyName ] );
17       } // end if
```

Fig. 19.30 | Session data used to provide book recommendations to the user. (Part 1 of 2.)

```
18          else
19          {
20             // if there are no session items, no language was chosen, so
21             // display appropriate message and clear and hide booksListBox
22             recommendationsLabel.Text = "No Recommendations";
23             booksListBox.Items.Clear();
24             booksListBox.Visible = false;
25
26             // modify languageLink because no language was selected
27             languageLink.Text = "Click here to choose a language";
28          } // end else
29       } // end method Page_Init
30    } // end class Recommendations
```

Fig. 19.30 | Session data used to provide book recommendations to the user. (Part 2 of 2.)

19.8 Case Study: Database-Driven ASP.NET Guestbook

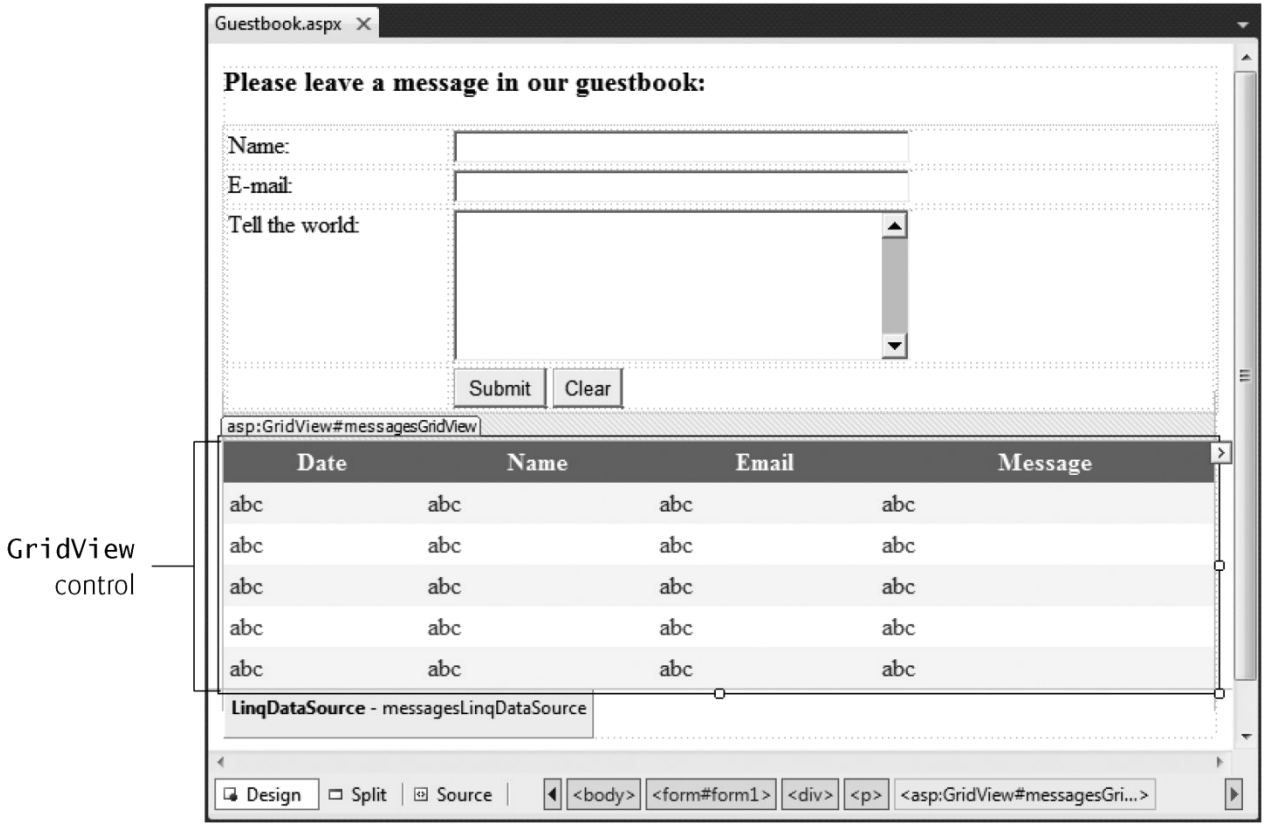


Fig. 19.31 | Guestbook application GUI in Design mode.

a) User enters data for the name, e-mail and message, then presses Submit to send the data to the server

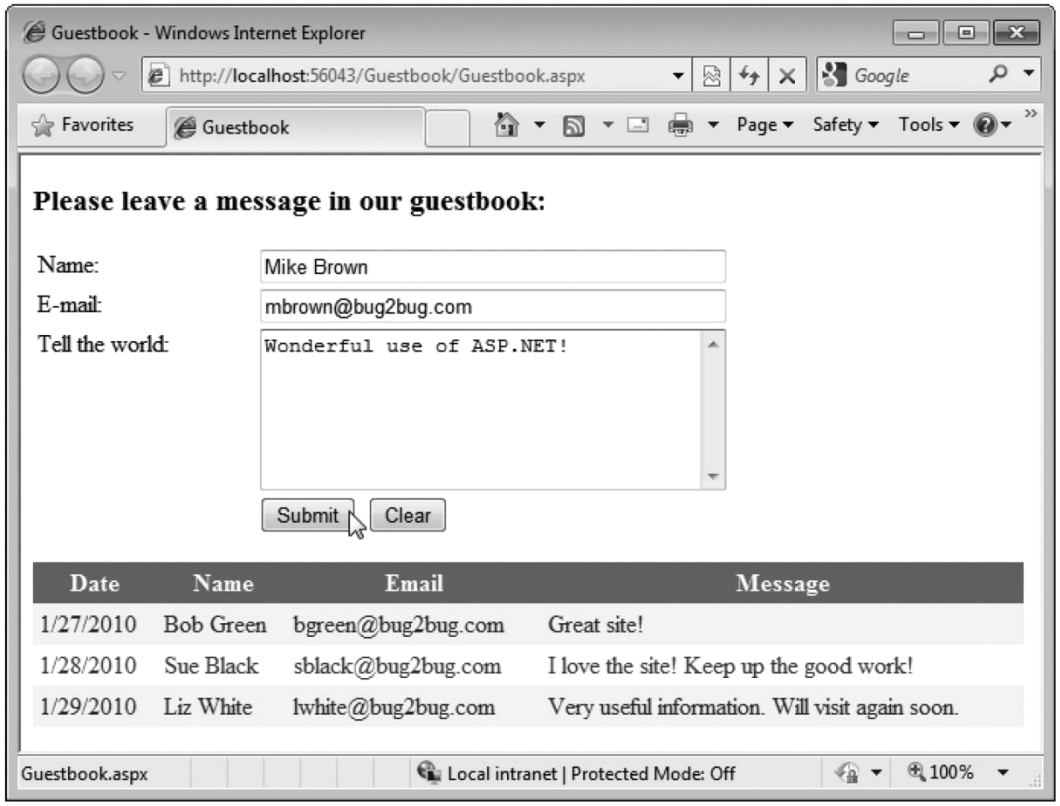


Fig. 19.32 | Sample execution of the Guestbook application.

b) Server stores the data in the database, then refreshes the `GridView` with the updated data

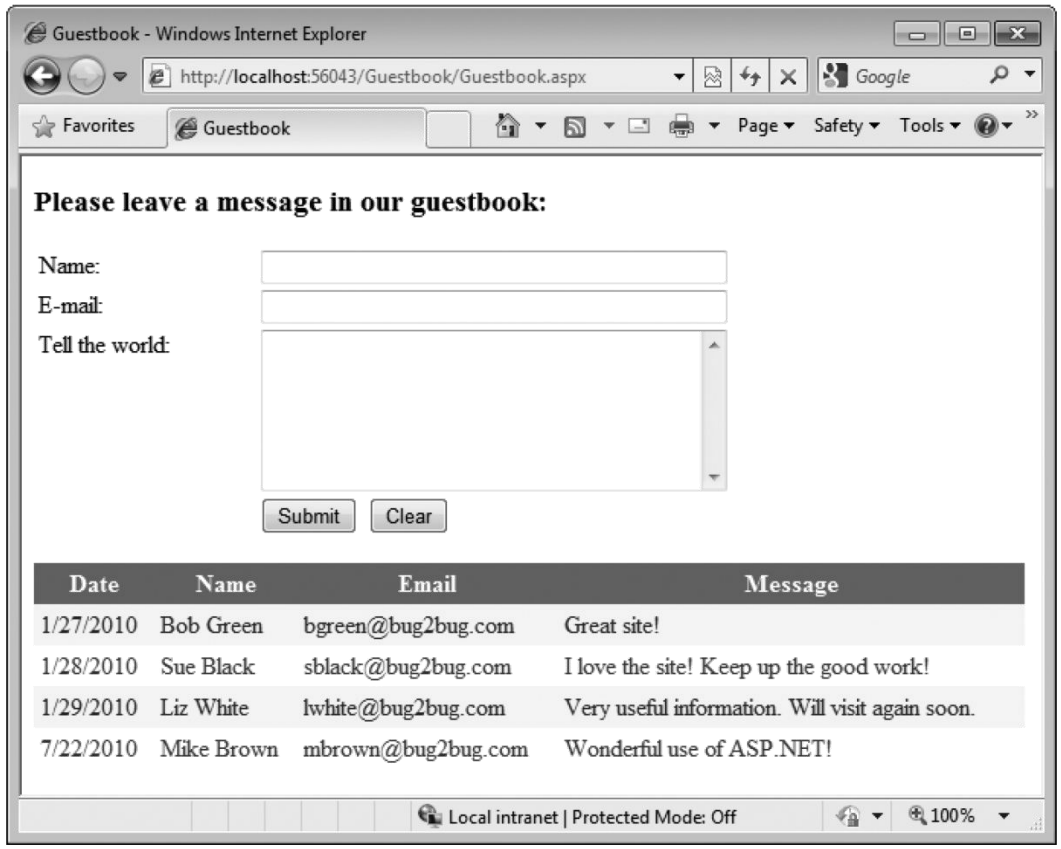


Fig. 19.32 | Sample execution of the Guestbook application.

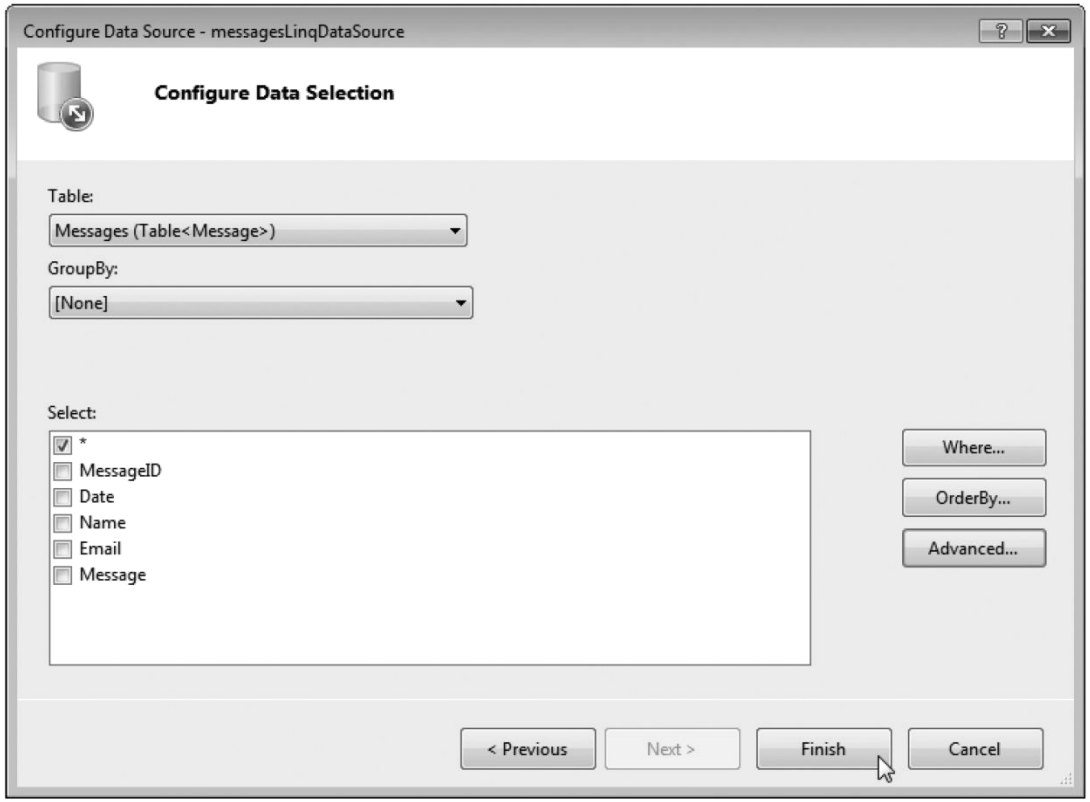
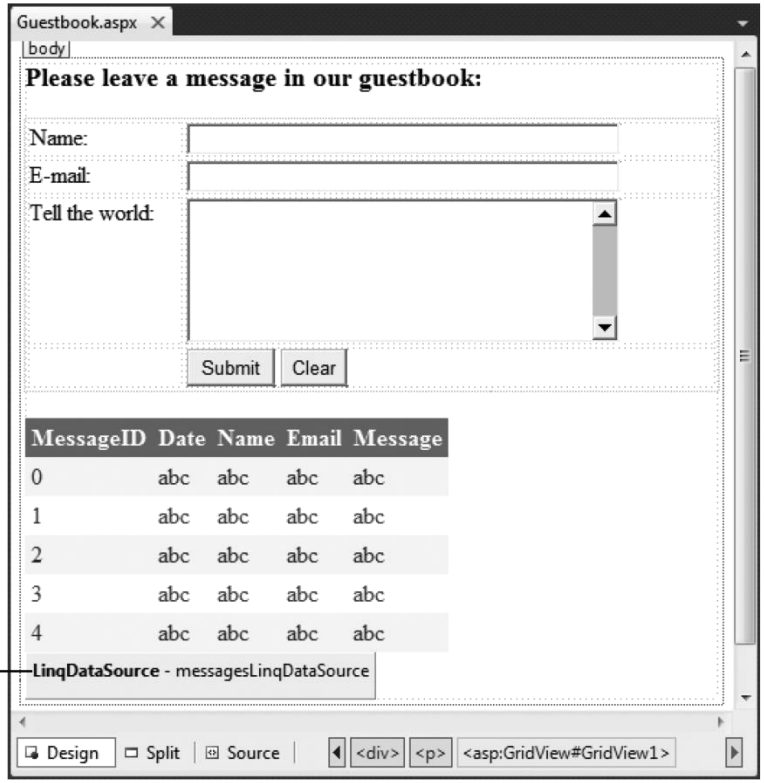


Fig. 19.33 | Configuring the query used by the `LinqDataSource` to retrieve data.



LinqDataSource control

Fig. 19.34 | **Design** mode displaying `LinqDataSource` control for a `GridView`.

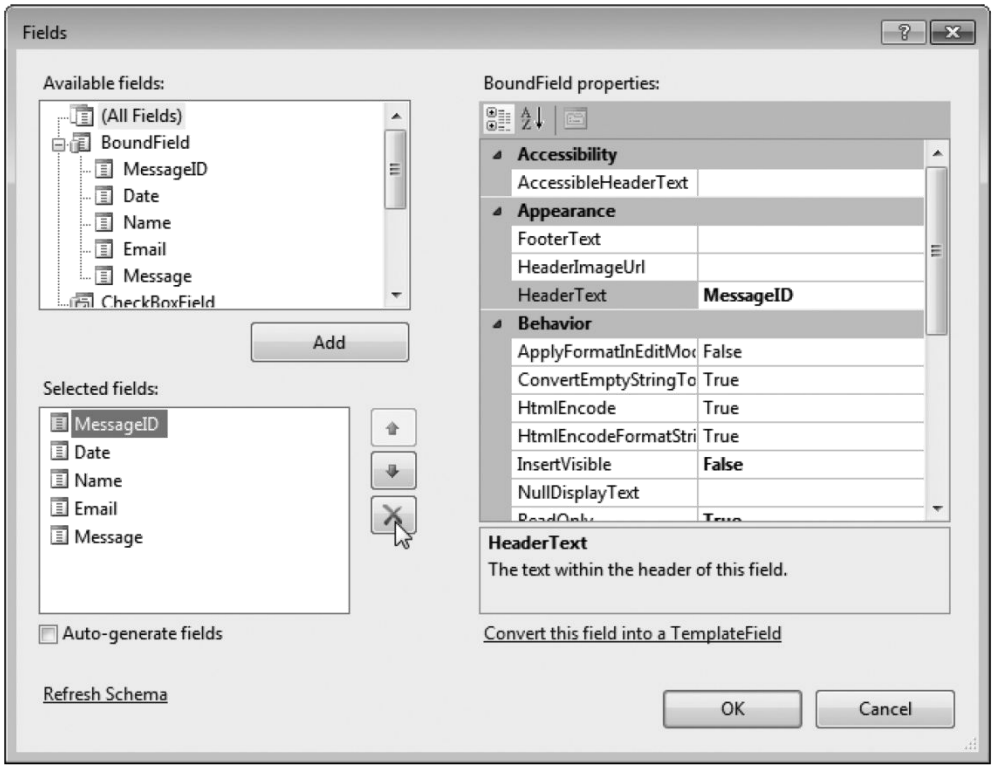


Fig. 19.35 | Removing the `MessageID` column from the `GridView`.

```
1  // Fig. 19.36: Guestbook.aspx.cs
2  // Code-behind file that defines event handlers for the guestbook.
3  using System;
4  using System.Collections.Specialized; // for class ListDictionary
5
6  public partial class Guestbook : System.Web.UI.Page
7  {
8     // Submit Button adds a new guestbook entry to the database,
9     // clears the form and displays the updated list of guestbook entries
10    protected void submitButton_Click( object sender, EventArgs e )
11    {
12       // create dictionary of parameters for inserting
13       ListDictionary insertParameters = new ListDictionary();
14
15       // add current date and the user's name, e-mail address
16       // and message to dictionary of insert parameters
17       insertParameters.Add( "Date", DateTime.Now.ToShortDateString() );
18       insertParameters.Add( "Name", nameTextBox.Text );
19       insertParameters.Add( "Email", emailTextBox.Text );
20       insertParameters.Add( "Message", messageTextBox.Text );
21
```

Fig. 19.36 | Code-behind file for the guestbook application. (Part 1 of 2.)

```
22          // execute an INSERT LINQ statement to add a new entry to the
23          // Messages table in the Guestbook data context that contains the
24          // current date and the user's name, e-mail address and message
25          messagesLinqDataSource.Insert( insertParameters );
26
27          // clear the TextBoxes
28          nameTextBox.Text = String.Empty;
29          emailTextBox.Text = String.Empty;
30          messageTextBox.Text = String.Empty;
31
32          // update the GridView with the new database table contents
33          messagesGridView.DataBind();
34       } // submitButton_Click
35
36       // Clear Button clears the Web Form's TextBoxes
37       protected void clearButton_Click( object sender, EventArgs e )
38       {
39          nameTextBox.Text = String.Empty;
40          emailTextBox.Text = String.Empty;
41          messageTextBox.Text = String.Empty;
42       } // clearButton_Click
43    } // end class Guestbook
```

Fig. 19.36 | Code-behind file for the guestbook application. (Part 2 of 2.)