2

Is It Really This Easy?

In the previous chapter, you saw how ASP.NET 2.0 contains a raft of new features that reduce the code you need to write and save you time and effort when building dynamic and interactive Web pages and applications. To further illustrate this, and so that you get a better feel for the way all these features combine to provide the overall ASP.NET 2.0 development experience, this chapter presents a scenario-based demonstration focused on a day in the life of a developer who is in the process of fulfilling the requirements of a fictional customer.

Although this may seem a contrived approach, it actually follows the general process of evolving your applications to meet the needs of the users. More than that, it shows you how all the various features in ASP.NET 2.0 fit together and interact to give you improved productivity and a simpler development process. Along the way, you will see the process steps required for:

- Using a data source control and `GridView` to display data
- Enabling sorting and paging for the rows
- Providing a row editing feature
- Adding filtering to select specific sets of rows
- Displaying single rows in a form for editing
- Working with data exposed through a business object
- Caching the data to reduce database access

- Using a master page to give a consistent look and feel
- Adding a menu and other navigation features

By the end of this chapter, you will have a good understanding of the main features in ASP.NET 2.0 that make your life as a developer much easier.

A Day in the Life of a Developer

It's nine-thirty in the morning, and your second cup of coffee is just starting to take effect when the phone rings. At the other end is Margaret, the CEO of AdventureWorks Trading Inc., and she is in no mood for light conversation. It seems that, although they love the new Web site you created for them, they just discovered that there is no page for their staff to view lists of products. So you commit to provide one, drain the remnants of the now cold coffee, and fire up Visual Studio 2005.

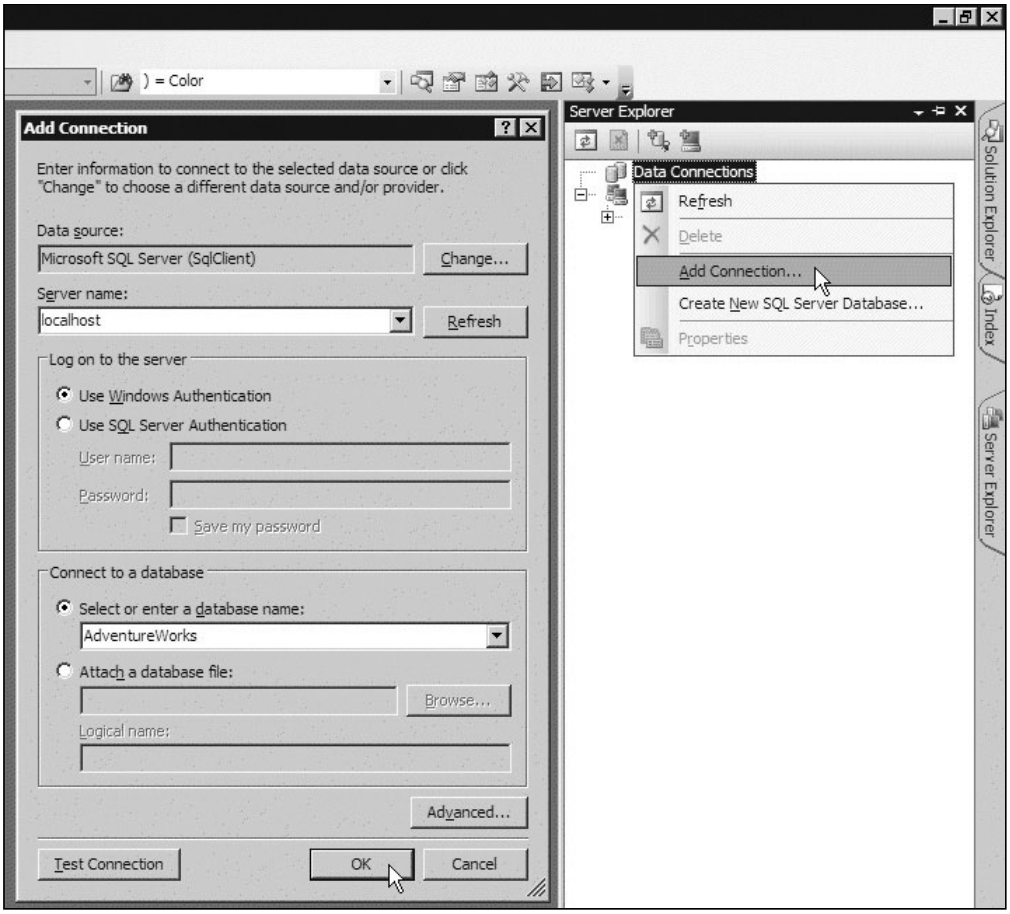
Using a Data Source Control and GridView to Display Data

To build almost all types of data access pages, you need to be able to get the data from the database and display it in a Web page. In previous versions of ASP and ASP.NET, you would already be thinking about creating a connection to the database, building a `Recordset` or filling a `DataSet`, and then either iterating through the rows to create an HTML table (in ASP 3.0) or taking advantage of server-side data binding in ASP.NET 1.*x*.

However, in ASP.NET 2.0, the process is much easier. You start by using the Server Explorer window (or the Database Explorer window in Visual Web Developer) to create a connection to the database (see Figure 2.1).

Now that you have access to the database, you need a new Web page. This will be part of the existing AdventureWorks Web site that you have already built, and so you must first open this site. Visual Studio 2005 and Visual Web Developer allow you to open an existing site using a range of techniques—including directly from the file system, from the local IIS folders via HTTP, or from a remote site via FTP or the Microsoft FrontPage Extensions (see Figure 2.2).

Next, you create a new Web Form, switch to Design view, and drag the **Product** table from the Server/Database Explorer window onto the new Web Form. This adds a `SqlDataSource` and a `GridView` control to the page


Add Connection

Enter information to connect to the selected data source or click "Change" to choose a different data source and/or provider.

Data source: Microsoft SQL Server (SqlClient)

Server name: localhost

Log on to the server

Use Windows Authentication (selected)

Use SQL Server Authentication

User name:

Password:

Save my password

Connect to a database

Select or enter a database name: AdventureWorks (selected)

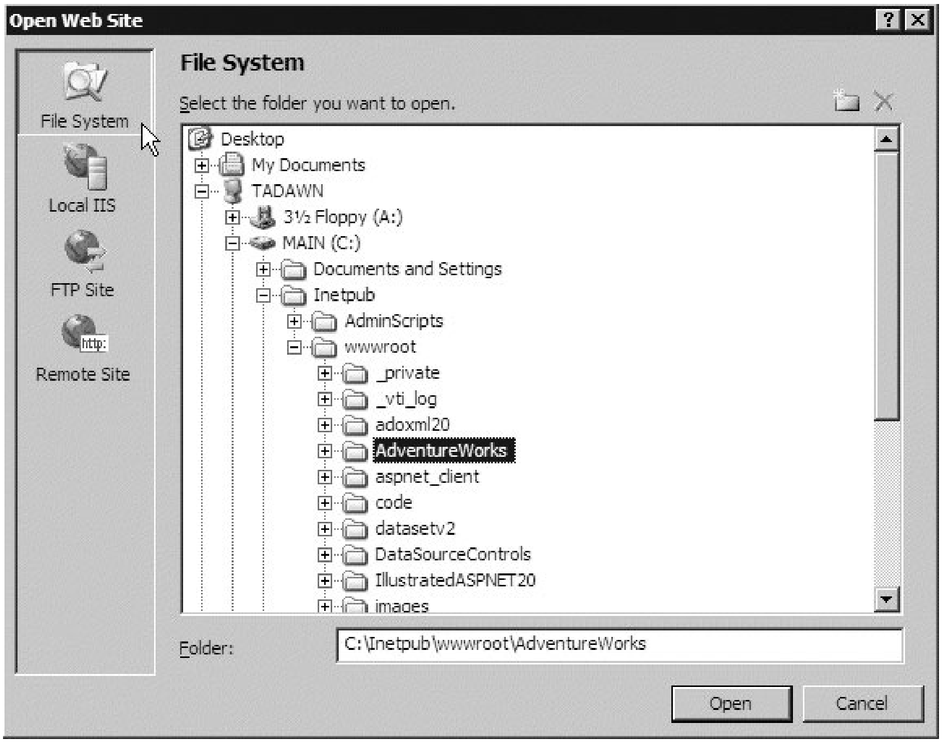
Attach a database file:

Logical name:

FIGURE 2.1: Connecting to a database

and you can run the page to see the results. OK, so it isn't very pretty and probably contains columns that you don't want to display, but it really does save you time in getting the basics of the page up and running—and you haven't written any code at all! (see Figure 2.3).

You can now fine-tune the page to provide just the features you want by removing columns, adding formatting to the values, and applying one of the predefined (Auto Format) styles to the `GridView`. The Visual Studio 2005 and Visual Web Developer page designers provide a "tasks" pane for many of the rich controls such as the `GridView` that makes it easy to complete all these tasks. The tasks pane appears when you first add a control to



Folder: C:\Inetpub\wwwroot\AdventureWorks

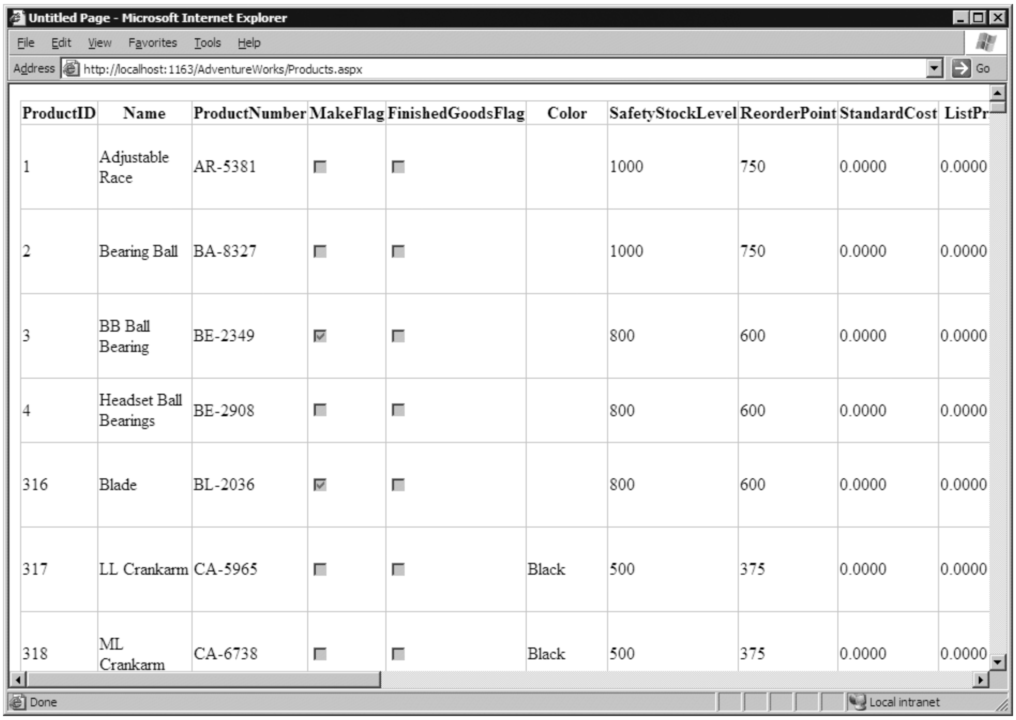
FIGURE 2.2: Opening an existing Web site

the page. You can also open it by clicking the small arrow icon that appears when you move the mouse over the control (see Figure 2.4).

The tasks panes contain a set of links that open dialogs or start Wizards—depending on the control type. For the `GridView` control, as you can see in Figure 2.4, the tasks include applying an Auto Format, selecting the appropriate data source control, enabling various features directly supported by the new `GridView` control in ASP.NET 2.0, and modifying the columns displayed by the `GridView` control. You only want to display the six most useful columns, so you can remove the rest from the list. Moreover, you want the `StandardCost` and `ListPrice` columns to display as currency values, so you can specify this in the `DataFormatString` property for these columns (see Figure 2.5).

Enabling Sorting and Paging for the Rows

The `GridView` control now displays the required columns from the database table, but it is not very easy for the user to find the rows they want to


Untitled Page - Microsoft Internet Explorer

Address http://localhost:1163/AdventureWorks/Products.aspx

ProductID	Name	ProductNumber	MakeFlag	FinishedGoodsFlag	Color	SafetyStockLevel	ReorderPoint	StandardCost	ListPr
1	Adjustable Race	AR-5381	☐	☐		1000	750	0.0000	0.0000
2	Bearing Ball	BA-8327	☐	☐		1000	750	0.0000	0.0000
3	BB Ball Bearing	BE-2349	☑	☐		800	600	0.0000	0.0000
4	Headset Ball Bearings	BE-2908	☐	☐		800	600	0.0000	0.0000
316	Blade	BL-2036	☑	☐		800	600	0.0000	0.0000
317	LL Crankarm	CA-5965	☐	☐	Black	500	375	0.0000	0.0000
318	ML Crankarm	CA-6738	☐	☐	Black	500	375	0.0000	0.0000

FIGURE 2.3: Creating a data display page with drag and drop in Visual Studio 2005

view. All the rows appear in one long list sorted by product number. It would be helpful if users could sort the rows in a different order (perhaps by name when they don't know the product number), and it would also be nice to be able to limit the display to a specific number of rows and provide navigation controls so that they can see separate "pages" of rows.

Prior to ASP.NET 2.0, you would now be writing code to sort the source rowset into the required order, and then connecting this code up to controls in the page. In ASP.NET 2.0, it is all automatic. You just turn on sorting and paging with the checkboxes in the tasks pane (see Figure 2.6). The column headings become hyperlinks, and the paging controls appear at the foot of the grid.

Then you can make the page look nicer by selecting an appropriate **Auto Format** option from the list that appears when you click the link in the tasks pane, and the page is complete (see Figure 2.7).

You run the page to see the results. Clicking any one of the column heading hyperlinks sorts the rows in ascending order by that column value. Another click on the heading changes the sort order to descending. You've

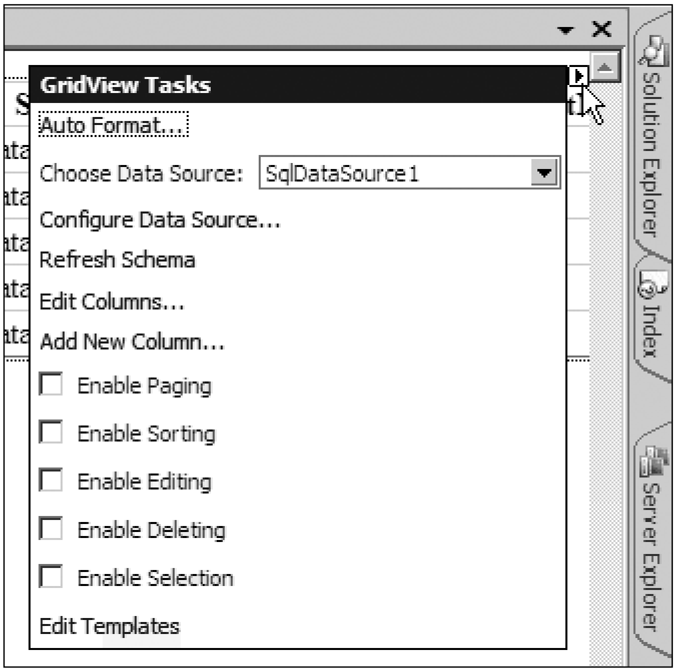


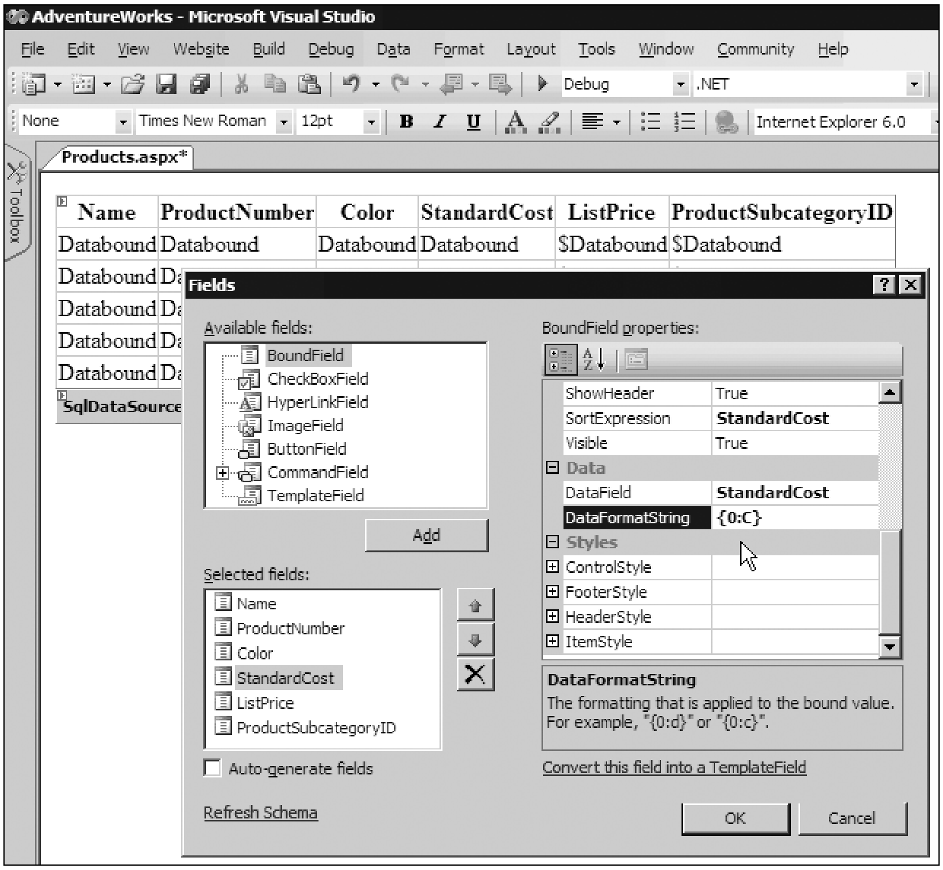
FIGURE 2.4: Opening the Tasks pane in Visual Studio and Visual Web Developer

created an extremely useful and usable page, and you have not written any code at all.

Providing a Row Editing Feature

While you have the tasks pane open for the `GridView` control, you might as well take advantage of some of the other features it offers. How about allowing users to edit the rows? This used to involve a lot of work writing code to handle the edit/update/cancel options that are part of the process for editing rows in a Web page, even in ASP.NET 1.*x*, and you still had to figure out how to push the changes back into the database by executing SQL `UPDATE` statements.

In ASP.NET 2.0, all of this goes away if you are happy to use the default parameterized SQL statement approach to updating the database table. You just select the **Enable Editing** and **Enable Deleting** options in the tasks pane for the `GridView` control. You will see the **Edit** and **Delete** links appear at the left-hand side of the grid (see Figure 2.8).


AdventureWorks - Microsoft Visual Studio
File Edit View Website Build Debug Data Format Layout Tools Window Community Help
Debug
.NET
None
Times New Roman
12pt
Internet Explorer 6.0
Toolbox
Products.aspx*
SqlDataSource
Fields
Add
Refresh Schema
Convert this field into a TemplateField
OK
Cancel

Name	ProductNumber	Color	StandardCost	ListPrice	ProductSubcategoryID
Databound	Databound	Databound	Databound	$Databound	$Databound

Available fields:
- BoundField
- CheckBoxField
- HyperLinkField
- ImageField
- ButtonField
- CommandField
- TemplateField

Selected fields:
- Name
- ProductNumber
- Color
- StandardCost
- ListPrice
- ProductSubcategoryID

Auto-generate fields: unchecked

BoundField properties:

ShowHeader	True
SortExpression	StandardCost
Visible	True
Data	
DataField	StandardCost
DataFormatString	{0:C}
Styles	
ControlStyle	
FooterStyle	
HeaderStyle	
ItemStyle	

DataFormatString
The formatting that is applied to the bound value. For example, "{0:d}" or "{0:c}".

Figure 2.5: Modifying the columns displayed by the GridView control

Now users can edit any of the column values in individual rows (except for the primary key column) and persist these changes back to the database (see Figure 2.9), while you still have not written a single line of code!

Adding Filtering to Select Specific Sets of Rows

Just when you think you've satisfied Margaret the CEO at AdventureWorks Trading Inc. with a shiny new Web page for displaying product information, the phone rings again. It's Mike, the AdventureWorks sales manager, who says that his sales people from different divisions of the company will want to be able to filter the list by category, rather than just getting a list of all of the products. He would also like this implemented as soon as possible.

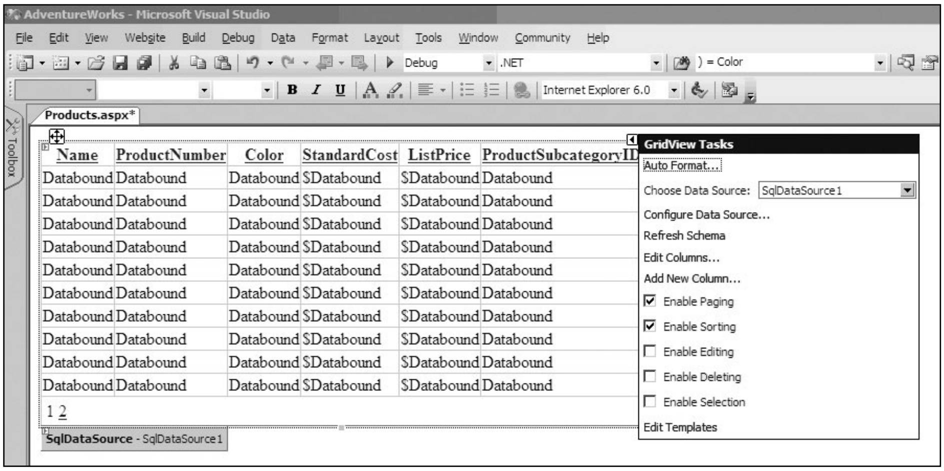


FIGURE 2.6: Enabling sorting and paging in the GridView tasks pane

Thoughts of a nice long lunch break evaporate, and back you go to Visual Studio. You will need some kind of control where users can select the category they want to view, and the obvious one is a drop-down list box (a `DropDownList` control). You will also need some way of populating this

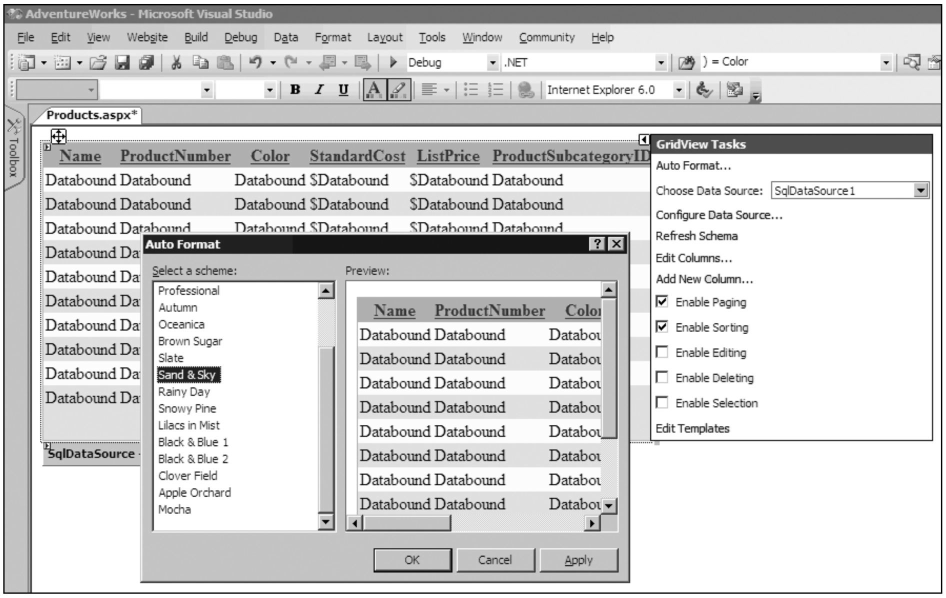
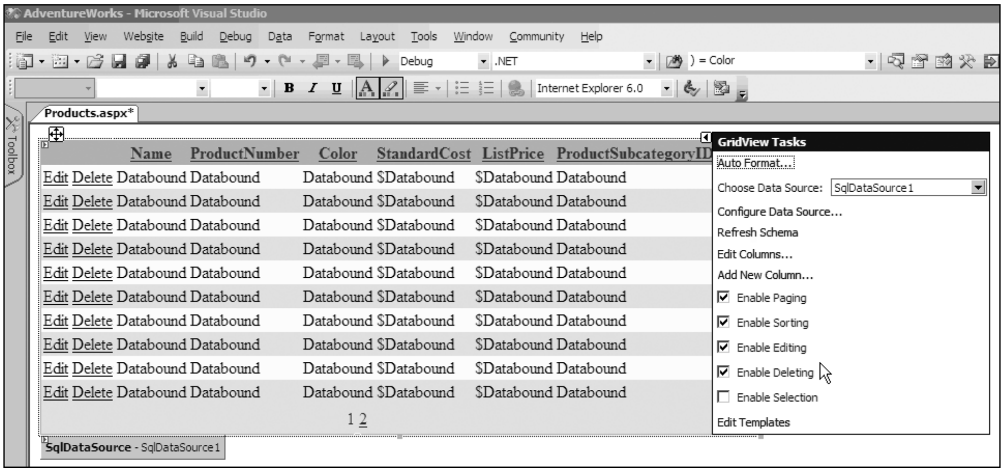


FIGURE 2.7: Applying an Auto Format to the GridView control


AdventureWorks - Microsoft Visual Studio
File Edit View Website Build Debug Data Format Layout Tools Window Community Help
Debug
.NET
) = Color
Internet Explorer 6.0
Products.aspx*
Toolbox
SqlDataSource - SqlDataSource1

		Name	ProductNumber	Color	StandardCost	ListPrice	ProductSubcategoryID
Edit	Delete	Databound	Databound	Databound	$Databound	$Databound	Databound
Edit	Delete	Databound	Databound	Databound	$Databound	$Databound	Databound
Edit	Delete	Databound	Databound	Databound	$Databound	$Databound	Databound
Edit	Delete	Databound	Databound	Databound	$Databound	$Databound	Databound
Edit	Delete	Databound	Databound	Databound	$Databound	$Databound	Databound
Edit	Delete	Databound	Databound	Databound	$Databound	$Databound	Databound
Edit	Delete	Databound	Databound	Databound	$Databound	$Databound	Databound
Edit	Delete	Databound	Databound	Databound	$Databound	$Databound	Databound
Edit	Delete	Databound	Databound	Databound	$Databound	$Databound	Databound
Edit	Delete	Databound	Databound	Databound	$Databound	$Databound	Databound

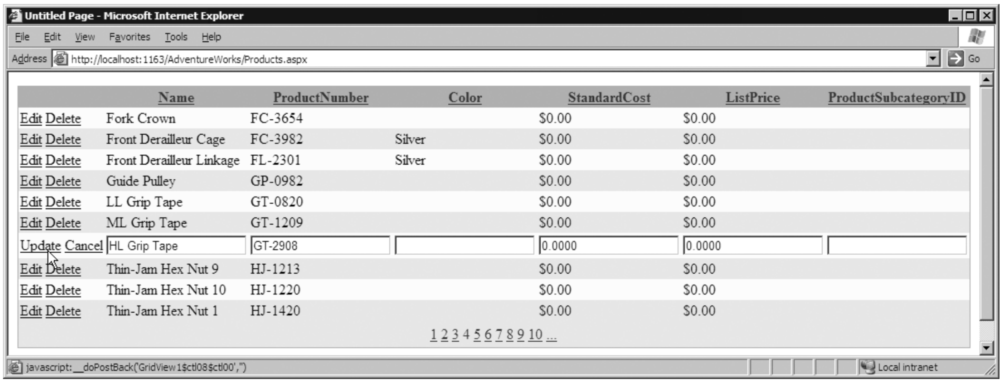
1 2

GridView Tasks
Auto Format...
Choose Data Source: SqlDataSource1
Configure Data Source...
Refresh Schema
Edit Columns...
Add New Column...
[✓] Enable Paging
[✓] Enable Sorting
[✓] Enable Editing
[✓] Enable Deleting
[ ] Enable Selection
Edit Templates

FIGURE 2.8: Enabling editing in the tasks pane of a GridView control

drop-down list with the available categories, taken from the database rows in the Products table. Therefore, step one is to drag another `SqlDataSource` control onto the page and click the **Configure Data Source** link in the tasks pane to start the Configure Data Source Wizard.

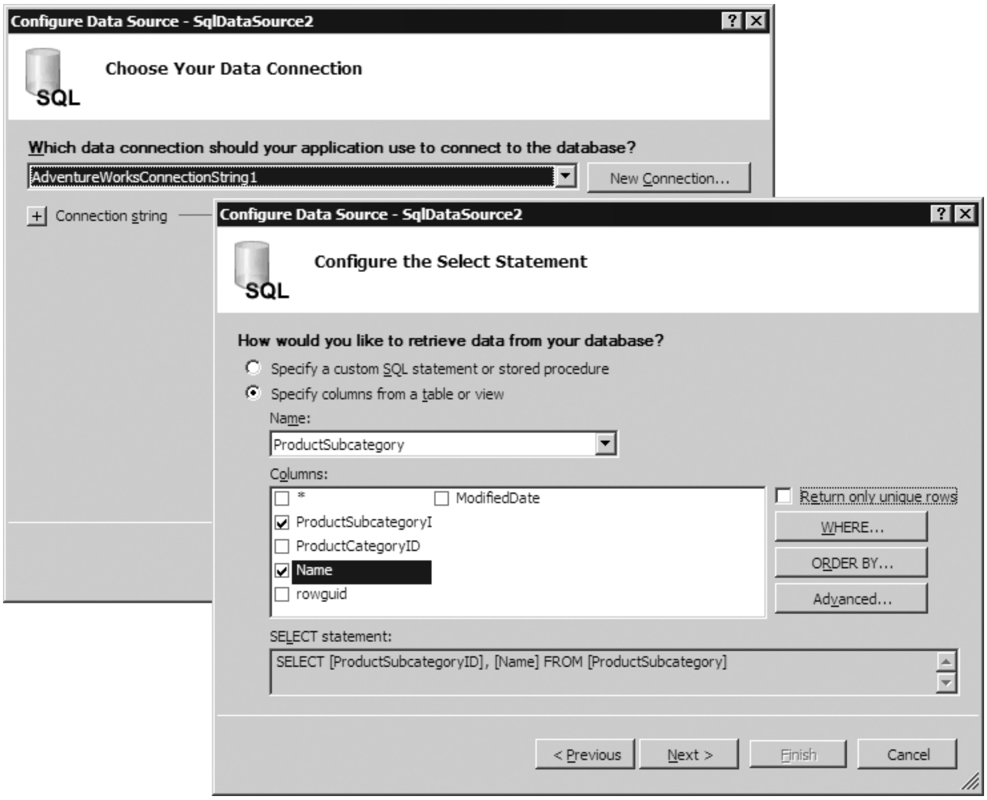
The first page of the Wizard specifies the connection string to use (you select the same one that was created for the previous `SqlDataSource` control from the list), and then you can specify the query to select the rows for the database. The table named `ProductSubcategory` contains the ID and name of each category for the items in the `Products` table (see Figure 2.10).


Untitled Page - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://localhost:1163/AdventureWorks/Products.aspx
Go
javascript:__doPostBack('GridView1$ctl08$ctl00','')
Local intranet

		Name	ProductNumber	Color	StandardCost	ListPrice	ProductSubcategoryID
Edit	Delete	Fork Crown	FC-3654		$0.00	$0.00	
Edit	Delete	Front Derailleur Cage	FC-3982	Silver	$0.00	$0.00	
Edit	Delete	Front Derailleur Linkage	FL-2301	Silver	$0.00	$0.00	
Edit	Delete	Guide Pulley	GP-0982		$0.00	$0.00	
Edit	Delete	LL Grip Tape	GT-0820		$0.00	$0.00	
Edit	Delete	ML Grip Tape	GT-1209		$0.00	$0.00	
Update	Cancel	HL Grip Tape	GT-2908		0.0000	0.0000	
Edit	Delete	Thin-Jam Hex Nut 9	HJ-1213		$0.00	$0.00	
Edit	Delete	Thin-Jam Hex Nut 10	HJ-1220		$0.00	$0.00	
Edit	Delete	Thin-Jam Hex Nut 1	HJ-1420		$0.00	$0.00	

1 2 3 4 5 6 7 8 9 10 ...

FIGURE 2.9: Editing the rows in the GridView control


Configure Data Source - SqlDataSource2

Choose Your Data Connection

Which data connection should your application use to connect to the database?

AdventureWorksConnectionString1

Configure Data Source - SqlDataSource2

Configure the Select Statement

How would you like to retrieve data from your database?

- ( ) Specify a custom SQL statement or stored procedure
- (•) Specify columns from a table or view

Name: ProductSubcategory

Columns:

- [ ] *
- [✓] ProductSubcategoryI
- [ ] ProductCategoryID
- [✓] Name
- [ ] rowguid
- [ ] ModifiedDate

[ ] Return only unique rows

SELECT statement:

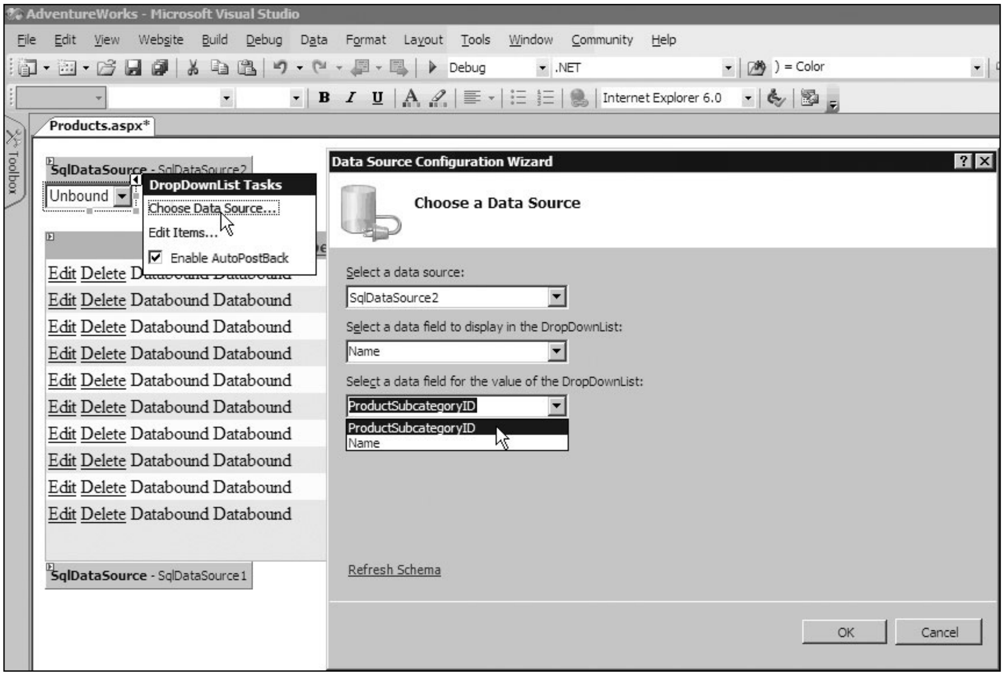
```
SELECT [ProductSubcategoryID], [Name] FROM [ProductSubcategory]
```

FIGURE 2.10: Setting the properties of the new SqlDataSource to select the category details

Now you can drag that `DropDownList` control onto the page and select the new `SqlDataSource` control as the source of the data. You specify that the `DropDownList` will show the name of the subcategory, while the value of each item in the list will be the `ProductSubcategoryID`. Also, make sure you set `AutoPostback` to `True` (in the tasks pane) so that changes to the selected value will submit the page to the server (see Figure 2.11).

Run the page, and you see a list of the categories. All of the list controls that support server-side data binding can be used with a data source control in this way, even controls such as the `DropDownList` that were originally provided with ASP.NET version 1.*x*.

All that remains is to connect the `DropDownList` and the `GridView` together so that the `GridView` displays rows from the category selected in


AdventureWorks - Microsoft Visual Studio
Products.aspx*
SqlDataSource - SqlDataSource2
Unbound
DropDownList Tasks
Choose Data Source...
Edit Items...
Enable AutoPostBack
Edit Delete Databound Databound
SqlDataSource - SqlDataSource1
Data Source Configuration Wizard
Choose a Data Source
Refresh Schema
OK
Cancel

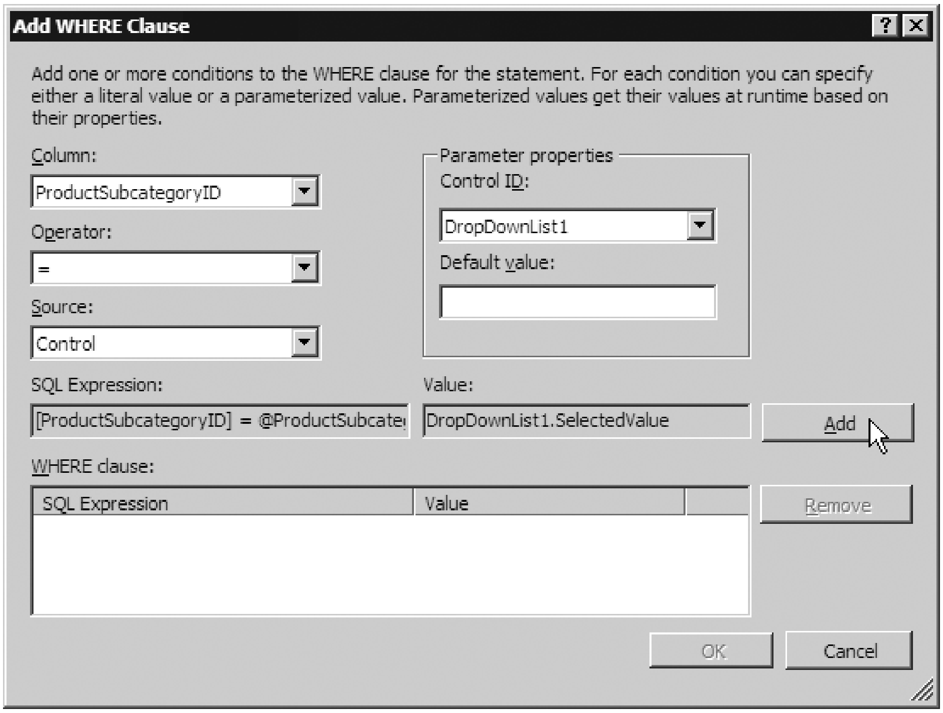
Select a data source: SqlDataSource2
Select a data field to display in the DropDownList: Name
Select a data field for the value of the DropDownList: ProductSubcategoryID

FIGURE 2.11: Setting the properties of the new DropDownList control

the `DropDownList`. How much code do you need to write for this? Perhaps you can guess that the answer is (still) none.

Select the `SqlDataSource` control that powers the `GridView` control and run the Configure Data Source Wizard again by selecting this option in the tasks pane. In the second page of the Wizard, click the **WHERE** button to open the Add WHERE Clause dialog. Here you specify the column to which the condition will apply; the comparison operator; and the source of the value to compare against the column value. This value is, of course, the value currently selected in the `DropDownList` control, and the dialog shows the SQL expression that will be added as the `WHERE` clause next to the **Add** button (see Figure 2.12).

This adds a `WHERE` clause to the SQL statement that includes a parameter for the category, and adds a `ControlParameter` to the declaration of the `SqlDataSource` control. If you switch to **Source** view in Visual Studio 2005 or Visual Web Developer, you will see the code for the `SqlDataSource` control


Add WHERE Clause

Add one or more conditions to the WHERE clause for the statement. For each condition you can specify either a literal value or a parameterized value. Parameterized values get their values at runtime based on their properties.

Column: ProductSubcategoryID

Operator: =

Source: Control

Parameter properties

Control ID: DropDownList1

Default value:

SQL Expression: [ProductSubcategoryID] = @ProductSubcate

Value: DropDownList1.SelectedValue

WHERE clause:

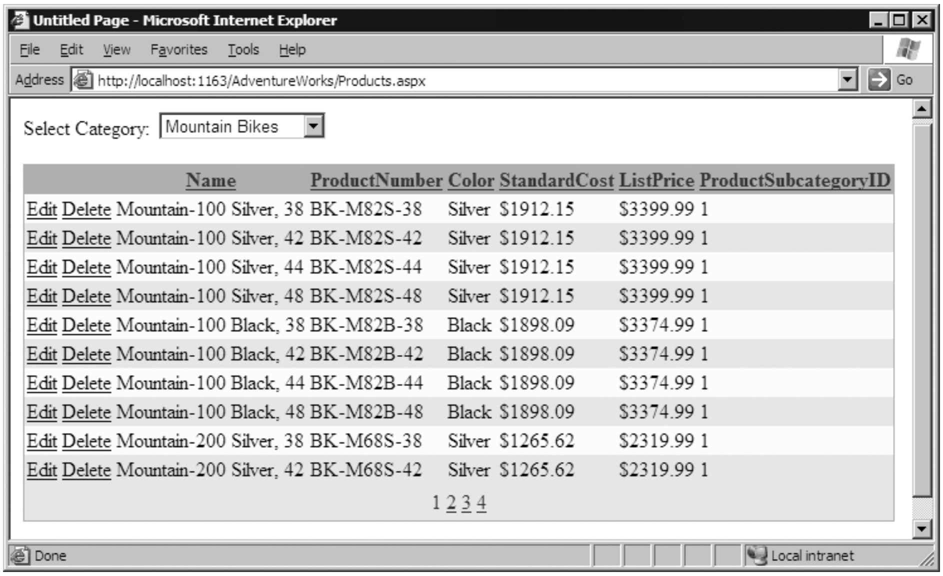
SQL Expression	Value

FIGURE 2.12: Adding a WHERE clause to select on subcategory

with this `ControlParameter` element nested in the `SelectParameters` section (see Listing 2.1).

Listing 2.1. The SqlDataSource Control and Its Nested ControlParameter

```
<asp:SqlDataSource ID="SqlDataSource1" runat="server" ... >
  <InsertParameters>
    ...
  </InsertParameters>
  <UpdateParameters>
    ...
  </UpdateParameters>
  <DeleteParameters>
    ...
  </DeleteParameters>
  <SelectParameters>
    <asp:ControlParameter ControlID="DropDownList1"
         Name="ProductSubcategoryID" PropertyName="SelectedValue"
         Type="Int16" />
  </SelectParameters>
</asp:SqlDataSource>
```


Untitled Page - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://localhost:1163/AdventureWorks/Products.aspx
Go
Done
Local intranet

Select Category: Mountain Bikes

		Name	ProductNumber	Color	StandardCost	ListPrice	ProductSubcategoryID
Edit	Delete	Mountain-100 Silver, 38	BK-M82S-38	Silver	$1912.15	$3399.99	1
Edit	Delete	Mountain-100 Silver, 42	BK-M82S-42	Silver	$1912.15	$3399.99	1
Edit	Delete	Mountain-100 Silver, 44	BK-M82S-44	Silver	$1912.15	$3399.99	1
Edit	Delete	Mountain-100 Silver, 48	BK-M82S-48	Silver	$1912.15	$3399.99	1
Edit	Delete	Mountain-100 Black, 38	BK-M82B-38	Black	$1898.09	$3374.99	1
Edit	Delete	Mountain-100 Black, 42	BK-M82B-42	Black	$1898.09	$3374.99	1
Edit	Delete	Mountain-100 Black, 44	BK-M82B-44	Black	$1898.09	$3374.99	1
Edit	Delete	Mountain-100 Black, 48	BK-M82B-48	Black	$1898.09	$3374.99	1
Edit	Delete	Mountain-200 Silver, 38	BK-M68S-38	Silver	$1265.62	$2319.99	1
Edit	Delete	Mountain-200 Silver, 42	BK-M68S-42	Silver	$1265.62	$2319.99	1

1 2 3 4

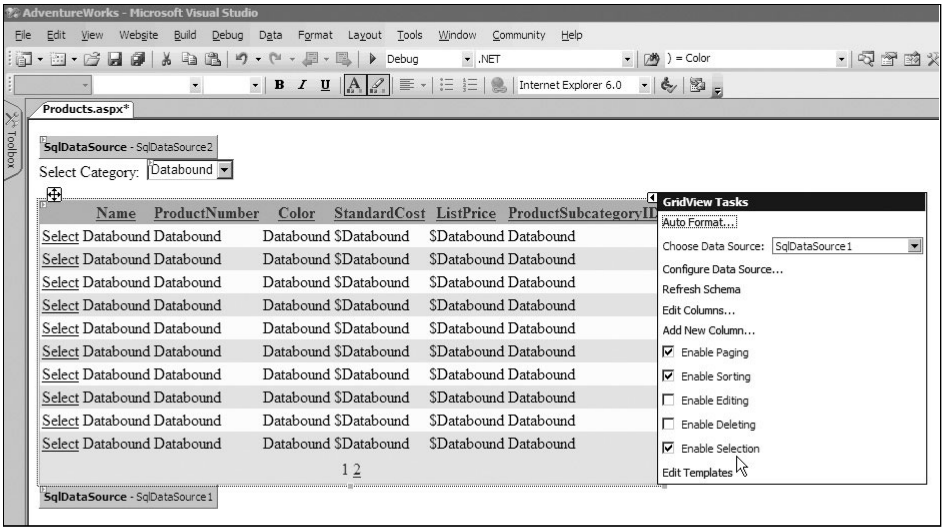
FIGURE 2.13: Filtering the rows by category using a DropDownList and ControlParameter

Now, as the page posts back each time the user makes a selection in the `DropDownList`, the original `SqlDataSource` control populates the parameter in the SQL statement with the `SelectedValue` property of the `DropDownList`, so that the `GridView` displays only rows from the selected category (see Figure 2.13).

Displaying Single Rows in a Form for Editing

The page now displays the rows from the database table, allows them to be sorted in almost any order, and displays them in separate pages. It also allows filtering by product category to be applied to the rows, and editing to be performed on all but the primary key column. However, this editing feature is not the most ideal of approaches, and it is not as intuitive as the traditional approach for editing the values in one row in a separate "form"-style page.

In ASP.NET 2.0, you can take advantage of a new control named `DetailsView` that provides a "one page at a time" view of the rows exposed by a data source control. Moreover, you can connect the `GridView` and `DetailsView` controls together so that viewing rows is easy in the grid, while editing is more intuitive in the "form" view.


AdventureWorks - Microsoft Visual Studio
File Edit View Website Build Debug Data Format Layout Tools Window Community Help
Debug
.NET
) = Color
Internet Explorer 6.0
Products.aspx*
Toolbox
SqlDataSource - SqlDataSource2
SqlDataSource - SqlDataSource1

Select Category: Databound

	Name	ProductNumber	Color	StandardCost	ListPrice	ProductSubcategoryII
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound

1 2

GridView Tasks
Auto Format...
Choose Data Source: SqlDataSource1
Configure Data Source...
Refresh Schema
Edit Columns...
Add New Column...
- ✓ Enable Paging
- ✓ Enable Sorting
- ☐ Enable Editing
- ☐ Enable Deleting
- ✓ Enable Selection

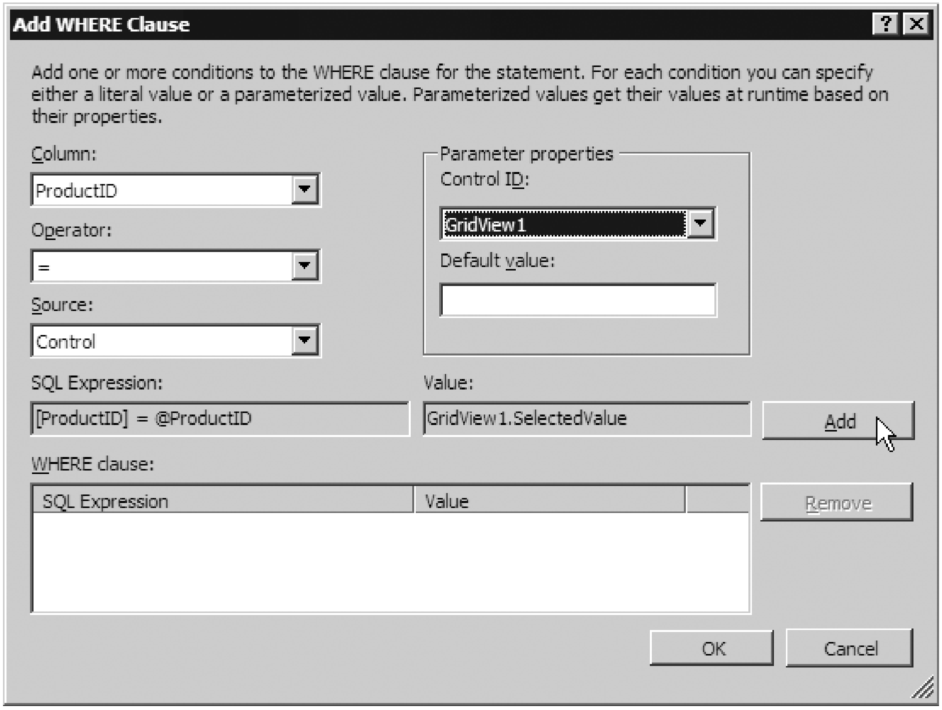
Edit Templates

FIGURE 2.14: Specifying selection without editing features for a GridView control

The first step in this process is to turn off editing in the `GridView`, and enable selection so that users can select a row in the `GridView` control. Both of these tasks are performed simply by setting the checkboxes in the tasks pane for the `GridView` control (see Figure 2.14).

Now you drag another `SqlDataSource` control onto the page and click the **Configure Data Source** link in the tasks pane to start the Wizard. In the first page, you select the same connection string as before. In the second page of the Wizard, you specify that the query should include all except for the last two columns from the `Product` table. Then click the **WHERE** button to add a `ControlParameter` to the `SqlDataSource` control just as you did in the previous section. However, this time, specify the `SelectedValue` property of the `GridView` control so that—following a postback—this third `SqlDataSource` control will expose only the row selected in the `GridView` control (see Figure 2.15).

By default, the `SqlDataSource` does not provide for editing of rows. It only did so for the `SqlDataSource` that powers the main `GridView` control because you created this by dragging a table from the Server/Database Explorer window onto the page. When you add a `SqlDataSource` to a page from the Toolbox, you must specify if you want to be able to update


Add WHERE Clause

Add one or more conditions to the WHERE clause for the statement. For each condition you can specify either a literal value or a parameterized value. Parameterized values get their values at runtime based on their properties.

Column: ProductID

Operator: =

Source: Control

Parameter properties

Control ID: GridView1

Default value:

SQL Expression: [ProductID] = @ProductID

Value: GridView1.SelectedValue

WHERE clause:

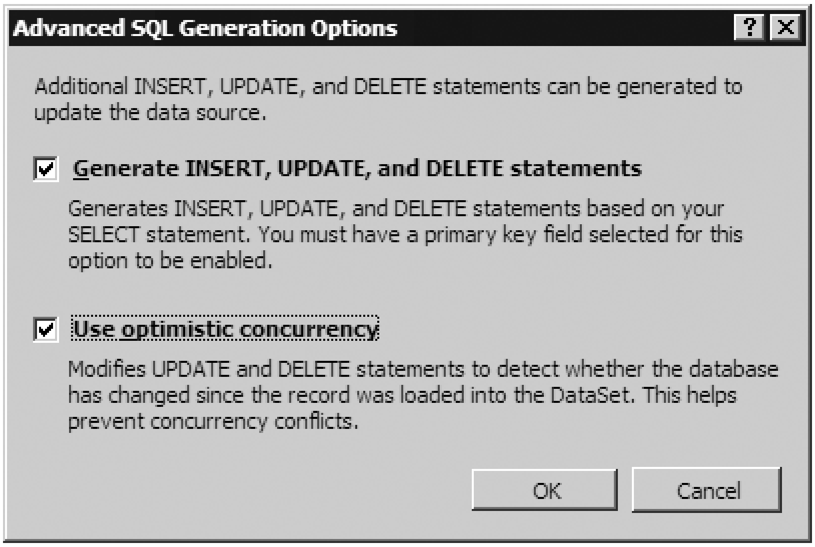
SQL Expression	Value

FIGURE 2.15: Creating a ControlParameter for the third SqlDataSource control

the rows (in most cases you will not, and so this default makes sense). You therefore remember to click the **Advanced** button in the second page of the Wizard and tick the options in the dialog that appears (see Figure 2.16).

Next, drag a `DetailsView` control onto the page and bind it to the new `SqlDataSource` control using the drop-down **Choose Data Source** list in the tasks pane. While you are there, use the options in the tasks pane for the `DetailsView` control to apply the same Auto Format as before, and turn on **Enable Inserting**, **Enable Editing**, and **EnableDeleting**. You then see the **Edit**, **Delete**, and **New** links appear at the bottom of the control (see Figure 2.17). You also adjust the width of the `DetailsView` control by dragging the right-hand border.

Now you can run the page to see the results. You discover that, as you select rows in the `GridView`, the `DetailsView` shows the values for that row. Moreover, using the links at the bottom of the `DetailsView`, all the


Advanced SQL Generation Options

Additional INSERT, UPDATE, and DELETE statements can be generated to update the data source.

[✓] Generate INSERT, UPDATE, and DELETE statements

Generates INSERT, UPDATE, and DELETE statements based on your SELECT statement. You must have a primary key field selected for this option to be enabled.

[✓] Use optimistic concurrency

Modifies UPDATE and DELETE statements to detect whether the database has changed since the record was loaded into the DataSet. This helps prevent concurrency conflicts.

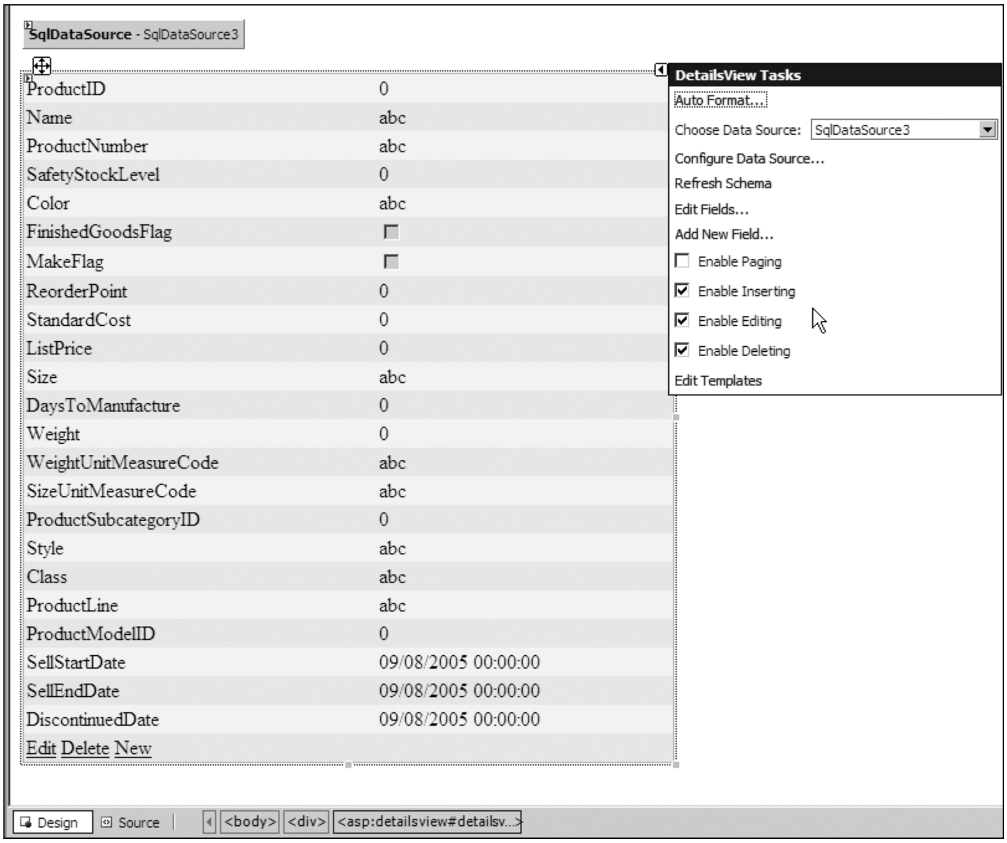
FIGURE 2.16: Specifying the options to allow row updates through controls linked to this SqlDataSource

values (except for the primary key) are available for editing. You can even insert new rows. It looks rather like a traditional executable data access application, yet you have built it in less than an hour—and you still have not had to write any code at all (see Figure 2.18)!

Working with Data Exposed through a Business Object

Just as you are leaning back and admiring your handiwork, the phone rings again. This time, it is the senior developer at AdventureWorks Trading Inc.—and he is not a happy fellow. His team has spent months building an object-oriented business and data access layer, and they do not approve of people using SQL statements to access the database directly. This *n*-tier architecture approach is a common scenario, and you probably should have known better at the start. The `SqlDataSource` can use stored procedures instead of SQL statements, but to use a data layer based on business objects means more significant changes are required.

However, all you actually need do is change the controls that expose the data (the `SqlDataSource` controls) for controls that can communicate with business objects. AdventureWorks can provide a .NET managed code assembly that implements their data access layer, so all you have to do is switch to using this in place of direct database access.


SqlDataSource - SqlDataSource3

ProductID	0
Name	abc
ProductNumber	abc
SafetyStockLevel	0
Color	abc
FinishedGoodsFlag	☐
MakeFlag	☐
ReorderPoint	0
StandardCost	0
ListPrice	0
Size	abc
DaysToManufacture	0
Weight	0
WeightUnitMeasureCode	abc
SizeUnitMeasureCode	abc
ProductSubcategoryID	0
Style	abc
Class	abc
ProductLine	abc
ProductModelID	0
SellStartDate	09/08/2005 00:00:00
SellEndDate	09/08/2005 00:00:00
DiscontinuedDate	09/08/2005 00:00:00
Edit Delete New	

DetailsView Tasks
Auto Format...
Choose Data Source: SqlDataSource3
Configure Data Source...
Refresh Schema
Edit Fields...
Add New Field...
☐ Enable Paging
☑ Enable Inserting
☑ Enable Editing
☑ Enable Deleting
Edit Templates

FIGURE 2.17: Setting the editing options for the DetailsView control

However, first, you must install the business object. As it is a .NET assembly, there is no registration required. A compiled DLL can just be dropped into the `bin` folder of the application, and then referenced in the pages. What happens if the code is not compiled? In that case, you can run the compiler from the command line, or use Visual Studio to compile it, and then deploy.

Even better, in ASP.NET 2.0, you can deploy the source code and leave it to ASP.NET to compile it and register it with the application at runtime. Files placed in the `App_Code` subfolder of the application root folder are compiled automatically as soon as the application starts (when the first hit is received), and the compiled code is stored on disk for use in subsequent hits. If you edit or update the source code file, it is automatically recompiled and the application restarts.

The (extremely simplified) data access component provided by the AdventureWorks team is a single `class` file named `DataLayer.cs` containing public methods that return the data to be displayed in the page (it does not support updates to the data). The three methods it exposes are named `GetProductsByCategory`, `GetProductByProductID`, and `GetCategoryList`—as shown in Listing 2.2.

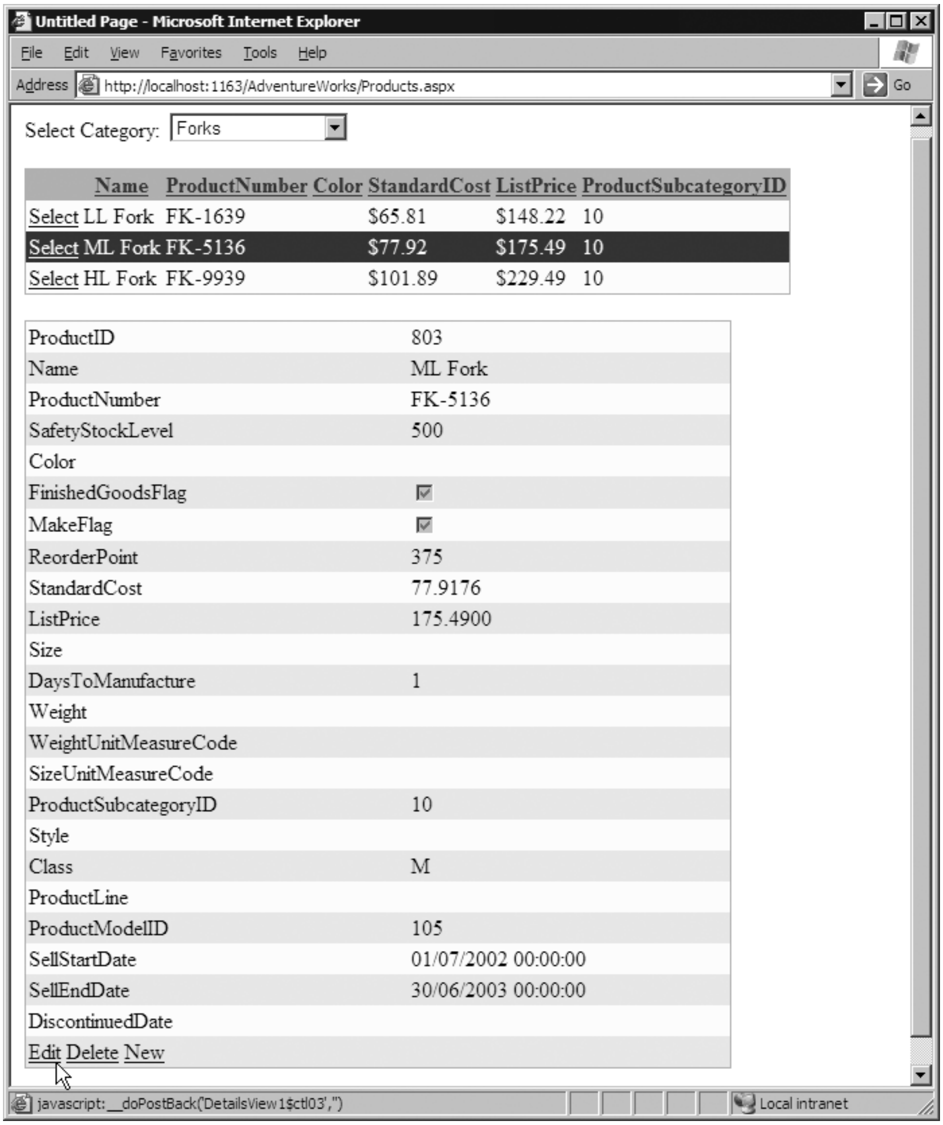
Listing 2.2. The Data Access Component Implemented as a Class File

```
using System;
using System.Data;
using System.Data.SqlClient;
using System.Configuration;
public class DataLayer
{
  public DataSet GetProductsByCategory(Int32 category)
  {
    String connect = ConfigurationManager.ConnectionStrings[
           "AdventureWorksConnectionString1"].ConnectionString;
    String sql = "SELECT ProductID, Name, ProductNumber, Color, "
               + "StandardCost, ListPrice, ProductSubcategoryID "
               + "FROM AdventureWorks.Production.Product "
               + "WHERE ProductSubcategoryID = @Category";
    using (SqlConnection con = new SqlConnection(connect))
    {
      SqlDataAdapter da = new SqlDataAdapter(sql, con);
      da.SelectCommand.Parameters.AddWithValue("@Category", category);
      DataSet ds = new DataSet();
      da.Fill(ds, "Products");
      return ds;
    }
  }
  public DataSet GetProductByProductID(Int32 pid)
  {
    String connect = ConfigurationManager.ConnectionStrings[
           "AdventureWorksConnectionString1"].ConnectionString;
    String sql = "SELECT ProductID, Name, ProductNumber, "
               + "SafetyStockLevel, Color, FinishedGoodsFlag, "
               + "MakeFlag, ReorderPoint, StandardCost, ListPrice, "
               + "Size, DaysToManufacture, Weight, "
               + "WeightUnitMeasureCode, SizeUnitMeasureCode, "
               + "ProductSubcategoryID, Style, Class, ProductLine, "
               + "ProductModelID, SellStartDate, SellEndDate, "
               + "DiscontinuedDate "
               + "FROM AdventureWorks.Production.Product "
               + "WHERE ProductID = @ProductID";
    using (SqlConnection con = new SqlConnection(connect))
    {
        SqlDataAdapter da = new SqlDataAdapter(sql, con);
        da.SelectCommand.Parameters.AddWithValue("@ProductID", pid);
        DataSet ds = new DataSet();
        da.Fill(ds, "Products");
        return ds;
      }
    }
    public SqlDataReader GetCategoryList()
    {
      String connect = ConfigurationManager.ConnectionStrings[
             "AdventureWorksConnectionString1"].ConnectionString;
      String sql = "SELECT ProductSubcategoryID, Name "
                 + "FROM AdventureWorks.Production.ProductSubcategory";
      SqlConnection con = new SqlConnection(connect);
      try
      {
        con.Open();
        SqlCommand cmd = new SqlCommand(sql, con);
        return cmd.ExecuteReader(CommandBehavior.CloseConnection);
      }
      catch
      {
        return null;
      }
    }
  }
```

The data access class listed here is designed to be only a basic demonstration of using the `ObjectDataSource` control. A "real-world" example would generally contain a great deal more code, incorporate update methods, and use stored procedures rather than declarative SQL statements.

The ASP.NET page calls these methods, via the data source control, to fetch rows from the database table. Therefore, the next step after deploying the data access class file is to remove the `SqlDataSource` controls from the page and replace them with instances of the `ObjectDataSouce` control. Using the Configure Data Source Wizard for each one, you connect these controls to the data access layer so that they can expose the same rowsets as the `SqlDataSource` controls did. No changes are required to the UI of the page, and—besides the data-access layer class—there is still no code required!

Figure 2.19 shows the only two steps required to connect the `ObjectDataSource` that populates the `DropDownList` of categories to the `GetCategoryList` method, because this method accepts no parameters. The `ObjectDataSource` for the `GridView` control requires a parameter, and this


Untitled Page - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://localhost:1163/AdventureWorks/Products.aspx
Go
Select Category: Forks

	Name	ProductNumber	Color	StandardCost	ListPrice	ProductSubcategoryID
Select	LL Fork	FK-1639		$65.81	$148.22	10
Select	ML Fork	FK-5136		$77.92	$175.49	10
Select	HL Fork	FK-9939		$101.89	$229.49	10

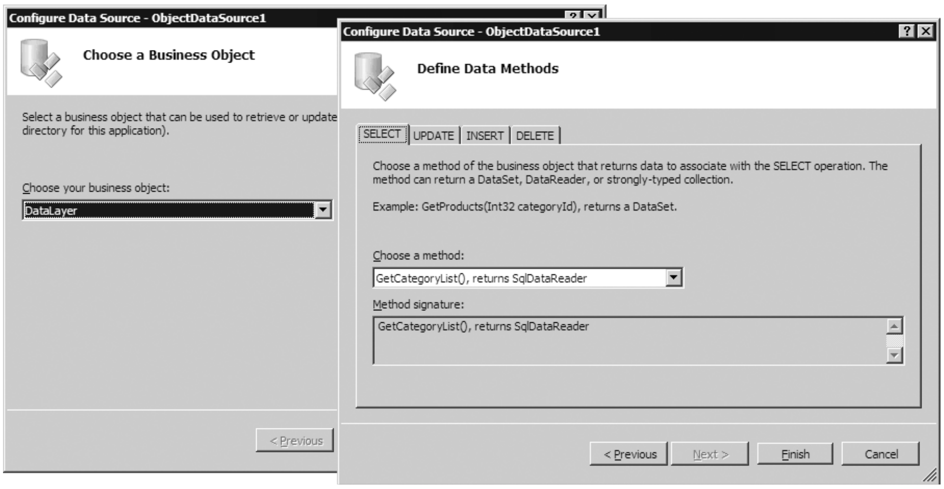
ProductID	803
Name	ML Fork
ProductNumber	FK-5136
SafetyStockLevel	500
Color	
FinishedGoodsFlag	☑
MakeFlag	☑
ReorderPoint	375
StandardCost	77.9176
ListPrice	175.4900
Size	
DaysToManufacture	1
Weight	
WeightUnitMeasureCode	
SizeUnitMeasureCode	
ProductSubcategoryID	10
Style	
Class	M
ProductLine	
ProductModelID	105
SellStartDate	01/07/2002 00:00:00
SellEndDate	30/06/2003 00:00:00
DiscontinuedDate	
Edit Delete New	

javascript:__doPostBack('DetailsView1$ctl03','')

FIGURE 2.18: Viewing and editing rows in a linked DetailsView control

is specified in the third step of the Configure Data Source Wizard—it recognizes that a parameter is required, and you link it up to the `SelectedValue` property of the `DropDownList` just as you did when using a `SqlDataSource` control earlier (see Figure 2.20).

Having added a third `ObjectDataSource` control to replace the `SqlDataSource` that populates the `DetailsView` control, you just connect


Configure Data Source - ObjectDataSource1

Choose a Business Object

Select a business object that can be used to retrieve or update directory for this application).

Choose your business object: DataLayer

Configure Data Source - ObjectDataSource1

Define Data Methods

SELECT | UPDATE | INSERT | DELETE

Choose a method of the business object that returns data to associate with the SELECT operation. The method can return a DataSet, DataReader, or strongly-typed collection.

Example: GetProducts(Int32 categoryId), returns a DataSet.

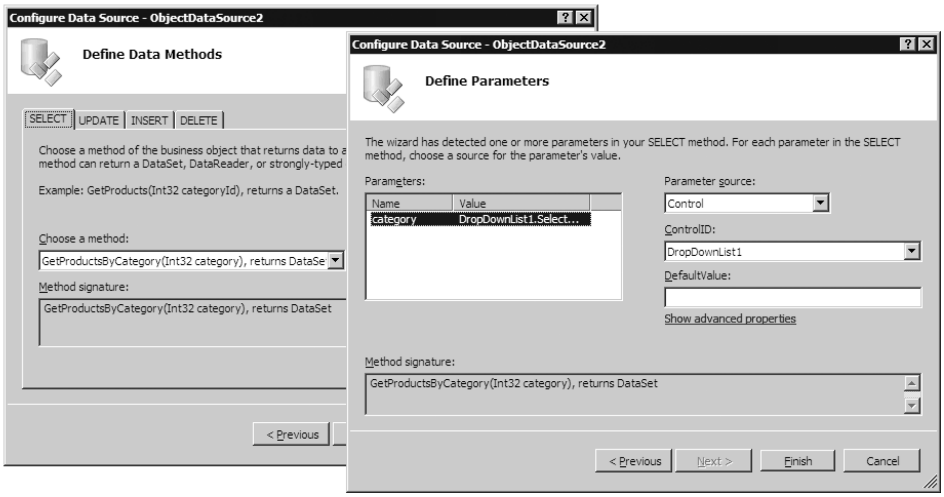
Choose a method: GetCategoryList(), returns SqlDataReader

Method signature: GetCategoryList(), returns SqlDataReader

FIGURE 2.19: Configuring the ObjectDataSource for the DropDownList

the DropDownList, GridView, and DetailsView controls to the new data source controls using the tasks panes for each one. Because the data layer does not support editing, the tasks panes do not display the **Enable Editing** checkbox (see Figure 2.21).

Now you can run the page, and see that—with the exception of editing features—the results are the same (see Figure 2.22). This is just what you want and expect, because the UI has not changed. In addition, the work


Configure Data Source - ObjectDataSource2

Define Data Methods

SELECT | UPDATE | INSERT | DELETE

Choose a method of the business object that returns data to a method can return a DataSet, DataReader, or strongly-typed

Example: GetProducts(Int32 categoryId), returns a DataSet.

Choose a method: GetProductsByCategory(Int32 category), returns DataSe

Method signature: GetProductsByCategory(Int32 category), returns DataSet

Configure Data Source - ObjectDataSource2

Define Parameters

The wizard has detected one or more parameters in your SELECT method. For each parameter in the SELECT method, choose a source for the parameter's value.

Parameters:

Name	Value
category	DropDownList1.Select...

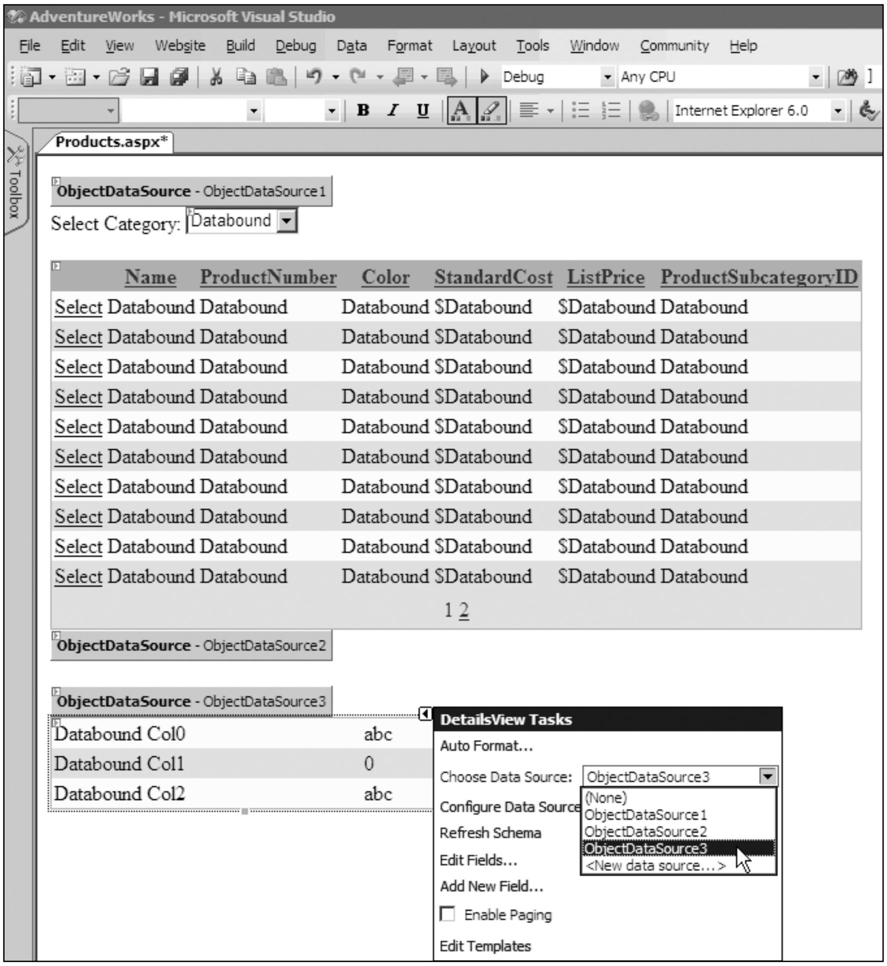
Parameter source: Control

ControlID: DropDownList1

DefaultValue:

Method signature: GetProductsByCategory(Int32 category), returns DataSet

FIGURE 2.20: Configuring the ObjectDataSource for the GridView



Select Category: Databound

	Name	ProductNumber	Color	StandardCost	ListPrice	ProductSubcategoryID
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound

1 2

Databound Col0	abc
Databound Col1	0
Databound Col2	abc

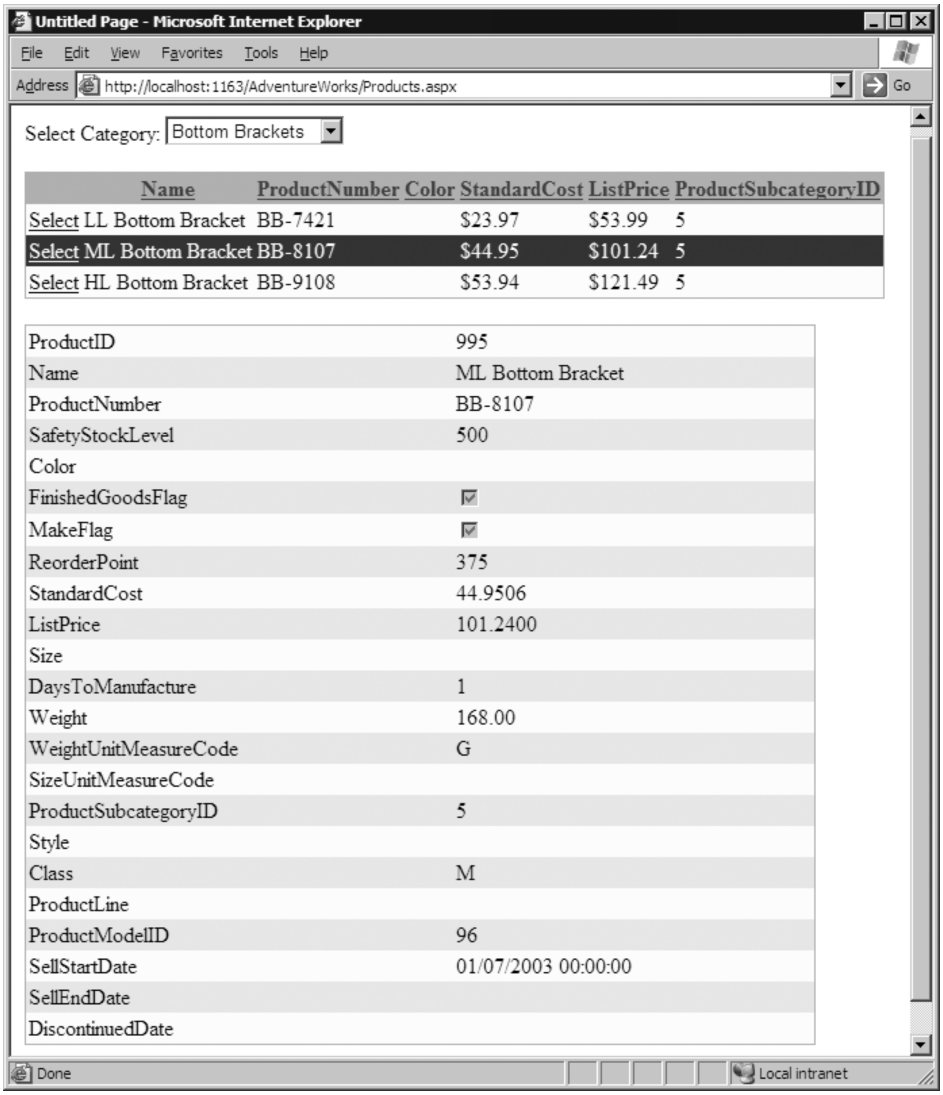
Choose Data Source: ObjectDataSource3

FIGURE 2.21: Connecting the data display controls to the ObjectDataSource instances

involved in changing to a data access/business object layer from declarative SQL statements is not difficult or time-consuming.

Caching the Data to Reduce Database Access

It has taken a couple of hours to build the new page for Margaret at AdventureWorks Trading Inc., and you are ready for a break. However, Lucy (the database administrator), has just been told about the new features in the application. It is her job to keep the database running smoothly and efficiently, and she is worried that you are going to slow things down. You


Untitled Page - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://localhost:1163/AdventureWorks/Products.aspx
Go
Done
Local intranet

Select Category: Bottom Brackets

	Name	ProductNumber	Color	StandardCost	ListPrice	ProductSubcategoryID
Select	LL Bottom Bracket	BB-7421		$23.97	$53.99	5
Select	ML Bottom Bracket	BB-8107		$44.95	$101.24	5
Select	HL Bottom Bracket	BB-9108		$53.94	$121.49	5

ProductID	995
Name	ML Bottom Bracket
ProductNumber	BB-8107
SafetyStockLevel	500
Color	
FinishedGoodsFlag	✓
MakeFlag	✓
ReorderPoint	375
StandardCost	44.9506
ListPrice	101.2400
Size	
DaysToManufacture	1
Weight	168.00
WeightUnitMeasureCode	G
SizeUnitMeasureCode	
ProductSubcategoryID	5
Style	
Class	M
ProductLine	
ProductModelID	96
SellStartDate	01/07/2003 00:00:00
SellEndDate	
DiscontinuedDate	

FIGURE 2.22: The results from using a data access/business logic layer

are generating constant hits on her database server for every postback as users sort, page, filter, select, and edit rows.

Lucy is a great believer in caching data where it does not change very often, and wants you to implement this in the new page. No, not next week, but now. It looks very much like the game of golf you were planning is not going to happen today.

AdventureWorks Trading Inc. uses the new SQL Server 2005 database, and so you can take advantage of a feature called database cache invalidation to improve performance and reduce database server loading. This makes much more sense than the traditional technique of caching for a specific period, based on a best guess as to how often the data might change.

ASP.NET database cache invalidation supports both SQL Server 2000 and SQL Server 2005. In SQL Server 2000, you use the special tool named `aspnet_regsql` (in the `%windir%\Microsoft.NET\Framework\`[*version*] folder of your machine) to prepare the database and the table containing your source data. You also have to edit your `Web.Config` file (see Chapter 11 for more details).

In SQL Server 2005, database cache invalidation depends on the Broker Service feature of the database. This allows a `SqlCacheDependency` to be linked to a data source control so that the data is cached within ASP.NET and only refreshed from the database when it changes (or when another notifiable event such as a server restart occurs on the database server).

All that is required, when you use the data source controls, is to add an `OutputCache` directive to the page that includes a `SqlDependency` attribute.

```
<%@OutputCache SqlDependency="CommandNotification"
               Duration="60" VaryByParam="*" %>
```

Note that you must enable the Broker Service for the database, and grant the relevant permissions, before using the Command Notification architecture. For more details, see http://msdn.microsoft.com/library/enus/dnvs05/html/querynotification.asp.

Now you can run the page and then refresh it without causing a database query to occur (you can monitor database activity using the **SQL Profiler** tool that comes with SQL Server). However, if you open the source table in Visual Studio or Visual Web Developer and change one of the column values, you will see that the next time you refresh the page there is a hit on the database.

Using a Master Page to Give a Consistent Look and Feel

The styles you applied to the `GridView` and `DetailsView` controls, using the Auto Format feature, provide a reasonably attractive outcome. However, they say that beauty is in the eye of the beholder, and so it is no surprise to hear the phone ringing again. This time, Juan-Paul from the marketing department is "just calling to say" that they have a corporate design scheme from their Web site, and he would really appreciate your help to "facilitate an outward appearance of compatibility for reasons of enhanced staff resource utilization via familiarization with the infrastructure."

You take a wild guess that he means he wants the new page to follow the same style and layout as the existing pages. After promising Juan-Paul that you will "personally endeavor to push the envelope, drive the process, and aim skyward toward a satisfactory and visually coherent solution," you fire up Visual Studio again.

Luckily, you took advantage of the Master Pages feature of ASP.NET 2.0 when you built the AdventureWorks Web site. Therefore, fitting the new page into the existing site simply means converting it from a "normal" Web page into a Content Page and referencing the Master Page file. You did this because you realized marketing departments have a changeable attitude to life, and you may well be required to change the whole design and layout of the site at some time in the future. Figure 2.23 shows the Master Page, with

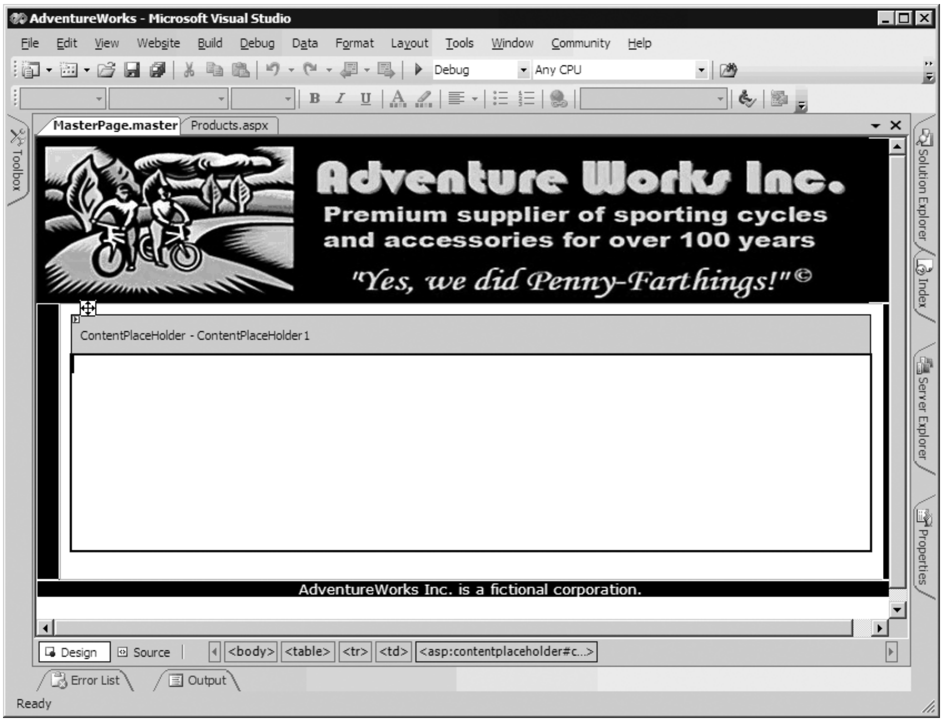

AdventureWorks - Microsoft Visual Studio
File Edit View Website Build Debug Data Format Layout Tools Window Community Help
Debug
Any CPU
MasterPage.master
Products.aspx
Toolbox
Solution Explorer
Index
Server Explorer
Properties
Adventure Works Inc.
Premium supplier of sporting cycles and accessories for over 100 years
"Yes, we did Penny-Farthings!"©
ContentPlaceHolder - ContentPlaceHolder1
AdventureWorks Inc. is a fictional corporation.
Design
Source
<body> <table> <tr> <td> <asp:contentplaceholder#c...>
Error List
Output
Ready

FIGURE 2.23: The AdventureWorks Master Page in Design View in Visual Studio

the `ContentPlaceHolder` control indicating the area occupied by the content from each of the Content Pages. The code that creates this page is shown in Listing 2.3, where you can see the `PlaceHolder` control within an HTML table.

Listing 2.3. The Source Code of the AdventureWorks Master Page

```
<%@ Master Language="C#" AutoEventWireup="true"
    CodeFile="MasterPage.master.cs" Inherits="MasterPage" %>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN"
          "http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">
<html xmlns="http://www.w3.org/1999/xhtml" >
<head runat="server">
    <title>AdventureWorks Inc.</title>
    <link rel="Stylesheet" type="text/css"
          href="StyleSheet.css" title="Default" />
</head>
<body topmargin="0" leftmargin="0" rightmargin="0">
 <form id="form1" runat="server">
  <table width="100%" border="0" cellpadding="0" cellspacing="0">
   <tr>
    <td align="left" colspan="3" bgcolor="#000000">
     <img src="Images/header.jpg" border="0" vspace="0" />
    </td>
   </tr>
   <tr>
    <td bgcolor="#000000">&nbsp;</td>
    <td style="padding:10px">
     <asp:ContentPlaceholder id="CP1" runat="server" />
    </td>
    <td bgcolor="#000000">&nbsp;</td>
   </tr>
   <tr>
    <td align="center" colspan="3" bgcolor="#000000">
     <span class="footer">
      AdventureWorks Inc. is a fictional corporation.
     </span>
    </td>
   </tr>
  </table>
 </form>
</body>
</html>
```

All that is required is to strip out of the page all the `<html>`, `<body>`, `<head>`, `<form>`, and other elements that are not part of the display of rows from the new Web page. Then add the `MasterPageFile` attribute to the `Page` directive, and wrap the content in a `Content` control that specifies the

ContentPlaceHolder control on the Master Page that it will populate. Listing 2.4 shows how this looks in outline.

Listing 2.4. The Outline Structure of a Content Page

```
<%@ Page Language="C#" AutoEventWireup="true"
        CodeFile="Products.aspx.cs" Inherits="Products"
        MasterPageFile="~/MasterPage.master" %>
<asp:Content ContentPlaceHolderID="CP1" runat="server" ID="Content1">
  ... all page content goes here ...
</asp:Content>
```

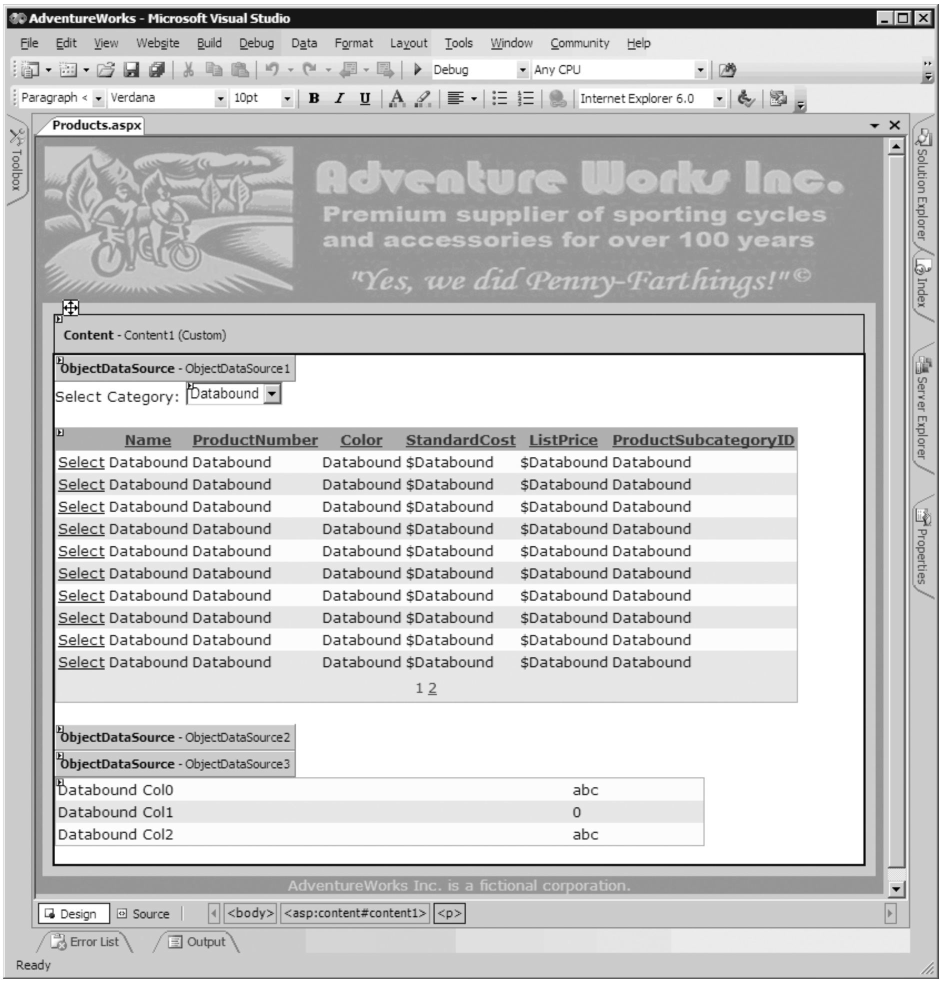
Now, in Design view of the "product list" page, you can see how the new page fits into the Master Page (see Figure 2.24), with the Master Page itself grayed out and not available for editing unless you open it in a separate window. At runtime, the Master Page content merges into the content generated by the new page you have been building to give the combined result.

Adding a Menu and Other Navigation Features

One item missing from the site is a menu that makes it easy to navigate from one page to another. Again, ASP.NET 2.0 provides all you need to implement various navigation strategies, and the common and effective solution is often a dynamic fly-out or drop-down menu. The data to drive the `Menu` control comes from an XML file named `Web.sitemap`, which defines the items for the menu, their position within the hierarchical menu structure, the pop-up tool-tip for each item, and the target URL for navigation. With the new "products" page added to the XML file, the menu will automatically provide a link to this page.

You drag a `SiteMapDataSource` control from the Toolbox and drop it onto the page, using the Configure Data Source Wizard to select the `Web.sitemap` file. Then you drag a `Menu` control from the Toolbox and drop it onto the Master Page, select the new `SiteMapDataSource` control in the **Choose Data Source** list, and use the tasks pane to apply a suitable Auto Format (see Figure 2.25).

You also decide to make it easy for users to tell where they are in the site hierarchy by adding a `SiteMapPath` control to the Master Page as well, at the bottom of the right-hand section of the page below the `ContentPlaceHolder` control. This uses the same `Web.sitemap` file, and


AdventureWorks - Microsoft Visual Studio
File Edit View Website Build Debug Data Format Layout Tools Window Community Help
Debug
Any CPU
Paragraph
Verdana
10pt
Internet Explorer 6.0
Products.aspx
Toolbox
Solution Explorer
Index
Server Explorer
Properties
Adventure Works Inc.
Premium supplier of sporting cycles and accessories for over 100 years
"Yes, we did Penny-Farthings!"©
AdventureWorks Inc. is a fictional corporation.
Design
Source
<body> <asp:content#content1> <p>
Error List
Output
Ready

Content - Content1 (Custom)

ObjectDataSource - ObjectDataSource1

Select Category: Databound

	Name	ProductNumber	Color	StandardCost	ListPrice	ProductSubcategoryID
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound
Select	Databound	Databound	Databound	$Databound	$Databound	Databound

1 2

ObjectDataSource - ObjectDataSource2

ObjectDataSource - ObjectDataSource3

Databound Col0	abc
Databound Col1	0
Databound Col2	abc

FIGURE 2.24: The new page running within the Master Page

automatically displays a "breadcrumb trail" for the current page (see Figure 2.26). In addition, like all the other features of ASP.NET 2.0 you have used so far, there is no code to write! It all just works...

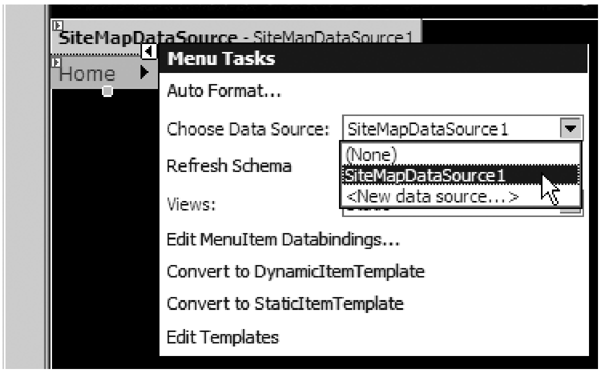
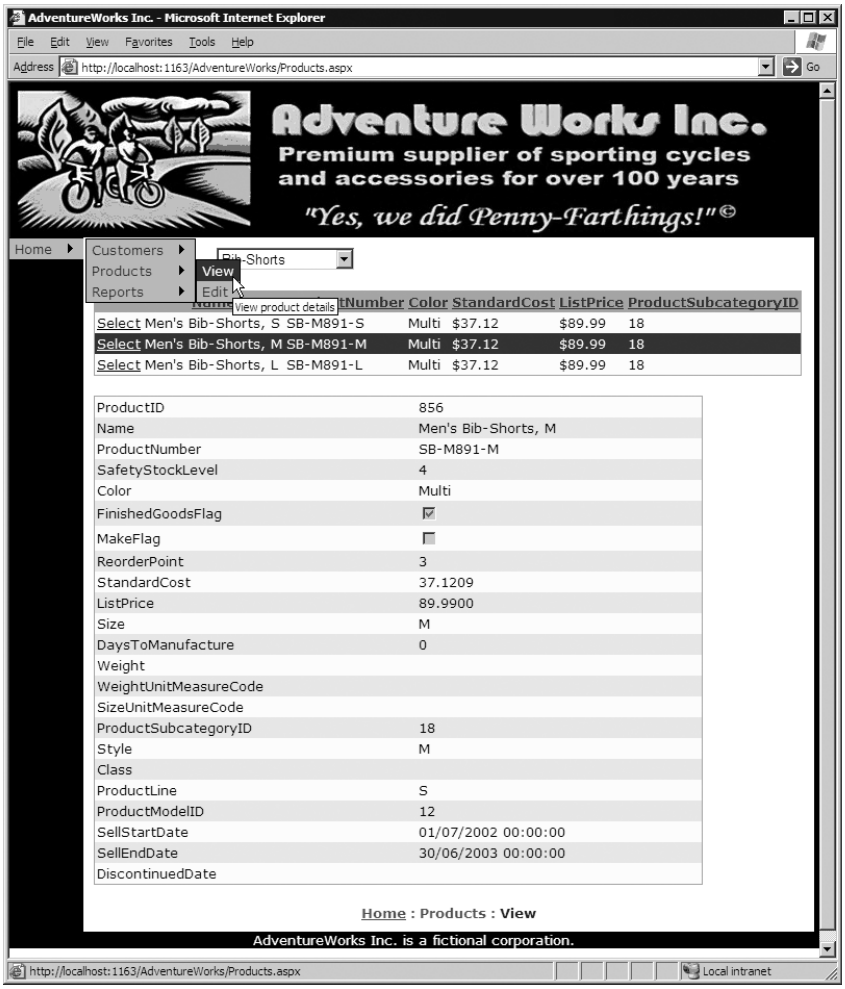


FIGURE 2.25: Adding a SiteMapDataSource and menu control to the Master Page


AdventureWorks Inc. - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://localhost:1163/AdventureWorks/Products.aspx
Go
Adventure Works Inc.
Premium supplier of sporting cycles and accessories for over 100 years
"Yes, we did Penny-Farthings!"©
Home
Customers
Products
Reports
View
Edit
View product details
Bib-Shorts
http://localhost:1163/AdventureWorks/Products.aspx
Local intranet

		tNumber	Color	StandardCost	ListPrice	ProductSubcategoryID
Select	Men's Bib-Shorts, S	SB-M891-S	Multi	$37.12	$89.99	18
Select	Men's Bib-Shorts, M	SB-M891-M	Multi	$37.12	$89.99	18
Select	Men's Bib-Shorts, L	SB-M891-L	Multi	$37.12	$89.99	18

ProductID	856
Name	Men's Bib-Shorts, M
ProductNumber	SB-M891-M
SafetyStockLevel	4
Color	Multi
FinishedGoodsFlag	☑
MakeFlag	☐
ReorderPoint	3
StandardCost	37.1209
ListPrice	89.9900
Size	M
DaysToManufacture	0
Weight	
WeightUnitMeasureCode	
SizeUnitMeasureCode	
ProductSubcategoryID	18
Style	M
Class	
ProductLine	S
ProductModelID	12
SellStartDate	01/07/2002 00:00:00
SellEndDate	30/06/2003 00:00:00
DiscontinuedDate	

Home : Products : View

AdventureWorks Inc. is a fictional corporation.

FIGURE 2.26: Adding a menu and a navigation trail to the Master Page

SUMMARY

Although this is a somewhat contrived scenario, this chapter has demonstrated just how powerful ASP.NET 2.0 is, and how it can considerably reduce development time while helping you to construct efficient and attractive Web sites and Web applications. One of the main goals of ASP.NET 2.0 is to reduce even further the amount of code you have to write to build dynamic and interactive pages, removing, in particular, the need for that repetitive code you seem to need for almost all of your projects! As you can see from this chapter, you can achieve remarkable results without writing any code at all.

In this chapter, you have seen how you can create and then evolve a data access page, starting with dragging a database table onto the editing window. You then saw how easy it is to change the content and appearance of the grid and then add features like sorting, paging, and editing. The next stage added a category selection capability, so that only specific sets of rows appear. Following this was implementation of a "form"-style view of the data.

Once the page provided the features required, you next saw how you can make it part of an existing site, by matching the overall style and layout using a Master Page and by integrating it with a menu and navigation system. All this was achieved within the visual design tool, using drag and drop techniques and Wizards, and without writing any code at all.

In the next chapter, you will work more deeply with the data source controls and data display controls introduced here, seeing how they offer a wide range of features to support all kinds of data management requirements.