

Intro to ASP.NET MVC 4 with Visual Studio (Beta)

Rick Anderson and Scott Hanselman

Step-by-Step



Microsoft®

Intro to ASP.NET MVC 4 with Visual Studio (Beta)

Rick Anderson and Scott Hanselman

Summary: This tutorial will teach you the basics of building an ASP.NET MVC Web application using Microsoft Visual Studio 11 Express Beta for Web, which is a free version of Microsoft Visual Studio.

Category: Step-By-Step

Applies to: ASP.NET MVC 4 Beta, Visual Studio 11 Beta

Source: ASP.NET site ([link to source content](#))

E-book publication date: May 2012

115 pages



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Getting Started

By Rick Anderson and Scott Hanselman

This tutorial will teach you the basics of building an ASP.NET MVC Web application using Microsoft Visual Studio 11 Express Beta for Web, which is a free version of Microsoft Visual Studio. Before you start, make sure you've installed the prerequisites listed below. You can install all of them by clicking the following link: [Web Platform Installer](#).

If you're using Visual Studio 11 Beta instead of Visual Studio 11 Express Beta for Web , install the prerequisites by clicking the following link: [Web Platform Installer](#)

A Visual Web Developer project with C# source code is available to accompany this topic. [Download the C# version.](#)

What You'll Build

You'll implement a simple movie-listing application that supports creating, editing, searching and listing movies from a database. Below are two screenshots of the application you'll build. It includes a page that displays a list of movies from a database:

The screenshot shows a web browser window with the URL <http://localhost:1234/Mc> in the address bar. The title bar says "SearchIndex - Movie ...". The page header includes the "MVC Movie" logo, navigation links for "Home", "About", and "Contact", and user links for "Register" and "Log in". Below the header, the main content area has a section titled "SearchIndex" with a "Create New" link. It features a search/filtering interface with dropdowns for "Genre: All" and "Title: ghost", and a "Filter" button. A table lists movie records:

Title	ReleaseDate	Genre	Price
Ghostbusters	3/13/1984 12:00:00 AM	Comedy	8.99
Ghostbusters 2	2/23/1986 12:00:00 AM	Comedy	9.99

Each row in the table has "Edit", "Details", and "Delete" links. At the bottom left, it says "© 2012 - My ASP.NET MVC Application". On the right side, there are social media sharing icons for Facebook and Twitter.

Title	ReleaseDate	Genre	Price
Ghostbusters	3/13/1984 12:00:00 AM	Comedy	8.99
Ghostbusters 2	2/23/1986 12:00:00 AM	Comedy	9.99

The application also lets you add, edit, and delete movies, as well as see details about individual ones. All data-entry scenarios include validation to ensure that the data stored in the database is correct.

Edit - Movie App

localhost:64148/Movies/Edit/2

MVC Movie

Register Log in

Home About Contact

Edit

Title

Ghostbusters

ReleaseDate

abc

The field ReleaseDate must be a date.

Genre

Comedy

Price

zyz

The field Price must be a number.

Save

[Back to List](#)

© 2012 - My ASP.NET MVC Application

f t

This screenshot shows a browser window displaying an ASP.NET MVC application titled "Edit - Movie App". The URL in the address bar is "localhost:64148/Movies/Edit/2". The page has a header with "MVC Movie" and navigation links for "Home", "About", and "Contact". On the right side of the header are "Register" and "Log in" buttons. The main content area is titled "Edit". It contains four input fields: "Title" with value "Ghostbusters", "ReleaseDate" with value "abc" (which is highlighted in red), "Genre" with value "Comedy", and "Price" with value "zyz" (which is highlighted in yellow). To the right of the "ReleaseDate" and "Price" inputs, error messages appear in red: "The field ReleaseDate must be a date." and "The field Price must be a number.". Below the inputs is a "Save" button. At the bottom left is a link "Back to List". At the bottom right are social media icons for Facebook and Twitter. The footer of the page says "© 2012 - My ASP.NET MVC Application".

Skills You'll Learn

Here's what you'll learn:

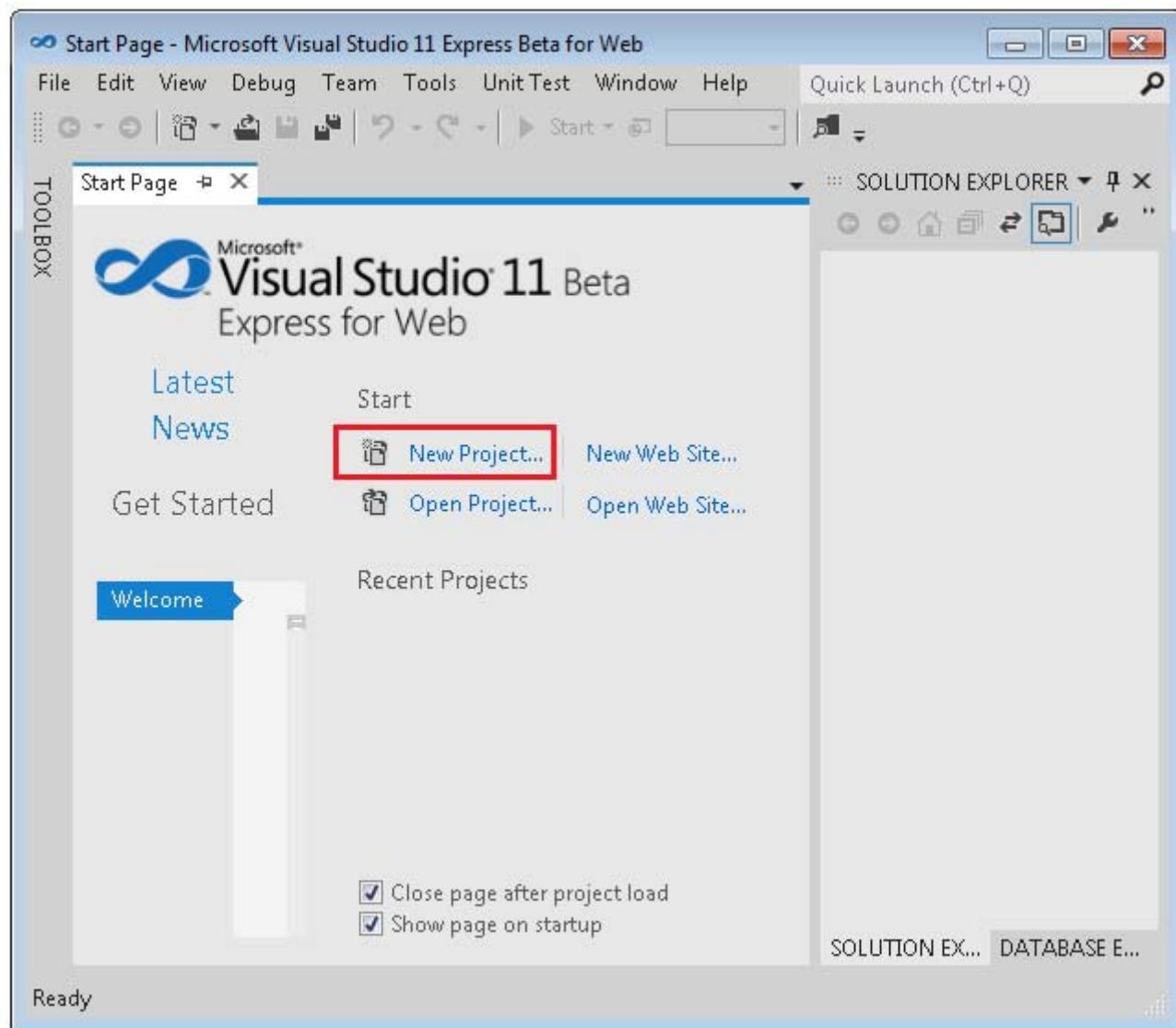
- How to create a new ASP.NET MVC project.

- How to create ASP.NET MVC controllers and views.
- How to create a new database using the Entity Framework Code First paradigm.
- How to retrieve and display data.
- How to edit data and enable data validation.

Getting Started

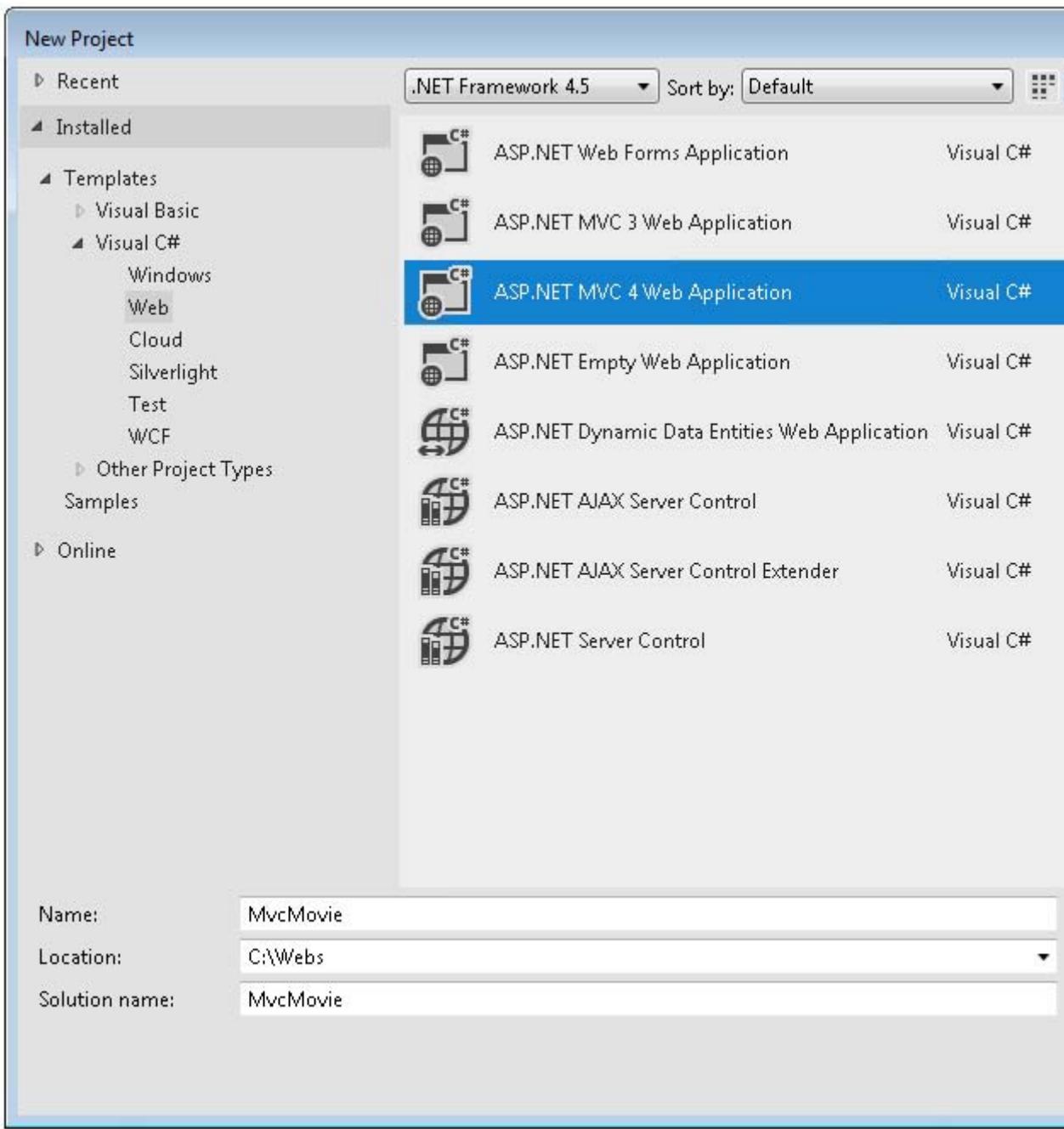
Start by running Visual Web Developer 11 Express Beta("Visual Web Developer" or VWD for short) and select **New Project** from the **Start** page.

Visual Web Developer is an IDE, or integrated development environment. Just like you use Microsoft Word to write documents, you'll use an IDE to create applications. In Visual Web Developer there's a toolbar along the top showing various options available to you. There's also a menu that provides another way to perform tasks in the IDE. (For example, instead of selecting **New Project** from the **Start** page, you can use the menu and select **File>New Project**.)



Creating Your First Application

You can create applications using either Visual Basic or Visual C# as the programming language. Select Visual C# on the left and then select **ASP.NET MVC 4 Web Application**. Name your project "MvcMovie" and then click **OK**.



In the **New ASP.NET MVC 4 Project** dialog box, select **Internet Application**. Leave**Razor** as the default view engine.

New ASP.NET MVC 4 Project



Project Template

Select a template:



Empty



Internet Application



Intranet Application



Mobile Application



Web API



Single Page Application

Description:

A default ASP.NET MVC 4 project with an account controller that uses forms authentication.

View engine:

Razor



Create a unit test project

Test project name:

Test framework:

Additional Info

OK

Cancel

Click **OK**. Visual Web Developer used a default template for the ASP.NET MVC project you just created, so you have a working application right now without doing anything! This is a simple "Hello World!" project, and it's a good place to start your application.

MvcMovie - Microsoft Visual Studio 11 Express Beta for Web

File Edit View Project Debug Team Tools Unit Test Window Quick Launch (Ctrl+Q)

Help

Internet Explorer | Debug | Solution Explorer | Properties | Toolbox | Task List | Help

HomeController.cs

MvcMovie.Controllers.HomeController Index()

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.Mvc;

namespace MvcMovie.Controllers
{
    public class HomeController : Controller
    {
        public ActionResult Index()
        {
            ViewBag.Message = "Modify this template to reflect your own application.";
            return View();
        }

        public ActionResult About()
        {
            ViewBag.Message = "Your quintessential app";
            return View();
        }

        public ActionResult Contact()
        {
            ViewBag.Message = "Your quintessential contact";
            return View();
        }
    }
}
```

SOLUTION EXPLORER

Search Solution Explorer (P)

MvcMovie

- Properties
- References
- App_Data
- Content
- Controllers
- Images
- Models
- Scripts
- Views
- favicon.ico
- Global.asax
- packages.config
- Web.config

SOLUTION E... DATABASE E...

PROPERTIES

Ready

From the **Debug** menu, select **Start Debugging**.

MvcMovie - Microsoft Visual Studio 11 Express Beta for Web

File Edit View Project Debug Team Tools Unit Test Window Quick Launch (Ctrl+Q)

Help

Start Debugging F5

Build MvcMovie

Step Into F11

Step Over F10

Toggle Breakpoint F9

Windows

Clear All DataTips

Export DataTips ...

Import DataTips ...

Options and Settings...

MvcMovie Properties...

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.Mvc;

namespace MvcMovie.Controllers
{
    public class HomeController : Controller
    {
        public ActionResult Index()
        {
            ViewBag.Message = "Modify this template to reflect your own application!";

            return View();
        }

        public ActionResult About()
        {
            ViewBag.Message = "Your quintessential app about page!";

            return View();
        }

        public ActionResult Contact()
        {
            ViewBag.Message = "Your quintessential contact page!";

            return View();
        }
    }
}
```

SOLUTION EXPLORER

Search Solution Explorer (

MvcMovie

- Properties
- References
- App_Data
- Content
- Controllers
- Images
- Models
- Scripts
- Views
- favicon.ico
- Global.asax
- packages.config
- Web.config

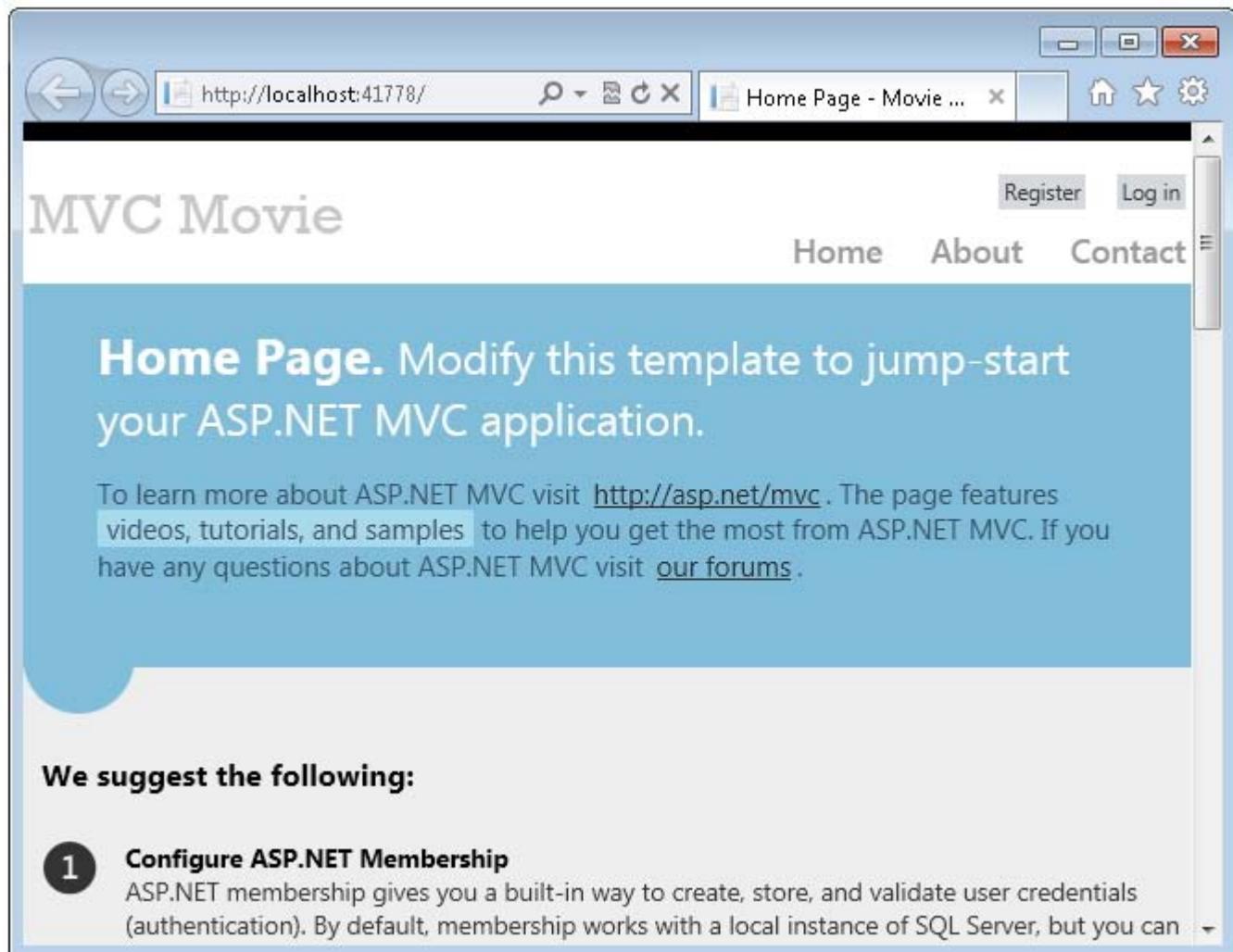
SOLUTION E... DATABASE E...

PROPERTIES

Ready

Notice that the keyboard shortcut to start debugging is F5.

F5 causes Visual Web Developer to start IIS Express and run your web application. Visual Web Developer then launches a browser and opens the application's home page. Notice that the address bar of the browser says **localhost** and not something like **example.com**. That's because **localhost** always points to your own local computer, which in this case is running the application you just built. When Visual Web Developer runs a web project, a random port is used for the web server. In the image below, the port number is 41778. When you run the application, you'll probably see a different port number.



Right out of the box this default template gives you Home, Contact and About pages. It also provides support to register and log in, and links to Facebook and Twitter. The next step is to change how this application works and learn a little bit about ASP.NET MVC. Close your browser and let's change some code.

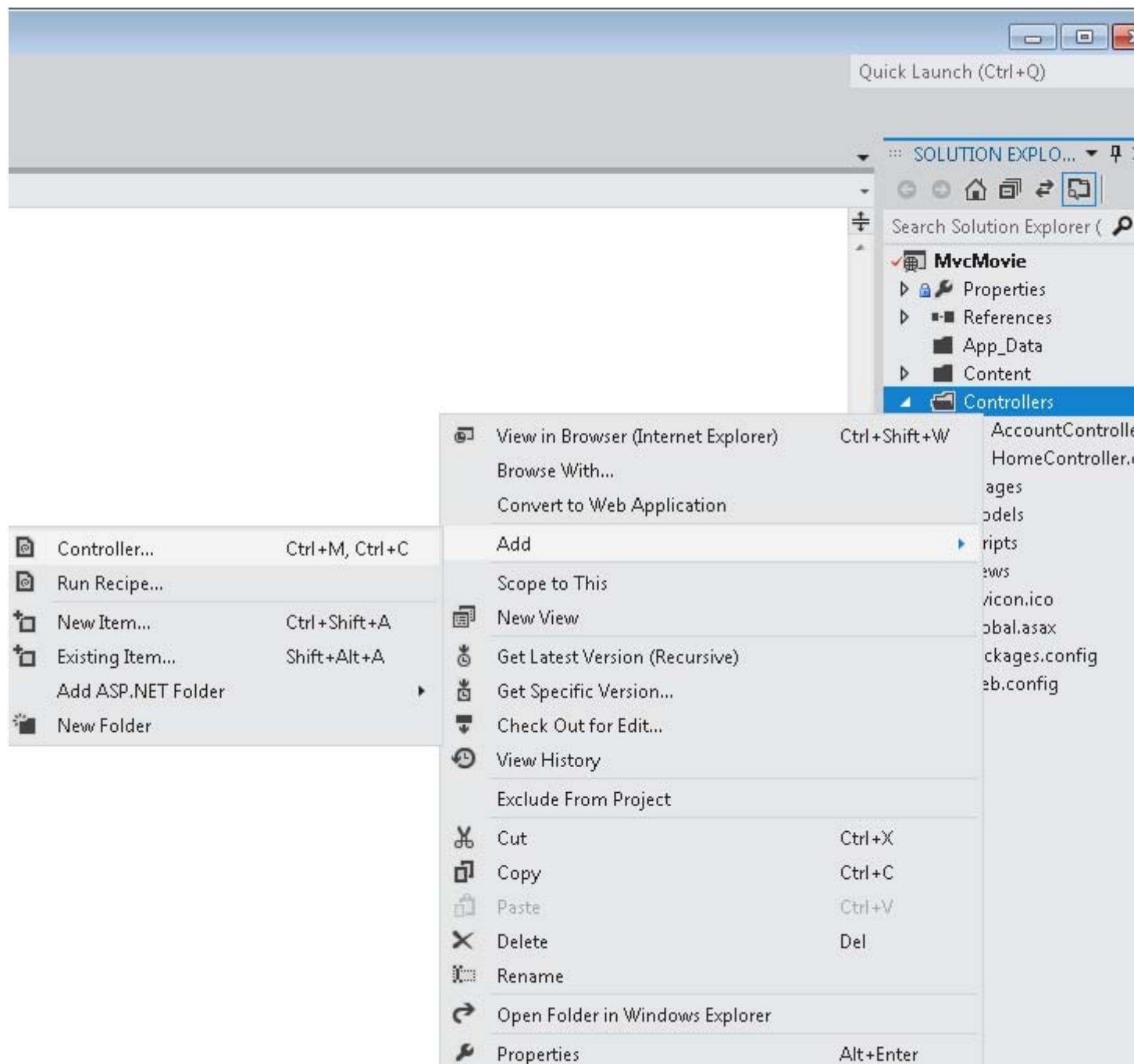
Adding a Controller

MVC stands for *model-view-controller*. MVC is a pattern for developing applications that are well architected, testable and easy to maintain. MVC-based applications contain:

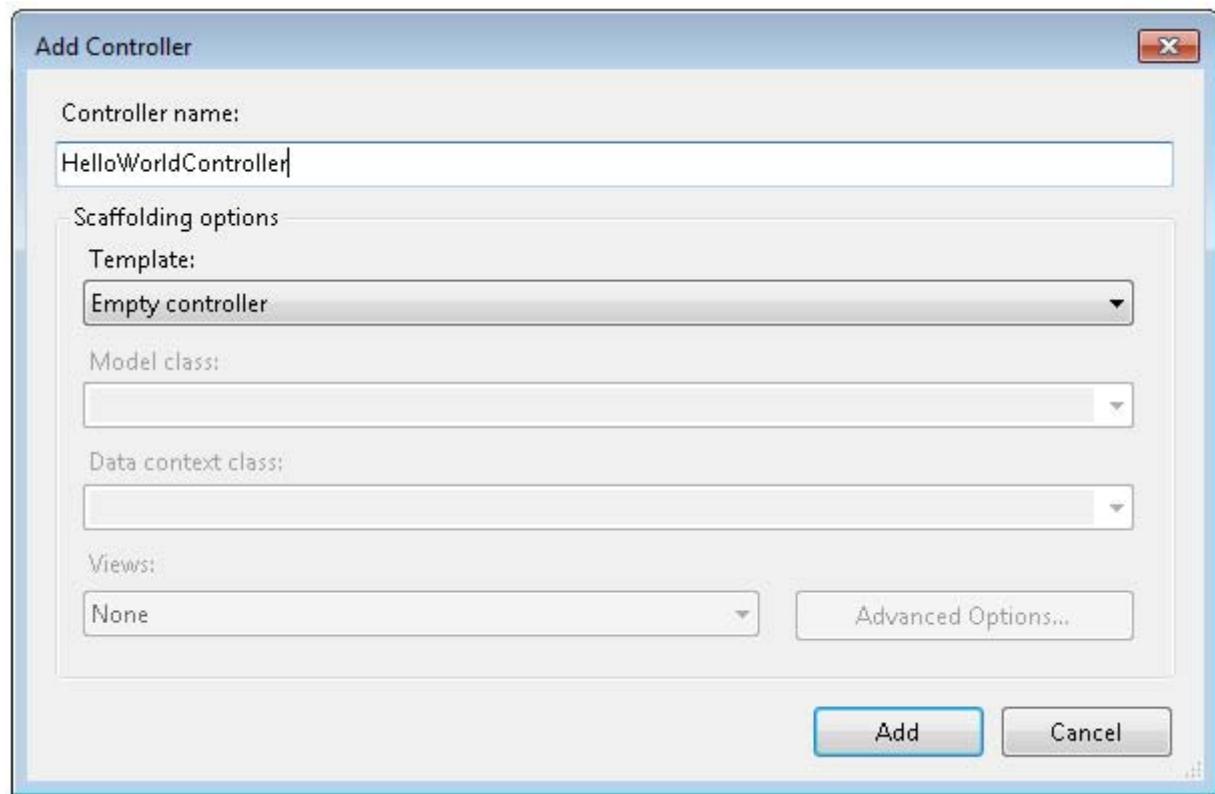
- **Models:** Classes that represent the data of the application and that use validation logic to enforce business rules for that data.
- **Views:** Template files that your application uses to dynamically generate HTML responses.
- **Controllers:** Classes that handle incoming browser requests, retrieve model data, and then specify view templates that return a response to the browser.

We'll be covering all these concepts in this tutorial series and show you how to use them to build an application.

Let's begin by creating a controller class. In **Solution Explorer**, right-click the `Controllers` folder and then select **Add Controller**.



Name your new controller "HelloWorldController". Leave the default template as **Empty controller** and click **Add**.



Notice in **Solution Explorer** that a new file has been created named *HelloWorldController.cs*. The file is open in the IDE.

The screenshot shows the Microsoft Visual Studio 11 Express Beta for Web interface. The title bar reads "MvcMovie - Microsoft Visual Studio 11 Express Beta for Web". The menu bar includes File, Edit, View, Project, Debug, Team, Tools, Unit Test, Window, Help, and Quick Launch (Ctrl+Q). The toolbar has icons for Save, Undo, Redo, Cut, Copy, Paste, Find, Replace, and others. The status bar at the bottom shows "100 %", "Ready", "Ln 1", "Col 1", "Ch 1", and "INS".

The main window displays the code for `HelloWorldController.cs` under the `MvcMovie*` tab. The code defines a controller class `HelloWorldController` that inherits from `Controller`. It contains a single action method `Index()` that returns a view.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.Mvc;

namespace MvcMovie.Controllers
{
    public class HelloWorldController : Controller
    {
        // GET: /HelloWorld/
        public ActionResult Index()
        {
            return View();
        }
    }
}
```

The Solution Explorer on the right shows the project structure for `MvcMovie`:

- Properties
- References
- App_Data
- Content
- Controllers
 - AccountController.cs
 - HomeController.cs
- Images
- Models
- Scripts
- Views
 - favicon.ico
 - Global.asax
 - packages.config
 - Web.config

Replace the contents of the file with the following code.

```
usingSystem.Web;
usingSystem.Web.Mvc;

namespaceMvcMovie.Controllers
{
    publicclassHelloWorldController:Controller
    {
        //
        // GET: /HelloWorld/
```

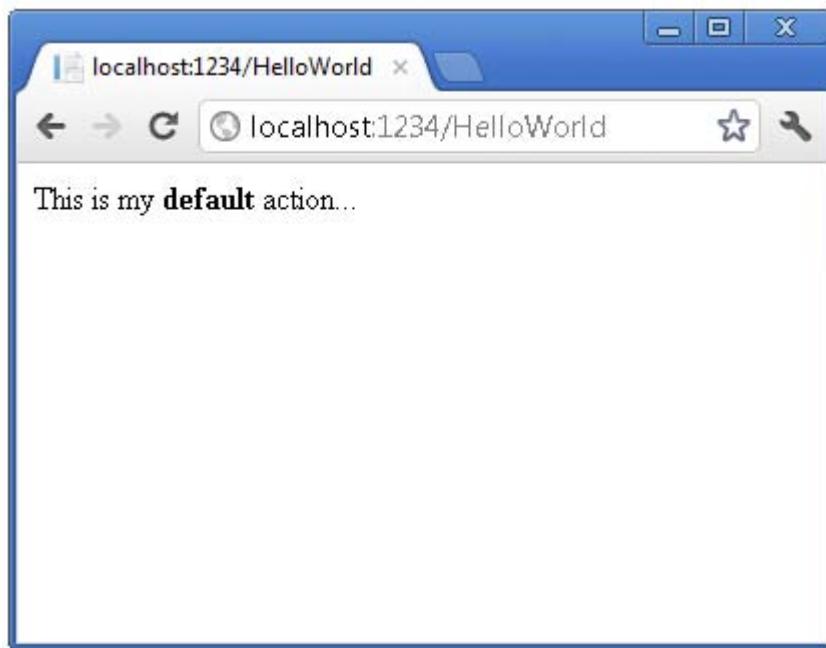
```
public string Index()
{
    return "This is my <b>default</b> action...";
}

//  

// GET: /HelloWorld/Welcome

public string Welcome()
{
    return "This is the Welcome action method...";
}
}
}
}
```

The controller methods will return a string of HTML as an example. The controller is named **HelloWorldController** and the first method above is named **Index**. Let's invoke it from a browser. Run the application (press F5 or Ctrl+F5). In the browser, append "HelloWorld" to the path in the address bar. (For example, in the illustration below, it's `http://localhost:1234/HelloWorld`.) The page in the browser will look like the following screenshot. In the method above, the code returned a string directly. You told the system to just return some HTML, and it did!



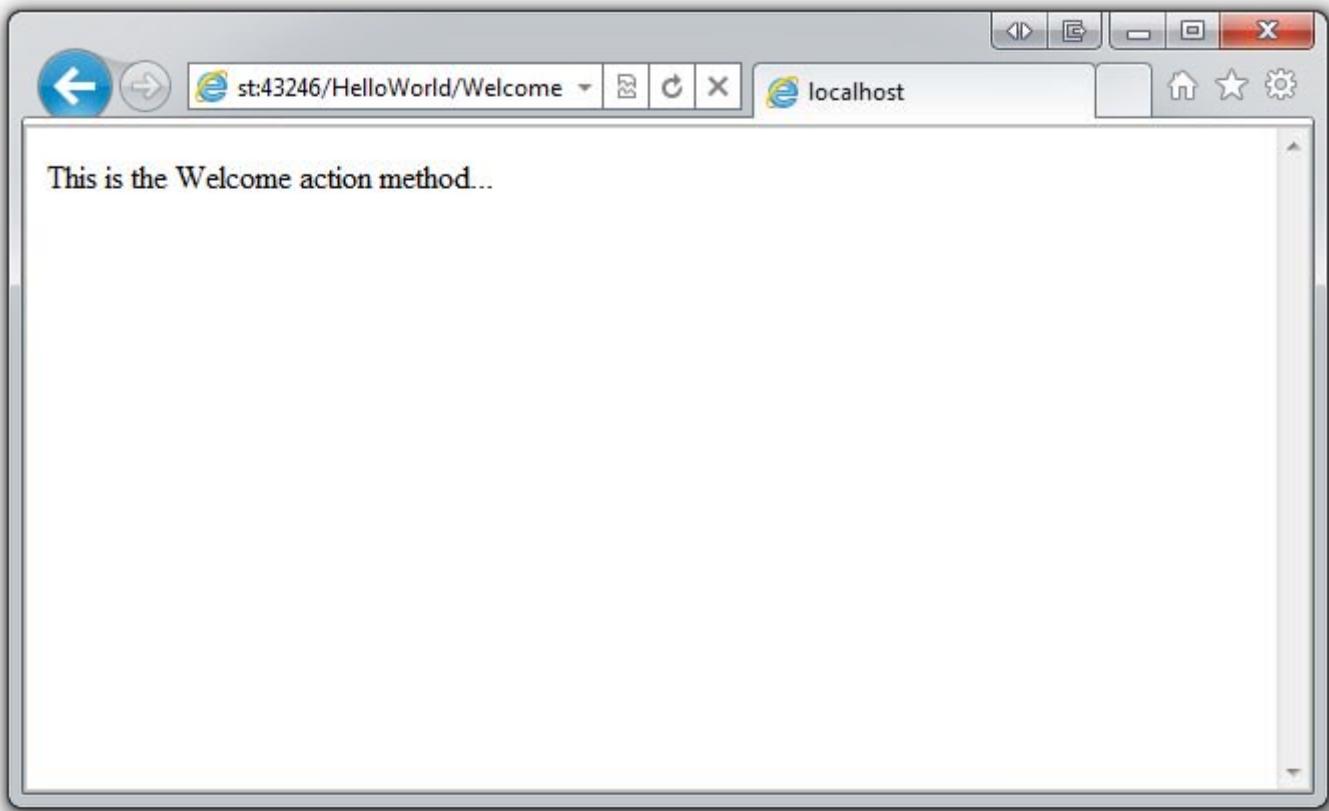
ASP.NET MVC invokes different controller classes (and different action methods within them) depending on the incoming URL. The default URL routing logic used by ASP.NET MVC uses a format like this to determine what code to invoke:

`/[Controller]/[ActionName]/[Parameters]`

The first part of the URL determines the controller class to execute. So `/HelloWorld` maps to the **HelloWorldController** class. The second part of the URL determines the action method on the class to

execute. So `/HelloWorld/Index` would cause the `Index` method of the `HelloWorldController` class to execute. Notice that we only had to browse to `/HelloWorld` and the `Index` method was used by default. This is because a method named `Index` is the default method that will be called on a controller if one is not explicitly specified.

Browse to `http://localhost:xxxx>HelloWorld>Welcome`. The `Welcome` method runs and returns the string "This is the Welcome action method...". The default MVC mapping is `[/Controller]/[ActionName]/[Parameters]`. For this URL, the controller is `HelloWorld` and `Welcome` is the action method. You haven't used the `[Parameters]` part of the URL yet.



Let's modify the example slightly so that you can pass some parameter information from the URL to the controller (for example, `/HelloWorld>Welcome?name=Scott&numtimes=4`). Change your `Welcome` method to include two parameters as shown below. Note that the code uses the C# optional-parameter feature to indicate that the `numTimes` parameter should default to 1 if no value is passed for that parameter.

```
public string Welcome(string name, int numTimes = 1){  
    return HttpUtility.HtmlEncode("Hello " + name + ", NumTimes is: " + numTimes);  
}
```

Run your application and browse to the example URL (`http://localhost:xxxx>HelloWorld>Welcome?name=Scott&numtimes=4`). You can try different values for `name` and `numtimes` in the URL. The **ASP.NET MVC model binding system** automatically maps the named parameters from the query string in the address bar to parameters in your method.



In both these examples the controller has been doing the "VC" portion of MVC — that is, the view and controller work. The controller is returning HTML directly. Ordinarily you don't want controllers returning HTML directly, since that becomes very cumbersome to code. Instead we'll typically use a separate view template file to help generate the HTML response. Let's look next at how we can do this.

Adding a View

In this section you're going to modify the `HelloWorldController` class to use view template files to cleanly encapsulate the process of generating HTML responses to a client.

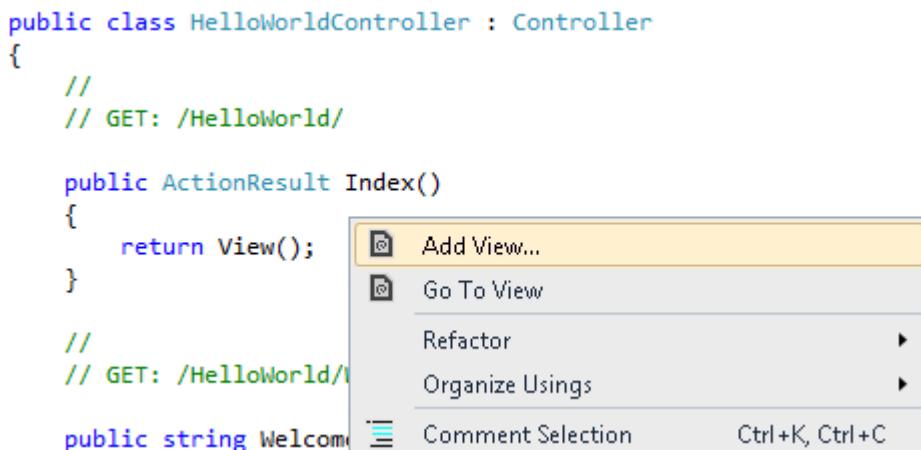
You'll create a view template file using the [Razor view engine](#) introduced with ASP.NET MVC 3. Razor-based view templates have a `.cshtml` file extension, and provide an elegant way to create HTML output using C#. Razor minimizes the number of characters and keystrokes required when writing a view template, and enables a fast, fluid coding workflow.

Start by creating a view template with the `Index` method in the `HelloWorldController` class. Currently the `Index` method returns a string with a message that is hard-coded in the controller class. Change the `Index` method to return a `View` object, as shown in the following code:

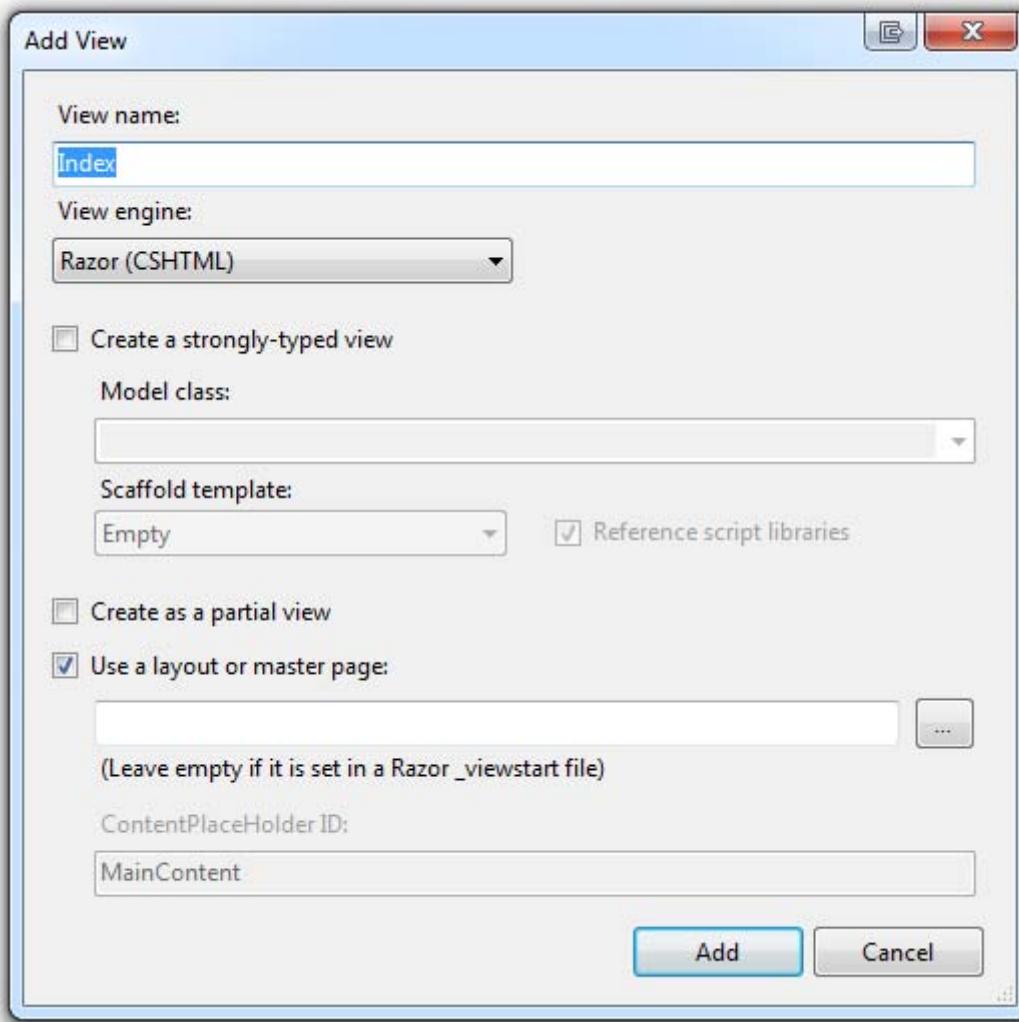
```
public ActionResult Index()
{
    return View();
}
```

The `Index` method above uses a view template to generate an HTML response to the browser. Controller methods (also known as [action methods](#)), such as the `Index` method above, generally return an [ActionResult](#) (or a class derived from [ActionResult](#)), not primitive types like `string`.

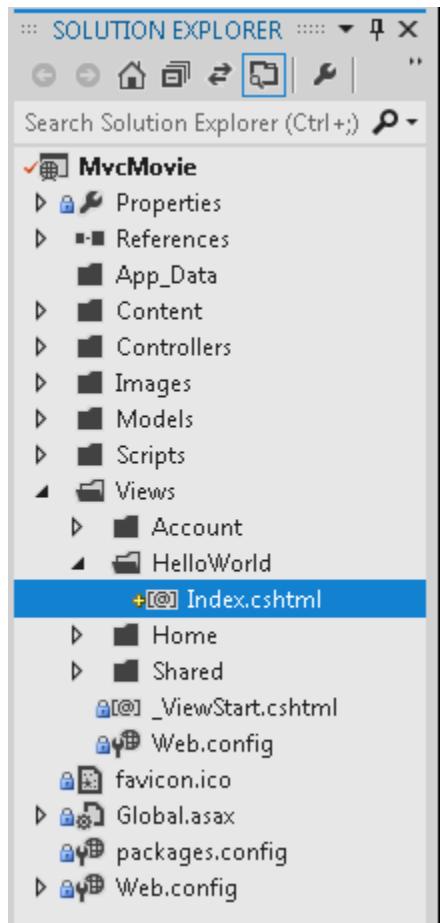
In the project, add a view template that you can use with the `Index` method. To do this, right-click inside the `Index` method and click **Add View**.



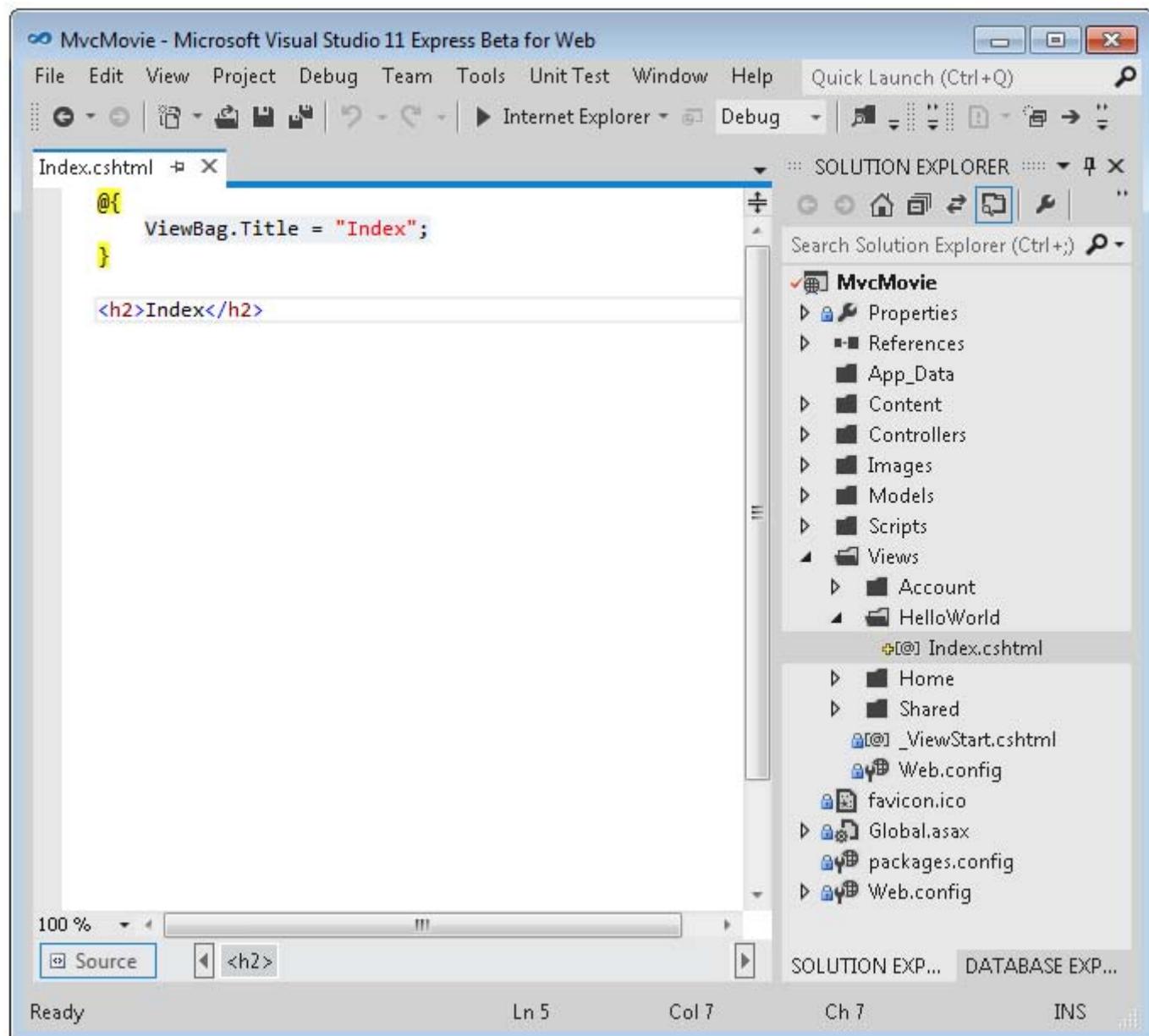
The **Add View** dialog box appears. Leave the defaults the way they are and click the **Add** button:



The `MvcMovie\Views\HelloWorld` folder and the `MvcMovie\Views\HelloWorld\Index.cshtml` file are created. You can see them in **Solution Explorer**:



The following shows the *Index.cshtml* file that was created:



Add the following HTML under the `<h2>` tag.

```
<p>Hello from our View Template!</p>
```

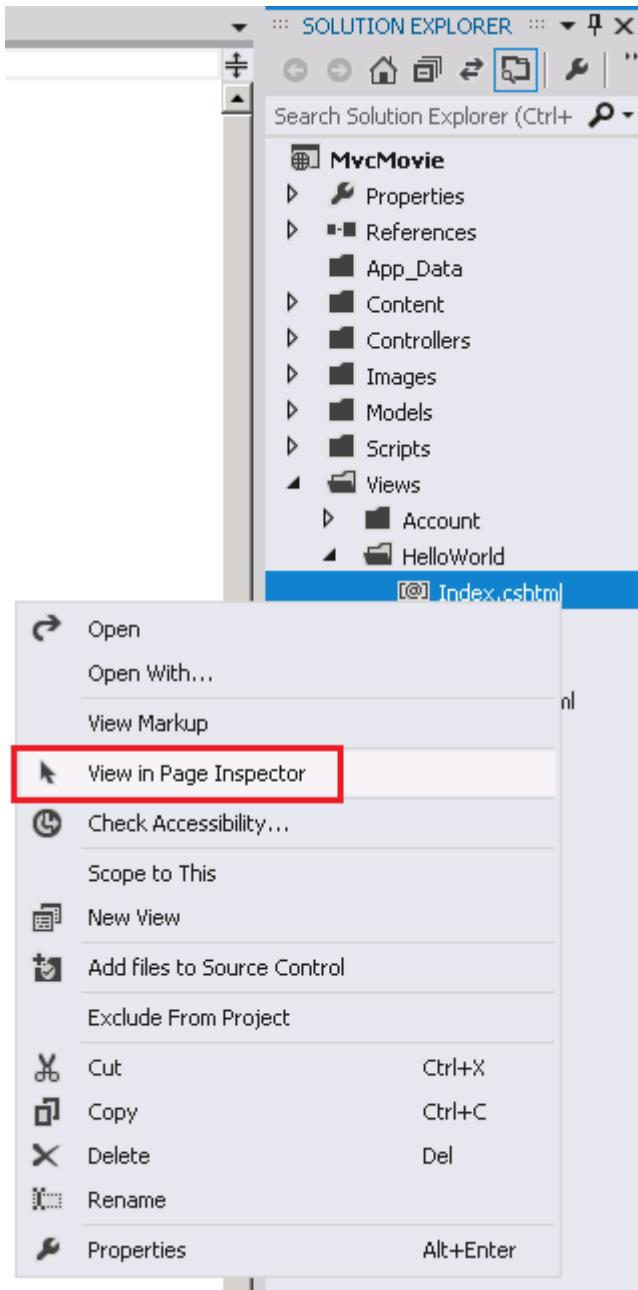
The complete `MvcMovie\Views\HelloWorld\Index.cshtml` file is shown below.

```
@{  
    ViewBag.Title = "Index";  
}
```

```
<h2>Index</h2>
```

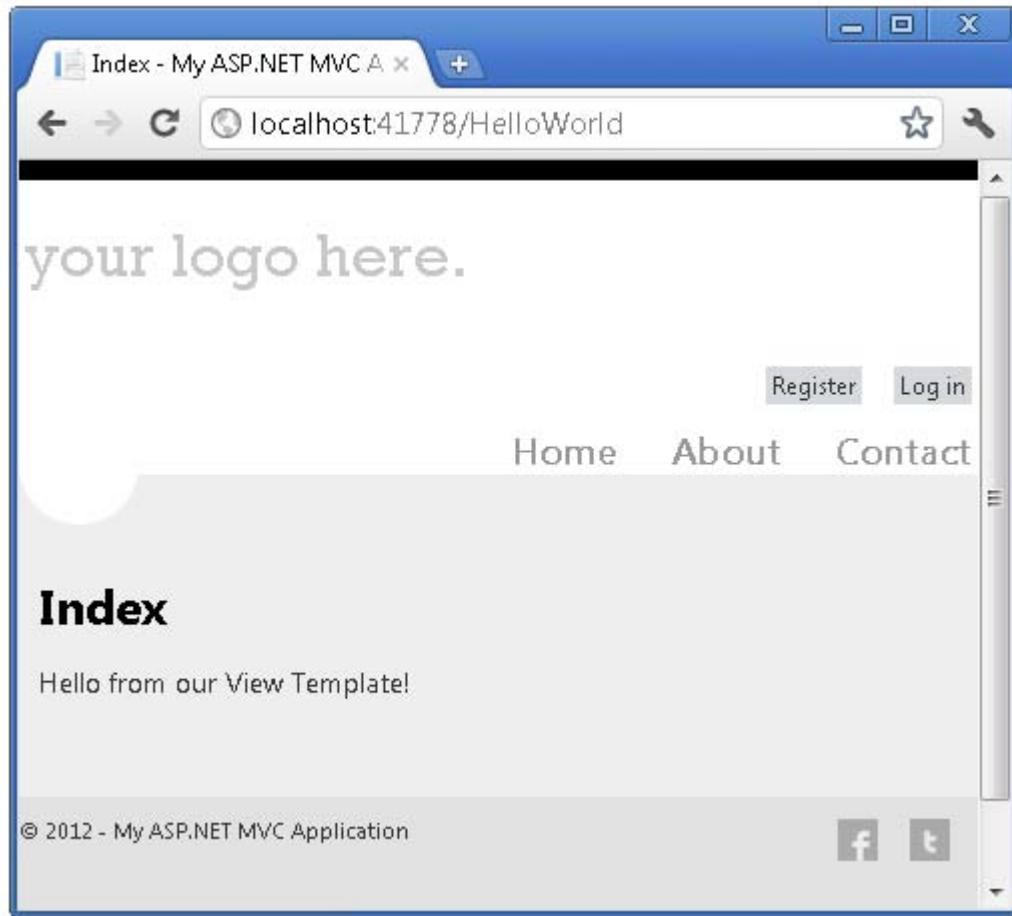
```
<p>Hello from our View Template!</p>
```

In solution explorer, right click the *Index.cshtml* file and select **View in Page Inspector**.



The [Page Inspector tutorial](#) has more information about this new tool.

Alternatively, run the application and browse to the **HelloWorld** controller (<http://localhost:xxxx/HelloWorld>). The **Index** method in your controller didn't do much work; it simply ran the statement `return View()`, which specified that the method should use a view template file to render a response to the browser. Because you didn't explicitly specify the name of the view template file to use, ASP.NET MVC defaulted to using the *Index.cshtml* view file in the `\Views\HelloWorld` folder. The image below shows the string hard-coded in the view.



Looks pretty good. However, notice that the browser's title bar shows "Index My ASP.NET A" and the big link on the top of the page says "your logo here." Below the "your logo here." link are registration and log in links, and below that links to Home, About and Contact pages. Let's change some of these.

Changing Views and Layout Pages

First, you want to change the "your logo here." title at the top of the page. That text is common to every page. It's actually implemented in only one place in the project, even though it appears on every page in the application. Go to the `/Views/Shared` folder in **Solution Explorer** and open the `_Layout.cshtml` file. This file is called a *layout page* and it's the shared "shell" that all other pages use.

MvcMovie - Microsoft Visual Studio 11 Express Beta for Web

File Edit View Project Debug Team Tools Unit Test Window Quick Launch (Ctrl+Q)

Help

Internet Explorer | Debug | Solution Explorer

_Layout.cshtml Index.cshtml

```
<!DOCTYPE html>
<html lang="en">
    <head>
        <meta charset="utf-8" />
        <title>@ViewBag.Title - My ASP.NET MVC Application</title>
        <link href="~/favicon.ico" rel="shortcut icon" type="image/x-icon" />
        <link href="@System.Web.Optimization.BundleTable.Bundles.ResolveBundleUrl("~/Content/themes/base/css/site.css")" rel="stylesheet" type="text/css" />
        <script src="@System.Web.Optimization.BundleTable.Bundles.ResolveBundleUrl("~/bundles/modernizr.js")" type="text/javascript"></script>
        <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    </head>
    <body>
        <header>
            <div class="content-wrapper">
                <div class="float-left">
                    <p class="site-title">@Html.ActionLink("My ASP.NET MVC Application", "Index", "Home")</p>
                </div>
                <div class="float-right">
                    <section id="login">
                        @Html.Partial("_LoginPartial")
                    </section>
                    <nav>
                        <ul id="menu">
                            <li>@Html.ActionLink("Home", "Index", "Home")</li>
                            <li>@Html.ActionLink("About", "About", "Home")</li>
                            <li>@Html.ActionLink("Contact", "Contact", "Home")</li>
                        </ul>
                    </nav>
                </div>
            </div>
        </header>
        <div id="body">
            @RenderSection("featured", required: false)
            <section class="content-wrapper main-content clear-fix">
                @RenderBody()
            </section>
        </div>
    </body>
</html>
```

SOLUTION EXPLORER

Search Solution Explorer (Ctrl+F)

MvcMovie

- Properties
- References
- App_Data
- Content
- Controllers
- Images
- Models
- Scripts
- Views
 - Account
 - HelloWorld
 - Home
 - Shared
 - _Layout.cshtml
 - _LoginPartial.cshtml
 - Error.cshtml
 - _ViewStart.cshtml

Web.config

favicon.ico

Global.asax

packages.config

Web.config

Source

ERROR LIST OUTPUT FIND RESULTS 1

Ready Ln 1 Col 1 Ch 1 INS

Layout templates allow you to specify the HTML container layout of your site in one place and then apply it across multiple pages in your site. Find the `@RenderBody()` line. `RenderBody` is a placeholder where all the view-specific pages you create show up, "wrapped" in the layout page. For example, if you select the About link, the `Views\Home\About.cshtml` view is rendered inside the `RenderBody` method.

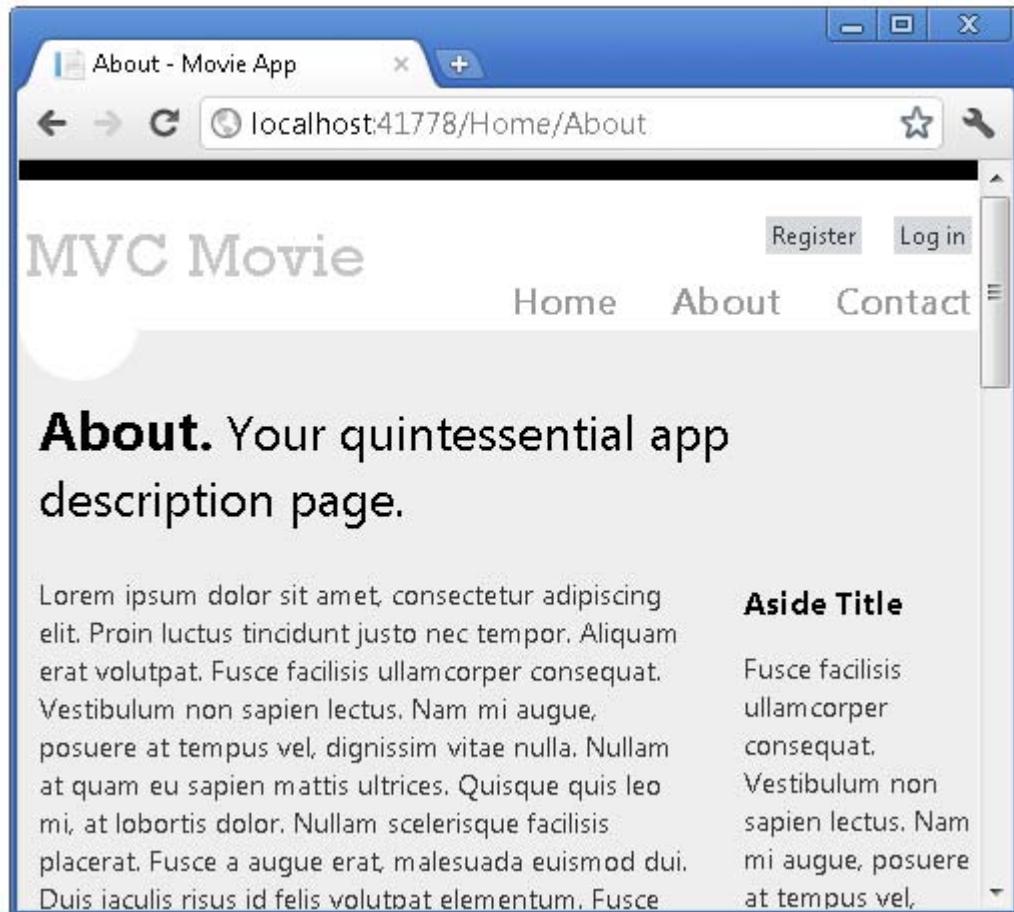
Change the site-title heading in the layout template from "your logo here" to "MVC Movie".

```
<div class="float-left">
<p class="site-title">@Html.ActionLink("MVC Movie", "Index", "Home")</p>
</div>
```

Replace the contents of the title element with the following markup:

```
<title>@ViewBag.Title - Movie App</title>
```

The `ViewBag` is a `zzz` (dict object). Run the application and notice that it now says "MVC Movie ". Click the `About` link, and you see how that page shows "MVC Movie", too. We were able to make the change once in the layout template and have all pages on the site reflect the new title.



The complete `_Layout.cshtml` file is shown below:

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="utf-8"/>
<title>@ViewBag.Title - Movie App</title>
<link href="~/favicon.ico" rel="shortcut icon" type="image/x-icon"/>
<link href="@System.Web.Optimization.BundleTable.Bundles.ResolveBundleUrl("~/Content/css")" rel="stylesheet" type="text/css"/>
<link href="@System.Web.Optimization.BundleTable.Bundles.ResolveBundleUrl("~/Content/themes/base/css")" rel="stylesheet" type="text/css"/>
<script src="@System.Web.Optimization.BundleTable.Bundles.ResolveBundleUrl("~/Scripts/js")"></script>
<meta name="viewport" content="width=device-width"/>
</head>
```

```
<body>
<header>
<div class="content-wrapper">
<div class="float-left">
<p class="site-title">@Html.ActionLink("MVC Movie", "Index", "Home")</p>
</div>
<div class="float-right">
<section id="login">
@Html.Partial("_LoginPartial")
</section>
<nav>
<ul id="menu">
<li>@Html.ActionLink("Home", "Index", "Home")</li>
<li>@Html.ActionLink("About", "About", "Home")</li>
<li>@Html.ActionLink("Contact", "Contact", "Home")</li>
</ul>
</nav>
</div>
</div>
</header>
<div id="body">
@RenderSection("featured", required: false)
<section class="content-wrapper main-content clear-fix">
@RenderBody()
</section>
</div>
<footer>
<div class="content-wrapper">
<div class="float-left">
<p>&copy; @DateTime.Now.Year - My ASP.NET MVC Application</p>
</div>
<div class="float-right">
<ul id="social">
<li><a href="http://facebook.com" class="facebook">Facebook</a></li>
<li><a href="http://twitter.com" class="twitter">Twitter</a></li>
</ul>
</div>
</div>
</div>
```

```
</footer>
</body>
</html>
```

Now, let's change the title of the Index view.

Open `MvcMovie\Views\HelloWorld\Index.cshtml`. There are two places to make a change: first, the text that appears in the title of the browser, and then in the secondary header (the `<h2>` element). You'll make them slightly different so you can see which bit of code changes which part of the app.

```
@{
    ViewBag.Title = "Movie List";
}

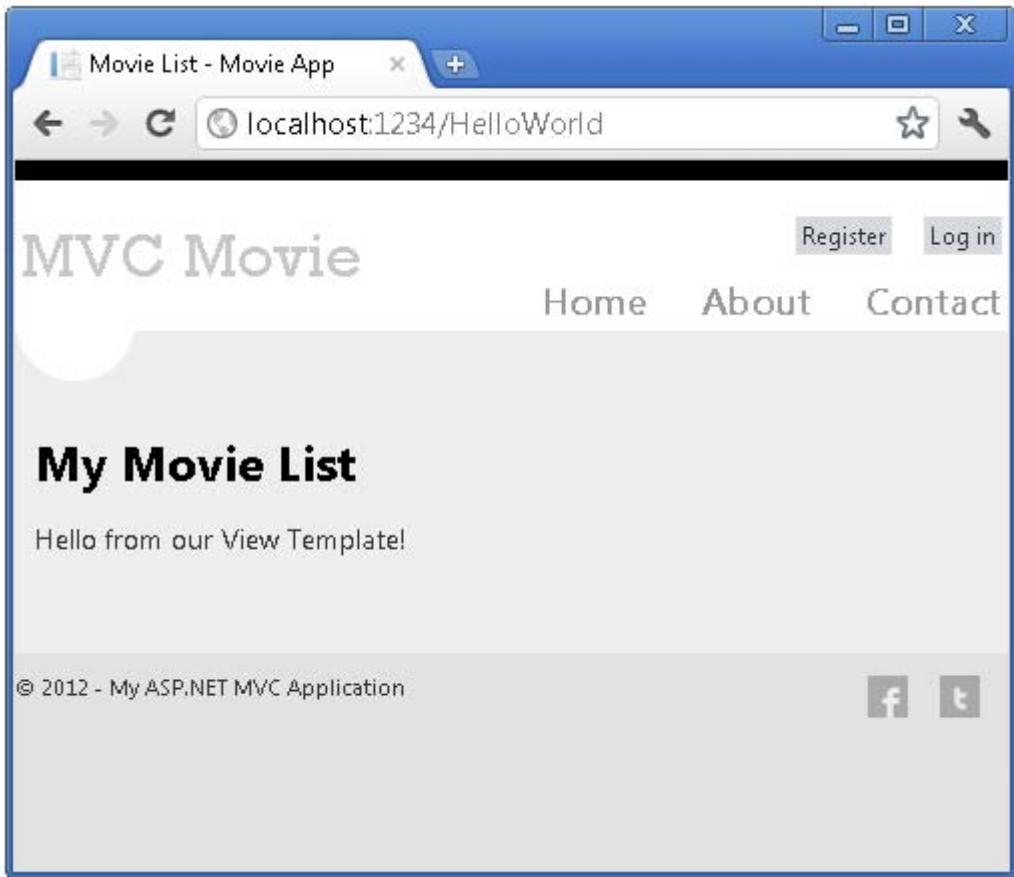
<h2>My Movie List</h2>

<p>Hello from our View Template!</p>
```

To indicate the HTML title to display, the code above sets a `Title` property of the `ViewBag` object (which is in the `Index.cshtml` view template). If you look back at the source code of the layout template, you'll notice that the template uses this value in the `<title>` element as part of the `<head>` section of the HTML that we modified previously. Using this `ViewBag` approach, you can easily pass other parameters between your view template and your layout file.

Run the application and browse to `http://localhost:xx/HelloWorld`. Notice that the browser title, the primary heading, and the secondary headings have changed. (If you don't see changes in the browser, you might be viewing cached content. Press `Ctrl+F5` in your browser to force the response from the server to be loaded.) The browser title is created with the `ViewBag.Title` we set in the `Index.cshtml` view template and the additional "-Movie App" added in the layout file.

Also notice how the content in the `Index.cshtml` view template was merged with the `_Layout.cshtml` view template and a single HTML response was sent to the browser. Layout templates make it really easy to make changes that apply across all of the pages in your application.



Our little bit of "data" (in this case the "Hello from our View Template!" message) is hard-coded, though. The MVC application has a "V" (view) and you've got a "C" (controller), but no "M" (model) yet. Shortly, we'll walk through how to create a database and retrieve model data from it.

Passing Data from the Controller to the View

Before we go to a database and talk about models, though, let's first talk about passing information from the controller to a view. Controller classes are invoked in response to an incoming URL request. A controller class is where you write the code that handles the incoming browser requests, retrieves data from a database, and ultimately decides what type of response to send back to the browser. View templates can then be used from a controller to generate and format an HTML response to the browser.

Controllers are responsible for providing whatever data or objects are required in order for a view template to render a response to the browser. A best practice: **A view template should never perform business logic or interact with a database directly.** Instead, a view template should work only with the data that's provided to it by the controller. Maintaining this "separation of concerns" helps keep your code clean, testable and more maintainable.

Currently, the `Welcome` action method in the `HelloWorldController` class takes a `name` and a `numTimes` parameter and then outputs the values directly to the browser. Rather than have the controller render this response as a string, let's change the controller to use a view template instead. The view template will generate a dynamic response, which means that you need to pass appropriate bits of data from the controller to the view in order to generate the response. You can do this by having the controller put the dynamic data (parameters) that the view template needs in a `ViewBag` object that the view template can then access.

Return to the `HelloWorldController.cs` file and change the `Welcome` method to add a `Message` and `NumTimes` value to the `ViewBag` object. `ViewBag` is a dynamic object, which means you can put whatever you want in to it; the `ViewBag` object has no defined properties until you put something inside it. The [ASP.NET MVC model binding system](#) automatically maps the named parameters (`name` and `numTimes`) from the query string in the address bar to parameters in your method. The complete `HelloWorldController.cs` file looks like this:

```
usingSystem.Web;
usingSystem.Web.Mvc;

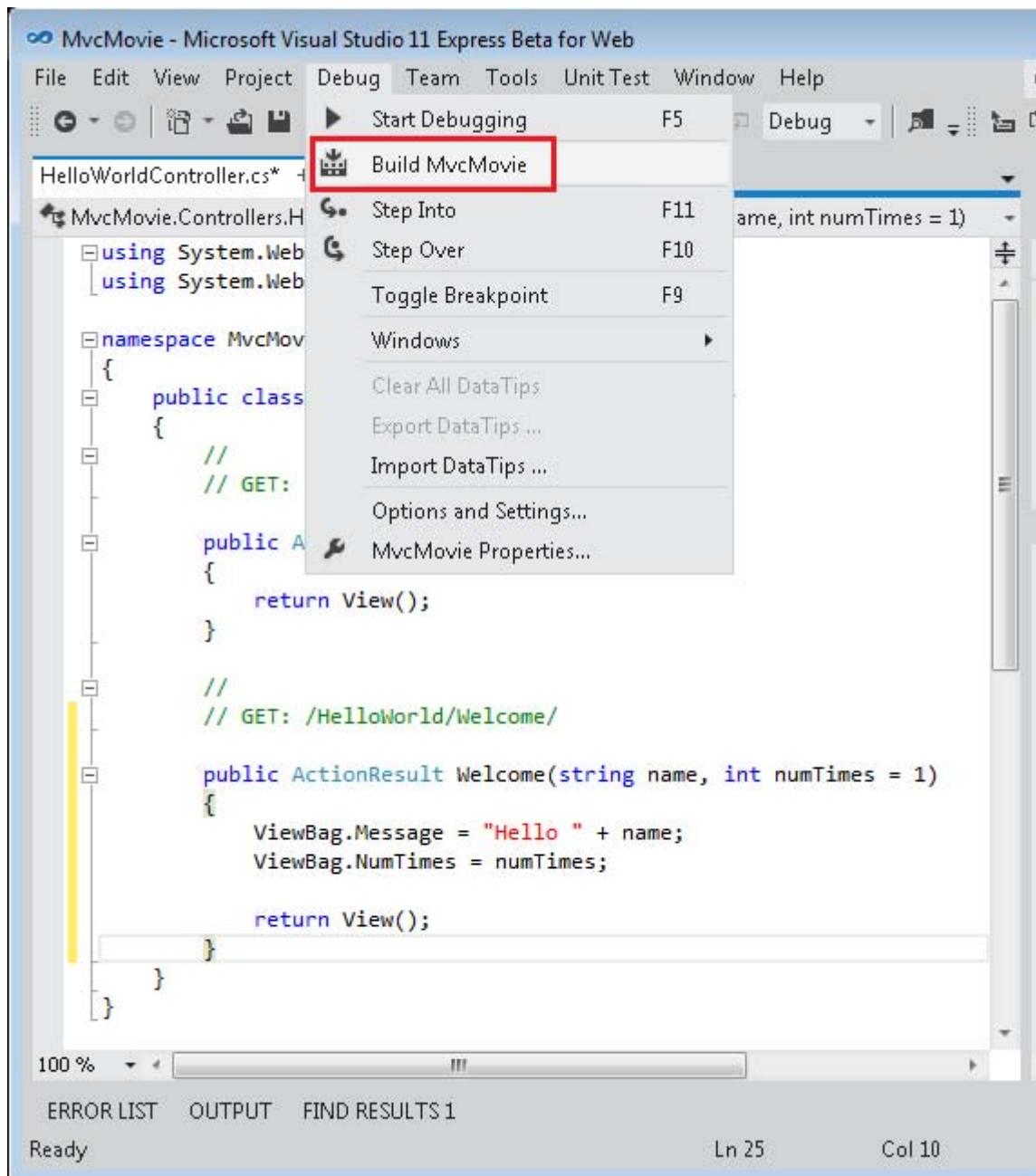
namespaceMvcMovie.Controllers
{
    publicclassHelloWorldController:Controller
    {
        publicActionResultIndex()
        {
            returnView();
        }

        publicActionResultWelcome(string name,int numTimes =1)
        {
            ViewBag.Message="Hello "+ name;
            ViewBag.NumTimes= numTimes;

            returnView();
        }
    }
}
```

Now the `ViewBag` object contains data that will be passed to the view automatically.

Next, you need a Welcome view template! In the **Build** menu, select **Build MvcMovie** to make sure the project is compiled.



Then right-click inside the `Welcome` method and click **Add View**.



Internet Explorer ▾ Debug ▾

HelloWorldController.cs* ▾ _Layout.cshtml Index.cshtml

MvcMovie.Controllers.HelloWorldCor ▾ Welcome(string name, int numTimes)

```
{\n    public class HelloWorldController : Controller\n    {\n        //\n        // GET: /HelloWorld/\n\n        public ActionResult Index()\n        {\n            return View();\n        }\n\n        //\n        // GET: /HelloWorld>Welcome/\n\n        public ActionResult Welcome(string name, int numTim
```

- Add View... Ctrl+M, Ctrl+V
- Go To View Ctrl+M, Ctrl+G
- Refactor
- Organize Usings
- Run Unit Tests Ctrl+R, T
- Comment Selection Ctrl+K, Ctrl+C
- Uncomment Selection Ctrl+K, Ctrl+U
- Insert Snippet... Ctrl+K, Ctrl+X
- Surround With... Ctrl+K, Ctrl+S
- Go To Definition F12
- Find All References Shift+F12
- Breakpoint
- Run To Cursor Ctrl+F10
- Run Flagged Threads To Cursor
- Cut Ctrl+X
- Copy Ctrl+C
- Paste Ctrl+V
- Outlining
- Source Control

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ERROR LIST OUTPUT FIND RESULTS

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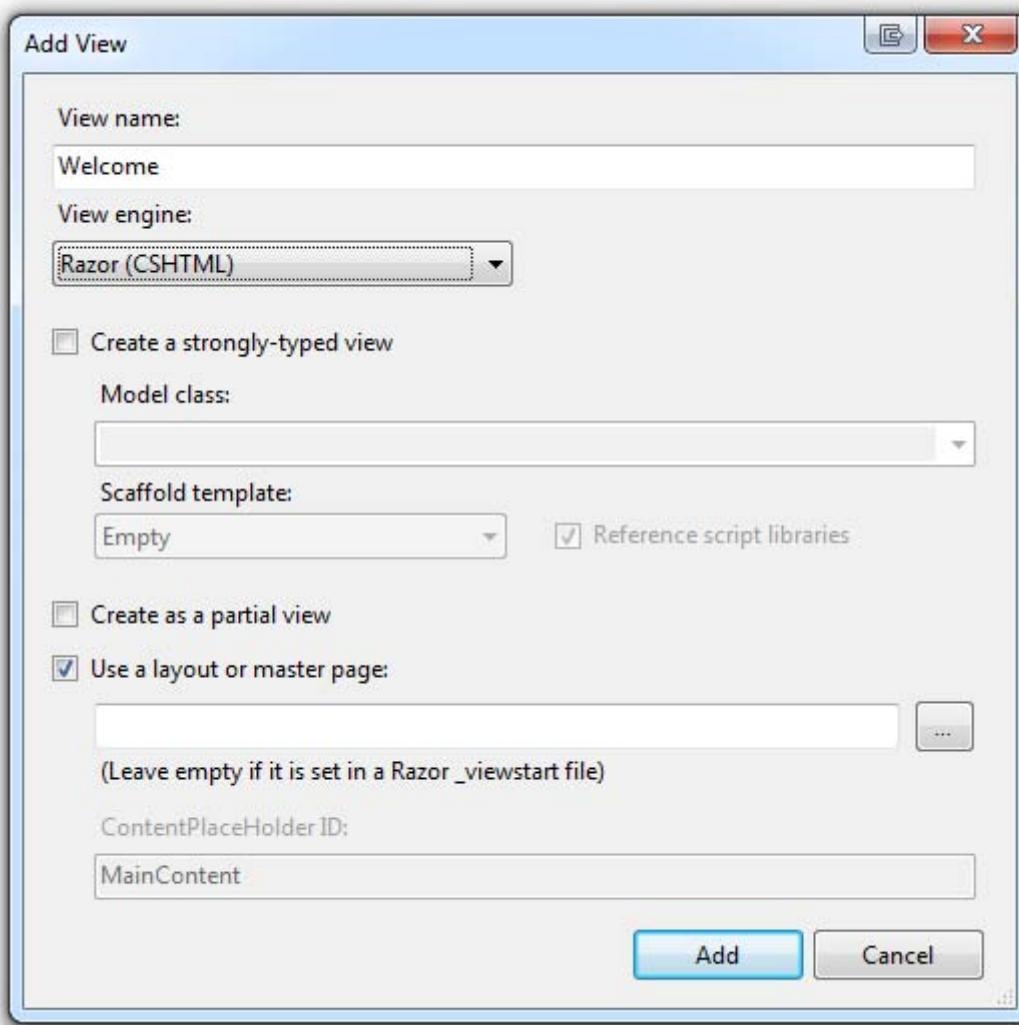
INS

SOLUTION EXPLORER ▾

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 - packages.config
 - Web.config

Here's what the **Add View** dialog box looks like:



Click **Add**, and then add the following code under the `< h2>` element in the new `Welcome.cshtml` file. You'll create a loop that says "Hello" as many times as the user says it should. The complete `Welcome.cshtml` file is shown below.

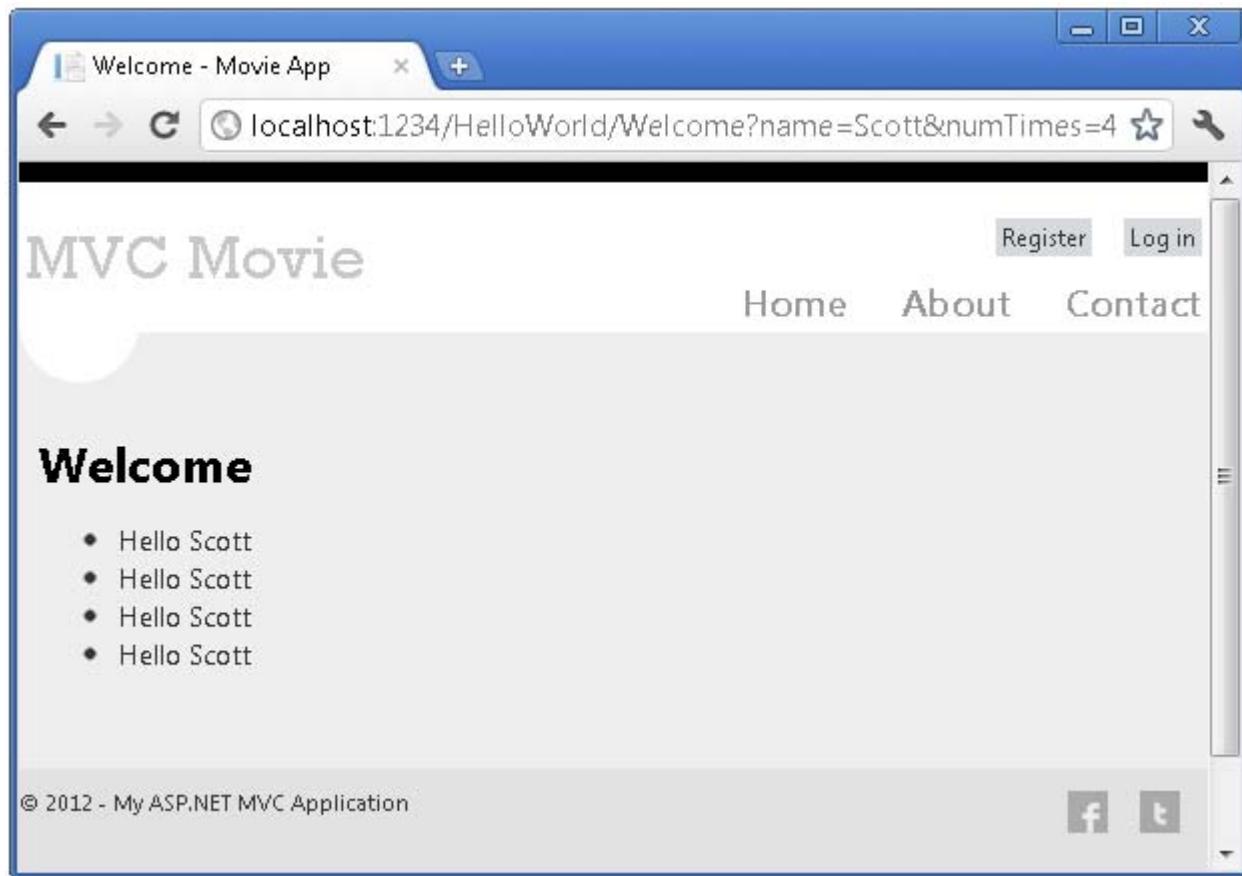
```
@{  
    ViewBag.Title = "Welcome";  
}  
  
<h2>Welcome</h2>  
  
<ul>
```

```
@for (int i=0; i < ViewBag.NumTimes; i++) {  
    <li>@ViewBag.Message</li>  
}  
/>
```

Run the application and browse to the following URL:

<http://localhost:xx/HelloWorld/Welcome?name=Scott&numtimes=4>

Now data is taken from the URL and passed to the controller using the [model binder](#). The controller packages the data into a [ViewBag](#) object and passes that object to the view. The view then displays the data as HTML to the user.



Well, that was a kind of an "M" for model, but not the database kind. Let's take what we've learned and create a database of movies.

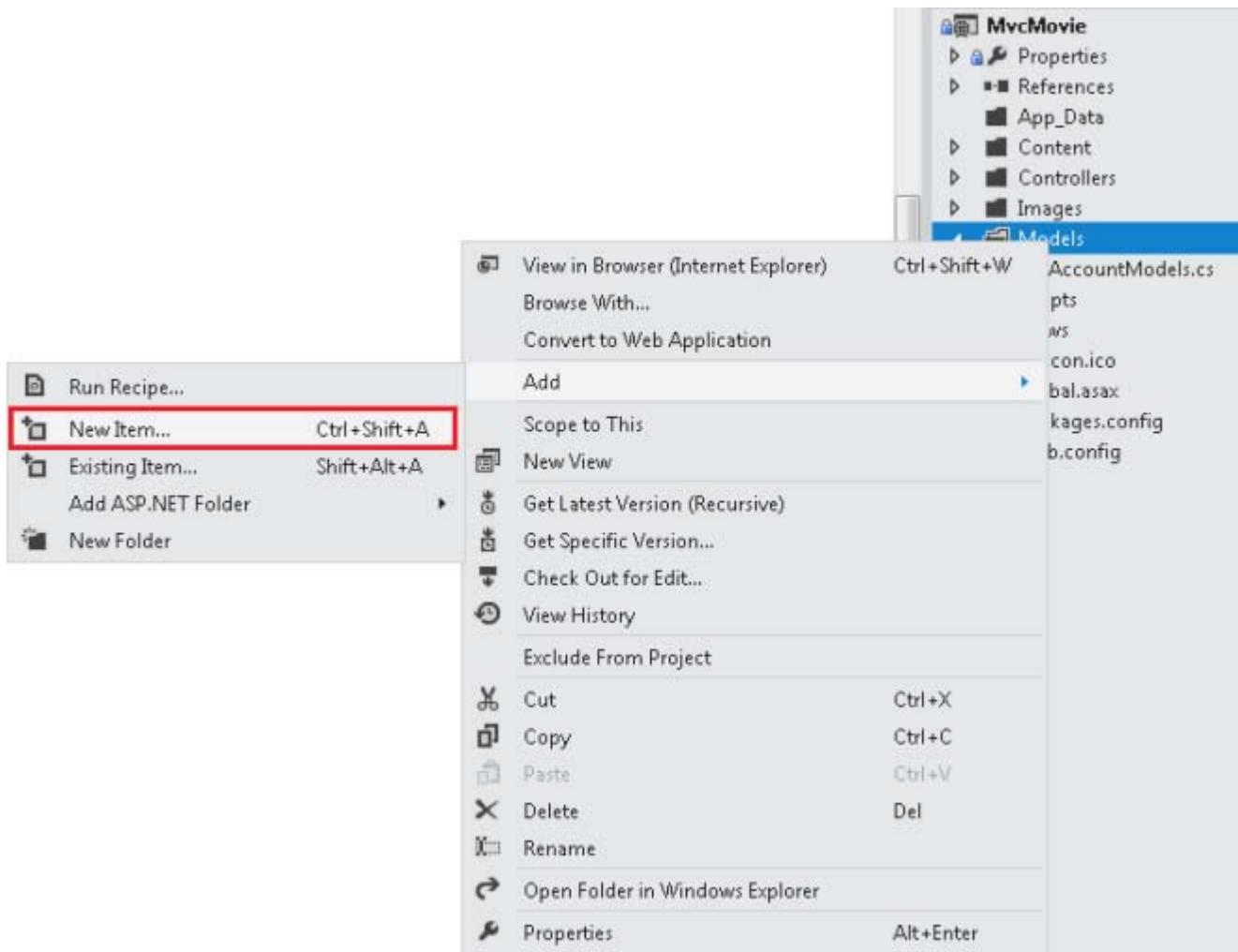
Adding a Model

In this section you'll add some classes for managing movies in a database. These classes will be the "model" part of the ASP.NET MVC application.

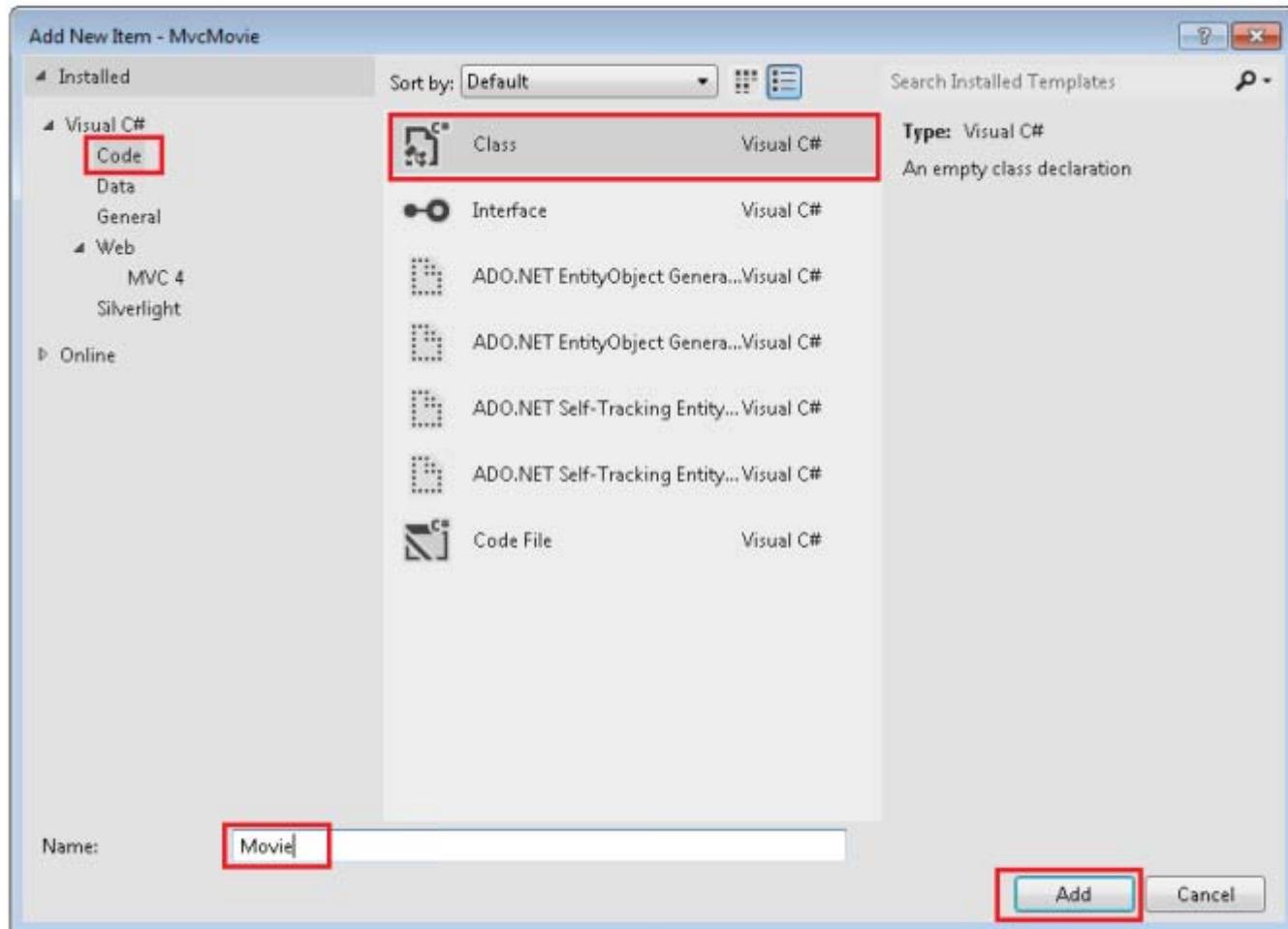
You'll use a .NET Framework data-access technology known as the Entity Framework to define and work with these model classes. The Entity Framework (often referred to as EF) supports a development paradigm called *Code First*. Code First allows you to create model objects by writing simple classes. (These are also known as POCO classes, from "plain-old CLR objects.") You can then have the database created on the fly from your classes, which enables a very clean and rapid development workflow.

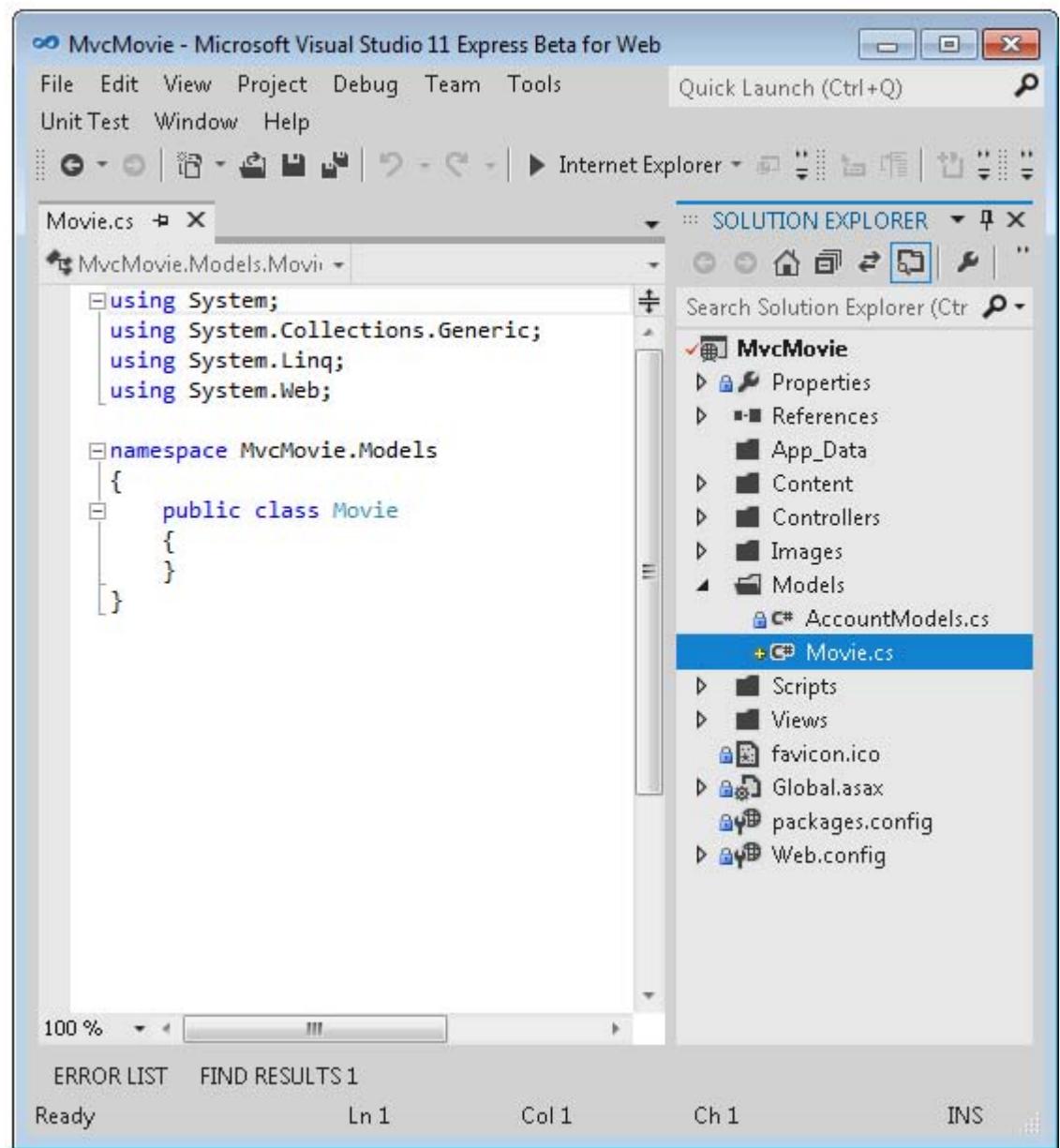
Adding Model Classes

In **Solution Explorer**, right click the *Models* folder, select **Add**, and then select **New Item**.



In the **Add New Item** dialog, select **Class** then name the class "Movie".





Add the following five properties to the **Movie** class:

```
public class Movie
{
    public int ID { get; set; }
    public string Title { get; set; }
    public DateTime ReleaseDate { get; set; }
    public string Genre { get; set; }
    public decimal Price { get; set; }
```

```
}
```

We'll use the `Movie` class to represent movies in a database. Each instance of a `Movie` object will correspond to a row within a database table, and each property of the `Movie` class will map to a column in the table.

In the same file, add the following `MovieDBContext` class:

```
public class MovieDBContext : DbContext
{
    public DbSet<Movie> Movies { get; set; }
}
```

The `MovieDBContext` class represents the Entity Framework movie database context, which handles fetching, storing, and updating `Movie` class instances in a database. The `MovieDBContext` derives from the `DbContext` base class provided by the Entity Framework. For more information about `DbContext` and `DbSet`, see [Productivity Improvements for the Entity Framework](#).

In order to be able to reference `DbContext` and `DbSet`, you need to add the following `using` statement at the top of the file:

```
using System.Data.Entity;
```

The complete `Movie.cs` file is shown below. (Several using statements that are not needed have been removed.)

```
using System;
using System.Data.Entity;

namespace MvcMovie.Models
{
    public class Movie
    {
        public int ID { get; set; }
        public string Title { get; set; }
        public DateTime ReleaseDate { get; set; }
        public string Genre { get; set; }
        public decimal Price { get; set; }
    }
}
```

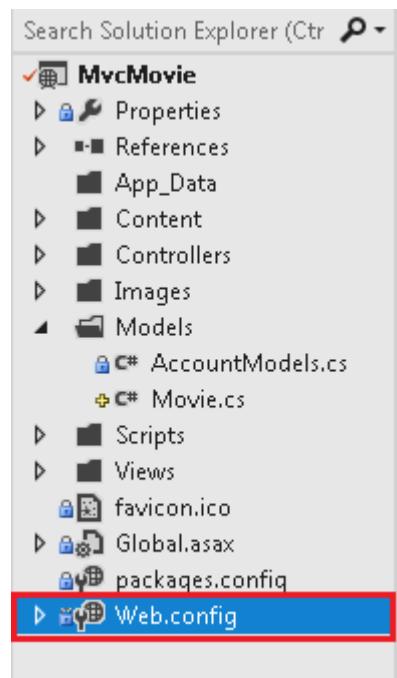
```
}

public class MovieDBContext : DbContext
{
    public DbSet<Movie> Movies { get; set; }
}
```

Creating a Connection String and Working with SQL Server LocalDB

The **MovieDBContext** class you created handles the task of connecting to the database and mapping **Movie** objects to database records. One question you might ask, though, is how to specify which database it will connect to. You'll do that by adding connection information in the *Web.config* file of the application.

Open the application root *Web.config* file. (Not the *Web.config* file in the *Views* folder.) Open the *Web.config* file outlined in red.



Add the following connection string to the **<connectionStrings>** element in the *Web.config* file.

```
<add name="MovieDBContext"
```

```
connectionString="Data
Source=(LocalDB)\v11.0;AttachDbFilename=|DataDirectory|\Movies.mdf;Integrated
Security=True"
providerName="System.Data.SqlClient"
/>>
```

The following example shows a portion of the *Web.config* file with the new connection string added:

```
<connectionStrings>
<addname="DefaultConnection"
connectionString="Data Source=(LocalDb)\v11.0;Initial Catalog=aspnet-MvcMovie-
2012213181139;Integrated Security=true"
providerName="System.Data.SqlClient"
/>
<addname="MovieDBContext"
connectionString="Data
Source=(LocalDB)\v11.0;AttachDbFilename=|DataDirectory|\Movies.mdf;Integrated
Security=True"
providerName="System.Data.SqlClient"
/>
</connectionStrings>
```

This small amount of code and XML is everything you need to write in order to represent and store the movie data in a database.

Next, you'll build a new **MoviesController** class that you can use to display the movie data and allow users to create new movie listings.

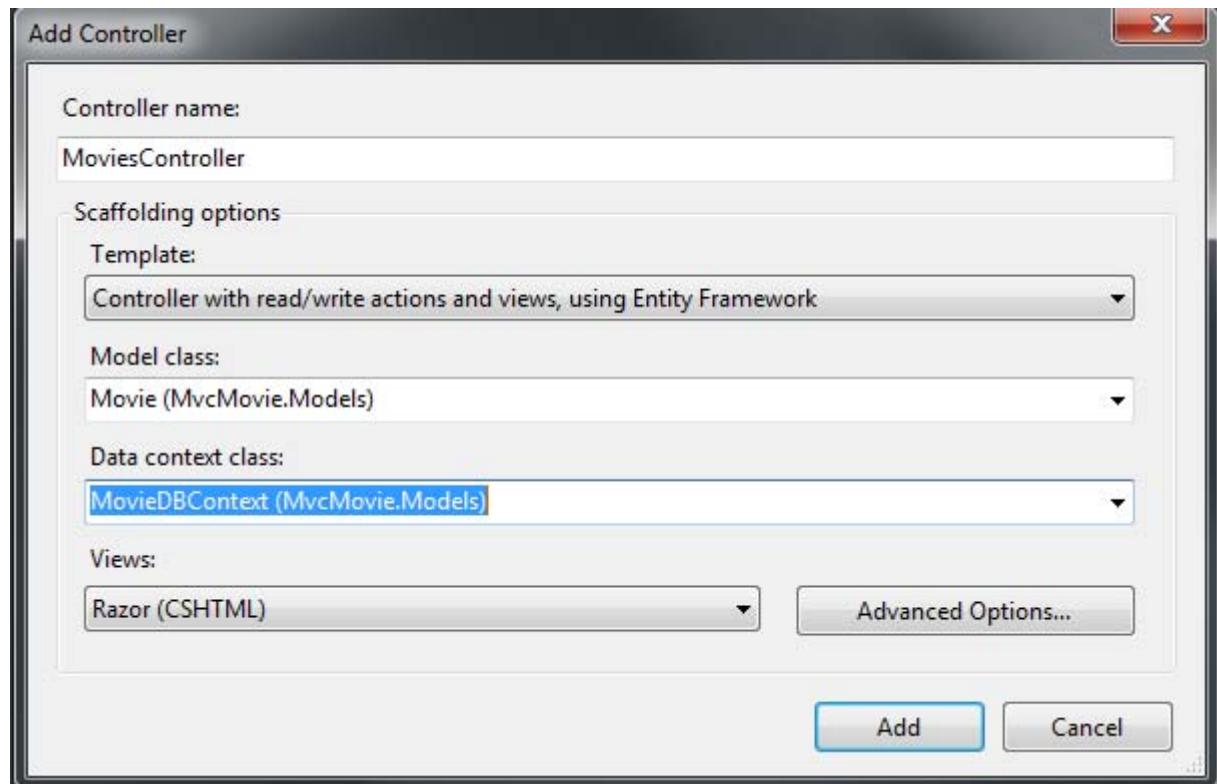
Accessing Your Model's Data from a Controller

In this section, you'll create a new **MoviesController** class and write code that retrieves the movie data and displays it in the browser using a view template.

Build the application before going on to the next step.

Right-click the *Controllers* folder and create a new **MoviesController** controller. The options below will not appear until you build your application. Select the following options:

- Controller name: **MoviesController**. (This is the default.)
- Template: **Controller with read/write actions and views, using Entity Framework**.
- Model class: **Movie (MvcMovie.Models)**.
- Data context class: **MovieDBContext (MvcMovie.Models)**.
- Views: **Razor (CSHTML)**. (The default.)



Click **Add**. Visual Studio Express creates the following files and folders:

- A *MoviesController.cs* file in the project's *Controllers* folder.

- A *Movies* folder in the project's *Views* folder.
- *Create.cshtml*, *Delete.cshtml*, *Details.cshtml*, *Edit.cshtml*, and *Index.cshtml* in the new *Views\Movies* folder.

MvcMovie - Microsoft Visual Studio 11 Express Beta for Web

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MoviesController.cs Create.cshtml

```
MvcMovie.Controllers.Movie: db
```

```
using System;
using System.Collections.Generic;
using System.Data;
using System.Data.Entity;
using System.Linq;
using System.Web;
using System.Web.Mvc;
using MvcMovie.Models;

namespace MvcMovie.Controllers
{
    public class MoviesController : Controller
    {
        private MovieDBContext db = new MovieDBContext();

        // GET: /Movies/
        public ActionResult Index()
        {
            return View(db.Movies.ToList());
        }

        // GET: /Movies/Details/5
        public ActionResult Details(int id = 0)
        {
            Movie movie = db.Movies.Find(id);
            if (movie == null)
            {
                return HttpNotFound();
            }
            return View(movie);
        }

        // GET: /Movies/Create
    }
}
```

MvcMovie

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- Global.asax
- packages.config
- Web.config

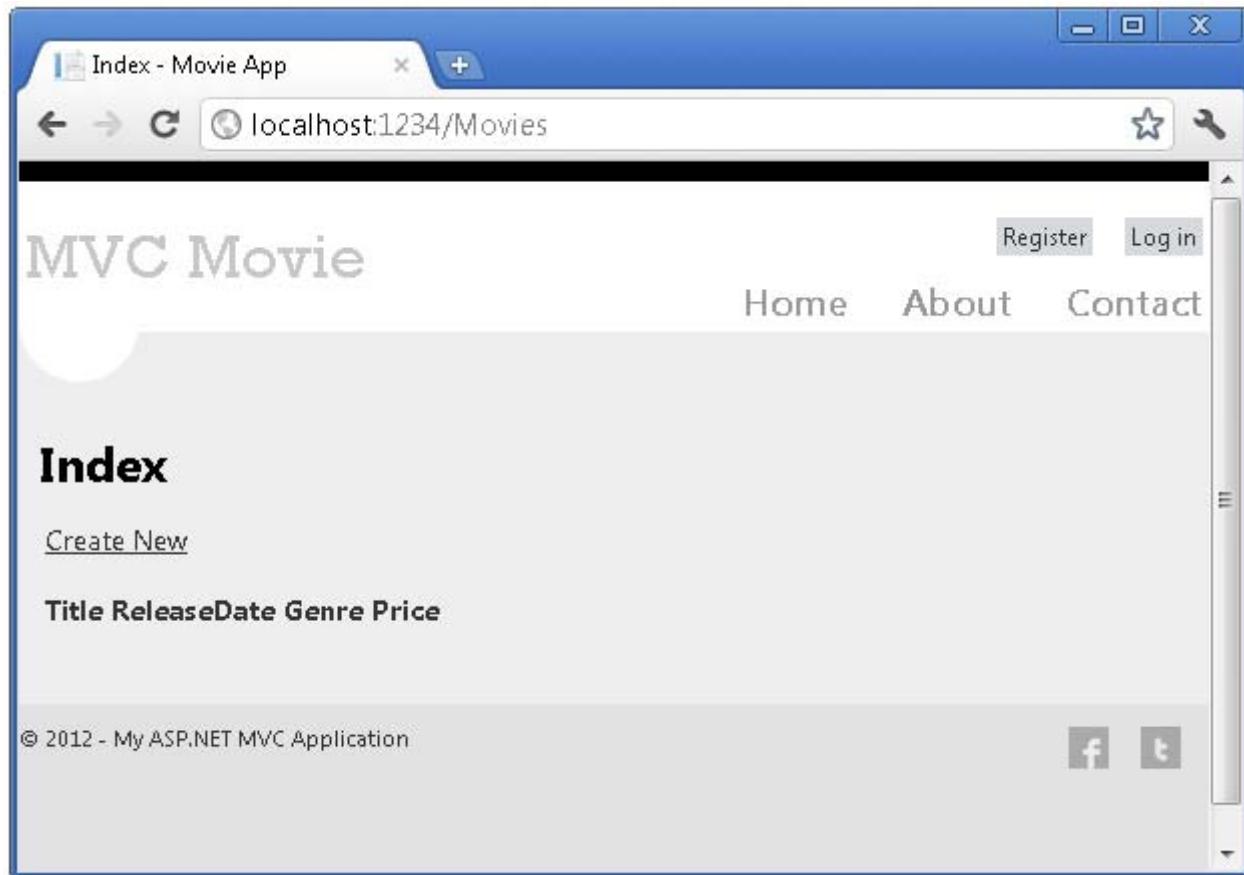
100 %

ERROR LIST FIND RESULTS 1

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ASP.NET MVC 4 automatically created the CRUD (create, read, update, and delete) action methods and views for you (the automatic creation of CRUD action methods and views is known as scaffolding). You now have a fully functional web application that lets you create, list, edit, and delete movie entries.

Run the application and browse to the **Movies** controller by appending `/Movies` to the URL in the address bar of your browser. Because the application is relying on the default routing (defined in the `Global.asax` file), the browser request `http://localhost:xxxx/Movies` is routed to the default **Index** action method of the **Movies** controller. In other words, the browser request `http://localhost:xxxx/Movies` is effectively the same as the browser request `http://localhost:xxxx/Movies/Index`. The result is an empty list of movies, because you haven't added any yet.



Creating a Movie

Select the **Create New** link. Enter some details about a movie and then click the **Create** button.

Create - Movie App

localhost:1234/Movies/Create

MVC Movie

Home About Contact Register Log in

Create

Title

ReleaseDate

Genre

Price

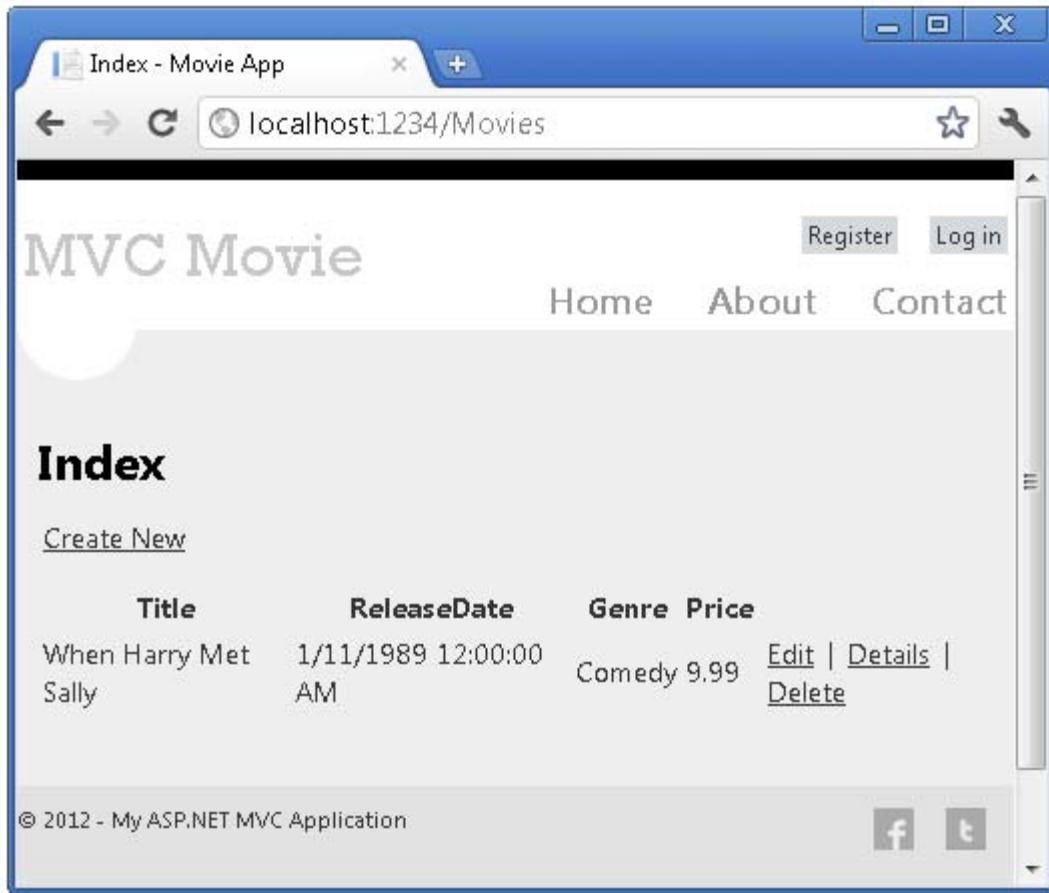
Create

[Back to List](#)

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Clicking the **Create** button causes the form to be posted to the server, where the movie information is saved in the database. You're then redirected to the `/Movies` URL, where you can see the newly created movie in the listing.



Create a couple more movie entries. Try the **Edit**, **Details**, and **Delete** links, which are all functional.

Examining the Generated Code

Open the *Controllers\MoviesController.cs* file and examine the generated **Index** method. A portion of the movie controller with the **Index** method is shown below.

```
public class MoviesController : Controller
{
    private MovieDBContext db = new MovieDBContext();

    //
    // GET: /Movies/

    public ActionResult Index()
    {
        return View(db.Movies.ToList());
    }
}
```

```
}
```

The following line from the `MoviesController` class instantiates a movie database context, as described previously. You can use the movie database context to query, edit, and delete movies.

```
private MovieDBContext db = new MovieDBContext();
```

A request to the `Movies` controller returns all the entries in the `Movies` table of the movie database and then passes the results to the `Index` view.

Strongly Typed Models and the @model Keyword

Earlier in this tutorial, you saw how a controller can pass data or objects to a view template using the `ViewBag` object. The `ViewBag` is a dynamic object that provides a convenient late-bound way to pass information to a view.

ASP.NET MVC also provides the ability to pass strongly typed data or objects to a view template. This strongly typed approach enables better compile-time checking of your code and richer IntelliSense in the Visual Studio Express editor. The scaffolding mechanism in Visual Studio Express used this approach with the `MoviesController` class and view templates when it created the methods and views.

In the `Controllers\MoviesController.cs` file examine the generated `Details` method. A portion of the movie controller with the `Details` method is shown below.

```
public ActionResult Details(int id = 0)
{
    Movie movie = db.Movies.Find(id);
    if(movie == null)
    {
        return HttpNotFound();
    }
    return View(movie);
}
```

An instance of the `Movie` model is passed to the Details view.

By including a `@model` statement at the top of the view template file, you can specify the type of object that the view expects. When you created the movie controller, Visual Studio Express automatically included the following `@model` statement at the top of the `Details.cshtml` file:

```
@model MvcMovie.Models.Movie
```

This `@model` directive allows you to access the movie that the controller passed to the view by using a `Model` object that's strongly typed. For example, in the `Details.cshtml` template, the code passes each movie field to the `DisplayNameFor` and `DisplayFor` HTML Helpers with the strongly typed `Model` object. The Create and Edit methods and view templates also pass a movie model object.

Examine the `Index.cshtml` view template and the `Index` method in the `MoviesController.cs` file. Notice how the code creates a `List` object when it calls the `View` helper method in the `Index` action method. The code then passes this `Movies` list from the controller to the view:

```
public ActionResult Index()
{
    return View(db.Movies.ToList());
}
```

When you created the movie controller, Visual Studio Express automatically included the following `@model` statement at the top of the `Index.cshtml` file:

```
@model IEnumerable<MvcMovie.Models.Movie>
```

This `@model` directive allows you to access the list of movies that the controller passed to the view by using a `Model` object that's strongly typed. For example, in the `Index.cshtml` template, the code loops through the movies by doing a `foreach` statement over the strongly typed `Model` object:

```
@foreach (var item in Model) {
    <tr>
        <td>
            @Html.DisplayFor(modelItem => item.Title)
        </td>
        <td>
            @Html.DisplayFor(modelItem => item.ReleaseDate)
```

```
</td>
<td>
@Html.DisplayFor(modelItem => item.Genre)
</td>
<td>
@Html.DisplayFor(modelItem => item.Price)
</td>
<th>
@Html.DisplayFor(modelItem => item.Rating)
</th>
<td>
@Html.ActionLink("Edit", "Edit", new { id=item.ID }) |
@Html.ActionLink("Details", "Details", { id=item.ID }) |
@Html.ActionLink("Delete", "Delete", { id=item.ID })
</td>
</tr>
}
```

Because the `Model` object is strongly typed (as an `IEnumerable<Movie>` object), each `item` object in the loop is typed as `Movie`. Among other benefits, this means that you get compile-time checking of the code and full IntelliSense support in the code editor.

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Internet Explorer Debug

Index.cshtml* Web.config

```
        @Html.DisplayNameFor(model => model.Price)
    </th>
    <th></th>
</tr>

@foreach (var item in Model) {
    <tr>
        <td>
            @Html.DisplayFor(modelItem => item.Title)
        </td>
        <td>
            @Html.DisplayFor(modelItem => item.ReleaseDate)
        </td>
        <td>
            @Html.DisplayFor(modelItem => item.Genre)
        </td>
        <td>
            @Html.DisplayFor(modelItem => item.P)
        </td>
        <td>
            @Html.ActionLink("Edit", "Edit", new { id = item.ID })
            @Html.ActionLink("Details", "Detail", new { id = item.ID })
            @Html.ActionLink("Delete", "Delete", new { id = item.ID })
        </td>
    </tr>
}
</table>
```

Equals Genre GetHashCode GetType ID Movie.Price ReleaseDate Title ToString

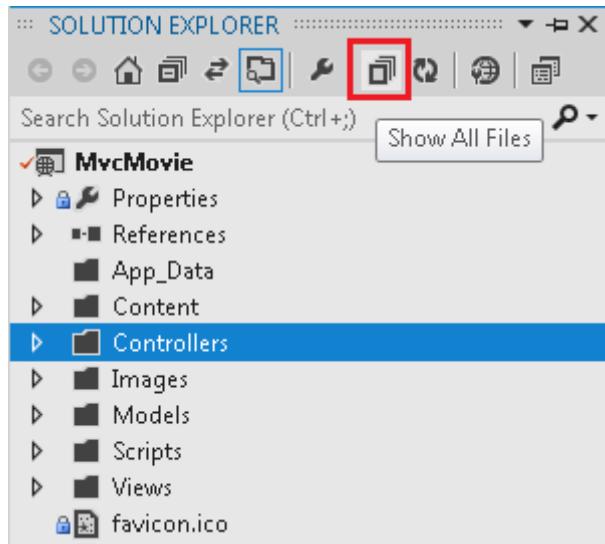
Source <table> <tr> <td>

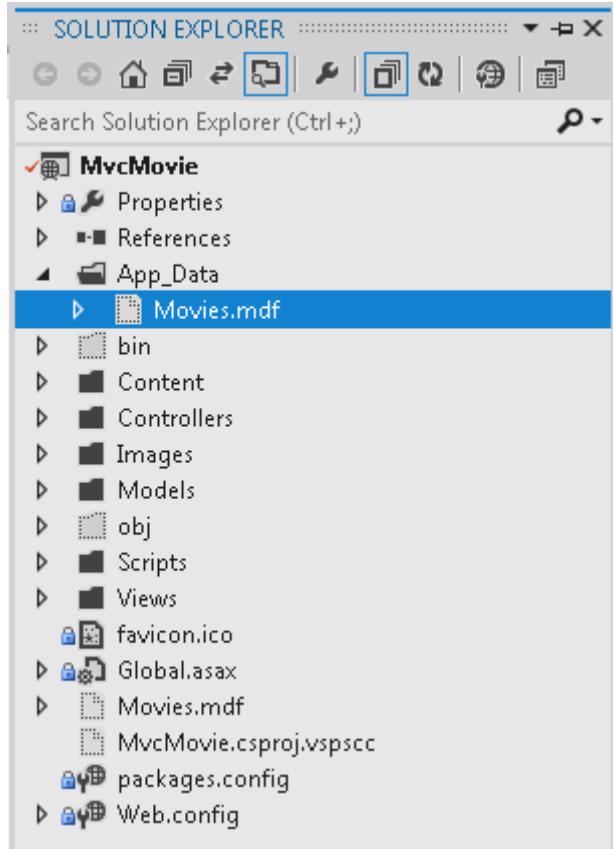
ERROR LIST OUTPUT FIND RESULTS 1

Ready Ln 41 Col 49 Ch 49 INS

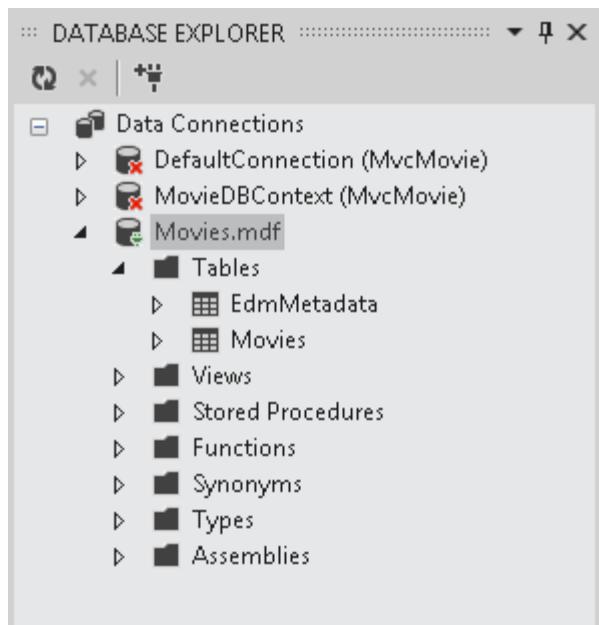
Working with SQL Server LocalDB

Entity Framework Code First detected that the database connection string that was provided pointed to a **Movies** database that didn't exist yet, so Code First created the database automatically. You can verify that it's been created by looking in the *App_Data* folder. If you don't see the *Movies.sdf* file, click the **Show All Files** button in the **Solution Explorer** toolbar, click the **Refresh** button, and then expand the *App_Data* folder.





Double-click *Movies.mdf* to open **DATABASE EXPLORER**. Then expand the **Tables** folder to see the tables that have been created in the database.



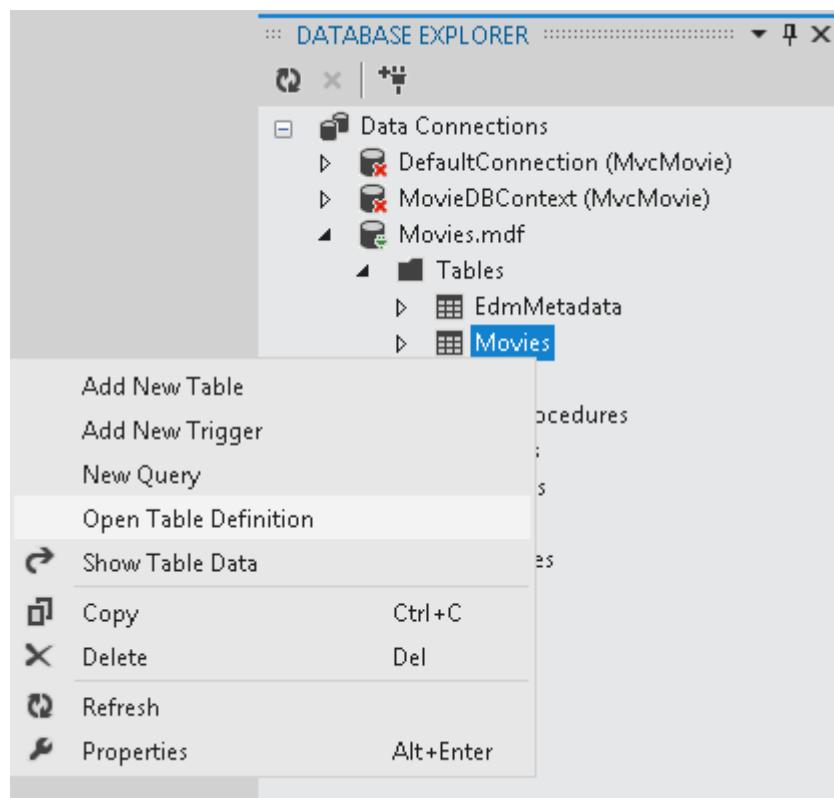
There are two tables, one for the **Movie** entity set and the **EdmMetadata** table. The **EdmMetadata** table is used by the Entity Framework to determine when the model and the database are out of sync.

Right-click the **Movies** table and select **Show Table Data** to see the data you created.

The screenshot shows the 'Movies' table data in the 'Data' view of the Database Explorer. The table has columns: ID, Title, ReleaseDate, Genre, and Price. There are three rows: 'Ghostbusters' (ID 1), 'Rio Bravo' (ID 2), and a new row with NULL values (ID *).

	ID	Title	ReleaseDate	Genre	Price
▶	1	Ghostbusters	1/11/1984 12:00:00	Comedy	7.99
▶	2	Rio Bravo	2/16/1959 12:00:00	Western	4.99
*	NULL	NULL	NULL	NULL	NULL

Right-click the **Movies** table and select **Open Table Definition** to see the table structure that Entity Framework Code First created for you.



The screenshot shows the Microsoft Visual Studio 11 Express Beta for Web interface. The title bar reads "MvcMovie - Microsoft Visual Studio 11 Express Beta for Web". The menu bar includes File, Edit, View, Project, Debug, Team, Tools, Unit Test, Window, Help. The toolbar has icons for Back, Forward, Refresh, Save, and others. A connection status bar at the bottom says "Connection Ready | (LocalDB)\v11.0 | REDMOND\riande | MOVIES_46ce488d79354a...".

The main window displays the "dbo.Movies [Design]" tab. It shows a table structure with five columns: Name, Data Type, and Allow Null. The columns are:

Name	Data Type	Allow Null
ID	int	<input type="checkbox"/>
Title	nvarchar(MAX)	<input checked="" type="checkbox"/>
ReleaseDate	datetime	<input type="checkbox"/>
Genre	nvarchar(MAX)	<input checked="" type="checkbox"/>
Price	decimal(18,2)	<input type="checkbox"/>

To the right of the table, there is a sidebar with the following sections:

- Keys (1) <unnamed> (Primary Key, Clustered)
- Check Constraints (0)
- Indexes (0)
- Foreign Keys (0)
- Triggers (0)

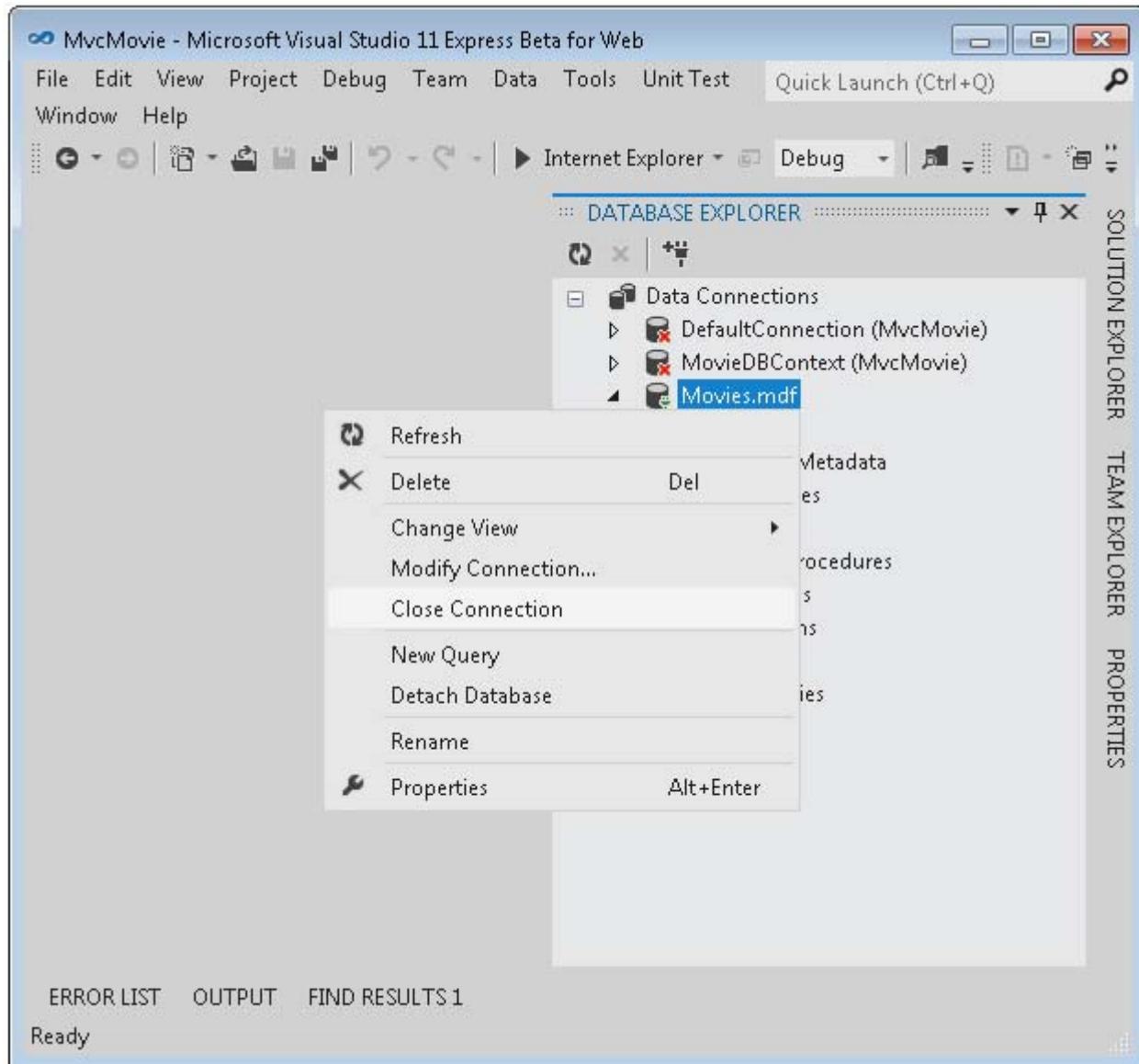
Below the table, there is a T-SQL code editor with the following SQL script:

```
CREATE TABLE [dbo].[Movies] (
    [ID] INT IDENTITY (1, 1) NOT NULL,
    [Title] NVARCHAR (MAX) NULL,
    [ReleaseDate] DATETIME NOT NULL,
    [Genre] NVARCHAR (MAX) NULL,
    [Price] DECIMAL (18, 2) NOT NULL,
    PRIMARY KEY CLUSTERED ([ID] ASC)
);
```

The status bar at the bottom shows "100 %", "ERROR LIST", "OUTPUT", "FIND RESULTS 1", and "Ready".

Notice how the schema of the **Movies** table maps to the **Movie** class you created earlier. Entity Framework Code First automatically created this schema for you based on your **Movie** class.

When you're finished, close the connection by right clicking *Movies.mdf* and selecting **Close Connection**. (If you don't close the connection, you might get an error the next time you run the project).



You now have the database and a simple listing page to display content from it. In the next tutorial, we'll examine the rest of the scaffolded code and add a `SearchIndex` method and a `SearchIndex` view that lets you search for movies in this database.

Examining the Edit Methods and Edit View

In this section, you'll examine the generated action methods and views for the movie controller. Then you'll add a custom search page.

Run the application and browse to the **Movies** controller by appending `/Movies` to the URL in the address bar of your browser. Hold the mouse pointer over an **Edit** link to see the URL that it links to.

The screenshot shows a web browser window titled "Index - Movie App" with the URL "localhost:1234/Movies". The page content is titled "MVC Movie" with navigation links for "Home", "About", and "Contact". Below this is a section titled "Index" with a "Create New" link. A table lists four movies:

Title	ReleaseDate	Genre	Price	
When Harry Met Sally	1/11/1989 12:00:00 AM	Romantic Comedy	9.99	Edit Details Delete
Ghostbusters	1/11/1984 12:00:00 AM	Comedy	7.99	Edit Details Delete
Ghostbusters II	9/1/1986 12:00:00 AM	Comedy	7.99	Edit Details Delete
Rio Bravo	4/15/1959 12:00:00 AM	Western	3.99	Edit Details Delete

The "Edit" link for the movie "Rio Bravo" is highlighted with a red box. At the bottom of the page, the status bar shows the URL "localhost:1234/Movies/Edit/4".

The **Edit** link was generated by the `Html.ActionLink` method in the `Views\Movies\Index.cshtml` view:

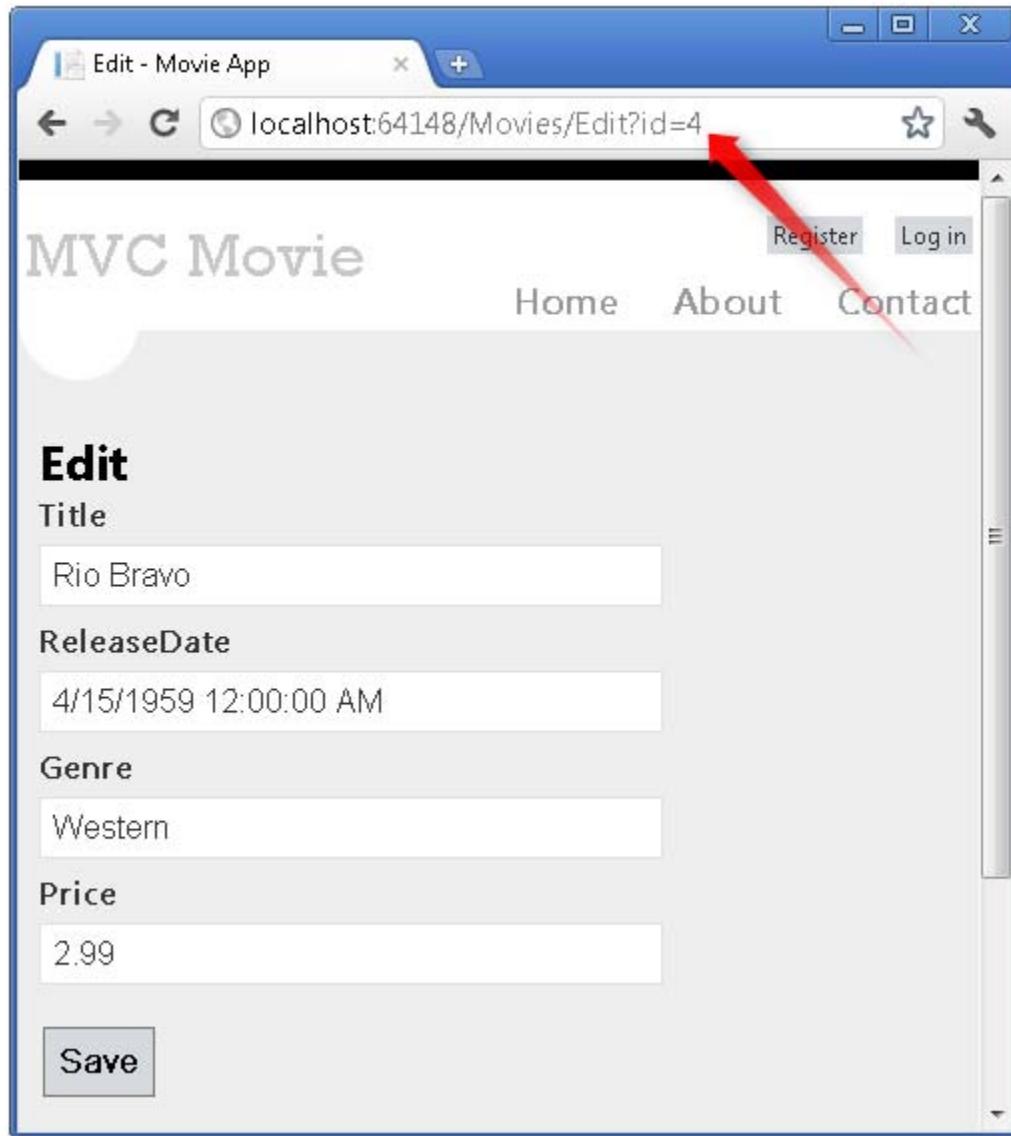
```
@Html.ActionLink("Edit", "Edit", new { id=item.ID })
```

<pre><td> <Html.ActionLink("Edit Me", "Edit", new { id=item.ID }) </pre>
<pre> <Html. (extension) MvcHtmlString HtmlHelper.ActionLink(string linkText, string actionName, object routeValues)</pre>
<pre> <Html. Returns an anchor element (a element) that contains the virtual path of the specified action.</pre>
<p>Exceptions:</p> <pre> System.ArgumentException</pre>

The `Html` object is a helper that's exposed using a property on the `System.Web.Mvc.WebViewPage` base class. The `ActionLink` method of the helper makes it easy to dynamically generate HTML hyperlinks that link to action methods on controllers. The first argument to the `ActionLink` method is the link text to render (for example, `<a>Edit Me`). The second argument is the name of the action method to invoke. The final argument is an `anonymous object` that generates the route data (in this case, the ID of 4).

The generated link shown in the previous image is `http://localhost:xxxxx/Movies/Edit/4`. The default route (established in `Global.asax.cs`) takes the URL pattern `{controller}/{action}/{id}`. Therefore, ASP.NET translates `http://localhost:xxxxx/Movies/Edit/4` into a request to the `Edit` action method of the `Movies` controller with the parameter `ID` equal to 4.

You can also pass action method parameters using a query string. For example, the URL `http://localhost:xxxxx/Movies/Edit?ID=4` also passes the parameter `ID` of 4 to the `Edit` action method of the `Movies` controller.



Open the **Movies** controller. The two **Edit** action methods are shown below.

```
//  
// GET: /Movies/Edit/5  
  
public ActionResult Edit(int id = 0)  
{  
    Movie movie = db.Movies.Find(id);  
    if(movie == null)  
    {  
        return HttpNotFound();  
    }
```

```

returnView(movie);
}

//  

// POST: /Movies/Edit/5

[HttpPost]
public ActionResult Edit(Movie movie)
{
    if(ModelState.IsValid)
    {
        db.Entry(movie).State=EntityState.Modified;
        db.SaveChanges();
        returnRedirectToAction("Index");
    }
    returnView(movie);
}

```

Notice the second `Edit` action method is preceded by the `HttpPost` attribute. This attribute specifies that that overload of the `Edit` method can be invoked only for POST requests. You could apply the `HttpGet` attribute to the first edit method, but that's not necessary because it's the default. (We'll refer to action methods that are implicitly assigned the `HttpGet` attribute as `HttpGet` methods.)

The `HttpGetEdit` method takes the movie ID parameter, looks up the movie using the Entity Framework `Find` method, and returns the selected movie to the Edit view. The ID parameter specifies a `default value` of zero if the `Edit` method is called without a parameter. If a movie cannot be found, `NotFound` is returned. When the scaffolding system created the Edit view, it examined the `Movie` class and created code to render `<label>` and `<input>` elements for each property of the class. The following example shows the Edit view that was generated:

```

@model MvcMovie.Models.Movie

@{
    ViewBag.Title = "Edit";
}



## Edit


```

```
<script src="@Url.Content("~/Scripts/jquery.validate.min.js")" type="text/javascript"><
/script>
<script src="@Url.Content("~/Scripts/jquery.validate.unobtrusive.min.js")" type="text/j
avascript"></script>

@using (Html.BeginForm()) {
    @Html.ValidationSummary(true)
    <fieldset>
        <legend>Movie</legend>

        @Html.HiddenFor(model => model.ID)

        <div class="editor-label">
            @Html.LabelFor(model => model.Title)
        </div>
        <div class="editor-field">
            @Html.EditorFor(model => model.Title)
            @Html.ValidationMessageFor(model => model.Title)
        </div>

        <div class="editor-label">
            @Html.LabelFor(model => model.ReleaseDate)
        </div>
        <div class="editor-field">
            @Html.EditorFor(model => model.ReleaseDate)
            @Html.ValidationMessageFor(model => model.ReleaseDate)
        </div>

        <div class="editor-label">
            @Html.LabelFor(model => model.Genre)
        </div>
        <div class="editor-field">
            @Html.EditorFor(model => model.Genre)
            @Html.ValidationMessageFor(model => model.Genre)
        </div>

        <div class="editor-label">
```

```

@Html.LabelFor(model => model.Price)
</div>
<div class="editor-field">
@Html.EditorFor(model => model.Price)
@Html.ValidationMessageFor(model => model.Price)
</div>

<p>
<input type="submit" value="Save" />
</p>
</fieldset>
}

<div>
@Html.ActionLink("Back to List", "Index")
</div>

```

Notice how the view template has a `@model MvcMovie.Models.Movie` statement at the top of the file — this specifies that the view expects the model for the view template to be of type `Movie`.

The scaffolded code uses several *helper methods* to streamline the HTML markup. The `Html.LabelFor` helper displays the name of the field ("Title", "ReleaseDate", "Genre", or "Price"). The `Html.EditorFor` helper renders an HTML `<input>` element. The `Html.ValidationMessageFor` helper displays any validation messages associated with that property.

Run the application and navigate to the `/Movies` URL. Click an **Edit** link. In the browser, view the source for the page. The HTML for the form element is shown below.

```

<form action="/Movies/Edit/4" method="post"><fieldset>
<legend>Movie</legend>

<input data-val="true" data-val-number="The field ID must be a number." data-val-
required="The ID field is required." id="ID" name="ID" type="hidden" value="4" />

<div class="editor-label">
<label for="Title">Title</label>
</div>

```

```
<div class="editor-field">
<input class="text-box single-line" id="Title" name="Title" type="text" value="Rio
Bravo"/>
<span class="field-validation-valid" data-valmsg-for="Title" data-valmsg-
replace="true"></span>
</div>

<div class="editor-label">
<label for="ReleaseDate">ReleaseDate</label>
</div>
<div class="editor-field">
<input class="text-box single-line" data-val="true" data-val-date="The field ReleaseDate
must be a date." data-val-required="The ReleaseDate field is
required." id="ReleaseDate" name="ReleaseDate" type="text" value="4/15/1959 12:00:00
AM"/>
<span class="field-validation-valid" data-valmsg-for="ReleaseDate" data-valmsg-
replace="true"></span>
</div>

<div class="editor-label">
<label for="Genre">Genre</label>
</div>
<div class="editor-field">
<input class="text-box single-line" id="Genre" name="Genre" type="text" value="Western"/>
<span class="field-validation-valid" data-valmsg-for="Genre" data-valmsg-
replace="true"></span>
</div>

<div class="editor-label">
<label for="Price">Price</label>
</div>
<div class="editor-field">
<input class="text-box single-line" data-val="true" data-val-number="The field Price
must be a number." data-val-required="The Price field is
required." id="Price" name="Price" type="text" value="2.99"/>
<span class="field-validation-valid" data-valmsg-for="Price" data-valmsg-
replace="true"></span>
</div>
```

```
<p>
<input type="submit" value="Save" />
</p>
</fieldset>
</form>
```

The `<input>` elements are in an HTML `<form>` element whose `action` attribute is set to post to the `/Movies/Edit` URL. The form data will be posted to the server when the **Edit** button is clicked.

Processing the POST Request

The following listing shows the `HttpPost` version of the **Edit** action method.

```
[HttpPost]
public ActionResult Edit(Movie movie)
{
    if(ModelState.IsValid)
    {
        db.Entry(movie).State=EntityState.Modified;
        db.SaveChanges();
        return RedirectToAction("Index");
    }
    return View(movie);
}
```

The [ASP.NET MVC model binder](#) takes the posted form values and creates a `Movie` object that's passed as the `movie` parameter. The `ModelState.IsValid` method verifies that the data submitted in the form can be used to modify (edit or update) a `Movie` object. If the data is valid, the movie data is saved to the `Movies` collection of the `db` (`MovieDBContext` instance). The new movie data is saved to the database by calling the `SaveChanges` method of `MovieDBContext`. After saving the data, the code redirects the user to the `Index` action method of the `MoviesController` class, which displays the of movie collection, including the changes just made..

If the posted values aren't valid, they are redisplayed in the form. The `Html.ValidationMessageFor` helpers in the `Edit.cshtml` view template take care of displaying appropriate error messages.

Edit - Movie App [Edit](#) | [Delete](#)

localhost:64148/Movies/Edit/2

MVC Movie

Register Log in

Home About Contact

Edit

Title

Ghostbusters

ReleaseDate

abc The field ReleaseDate must be a date.

Genre

Comedy

Price

zyz The field Price must be a number.

[Save](#)

[Back to List](#)

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The screenshot shows a web browser window with the title "Edit - Movie App". The address bar displays "localhost:64148/Movies/Edit/2". The page header includes "Register" and "Log in" links. Below the header are navigation links for "Home", "About", and "Contact". The main content area has a heading "Edit". It contains four input fields: "Title" with value "Ghostbusters", "ReleaseDate" with value "abc" (highlighted with a red border) and error message "The field ReleaseDate must be a date.", "Genre" with value "Comedy", and "Price" with value "zyz" (highlighted with a yellow border) and error message "The field Price must be a number.". At the bottom left is a "Save" button, and at the bottom right are links for social media platforms "f" and "t". The footer contains the copyright notice "© 2012 - My ASP.NET MVC Application".

Note about locales If you normally work with a locale other than English, see [Supporting ASP.NET MVC Validation with Non-English Locales](#). The decimal field may require a common, not a decimal point. As a temporary fix, you can add the globalization element to the projects root web.config file. The following code shows the globalization element with the culture set to United States English.

```
<system.web>

<globalizationculture="en-US"/>

<!--elements removed for clarity-->

</system.web>
```

All the **HttpGet** methods follow a similar pattern. They get a movie object (or list of objects, in the case of **Index**), and pass the model to the view. The **Create** method passes an empty movie object to the Create view. All the methods that create, edit, delete, or otherwise modify data do so in the **HttpPost** overload of the method. Modifying data in an HTTP GET method is a security risk, as described in the blog post entry [ASP.NET MVC Tip #46 – Don't use Delete Links because they create Security Holes](#). Modifying data in a GET method also violates HTTP best practices and the architectural REST pattern, which specifies that GET requests should not change the state of your application. In other words, performing a GET operation should be a safe operation that has no side effects and doesn't modify your persisted data.

Adding a Search Method and Search View

In this section you'll add a **SearchIndex** action method that lets you search movies by genre or name. This will be available using the `/Movies/SearchIndex` URL. The request will display an HTML form that contains input elements that a user can enter in order to search for a movie. When a user submits the form, the action method will get the search values posted by the user and use the values to search the database.

Displaying the SearchIndex Form

Start by adding a **SearchIndex** action method to the existing **MoviesController** class. The method will return a view that contains an HTML form. Here's the code:

```
publicActionResultSearchIndex(string searchString)
{
    var movies =from m in db.Movies
    select m;

    if(!String.IsNullOrEmpty(searchString))
    {
```

```
movies= movies.Where(s => s.Title.Contains(searchString));  
}  
  
returnView(movies);  
}
```

The first line of the **SearchIndex** method creates the following [LINQ](#) query to select the movies:

```
var movies =from m in db.Movies  
select m;
```

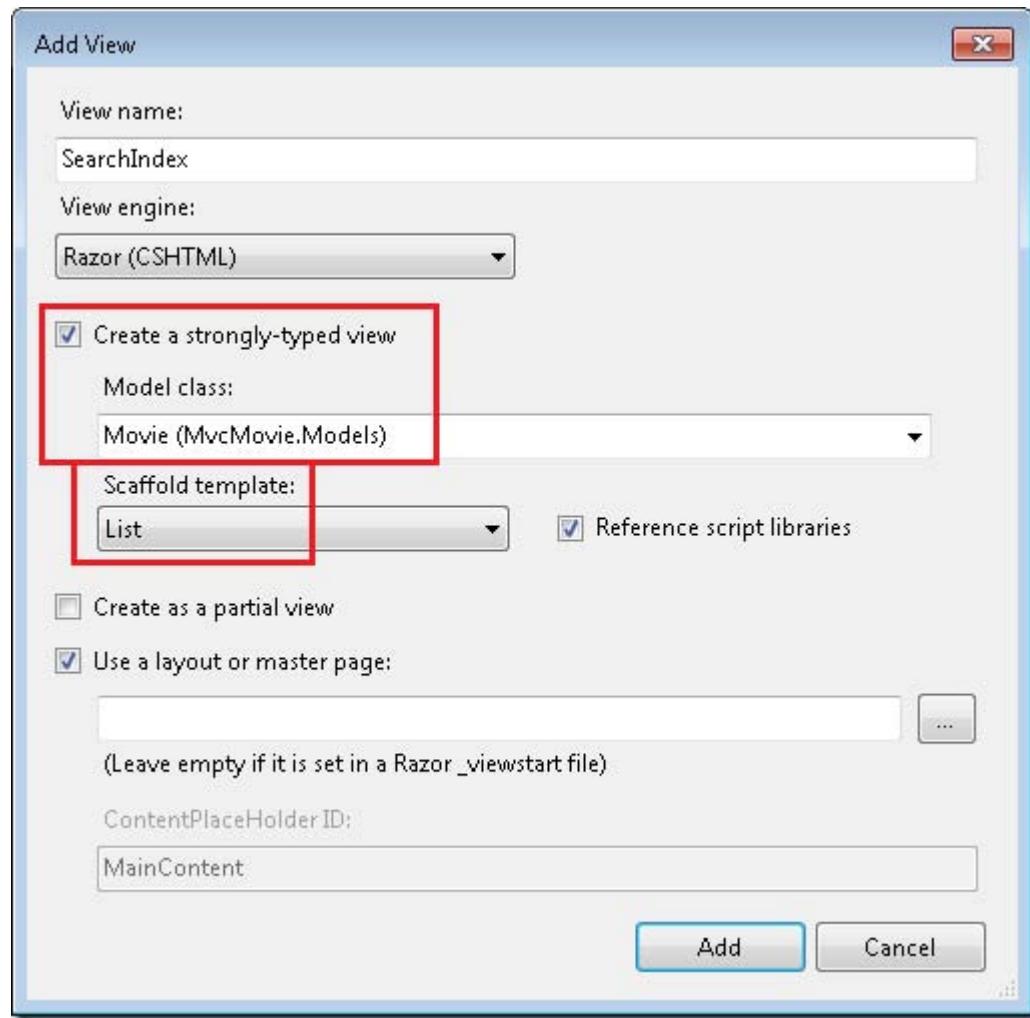
The query is defined at this point, but hasn't yet been run against the data store.

If the **searchString** parameter contains a string, the movies query is modified to filter on the value of the search string, using the following code:

```
if(!String.IsNullOrEmpty(searchString))  
{  
movies= movies.Where(s => s.Title.Contains(searchString));  
}
```

The **s => s.Title** code above is a [Lambda Expression](#). Lambdas are used in method-based [LINQ](#) queries as arguments to standard query operator methods such as [Where](#) method used in the above code. LINQ queries are not executed when they are defined or when they are modified by calling a method such as [Where](#) or [OrderBy](#). Instead, query execution is deferred, which means that the evaluation of an expression is delayed until its realized value is actually iterated over or the [ToList](#) method is called. In the **SearchIndex** sample, the query is executed in the **SearchIndex** view. For more information about deferred query execution, see [Query Execution](#).

Now you can implement the **SearchIndex** view that will display the form to the user. Right-click inside the **SearchIndex** method and then click **Add View**. In the **Add View** dialog box, specify that you're going to pass a **Movie** object to the view template as its model class. In the **Scaffold template** list, choose **List**, then click **Add**.



When you click the **Add** button, the `Views\Movies\SearchIndex.cshtml` view template is created. Because you selected **List** in the **Scaffold template** list, Visual Studio Express automatically generated (scaffolded) some default markup in the view. The scaffolding created an HTML form. It examined the **Movie** class and created code to render `<label>` elements for each property of the class. The listing below shows the Create view that was generated:

```
@model IEnumerable<MvcMovie.Models.Movie>

@{
    ViewBag.Title = "SearchIndex";
}

<h2>SearchIndex</h2>
```

```
<p>
@Html.ActionLink("Create New", "Create")
</p>
<table>
<tr>
<th>
    Title
</th>
<th>
    ReleaseDate
</th>
<th>
    Genre
</th>
<th>
    Price
</th>
<th></th>
</tr>

@foreach (var item in Model) {
<tr>
<td>
@Html.DisplayFor(modelItem => item.Title)
</td>
<td>
@Html.DisplayFor(modelItem => item.ReleaseDate)
</td>
<td>
@Html.DisplayFor(modelItem => item.Genre)
</td>
<td>
@Html.DisplayFor(modelItem => item.Price)
</td>
<td>
@Html.ActionLink("Edit", "Edit", new { id=item.ID }) |
@Html.ActionLink("Details", "Details", new { id=item.ID }) |
@Html.ActionLink("Delete", "Delete", new { id=item.ID })

```

```
</td>
</tr>
}

</table>
```

Run the application and navigate to `/Movies/SearchIndex`. Append a query string such as `?searchString=ghost` to the URL. The filtered movies are displayed.

Title	ReleaseDate	Genre	Price	
Ghostbusters	1/11/1984 12:00:00 AM	Comedy	7.99	Edit Details Delete
Ghostbusters 2	2/23/1986 12:00:00 AM	Comedy	3.99	Edit Details Delete

If you change the signature of the `SearchIndex` method to have a parameter named `id`, the `id` parameter will match the `{id}` placeholder for the default routes set in the `Global.asax` file.

```
{controller}/{action}/{id}
```

The original `SearchIndex` method looks like this:

```
public ActionResult SearchResult(string searchString)
{
    var movies = from m in db.Movies
    select m;

    if(!String.IsNullOrEmpty(searchString))
    {
        movies= movies.Where(s => s.Title.Contains(searchString));
    }

    return View(movies);
}
```

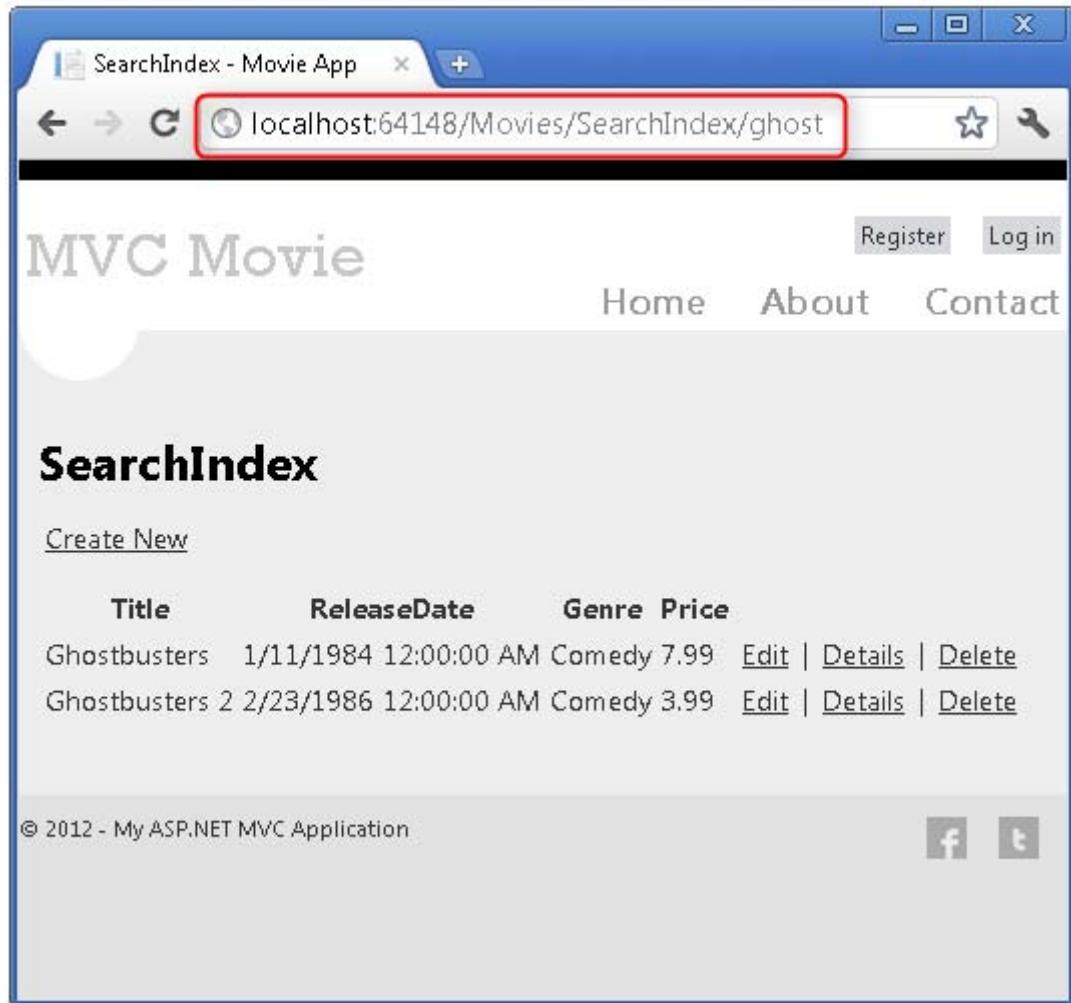
The modified `SearchIndex` method would look as follows:

```
public ActionResult SearchResult(string id)
{
    string searchString = id;
    var movies = from m in db.Movies
    select m;

    if(!String.IsNullOrEmpty(searchString))
    {
        movies= movies.Where(s => s.Title.Contains(searchString));
    }

    return View(movies);
}
```

You can now pass the search title as route data (a URL segment) instead of as a query string value.



However, you can't expect users to modify the URL every time they want to search for a movie. So now you'll add UI to help them filter movies. If you changed the signature of the `SearchIndex` method to test how to pass the route-bound ID parameter, change it back so that your `SearchIndex` method takes a string parameter named `searchString`:

```
public ActionResult SearchIndex(string searchString)
{
    var movies = from m in db.Movies
    select m;

    if (!String.IsNullOrEmpty(searchString))
    {
        movies = movies.Where(s => s.Title.Contains(searchString));
    }
}
```

```
    returnView(movies);
}
```

Open the `Views\Movies\SearchIndex.cshtml` file, and just after `@Html.ActionLink("Create New", "Create")`, add the following:

```
@using (Html.BeginForm()){
<p> Title: @Html.TextBox("SearchString")<br/>
<input type="submit" value="Filter"/></p>
}
```

The following example shows a portion of the `Views\Movies\SearchIndex.cshtml` file with the added filtering markup.

```
@model IEnumerable<MvcMovie.Models.Movie>

@{
    ViewBag.Title = "SearchIndex";
}

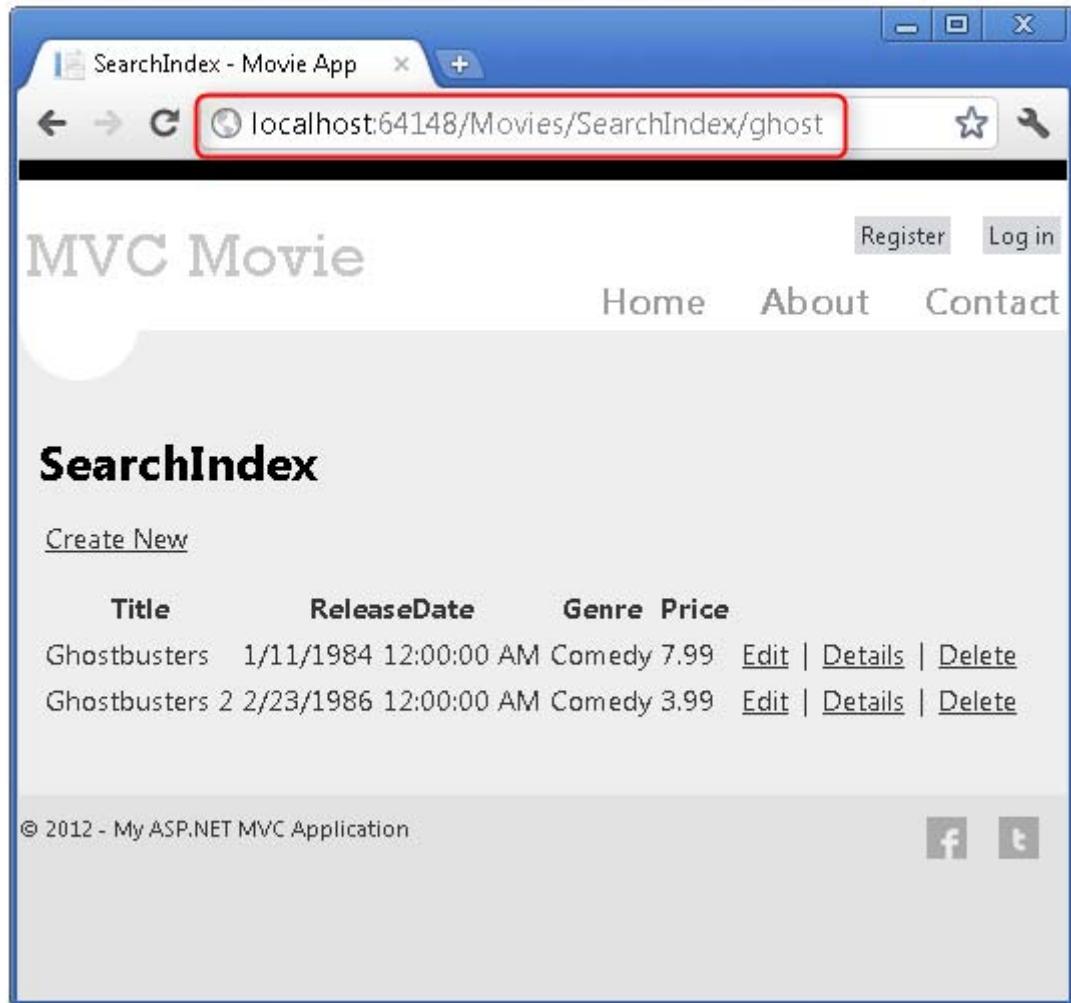
<h2>SearchIndex</h2>

<p>
@Html.ActionLink("Create New", "Create")

    @using (Html.BeginForm()){
        <p> Title: @Html.TextBox("SearchString") <br/>
        <input type="submit" value="Filter"/></p>
    }
</p>
```

The `Html.BeginForm` helper creates an opening `<form>` tag. The `Html.BeginForm` helper causes the form to post to itself when the user submits the form by clicking the **Filter** button.

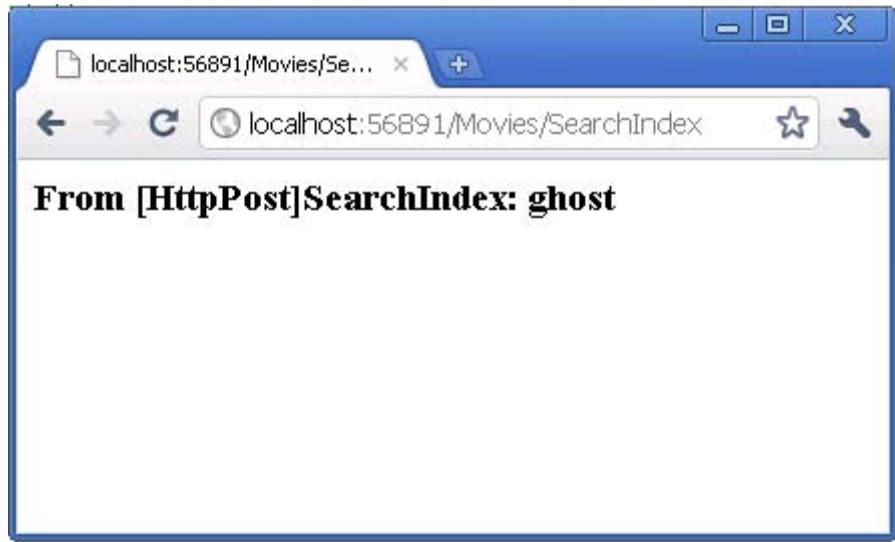
Run the application and try searching for a movie.



There's no `HttpPost` overload of the `SearchIndex` method. You don't need it, because the method isn't changing the state of the application, just filtering data.

You could add the following `HttpPost SearchIndex` method. In that case, the action invoker would match the `HttpPost SearchIndex` method, and the `HttpPost SearchIndex` method would run as shown in the image below.

```
[HttpPost]
public string SearchIndex/FormCollection fc, string searchString)
{
    return "<h3> From [HttpPost]SearchIndex: " + searchString + "</h3>";
}
```



However, even if you add this `HttpPost` version of the `SearchIndex` method, there's a limitation in how this has all been implemented. Imagine that you want to bookmark a particular search or you want to send a link to friends that they can click in order to see the same filtered list of movies. Notice that the URL for the HTTP POST request is the same as the URL for the GET request (`localhost:xxxxx/Movies/SearchIndex`) -- there's no search information in the URL itself. Right now, the search string information is sent to the server as a form field value. This means you can't capture that search information to bookmark or send to friends in a URL.

The solution is to use an overload of `BeginForm` that specifies that the POST request should add the search information to the URL and that it should be routed to the `HttpGet` version of the `SearchIndex` method. Replace the existing parameterless `BeginForm` method with the following:

```
@using (Html.BeginForm("SearchIndex", "Movies", FormMethod.Get))
```

```
@Html.ActionLink("Create New", "Create")
@using (Html.BeginForm("SearchIndex", "Movies", FormMethod.Get))
{
    <form action="SearchIndex" controller="Movies" method="Get">
        <input type="text" name="searchString" />
        <input type="submit" value="Search" />
    </form>
}
```

5 of 13 (extension) `MvcForm` `HtmlHelper.BeginForm(string actionPerformed, string controllerName, FormMethod method)`
Writes an opening `<form>` tag to the response. When the user submits the form, the request will be processed by an action method.
`method:` The HTTP method for processing the form, either `GET` or `POST`.

Now when you submit a search, the URL contains a search query string. Searching will also go to the `HttpGet SearchIndex` action method, even if you have a `HttpPost SearchIndex` method.

MVC Movie

Register Log in

Home About Contact

SearchIndex

[Create New](#)

Title: [Filter](#)

Title	ReleaseDate	Genre	Price
Ghostbusters	1/11/1984 12:00:00 AM	Comedy	7.99
Ghostbusters 2	2/23/1986 12:00:00 AM	Comedy	3.99

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Adding Search by Genre

If you added the `HttpPost` version of the `SearchIndex` method, delete it now.

Next, you'll add a feature to let users search for movies by genre. Replace the `SearchIndex` method with the following code:

```
public ActionResult SearchIndex(string movieGenre, string searchString)
{
    var genreLst = newList<string>();

    var genreQry = from d in db.Movies
                  orderby d.Genre
```

```

select d.Genre;
GenreLst.AddRange(GenreQry.Distinct());
ViewBag.movieGenre =new SelectList(GenreLst);

var movies =from m in db.Movies
select m;

if(!String.IsNullOrEmpty(searchString))
{
movies= movies.Where(s => s.Title.Contains(searchString));
}

if(string.IsNullOrEmpty(movieGenre))
returnView(movies);
else
{
returnView(movies.Where(x => x.Genre== movieGenre));
}

}

```

This version of the `SearchIndex` method takes an additional parameter, namely `movieGenre`. The first few lines of code create a `List` object to hold movie genres from the database.

The following code is a LINQ query that retrieves all the genres from the database.

```

varGenreQry=from d in db.Movies
orderby d.Genre
select d.Genre;

```

The code uses the `AddRange` method of the generic `List` collection to add all the distinct genres to the list. (Without the `Distinct` modifier, duplicate genres would be added — for example, comedy would be added twice in our sample). The code then stores the list of genres in the `ViewBag` object.

The following code shows how to check the `movieGenre` parameter. If it's not empty, the code further constrains the movies query to limit the selected movies to the specified genre.

```
if(string.IsNullOrEmpty(movieGenre))
    returnView(movies);
else
{
    returnView(movies.Where(x => x.Genre== movieGenre));
}
```

Adding Markup to the SearchIndex View to Support Search by Genre

Add an `Html.DropDownList` helper to the `Views\Movies\SearchIndex.cshtml` file, just before the `TextBox` helper. The completed markup is shown below:

```
<p>
    @Html.ActionLink("Create New", "Create")
    @using (Html.BeginForm("SearchIndex", "Movies", FormMethod.Get)){
        <p>Genre: @Html.DropDownList("movieGenre", "All")
            Title: @Html.TextBox("SearchString")
        <input type="submit" value="Filter"/></p>
    }
</p>
```

Run the application and browse to `/Movies/SearchIndex`. Try a search by genre, by movie name, and by both criteria.

In this section you examined the CRUD action methods and views generated by the framework. You created a search action method and view that let users search by movie title and genre. In the next section, you'll look at how to add a property to the `Movie` model and how to add an initializer that will automatically create a test database.

Adding a New Field to the Movie Model and Table

In this section you'll make some changes to the model classes and learn how you can update the database schema to match the model changes.

Adding a Rating Property to the Movie Model

Start by adding a new **Rating** property to the existing **Movie** class. Open the *Models\Movie.cs* file and add the **Rating** property like this one:

```
public string Rating { get; set; }
```

The complete **Movie** class now looks like the following code:

```
public class Movie
{
    public int ID { get; set; }
    public string Title { get; set; }
    public DateTime ReleaseDate { get; set; }
    public string Genre { get; set; }
    public decimal Price { get; set; }
    public string Rating { get; set; }
}
```

Recompile the application using the **Build > Build Movie** menu command.

Now that you've updated the **Model** class, you also need to update the *\Views\Movies\Index.cshtml* and *\Views\Movies\Create.cshtml* view templates in order to display the new **Rating** property in the browser view.

Open the *\Views\Movies\Index.cshtml* file and add a **<th>Rating</th>** column heading just after the **Price** column. Then add a **<td>** column near the end of the template to render the **@item.Rating** value. Below is what the updated *Index.cshtml* view template looks like:

```
@model IEnumerable<MvcMovie.Models.Movie>
```

```
@{  
    ViewBag.Title = "Index";  
}  
  
<h2>Index</h2>  
  
<p>  
@Html.ActionLink("Create New", "Create")  
</p>  
<table>  
<tr>  
<th>  
@Html.DisplayNameFor(model => model.Title)  
</th>  
<th>  
@Html.DisplayNameFor(model => model.ReleaseDate)  
</th>  
<th>  
@Html.DisplayNameFor(model => model.Genre)  
</th>  
<th>  
@Html.DisplayNameFor(model => model.Price)  
</th>  
<th>  
@Html.DisplayNameFor(model => model.Rating)  
</th>  
<th></th>  
</tr>  
  
@foreach (var item in Model) {  
<tr>  
<td>  
@Html.DisplayFor(modelItem => item.Title)  
</td>  
<td>  
@Html.DisplayFor(modelItem => item.ReleaseDate)  
</td>
```

```

<td>
@Html.DisplayFor(modelItem => item.Genre)
</td>
<td>
@Html.DisplayFor(modelItem => item.Price)
</td>
<td>
@Html.DisplayFor(modelItem => item.Rating)
</td>
<td>
@Html.ActionLink("Edit", "Edit", new { id=item.ID }) |
@Html.ActionLink("Details", "Details", new { id=item.ID }) |
@Html.ActionLink("Delete", "Delete", new { id=item.ID })
</td>
</tr>
}

</table>

```

Next, open the `\Views\Movies\Create.cshtml` file and add the following markup near the end of the form. This renders a text box so that you can specify a rating when a new movie is created.

```

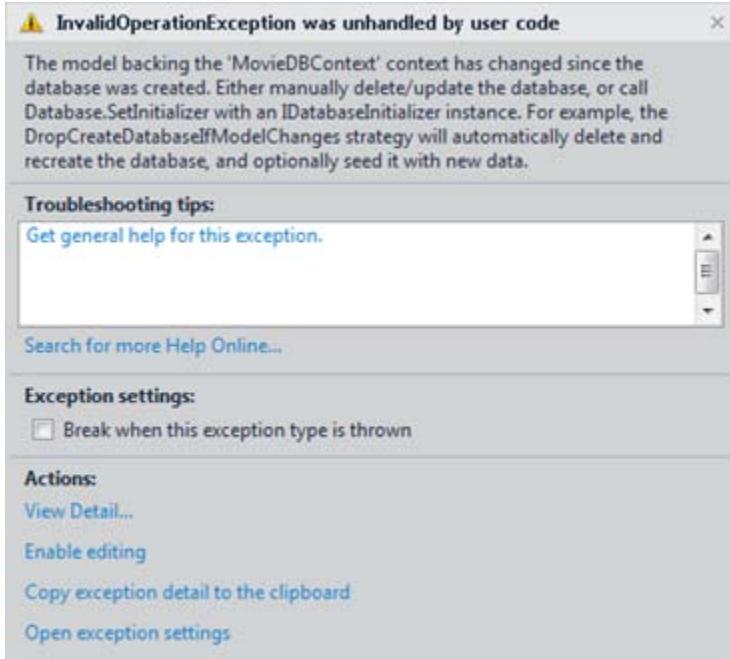
<div class="editor-label">
@Html.LabelFor(model => model.Rating)
</div>
<div class="editor-field">
@Html.EditorFor(model => model.Rating)
@Html.ValidationMessageFor(model => model.Rating)
</div>

```

Managing Model and Database Schema Differences

You've now updated the application code to support the new **Rating** property.

Now run the application and navigate to the `/Movies` URL. When you do this, though, you'll see one of the following errors:



The screenshot shows a Microsoft Internet Explorer window with a blue title bar. The address bar displays "http://loc...". The main content area is titled "Server Error in '/' Application." in red. Below this, a large block of red text provides instructions on how to handle schema changes between the model and the database. A "Description:" section follows, detailing an unhandled exception. An "Exception Details:" section provides specific error information. A "Source Error:" section highlights a portion of C# code from a controller file. The "Source File:" and "Line:" details are shown below the code. A "Stack Trace:" section is present at the bottom, though its content is not visible in the screenshot.

Server Error in '/' Application.

The model backing the 'MovieDBContext' context has changed since the database was created. Either manually delete/update the database, or call Database.SetInitializer with an IDatabaseInitializer instance. For example, the DropCreateDatabaseIfModelChanges strategy will automatically delete and recreate the database, and optionally seed it with new data.

Description: An unhandled exception occurred during the execution of the current web request. Please review the stack trace for more information about the error and where it originated in the code.

Exception Details: System.InvalidOperationException: The model backing the 'MovieDBContext' context has changed since the database was created. Either manually delete/update the database, or call Database.SetInitializer with an IDatabaseInitializer instance. For example, the DropCreateDatabaseIfModelChanges strategy will automatically delete and recreate the database, and optionally seed it with new data.

Source Error:

```
Line 10:  
Line 11:     public ActionResult Index() {  
Line 12:         var movies = from m in db.Movies  
Line 13:                 where m.ReleaseDate > new DateTime(1984, 6, 1)  
Line 14:                 select m;
```

Source File: C:\Temp\c_project\c#project\MvcMovie\Controllers\MoviesController.cs **Line:** 12

Stack Trace:

You're seeing this error because the updated **Movie** model class in the application is now different than the schema of the **Movie** table of the existing database. (There's no **Rating** column in the database table.)

By default, when you use Entity Framework Code First to automatically create a database, as you did earlier in this tutorial, Code First adds a table to the database to help track whether the schema of the database is in sync with the model classes it was generated from. If they aren't in sync, the Entity Framework throws an error. This makes it easier to track down issues at development time that you might otherwise only find (by obscure

errors) at run time. The sync-checking feature is what causes the error message to be displayed that you just saw.

There are two approaches to resolving the error:

1. Have the Entity Framework automatically drop and re-create the database based on the new model class schema. This approach is very convenient when doing active development on a test database; it allows you to quickly evolve the model and database schema together. The downside, though, is that you lose existing data in the database — so you *don't* want to use this approach on a production database!
2. Explicitly modify the schema of the existing database so that it matches the model classes. The advantage of this approach is that you keep your data. You can make this change either manually or by creating a database change script.

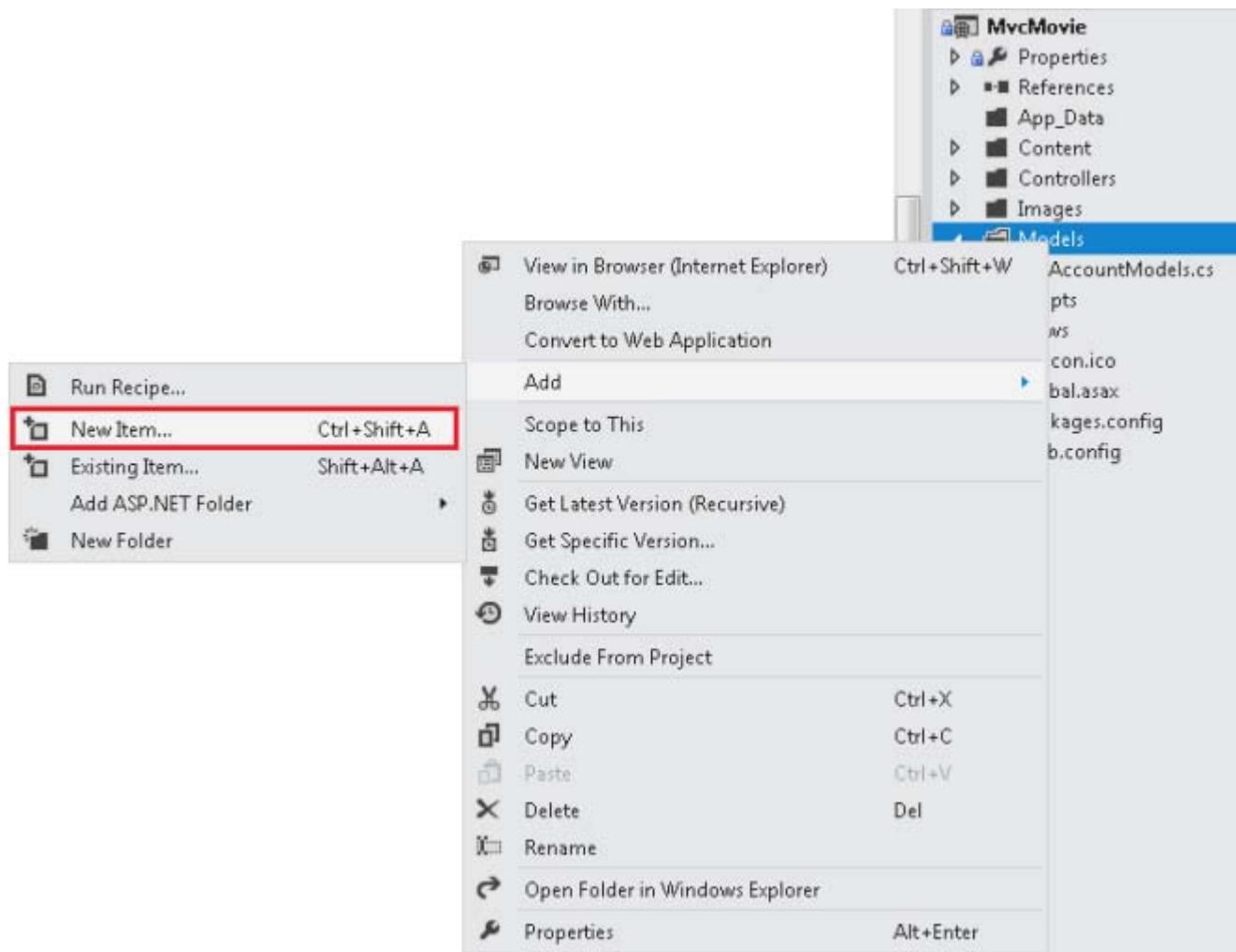
For this tutorial, we'll use the first approach — you'll have the Entity Framework Code First automatically re-create the database anytime the model changes.

Automatically Re-Creating the Database on Model Changes

Let's update the application so that Code First automatically drops and re-creates the database anytime you change the model for the application.

Warning You should enable this approach of automatically dropping and re-creating the database only when you're using a development or test database, and *never* on a production database that contains real data. Using it on a production server can lead to data loss.

Stop the debugger. In **Solution Explorer**, right click the *Models* folder, select **Add**, and then select **New Item**.



In the **Add New Item** dialog, select **Class** then name the class "MovieInitializer". Update the **MovieInitializer** class to contain the following code:

```
usingSystem;
usingSystem.Collections.Generic;
usingSystem.Data.Entity;

namespaceMvcMovie.Models{
publicclassMovieInitializer:DropCreateDatabaseIfModelChanges<MovieDBContext>{
protectedoverridevoidSeed(MovieDBContext context){
var movies =newList<Movie>{

newMovie{Title="When Harry Met Sally",
ReleaseDate=DateTime.Parse("1989-1-11"),
Genre="Romantic Comedy",
```

```

Rating="R",
Price=7.99M},

newMovie{Title="Ghostbusters ",
ReleaseDate=DateTime.Parse("1984-3-13"),
Genre="Comedy",
Rating="R",
Price=8.99M},

newMovie{Title="Ghostbusters 2",
ReleaseDate=DateTime.Parse("1986-2-23"),
Genre="Comedy",
Rating="R",
Price=9.99M},

newMovie{Title="Rio Bravo",
ReleaseDate=DateTime.Parse("1959-4-15"),
Genre="Western",
Rating="R",
Price=3.99M},
};

movies.ForEach(d => context.Movies.Add(d));
}
}
}

```

The `MovieInitializer` class specifies that the database used by the model should be dropped and automatically re-created if the model classes ever change. `DropCreateDatabaseIfModelChanges` initializer specifies the DB should be re-created only if the schema changes. Alternatively, you could use the `DropCreateDatabaseAlways` initializer to always recreate and re-seed the database with data the first time that a context is used in the application domain. The `DropCreateDatabaseAlways` approach is useful in some integration testing scenarios. The code that you inserted into the `MovieInitializer` class includes a `Seed` method that specifies some default data to automatically add to the database any time it's created (or re-created). This provides a useful way to populate the database with some test data, without requiring you to manually populate it each time you make a model change.

Now that you've defined the `MovieInitializer` class, you'll want to wire it up so that each time the application runs, it checks whether the model classes are different from the schema in the database. If they are, you can run the initializer to re-create the database to match the model and then populate the database with the sample data.

Open the `Global.asax` file:

MvcMovie - Microsoft Visual Studio 11 Express Beta for Web

File Edit View Project Debug Team Tools Unit Test Window Quick Launch (Ctrl+Q)

Help

Internet Explorer | Debug | Global.asax.cs | ... SOLUTION... | PROPERTIES

MvcMovie.MvcApplication | RegisterGlobalFilters(GlobalFilterCollection)

```
using System.Web.Mvc;
using System.Web.Optimization;
using System.Web.Routing;

namespace MvcMovie
{
    // Note: For instructions on enabling IIS6 or IIS7 class
    // visit http://go.microsoft.com/?LinkId=9394801

    public class MvcApplication : System.Web.HttpApplication
    {
        public static void RegisterGlobalFilters(GlobalFilterCollection filters)
        {
            filters.Add(new HandleErrorAttribute());
        }

        public static void RegisterRoutes(RouteCollection routes)
        {
            routes.IgnoreRoute("{resource}.axd/{*pathInfo}");

            routes.MapHttpRoute(
                name: "DefaultApi",
                routeTemplate: "api/{controller}/{id}",
                defaults: new { id = RouteParameter.Optional });
        }

        routes.MapRoute(
            name: "Default",
            url: "{controller}/{action}/{id}",
            defaults: new { controller = "Home", action = "Index", id = UrlParameter.Optional });
    }

    protected void Application_Start()
    {
        AreaRegistration.RegisterAllAreas();

        // Use LocalDB for Entity Framework by default
        Database.DefaultConnectionFactory = new SqlConnectionFactory();
    }
}
```

PROPERTIES

MvcMovie

- Properties
- References
- App_Data
- Content
- Controllers
- Images
- Models
- Scripts
- Views

favicon.ico

Global.asax

packages.config

Web.config

TEAM E... SOLUTI...

100 %

ERROR LIST OUTPUT FIND RESULTS 1

Ready Ln 1 Col 1 Ch 1 INS

The `Global.asax` file contains the class that defines the entire application for the project, and contains an `Application_Start` event handler that runs when the application first starts.

At the beginning of the `Application_Start` method, add a call to `Database.SetInitializer` as shown below:

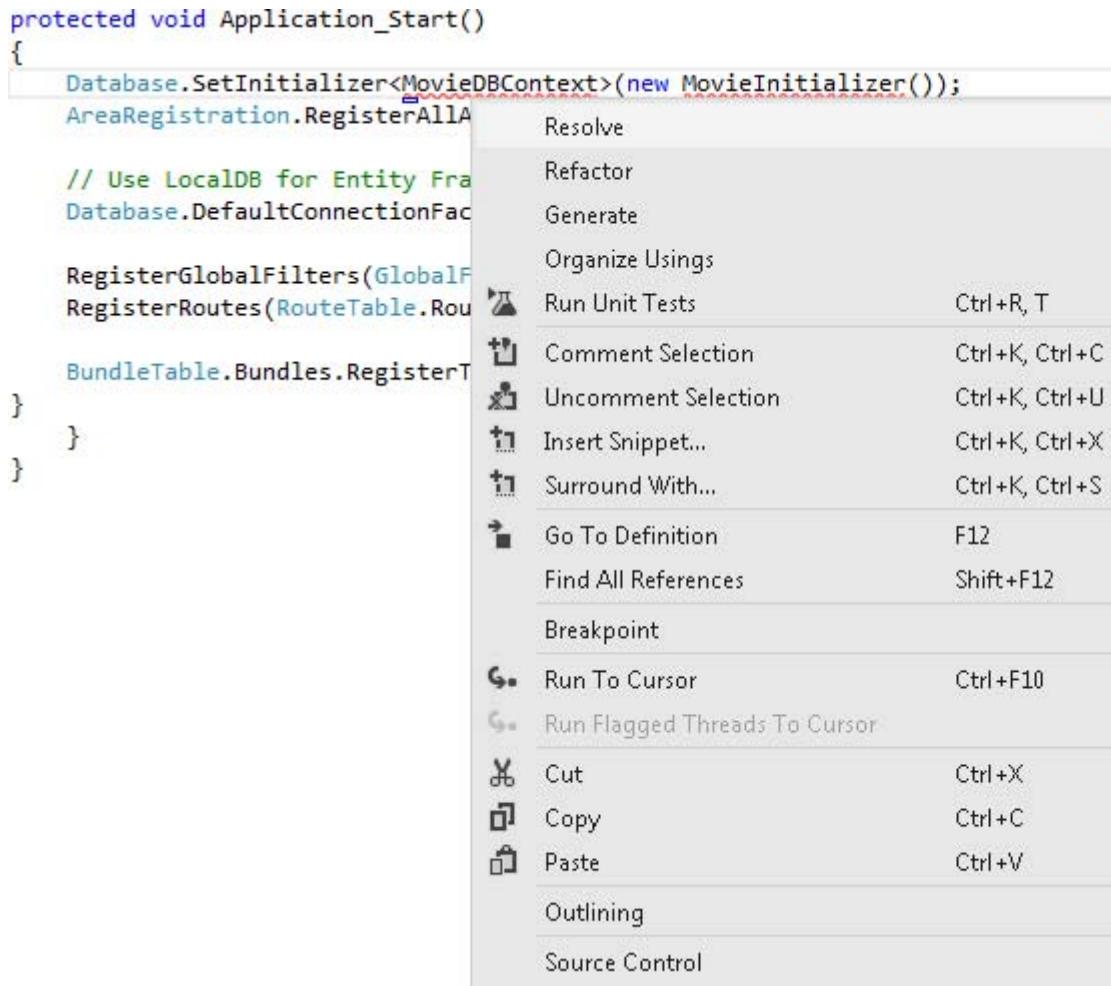
```
protected void Application_Start()
{
    Database.SetInitializer<MovieDBContext>(new MovieInitializer());
    AreaRegistration.RegisterAllAreas();

    // Use LocalDB for Entity Framework by default
    Database.DefaultConnectionFactory = new SqlConnectionFactory("Data
Source=(localdb)\v11.0; Integrated Security=True; MultipleActiveResultSets=True");

    RegisterGlobalFilters(GlobalFilters.Filters);
    RegisterRoutes(RouteTable.Routes);

    BundleTable.Bundles.RegisterTemplateBundles();
}
```

Put the cursor on the red squiggly line (on `MovieDBContext`, or `MovieInitializer`) right click and select `Resolve`, then `using MvcMovie.Models;`



Alternatively, add the using statement to the top of the file. The using statement references the namespace where our **MovieInitializer** class lives:

```
usingMvcMovie.Models;// MovieInitializer
```

The **Database.SetInitializer** statement you just added indicates that the database used by the **MovieDBContext** instance should be automatically deleted and re-created if the schema and the database don't match. And as you saw, it will also populate the database with the sample data that's specified in the **MovieInitializer** class.

Close the *Global.asax* file.

Re-run the application and navigate to the */Movies* URL. When the application starts, it detects that the model structure no longer matches the database schema. It automatically re-creates the database to match the new model structure and populates the database with the sample movies:

The screenshot shows a web browser window with the URL <http://localhost:1234> in the address bar. The title of the page is "Index - Movie App". The main content area displays the word "MVC Movie" and a navigation menu with links for "Home", "About", and "Contact". Below this, a heading "Index" is followed by a link "Create New". A table lists movie details:

Title	ReleaseDate	Genre	Price	Rating	
When Harry Met Sally	1/11/1989 12:00:00 AM	Romantic Comedy	7.99	R	Edit Details Delete
Ghostbusters	3/13/1984 12:00:00 AM	Comedy	8.99	R	Edit Details Delete
Ghostbusters 2	2/23/1986 12:00:00 AM	Comedy	9.99	R	Edit Details Delete
Rio Bravo	4/15/1959 12:00:00 AM	Western	3.99	R	Edit Details Delete

At the bottom left, there is a copyright notice: "© 2012 - My ASP.NET MVC Application". On the right side, there are social media icons for Facebook and Twitter.

<="">

Click the **Create New** link to add a new movie. Note that you can add a rating.

The screenshot shows a Microsoft Internet Explorer browser window with the following details:

- Title Bar:** http://localhost: Create - Movie App
- Header:** MVC Movie (Logo), Register, Log in, Home, About, Contact
- Section:** Create
- Form Fields:**
 - Title: Rio Bravo II
 - ReleaseDate: 3/15/2012
 - Genre: Western
 - Price: 9.99
 - Rating: G
- Buttons:** Create (highlighted with a dotted border)
- Links:** Back to List
- Page Footer:** © 2012 - My ASP.NET MVC Application, Facebook icon, Twitter icon

Click **Create**. The new movie, including the rating, now shows up in the movies listing:

The screenshot shows a Firefox browser window displaying an MVC Movie application. The title bar says "Index - Movie App". The address bar shows "localhost:1234/Movies". The page header includes "MVC Movie" on the left, "Register" and "Log in" buttons on the right, and navigation links "Home", "About", and "Contact". Below the header is a section titled "Index" with a "Create New" link. A table lists movie data with columns: Title, ReleaseDate, Genre, Price, and Rating. Each row has edit, details, and delete links. The footer contains copyright information and social media links for Facebook and Twitter.

Title	ReleaseDate	Genre	Price	Rating
When Harry Met Sally	1/11/1989 12:00:00 AM	Romantic Comedy	7.99	R
Ghostbusters	3/13/1984 12:00:00 AM	Comedy	8.99	R
Ghostbusters 2	2/23/1986 12:00:00 AM	Comedy	9.99	R
Rio Bravo	4/15/1959 12:00:00 AM	Western	3.99	R
Rio Bravo II	3/15/2012 12:00:00 AM	Western	9.99	G

You should also add the **Rating** field to the Edit view template.

In this section you saw how you can modify model objects and keep the database in sync with the changes. You also learned a way to populate a newly created database with sample data so you can try out scenarios. Next, let's look at how you can add richer validation logic to the model classes and enable some business rules to be enforced.

Adding Validation to the Model

In this section you'll add validation logic to the **Movie** model, and you'll ensure that the validation rules are enforced any time a user attempts to create or edit a movie using the application.

Keeping Things DRY

One of the core design tenets of ASP.NET MVC is DRY ("Don't Repeat Yourself"). ASP.NET MVC encourages you to specify functionality or behavior only once, and then have it be reflected everywhere in an application. This reduces the amount of code you need to write and makes the code you do write less error prone and easier to maintain.

The validation support provided by ASP.NET MVC and Entity Framework Code First is a great example of the DRY principle in action. You can declaratively specify validation rules in one place (in the model class) and the rules are enforced everywhere in the application.

Let's look at how you can take advantage of this validation support in the movie application.

Adding Validation Rules to the Movie Model

You'll begin by adding some validation logic to the **Movie** class.

Open the *Movie.cs* file. Add a **using** statement at the top of the file that references the **System.ComponentModel.DataAnnotations** namespace:

```
using System.ComponentModel.DataAnnotations;
```

Notice the namespace does not contain **System.Web**. DataAnnotations provides a built-in set of validation attributes that you can apply declaratively to any class or property.

Now update the **Movie** class to take advantage of the built-in **Required**, **StringLength**, and **Range** validation attributes. Use the following code as an example of where to apply the attributes.

```
public class Movie{
    public int ID { get; set; }

    [Required]
```

```

public string Title {get; set;}

[DataType(DataType.Date)]
public DateTime ReleaseDate {get; set;}

[Required]
public string Genre {get; set;}

[Range(1,100)]
[DataType(DataType.Currency)]
public decimal Price {get; set;}

[StringLength(5)]
public string Rating {get; set;}
}

```

The validation attributes specify behavior that you want to enforce on the model properties they are applied to. The **Required** attribute indicates that a property must have a value; in this sample, a movie has to have values for the **Title**, **ReleaseDate**, **Genre**, and **Price** properties in order to be valid. The **Range** attribute constrains a value to within a specified range. The **StringLength** attribute lets you set the maximum length of a string property, and optionally its minimum length. Intrinsic types (such as **decimal**, **int**, **float**, **DateTime**) are required by default and don't need the **Required** attribute.

Code First ensures that the validation rules you specify on a model class are enforced before the application saves changes in the database. For example, the code below will throw an exception when the **SaveChanges** method is called, because several required **Movie** property values are missing and the price is zero (which is out of the valid range).

```

MovieDBContext db = new MovieDBContext();

Movie movie = new Movie();
movie.Title = "Gone with the Wind";
movie.Price = 0.0M;

db.Movies.Add(movie);
db.SaveChanges(); // <= Will throw validation exception

```

Having validation rules automatically enforced by the .NET Framework helps make your application more robust. It also ensures that you can't forget to validate something and inadvertently let bad data into the database.

Here's a complete code listing for the updated *Movie.cs* file:

```
usingSystem;
usingSystem.Data.Entity;
usingSystem.ComponentModel.DataAnnotations;

namespaceMvcMovie.Models{
publicclassMovie{
publicint ID {get;set;}

[Required]
publicstringTitle{get;set;}

[DataType(DataType.Date)]
publicDateTimeReleaseDate{get;set;}

[Required]
publicstringGenre{get;set;}

[Range(1,100)]
[DataType(DataType.Currency)]
publicdecimalPrice{get;set;}

[StringLength(5)]
publicstringRating{get;set;}
}

publicclassMovieDBContext:DbContext{
publicDbSet<Movie>Movies{get;set;}
}
}
```

Validation Error UI in ASP.NET MVC

Re-run the application and navigate to the /Movies URL.

Click the **Create New** link to add a new movie. Fill out the form with some invalid values and then click the **Create** button.

The screenshot shows a Firefox browser window with the title bar "Create - Movie App". The address bar shows "localhost:1234/Movies/Create". The page content is titled "MVC Movie" with navigation links "Home", "About", and "Contact". A "Register" and "Log in" link are also present. The main content area is titled "Create". It contains five input fields with validation errors:

- Title**: An empty input field.
- ReleaseDate**: An input field containing "xyz". A red error message to its right states: "The field ReleaseDate must be a date."
- Genre**: An empty input field.
- Price**: An input field containing "129". A red error message to its right states: "Price must be between \$1 and \$100"
- Rating**: An input field containing "Probably G". A red error message to its right states: "The field Rating must be a string with a maximum length of 5."

At the bottom left is a "Create" button, and at the bottom center is a "Back to List" link.

Notice how the form has automatically used a red border color to highlight the text boxes that contain invalid data and has emitted an appropriate validation error message next to each one. The errors are enforced both client-side (using JavaScript) and server-side (in case a user has JavaScript disabled).

A real benefit is that you didn't need to change a single line of code in the `MoviesController` class or in the `Create.cshtml` view in order to enable this validation UI. The controller and views you created earlier in this tutorial automatically picked up the validation rules that you specified by using validation attributes on the properties of the `Movie` model class.

You might have noticed for the properties `Title` and `Genre`, the required attribute is not enforced until you submit the form (hit the `Create` button), or enter text into the input field and removed it. For a field which is initially empty (such as the fields on the Create view) and which has only the required attribute and no other validation attributes, you can do the following to trigger validation:

1. Tab into the field.
2. Enter some text.
3. Tab out.
4. Tab back into the field.
5. Remove the text.
6. Tab out.

The above sequence will trigger the required validation without hitting the submit button. Simply hitting the submit button without entering any of the fields will trigger client side validation. The form data is not sent to the server until there are no client side validation errors. You can test this by putting a break point in the HTTP Post method or using the [fiddler tool](#) or the IE 9 [F12 developer tools](#).

Firefox

Create - Movie App

localhost:1234/Movies/Create

Bing

MVC Movie

Home About Contact

Register Log in

Create

Title

The Title field is required.

ReleaseDate

Genre

The Genre field is required.

Price

Rating

Create

[Back to List](#)

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f t

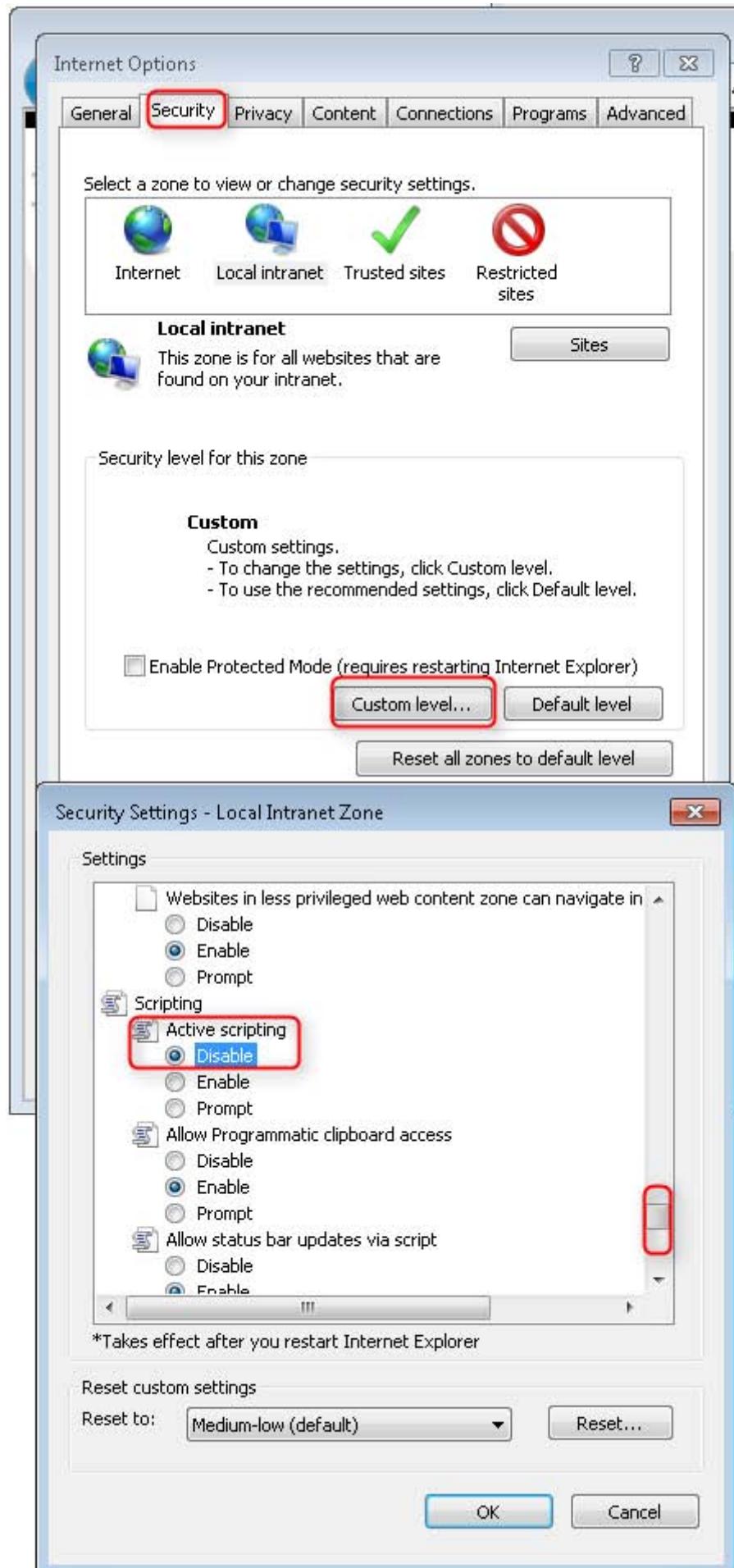
How Validation Occurs in the Create View and Create Action Method

You might wonder how the validation UI was generated without any updates to the code in the controller or views. The next listing shows what the `Create` methods in the `MovieController` class look like. They're unchanged from how you created them earlier in this tutorial.

```
//  
// GET: /Movies/Create  
  
public ActionResult Create()  
{  
    return View();  
}  
  
//  
// POST: /Movies/Create  
  
[HttpPost]  
public ActionResult Create(Movie movie)  
{  
    if(ModelState.IsValid)  
    {  
        db.Movies.Add(movie);  
        db.SaveChanges();  
        return RedirectToAction("Index");  
    }  
  
    return View(movie);  
}
```

The first (HTTP GET) `Create` action method displays the initial Create form. The second (`[HttpPost]`) version handles the form post. The second `Create` method (The `HttpPost` version) calls `ModelState.IsValid` to check whether the movie has any validation errors. Calling this method evaluates any validation attributes that have been applied to the object. If the object has validation errors, the `Create` method re-displays the form. If there are no errors, the method saves the new movie in the database. In our movie example we are using, the form is not posted to the server when their are validation errors detected on the client side; the second `Create` method is never called. If you disable JavaScript in your browser, client validation is disabled and the HTTP POST `Create` method calls `ModelState.IsValid` to check whether the movie has any validation errors.

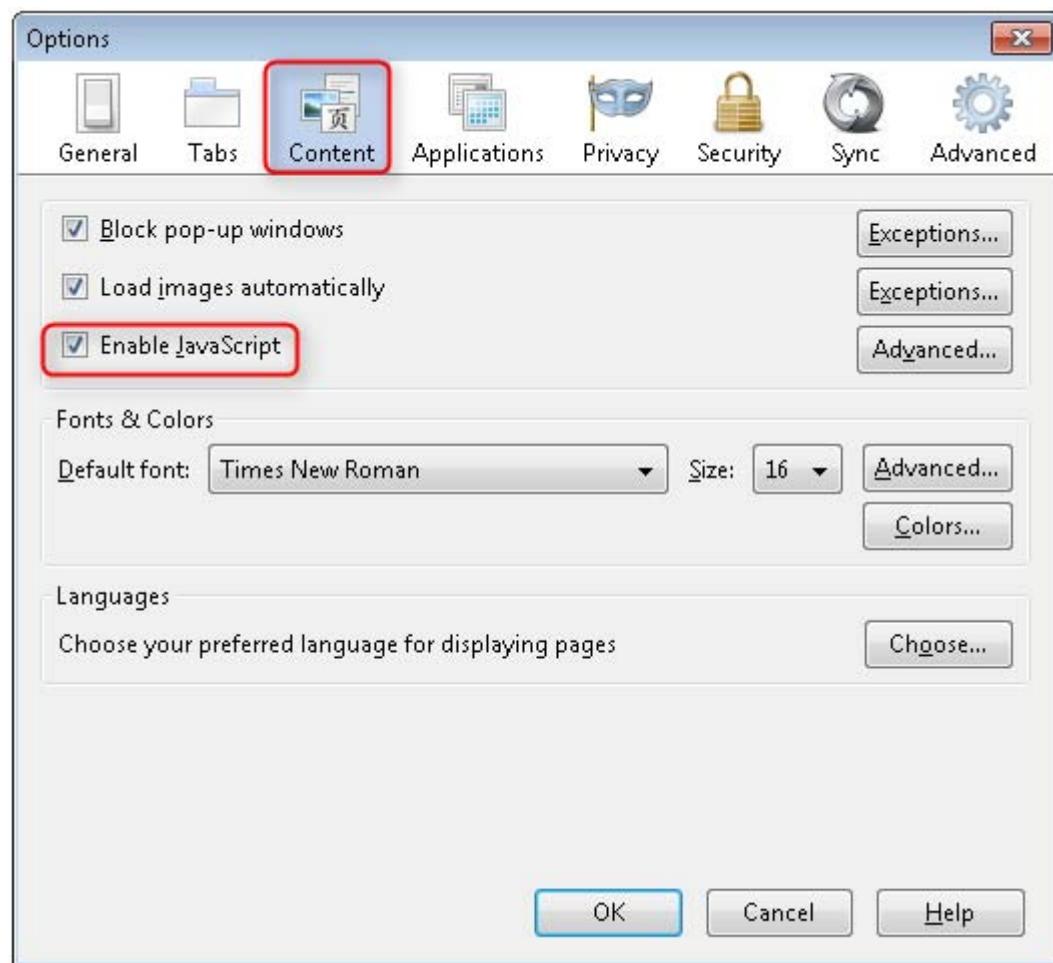
You can set a break point in the **HttpPost Create** method and verify the method is never called, client side validation will not submit the form data when validation errors are detected. If you disable JavaScript in your browser, submit the form with errors, the break point will be hit. You still get full validation without JavaScript.



```
[HttpPost]
public ActionResult Create(Movie movie)
{
    if (ModelState.IsValid)
    {
        db.Movies.Add(movie);
        db.SaveChanges();
        return RedirectToAction("Index");
    }

    return View(movie);
}
```

The following image shows how to disable JavaScript in the FireFox browser.



The following image shows how to disable JavaScript with the Chrome browser.

The screenshot shows the 'Content Settings' page within the Chrome Options interface. The left sidebar lists categories: Basics, Personal Stuff, Under the Hood (which is selected and highlighted with a red box), and Extensions. The main area displays settings for Cookies, Images, JavaScript (which is also highlighted with a red box), Handlers, and Plug-ins. Each setting includes a radio button for selecting an option and a 'Manage exceptions...' button.

Setting	Option Selected	Description
Cookies	<input checked="" type="radio"/>	Allow local data to be set (recommended)
Images	<input checked="" type="radio"/>	Show all images (recommended)
JavaScript	<input checked="" type="radio"/>	Allow all sites to run JavaScript (recommended)
Handlers	<input checked="" type="radio"/>	Allow sites to ask to become handlers
Plug-ins	<input checked="" type="radio"/>	Run automatically (recommended)

Below is the *Create.cshtml* view template that you scaffolded earlier in the tutorial. It's used by the action methods shown above both to display the initial form and to redisplay it in the event of an error.

```
@model MvcMovie.Models.Movie

@{
    ViewBag.Title = "Create";
}



## Create



<script src="@Url.Content("~/Scripts/jquery.validate.min.js")"></script>
<script src="@Url.Content("~/Scripts/jquery.validate.unobtrusive.min.js")"></script>

@using (Html.BeginForm()) {
    @Html.ValidationSummary(true)

    <fieldset>
        <legend>Movie</legend>

        <div class="editor-label">
            @Html.LabelFor(model => model.Title)
        </div>
        <div class="editor-field">
            @Html.EditorFor(model => model.Title)
            @Html.ValidationMessageFor(model => model.Title)
        </div>

        <div class="editor-label">
            @Html.LabelFor(model => model.ReleaseDate)
        </div>
        <div class="editor-field">
            @Html.EditorFor(model => model.ReleaseDate)
            @Html.ValidationMessageFor(model => model.ReleaseDate)
        </div>

        <div class="editor-label">
            @Html.LabelFor(model => model.Genre)
        </div>
        <div class="editor-field">
            @Html.EditorFor(model => model.Genre)
        </div>
}
```

```

@Html.ValidationMessageFor(model => model.Genre)
</div>

<div class="editor-label">
@Html.LabelFor(model => model.Price)
</div>
<div class="editor-field">
@Html.EditorFor(model => model.Price)
@Html.ValidationMessageFor(model => model.Price)
</div>
<div class="editor-label">
@Html.LabelFor(model => model.Rating)
</div>
<div class="editor-field">
@Html.EditorFor(model => model.Rating)
@Html.ValidationMessageFor(model => model.Rating)
</div>
<p>
<input type="submit" value="Create"/>
</p>
</fieldset>
}

<div>
@Html.ActionLink("Back to List", "Index")
</div>

```

Notice how the code uses an `Html.EditorFor` helper to output the `<input>` element for each `Movie` property. Next to this helper is a call to the `Html.ValidationMessageFor` helper method. These two helper methods work with the model object that's passed by the controller to the view (in this case, a `Movie` object). They automatically look for validation attributes specified on the model and display error messages as appropriate.

What's really nice about this approach is that neither the controller nor the Create view template knows anything about the actual validation rules being enforced or about the specific error messages displayed. The validation rules and the error strings are specified only in the `Movie` class.

If you want to change the validation logic later, you can do so in exactly one place by adding validation attributes to the model (in this example, the `Movie` class). You won't have to worry about different parts of the application being inconsistent with how the rules are enforced — all validation logic will be defined in one place and used everywhere. This keeps the code very clean, and makes it easy to maintain and evolve. And it means that that you'll be fully honoring the DRY principle.

Adding Formatting to the Movie Model

Open the `Movie.cs` file and examine the `Movie` class. The `System.ComponentModel.DataAnnotations` namespace provides formatting attributes in addition to the built-in set of validation attributes. We've already applied a `DataType` enumeration value to the release date and to the price fields. The following code shows the `ReleaseDate` and `Price` properties with the appropriate `DisplayFormat` attribute.

```
[DataType(DataType.Date)]
public DateTime ReleaseDate { get; set; }

[DataType(DataType.Currency)]
public decimal Price { get; set; }
```

Alternatively, you could explicitly set a `DataFormatString` value. The following code shows the `ReleaseDate` property with a date format string (namely, "d"). You'd use this to specify that you don't want to time as part of the release date.

```
[DisplayFormat(DataFormatString = "{0:d}")]
public DateTime ReleaseDate { get; set; }
```

The following code formats the `Price` property as currency.

```
[DisplayFormat(DataFormatString = "{0:c}")]
public decimal Price { get; set; }
```

The complete `Movie` class is shown below.

```
public class Movie {
    public int ID { get; set; }
```

```
[Required]
public string Title {get; set;}

[DataType(DataType.Date)]
public DateTime ReleaseDate {get; set; }

[Required]
public string Genre {get; set; }

[Range(1, 100)]
[DataType(DataType.Currency)]
public decimal Price {get; set; }

[StringLength(5)]
public string Rating {get; set; }

}
```

Run the application and browse to the `Movies` controller. The release date and price are nicely formatted.

The screenshot shows a web browser window with the URL <http://localhost:1234/>. The title bar says "Index - Movie App". The page header includes "MVC Movie" on the left, "Register" and "Log in" buttons on the right, and navigation links "Home", "About", and "Contact" below it. A main section titled "Index" contains a table of movie data with columns: Title, ReleaseDate, Genre, Price, and Rating. The table lists four movies: "When Harry Met Sally" (1/11/1989, Romantic Comedy, \$7.99, R), "Ghostbusters" (3/13/1984, Comedy, \$8.99, R), "Ghostbusters 2" (2/23/1986, Comedy, \$9.99, R), and "Rio Bravo" (4/15/1959, Western, \$3.99, R). Each row has "Edit", "Details", and "Delete" links. At the bottom, there's a copyright notice "© 2012 - My ASP.NET MVC Application" and social media icons for Facebook and Twitter.

Title	ReleaseDate	Genre	Price	Rating
When Harry Met Sally	1/11/1989	Romantic Comedy	\$7.99	R
Ghostbusters	3/13/1984	Comedy	\$8.99	R
Ghostbusters 2	2/23/1986	Comedy	\$9.99	R
Rio Bravo	4/15/1959	Western	\$3.99	R

In the next part of the series, we'll review the application and make some improvements to the automatically generated **Details** and **Delete** methods.

Examining the Details and Delete Methods

In this part of the tutorial, you'll examine the automatically generated **Details** and **Delete** methods.

Examining the Details and Delete Methods

Open the **Movie** controller and examine the **Details** method.

```
public ActionResult Details(int id =0)
{
    Movie movie =db.Movies.Find(id);
    if(movie ==null)
    {
        return HttpNotFound();
    }
    returnView(movie);
}
```

Code First makes it easy to search for data using the **Find** method. An important security feature built into the method is that the code verifies that the **Find** method has found a movie before the code tries to do anything with it. For example, a hacker could introduce errors into the site by changing the URL created by the links from *http://localhost:xxxx/Movies/Details/1* to something like *http://localhost:xxxx/Movies/Details/12345* (or some other value that doesn't represent an actual movie). If you did not check for a null movie, a null movie would result in a database error.

Examine the **Delete** and **DeleteConfirmed** methods.

```
// GET: /Movies/Delete/5

public ActionResult Delete(int id =0)
{
    Movie movie =db.Movies.Find(id);
    if(movie ==null)
    {
        return HttpNotFound();
    }
    returnView(movie);
```

```

}

// 
// POST: /Movies/Delete/5

[HttpPost,ActionName("Delete")]
public ActionResult DeleteConfirmed(int id =0)
{
    Movie movie =db.Movies.Find(id);
    if(movie ==null)
    {
        return HttpNotFound();
    }
    db.Movies.Remove(movie);
    db.SaveChanges();
    returnRedirectToAction("Index");
}

```

Note that the **HTTP Get Delete** method doesn't delete the specified movie, it returns a view of the movie where you can submit (**HttpPost**) the deletion.. Performing a delete operation in response to a GET request (or for that matter, performing an edit operation, create operation, or any other operation that changes data) opens up a security hole. For more information about this, see Stephen Walther's blog entry [ASP.NET MVC Tip #46 — Don't use Delete Links because they create Security Holes.](#)

The **HttpPost** method that deletes the data is named **DeleteConfirmed** to give the HTTP POST method a unique signature or name. The two method signatures are shown below:

```

// GET: /Movies/Delete/5
public ActionResult Delete(int id =0)

//
// POST: /Movies/Delete/5
[HttpPost,ActionName("Delete")]
public ActionResult DeleteConfirmed(int id =0)

```

The common language runtime (CLR) requires overloaded methods to have a unique signature (same method name but different list of parameters). However, here you need two Delete methods -- one for GET and one for POST -- that both have the same signature. (They both need to accept a single integer as a parameter.)

To sort this out, you can do a couple of things. One is to give the methods different names. That's what the scaffolding mechanism did in the preceding example. However, this introduces a small problem: ASP.NET maps segments of a URL to action methods by name, and if you rename a method, routing normally wouldn't be able to find that method. The solution is what you see in the example, which is to add the `ActionName("Delete")` attribute to the `DeleteConfirmed` method. This effectively performs mapping for the routing system so that a URL that includes `/Delete/` for a POST request will find the `DeleteConfirmed` method.

Another common way to avoid a problem with methods that have identical names and signatures is to artificially change the signature of the POST method to include an unused parameter. For example, some developers add a parameter type `FormCollection` that is passed to the POST method, and then simply don't use the parameter:

```
public ActionResult Delete(FormCollection fcNotUsed, int id = 0)
{
    Movie movie = db.Movies.Find(id);
    if(movie == null)
    {
        return HttpNotFound();
    }
    db.Movies.Remove(movie);
    db.SaveChanges();
    return RedirectToAction("Index");
}
```

Wrapping Up

You now have a complete ASP.NET MVC application that stores data in a SQL Server Compact database. You can create, read, update, delete, and search for movies.

The screenshot shows a web browser window with the title "SearchIndex - Movie App". The address bar displays "localhost:1234/Movies/SearchIndex". The page header includes the "MVC Movie" logo, navigation links for "Home", "About", and "Contact", and user links for "Register" and "Log in". A search section titled "SearchIndex" features a "Create New" link, a dropdown menu set to "All", a search input field, and a "Filter" button. Below this is a table listing movies with columns for Title, Release Date, Genre, and Price. Each row includes edit, details, and delete links. The movies listed are:

Title	Release Date	Genre	Price
When Harry Met Sally	1/11/1989	Romantic Comedy	\$7.99
Ghostbusters	3/13/1984	Comedy	\$8.99
Ghostbusters 2	2/23/1986	Comedy	\$9.99
Rio Bravo	4/15/1959	Western	\$3.99

At the bottom left, it says "© 2012 - My ASP.NET MVC Application". On the right, there are social media sharing icons for Facebook and Twitter.

This basic tutorial got you started making controllers, associating them with views, and passing around hard-coded data. Then you created and designed a data model. Entity Framework code-first created a database from the data model on the fly, and the ASP.NET MVC scaffolding system automatically generated the action methods and views for basic CRUD operations. You then added a search form that let users search the database. You changed the database to include a new column of data, and then updated two pages to create and display this new data. You added validation by marking the data model with attributes from the **DataAnnotations** namespace. The resulting validation runs on the client and on the server.

If you'd like to deploy your application, it's helpful to first test the application on your local IIS 7 server. You can use this [Web Platform Installer](#) link to enable IIS setting for ASP.NET applications. See the following deployment links:

- [ASP.NET Deployment Content Map](#)
- [Enabling IIS 7.x](#)
- [Web Application Projects Deployment](#)

I now encourage you to move on to our intermediate-level [Creating an Entity Framework Data Model for an ASP.NET MVC Application](#) and [MVC Music Store](#) tutorials, to explore the [ASP.NET articles on MSDN](#), and to check out the many videos and resources at <http://asp.net/mvc> to learn even more about ASP.NET MVC! The [ASP.NET MVC forums](#) are a great place to ask questions.

Enjoy!

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