4

Controller

This chapter covers

* Understanding the Controller Anatomy
* Storyboarding the Application.
* Mapping the Presentation Model
* Using Input from the Browser
* Passing View Metadata

The focus of the Model-View-Controller pattern is the controller. With this pattern, every request is handled by a controller and rendered by a view. Without the controller, presentation and business logic would move to the view, as we have seen with Web Forms. With the ASP.NET MVC Framework, every request routes to a controller, which is simply a class that implements the IController interface (see chapter 9). Microsoft provides the base class System.Web.Mvc.Controller to make creating a controller easy. The controller base class you choose is not crucial because most request processing goes into executing the ActionResult, which is the type that each action returns.‑­

An action is a method that handles a particular request. This method can take no parameters or many, but by the time the action method finishes executing, there ought to be one or many objects ready to be sent to the view, and the name of the view should be selected if the view does not follow the convention of having the same name as the action. Beyond that, the developer is in complete control regarding how to implement a controller and its actions. This chapter will explore controllers that use many actions and inherit from the System.Web.Mvc.Controller base class. The meat of the controller is the action.

4.1 The Anatomy of a Controller

A controller is simply a class that inherits from System.Web.Mvc.Controller that contains one or more methods that act as Actions. An action method is used to serve a single web requests that normally returns an ActionResult and can take zero or many arguments. Parameters are resolved into the action method by the Model Binders, by using this automatic binding to complex types Action methods can focus on the concerns of controlling the application logic rather than spending time: translating input from the browser into Input Models or mapping Domain models into presentation models.

An well written action should have a clear purpose and a single responsibility. That responsibility is to accept input from the browser and coordinate the flow of the application. Along the way, the action should rely on application services to perform tasks such executing business logic, performing data access, or file I/O.

Listing 4.1 The SimpleController decides on ViewData and renders a view

using System.Web.Mvc;

namespace MvcInAction.Controllers

{

public class SimpleController : Controller

{

public ActionResult Hello()

{

ViewData.Add("greeting", "Hello Readers!");

return View();

}

}

}

4.2 Storyboarding the Application

Action methods exist to perform presentation coordination for a screen/page. This coordination is the glue that puts ties together the Storyboard of the Application. Imagine drawing the flow of application screens on a whiteboard. Each place that a user has the ability to input information through a form or click a button, there are at least two possible outcomes. These are a successfully handled request or an alternate path that requires additional input or a decision from the user. This alternate path could included dealing with data type validation errors, business rule validation errors, or exception handling.

Focusing an Action to concentrate on wiring together the storyboard of the application has some good side effects. Actions tend to become smaller and focused. By moving business logic out of the Action and into supporting services, the actions are less complex and easier to test. A lean action should result in two possible outcomes: Happy Path ( a successfully processed request) or a alternate path. If an action starts branching to handle multiple alternate paths this is sign that the Action method is handling too much and some design should be put into the storyboard of the application.

Figure 4.2 Storyboard of a User Interaction

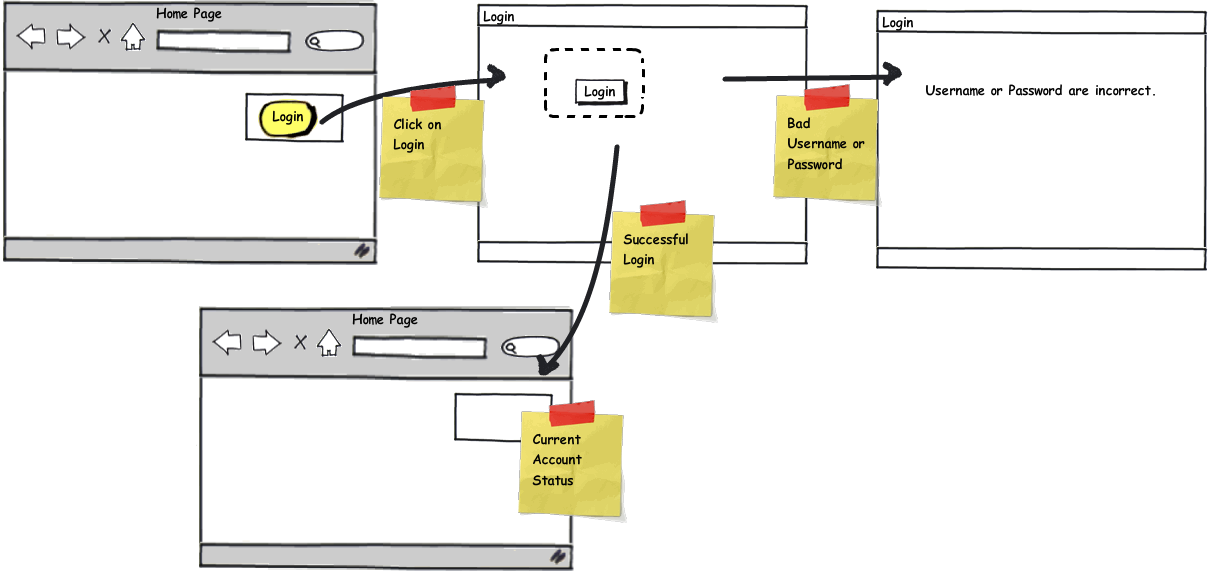


Figure 4.2 shows a sample Storyboard of how a user would login to a web application and see some customized content after a successful login. The Action that handles the Login Form post would decide to redirect the user to the homepage or re-render the Login form with a message that explains the user needs to enter a correct username and password combination. While this seems like a very obvious path that needs to be developed, it is very easy to overlook the alternate paths when you do not storyboard them. By using a storyboard the design and requirements of your actions just fall off of the storyboard. This technique helps developers and designers communicate how the screens would work before writing a single line of code.

4.3 Transforming a model to a view model

A common role of an action is to simple do the work necessary to mold a Domain model into a presentation model for a view, JSON, or other output type. This type of action handles a GET request to the web server and in its simplest form returns Html to the browser.

Listing 4.3 - An Action that prepares a Presentation Model for a view

public ActionResult Index()

{

IEnumerable<User> users = UserRepository.GetAll();

UserDisplay[] viewModel = users.Select(

user => new UserDisplay

{

Username = user.Username,

Name =

user.FirstName + " " +

user.LastName

}).ToArray();

return View(viewModel);

}

In the code example listing 4.3, this action retrieves a collection of User domain model objects and transforms the objects into a Presentation Model of type UserDisplay[]. The action relies on a UserRepository class to handle all the communication to the database and turning the native database objects into the User collection. Next, the action uses some System.Linq syntax to minimize the noise in performing this type of transformation. The last line of the action sends the Presentation Model to a View helper method and returns a ViewResult to the MVC framework. Since a view name was not specified the framework uses a convention and looks for a view that matches the Action name. In this case it would look for a view called Index.

4.3 Accepting Input

Accepting input from a web browser into an action can happen through a Accepting input from a web browser into an action. The controller uses the Model Binder feature resolve values from form posts and query string and turn them into .Net object that match the named of parameters of an Action. The internals of how this works is covered in a later chapter, for now it is important to understand that a convention is used to match up form values by their name to the parameter name of an action.

Listing 4. A value object bound to an Action from a query string

[HttpGet]

public ActionResult Edit(int Id)

{

User users = UserRepository.GetById(Id);

....

}

The code in listing 4.4 shows a value object being bound from the query string of a url. The url to send an id with the value 4 would be http://localhost/User/Edit/4. The Action can use the value to perform it's work without having to deal with the concerns of pulling values out of the HttpContext. When the code in an action accesses the Request object to translate data into an object, that is a sign that the action is doing work that it should not be. Actions need to be focused on the storyboard instead of translating input data.

Listing 4.5 A complex object bound to an Action from a Form Post

public class UserInput

{

[Required]

public string Username { get; set; }

public string FirstName { get; set; }

public string LastName { get; set; }

}

[HttpPost]

public ActionResult Edit(UserInput input)

{

...

}

The code listing 4.5 demonstrates how an Action method that accepts a complex type as a parameter. The framework will automatically convert the form values to match the form values.

The resolution of action parameters coupled with model binders makes it easy to craft an action method that takes in information from a web request. We can use the form values, route values, and the querystring to make the action behavior more dynamic. Again, notice how effortless it is to consume this request data. We do not have to write any repetitive code to pull these values in. Rather, the ASP.NET MVC Framework finds the correct parameter and maps it to the action parameter.

4.3.1 Handling the Successful Storyboard path in an Action

Now that accepting user input to an action parameter is taken care by the framework, an action be used to implement the applications storyboard. In the case of accepting user input from a form post, the decision to determine the success or alternate path can be determined by datatype validation. When the criteria for success are met, than the action can coordinate the success action and control the flow to the next screen or action.

Listing 4.x The success path in an Action

[HttpPost]

public ActionResult Edit(UserInput input)

{

if (ModelState.IsValid)

{

UpdateUserFromInput(input);

TempData["message"] = "The user was updated";

return RedirectToAction("index");

}

return View(input);

}

private void UpdateUserFromInput(UserInput input)

{

User user =

UserRepository.GetByUsername(input.Username);

user.FirstName = input.FirstName;

user.LastName = input.LastName;

UserRepository.Save(user);

}

The code in figure 4. the success path is determined by the call to the ModelState.IsValid property. The model binder that translate the Form Post data into the UserInput object also populates the ModelState object with metadata about the data type validation of the object. When all of the validation passes than the IsValid property is true. In this case, the UpdateUserFromInput method is called. This method updates the User object from the input model. Once the update occurs a success message is put into TempData. The TempData allows transient data to be passed between to consecutive calls to the webserver. In this case after the Redirect method the next Action call will have the TempData available to display the message to the user. The last line of code in the success path returns a RedirectToAction ActionResult. The RedirectToAction("Index") returns a browser redirect to the UserController.Index action. This approach keeps the Action simple and concise.

4.3.2 Using the Post Redirect Get ( PRG ) Pattern

The code in listing 4.x demonstrates a pattern call Post Redirect Get. This is pattern was published in 2003 by Michael Jouravlev. The pattern is used to prevent some common problems that occur after a user has posted a form to a web server. If a view is rendered directly from a form post than the user may attempt to refresh the browser or bookmark the page. This problem can cause double form submissions or other erroneous behavior. By redirecting after a Post to a url that uses a Get request, the problem is eliminated. This makes the user experience consistent and deterministic. This pattern should be used when handling form posts.

The screenshots in Figure 4.x and 4.x demonstrate a form to collect user input used by the Edit Action. The success path of the action redirects to the Index page and the page pulls the success message from TempData. The ASP.Net MVC framework provides the components like TempData and the RedirectToAction method to support the PRG pattern. This pattern combines very nicely with the keeping Controller Actions simple and concise to support the application Storyboard.

Figure Screenshot of User Edit View

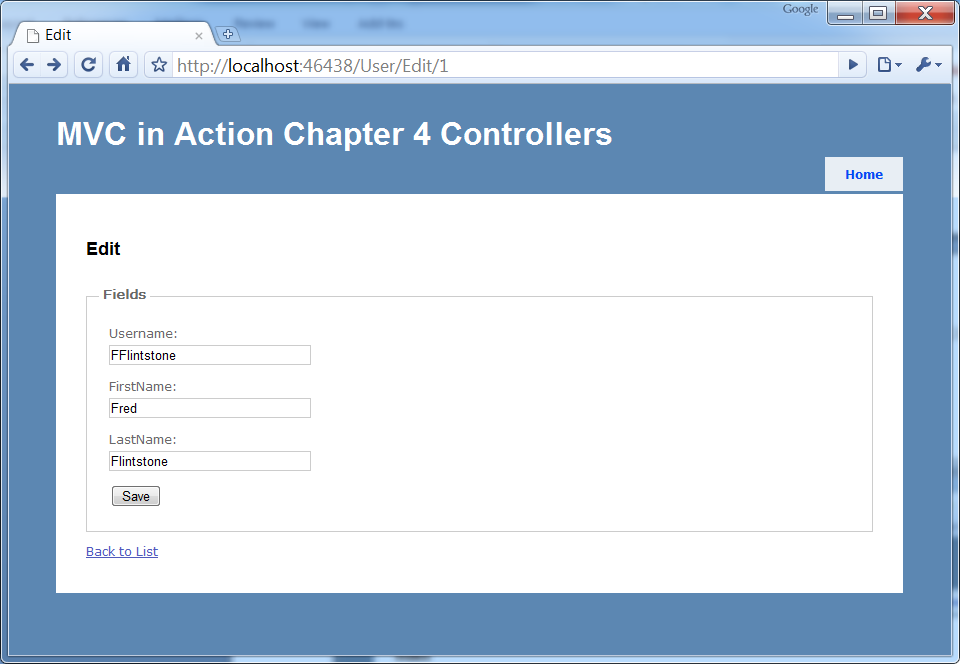
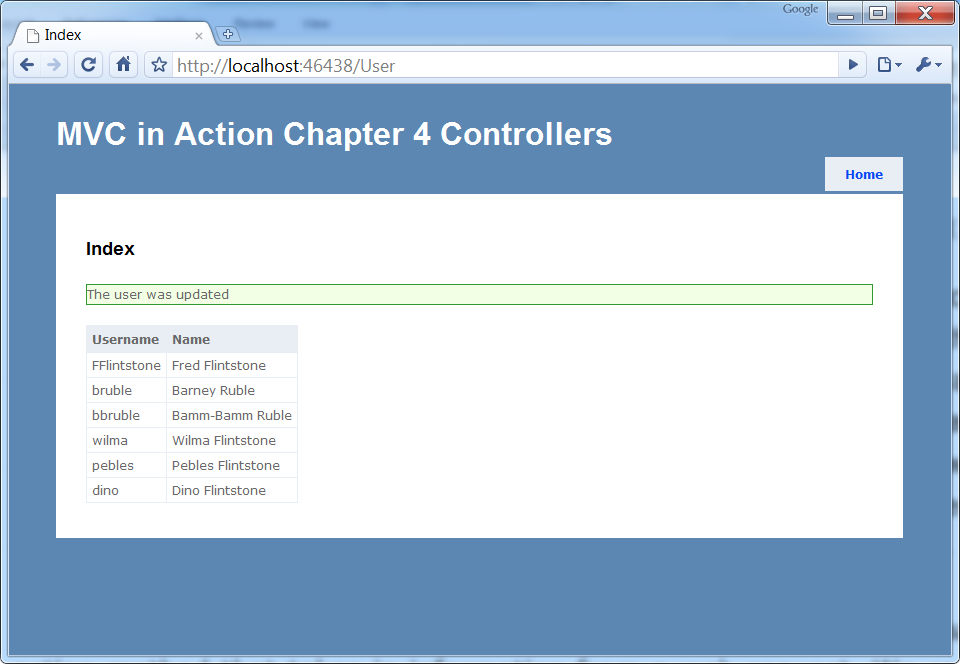


Figure Screenshot of the redirected action showing a message from TempData



4.3.3 Handling the Failure processing of the Action Input

The code listing 4.x has the alternate path when the ModelState.IsValid returns a value of false. This occurs when the Username is not entered in the form. The ModelBinder utilizes the built in validation framework that uses DataAnnotation attributes to designate how the Input Model should be validated. When an empty value for the Username is posted to the server, a Error Message is automatically added to the ModelState object. Leaning on the Model Binders allows the code in the failure path to be very simple and clean. In listing 4. , The Failure path is simply the return View(input). The ModelState is sent the view so no additional code is required in the Action to send a useful error message to the user.

Listing 4. The Failure Path

public class UserInput

{

[Required]

public string Username { get; set; }

public string FirstName { get; set; }

public string LastName { get; set; }

}

[HttpPost]

public ActionResult Edit(UserInput input)

{

if (ModelState.IsValid)

{

...

}

return View(input);

}

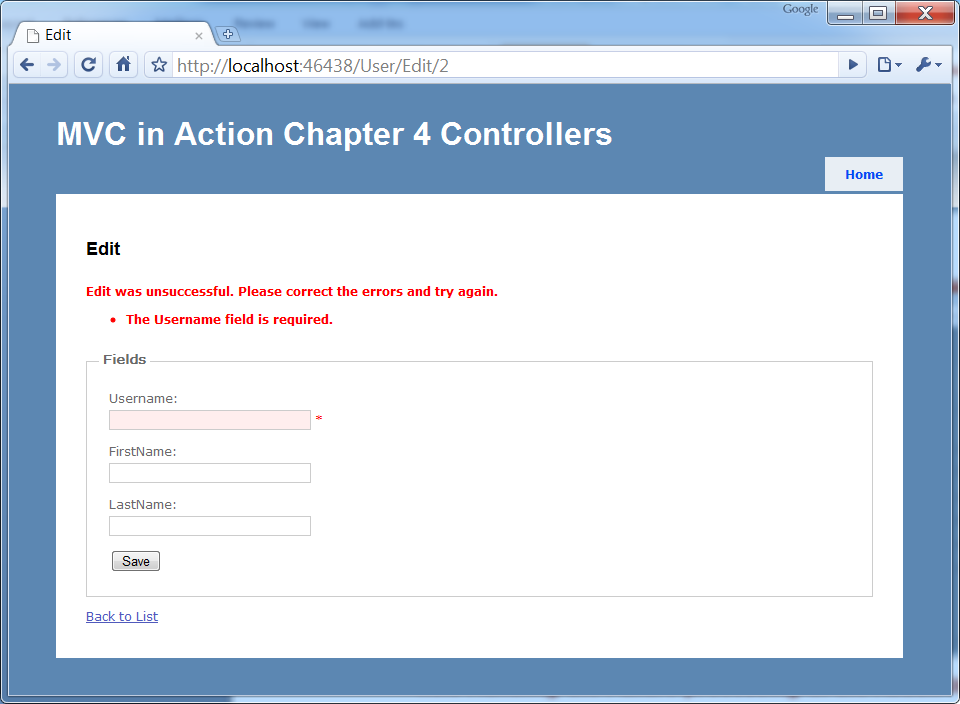


Figure 4.

4.4 Summary

Controllers are the center of an MVC presentation layer. Controllers handle all the coordination between the Model and the View. Without the controller, we must find another place for this presentation logic. In the ASP.NET MVC Framework, logic is separated into controllers and actions. Actions can accept parameters and can call for the rendering of a view. Actions are not required to have a view, but they commonly do. When using a view, we have several methods for passing view data, and the preferred method is to use an object that best suits your needs. Keep in mind that the default way might not be best for your situation.

Action parameters are matched by name first from the form, then the route, and then querystring. Order is unimportant. If one of the responsibilities of the controller is to perform some task for every action, consider an action filter. In fact, if this task is applicable for many controllers, consider creating a layer supertype that applies this filter. When you’re starting a new application based on the ASP.NET MVC Framework, consider creating a layer supertype right from the start. Chances are, the need to make some functionality available to all controllers through inheritance will surface, and it will save you time if you have accumulated many controllers. Of course, YAGNI (You aren’t going to need it) applies here, so evaluate your scenario and choose wisely. We often find a layer supertype comes into play at some point. The variable is when.

Wielded without caution, controllers have the potential because of becoming just as large and convoluted as Page\_Load methods in Web Forms. Armed with test-driven development and a disciplined approach to separation of concerns, you will ensure the maintainability of your presentation layer.