

Contents at a Glance

About the Author	xxvii
About the Technical Reviewer	xxix
■ Part I: Introducing ASP.NET Core MVC 2	1
■ Chapter 1: ASP .NET Core MVC in Context	3
■ Chapter 2: Your First MVC Application	11
■ Chapter 3: The MVC Pattern, Projects, and Conventions	53
■ Chapter 4: Essential C# Features.....	67
■ Chapter 5: Working with Razor	105
■ Chapter 6: Working with Visual Studio.....	127
■ Chapter 7: Unit Testing MVC Applications	163
■ Chapter 8: SportsStore: A Real Application.....	193
■ Chapter 9: SportsStore: Navigation	237
■ Chapter 10: SportsStore: Completing the Cart	271
■ Chapter 11: SportsStore: Administration	295
■ Chapter 12: SportsStore: Security and Deployment	323
■ Chapter 13: Working with Visual Studio Code.....	349
■ Part II: ASP.NET Core MVC 2 in Detail	373
■ Chapter 14: Configuring Applications.....	375
■ Chapter 15: URL Routing.....	429
■ Chapter 16: Advanced Routing Features	469

■ Chapter 17: Controllers and Actions.....	507
■ Chapter 18: Dependency Injection.....	551
■ Chapter 19: Filters.....	585
■ Chapter 20: API Controllers.....	625
■ Chapter 21: Views	657
■ Chapter 22: View Components	691
■ Chapter 23: Understanding Tag Helpers	721
■ Chapter 24: Using the Form Tag Helpers	755
■ Chapter 25: Using the Other Built-in Tag Helpers.....	781
■ Chapter 26: Model Binding.....	811
■ Chapter 27: Model Validation	849
■ Chapter 28: Getting Started with Identity.....	881
■ Chapter 29: Applying ASP.NET Core Identity.....	919
■ Chapter 30: Advanced ASP.NET Core Identity	949
■ Chapter 31: Model Conventions and Action Constraints	983
Index.....	1013

Contents

About the Author	xxvii
About the Technical Reviewer	xxix
■ Part I: Introducing ASP.NET Core MVC 2	1
■ Chapter 1: ASP .NET Core MVC in Context	3
Understanding the History of ASP.NET Core MVC	3
ASP.NET Web Forms	4
The Original MVC Framework	5
Understanding ASP.NET Core	5
What's New in ASP.NET Core MVC 2	6
Key Benefits of ASP.NET Core MVC	6
What Do I Need to Know?	9
What Is the Structure of This Book?	9
Part 1: Introducing ASP.NET Core MVC	9
Part 2: ASP.NET Core MVC in Detail	9
Where Can You Get the Example Code?	9
Where Can You Get Corrections for This Book?	10
Contacting the Author	10
Summary	10
■ Chapter 2: Your First MVC Application	11
Installing Visual Studio	11
Installing the .NET Core 2.0 SDK	12

Creating a New ASP.NET Core MVC Project	13
Adding the Controller	17
Understanding Routes	20
Rendering Web Pages	20
Creating and Rendering a View	20
Adding Dynamic Output	23
Creating a Simple Data-Entry Application	25
Setting the Scene	25
Designing a Data Model	26
Creating a Second Action and a Strongly Typed View	27
Linking Action Methods	29
Building the Form	30
Receiving Form Data	32
Displaying the Responses	37
Adding Validation	39
Styling the Content	45
Summary	51
■ Chapter 3: The MVC Pattern, Projects, and Conventions	53
The History of MVC	53
Understanding the MVC Pattern	53
Understanding Models	53
Understanding Controllers	54
Understanding Views	55
The ASP.NET Implementation of MVC	55
Comparing MVC to Other Patterns	56
Understanding the Smart UI Pattern	56
Understanding the Model-View Architecture	57
Understanding Classic Three-Tier Architecture	58
Understanding Variations on MVC	59

Understanding ASP.NET Core MVC Projects.....	60
Creating the Project.....	60
Understanding MVC Conventions	63
Summary.....	65
Chapter 4: Essential C# Features.....	67
Preparing the Example Project.....	68
Enabling ASP.NET Core MVC	69
Creating the MVC Application Components	70
Using the Null Conditional Operator	73
Chaining the Null Conditional Operator	74
Combining the Conditional and Coalescing Operators	75
Using Automatically Implemented Properties	76
Using Auto-Implemented Property Initializers	77
Creating Read-Only Automatically Implemented Properties.....	78
Using String Interpolation.....	79
Using Object and Collection Initializers.....	80
Using an Index Initializer	82
Pattern Matching.....	83
Pattern Matching in Switch Statements.....	84
Using Extension Methods	85
Applying Extension Methods to an Interface	86
Creating Filtering Extension Methods.....	88
Using Lambda Expressions	90
Defining Functions.....	91
Using Lambda Expression Methods and Properties	94
Using Type Inference and Anonymous Types.....	96
Using Anonymous Types	97
Using Asynchronous Methods	99
Working with Tasks Directly	99
Applying the async and await Keywords.....	101
Getting Names.....	102
Summary.....	104

■ Chapter 5: Working with Razor	105
Preparing the Example Project.....	106
Defining the Model	107
Creating the Controller	107
Creating the View	108
Working with the Model Object	109
Using View Imports.....	111
Working with Layouts.....	112
Creating the Layout	113
Applying a Layout	115
Using a View Start File.....	116
Using Razor Expressions	118
Inserting Data Values.....	119
Setting Attribute Values	121
Using Conditional Statements	122
Enumerating Arrays and Collections.....	124
Summary	126
■ Chapter 6: Working with Visual Studio.....	127
Preparing the Example Project.....	127
Creating the Model	128
Creating the Controller and View	129
Managing Software Packages.....	131
Understanding NuGet.....	131
Understanding Bower	133
Understanding Iterative Development.....	137
Making Changes to Razor Views	138
Making Changes to C# Classes	139
Using Browser Link.....	147

Preparing JavaScript and CSS for Deployment	152
Enabling Static Content Delivery	153
Adding Static Content to the Project.....	153
Updating the View.....	156
Bundling and Minifying in MVC Applications	157
Summary.....	161
■ Chapter 7: Unit Testing MVC Applications	163
Preparing the Example Project.....	164
Enabling the Built-in Tag Helpers	164
Adding Actions to the Controller	164
Creating the Data Entry Form	165
Updating the Index View	166
Unit Testing MVC Applications	167
Creating a Unit Test Project	168
Creating the Project Reference.....	169
Writing and Running Unit Tests.....	169
Isolating Components for Unit Testing	174
Improving Unit Tests	182
Parameterizing a Unit Test.....	182
Improving Fake Implementations	186
Summary.....	191
■ Chapter 8: SportsStore: A Real Application	193
Getting Started	194
Creating the MVC Project.....	194
Creating the Unit Test Project	198
Checking and Running the Application.....	199
Starting the Domain Model.....	200
Creating a Repository	201
Creating a Fake Repository	202
Registering the Repository Service	202

Displaying a List of Products	203
Adding a Controller	204
Adding and Configuring the View	205
Setting the Default Route	207
Running the Application	208
Preparing a Database	208
Installing the Entity Framework Core Tools Package	209
Creating the Database Classes	210
Creating the Repository Class	210
Defining the Connection String	211
Configuring the Application	212
Creating the Database Migration	214
Creating the Seed Data	215
Adding Pagination	218
Displaying Page Links	220
Improving the URLs	229
Styling the Content	231
Installing the Bootstrap Package	231
Applying Bootstrap Styles to the Layout	232
Creating a Partial View	235
Summary	236
■ Chapter 9: SportsStore: Navigation	237
Adding Navigation Controls	237
Filtering the Product List	237
Refining the URL Scheme	242
Building a Category Navigation Menu	246
Correcting the Page Count	253
Building the Shopping Cart	257
Defining the Cart Model	257
Adding the Add to Cart Buttons	261
Enabling Sessions	263

Implementing the Cart Controller	264
Displaying the Contents of the Cart	266
Summary	270
■ Chapter 10: SportsStore: Completing the Cart	271
Refining the Cart Model with a Service	271
Creating a Storage-Aware Cart Class	271
Registering the Service	272
Simplifying the Cart Controller	273
Completing the Cart Functionality	274
Removing Items from the Cart	274
Adding the Cart Summary Widget	276
Submitting Orders	279
Creating the Model Class	279
Adding the Checkout Process	280
Implementing Order Processing	284
Completing the Order Controller	287
Displaying Validation Errors	290
Displaying a Summary Page	292
Summary	293
■ Chapter 11: SportsStore: Administration	295
Managing Orders	295
Enhancing the Model	295
Adding the Actions and View	296
Adding Catalog Management	299
Creating a CRUD Controller	300
Implementing the List View	302
Editing Products	303
Creating New Products	317
Deleting Products	318
Summary	322

■ Chapter 12: SportsStore: Security and Deployment	323
Securing the Administration Features	323
Creating the Identity Database	323
Applying a Basic Authorization Policy.....	328
Creating the Account Controller and Views	330
Testing the Security Policy.....	334
Deploying the Application.....	334
Creating the Databases	334
Preparing the Application	336
Applying the Database Migrations.....	340
Managing Database Seeding.....	340
Deploying the Application	344
Summary.....	348
■ Chapter 13: Working with Visual Studio Code	349
Setting Up the Development Environment	349
Installing Node.js	349
Checking the Node Installation.....	351
Installing Git.....	351
Checking the Git Installation.....	351
Installing Bower.....	352
Installing .NET Core	352
Checking the .NET Core Installation	353
Installing Visual Studio Code	353
Checking the Visual Studio Code Installation	354
Installing the Visual Studio Code C# Extension.....	355
Creating an ASP.NET Core Project	355
Preparing the Project with Visual Studio Code	356
Managing Client-Side Packages.....	357
Configuring the Application	359
Building and Running the Project	359

Re-creating the PartyInvites Application	360
Creating the Model and Repository	360
Creating the Database	364
Creating the Controllers and Views	366
Unit Testing in Visual Studio Code	370
Creating a Unit Test.....	371
Running Tests	371
Summary	372
■ Part II: ASP.NET Core MVC 2 in Detail	373
■ Chapter 14: Configuring Applications.....	375
Preparing the Example Project.....	376
Configuring the Project.....	378
Adding Packages to the Project.....	379
Adding Tools Packages to the Project.....	381
Understanding the Program Class.....	382
Digging into the Configuration Detail.....	382
Understanding the Startup Class.....	386
Understanding ASP.NET Services.....	388
Understanding ASP.NET Middleware.....	391
Understanding How the Configure Method Is Invoked	400
Adding the Remaining Middleware Components.....	405
Configuring the Application	409
Creating the JSON Configuration File	411
Using Configuration Data	413
Configuring Logging	415
Configuring Dependency Injection.....	419
Configuring MVC Services	420
Dealing with Complex Configurations	422
Creating Different External Configuration Files	422
Creating Different Configuration Methods	424
Creating Different Configuration Classes.....	425
Summary	427

■ Chapter 15: URL Routing	429
Preparing the Example Project	430
Creating the Model Class	431
Creating the Example Controllers	431
Creating the View	432
Introducing URL Patterns	434
Creating and Registering a Simple Route	435
Defining Default Values	437
Defining Inline Default Values	438
Using Static URL Segments	440
Defining Custom Segment Variables	445
Using Custom Variables as Action Method Parameters	448
Defining Optional URL Segments	449
Defining Variable-Length Routes	451
Constraining Routes	453
Constraining a Route Using a Regular Expression	457
Using Type and Value Constraints	458
Combining Constraints	459
Defining a Custom Constraint	461
Using Attribute Routing	463
Preparing for Attribute Routing	463
Applying Attribute Routing	464
Applying Route Constraints	467
Summary	468
■ Chapter 16: Advanced Routing Features	469
Preparing the Example Project	470
Generating Outgoing URLs in Views	471
Generating Outgoing Links	471
Generating URLs (and Not Links)	483

■ Chapter 15: URL Routing	4
Preparing the Example Project	4
Creating the Model Class	4
Creating the Example Controllers	4
Creating the View	4
Introducing URL Patterns	4
Creating and Registering a Simple Route	4
Defining Default Values	4
Defining Inline Default Values	4
Using Static URL Segments	4
Defining Custom Segment Variables	4
Using Custom Variables as Action Method Parameters	4
Defining Optional URL Segments	4
Defining Variable-Length Routes	4
Constraining Routes	4
Constraining a Route Using a Regular Expression	4
Using Type and Value Constraints	4
Combining Constraints	4
Defining a Custom Constraint	4
Using Attribute Routing	4
Preparing for Attribute Routing	4
Applying Attribute Routing	4
Applying Route Constraints	4
Summary	4
■ Chapter 16: Advanced Routing Features	4
Preparing the Example Project	4
Generating Outgoing URLs in Views	4
Generating Outgoing Links	4
Generating URLs (and Not Links)	4

Customizing the Routing System	484
Changing the Routing System Configuration	484
Creating a Custom Route Class	486
Working with Areas	497
Creating an Area	497
Creating an Area Route	498
Populating an Area	499
Generating Links to Actions in Areas	502
URL Schema Best Practices	503
Making Your URLs Clean and Human-Friendly	503
GET and POST: Picking the Right One	504
Summary	505
■ Chapter 17: Controllers and Actions.....	507
Preparing the Example Project.....	508
Preparing the Views.....	509
Understanding Controllers.....	511
Creating Controllers	512
Creating POCO Controllers.....	512
Using the Controller Base Class	514
Receiving Context Data	516
Getting Data from Context Objects	516
Using Action Method Parameters	520
Producing a Response.....	522
Producing a Response Using the Context Object.....	522
Understanding Action Results.....	524
Producing an HTML Response.....	526
Performing Redirections.....	535
Returning Different Types of Content.....	543
Responding with the Contents of Files.....	545

Returning Errors and HTTP Codes	547
Understanding the Other Action Result Classes	549
Summary	550
■ Chapter 18: Dependency Injection.....	551
Preparing the Example Project.....	552
Creating the Model and Repository	553
Creating the Controller and View	554
Creating the Unit Test Project	556
Creating Loosely Coupled Components.....	556
Examining Closely Coupled Components.....	557
Introducing ASP.NET Dependency Injection	564
Preparing for Dependency Injection	564
Configuring the Service Provider	565
Unit Testing a Controller with a Dependency	567
Using Dependency Chains	568
Using Dependency Injection for Concrete Types.....	570
Understanding Service Life Cycles.....	573
Using the Transient Life Cycle.....	574
Using the Scoped Life Cycle	578
Using the Singleton Life Cycle	580
Using Action Injection	581
Using the Property Injection Attributes.....	582
Manually Requesting an Implementation Object.....	582
Summary	583
■ Chapter 19: Filters.....	585
Preparing the Example Project.....	586
Enabling SSL.....	587
Creating the Controller and View	587
Using Filters	589

Understanding Filters	592
Getting Context Data.....	593
Using Authorization Filters	594
Creating an Authorization Filter.....	594
Using Action Filters	597
Creating an Action Filter	598
Creating an Asynchronous Action Filter.....	600
Using Result Filters	601
Creating a Result Filter.....	602
Creating an Asynchronous Result Filter.....	604
Creating a Hybrid Action/Result Filter.....	605
Using Exception Filters.....	607
Creating an Exception Filter	608
Using Dependency Injection for Filters.....	610
Resolving Filter Dependencies	610
Managing Filter Life Cycles	615
Creating Global Filters.....	618
Understanding and Changing Filter Order	620
Changing Filter Order	622
Summary.....	623
■ Chapter 20: API Controllers	625
Preparing the Example Project.....	626
Creating the Model and Repository	626
Creating the Controller and Views	628
Understanding the Role of RESTful Controllers	632
Understanding the Speed Problem.....	632
Understanding the Efficiency Problem	632
Understanding the Openness Problem	633

Introducing REST and API Controllers	633
Creating an API Controller.....	634
Testing an API Controller.....	639
Using the API Controller in the Browser.....	643
Understanding Content Formatting	645
Understanding the Default Content Policy.....	646
Understanding Content Negotiation.....	647
Specifying an Action Data Format	650
Getting the Data Format from the Route or Query String	651
Enabling Full Content Negotiation	653
Receiving Different Data Formats.....	654
Summary	655
■ Chapter 21: Views	657
Preparing the Example Project.....	658
Creating a Custom View Engine	659
Creating a Custom IView	661
Creating an IViewEngine Implementation.....	662
Registering a Custom View Engine.....	663
Testing the View Engine.....	664
Working with the Razor Engine	666
Preparing the Example Project	667
Demystifying Razor Views	669
Adding Dynamic Content to a Razor View	673
Using Layout Sections	673
Using Partial Views	679
Adding JSON Content to Views	682
Configuring Razor.....	684
Understanding View Location Expanders	685
Summary	690

■ Chapter 22: View Components	691
Preparing the Example Project.....	692
Creating the Models and Repositories.....	692
Creating the Controller and Views	694
Configuring the Application	697
Understanding View Components	698
Creating a View Component	698
Creating POCO View Components.....	699
Deriving from the ViewComponent Base Class.....	700
Understanding View Component Results.....	702
Getting Context Data.....	707
Creating Asynchronous View Components	713
Creating Hybrid Controller/View Component Classes	715
Creating the Hybrid Views	716
Applying the Hybrid Class.....	717
Summary	719
■ Chapter 23: Understanding Tag Helpers	721
Preparing the Example Project.....	722
Creating the Model and Repository	722
Creating the Controller, Layout, and Views	723
Configuring the Application	726
Creating a Tag Helper	727
Defining the Tag Helper Class.....	728
Registering Tag Helpers.....	731
Using a Tag Helper	732
Managing the Scope of a Tag Helper	734

Advanced Tag Helper Features	739
Creating Shorthand Elements	739
Prepending and Appending Content and Elements	741
Getting View Context Data and Using Dependency Injection	745
Working with the View Model	747
Coordinating Between Tag Helpers	750
Suppressing the Output Element	752
Summary	753
■ Chapter 24: Using the Form Tag Helpers	755
Preparing the Example Project	756
Resetting the Views and Layout	756
Working with Form Elements	758
Setting the Form Target	759
Using the Anti-forgery Feature	760
Working with Input Elements	762
Configuring Input Elements	763
Formatting Data Values	765
Working with Label Elements	768
Working with Select and Option Elements	770
Using a Data Source to Populate a select Element	772
Generating Option Elements from an enum	772
Working with Text Areas	777
Understanding the Validation Form Tag Helpers	779
Summary	779
■ Chapter 25: Using the Other Built-in Tag Helpers	781
Preparing the Example Project	782
Using the Hosting Environment Tag Helper	783
Using the JavaScript and CSS Tag Helpers	784
Managing JavaScript Files	784
Managing CSS Stylesheets	794

Working with Anchor Elements	797
Working with Image Elements	798
Using the Data Cache	799
Setting Cache Expiry	802
Using Cache Variations	804
Using Application-Relative URLs	806
Summary	809
■ Chapter 26: Model Binding	811
Preparing the Example Project	812
Creating the Model and Repository	812
Creating the Controller and View	814
Configuring the Application	815
Understanding Model Binding	817
Understanding Default Binding Values	818
Binding Simple Types	820
Binding Complex Types	821
Binding to Arrays and Collections	832
Specifying a Model Binding Source	839
Selecting a Standard Binding Source	840
Using Headers As Binding Sources	841
Using Request Bodies as Binding Sources	845
Summary	847
■ Chapter 27: Model Validation	849
Preparing the Example Project	850
Creating the Model	851
Creating the Controller	851
Creating the Layout and Views	852
Understanding the Need for Model Validation	855

Explicitly Validating a Model.....	855
Displaying Validation Errors to the User	858
Displaying Validation Messages	860
Displaying Property-Level Validation Messages	864
Displaying Model-Level Messages	866
Specifying Validation Rules Using Metadata	869
Creating a Custom Property Validation Attribute	872
Performing Client-Side Validation	874
Performing Remote Validation.....	877
Summary.....	880
■ Chapter 28: Getting Started with Identity.....	881
Preparing the Example Project.....	882
Creating the Controller and View	883
Setting Up ASP.NET Core Identity.....	885
Creating the User Class	885
Creating the Database Context Class	887
Configuring the Database Connection String Setting	887
Creating the Identity Database	890
Using ASP.NET Core Identity	890
Enumerating User Accounts	890
Creating Users	893
Validating Passwords	897
Validating User Details.....	904
Completing the Administration Features.....	910
Implementing the Delete Feature	910
Implementing the Edit Feature	912
Summary.....	917

Chapter 29: Applying ASP.NET Core Identity.....	919
Preparing the Example Project.....	919
Authenticating Users.....	920
Preparing to Implement Authentication.....	922
Adding User Authentication.....	925
Testing Authentication.....	927
Authorizing Users with Roles.....	928
Creating and Deleting Roles.....	929
Managing Role Memberships.....	934
Using Roles for Authorization.....	940
Seeding the Database.....	943
Summary.....	947
Chapter 30: Advanced ASP.NET Core Identity.....	949
Preparing the Example Project.....	949
Adding Custom User Properties.....	951
Preparing for Database Migration.....	954
Testing the Custom Properties.....	955
Working with Claims and Policies.....	955
Understanding Claims.....	956
Creating Claims.....	960
Using Policies.....	964
Using Policies to Authorize Access to Resources.....	970
Using Third-Party Authentication.....	976
Registering the Application with Google.....	976
Enabling Google Authentication.....	976
Summary.....	981

■ Chapter 31: Model Conventions and Action Constraints	983
Preparing the Example Project.....	983
Creating the View Model, Controller, and View	984
Using the Application Model and Model Conventions	986
Understanding the Application Model.....	987
Understanding the Role of Model Conventions.....	991
Creating a Model Convention.....	992
Understanding Model Convention Execution Order	997
Creating Global Model Conventions.....	998
Using Action Constraints	1000
Preparing the Example Project.....	1000
Understanding Action Constraints	1003
Creating an Action Constraint.....	1004
Resolving Dependencies in Action Constraints.....	1008
Summary.....	1011
Index.....	1013