

Beginning ASP.NET 4.5 in C#



Matthew MacDonald

Apress®

Beginning ASP.NET 4.5 in C#

Copyright © 2012 by Matthew MacDonald

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed. Exempted from this legal reservation are brief excerpts in connection with reviews or scholarly analysis or material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work. Duplication of this publication or parts thereof is permitted only under the provisions of the Copyright Law of the Publisher's location, in its current version, and permission for use must always be obtained from Springer. Permissions for use may be obtained through RightsLink at the Copyright Clearance Center. Violations are liable to prosecution under the respective Copyright Law.

ISBN-13 (pbk): 978-1-4302-4251-2

ISBN-13 (electronic): 978-1-4302-4252-9

Trademarked names, logos, and images may appear in this book. Rather than use a trademark symbol with every occurrence of a trademarked name, logo, or image, we use the names, logos, and images only in an editorial fashion and to the benefit of the trademark owner, with no intention of infringement of the trademark.

The use in this publication of trade names, trademarks, service marks, and similar terms, even if they are not identified as such, is not to be taken as an expression of opinion as to whether or not they are subject to proprietary rights.

While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

President and Publisher: Paul Manning

Lead Editor: Ewan Buckingham

Technical Reviewers: Todd Meister and Fabio Claudio Ferracchiati

Editorial Board: Steve Anglin, Ewan Buckingham, Gary Cornell, Louise Corrigan, Morgan Ertel, Jonathan Gennick, Jonathan Hassell, Robert Hutchinson, Michelle Lowman, James Markham, Matthew Moodie, Jeff Olson, Jeffrey Pepper, Douglas Pundick, Ben Renow-Clarke, Dominic Shakeshaft, Gwenan Spearing, Matt Wade, Tom Welsh

Coordinating Editor: Mark Powers

Copy Editors: Sharon Wilkey and Carole Berglie

Compositor: SPi Global

Indexer: SPi Global

Artist: SPi Global

Cover Designer: Anna Ishchenko

Distributed to the book trade worldwide by Springer Science + Business Media New York, 233 Spring Street, 6th Floor, New York, NY 10013. Phone 1-800-SPRINGER, fax (201) 348-4505, e-mail orders-ny@springer-sbm.com, or visit www.springeronline.com.

For information on translations, please e-mail rights@apress.com, or visit www.apress.com.

Apress and friends of ED books may be purchased in bulk for academic, corporate, or promotional use. eBook versions and licenses are also available for most titles. For more information, reference our Special Bulk Sales-eBook Licensing web page at www.apress.com/bulk-sales.

Any source code or other supplementary materials referenced by the author in this text is available to readers at www.apress.com/9781430242512. For detailed information about how to locate your book's source code, go to www.apress.com/source-code.

*For my wonderful family,
Faria, Maya, and Brenna*

Contents at a Glance

About the Author	xxvii
About the Technical Reviewers	xxix
Acknowledgments	xxxï
Introduction	xxxiii
■ Part 1: Introducing .NET	1
■ Chapter 1: The Big Picture.....	3
■ Chapter 2: The C# Language.....	15
■ Chapter 3: Types, Objects, and Namespaces	47
■ Part 2: Developing ASP.NET Applications	77
■ Chapter 4: Visual Studio	79
■ Chapter 5: Web Form Fundamentals	121
■ Chapter 6: Web Controls	163
■ Chapter 7: Error Handling, Logging, and Tracing.....	203
■ Chapter 8: State Management.....	233
■ Part 3: Building Better Web Forms	269
■ Chapter 9: Validation	271
■ Chapter 10: Rich Controls.....	293
■ Chapter 11: User Controls and Graphics.....	319
■ Chapter 12: Styles, Themes, and Master Pages	345
■ Chapter 13: Website Navigation	387

■ Part 4: Working with Data	423
■ Chapter 14: ADO.NET Fundamentals	425
■ Chapter 15: Data Binding	473
■ Chapter 16: The Data Controls	511
■ Chapter 17: Files and Streams	551
■ Chapter 18: XML	581
■ Part 5: Website Security	615
■ Chapter 19: Security Fundamentals	617
■ Chapter 20: Membership	639
■ Chapter 21: Profiles	675
■ Part 6: Advanced ASP.NET	697
■ Chapter 22: Component-Based Programming	699
■ Chapter 23: Caching	729
■ Chapter 24: LINQ and the Entity Framework	753
■ Chapter 25: ASP.NET AJAX	791
■ Chapter 26: Deploying ASP.NET Applications	825
Index	867

Contents

About the Author	xxvii
About the Technical Reviewers	xxix
Acknowledgments	xxxï
Introduction	xxxiii
■ Part 1: Introducing .NET.....	1
■ Chapter 1: The Big Picture.....	3
The Evolution of Web Development.....	3
Basic HTML.....	3
HTML Forms	5
ASP.NET	6
Server-Side and Client-Side Programming.....	6
The .NET Framework.....	8
C#, VB, and the .NET Languages	10
The Common Language Runtime	12
The .NET Class Library.....	13
Visual Studio.....	13
The Last Word.....	14
■ Chapter 2: The C# Language.....	15
The .NET Languages.....	15
C# Language Basics.....	16
Case Sensitivity	16
Commenting	16

Statement Termination	17
Blocks	18
Variables and Data Types	18
Assignment and Initializers	20
Strings and Escaped Characters	21
Arrays	22
Enumerations.....	24
Variable Operations	25
Advanced Math.....	26
Type Conversions.....	26
Object-Based Manipulation	28
The String Type	29
The DateTime and TimeSpan Types	31
The Array Type	33
Conditional Logic.....	34
The if Statement	35
The switch Statement.....	36
Loops.....	37
The for Loop.....	37
The foreach Loop.....	38
The while loop	39
Methods	40
Parameters	41
Method Overloading	41
Optional and Named Parameters.....	42
Delegates.....	43
The Last Word.....	45
■ Chapter 3: Types, Objects, and Namespaces	47
The Basics About Classes.....	47
Static Members	49

A Simple Class.....	49
Building a Basic Class	49
Creating an Object	51
Adding Properties	51
Using Automatic Properties	53
Adding a Method	54
Adding a Constructor	55
Adding an Event.....	56
Testing the Product Class	58
Value Types and Reference Types	60
Assignment Operations	60
Equality Testing.....	61
Passing Parameters by Reference and by Value	61
Reviewing .NET Types.....	62
Understanding Namespaces and Assemblies	63
Using Namespaces	66
Importing Namespaces.....	67
Using Assemblies	68
Advanced Class Programming	68
Inheritance.....	69
Static Members	70
Casting Objects.....	71
Partial Classes	74
Generics.....	75
The Last Word.....	76
■ Part 2: Developing ASP.NET Applications.....	77
■ Chapter 4: Visual Studio	79
The Promise of Visual Studio.....	79
Creating Websites	80
Creating an Empty Web Application.....	81

The Difference Between Websites and Web Projects	84
Working with the Hidden Solution Files.....	85
Using the Solution Explorer	86
Adding Web Forms.....	87
Multitargeting	88
Opening a Website from a Previous Version of Visual Studio	89
Designing a Web Page.....	90
Adding Web Controls	91
Using the Properties Window.....	93
Exploring the Anatomy of a Web Form	96
The Web Form Markup	96
The Page Directive.....	97
The Doctype.....	97
The Essentials of HTML	98
Writing Code.....	103
Using the Code-Behind Class	103
Adding Event Handlers	104
Outlining	106
IntelliSense	106
Debugging	112
The IIS Express Web Server.....	112
Single-Step Debugging.....	114
Variable Watches	118
The Last Word.....	119
■ Chapter 5: Web Form Fundamentals	121
Understanding the Anatomy of an ASP.NET Application	121
ASP.NET File Types.....	123
ASP.NET Web Folders.....	123
Introducing Server Controls	124
HTML Server Controls.....	125
Converting an HTML Page to an ASP.NET Page	125

View State	128
The HTML Control Classes	129
Adding the Currency Converter Code	132
Event Handling	134
Behind the Scenes with the Currency Converter	135
Error Handling	137
Improving the Currency Converter	138
Adding Multiple Currencies	138
Storing Information in the List	139
Adding Linked Images	140
Setting Styles	143
Taking a Deeper Look at HTML Control Classes	144
HTML Control Events	144
Advanced Events with the HtmlInputImage Control	145
The HtmlControl Base Class	147
The HtmlContainerControl Class	147
The HtmlInputControl Class	148
Using the Page Class	148
Sending the User to a New Page	150
Working with HTML Encoding	150
Using Application Events	152
The global.asax File	153
Additional Application Events	154
Configuring an ASP.NET Application	154
Working with the web.config File	155
Understanding Nested Configuration	156
Storing Custom Settings in the web.config File	157
Using the Website Administration Tool	160
The Last Word	162

■ Chapter 6: Web Controls	163
Stepping Up to Web Controls.....	163
Basic Web Control Classes	164
The Web Control Tags	165
Web Control Classes.....	166
The WebControl Base Class	167
Units	169
Enumerations.....	169
Colors.....	170
Fonts.....	171
Focus	173
The Default Button.....	174
List Controls	175
Multiple-Select List Controls	175
The BulletedList Control	177
Table Controls.....	179
Web Control Events and AutoPostBack	184
How Postback Events Work	187
The Page Life Cycle	189
An Interactive Web Page	192
Improving the Greeting Card Generator	197
Generating the Cards Automatically	199
The Last Word.....	202
■ Chapter 7: Error Handling, Logging, and Tracing.....	203
Avoiding Common Errors.....	203
Understanding Exception Handling	205
The Exception Class.....	206
The Exception Chain	207
Handling Exceptions.....	208

Catching Specific Exceptions	209
Using Nested Exception Handlers.....	211
Exception Handling in Action	212
Mastering Exceptions	214
Throwing Your Own Exceptions	214
Using Page Tracing	219
Enabling Tracing	219
Tracing Information.....	219
Writing Trace Information	225
Performing Application-Level Tracing.....	229
The Last Word.....	231
■ Chapter 8: State Management.....	233
Understanding the Problem of State	233
Using View State	233
The ViewState Collection	234
A View-State Example	234
Making View State Secure.....	235
Retaining Member Variables.....	237
Storing Custom Objects	238
Transferring Information Between Pages.....	239
Cross-Page Posting	240
The Query String.....	245
Using Cookies.....	249
A Cookie Example.....	250
Managing Session State.....	251
Session Tracking.....	252
Using Session State.....	252
A Session-State Example	254

Configuring Session State	256
Timeout.....	257
Cookieless	257
Mode.....	260
Using Application State	264
Comparing State Management Options	266
The Last Word.....	268
■ Part 3: Building Better Web Forms.....	269
■ Chapter 9: Validation	271
Understanding Validation	271
The Validation Controls	272
Server-Side Validation	272
Client-Side Validation	273
HTML5 Validation	273
Using the Validation Controls	274
A Simple Validation Example	276
Other Display Options	278
Manual Validation	280
Validation with Regular Expressions	282
A Validated Customer Form	286
Validation Groups.....	290
The Last Word.....	292
■ Chapter 10: Rich Controls.....	293
The Calendar	293
Formatting the Calendar.....	295
Restricting Dates	297
The AdRotator	301
The Advertisement File	302
The AdRotator Class	303

Pages with Multiple Views	304
The MultiView Control.....	306
The Wizard Control	311
The Last Word.....	318
■ Chapter 11: User Controls and Graphics.....	319
User Controls.....	319
Creating a Simple User Control.....	320
Working with Independent User Controls	323
Working with Integrated User Controls.....	325
Using User-Control Events	327
Passing Information with Events	329
Dynamic Graphics	331
Creating a Basic Drawing	332
Drawing a Custom Image	335
Placing Custom Images Inside Web Pages	336
Choosing Image Format and Quality.....	338
The Chart Control	340
Creating a Basic Chart.....	340
Using Other Ways to Get Chart Data	342
The Last Word.....	343
■ Chapter 12: Styles, Themes, and Master Pages	345
Styles.....	345
Style Types.....	346
Creating a Basic Inline Style	346
Creating a Style Sheet	355
Applying Style Sheet Rules.....	357
Themes.....	360
How Themes Work	360
Applying a Simple Theme	361
Handling Theme Conflicts.....	363

Creating Multiple Skins for the Same Control	365
More Advanced Skins	366
Master Page Basics	368
A Simple Master Page and Content Page	369
How Master Pages and Content Pages Are Connected	373
A Master Page with Multiple Content Regions	375
Default Content.....	377
Master Pages and Relative Paths	378
Advanced Master Pages.....	379
Style-Based Layouts.....	379
Code in a Master Page.....	384
Interacting with a Master Page Programmatically	384
The Last Word.....	386
■ Chapter 13: Website Navigation	387
Site Maps	387
Defining a Site Map	388
Seeing a Simple Site Map in Action.....	392
Binding an Ordinary Page to a Site Map.....	392
Binding a Master Page to a Site Map	394
Binding Portions of a Site Map	395
Working with the SiteMap Class.....	400
URL Mapping and Routing.....	402
URL Mapping	403
URL Routing	403
The SiteMapPath Control.....	405
Customizing the SiteMapPath	406
Using SiteMapPath Styles and Templates	406
Adding Custom Site Map Information.....	408
The TreeView Control.....	409
TreeView Properties.....	409
TreeView Styles	412

The Menu Control	416
Menu Styles	418
Menu Templates	419
The Last Word.....	422
■ Part 4: Working with Data.....	423
■ Chapter 14: ADO.NET Fundamentals.....	425
Understanding Databases	425
Configuring Your Database	427
Using SQL Server Express	427
Browsing and Modifying Databases in Visual Studio.....	428
Using the sqlcmd Command-Line Tool	431
Understanding SQL Basics	432
Running Queries in Visual Studio.....	433
Using the Select Statement.....	434
Using the SQL Update Statement	437
Using the SQL Insert Statement.....	438
Using the SQL Delete Statement	439
Understanding the Data Provider Model	440
Using Direct Data Access	441
Creating a Connection	442
Using the Select Command	448
Using the DataReader	449
Putting It All Together.....	449
Updating Data	453
Using Disconnected Data Access	464
Selecting Disconnected Data.....	465
Selecting Multiple Tables.....	466
Defining Relationships.....	468
The Last Word.....	471

■ Chapter 15: Data Binding.....	473
Introducing Data Binding.....	473
Types of ASP.NET Data Binding.....	474
How Data Binding Works	474
Using Single-Value Data Binding.....	474
A Simple Data-Binding Example.....	475
Simple Data Binding with Properties.....	478
Problems with Single-Value Data Binding	479
Using Repeated-Value Data Binding.....	480
Data Binding with Simple List Controls	481
A Simple List-Binding Example	481
Multiple Binding.....	483
Data Binding with a Dictionary Collection	485
Using the DataValueField Property	486
Data Binding with ADO.NET	487
Creating a Record Editor.....	489
Working with Data Source Controls	494
The Page Life Cycle with Data Binding.....	495
The SqlDataSource	496
Selecting Records.....	497
Parameterized Commands	499
Handling Errors.....	504
Updating Records	505
The Last Word.....	509
■ Chapter 16: The Data Controls.....	511
The GridView	511
Automatically Generating Columns	512
Defining Columns	514

Formatting the GridView	518
Formatting Fields.....	518
Using Styles	519
Formatting-Specific Values	523
Selecting a GridView Row	524
Adding a Select Button	525
Using Selection to Create Master-Details Pages	526
Editing with the GridView	528
Sorting and Paging the GridView.....	531
Sorting	531
Paging.....	533
Using GridView Templates.....	535
Using Multiple Templates.....	537
Editing Templates in Visual Studio.....	538
Handling Events in a Template	539
Editing with a Template	540
The DetailsView and FormView.....	544
The DetailsView	545
The FormView.....	547
The Last Word.....	549
■ Chapter 17: Files and Streams	551
Files and Web Applications.....	551
File System Information	552
The Path Class.....	553
The Directory and File Classes	554
The DirectoryInfo and FileInfo Classes	559
The DriveInfo Class.....	561
A Sample File Browser	562

Reading and Writing with Streams.....	566
Text Files.....	566
Binary Files.....	568
Shortcuts for Reading and Writing Files	569
A Simple Guest Book	570
Allowing File Uploads	576
The FileUpload Control.....	576
The Last Word.....	579
■ Chapter 18: XML	581
XML Explained	581
Improving the List with XML	582
XML Basics	584
Attributes	585
Comments	586
The XML Classes	586
The XML TextWriter.....	587
The XML Text Reader	589
Working with XML Documents in Memory	595
Reading an XML Document	598
Searching an XML Document	601
XML Validation.....	602
XML Namespaces.....	602
XML Schema Definition	605
Validating an XML Document.....	607
XML Display and Transforms.....	609
The Xml Web Control	612
The Last Word.....	613

■ Part 5: Website Security	615
■ Chapter 19: Security Fundamentals	617
Understanding Security Requirements.....	617
Testing and Deploying Security Settings	618
Authentication and Authorization	619
Forms Authentication	619
Web.config Settings.....	621
Authorization Rules.....	622
The WAT	625
The Login Page	628
Windows Authentication.....	634
Web.config Settings.....	634
A Windows Authentication Test.....	636
The Last Word.....	638
■ Chapter 20: Membership	639
The Membership Data Store.....	639
Membership with SQL Server Express	641
Using the Full Version of SQL Server	643
Configuring the Membership Provider.....	646
Creating Users with the WAT	649
The Membership and MembershipUser Classes	651
Authentication with Membership	655
Disabled Accounts	656
The Security Controls	656
The Login Control.....	657
The CreateUserWizard Control.....	662
The PasswordRecovery Control.....	666

Role-Based Security	668
Creating and Assigning Roles	669
Restricting Access Based on Roles	672
The LoginView Control	673
The Last Word.....	674
■ Chapter 21: Profiles.....	675
Understanding Profiles	675
Profile Performance.....	676
How Profiles Store Data.....	676
Using the SqlProfileProvider.....	678
Enabling Authentication.....	678
Using SQL Server Express	679
Using the Full Version of SQL Server	679
The Profile Databases.....	680
Defining Profile Properties.....	682
Using Profile Properties	683
Profile Serialization.....	684
Profile Groups	686
Profiles and Custom Data Types	687
The Profile API	690
Anonymous Profiles.....	693
The Last Word.....	695
■ Part 6: Advanced ASP.NET.....	697
■ Chapter 22: Component-Based Programming	699
Why Use Components?	699
Component Jargon	700
Three-Tier Design	700
Encapsulation	702
Business Objects	702

Data Objects	702
Components and Classes	702
Creating a Component.....	703
Classes and Namespaces.....	704
Class Members	706
Adding a Reference to the Component.....	707
Using the Component	710
Properties and State.....	711
A Stateful Account Class.....	712
A Stateless AccountUtility Class	713
Data-Access Components	714
A Simple Data-Access Component	714
Using the Data-Access Component	718
Enhancing the Component with Error Handling.....	721
Enhancing the Component with Aggregate Information.....	722
The ObjectDataSource.....	723
Making Classes the ObjectDataSource Can Understand	723
Selecting Records.....	724
Using Method Parameters	724
Updating Records	725
The Last Word.....	728
■ Chapter 23: Caching	729
Understanding Caching	729
When to Use Caching.....	730
Caching in ASP.NET	731
Output Caching.....	731
Caching and the Query String.....	733
Caching with Specific Query String Parameters.....	734
A Multiple Caching Example	735
Fragment Caching	736
Cache Profiles.....	736

Data Caching	737
Adding Items to the Cache.....	738
A Simple Cache Test	739
Caching to Provide Multiple Views	740
Caching with the Data Source Controls.....	743
Caching with Dependencies.....	747
File Dependencies	747
Cache Item Dependencies	748
SQL Server Cache Dependencies	748
The Last Word.....	751
■ Chapter 24: LINQ and the Entity Framework	753
Understanding LINQ	753
LINQ Basics	754
Using the Entity Framework	761
Creating an Entity Data Model	761
Exploring the Data Model Diagram	765
Updating a Data Model	767
Reviewing the Data Model Code.....	769
Querying the Data Model	770
Handling Errors.....	771
Navigating Relationships	773
Getting More Advanced with the Entity Framework	776
Querying with LINQ to Entities.....	776
Controlling When Data Is Loaded.....	779
Performing Updates, Inserts, and Deletes	780
Managing Concurrency.....	783
Using the EntityDataSource.....	784
Displaying Data.....	784
Editing Data	789
The Last Word.....	789

■ Chapter 25: ASP.NET AJAX.....	791
Understanding Ajax	791
Ajax: The Good	791
Ajax: The Bad	792
Ajax in ASP.NET	793
The ScriptManager	793
Using Partial Refreshes	794
A Simple UpdatePanel Test.....	796
Error Handling.....	798
Conditional Updates.....	800
Triggers.....	801
Using Progress Notification	805
Showing a Simulated Progress Bar	805
Enabling Cancellation	807
Implementing Timed Refreshes.....	809
Working with the ASP.NET AJAX Control Toolkit	811
Installing the ASP.NET AJAX Control Toolkit	812
Using the Accordion.....	814
Using the AutoCompleteExtender	817
Getting More Controls.....	820
The Last Word.....	824
■ Chapter 26: Deploying ASP.NET Applications	825
ASP.NET Applications and the Web Server	825
How Web Servers Work	825
The Virtual Directory	827
Web Application URLs.....	827
Web Farms.....	828
Internet Information Services (IIS)	829
The Many Faces of IIS	829
Installing IIS on a Desktop Version of Windows.....	830

Installing IIS on Windows Server 2008	832
Installing IIS on Windows Server 2012	832
Managing Websites with IIS Manager	833
Creating a Virtual Directory.....	834
Understanding Application Pools	836
The ASP.NET Account.....	839
Configuring a Website.....	843
The Default Page	847
Custom Error Pages.....	848
The Machine Key	850
Windows Authentication.....	851
Confidentiality with SSL and Certificates	853
Deploying a Simple Site	856
Web Applications and Components	856
Other Configuration Steps	857
Code Compilation.....	857
Deploying with Visual Studio	858
Creating a Virtual Directory for a New Project.....	859
Copying a Website	861
Publishing a Website	864
The Last Word.....	865
Index.....	867

About the Author



Matthew MacDonald is an author, educator, and three-time Microsoft MVP. He's the author of more than a dozen books about .NET programming, including *Pro Silverlight 5 in C#* (Apress, 2012) and *Pro WPF 4.5 in C#* (Apress, 2013). He's also the author of *Your Brain: The Missing Manual* (O'Reilly Media, 2008), a popular look at getting the most from your squishy gray matter. Matthew lives in Toronto with his wife and two daughters.

About the Technical Reviewers



Todd Meister has been working in the IT industry for more than 15 years. He's been a technical editor for over 75 titles, ranging from SQL Server to the .NET Framework. Besides technical editing, he is the senior IT architect at Ball State University in Muncie, Indiana. He lives in central Indiana with his wife, Kimberly, and their five excellent children.

Fabio Claudio Ferracchiati, a prolific writer on cutting-edge technologies, has contributed to more than a dozen books on .NET, C#, Visual Basic, and ASP.NET. He is a .NET Microsoft Certified Solution Developer and lives in Milan, Italy. You can read his blog at Ferracchiati.com.

Acknowledgments

No author could complete a book without a small army of helpful individuals. I'm deeply indebted to the whole Apress team, including Gwenan Spearing and Mark Powers, who helped everything move swiftly and smoothly; Sharon Wilkey and Carole Berglie, who performed the copy edit; Todd Meister, who performed a thorough technical review; Fabio Ferracchiati, who performed additional technical review; and many other individuals who worked behind the scenes indexing pages, drawing figures, and proofreading the final copy.

I'd also like to thank those who were involved with previous editions of this book. This group includes Emma Acker and Jane Brownlow at Osborne McGraw-Hill, and previous tech reviewers Damien Foggon, Ronald Landers, Gavin Smyth, Tim Vercruysse, Julian Skinner, and Andy Olsen. I also owe a hearty thanks to all the readers who caught errors and took the time to report problems and ask good questions. Keep sending in the feedback—it helps make better books!

Finally, I'd never write *any* book without the support of my wife and these special individuals: Nora, Razia, Paul, and Hamid. Thanks, everyone!

Introduction

ASP.NET is Microsoft's platform for developing web applications. Using ASP.NET, you can create e-commerce shops, data-driven portal sites, and just about anything else you can find on the Internet. Best of all, you don't need to paste together a jumble of HTML and script code in order to program the Web. Instead, you can create full-scale web applications using nothing but code and a design tool such as Visual Studio.

The cost of all this innovation is the learning curve. To master ASP.NET, you need to learn how to use an advanced design tool (Visual Studio), a toolkit of objects (the .NET Framework), and an object-oriented programming language (such as C#). Taken together, these topics provide more than enough to overwhelm any first-time web developer.

Beginning ASP.NET 4.5 in C# assumes you want to master ASP.NET, starting from the basics. Using this book, you'll build your knowledge until you understand the concepts, techniques, and best practices for writing sophisticated web applications. The journey is long, but it's also satisfying. At the end of the day, you'll find that ASP.NET allows you to tackle challenges that are simply out of reach on many other platforms.

About This Book

This book explores ASP.NET, which is a core part of Microsoft's .NET Framework. The .NET Framework is not a single application—it's a collection of technologies bundled into one marketing term. The .NET Framework includes languages such as C# and VB, an engine for hosting programmable web pages, a model for interacting with databases (ADO.NET), a higher-level framework for performing queries (LINQ and the Entity Framework), and a class library stocked with tools for everything from reading files to validating a password. To master ASP.NET, you need to learn about each of these ingredients.

This book covers all these topics from the ground up. As a result, you'll find yourself learning many techniques that will interest any .NET developer, even those who create Windows applications. For example, you'll learn about component-based programming, you'll discover structured error handling, and you'll see how to access files, XML, and relational databases. You'll also learn the key topics you need for web programming, such as state management, web controls, and caching. By the end of this book, you'll be ready to create your own rich web applications and make them available over the Internet.

Who Should Read This Book

This book is aimed at anyone who wants to create dynamic websites with ASP.NET. Ideally, you'll have experience with a previous version of a programming language such as C or Java. If not, you should be familiar with basic programming concepts (loops, conditional structures, arrays, and so on), whether you've learned them in Visual Basic, Pascal, Turing, or a completely different programming language. This is the only requirement for reading this book.

Understanding HTML and XHTML (the markup languages used to write web pages) will help you, but it's not required. ASP.NET works at a higher level, allowing you to deal with full-featured web controls instead of raw web page markup. However, you'll get a quick overview of HTML5 fundamentals in Chapter 4, and you'll learn about CSS, the Cascading Style Sheet standard, in Chapter 12.

This book will also appeal to programmers who have some experience with C# and .NET but haven't worked with ASP.NET in the past. However, if you've used a previous version of ASP.NET, you'll probably be more interested in a faster-paced book such as *Pro ASP.NET 4.5 in C#* instead.

■ **Note** This book begins with the fundamentals: C# syntax, the basics of object-oriented programming, and the philosophy of the .NET Framework. If you haven't worked with C# before, you can spend a little more time with the syntax review in Chapter 2 to pick up everything you need to know. If you aren't familiar with the ideas of object-oriented programming, Chapter 3 fills in the blanks with a quick but comprehensive review of the subject. The rest of the book builds on this foundation, from ASP.NET basics to advanced examples that show the techniques you'll use in real-world web applications.

ASP.NET MVC

This book focuses on *web forms*, which is ASP.NET's original website-building model. However, in recent years Microsoft has also added another toolkit, called ASP.NET MVC (ASP.NET Model-View-Controller), which offers a dramatically different way to build web pages.

The core idea of ASP.NET MVC is that your application is separated into three logical parts. The *model* includes the application-specific business code that powers your application. The *view* creates a suitable representation of the model, by converting it to the HTML that browsers understand. The *controller* coordinates the whole show, handling user interactions, updating the model, and passing the information to the view. Although this sounds simple enough, the MVC pattern sidelines several traditional ASP.NET concepts that are discussed in this book, including web forms, web controls, view state, postbacks, and session state. To some, the MVC pattern is cleaner and more suited to the Web. To others, it's a whole lot of extra effort with no clear payoff. Microsoft suggests you consider ASP.NET MVC if you need to implement *test-driven development* (which uses automated tests to validate web pages), or if you need complete control over the URLs and the HTML markup that are used in your web pages.

ASP.NET MVC isn't discussed in this book (and it's a bit of a slog for developers who aren't already familiar with ASP.NET). However, you can get more information from the official ASP.NET MVC website at www.asp.net/mvc or the book *Pro ASP.NET MVC 4* (Apress, 2012).

What You Need to Use This Book

To *develop* ASP.NET web pages, you need a computer with Visual Studio 2012. You can use the free Visual Studio 2012 Express for Web edition (available at <http://tinyurl.com/bpjvx7c>), which has all the tools and functionality you'll use in this book.

To *use* an ASP.NET web page (in other words, to surf to it over the Internet), you simply need a web browser. ASP.NET fully supports Microsoft Internet Explorer, Mozilla Firefox, Opera, Apple Safari, Google Chrome, and any other browser that respects the HTML standard on virtually any operating system. There are a few features that won't work with extremely old browsers (such as the ASP.NET AJAX techniques you'll learn about in Chapter 25), but 99.9 percent of web surfers can use any ASP.NET page to its fullest.

If you plan to host websites on your computer, you'll also need to use Internet Information Services (IIS), the web hosting software that's part of the Windows operating system. You might also use IIS if you want to test deployment strategies. You'll learn how to use and configure IIS in Chapter 26.

Finally, this book includes several examples that use SQL Server. “You can use any version of SQL Server to try these examples, including SQL Server Express LocalDB, which is included with Visual Studio.” If you use other relational database engines, the same concepts will apply; you will just need to modify the example code.

Code Samples

To master ASP.NET, you need to experiment with it. One of the best ways to learn ASP.NET is to try the code samples for this book, examine them, and dive in with your own modifications. To obtain the sample code, surf to www.prosetech.com or the publisher’s website at www.apress.com/9781430242512. You’ll also find some links to additional resources and any updates or errata that affect the book.

Chapter Overview

This book is divided into six parts. Unless you’ve already had experience with the .NET Framework, the most productive way to read this book is in order from start to finish. Chapters later in the book sometimes incorporate features that were introduced earlier in order to create more well-rounded and realistic examples. On the other hand, if you’re already familiar with the .NET platform, C#, and object-oriented programming, you’ll make short work of the first part of this book.

Part 1: Introducing .NET

You could start coding an ASP.NET application right away by following the examples in the second part of this book. But to really master ASP.NET, you need to understand a few fundamental concepts about the .NET Framework.

Chapter 1 sorts through the Microsoft jargon and explains what the .NET Framework really does and why you need it. Chapter 2 introduces you to C# with a comprehensive language tour. Finally, Chapter 3 explains the basics of modern object-oriented programming.

Part 2: Developing ASP.NET Applications

The second part of this book delves into the heart of ASP.NET programming and introduces its event-based model. In Chapter 4, you’ll take a look around the Visual Studio design environment and learn a few fundamentals about web forms, events, and HTML5. In Chapters 5 and 6, you learn how to program a web page’s user interface through a layer of objects called *server controls*.

Next you’ll explore two more essentials of ASP.NET programming. Chapter 7 presents techniques for handling errors. Chapter 8 describes strategies for state management. Taken together, the chapters in this part contain all the core concepts you need to design web pages and create a basic ASP.NET website.

Part 3: Building Better Web Forms

The third part of this book explores several topics that can help you transform ordinary web pages into polished web applications. In Chapter 9, you’ll learn to use the validation controls to catch invalid data before the user submits it. In Chapter 10, you’ll move on to consider some of ASP.NET’s more advanced controls, such as the Calendar and Wizard. In Chapter 11, you’ll learn how to build your own reusable blocks of web page user interface and draw custom graphics on the fly. Finally, Chapter 12 shows how you can standardize the appearance of an entire website with themes and master pages, and Chapter 13 shows you how to add navigation to a website.

Part 4: Working with Data

Almost all software needs to work with data, and web applications are no exception. In Chapter 14, you begin exploring the world of data by considering ADO.NET—Microsoft’s .NET-powered technology for interacting with relational databases. Chapters 15 and 16 explain how to use data binding and the advanced ASP.NET data controls to create web pages that integrate attractive, customizable data displays with automatic support for paging, sorting, and editing.

Chapter 17 moves out of the database world and considers how to interact with files. Chapter 18 broadens the picture even further and describes how ASP.NET applications can use the XML support that’s built into the .NET Framework.

Part 5: Website Security

Every public website needs to deal with security—making sure that sensitive data cannot be accessed by the wrong users. In Chapter 19, you’ll learn how ASP.NET provides authentication systems for dealing with users. You can write your own custom logic to verify usernames and passwords, or you can use existing Windows account information. In Chapter 20, you’ll learn about the membership model, which extends the authentication system with prebuilt security controls and handy objects that automate common tasks. If you want, you can even get ASP.NET to create and manage a database with user information automatically. Finally, Chapter 21 deals with another add-on—the profiles model that lets you store information for each user automatically, without writing any database code.

Part 6: Advanced ASP.NET

This part includes the advanced topics you can use to take your web applications that extra step. Chapter 22 covers how you can create reusable components for ASP.NET applications. Chapter 23 demonstrates how careful use of caching can boost the performance of almost any web application. Chapter 24 explores LINQ and the Entity Framework, two features that let you interact with a database without writing reams of custom code. Chapter 25 introduces ASP.NET AJAX, which allows you to build responsive web pages that add rich features such as text autocompletion and drag-and-drop. Finally, Chapter 26 walks you through the steps for deploying your application to a web server.

Feedback

This book has the ambitious goal of being the best tutorial and reference for ASP.NET. Toward that end, your comments and suggestions are extremely helpful. You can send complaints, adulation, and everything in between directly to apress@prosetech.com. I can’t solve your ASP.NET problems or critique your code, but I do benefit from information about what this book did right and wrong (and what it may have done in an utterly confusing way). You can also send comments about the website support for this book.