

# Pro ASP.NET 3.5 in C# 2008

Includes Silverlight 2  
Third Edition



Matthew MacDonald and  
Mario Szpuszta

**Pro ASP.NET 3.5 in C# 2008: Includes Silverlight 2, Third Edition**

**Copyright © 2009 by Matthew MacDonald and Mario Szpuszta**

All rights reserved. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage or retrieval system, without the prior written permission of the copyright owner and the publisher.

ISBN-13 (paperback): 978-1-4302-1567-7

ISBN-13 (electronic): 978-1-4302-1568-4

Printed and bound in the United States of America 9 8 7 6 5 4 3 2 1

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

Lead Editor: Ewan Buckingham

Technical Reviewer: Andy Olsen

Editorial Board: Clay Andres, Steve Anglin, Mark Beckner, Ewan Buckingham, Tony Campbell,

Gary Cornell, Jonathan Gennick, Michelle Lowman, Matthew Moodie, Duncan Parkes, Jeffrey Pepper,

Douglas Pundick, Frank Pohlmann, Ben Renow-Clarke, Dominic Shakeshaft, Matt Wade, Tom Welsh

Production Director | Project Manager: Grace Wong

Copy Editors: Kim Wimpsett, Damon Larson

Associate Production Director: Kari Brooks-Copony

Production Editor: Laura Esterman

Compositor: Susan Glinert

Proofreader: Nancy Bell

Indexer: Broccoli Information Management

Artist: April Milne

Cover Designer: Kurt Krames

Manufacturing Director: Tom Debolski

Distributed to the book trade worldwide by Springer-Verlag New York, Inc., 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 <http://www.springeronline.com>.

For information on translations, please contact Apress directly at 2855 Telegraph Avenue, Suite 600, Berkeley, CA 94705. Phone 510-549-5930, fax 510-549-5939, e-mail [info@apress.com](mailto:info@apress.com), or visit <http://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 <http://www.apress.com/info/bulksales>.

The information in this book is distributed on an “as is” basis, without warranty. Although every precaution has been taken in the preparation of this work, neither the author(s) nor Apress shall have any liability to any person or entity with respect to any loss or damage caused or alleged to be caused directly or indirectly by the information contained in this work.

The source code for this book is available to readers at <http://www.apress.com> in the Source Code section.

# Contents at a Glance

About the Authors .....	xxxi
About the Technical Reviewer .....	xxxiii
Introduction .....	xxxv

## PART 1 ■■■ Core Concepts

■ CHAPTER 1	Introducing ASP.NET .....	3
■ CHAPTER 2	Visual Studio .....	21
■ CHAPTER 3	Web Forms .....	69
■ CHAPTER 4	Server Controls .....	113
■ CHAPTER 5	ASP.NET Applications .....	165
■ CHAPTER 6	State Management .....	217

## PART 2 ■■■ Data Access

■ CHAPTER 7	ADO.NET Fundamentals .....	257
■ CHAPTER 8	Data Components and the DataSet .....	295
■ CHAPTER 9	Data Binding .....	337
■ CHAPTER 10	Rich Data Controls .....	381
■ CHAPTER 11	Caching and Asynchronous Pages .....	447
■ CHAPTER 12	Files and Streams .....	493
■ CHAPTER 13	LINQ .....	527
■ CHAPTER 14	XML .....	583

## PART 3 ■■■ Building ASP.NET Websites

■ CHAPTER 15	User Controls .....	641
■ CHAPTER 16	Themes and Master Pages .....	661

■ CHAPTER 17	Website Navigation .....	691
■ CHAPTER 18	Website Deployment .....	741

## PART 4 ■■■ Security

■ CHAPTER 19	The ASP.NET Security Model .....	823
■ CHAPTER 20	Forms Authentication .....	855
■ CHAPTER 21	Membership .....	881
■ CHAPTER 22	Windows Authentication .....	935
■ CHAPTER 23	Authorization and Roles .....	971
■ CHAPTER 24	Profiles .....	1005
■ CHAPTER 25	Cryptography .....	1037
■ CHAPTER 26	Custom Membership Providers .....	1067

## PART 5 ■■■ Advanced User Interface

■ CHAPTER 27	Custom Server Controls .....	1105
■ CHAPTER 28	Design-Time Support .....	1147
■ CHAPTER 29	Dynamic Graphics and GDI+ .....	1179
■ CHAPTER 30	Portals with Web Part Pages .....	1211

## PART 6 ■■■ Client-Side Programming

■ CHAPTER 31	JavaScript and Ajax Techniques .....	1269
■ CHAPTER 32	ASP.NET AJAX .....	1319
■ CHAPTER 33	Silverlight 2 .....	1383
■ INDEX	.....	1441

# Contents

About the Authors .....	xxxi
About the Technical Reviewer .....	xxxiii
Introduction .....	xxxv

## PART 1 ■■■ Core Concepts

■ CHAPTER 1	<b>Introducing ASP.NET</b> .....	3
	The Evolution of Web Development .....	3
	The Early Web Development World .....	4
	.NET Revolution .....	4
	Seven Important Facts About ASP.NET .....	4
	Fact 1: ASP.NET Is Integrated with the .NET Framework .....	5
	Fact 2: ASP.NET Is Compiled, Not Interpreted .....	5
	Fact 3: ASP.NET Is Multilanguage .....	7
	Fact 4: ASP.NET Is Hosted by the Common Language Runtime .....	9
	Fact 5: ASP.NET Is Object-Oriented .....	10
	Fact 6: ASP.NET Is Multidevice and Multibrowser .....	12
	Fact 7: ASP.NET Is Easy to Deploy and Configure .....	12
	ASP.NET: The Story Continues .....	13
	ASP.NET 2.0 .....	13
	ASP.NET 3.5 .....	14
	.NET 3.5 Service Pack 1 .....	18
	Silverlight .....	19
	Summary .....	20
■ CHAPTER 2	<b>Visual Studio</b> .....	21
	The .NET Development Model .....	22
	The Compiler .....	22
	The Visual Studio IDE .....	23
	Websites and Web Projects .....	24
	Creating a Projectless Website .....	24
	Multitargeting .....	27
	Designing a Web Page .....	28

The Visual Studio IDE .....	34
Solution Explorer.....	36
Document Window .....	37
Toolbox .....	37
Error List and Task List .....	38
Server Explorer .....	40
The Code Editor .....	40
Adding Assembly References .....	41
IntelliSense and Outlining .....	44
The Code Model .....	46
How Code-Behind Files Are Connected to Pages .....	49
How Control Tags Are Connected to Page Variables .....	50
How Events Are Connected to Event Handlers .....	51
Web Projects .....	53
Creating a Web Project.....	54
Migrating a Website from a Previous Version of Visual Studio ...	56
Visual Studio Debugging .....	57
Single-Step Debugging .....	58
Variable Watches .....	61
Advanced Breakpoints .....	62
Visual Studio Macros .....	63
The Web Development Helper .....	65
Summary .....	67

<b>CHAPTER 3</b> <b>Web Forms</b> .....	<b>69</b>
Page Processing .....	69
HTML Forms .....	70
Dynamic User Interface .....	71
The ASP.NET Event Model .....	72
Automatic Postbacks .....	73
View State .....	75
XHTML Compliance .....	80
Web Forms Processing Stages .....	84
Page Framework Initialization.....	85
User Code Initialization.....	86
Validation .....	86
Event Handling .....	87
Automatic Data Binding .....	87
Cleanup .....	88
A Page Flow Example.....	88

The Page As a Control Container .....	90
Showing the Control Tree .....	91
The Page Header .....	95
Dynamic Control Creation .....	96
The Page Class .....	97
Session, Application, and Cache .....	98
Request .....	98
Response .....	100
Server .....	102
User .....	105
Trace .....	105
Accessing the HTTP Context in Another Class .....	111
Summary .....	112
<b>CHAPTER 4 Server Controls .....</b>	<b>113</b>
Types of Server Controls .....	113
The Server Control Hierarchy .....	114
HTML Server Controls .....	116
The HtmlControl Class .....	117
The HtmlContainerControl Class .....	117
The HtmlInputControl Class .....	117
The HTML Server Control Classes .....	118
Setting Style Attributes and Other Properties .....	120
Programmatically Creating Server Controls .....	121
Handling Server-Side Events .....	123
Web Controls .....	125
The WebControl Base Class .....	127
Basic Web Control Classes .....	128
Units .....	130
Enumerations .....	130
Colors .....	131
Fonts .....	131
Focus .....	133
The Default Button .....	134
Scrollable Panels .....	135
Handling Web Control Events .....	135
The List Controls .....	138
The Selectable List Controls .....	140
The BulletedList Control .....	142

Input Validation Controls .....	144
The Validation Controls .....	144
The Validation Process .....	145
The BaseValidator Class .....	146
The RequiredFieldValidator Control .....	148
The RangeValidator Control .....	148
The CompareValidator Control .....	149
The RegularExpressionValidator Control .....	149
The CustomValidator Control .....	152
The ValidationSummary Control .....	154
Using the Validators Programmatically .....	155
Validation Groups .....	156
Rich Controls .....	158
The AdRotator Control .....	159
The Calendar Control .....	161
Summary .....	163

## CHAPTER 5 ASP.NET Applications .....

Anatomy of an ASP.NET Application .....	165
The Application Domain .....	166
Application Lifetime .....	167
Application Updates .....	167
Application Directory Structure .....	168
The global.asax Application File .....	169
Application Events .....	171
Demonstrating Application Events .....	173
ASP.NET Configuration .....	174
The machine.config File .....	174
The web.config File .....	177
<system.web> Settings .....	181
Reading and Writing Configuration Sections Programmatically ..	185
The Website Administration Tool (WAT) .....	188
Extending the Configuration File Structure .....	190
Encrypting Configuration Sections .....	194
.NET Components .....	196
Creating a Component .....	197
Using a Component Through the App_Code Directory .....	198
Using a Component Through the Bin Directory .....	199

Extending the HTTP Pipeline .....	201
HTTP Handlers and HTTP Modules .....	202
Creating a Custom HTTP Handler .....	204
Configuring a Custom HTTP Handler .....	205
Registering HTTP Handlers Without Configuring IIS .....	206
Creating an Advanced HTTP Handler .....	208
Creating an HTTP Handler for Non-HTML Content .....	210
Creating a Custom HTTP Module .....	213
Summary .....	216

## CHAPTER 6 State Management .....

ASP.NET State Management .....	217
View State .....	220
A View State Example .....	221
Storing Objects in View State .....	222
Retaining Member Variables .....	225
Assessing View State .....	226
View State Security .....	228
Transferring Information Between Pages .....	229
The Query String .....	229
Cross-Page Posting .....	231
Cookies .....	238
Session State .....	239
Session Architecture .....	239
Using Session State .....	241
Configuring Session State .....	242
Securing Session State .....	248
Application State .....	249
Static Application Variables .....	251
Summary .....	253

## PART 2 ■■■ Data Access

### CHAPTER 7 ADO.NET Fundamentals .....

The ADO.NET Architecture .....	258
ADO.NET Data Providers .....	258
Standardization in ADO.NET .....	260
Fundamental ADO.NET Classes .....	261

The Connection Class .....	262
Connection Strings .....	262
Testing a Connection .....	264
Connection Pooling .....	265
Connection Statistics .....	267
The Command and DataReader Classes .....	268
Command Basics .....	268
The DataReader Class .....	269
The ExecuteReader() Method and the DataReader .....	270
The ExecuteScalar() Method .....	275
The ExecuteNonQuery() Method .....	276
SQL Injection Attacks .....	276
Using Parameterized Commands .....	279
Calling Stored Procedures .....	281
Transactions .....	283
Transactions and ASP.NET Applications .....	284
Isolation Levels .....	288
Savepoints .....	290
Provider-Agnostic Code .....	291
Creating the Factory .....	291
Create Objects with Factory .....	292
A Query with Provider-Agnostic Code .....	293
Summary .....	294
<b>CHAPTER 8 Data Components and the DataSet .....</b>	<b>295</b>
Building a Data Access Component .....	295
The Data Package .....	296
The Stored Procedures .....	298
The Data Utility Class .....	299
Testing the Database Component .....	305
Disconnected Data .....	307
Web Applications and the DataSet .....	308
XML Integration .....	309
The DataSet .....	309
The DataAdapter Class .....	311
Filling a DataSet .....	312
Working with Multiple Tables and Relationships .....	313
Searching for Specific Rows .....	317
Using the DataSet in a Data Access Class .....	318
Data Binding .....	319

The DataView Class	319
Sorting with a DataView	320
Filtering with a DataView	321
Advanced Filtering with Relationships	323
Calculated Columns	324
Typed DataSets	326
Custom TableAdapters	327
Creating a Typed DataSet	328
Dissecting the Typed DataSet	330
Using the Typed DataSet	333
Summary	335
<b>CHAPTER 9 Data Binding</b>	<b>337</b>
Basic Data Binding	337
Single-Value Binding	338
Other Types of Expressions	340
Repeated-Value Binding	344
Data Source Controls	351
The Page Life Cycle with Data Binding	352
The SqlDataSource	353
Selecting Records	353
Parameterized Commands	356
Handling Errors	360
Updating Records	361
Deleting Records	365
Inserting Records	366
Disadvantages of the SqlDataSource	366
The ObjectDataSource	367
Selecting Records	368
Updating Records	373
Updating with a Data Object	373
The Limits of the Data Source Controls	377
The Problem	377
Adding the Extra Items	378
Handling the Extra Options with the SqlDataSource	379
Handling the Extra Options with the ObjectDataSource	380
Summary	380

<b>CHAPTER 10 Rich Data Controls</b> .....	381
The GridView .....	382
Defining Columns .....	382
Formatting the GridView .....	386
Formatting Fields .....	386
Styles .....	388
Formatting-Specific Values .....	391
GridView Row Selection .....	393
Using Selection to Create a Master-Details Form .....	394
The SelectedIndexChanged Event .....	396
Using a Data Field As a Select Button .....	397
Sorting the GridView .....	397
Sorting with the SqlDataSource .....	398
Sorting with the ObjectDataSource .....	398
Sorting and Selection .....	400
Advanced Sorting .....	401
Paging the GridView .....	402
Automatic Paging .....	403
Custom Pagination with the ObjectDataSource .....	404
Customizing the Pager Bar .....	407
GridView Templates .....	408
Using Multiple Templates .....	410
Editing Templates in Visual Studio .....	411
Binding to a Method .....	412
Handling Events in a Template .....	413
Editing with a Template .....	414
The ListView .....	419
Grouping .....	422
Paging .....	424
The DetailsView and FormView .....	425
The DetailsView .....	425
The FormView .....	428
Advanced Grids .....	429
Summaries in the GridView .....	430
A Parent/Child View in a Single Table .....	431
Editing a Field Using a Lookup Table .....	434
Serving Images from a Database .....	436
Detecting Concurrency Conflicts .....	441
Summary .....	446

<b>CHAPTER 11 Caching and Asynchronous Pages</b> .....	447
Understanding ASP.NET Caching .....	447
Output Caching .....	448
Declarative Output Caching .....	448
Caching and the Query String .....	449
Caching with Specific Query String Parameters .....	450
Custom Caching Control .....	451
Caching with the <code>HttpCachePolicy</code> Class .....	452
Post-Cache Substitution and Fragment Caching .....	453
Cache Profiles .....	455
Cache Configuration .....	456
Data Caching .....	457
Adding Items to the Cache .....	458
A Simple Cache Test .....	460
Cache Priorities .....	461
Caching with the Data Source Controls .....	462
Cache Dependencies .....	465
File and Cache Item Dependencies .....	465
Aggregate Dependencies .....	466
The Item Removed Callback .....	467
Understanding SQL Cache Notifications .....	469
Cache Notifications in SQL Server 2000 .....	470
Cache Notifications in SQL Server 2005 and SQL Server 2008 .....	475
Custom Cache Dependencies .....	477
A Basic Custom Cache Dependency .....	478
A Custom Cache Dependency Using Message Queues .....	479
Asynchronous Pages .....	481
Creating an Asynchronous Page .....	482
Querying Data in an Asynchronous Page .....	484
Handling Errors .....	486
Using Caching with Asynchronous Tasks .....	488
Multiple Asynchronous Tasks and Timeouts .....	491
Summary .....	492

<b>CHAPTER 12</b>	<b>Files and Streams</b> .....	493
	Working with the File System .....	493
	The Directory and File Classes .....	494
	The DirectoryInfo and FileInfo Classes .....	496
	The DriveInfo Class .....	499
	Working with Attributes .....	500
	Filter Files with Wildcards .....	502
	Retrieving File Version Information .....	502
	The Path Class .....	503
	A File Browser .....	506
	Reading and Writing Files with Streams .....	510
	Text Files .....	512
	Binary Files .....	513
	Uploading Files .....	514
	Making Files Safe for Multiple Users .....	516
	Compression .....	521
	Serialization .....	522
	Summary .....	525
<b>CHAPTER 13</b>	<b>LINQ</b> .....	527
	LINQ Basics .....	527
	Deferred Execution .....	529
	How LINQ Works .....	530
	LINQ Expressions .....	530
	LINQ Expressions “Under the Hood” .....	537
	LINQ to DataSet .....	540
	Typed DataSets .....	542
	Null Values .....	543
	LINQ to SQL .....	543
	Data Entity Classes .....	544
	The DataContext .....	546
	LINQ to SQL Queries “Under the Hood” .....	547
	LINQ to SQL and Database Components .....	550
	Selecting a Single Record or Value .....	552
	Generating Data Classes Automatically .....	553
	Relationships .....	559
	Generating Methods for Stored Procedures .....	567
	Committing Changes .....	569

The LinqDataSource .....	574
Displaying Data .....	575
Getting Related Data .....	578
Editing Data .....	579
Validation .....	579
Summary .....	582
<b>CHAPTER 14 XML .....</b>	<b>583</b>
When Does Using XML Make Sense? .....	583
An Introduction to XML .....	584
The Advantages of XML .....	585
Well-Formed XML .....	586
XML Namespaces .....	586
XML Schemas .....	588
Stream-Based XML Processing .....	590
Writing XML Files .....	590
Reading XML Files .....	593
In-Memory XML Processing .....	596
The XmlDocument .....	597
The XPathNavigator .....	601
The XDocument .....	603
Searching XML Content .....	608
Searching with XmlDocument .....	608
Searching XmlDocument with XPath .....	611
Searching XDocument with LINQ .....	613
Validating XML Content .....	615
A Basic Schema .....	615
Validating with XmlDocument .....	615
Validating with XDocument .....	617
Transforming XML Content .....	618
A Basic Stylesheet .....	618
Using XslCompiledTransform .....	619
Using the Xml Control .....	621
Transforming XML with LINQ to XML .....	621

XML Data Binding .....	623
Nonhierarchical Binding.....	623
Using XPath .....	625
Nested Grids .....	628
Hierarchical Binding with the TreeView .....	629
Using XSLT .....	631
Binding to XML Content from Other Sources.....	633
Updating XML Through the XmlDataSource .....	633
XML and the ADO.NET DataSet .....	634
Converting the DataSet to XML.....	635
Accessing a DataSet As XML.....	636
Summary .....	638

## PART 3 ■■■ Building ASP.NET Websites

■ CHAPTER 15 User Controls .....	641
User Control Basics .....	641
Creating a Simple User Control .....	642
Converting a Page to a User Control.....	643
Adding Code to a User Control .....	644
Handling Events .....	644
Adding Properties .....	645
Using Custom Objects .....	647
Adding Events .....	650
Exposing the Inner Web Control .....	653
Dynamically Loading User Controls .....	653
Portal Frameworks .....	654
Partial Page Caching .....	657
VaryByControl .....	658
Sharing Cached Controls .....	659
Summary .....	659
■ CHAPTER 16 Themes and Master Pages .....	661
Cascading Style Sheets .....	661
Creating a Stylesheet .....	661
Applying Stylesheet Rules .....	664

Themes .....	666
Theme Folders and Skins .....	667
Applying a Simple Theme .....	668
Handling Theme Conflicts .....	669
Creating Multiple Skins for the Same Control .....	670
Skins with Templates and Images .....	671
Using CSS in a Theme .....	673
Applying Themes Through a Configuration File .....	673
Applying Themes Dynamically .....	674
Standardizing Website Layout .....	676
Master Page Basics .....	676
A Simple Master Page .....	677
A Simple Content Page .....	679
Default Content .....	680
Master Pages with Tables and CSS Layout .....	681
Master Pages and Relative Paths .....	683
Applying Master Pages Through a Configuration File .....	684
Advanced Master Pages .....	685
Interacting with the Master Page Class .....	685
Dynamically Setting a Master Page .....	686
Nesting Master Pages .....	687
Summary .....	689

## CHAPTER 17 Website Navigation .....

Pages with Multiple Views .....	691
The MultiView Control .....	692
The Wizard Control .....	696
Site Maps .....	703
Defining a Site Map .....	704
Binding to a Site Map .....	706
Breadcrumbs .....	707
Showing a Portion of the Site Map .....	709
The Site Map Objects .....	712
Adding Custom Site Map Information .....	714
Creating a Custom SiteMapProvider .....	714
URL Mapping .....	721
Security Trimming .....	722

The TreeView Control .....	724
The TreeNode .....	725
Populating Nodes on Demand .....	727
TreeView Styles .....	729
The Menu Control .....	733
Menu Styles .....	736
Menu Templates .....	737
Summary .....	739

## CHAPTER 18 Website Deployment .....

741

Internet Information Services (IIS) .....	741
IIS Websites and Virtual Directories .....	742
IIS Management Console and IIS Configuration .....	743
Mapping Websites, Virtual Directories, and Files to URLs .....	744
Diving into the Architecture of IIS .....	746
Installing IIS .....	761
Managing Websites .....	767
Managing Virtual Directories and Websites with IIS 5.x and IIS 6.0 .....	768
Managing Application Pools in IIS 6.0 .....	774
Managing Virtual Directories and Websites with IIS 7.0 .....	780
Managing Application Pools in IIS 7.0 .....	792
Deploying Your ASP.NET Applications .....	794
Verifying the ASP.NET Installation on IIS 5.x and IIS 6.0 .....	796
ASP.NET Side-By-Side Execution on IIS 5.x and IIS 6.0 .....	797
ASP.NET Side-By-Side Execution on IIS 7.0 .....	799
Configuring HTTP Runtime Settings when Deploying on IIS 5.x .....	799
Compilation Models in ASP.NET .....	800
Deploying with Visual Studio .....	804
Visual Studio 2005 Web Deployment Projects .....	805
The VirtualPathProvider in ASP.NET .....	811
Health Monitoring in ASP.NET .....	815
Understanding the Basic Structure .....	816
Events and Providers .....	816
Summary .....	819

## PART 4 ■■■ Security

■ CHAPTER 19	<b>The ASP.NET Security Model</b> .....	823
	What It Means to Create Secure Software .....	823
	Understanding Potential Threats .....	824
	Secure Coding Guidelines .....	824
	Understanding Gatekeepers .....	825
	Understanding the Levels of Security .....	826
	Authentication .....	827
	Authorization .....	828
	Confidentiality and Integrity .....	829
	Pulling It All Together .....	829
	Internet Information Services Security .....	831
	Authentication and Authorization on IIS 5.x and IIS 6.0 .....	831
	Security Configuration on IIS 7.0 .....	834
	Understanding Secure Sockets Layer .....	839
	ASP.NET Security Architecture .....	848
	Authentication .....	849
	Authorization .....	851
	The Security Context .....	851
	Membership and Roles APIs .....	853
	Summary .....	854
■ CHAPTER 20	<b>Forms Authentication</b> .....	855
	Introducing Forms Authentication .....	855
	Why Use Forms Authentication? .....	856
	Why Would You Not Use Forms Authentication? .....	858
	Why Not Implement Cookie Authentication Yourself? .....	859
	The Forms Authentication Classes .....	860
	Implementing Forms Authentication .....	861
	Configuring Forms Authentication .....	861
	Denying Access to Anonymous Users .....	865
	Creating a Custom Login Page .....	865
	Custom Credentials Store .....	872
	Persistent Cookies in Forms Authentication .....	873
	IIS 7.0 and Forms Authentication .....	874
	Summary .....	880

<b>CHAPTER 21</b>	<b>Membership</b>	<b>881</b>
	Introducing the ASP.NET Membership API	881
	Using the Membership API	884
	Configuring Forms Authentication	885
	Creating the Data Store	886
	Configuring Connection String and Membership Provider	892
	Creating and Authenticating Users	896
	Using the Security Controls	898
	The Login Control	900
	The LoginStatus Control	910
	The LoginView Control	911
	The PasswordRecovery Control	912
	The ChangePassword Control	917
	The CreateUserWizard Control	918
	Configuring Membership in IIS 7.0	922
	Configuring Providers and Users	922
	Using the Membership API with Other Applications	924
	Using the Membership Class	926
	Retrieving Users from the Store	926
	Updating Users in the Store	929
	Creating and Deleting Users	929
	Validating Users	930
	Using Membership in Windows Forms	931
	Summary	933
<b>CHAPTER 22</b>	<b>Windows Authentication</b>	<b>935</b>
	Introducing Windows Authentication	935
	Why Use Windows Authentication?	936
	Why Would You Not Use Windows Authentication?	937
	Mechanisms for Windows Authentication	938
	Implementing Windows Authentication	944
	Configuring IIS 5.x or IIS 6.0	944
	Configuring IIS 7.0	946
	Configuring ASP.NET	948
	Denying Access to Anonymous Users	951
	Accessing Windows User Information	953

Impersonation .....	958
Impersonation in Windows 2000 .....	959
Impersonation on Windows XP .....	960
Impersonation and Delegation on Windows Server 2003 .....	960
Impersonation on Windows Vista .....	963
Impersonation and Delegation on Windows Server 2008 .....	964
Configured Impersonation .....	964
Programmatic Impersonation .....	966
Summary .....	969
<b>CHAPTER 23 Authorization and Roles .....</b>	<b>971</b>
URL Authorization .....	971
Authorization Rules .....	972
File Authorization .....	977
Authorization Checks in Code .....	978
Using the IsInRole() Method .....	978
Using the PrincipalPermission Class .....	979
Using the Roles API for Role-Based Authorization .....	981
Using the LoginView Control with Roles .....	987
Accessing Roles Programmatically .....	988
Using the Roles API with Windows Authentication .....	990
Protecting Non-ASP.NET Resources in IIS 5 and 6 .....	993
Adding a File Type Mapping .....	993
Writing a Custom HTTP Handler .....	994
Authorization and Roles in IIS 7.0 .....	996
Authorization with ASP.NET Roles in IIS 7.0 .....	998
Managing ASP.NET Roles with IIS 7.0 .....	1001
Summary .....	1002
<b>CHAPTER 24 Profiles .....</b>	<b>1005</b>
Understanding Profiles .....	1005
Profile Performance .....	1005
How Profiles Store Data .....	1006
Profiles and Authentication .....	1007
Profiles vs. Custom Data Components .....	1007

Using the SqlProfileProvider .....	1008
Creating the Profile Tables .....	1008
Configuring the Provider .....	1011
Defining Profile Properties .....	1012
Using Profile Properties .....	1013
Profile Serialization .....	1014
Profile Groups .....	1016
Profiles and Custom Data Types .....	1017
The Profiles API .....	1020
Anonymous Profiles .....	1022
Custom Profile Providers .....	1025
The Custom Profile Provider Classes .....	1025
Designing the FactoredProfileProvider .....	1027
Coding the FactoredProfileProvider .....	1029
Testing the FactoredProfileProvider .....	1033
Summary .....	1036

## CHAPTER 25 **Cryptography** .....

Encrypting Data: Confidentiality Matters .....	1037
The .NET Cryptography Namespace .....	1038
Understanding the .NET Cryptography Classes .....	1042
Symmetric Encryption Algorithms .....	1043
Asymmetric Encryption .....	1044
The Abstract Encryption Classes .....	1045
The ICryptoTransform Interface .....	1046
The CryptoStream Class .....	1046
Encrypting Sensitive Data .....	1047
Managing Secrets .....	1048
Using Symmetric Algorithms .....	1049
Using Asymmetric Algorithms .....	1054
Encrypting Sensitive Data in a Database .....	1057
Encrypting the Query String .....	1061
Wrapping the Query String .....	1062
Creating a Test Page .....	1065
Summary .....	1066

<b>CHAPTER 26 Custom Membership Providers</b> .....	1067
Architecture of Custom Providers .....	1067
Basic Steps for Creating Custom Providers .....	1069
Overall Design of the Custom Provider.....	1069
Designing and Implementing the Custom Store .....	1070
Implementing the Provider Classes .....	1078
Using the Custom Provider Classes .....	1098
Summary .....	1102

## PART 5 ■■■ **Advanced User Interface**

<b>CHAPTER 27 Custom Server Controls</b> .....	1105
Custom Server Control Basics .....	1105
Creating a Bare-Bones Custom Control .....	1106
Using a Custom Control .....	1108
Custom Controls in the Toolbox .....	1109
Creating a Web Control That Supports Style Properties.....	1110
The Rendering Process .....	1114
Dealing with Different Browsers .....	1115
The HtmlTextWriter.....	1115
Browser Detection .....	1116
Browser Properties.....	1118
Overriding Browser Type Detection .....	1120
Adaptive Rendering .....	1121
Control State and Events .....	1123
View State .....	1123
Control State .....	1125
Postback Data and Change Events.....	1127
Triggering a Postback .....	1129
Extending Existing Web Controls .....	1131
Composite Controls .....	1131
End SidebarDerived Controls.....	1134
Template Controls .....	1137
Creating a Template Control .....	1137
Using Customized Templates .....	1139
Styles .....	1144
Summary .....	1146

<b>CHAPTER 28</b>	<b>Design-Time Support</b>	1147
	The Key Players	1147
	Design-Time Attributes	1148
	The Properties Window	1149
	Attributes and Inheritance	1153
	The Toolbox Icon	1154
	Web Resources	1155
	Creating a Resource	1155
	Retrieving a Resource	1156
	Text Substitution	1157
	Code Serialization	1158
	Type Converters	1158
	Serialization Attributes	1166
	Type Editors	1168
	Control Designers	1170
	Design-Time HTML	1171
	Smart Tags	1173
	Summary	1178
<b>CHAPTER 29</b>	<b>Dynamic Graphics and GDI+</b>	1179
	The ImageMap Control	1179
	Creating Hotspots	1180
	Handling Hotspot Clicks	1181
	A Custom Hotspot	1182
	Drawing with GDI+	1184
	Simple Drawing	1185
	Image Format and Quality	1187
	The Graphics Class	1188
	Using a GraphicsPath	1190
	Pens	1191
	Brushes	1194
	Embedding Dynamic Graphics in a Web Page	1195
	Using the PNG Format	1196
	Passing Information to Dynamic Images	1197
	Custom Controls That Use GDI+	1200
	Charting with GDI+	1204
	Summary	1209

<b>CHAPTER 30</b>	<b>Portals with Web Part Pages</b>	1211
	Typical Portal Pages	1212
	Basic Web Part Pages	1213
	Creating the Page Design	1214
	WebPartManager and WebPartZone Controls	1215
	Adding Web Parts to the Page	1217
	Customizing the Page	1220
	Creating Web Parts	1222
	Simple Web Part Tasks	1223
	Developing Advanced Web Parts	1231
	Web Part Editors	1240
	Connecting Web Parts	1246
	Custom Verbs and Web Parts	1254
	User Controls and Advanced Web Parts	1255
	Uploading Web Parts Dynamically	1258
	Authorizing Web Parts	1264
	Final Tasks for Personalization	1264
	Summary	1265

## PART 6 ■■■ Client-Side Programming

<b>CHAPTER 31</b>	<b>JavaScript and Ajax Techniques</b>	1269
	JavaScript Essentials	1269
	The HTML Document Object Model	1270
	Client-Side Events	1271
	Script Blocks	1273
	Manipulating HTML Elements	1275
	Debugging JavaScript	1276
	Basic JavaScript Examples	1278
	Creating a JavaScript Page Processor	1278
	Using JavaScript to Download Images Asynchronously	1281
	Rendering Script Blocks	1286
	Script Injection Attacks	1287
	Request Validation	1287
	Disabling Request Validation	1288
	Custom Controls with JavaScript	1290
	Pop-Up Windows	1290
	Rollover Buttons	1294

Frames .....	1297
Frame Navigation .....	1298
Inline Frames .....	1299
Understanding Ajax .....	1300
The XMLHttpRequest Object .....	1301
An Ajax Example .....	1303
Using Ajax with Client Callbacks .....	1307
Creating a Client Callback .....	1307
Client Callbacks “Under the Hood” .....	1313
Client Callbacks in Custom Controls .....	1314
Summary .....	1318

## ■ CHAPTER 32 ASP.NET AJAX .....

Introducing ASP.NET AJAX .....	1319
ASP.NET AJAX on the Client: The Script Libraries .....	1320
ASP.NET AJAX on the Server: The ScriptManager .....	1321
Server Callbacks .....	1322
Web Services in ASP.NET AJAX .....	1323
The Web Service Proxy .....	1330
Placing a Web Method in a Page .....	1331
ASP.NET AJAX Application Services .....	1333
ASP.NET AJAX Server Controls .....	1339
Partial Rendering with the UpdatePanel .....	1340
Timed Refreshes with the Timer .....	1348
Time-Consuming Updates with UpdateProgress .....	1349
Managing Browser History .....	1352
Deeper into the Client Libraries .....	1356
Understanding the Client Model .....	1356
Object-Oriented Programming in JavaScript .....	1357
The Web-Page Framework .....	1365
Control Extenders .....	1371
Installing the ASP.NET AJAX Control Toolkit .....	1371
The AutoCompleteExtender .....	1373
The ASP.NET AJAX Control Toolkit .....	1376
Summary .....	1381

<b>CHAPTER 33 Silverlight 2</b> .....	1383
Understanding Silverlight .....	1384
Silverlight vs. Flash .....	1386
Silverlight System Requirements .....	1387
Installing the Silverlight Tools for Visual Studio .....	1388
Creating a Silverlight Solution .....	1389
Silverlight Compilation .....	1390
Entry Pages .....	1391
Creating a Silverlight Project .....	1396
Designing a Silverlight Page .....	1397
Understanding XAML .....	1401
Setting Properties .....	1402
The XAML Code-Behind .....	1403
Handling Events .....	1405
Browsing the Silverlight Class Libraries .....	1406
Layout .....	1407
The Canvas .....	1408
The Grid .....	1413
Animation .....	1417
Animation Basics .....	1418
Defining an Animation .....	1418
The Storyboard Class .....	1419
An Interactive Animation Example .....	1422
Transforms .....	1425
Silverlight and ASP.NET .....	1429
Using Web Services with Silverlight .....	1429
The MediaPlayer Control .....	1435
Summary .....	1439
<b>INDEX</b> .....	1441

# About the Authors



■ **MATTHEW MACDONALD** is an author, educator, and Microsoft MVP. He's a regular contributor to programming journals and the author of more than a dozen books about .NET programming, including *Pro Silverlight 2 in C# 2008* (Apress, 2008), *Pro WPF in C# 2008* (Apress, 2008), and *Beginning ASP.NET 3.5 in C# 2008* (Apress, 2007). He lives in Toronto with his wife and two daughters.



■ **MARIO SZPUSZTA** works as an architect in the Developer and Platform Group of Microsoft Austria, and helps software architects of top enterprise and web customers with establishing new Microsoft technologies. For several years, he has been focusing on secure software development, web services and interoperability, and integration of Microsoft Office clients and servers in custom applications. Mario speaks regularly at local and international conferences, such as DevDays and TechEd Europe Developers, and has been a technical content owner of TechEd Europe Developers for the past two years, as well.

# About the Technical Reviewer



■ **ANDY OLSEN** is a freelance developer and consultant based in the United Kingdom. Andy has been working with .NET since the beta 1 days and has coauthored and reviewed several books for Apress, covering C#, Visual Basic, ASP.NET, and other topics. Andy is a keen football and rugby fan and enjoys running and skiing (badly). Andy lives by the seaside in Swansea with his wife, Jayne, and children, Emily and Thomas, who have just discovered the thrills of surfing and look much cooler than he ever will!

# Introduction

**A**s you no doubt already know, ASP.NET is Microsoft's next-generation technology for creating server-side web applications. It's built on the Microsoft .NET Framework, which is a cluster of closely related new technologies that revolutionize everything from database access to distributed applications. ASP.NET is one of the most important components of the .NET Framework—it's the part that enables you to develop high-performance web applications.

It's not hard to get developers interested in ASP.NET. Without exaggeration, ASP.NET is the most complete platform for web development that's ever been put together. It far outclasses its predecessor, ASP, which was designed as a quick-and-dirty set of tools for inserting dynamic content into ordinary web pages. By contrast, ASP.NET is a full-blown platform for developing comprehensive, blisteringly fast *web applications*.

In this book, you'll learn everything you need to master ASP.NET 3.5. If you've programmed with a previous version of ASP.NET, you can focus on new features such as LINQ (Chapter 13), ASP.NET AJAX (Chapter 32), and Silverlight (Chapter 33). If you've never programmed with ASP.NET, you'll find that this book provides a well-paced tour that leads you through all the fundamentals, along with a backstage pass that lets you see how the ASP.NET internals *really* work. The only requirement for this book is that you have a solid understanding of the C# language and the basics of .NET. If you're a seasoned Java or C++ developer but you're new to C#, you may find it easier to start with a book about .NET fundamentals, such as *Pro C# 2008 and the .NET 3.5 Platform*, by Andrew Troelsen (Apress, 2007).

## What Does This Book Cover?

Here is a quick breakdown of what you'll find in this book:

**Part 1: Core Concepts:** You'll begin in Chapter 1 with a look at the overall ASP.NET platform, the .NET Framework, and an overview of the changes that have taken place in ASP.NET 3.5. In Chapter 2 you'll branch out to learn the tools of the trade—namely, Visual Studio 2008. In Chapters 3, 4, 5, and 6 you'll learn the key parts of the ASP.NET infrastructure, such as the web-page model, application configuration, and state management. As you learn these core concepts, you'll also take a low-level look at how ASP.NET processes requests and manages the lifetime of your web applications. You'll even learn how to extend the ASP.NET architecture.

**Part 2: Data Access:** This part tackles one of the core problem domains for all software development—accessing and manipulating data. In Chapters 7 and 8 you'll consider the fundamentals of ADO.NET as they apply to web applications and learn how to design data access components. In Chapters 9 and 10 you'll learn about ASP.NET's set of innovative data bound controls that let you format and present data without writing pages of code. Chapter 11 branches out into advanced caching strategies that ensure first-class performance. Finally, Chapters 12, 13, and 14 move beyond the world of ADO.NET to show you how to work with files, LINQ, and XML content.