

Contents

Acknowledgments	xxi
Introduction	xxiii
Part I: ADO.NET 2.0 Basics	1
Chapter 1: Migrating from ADO to ADO.NET	3
A New Approach to Data Access	4
The System.Data Namespace	4
ADO.NET Data Providers	6
Basic ADO.NET Data Objects	7
Creating Basic ADO.NET Data Objects with SqlClient	8
Applying Transactions to Multi-Table Updates	15
Using OleDb, SqlXml, and Odbc Member Classes	18
Working with Typed DataReader and SqlResultSet Data	21
ADO.NET Typed DataSet Objects	23
Add a Typed DataSet from an SQL Server Data Source	24
Add a DataGridView and BindingNavigator Controls	30
Persist and Reopen the DataSet	32
Change from a DataGridView to a Details Form	33
Add a Related DataBound Control	34
Summary	37
Chapter 2: Introducing New ADO.NET 2.0 Features	39
Working with New ADO.NET 2.0 Runtime Windows Form Objects	39
Use the DbProviderFactories to Create Database-Agnostic Projects	40
Retrieve Base Table Schemas	43
Check Available SQL Server Instances and ADO.NET 2.0 Data Providers	46
Batch Inserts to SQL Server Tables with the SqlBulkCopy Object	47
Get SQL Server Connection Statistics	51
Execute SqlCommands Asynchronously	52
Create Standalone DataTables	62
Use Nullable Types to Support DBNull Values	66

Contents

Using New ADO.NET 2.0 Persistent Windows Form Objects	69
Compare ADO.NET 1.x and 2.0 Data Designers	70
Add Missing ADO.NET Controls to the Toolbox	72
Upgrade 1.x Projects to ADO.NET 2.0 Components	72
Add Multi-Level Subforms	73
Parameterize the MasterDetailsForm	75
Batch Multiple Updates	77
Design and Display Reports with the ReportViewer Control	79
Summary	82
Chapter 3: Adopting Best Practices for Data-Centric Projects	83
Establish Architectural Best Practices	84
Reference Architectures	85
Find Patterns for Projects	86
Enterprise Solution Patterns Using Microsoft .NET	87
Data Patterns	87
Distributed Systems Patterns	88
Integration Patterns	88
Try Application Block Libraries	89
The Data Access Application Block	90
The DataAccessQuickStart Client	94
Adhere to Design Guides	96
The .NET Data Access Architecture Guide	96
Improving .NET Application Performance and Scalability	96
Designing Data Tier Components and Passing Data Through Tiers	97
Apply Class Library Design Guidelines	102
Naming Guidelines	102
Class Member Usage Guidelines	103
Prepare for Service-Oriented Architecture	103
The Road to Service-Oriented Architecture	104
Implement SOA with Web Services	105
Ensure Fully Interoperable Web Services	106
Use FxCop to Validate Project Code	110
Automate Test-Driven Development	112
Add a Unit Test Project to a VS 2005 Solution	112
Edit and Run the Wizard-Generated Tests	114
Run the SQL Server 2000 Best Practices Analyzer	116
Apply Specific Best Practices to ADO.NET 2.0 Projects	118
Use Identical Connection Strings to Pool Database Connections	118
Run SQL Server Profiler to Inspect SQL and RPC Queries	120
Avoid Adding Runtime CommandBuilder Instances	121

Substitute Stored Procedures for SQL Batch Queries	122
Add Default Values for Parameters That Aren't Required	122
Use sp_executesql and Named Parameters to Reuse Cached Query Plans	122
Add timestamp Columns for Optimistic Concurrency Control	123
Check All Related Records in Concurrency Tests	126
Batch Updates to Minimize Server Roundtrips	126
Avoid SqlExceptions with Client-Side Validation	126
Summary	127

Part II: Data Binding in Windows Forms and Controls **129**

Chapter 4: Programming TableAdapters, BindingSources, and DataGridViews **131**

Design a Basic Customer-Orders-Order Details Form	132
Reduce DataSet Size with Parameterized Queries	132
Create the Data Source and Add the Controls	133
Add FillBy Methods for Each Data Table	135
Alter the Autogenerated Code to Fill the Controls	137
Fill the ComboBox with CustomerID Values	137
Clean Up the UI and Code	138
Format and Add DataGridView Columns	139
Format the OrdersDataGridView Columns	140
Format and Add a Computed Column to the Order_DetailsDataGridView	141
Provide Default Values for New Records	143
Add Default Orders Record Values	144
Add Default Order Details Record Values	145
Handle the DataErrors Event	146
Streamline Heads-Down Data Entry	146
Migrate the UI to a Tabbed Form	149
Test Drive the OrdersByCustomersV3 Project	149
Fix Missing Default Values When Adding Rows with Code	150
Edit a Selected DataGridView Record on the Second Tab Page	152
Create and Bind Lookup Lists for Primary Key Values	153
Create an Untyped Lookup DataSet and Its DataTables	154
Populate the cboCustomerID Combo Box	156
Replace DataGridView Text Boxes with Combo Boxes	156
Associate Combo Boxes with Text Boxes	159
Add a Combo Box That Sets Additional Values	162
Create and Bind a DataView Sorted by ProductName	162
Test for Duplicates and Update the UnitPrice Column	163

Contents

Add Lookup Table Rows for New Customer Entries	166
Add and Bind a CustomerID BindingSource	166
Test for Duplicates with a DataRowView	167
Apply Business Rules to Edits	168
Save Changes to the Base Tables	169
Maintain Referential Integrity	170
Create and Test the UpdateBaseTables Function	171
Summary	180
Chapter 5: Adding Data Validation and Concurrency Management	181
Validate Data Entries	183
Validate Text Boxes	183
Validate DataGridViews	184
Catch Primary Key Constraint Violations on Entry	186
Validate Default Values	187
Manage Concurrency Violations	189
ADO.NET 2.0 Concurrency Control and Transaction Changes	189
Concurrency Control Strategies	191
The “Missing Links” of Concurrency Management	192
Anticipate Value-Based Primary-Key Constraint Violations	198
Handle Concurrency Errors Gracefully	201
Obtain Current Data from the Server	202
Retrieve and Compare Server and Client Cell Values	203
Accommodate Disconnected Users	208
Create and Manage Offline DataSets	209
Enable Handling Multiple Parent Records	211
Summary	212
Chapter 6: Applying Advanced DataSet Techniques	213
Apply Transactions to DataSet Updates	214
Simplify Enlistment with System.Transactions	217
Add Joins to DataTable Select Commands	222
Add a Join to the SelectCommand	222
Add the Joined Columns to the DataGridView	224
Provide Default Values and Update Read-Only Columns	225
Improve Performance by Reducing DataSet Size	227
Limit Rows Returned with TOP n Queries	228
Add Partial Classes for TableAdapters	228
Work with Images in DataGridViews	229
Add Image Columns to DataGridViews	230
Manipulate DataGridView Images	231

Edit XML Documents with DataSets and DataGridViews	235
Adapt an Existing XML Schema to Generate a DataSet	235
Infer an XML Schema to Generate a DataSet	248
Create Editing Forms from XML Data Sources	250
Generate Serializable Classes from Schemas	255
Create Data Sources from Serializable Classes	257
Enhance Editing with Generic BindingList Collections	259
Summary	261
Part III: Data Binding in ASP.NET 2.0	263
Chapter 7: Working with ASP.NET 2.0 DataSources and Bound Controls	265
Explore New ASP.NET 2.0 Features	266
The ASP.NET 2.0 Compilation Model	269
Special ASP.NET 2.0 Folders	271
New ASP.NET 2.0 Data Controls	272
DataSource Controls	273
The DataList Control	274
SqlDataSources for Bound Controls	275
Control Properties	280
Databound Templates and Data Formatting	281
DataSource WHERE Constraints from Bound Control Values	283
Edit Items in DataLists	286
The FormView Control	288
Page the DataSource	288
Replace Null Values with Column-Specific Text	289
Edit, Add, and Delete Records	291
Add Command Buttons	292
The GridView Control	293
Convert BoundFields to EditItemTemplate Fields	295
Replace TextBoxes with DropDownList for Editing	297
Design a GridView with an ImageField	299
Scale Image Rendering	302
The DetailsView Control	303
Synchronize a Child Table GridView and DetailsView	304
Make a Composite Primary Key Value Editable	304
Assign Default Values and Handle Update and Insert Errors	304
Link a DetailsView Page to a GridView Page with a QueryString	306
Summary	307

Chapter 8: Applying Advanced ASP.NET 2.0 Data Techniques	309
Validate Entries in Databound Controls	310
ASPRNET 2.0 Validation Controls	310
The New ValidationGroup Property	311
Other Shared Validation Properties	311
Validate GridView Edits	313
Add Required Field Validation to a GridView Control	313
Validate CustomerID Entries with a RegularExpressionValidator	315
Test EmployeeID Values with a RangeValidator	316
Apply a RangeValidator and RegularExpressionValidator to Date Entries	317
Prevent Unreasonable Entries with a CompareValidator	318
Add a CustomValidator Control	319
Provide a Validation Summary Message	321
Validate DetailsView Controls	322
Validate ProductID Edits at the Web Server	322
Test for Duplicate ProductID Values at the Client	323
Replace SqlDataSources with ObjectDataSources	325
ObjectDataSources from DataTables	325
ObjectDataSources from Typed DataSet DALCs	335
ObjectDataSources from Custom Business Objects	336
Read XML Files with the XmlDataSource	343
Create XmlDataSources from XML Documents	344
Populate a GridView with Orders.xml	346
Design a Repeater Control with an XmlDataSource	347
Fill a TreeView with Tabular Data	348
Trace Web Pages to Compare DataSource Performance	351
Deploy Completed Web Sites to IIS	353
Create a Virtual Directory for Your Site	353
Copy a Web Site to a Virtual Directory Folder	354
Publish Precompiled Web Sites	355
Summary	356
Chapter 9: Publishing Data-Driven Web Services	359
Web Service Development Strategies	360
Transactions	360
DataSets	361
Custom Business Objects	361
Multiple WebMethods and Versioning	362
Web Service Security	363

ASP.NET 2.0 Web Service Programming	363
The Web Service Help Page and WSDL Document	364
Web Service Deployment	369
Web Service Clients and Proxies	369
Create and Deploy a Simple Data Web Service	375
Web Service Connection Strings	376
Add a General-Purpose Procedure to Return a Typed DataSet	377
Add a WebMethod to Define and Return the DataSet	379
Add DataGridViews to the Web Service Client	380
Update the Web Service DataSet	382
Substitute Custom Business Objects for DataSets	384
Explore a Business Object Web Service	385
Bind Object Arrays to DataGridViews	391
Create an ASPNET Business Objects Web Services Client	397
Summary	399
Part IV: SQL Server 2005 and ADO.NET 2.0	401
Chapter 10: Upgrading from SQL Server 2000 to 2005	403
SQL Server 2005 Editions	404
Express Edition	404
Developer Edition	405
Workgroup Edition	405
Standard Edition	406
Enterprise Edition	406
Mobile Edition	406
New SQL Server 2005 Features in Brief	407
New or Updated Management Tools	407
Reporting Services	412
CLR Integration	413
The xml Data Type and XQuery Implementation	413
Chapter 12 also introduces you to SQL Server 2005's XQuery syntax.SQL Native Client	414
Multiple Active Result Sets (MARS)	415
Data Availability and Reliability Enhancements	416
T-SQL and Database Engine Enhancements	416
Service Broker	425
Notification Services	429
Query Notifications	429
Database Mail	430
SQL Server Native SOAP Web Services	430

Contents

Customize FOR XML Queries	432
Add Root Elements and Embed XML Schemas with FOR XML RAW Queries	433
Fine-Tune Document Structure with FOR XML PATH	435
Explore the PIVOT and UNPIVOT Operators	440
Create the Source Table	440
Apply the PIVOT Operator	441
Replace the Source Table with a Common Table Expression	442
UNPIVOT the Crosstab Report	443
Process Query Notifications	444
Add SqlDependency Notifications	446
Create SqlNotificationRequest Objects and Subscriptions	448
Automate Reorder Processing with Database Mail	452
Consume SQL Server Native Web Services	453
Summary	456
Chapter 11: Creating SQL Server Projects	457
An Introduction to SQL Server Projects	458
Commands to Enable CLR Integration	458
Attribute Decorations for SQL Server Projects	458
Visual Studio 2005 SQL Server Project Templates	459
The SqlServerProjectCLR Sample Project	460
Code for SQL Server Objects	461
Test Scripts	465
The CREATE ASSEMBLY Instruction	466
Create ObjectType Instructions	468
Drop SQL/CLR Objects	470
Debug SQL Server Projects	471
Design SQL/CLR Stored Procedures	472
Return Content-Dependent SqlDataRecords	473
Generate XML Documents with an XmlWriter	475
Project Product Sales with Linear Regression Analysis	484
Create User-Defined Types	491
Native-Format UDT Code for Structures and Classes	492
UserDefined-Format UDT Class Code	494
A Simple Value-Type UDT	496
Add a UDT Column to a Table	499
Display Table Rows with UDT Columns	500
Use an SqlDataReader to Return UDT Values	501
Work with a Complex UserDefined-Format UDT	502
The AddressBasic UDT	503
Verify the Address UDT Methods	506

Test the Address UDT with WHERE Constraints and ORDER BY Clauses	507
Access Data from Other Fields or Tables with UDT Queries	509
Generate Well-Formed XML with an XmlTextWriter	509
Summary	512
Chapter 12: Exploring the XML Data Type	513
<hr/>	
Select the Appropriate XML Data Model	515
Untyped XML Columns	515
Typed XML Columns	519
Indexed XML Columns	522
Explore the AdventureWorks XML Columns	525
Execute XQuery Expressions	528
XQuery Methods for XML Columns	529
FLWOR XQuery Expressions	535
Execute XQuery Expressions with Code	540
Evaluate Performance Effects of Data Model Choices	541
Create and Fill the SalesOrders and SalesOrderItems Tables	543
Populate the SalesOrders Table's OrdersXML1 and OrdersXML2 Columns	545
Evaluate the Effect of XML Indexes on UPDATES	546
Analyze Improvement of XQuery Performance	548
Summary	557
Index	559

