

# CONTENTS AT A GLANCE

	<i>Introduction</i>	<i>xxiii</i>
<b>PART I</b>	<b>Database Basics and Structured Query Language</b>	<b>1</b>
Chapter 1	Database Access: Architectures and Technologies <i>From Mastering™ Database Programming with Visual Basic® 6</i>	3
Chapter 2	Basic Concepts of Relational Databases <i>From Mastering™ Database Programming with Visual Basic® 6</i>	37
Chapter 3	Structured Query Language <i>From Mastering™ Database Programming with Visual Basic® 6</i>	91
Chapter 4	Transact-SQL <i>From Mastering™ Database Programming with Visual Basic® 6</i>	151
Chapter 5	Making the Most of Stored Procedures <i>From Mastering™ Database Programming with Visual Basic® 6</i>	217
Chapter 6	The Visual Database Tools <i>From Mastering™ Database Programming with Visual Basic® 6</i>	281
<b>PART II</b>	<b>Programming with ADO</b>	<b>331</b>
Chapter 7	Overview of ADO and Visual Basic <i>From Visual Basic® Developer's Guide to ADO</i>	333
Chapter 8	Data Access <i>From Visual Basic® Developer's Guide to ADO</i>	345
Chapter 9	The ADO Object Model <i>From Visual Basic® Developer's Guide to ADO</i>	375
Chapter 10	Programming with ADO <i>From Mastering™ Database Programming with Visual Basic®</i>	415
Chapter 11	More ADO Programming <i>From Mastering™ Database Programming with Visual Basic®</i>	481
Chapter 12	Fine-Tuning ADO through Visual Basic Code <i>From Visual Basic® Developer's Guide to ADO</i>	519

## viii Contents at a Glance

<b>PART III</b>	<b>Web and XML Database Programming</b>	<b>559</b>
Chapter 13	Accessing Databases over the Web <i>From Mastering™ Database Programming with Visual Basic®</i>	561
Chapter 14	Controlling Transactions in ASP <i>From Mastering™ Active Server Pages 3</i>	635
Chapter 15	XML and MS Databases <i>From XML Developer's Handbook</i>	659
Chapter 16	Building an Online Store <i>From Mastering™ Database Programming with Visual Basic®</i>	715
<b>PART IV</b>	<b>SQL Server Programming with Visual Basic</b>	<b>739</b>
Chapter 17	Overview of Visual Basic and SQL Server <i>From Visual Basic® Developer's Guide to SQL Server™</i>	741
Chapter 18	SQL Distributed Management Objects <i>From Visual Basic® Developer's Guide to SQL Server™</i>	757
Chapter 19	SQL Namespace <i>From Visual Basic® Developer's Guide to SQL Server™</i>	793
Chapter 20	Data Transformation Services <i>From Visual Basic® Developer's Guide to SQL Server™</i>	819
<b>PART V</b>	<b>OLAP and Analysis Services</b>	<b>851</b>
Chapter 21	OLAP and Data Mining Concepts <i>From SQL Server™ Developer's Guide to OLAP with Analysis Services</i>	853
Chapter 22	Analysis Services Architecture <i>From SQL Server™ Developer's Guide to OLAP with Analysis Services</i>	867
Chapter 23	Using Analysis Services <i>From SQL Server™ Developer's Guide to OLAP with Analysis Services</i>	895
Chapter 24	Using ADO MD to Summarize Data <i>From Visual Basic® Developer's Guide to ADO</i>	929
	<i>Index</i>	<i>953</i>

# CONTENTS

*Introduction*

*xxiii*

## **Part I ▶ Database Basics and Structured Query Language** **1**

### **Chapter 1 Database Access: Architectures and Technologies** **3**

Databases and Database Management Systems	4
Windows DNA	6
Universal Data Access	7
ADO and OLE DB	11
Client-Server Architecture	14
The Two-Tier Model	15
The Three-Tier Model	17
SQL Server	24
SQL Server Tools	26
Enterprise Manager	27
The Query Analyzer	33
Summary	35

### **Chapter 2 Basic Concepts of Relational Databases** **37**

Fundamentals of Database Design	38
What Is a Database?	39
Who Designs Databases?	41
Exploring the Northwind Database	42
Understanding Relations	49
Querying Relational Databases	52
Database Objects	53
Tables	53
Null Values	58
Indexes	59
Views	62
Establishing Relationships	65
Normalization Rules	70
Database Design Errors	70
First Normal Form	73

**x Contents**

Second Normal Form	74
Third Normal Form	74
Database Integrity	76
Domain Integrity	77
Entity Integrity	77
Referential Integrity	77
Enforcing Referential Integrity	78
The Pubs Database	81
The Biblio Database	84
Importing the Biblio Database into SQL Server	85
Summary	89
<b>Chapter 3 Structured Query Language</b>	<b>91</b>
Selection and Action Queries	93
Executing SQL Statements	93
The SQLEXP Application	93
The Query Analyzer	95
Access Queries	96
Data Manipulation Language	97
The WHERE Clause	99
The TOP Keyword	102
The LIKE Operator	103
Locating NULL Values	108
The UNION Operator	110
The DISTINCT Keyword	110
Sorting Rows with the ORDER Keyword	112
Calculated Fields	113
IN and NOT IN Keywords	122
Subqueries	123
The BETWEEN Keyword	127
Examples	128
Joining Tables	134
Types of Joins	137
Action Queries	147
The DELETE Statement	147
The INSERT Statement	148
The UPDATE Statement	149
Summary	150

<b>Chapter 4</b>	<b>Transact-SQL</b>	<b>151</b>
	The COMPUTE BY Clause	152
	Stored Procedures	157
	Writing Access Queries	158
	Using Parameters with Access Queries	159
	VBA Functions	160
	Date and Time Functions	161
	Writing T-SQL Stored Procedures	162
	Creating and Executing Stored Procedures	163
	Executing Command Strings	167
	Why Use Stored Procedures?	168
	T-SQL: The Language	169
	T-SQL Variables	169
	Flow-Control Statements	176
	T-SQL Functions	183
	Using Arguments	192
	Building SQL Statements on the Fly	194
	Triggers	197
	Implementing Triggers	198
	Transactions	203
	BEGIN TRANSACTION	204
	COMMIT TRANSACTION	204
	ROLLBACK TRANSACTION	204
	Implementing Business Rules with Stored Procedures	205
	Adding Customers	207
	Adding Orders	210
	Testing the NewOrder Procedure	214
	Summary	215
<b>Chapter 5</b>	<b>Making the Most of Stored Procedures</b>	<b>217</b>
	Methods for Executing SQL Statements and Stored Procedures	218
	The Connection.Execute Method	219
	The Recordset.Open Method	222
	The Command.Execute Method	224
	The CreateParameter Method	232
	Executing Commands Asynchronously	246
	The Connection_ExecuteComplete Event	247

**xii Contents**

The Command.State Property	248
The AsyncExecute Project	249
Implementing Business Rules with Stored Procedures	254
Calling the AddCustomer Procedure from a VB Application	256
Calling the NewOrder Procedure from a VB Application	258
T-SQL Cursors	262
Cursors Versus Recordsets	263
Cursor Types	263
Cursor Navigation	264
Using Cursors	265
Scanning a Cursor	267
Cursor Updating	270
Examples	271
Summary	280
<b>Chapter 6 The Visual Database Tools</b>	<b>281</b>
A First Look at the Visual Database Tools	282
The Data View Window	283
The Database Designer	283
The Query Designer	284
The Source Code Editor and T-SQL Debugger	285
Connecting to Databases	286
Using Data Link Files	287
Using Connection Strings	288
Connecting to the Northwind Database	292
Using the Data View Window	294
Using the Database Designer	296
The Tables Tab	298
The Relationships Tab	300
The Indexes/Keys Tab	300
Using the Database Diagram	302
Scripting Your Changes	305
Using the Query Designer	307
The Query Designer's Window	308
Building Simple Queries	310
Building Queries with Aggregate Functions	311
Building Multi-Table Queries	313
Entering SQL Statements	315



**xiv Contents**

---

OLE DB	351
ADO	353
RDS	368
Other ADO Libraries	369
ADOX	369
ADO MD	370
JRO	371
Getting MDAC	371
Referencing Libraries in Visual Basic	372
Summary	373
<b>Chapter 9 The ADO Object Model</b>	<b>375</b>
The ADO Object Hierarchy	376
The Connection Object	376
Methods, Properties, and Events	377
Using Connection Objects	379
The Command Object	383
Methods, Properties, and Events	383
Using Command Objects	384
The Recordset Object	386
Methods and Properties	387
Using Recordset Objects	390
The Parameter Object	394
Methods and Properties	394
Using Parameter Objects	395
The Field Object	397
Methods and Properties	398
Using Field Objects	398
The Record Object	400
Methods and Properties	400
Using Record Objects	401
The Stream Object	404
Methods and Properties	404
Using Stream Objects	405
The Error Object	408
Methods and Properties	408
Using Error Objects	408
The Property Object	410

ADO Extensions	412
ADOX	412
ADO MD	413
Summary	414
<b>Chapter 10 Programming with ADO</b>	<b>415</b>
The DataEnvironment Designer	416
Creating Connection Objects	417
Creating Command Objects	420
Programming the DataEnvironment Objects	423
Building Forms with Data-Bound Controls	429
Using the ADO Data Control	438
Setting up an ADO Data Control	440
ADO Data Control Properties	443
The Data Form Wizard	449
Building a Data-Entry Form with the Wizard	449
The Code behind the Wizard	451
Creating Simple and Functional Data-Entry Forms	455
Data-Aware Controls	458
Populating a Data-Aware Control	459
Looking Up Fields with a Data-Aware Control	460
Using the DataList Control	466
Examples	468
The AllTitles Project	468
Finding and Filtering Records	471
The ADODCDemo Project	473
The ADODCodeDemo Project	477
Summary	480
<b>Chapter 11 More ADO Programming</b>	<b>481</b>
Choosing the Right Cursor Type	482
Cursors and Data-Aware Controls	484
Avoid Wide Cursors	486
ADO Error Handling	490
Multiuser Considerations	494
Working with Client-Side Cursors	495
Working with Server-Side Cursors	504
How About the ADO Data Control?	507

**xvi Contents**

ADO Events	508
The Will and Complete Events	510
Some Common Event Arguments	510
Transaction Events	514
Connection Events	515
Recordset Events	516
Asynchronous Operations' Events	518
Summary	518
<b>Chapter 12 Fine-Tuning ADO through Visual Basic Code</b>	<b>519</b>
Basic Operations	520
Connecting to Data Sources	520
Connection Strings	524
Running Stored Procedures	526
Retrieving Data	531
Finding and Sorting Data	534
Sorting Recordsets	539
Updating, Adding, and Deleting Data	540
The Supports Method	545
Working with Persisted Recordsets	546
Saving a Recordset	546
Loading a Saved Recordset	548
Advanced Operations	549
Asynchronous Operations and ADO Events	549
Batch Updates and Conflicts	553
Summary	558
<b>Part III ► Web and XML Database Programming</b>	<b>559</b>
<b>Chapter 13 Accessing Databases over the Web</b>	<b>561</b>
Web Applications	563
Typical Web Applications	566
The Structure of Web Applications	567
HTML Forms and Controls	568
VBScript	577
The ASP Object Model	581
The Application Object	582
The Session Object	584

The Request Object	584
The Response Object	586
The Server Object	590
Making Queries with ASP Files	596
The GET and POST Methods	597
The Form Collection (Use with POST Method)	597
The QueryString Collection (Use with GET Method)	598
Accessing Databases with ASP	608
Querying Databases	608
Updating a Database	622
The File Access Component	628
The FileSystemObject Object	628
The TextStream Object's Methods	629
The TextStream Object's Properties	631
Using the TextStream Object	631
Summary	634
<b>Chapter 14 Controlling Transactions in ASP</b>	<b>635</b>
Introduction to MTS/COM+ Applications	636
TheObjectContext Object	637
ASP and Transactions	638
Components and MTS/COM+ Transactions	643
NT 4 MTS Package Creation and Component Registration	652
Windows 2000 COM+ Package Creation and Component Registration	654
Summary	658
<b>Chapter 15 XML and MS Databases</b>	<b>659</b>
RDS and Data Binding	660
Binding Fields to HTML Elements	661
Editing Data-Bound Controls	666
The XML Data Control	667
XML Data Islands	668
ADO Support for XML	668
Persisting Recordsets in XML Format	669
Updating XML Recordsets	674
Passing XML Data to the Client	678
Creating and Using Data Islands	679
Reading XML Data on the Server	686

**xviii Contents**

Hierarchical Recordsets	687
The SHAPE Language	688
Building Hierarchical Recordsets with VB	688
Binding Hierarchical Recordsets	693
Viewing Reduced Recordsets	696
XML and SQL Server 2000	698
The regxmlss Utility	701
SQL Server's XML Modes	702
Executing Stored Procedures	706
Using Templates	707
Using Update Grams	708
Summary	714
<b>Chapter 16 Building an Online Store</b>	<b>715</b>
Revising the Biblio Database	716
The Web Application	718
Summary	738
<b>Part IV ► SQL Server Programming with Visual Basic</b>	<b>739</b>
<b>Chapter 17 Overview of Visual Basic and SQL Server</b>	<b>741</b>
Brief History of Visual Basic	742
Brief History of SQL Server	744
Integration with SQL Server	747
Visual Basic Tools	748
SQL Server Tools	754
Summary	756
<b>Chapter 18 SQL Distributed Management Objects</b>	<b>757</b>
SQL-DMF	758
SQL-NS	759
SQL-DMO	759
DTS	760
SQL-DMO Object Model	760
Object Types	766
SQLServer Object	766
Database Object	773
QueryResults Object	780

SQL-DMO Files	782
SQL-DMO Sample Applications	783
Sample Application Tour	785
Summary	792
<b>Chapter 19 SQL Namespace</b>	<b>793</b>
SQL-NS Object Model	794
SQLNamespaceObject	795
Namespace Browser	799
SQLNamespaceObject Object	804
SQLNameSpaceCommand Object	806
What You Need	812
Using SQL-NS to Invoke Wizards	813
SQL-NS Errors	815
Summary	817
<b>Chapter 20 Data Transformation Services</b>	<b>819</b>
DTS	820
DTS Files	821
Saving and Executing Packages	823
Creating Packages	824
Using the DTS Wizard	827
DTS Sample Applications	835
DTS Object Model	837
The Package Object	840
Executing a Package	843
Creating a Package	844
Summary	850
<b>Part V ► OLAP and Analysis Services</b>	<b>851</b>
<b>Chapter 21 OLAP and Data Mining Concepts</b>	<b>853</b>
Turning Data into Information	854
Traditional Database Systems	856
Data Analysis with OLAP	859
Comparing OLTP and OLAP Databases	860
Applying OLAP in Your Organization	864
Limitations of OLAP Solutions	865
Summary	865

**xx Contents**

---

<b>Chapter 22 Analysis Services Architecture</b>	<b>867</b>
Key Concepts	868
Analyzing Sales with Analysis Services	868
Measures	871
Dimensions	872
Cubes	875
OLAP Storage Choices	877
Aggregations and Exponential Growth	877
Microsoft SQL Server 2000	880
SQL Server Database Engine	882
Data Transformation Services	883
Analysis Services	885
English Query	886
Meta Data Services	888
Data Access Components 2000	889
Using Analysis Services with Non-Microsoft Databases	893
Summary	894
<b>Chapter 23 Using Analysis Services</b>	<b>895</b>
Creating and Connecting a Database	896
Creating a Cube	898
Creating Measures	900
Creating Dimensions and Levels	900
Setting Storage Options	905
Processing the Cube	907
Browsing a Cube	907
Using the Cube Browser	908
Using Excel	913
Using Visual Basic	916
Using a Web Browser	917
Partitioned Cubes, Linked Cubes, and Virtual Cubes	920
Partitioned Cubes	921
Linked Cubes	924
Virtual Cubes	925
Updating a Cube	927
Summary	928

---

<b>Chapter 24 Using ADO MD to Summarize Data</b>	<b>929</b>
Basics of Multidimensional Data	930
Understanding Multidimensional Data	930
Introduction to Microsoft OLAP Server	931
Cubes, Dimensions, and Measures	932
Microsoft OLAP Manager	933
ADO MD Objects	934
Schema Objects	935
Data Objects	944
Additional ADO MD Techniques	948
Using OpenSchema to List Objects	949
Opening a Recordset from a Cellset	950
Summary	952
<i>Index</i>	<i>953</i>