

# CONTENTS AT A GLANCE

---

*Introduction* .....xxvii

<b>PART I</b>	<b>INTRODUCING SQL SERVER</b>	<b>1</b>
1	Introduction to SQL Server 2000	3
2	Overview of Database Concepts	31
3	Overview of SQL Server	61
4	Database Design and Normalization	105
<b>PART II</b>	<b>TRANSACT-SQL</b>	<b>135</b>
5	Transact-SQL Overview and Basics	137
6	SELECT Queries	187
7	Action Queries	235
8	Advanced Transact-SQL	265
<b>PART III</b>	<b>DIGGING INTO SQL SERVER</b>	<b>305</b>
9	Using SQL Server Enterprise Manager	307
10	Databases	369
11	Tables	405
12	Indexing	447
13	Views	471
14	Stored Procedures	507
15	Using Triggers	537
<b>PART IV</b>	<b>ADMINISTERING SQL SERVER</b>	<b>571</b>
16	Basic Administrative Tasks	573
17	Automating Administration	623
18	Security and SQL Server 2000	675

<b>PART V</b>	<b>DEVELOPMENT WITH SQL SERVER</b>	<b>721</b>
19	ADO and SQL Server	723
20	SQL-DMO	761
21	SQL Namespace	797
22	Data Transformation Services	817
23	The Web Assistant Wizard	857
24	Integrating SQL Server with Internet Information Server	881
<b>PART VI</b>	<b>ADVANCED TOPICS</b>	<b>921</b>
25	Locking	923
26	Monitoring and Optimizing SQL Server 2000	945
27	Replication	979
28	Analysis Services	1047
29	Microsoft English Query	1079
30	Troubleshooting	1101
	Appendix A Transact-SQL Reference	1119
	Appendix B Installing Microsoft SQL Server 2000	1129
	<i>Index</i> .....	<b>1155</b>

# CONTENTS

---

<i>Introduction</i> .....	<i>.xxvii</i>
---------------------------	---------------

## **PART I • INTRODUCING SQL SERVER**

<b>1</b>	<b>Introduction to SQL Server 2000</b>	<b>3</b>
	Tour for DBAs .....	4
	Opening Enterprise Manager .....	4
	Creating a Login .....	7
	Making a Change to a Table .....	11
	Viewing Current Activity .....	13
	Tracing Activity .....	13
	Optimizing an Index .....	15
	Tour for Developers .....	16
	A Few Words about ADO .....	16
	Creating an ADO Connection .....	17
	Retrieving Data .....	18
	Editing Data .....	20
	Displaying Data on a Web Page .....	22
	Tour for Users .....	24
	Opening Query Analyzer .....	24
	Other Query Analyzer Features .....	26
	Connecting Access 2000 to SQL Server .....	26
	Editing Data in Access 2000 .....	28
	Summary .....	29
<b>2</b>	<b>Overview of Database Concepts</b>	<b>31</b>
	Databases .....	32
	File-Server and Client-Server Databases .....	33
	Relational Databases .....	34
	OLTP and OLAP Databases .....	34
	Transaction Logs .....	35
	Tables .....	36
	Records, Fields, and Values .....	37
	Rows and Columns .....	37
	Null Values .....	38
	Field Properties .....	39
	Keys and Relationships .....	40
	Indexes and Constraints .....	43
	Rules and Defaults .....	44

Views	44
SQL	45
Locking	50
DDL and DML	50
Query Plan	51
Stored Procedures	52
Triggers	53
Transactions	54
System Stored Procedures	55
Ownership and Security	55
Jobs, Alerts, and Operators	56
Replication	57
Application Programming Interfaces	58
Summary	59
<b>3 Overview of SQL Server</b>	<b>61</b>
Programs Installed with SQL Server	62
Books Online	63
Client Network Utility	66
Server Network Utility	71
Service Manager	72
Profiler	73
Query Analyzer	74
OSQL	76
Bulk Copy Program (BCP)	80
Enterprise Manager	80
Parts of a Database	82
Tables	83
Views	84
Stored Procedures	85
Diagrams	86
Database User Accounts	87
Database Roles	88
User-Defined Datatypes	89
User-Defined Functions	91
Rules and Constraints	92
Defaults	92
Full-Text Catalogs	93
SQL Server Storage Concepts	97
Pages	99
Extents	100
Summary	101
<b>4 Database Design and Normalization</b>	<b>105</b>
What Is Normalization?	106
Key Concepts of Normalization	106
First Normal Form	114
Defining First Normal Form	115

Identifying a Primary Key .....	116
Second Normal Form .....	118
Foreign Keys and Relations .....	119
Third Normal Form .....	120
Boyce-Codd Normal Form .....	121
Advanced Normalization .....	123
Fourth Normal Form .....	123
Fifth Normal Form .....	125
Denormalization .....	125
Making the Trade-offs .....	127
Tools for Normalization in SQL Server .....	128
Identity Columns .....	128
Constraints .....	128
Rules .....	130
Declarative Referential Integrity (DRI) .....	130
Triggers .....	132
Database Diagrams .....	132
Summary .....	133

## PART II • TRANSACT-SQL

<b>5 Transact-SQL Overview and Basics</b> .....	<b>137</b>
What Is Transact-SQL? .....	138
ANSI SQL .....	138
SQL Dialects .....	139
SQL Configuration Options .....	139
T-SQL Syntax and Conventions .....	149
Reading Syntax Diagrams .....	149
Valid Identifiers .....	150
Referring to Objects .....	151
Reserved Words .....	152
Datatypes .....	153
Integers .....	153
Text .....	154
Decimal .....	156
Money .....	156
Floating Point .....	156
Date .....	157
Binary Data .....	157
Miscellaneous .....	158
Synonyms for Datatypes .....	159
Operators .....	160
Available Operators .....	160
Operator Precedence and Grouping .....	161
Wild Cards .....	162
Variables .....	162
System Global Variables .....	163

Local Variables .....	165
Functions .....	166
Generating GUIDs .....	167
String Functions .....	168
Date and Time Functions .....	169
Mathematical Functions .....	171
System and Metadata Functions .....	172
User-Defined Functions .....	173
Executing T-SQL .....	175
Using Query Analyzer .....	175
Using SQL Server Enterprise Manager .....	179
Using OSQL .....	183
Summary .....	186
<b>6 SELECT Queries</b> .....	<b>187</b>
Using Basic SELECT Queries .....	188
Limiting Records with the WHERE Clause .....	190
Using JOINS .....	195
INNER JOINS .....	196
OUTER JOINS .....	198
JOINing Multiple Tables .....	200
Turning Result Sets into Reports .....	201
Using ORDER BY .....	201
Using GROUP BY and HAVING .....	204
Using ROLLUP .....	208
Using CUBE and GROUPING .....	209
Using COMPUTE and COMPUTE BY .....	212
Using TOP N .....	214
Full-Text Searching .....	217
Installing and Configuring Full-Text Search .....	218
Performing Full-Text Searches .....	225
Administering Full-Text Search .....	229
Linked Server Queries .....	231
Summary .....	232
<b>7 Action Queries</b> .....	<b>235</b>
What Are Action Queries? .....	236
Delete Queries .....	237
Syntax of DELETE .....	237
Limitations of DELETE .....	238
Examples of DELETE .....	239
Syntax of TRUNCATE TABLE .....	240
Limitations of TRUNCATE TABLE .....	241
Example of TRUNCATE TABLE .....	241
Update Queries .....	242
Syntax of UPDATE .....	242
Limitations of UPDATE .....	243
Examples of UPDATE .....	244

The WRITETEXT Statement .....	253
Recovery Models .....	255
The UPDATETEXT Statement .....	255
Insert Queries .....	257
Syntax of INSERT .....	257
Limitations of INSERT .....	258
Examples of INSERT .....	259
Syntax of SELECT INTO .....	260
Limitations of SELECT INTO .....	261
Examples of SELECT INTO .....	261
Summary .....	263
<b>8 Advanced Transact-SQL .....</b>	<b>265</b>
Transactions .....	266
What Are Transactions? .....	266
The ACID Properties .....	267
Using Transactions .....	268
Distributed Transactions .....	274
Transaction Tips .....	275
Rowset Functions .....	276
CONTAINSTABLE .....	276
FREETEXTTABLE .....	279
OPENQUERY .....	281
OPENROWSET .....	282
OPENDATASOURCE .....	283
Cursors .....	284
What Are Cursors? .....	284
DECLARE CURSOR .....	285
OPEN and @@CURSOR_ROWS .....	287
FETCH and @@FETCH_STATUS .....	288
CLOSE .....	291
DEALLOCATE .....	291
A Cursor Example .....	292
Using the System Tables and Information Schema Views .....	295
What's in the System Tables? .....	295
Sample System Table Queries .....	298
Information Schema Views .....	300
Optimizer Hints .....	301
Table Hints .....	302
Join Hints .....	302
Query Hints .....	303
Summary .....	303
<b>PART III • DIGGING INTO SQL SERVER</b>	
<b>9 Using SQL Server Enterprise Manager .....</b>	<b>307</b>
The Microsoft Management Console (MMC) .....	308
The SQL Server Enterprise Manager Tree .....	310

SQL Server Groups .....	310
Creating a Group .....	311
Managing Servers in a Group .....	312
Server Icons .....	316
The Databases Folder .....	317
The Data Transformation Services Folder .....	331
The Management Folder .....	334
The Replication Folders .....	340
The Security Folder .....	342
The Support Services Folder .....	345
The Meta Data Services Folder .....	346
SQL Server Wizards .....	346
Database Wizards .....	347
Data Transformation Services Wizards .....	351
Management Wizards .....	353
Replication Wizards .....	360
Customizing MMC .....	364
Creating Custom Consoles .....	364
Adding Additional Snap-Ins .....	364
Modifying the Tools Menu .....	365
Adding Other Content .....	366
Summary .....	367
<b>10 Databases</b> .....	<b>369</b>
Database Basics .....	370
Planning for Capacity .....	373
Creating Databases .....	374
Using the Create Database Wizard .....	375
Creating Databases with Enterprise Manager .....	379
Creating Databases with Transact-SQL .....	383
Modifying Databases .....	386
Setting Database Options .....	387
Changing Database Size .....	394
Summary .....	403
<b>11 Tables</b> .....	<b>405</b>
Planning Tables .....	406
Creating Tables .....	412
Restricting the Data .....	417
Enforcing Domain Integrity .....	418
Enforcing Entity Integrity .....	426
Enforcing Referential Integrity .....	431
Using Database Diagrams .....	440
Summary .....	445
<b>12 Indexing</b> .....	<b>447</b>
Index Architecture .....	448
Understanding Heaps .....	449

Understanding Clustered Indexes .....	452
Understanding Nonclustered Indexes .....	457
Creating Indexes .....	462
Creating Indexes with Enterprise Manager .....	462
Creating Indexes with the Index Tuning Wizard .....	463
Summary .....	469
<b>13 Views</b> .....	<b>471</b>
Using Views to Partition Tables .....	472
Creating a View with the Create View Wizard .....	473
Modifying a View in the View Designer .....	478
Using Aliases in a View .....	480
Organizing the Result Set .....	482
Using Views to Join Tables .....	484
JOINing Two Tables in a View .....	485
JOINing Multiple Tables in a View .....	488
Modifying Data through a View .....	491
Working with Indexed Views .....	495
Considerations .....	496
Creating Indexed Views .....	498
Enhancing Indexed Views with Inline User-Defined Functions .....	500
Using Distributed Partitioned Views .....	501
Using Information Schema Views .....	502
Summary .....	505
<b>14 Stored Procedures</b> .....	<b>507</b>
Understanding Stored Procedures .....	508
Understanding User-Defined Stored Procedures .....	509
Using System and Extended Stored Procedures .....	527
Summary .....	535
<b>15 Using Triggers</b> .....	<b>537</b>
Understanding Triggers .....	538
Working with INSERT Triggers .....	540
Working with DELETE Triggers .....	545
Working with UPDATE Triggers .....	548
Working with INSTEAD OF Triggers .....	556
Advanced Considerations .....	560
Combining Trigger Types .....	560
Reporting Errors with RAISERROR() .....	563
Recursive Triggers .....	566
Summary .....	569
 <b>PART IV • ADMINISTERING SQL SERVER</b>	
<b>16 Basic Administrative Tasks</b> .....	<b>573</b>
Backing Up Your Data .....	574
How Backups Work .....	575

Creating a Backup Device .....	576
Performing a Full Backup .....	577
Performing Differential Backups .....	581
Performing Transaction Log Backups .....	583
Performing Filegroup Backups .....	585
Performing Parallel Striped Backups .....	591
Restoring Databases .....	596
Standard Restores .....	596
Point-in-Time Restores .....	599
Partial Restores .....	602
Devising a Backup Strategy .....	604
Full Backups Only .....	604
Full with Differential Backups .....	605
Full with Transaction Log Backups .....	606
Full, Differential, and Transaction Log Backups .....	607
Filegroup Backups .....	607
Maintaining Indexes .....	608
Using DBCC SHOWCONTIG .....	609
Reconstructing Indexes .....	611
Reading the Logs .....	613
Copying Databases .....	614
Summary .....	620
<b>17 Automating Administration</b> .....	<b>623</b>
Automation Basics .....	625
Configuring Mail Support .....	627
Creating Operators .....	629
Creating Jobs .....	631
Creating Local Server Jobs .....	632
Creating Multiserver Jobs .....	639
Creating Alerts .....	647
Event Alerts Based on Standard Errors .....	649
Event Alerts Based on Custom Errors .....	653
Performance Alerts .....	658
Using the Database Maintenance Plan Wizard .....	660
Working with SQL Mail .....	671
Summary .....	673
<b>18 Security and SQL Server 2000</b> .....	<b>675</b>
Understanding Security Modes .....	676
Windows NT/2000 Authentication Mode .....	676
Mixed Mode .....	678
Setting the Authentication Mode .....	679
SQL Server Logins .....	680
Standard Logins .....	681
Windows NT/2000 Logins .....	684
Items Common to All Logins .....	688

Fixed Server Roles .....	688
Creating Database User Accounts .....	691
Understanding Permissions .....	693
Statement Permissions .....	693
Object Permissions .....	696
Database Roles .....	698
Fixed Database Roles .....	698
Custom Database Roles .....	700
Application Roles .....	702
Permission States .....	704
Grant .....	704
Revoke .....	704
Deny .....	705
Ownership Chains .....	708
N-Tier Security .....	710
Monitoring SQL Server Logins with SQL Profiler .....	712
Creating a Security Plan .....	717
Summary .....	719

## PART V • DEVELOPMENT WITH SQL SERVER

<b>19 ADO and SQL Server</b> .....	<b>723</b>
The ADO Object Model .....	724
Understanding Objects .....	725
Connection and Error .....	726
Command and Parameter .....	726
Recordset and Field .....	727
Properties .....	728
Record and Stream .....	728
Understanding Cursors .....	728
CursorLocation .....	729
CursorType .....	729
LockType .....	730
Graceful Degradation .....	730
Sample ADO Code .....	732
Creating a Connection .....	733
Executing a SQL Statement .....	736
Recordset Operations .....	743
Other ADO Libraries .....	756
Summary .....	760
<b>20 SQL-DMO</b> .....	<b>761</b>
What Is SQL-DMO? .....	762
SQL-DMO Object Model .....	763
The Full Object Hierarchy .....	763
The SQLServer Object .....	769

The Configuration Object .....	778
The Database Object .....	778
The DBOption Object .....	779
The StoredProcedure Object .....	780
The Table Object .....	782
The Column Object .....	783
The Alert Object .....	785
Sample SQL-DMO Code .....	785
Creating and Connecting a SQLServer Object .....	786
Creating a Database .....	788
Changing a Configuration Option .....	790
Creating a Table .....	790
Dropping a Table .....	792
Creating and Executing a Stored Procedure .....	793
Creating an Alert .....	794
Summary .....	795
<b>21 SQL Namespace</b> .....	<b>797</b>
What Is SQL-NS? .....	798
SQL-NS Object Model .....	798
SQLNamespace .....	799
SQLNamespaceObject .....	802
SQLNamespaceCommands .....	803
SQLNamespaceCommand .....	804
Sample SQL-NS Code .....	804
Creating and Initializing the Root Object .....	804
Navigating the Hierarchy .....	805
Enumerating Commands .....	807
Executing a Command .....	809
A Sample SQL-NS Application .....	810
Using SQL-NS with SQL-DMO .....	814
Summary .....	816
<b>22 Data Transformation Services</b> .....	<b>817</b>
What Is DTS? .....	818
DTS in the User Interface .....	819
The Wizards .....	819
The Designer .....	832
Programming DTS .....	843
A Programming Example .....	844
The DTS Object Hierarchy .....	854
Summary .....	856
<b>23 The Web Assistant Wizard</b> .....	<b>857</b>
Why Put Data on the Web? .....	858
Publishing Data with the Web Assistant Wizard .....	860
The Welcome Screen .....	861

Selecting a Database	.862
Creating a New Job	.862
Selecting the Data to Publish	.863
Selecting Rows to Publish	.865
Scheduling the Job	.867
Determining Where to Place the Web Page	.869
Asking for Formatting Help	.869
Specifying Titles	.870
Formatting the Table	.871
Linking to Other Sites	.872
Limiting the Rows Displayed	.873
The Final Page	.874
The Steps to Create the Northwind Employees Web Page	.875
Viewing the Page	.876
Summary	.880

## **24 Integrating SQL Server with Internet Information Server** **881**

What Is Internet Information Server?	.882
Installing IIS	.883
A Few Words about Security	.883
Active Server Pages	.884
What Are Active Server Pages?	.884
Creating ASP Pages with ADO	.889
Remote Data Service	.900
Examining RDS	.900
Using a Disconnected Recordset	.902
Using the RDS.DataControl Object	.905
Using the RDS.DataSpace Object	.906
Invoking Business Objects on the Server	.908
Returning Results as XML	.910
What Is XML?	.910
XML in SELECT Statements	.911
Querying SQL Server through HTTP	.912
Allowing HTTP Queries	.912
Querying Directly in URL	.914
Using Templates in Files	.918
Summary	.919

## **PART VI • ADVANCED TOPICS**

### **25 Locking** **923**

Why Locking?	.924
Lost Updates	.924
Uncommitted Dependencies	.925
Inconsistent Analysis	.925
Phantom Reads	.925

Optimistic and Pessimistic Concurrency	926
Isolation Levels	926
Locking Mechanics	927
Locking Granularity	927
Locking Modes	928
Lock Escalation	930
Dynamic Locking	930
Viewing Current Locks	931
Using sp_lock	931
Using SQL Server Enterprise Manager	934
Deadlocks	936
Customizing Locking Behavior	939
Setting the Lock Timeout	939
Setting the Transaction Isolation Level	940
Locking Hints	941
Application Locks	942
sp_getapplock	943
sp_releaseapplock	944
Summary	944
<b>26 Monitoring and Optimizing SQL Server 2000</b>	<b>945</b>
Using Performance Monitor	946
Using Query Analyzer	953
Monitoring with SQL Profiler	958
Filtering the Trace Data	964
Replaying a Trace File	966
Using the Index Tuning Wizard	967
Tips and Techniques	971
Setting a Measurement Baseline	971
Data Archiving and Trend Tracking	972
Optimization Techniques	972
Queries and Stored Procedures	973
Tempdb	973
Query Governor	973
Setting Trace Flags	974
Max Async I/O	975
LazyWriter	975
RAID	976
Adding Memory	976
Manually Configuring Memory Use	976
Summary	977
<b>27 Replication</b>	<b>979</b>
Understanding Replication	980
The Publisher/Subscriber Metaphor	981
Replication Types	982
Replication Agents	985
Replication Models	987

Setting Up Replication .....	990
Creating and Subscribing to a Transactional Publication .....	999
Creating and Subscribing to a Snapshot Publication .....	1017
Creating and Subscribing to a Merge Publication .....	1028
Using Replication Monitor .....	1040
Summary .....	1046
<b>28 Analysis Services</b> .....	<b>1047</b>
Understanding OLAP .....	1048
Analysis Services Terminology .....	1049
Cubes and Their Parts .....	1049
MOLAP, ROLAP, and HOLAP .....	1050
Partitions and Virtual Cubes .....	1051
Using Analysis Services .....	1051
Creating a Sample Database .....	1052
Creating a Cube .....	1052
Setting Storage Options .....	1059
Processing the Cube .....	1061
Browsing the Cube .....	1062
Advanced Capabilities of Analysis Services .....	1063
Custom Actions .....	1064
Data Mining .....	1067
OLAP from the Client .....	1071
CUBE and ROLLUP Queries .....	1072
Using Excel to Retrieve Data from Analysis Services .....	1075
Summary .....	1077
<b>29 Microsoft English Query</b> .....	<b>1079</b>
What Is English Query? .....	1080
English Query Components .....	1081
English Query Models .....	1081
Question Builder .....	1082
The English Query Runtime .....	1083
Creating an English Query Application .....	1084
Preparing Your Database for English Query .....	1084
Creating a Project .....	1090
Adding Synonyms .....	1094
Adding Relationships .....	1095
Testing the Model .....	1097
Deploying an English Query Application .....	1098
Building the Application .....	1099
Deploying to the Web .....	1099
Summary .....	1100
<b>30 Troubleshooting</b> .....	<b>1101</b>
General Troubleshooting .....	1102
Troubleshooting Setup .....	1105

Troubleshooting Databases .....	1106
Using DBCC .....	1106
Resetting Suspect Databases .....	1108
Troubleshooting Backup and Restores .....	1109
Troubleshooting Client Connectivity .....	1110
Troubleshooting Replication .....	1112
Security and Replication .....	1113
Subscribers Are Not Getting Data .....	1113
Recovering Servers .....	1114
Troubleshooting Jobs and Alerts .....	1115
Troubleshooting Mail Connectivity .....	1116
Troubleshooting the Services (MSSQLServer and SQLServerAgent) .....	1117
Summary .....	1117

---

## **Appendix A Transact-SQL Reference** **1119**

Creating a Database .....	1120
Cursor Statements .....	1120
Database Options .....	1121
Deleting Records .....	1122
Inserting Records .....	1123
Retrieving Records .....	1123
Rowsets .....	1124
Transactions .....	1125
Updating Records .....	1126
User-Defined Functions .....	1127

---

## **Appendix B Installing Microsoft SQL Server 2000** **1129**

The Prerequisites .....	1130
The Setup Wizard .....	1131
Choosing Service Accounts .....	1136
Choosing a Collation Setting .....	1138
Choosing Network Libraries .....	1140
The Client Software .....	1142
Unattended Setup .....	1142
Upgrading from a Previous Version .....	1143
The Upgrade Wizard .....	1143
Side-by-Side Upgrade Using DTS .....	1149
Installing SQL Server Yourself .....	1150
Installing a Second Instance .....	1151
The Desktop Database Engine .....	1153
Troubleshooting Installation .....	1153
Service Packs .....	1154

<i>Index</i> .....	<b>1155</b>
--------------------	-------------