

Contents

Introduction	xxvii
Chapter 1: Introducing SQL Server 2008	1
A Condensed History of SQL Server	1
In the Beginning	1
The Evolution of a Database	1
Microsoft Goes It Alone	2
BI for the Masses	2
2008 . . . and Beyond!	3
What Is SQL Server 2008?	3
Database Engine	3
Integration Services	5
Analysis Services	5
Reporting Services	6
Service Broker	6
Data Tier Web Services	6
Replication Services	6
Multiple Instances	6
Database Mail	7
A Note about Notification Services	7
SQL Server 2008 Editions	7
SQL Server Compact 3.5 SP1	8
SQL Server 2008 Express Edition	9
SQL Server 2008 Web Edition	9
SQL Server 2008 Workgroup Edition	10
SQL Server 2008 Standard Edition	10
SQL Server 2008 Enterprise Edition	10
SQL Server 2008 Architecture	11
SQL Server 2008 Communication	11
SQL Server 2008 Services	13
SQL Server 2008 Database Objects	15
Server	15
Database	16
Schema	16
Object Names	16

Contents

SQL Server 2008 Databases	18
System Databases	18
User Databases	20
Distribution Databases	20
SQL Server 2008 Database Storage	20
Data Files and Filegroups	21
Log Files	21
SQL Server Security	22
Windows Authentication Mode	22
SQL Server and Windows Authentication Mode (Mixed Mode)	22
Summary	23
Chapter 2: Installing SQL Server 2008	25
SQL Server Installation Planning	25
Hardware Considerations	26
Processor Considerations	27
Memory Considerations	27
Storage Considerations	28
Virtualization Considerations	32
Software Prerequisites	32
SQL Server Installation Center	34
Setup Support Rules (for Setup Support Files)	34
Setup Support Rules (for Installation)	36
Feature Selection	37
Installing to a Windows Cluster	45
Configuring the Virtual Server Name	46
Sample Databases	49
Installation Review	50
Summary	50
Chapter 3: SQL Server 2008 Tools	51
SQL Server Management Studio	52
Tool Windows	53
Toolbars	65
SQL Server Management Studio Configuration	82
Log File Viewer	90
SQL Server Business Intelligence Development Studio	91
SQL Server Profiler	93
SQL Server Trace	93
Trace Properties	94

Contents

Database Engine Tuning Advisor	97
General Tab	98
Tuning Options Tab	99
SQL Server Configuration Manager	100
Reporting Services Configuration Manager	100
Command-Line Tools	102
SQLCMD	102
Bulk Copy Program (BCP)	104
PowerShell	106
Summary	109
Chapter 4: SQL Server 2008 Storage Architecture	111
The Resource Database	112
The sys Schema	112
SQL Server Database Physical Structure	113
Physical Storage Data Types	114
FILESTREAM Data	118
Other Data Types	119
SQL Server Database Files	119
Data Files	120
Transaction Log	123
Summary	127
Chapter 5: SQL Server 2008 Databases	129
System Databases	129
User Databases	129
Database Planning	129
Capacity Planning	130
Creating Databases	131
Getting Started	132
Creating a New Database	132
Schemas	152
Tables	155
Indexes	165
Enforcing Data Integrity	181
Database Diagrams	190
Views	191
System Views	191
Synonyms	192
Programming Objects	193

Contents

Stored Procedures	193
Functions	193
Triggers	194
Assemblies	196
Types	196
Defaults	199
Rules	200
Summary	200
Chapter 6: SQL Server 2008 Security	201
SQL Server Authentication Modes	201
Changing the Authentication Mode from Management Studio	202
Using the <code>xp_instance_regwrite</code> Extended Stored Procedure	202
Principals	204
Logins	205
Credentials	210
Server Roles	212
Database Users	214
Fixed Database Roles	219
Permissions	225
Server Permissions	229
Database Scope Permissions	235
Schema Scope Permissions	238
Using SQL Server Management Studio for Managing Permissions	240
SQL Server Encryption	243
Extensible Key Management (EKM)	246
Encryption Tools	246
Best Practices	257
Summary	259
Chapter 7: Configuring SQL Server Network Communication	261
SQL Server 2008 Network Protocols	261
Shared Memory	262
Named Pipes	262
TCP/IP	262
Virtual Interface Adapter (VIA)	264
SQL Native Client Configuration	264
SQL Server Endpoints	265
Default TSQL Endpoints	266
TSQL TCP Endpoints	269
Database Mirroring Endpoints	270

Contents

SOAP Endpoints	272
Service Broker Endpoints	278
Securing Endpoints	278
Summary	284
Chapter 8: Automating Administrative Tasks	285
Policy-Based Management	286
Targets	286
Facets	287
Conditions	287
Policies	288
Policy Categories	289
Effective Policies	289
Central Management Servers	292
Database Mail	294
How It Works	294
How to Configure Database Mail	295
Configuring Database Mail Options	300
Managing Profiles and Accounts	301
Guidelines for Deleting Mail Objects	309
Sending Mail	310
Managing Messages	314
Event Notifications	315
SQL Server Agent	316
Configuring the SQL Server Agent Service	316
SQL Server Agent Security	321
Creating Jobs	323
Creating Schedules	335
Creating Operators	342
Creating Alerts	345
Creating Proxies	353
Multi-Server Jobs	356
Maintenance Plans	358
Maintenance Plan Wizard	358
Maintenance Plan Designer	358
Best Practices	360
Summary	361
Chapter 9: Disaster Prevention and Recovery	363
Chapter Preparation	363
Database Recovery Models	365

Contents

Full Recovery Model	365
Bulk-Logged Recovery Model	366
Simple Recovery Model	366
SQL Server 2008 Database Backup	367
Backup Devices	367
SQL Server 2008 Backup Types	369
Full Backup	369
Differential Backup	370
File/Filegroup Backup	370
Transaction Log Backup	371
Partial Backup	371
Copy Only Backup	372
Backup Options	372
Backup Stripe	372
Mirrored Backup	372
Compressed Backup	373
WITH Options	373
Backup Strategies	375
Full Backup Only	375
Full Backup with Differential	376
Full Backup with Transaction Log	376
Full and Differential Backup with Transaction Log	377
File and Filegroup Backup	377
Filegroup with Differential	378
Partial Backup	378
Backup Summary	378
Restoring Databases	379
Restore Process	379
Delaying Recovery	380
RESTORE Command	380
RESTORE DATABASE database_name	381
FROM Options	382
WITH Clause	382
Database Restore Preparation	385
Restoring User Databases	387
Recovering System Databases	393
Database Restore Summary	395
Database Snapshots	396
Database Snapshot Limitations	398
Disaster Recovery and Database Snapshots	398
Summary	400

Contents

Chapter 10: Monitoring SQL Server	401
Performance Monitoring	401
Performance Monitoring Strategy	402
Creating a Performance Baseline	403
Tools and Techniques for Monitoring	409
Log File Viewer	410
Activity Monitor	411
System Stored Procedures	413
Using Profiler	420
Monitoring Files	427
Auditing	430
SQL Server Audit	430
Login Auditing	438
C2 Audit Mode	440
Security Audit Event Category	441
SQL Trace	442
Tracking Changes	444
Change Data Capture	444
Change Tracking	452
Data Collection	455
Terminology	456
Architecture and Processing	456
Configuring Data Collection	458
Data Collector Types	461
Data Collection Sets	461
Error Handling	465
Reporting	466
Management Data Warehouse	466
Monitoring Database Modifications	468
Data Definition Language (DDL) Triggers	469
Summary	472
Chapter 11: Optimizing SQL Server	473
Hardware Optimization	474
CPU Selection	475
Hyperthreading	475
Memory	475
Storage Options	476
Network Design	477
Virtualizing SQL Server	478

Contents

Design Considerations	478
Database Recovery Model	479
Designing Efficient Tables	480
Declarative Referential Integrity (DRI)	485
Constraints versus Triggers	488
Deciding What to Index	488
Indexed Views and Filtered Indexes	494
Minimizing Blocking	497
Hidden Dangers of Time-Outs	498
Query Optimization	499
Execution Plans	500
Updating Statistics	504
Managing Indexes	504
Query Optimizer Hints	510
Plan Guides	512
Database Engine Tuning Advisor	517
T-SQL Optimization Tips	526
Limiting Result Sets	527
ANSI-Style Join Syntax	530
Dealing with Null Values	531
Alternatives to Cursors	533
Merge Joins	534
Grouping Sets	536
Distinct Aggregation	537
How Many Records Are in That Table?	538
Temp Tables versus Table Variables	539
Resource Governor	540
Configuring the Resource Governor	541
Monitoring the Resource Governor	545
Summary	551
Chapter 12: SQL Server High Availability	553
Introduction to High Availability	553
Failover Clustering	554
Windows Clustering — A Quick Primer	555
Clustering Components	556
Active/Passive Clustering	556
Active/Active Clustering	557
Considering Clustering	558
Log Shipping	558
Preparing for Log Shipping	558
Configuring Log Shipping with SQL Server Management Studio	558

Contents

Configuring Log Shipping with Transact-SQL	563
Configuring Failover	571
Database Mirroring	572
Client Redirection	574
Database Mirroring Modes	574
Configuring Database Mirroring	576
Monitoring Database Mirroring	581
Managing Database Mirroring	584
Summary	587
Chapter 13: Introduction to Replication	589
Replication Overview	589
SQL Server Replication Agents	590
Snapshot Agent	591
Log Reader Agent	591
Distribution Agent	591
Merge Agent	591
Queue Reader Agent	591
SQL Server Replication Types	591
Distributed Transactions	592
Transactional Replication	593
Snapshot Replication	594
Merge Replication	594
Oracle Replication	595
SQL Server Replication Models	595
Single Publisher/Multiple Subscribers	595
Multiple Publishers/Single Subscriber	596
Multiple Publishers/Multiple Subscribers	596
Replication Tools	596
Filtering	596
Replicating Partitioned Tables and Indexes	598
New Publication Wizard	598
New Subscription Wizard	601
Replication Monitor	602
Summary	605
Chapter 14: Introduction to the Common Language Runtime	607
Databases and Programming	607
Is Transact-SQL Going Away?	608
.NET and the CLR	609

Contents

Assemblies	609
Namespaces	609
Classes	609
Methods	610
SQL Server CLR Objects	610
Enabling SQL CLR	611
Creating a SQL CLR Assembly	611
Adding an Assembly	617
Compatible Data Types	618
User-Defined Functions	619
Stored Procedures	621
Triggers	622
User-Defined Types	623
Aggregates	627
Deployment with Visual Studio	629
Programming Support	632
Threading	633
Impersonation	633
Security Options	633
.NET Security	634
Securing SQL CLR	634
SQL Server CLR Permission Sets	634
Summary	637
Chapter 15: An Administrator's Guide to Business Intelligence	639
Understanding BI	639
Performance Management	640
Business Intelligence Components	640
Data Goes In, Data Comes Out	640
Analyze This!	641
Did You Get the Memo about Cover Pages?	642
Beyond SQL	642
The BI Side of SharePoint	642
ProClarity and PerformancePoint Server	643
So Many Tools, So Little Time	644
Summary	644
Chapter 16: Introduction to SQL Server Integration Services	645
About SSIS	645
Integration Services	646
Integration Services Object Model	647

Contents

Integration Services Run Time	648
Integration Services Data Flow	648
Importing and Exporting Data	649
Using the Import Wizard	649
Using the Export Wizard	656
Transforming Data with SSIS	658
Understanding the Development Environment	659
Package Elements	661
Creating a Simple Package	670
Summary	675
<u>Chapter 17: Introduction to SQL Server Analysis Services</u>	<u>677</u>
Understanding OLAP	677
OLAP Terminology	678
Working with SSAS	679
Creating the Project	679
Defining a Data Source	679
Creating the Data Source View	682
Defining Dimensions	684
Creating the Cube	684
Create Hierarchies	686
Deploying the Project	695
Managing SSAS	696
Browsing the Cube	697
SSAS Security	698
Advanced SSAS Concepts	702
MDX	703
Data Mining	704
Summary	705
<u>Chapter 18: Introduction to SQL Server Reporting Services</u>	<u>707</u>
SQL Server Reporting Services Overview	707
Components and Tools	708
Installation and Configuration	717
Hardware and Software Requirements	717
Security Considerations	718
Installation Mode	719
Multiple Instances and Versions	719
Creating Reports	720
Report Designer	720
Report Builder	721
	xxv

Contents

Report Delivery	729
Caching	729
Snapshots	729
Subscriptions	730
Summary	731
Chapter 19: Introduction to Service Broker	733
Service-Oriented Architecture	733
Service Broker Overview	734
Service Broker Elements	734
Conversations	734
Contracts	737
Queues	737
Services	737
Routes	737
Security Considerations for Service Broker	738
Dialog Security	738
Transport Security	739
Creating a Sample Application	739
Creating and Preparing the Database	740
Creating the Service Broker Objects	741
Creating Objects for the TicketInputService	744
Creating Objects for the TicketNotifyService	746
Testing the Application	749
Managing Service Broker with SSMS	753
Summary	753
Index	755