SYBEX Book Index

MCSE: SQL Server™ 2000 Design Study Guide

Marc Israel
J. Steven Jones

Index

Copyright © 2001 SYBEX Inc., 1151 Marina Village Parkway, Alameda, CA 94501. World rights reserved. No part of this publication may be stored in a retrieval system, transmitted, or reproduced in any way, including but not limited to photocopy, photograph, magnetic or other record, without the prior agreement and written permission of the publisher.

ISBN: 0-7821-2942-0

SYBEX and the SYBEX logo are either registered trademarks or trademarks of SYBEX Inc. in the USA and other countries.

TRADEMARKS: Sybex has attempted throughout this book to distinguish proprietary trademarks from descriptive terms by following the capitalization style used by the manufacturer. Copyrights and trademarks of all products and services listed or described herein are property of their respective owners and companies. All rules and laws pertaining to said copyrights and trademarks are inferred.

This document may contain images, text, trademarks, logos, and/or other material owned by third parties. All rights reserved. Such material may not be copied, distributed, transmitted, or stored without the express, prior, written consent of the owner.

The author and publisher have made their best efforts to prepare this book, and the content is based upon final release software whenever possible. Portions of the manuscript may be based upon pre-release versions supplied by software manufacturers. The author and the publisher make no representation or warranties of any kind with regard to the completeness or accuracy of the contents herein and accept no liability of any kind including but not limited to performance, merchantability, fitness for any particular purpose, or any losses or damages of any kind caused or alleged to be caused directly or indirectly from this book.

SYBEX Inc. 1151 Marina Village Pkwy. Alameda, CA 94501 USA Phone: 510-523-8233

www.sybex.com

Index

Note to the reader: Throughout this index **boldfaced** page numbers indicate primary discussions of a topic. *Italicized* page numbers indicate illustrations.

Symbols

@@ERROR system function, 393–394 @@IDENTITY global variable, 158–160 .LDF log files, 67 .MDF primary data files, 67 .NDF secondary data files, 67

Numbers

1NF (First Normal Form), 32–35, 32, 33, 34 2NF (Second Normal Form), 35–36, 36 3NF (Third Normal Form), 36–39, 38 4NF (Fourth Normal Form), 39–40 5NF (Fifth Normal Form), 40

Α

access to databases, 659–664
adding new users, 660–662, 660, 661, 662
adding roles and users, 663–664
basics, 659–660
user-defined roles, 662–663
accessing data. See data, accessing accessing servers. See under SQL Server 2000
ACID properties, 396
AFTER triggers, 407–408
aggregates
aggregate operators, 464–468
exercise using, 468–469
aliases
ease in reading code and, 458
specifying, 450–451

allocation data allocation, 99-103, 99 extent allocation, 96-98 tracking, 103-107, 104 alternate keys, 16 ANSI NULL default option, 155 applications application access and design, 129 application roles, 664-666 Decision Support System (DSS), 129 OnLine Transaction Processing (OLTP), 129 ARITHABORT, 328 artificial keys, 17 atomic columns, 29 attributes, See also keys datatype attributes, 23-24 defined, 6, 7 defining, 7-9 autoparametization, 745

В

B, meaning of in SQL Server, 291
B-Trees, 199
back up issues, and filegroups, 127
Balanced Trees, 199
batch optimization, 702–703
batches defined, 382–383
BCNF (Boyce/Codd Normal Form), 39
BCP (bulk copy program), 588–607, See also bulk copy
BCP syntax, 589–594
BCP utility, 600–601
format files, 594–600
binary attributes datatypes, 23–24

composite indexes	extracting in XML format, 507
creating, 325–326	functions for transforming, 476–479
described, 296	masking complexity with views, 361
COMPUTE clause, 467–468	modifying using XML, 559-568
conceptual design	modifying rows with OPENXML, 564-567
aspects of, 28	using OPENXML, 559–563
importance of, 3	placement and database performance, 129-130
vs. relational model, 5	retrieving using views, 368–369
connections, 609–610	updating
constraints, 659-664, See also foreign keys	using cursors, 556–558
default constraints, 228–231	using views, 368–369
defining at table creation, 228–230, 230	data access, analyzing and optimizing, 698–767
defining for existing tables, 230–231	analyzing queries, 703–716
unique constraints, 246–252	execution plan analysis, 709–714
defining at table creation, 247–251, 249	exercise in, 714–716
defining at table modification, 251–252	SET FORCEPLAN, 704
vs. default objects, 233	SET NOEXEC, 704–705
vs. triggers, 25	SET SHOWPLAN_ALL, 705–707
correlated subqueries, 473	SET statements basics, 703–704
Create Database statement	SET STATISTICS IO, 708
options, 73–94	SET STATISTICS 10, 708 SET STATISTICS PROFILE, 709
	SET STATISTICS FROTILE, 709
automatic shrinking, 80–81	
collation, 79–80	SETSHOWPLAN_TEXT, 707–708
filenames, 73–74	exam essentials, 757–758
manual shrinking, 82–86, 82, 85	key terms, 757
size and growth, 74–79, 77, 78	optimizing queries, 717–732
script, 68	changing an index, 723–726, 724, 726
CREATE INDEX statement, 320–322	indexes and, 717–721
creation scripts, and Generate SQL Scripts	limiting the result set, 721–723, 722, 723
utility, 69	query hints and, 726–731
cross joins, 462	optimizing stored procedures and triggers,
crow's feet, 12, 12	744–746
CUBE and ROLLUP, 466–467	Profiler, 731–744
cursors, 480–489	basics, 731–732, 732
basics, 480	creating traces using, 738–739, 739
cursor declarations, 484–488 , <i>555–556</i>	functions and use, 733-738, 735, 736, 737
modifying data inside, 555-558	Index Tuning Wizard, 741–744
retrieving data from, 488–489	lock detection, 740–741
using, 481–484	replaying saved trace files, 739–740
	query optimizer, 699–703
	basics, 699-700
D	batch optimization, 702–703
	single statement optimization, 700–702
data, See also datatypes	review questions and answers, 758–767
allocation, 99–103, 99	stored procedure debugger, 746–755
allocation tracking, 103–107, 104	exercise in debugging, 749–755, 752,
binary data, isolating, 126	753, 754
, , , -	

using, 746–749, 748	access through URLs using template files,
summary, 755–756	508–511
data, accessing, 442–532	access through URLs using XPATH, 514
cursors, 480–489	access through URLs using XSL,
declarations, 484–488	511–513, 513
definition and uses, 480	description, 500–501
retrieving data from, 488–489	exercise in extracting data in XML
using, 481–484	format, 507
data transforming functions, 476–479	using SELECT with, 502–506
distributed queries, 489–500	data files, See also filegroups; files
about, 489–490	databases and
distributed partitioned views, 496-500, 497	adding to, 92, 124
linked servers, 490–494	creating databases and, 66-72, 66
OPENROWSET function, 494–496	removing files, 93
exam essentials, 516–517	defragmenting, 339-341
heterogeneous, 495–496	filenames, and database management,
indexes and, 297–306	73–74, 73
clustered indexes, 299-302, 300, 301	placement
heaps, 297–299, 298, 299	data placement, 129–130
nonclustered indexes, 302–306, 304, 305	default placement, 67
key terms, 518	placement and performance, 127–131
review questions and answers, 519-532	shrinking, 80–90
SELECT statement and, 443–475	automatically, 80–81
aggregate operators, 464–465	files directly, 87–90, 89
COMPUTE clause, 467–468	manually, 82–86, 82, 85
cross joins, 462	with Enterprise Manager, 86–87, 90
CUBE and ROLLUP, 466–467	size and growth options, 74–75
DISTINCT command, 470–471	space management and, 94–107 , 95, 96,
exercise in joining tables, 463–464	99, 104
exercise in using aggregates, 468–469	allocation tracking, 103-107, 104
exercise in using queries, 453–455	data allocation, 99–103
GROUP BY clause, 465	extents, 95–98, 95, 96
HAVING clause, 466	pages, 98–99, 99
inner joins, 456–458	types, 67
limiting returned results, 451–453	vs. log files, 107
ORDER BY clause, 446–447	data, importing and exporting, 588-624
outer joins, 458–461	bulk copy program (BCP), 588–601
scalars, 471–472	BCP syntax, 589–594
single table SELECT, 444–445, 445	BCP utility, 600–601
specifying aliases, 450–451	format files, 594–600
subqueries, 472–475	BULK INSERT, 602–607
UNION command, 470	BULK INSERT syntax, 602–605
WHERE clause, 447-449	using, 606–607
SQL Server 2000 and, 442–443	Data Transformation Services (DTS), 607–617
summary, 515–516	basics, 608–609, 608
XML and, 500–514	connections, 609–610

packages, 608, 612-613	single rows with identity fields, 540–541
tasks, 610–612	single rows with selected columns, 538–539
using, 613–617, 614, 615, 616	inside cursors, 555–558
exam essentials, 618	key terms, 573
key terms, 618	review questions and answers, 574-586
review questions and answers, 619-624, 622	summary, 573
summary, 617–618	UPDATE statement, 544–551
data integrity, 222–286	all rows, 545–546
basics, 222	multiple columns, 548-550
check rules, 234–240	sets of rows, 547–548
check constraints, 235-239	views, 550–551
rules, 239–240	using distributed queries, 568–572
default values, 227–234	using linked servers, 569
basics, 227–228	using OPENROWSET, 570–572, 571, 572
default constraints, 228–231, 230	using OPENXML, 559–568
default objects, 232–234	deleting rows, 566–567
exam essentials, 268	inserting rows, 564–565
foreign key constraints, 252-267, 252	new rowset views, 561–564
cascading foreign key constraints, 260–265,	SP_XML_PREPAREDOCUMENT, 559–561
264, 265	updating rows, 565–566
creating and using exercise, 257–258	Data Read and Write Log process, 70, 70
defining at table creation, 253–260	Data Transformation Services (DTS), 607-617
defining at table modification, 266–267	basics, 608-609, 608
real world scenario, 259	connections, 609–610
implementing, 223–227	packages, 608, 612-613
key terms, 268	tasks, 610–612
primary keys, 240–246	using, 613–617, 614, 615, 616
basics, 240–241	database logical modeling, 2-61
defining at table creation, 241-245, 244	denormalization process, 41–47, 41, 42
defining at table modification, 245-246	adding derived columns, 45-46, 45
review questions and answers, 269-286, 269,	adding redundant columns, 43-45, 44
271, 273, 278, 279	partitioning tables, 46-47, 46
summary, 267	designing database systems, 2-5
types, 22–28	Entity/Relationship (ER) database model, 5-28
domain integrity, 22–24, 222	basics, 5–7
enterprise integrity, 28, 223	defining entities and attributes, 7-10, 9
entity integrity, 24, 223	domain integrity, 22-24
referential integrity, 24–28, 223	enterprise integrity, 28
unique constraints, 246–252	entity integrity, 24
defining at table creation, 247-251, 249	keys, 16–21
defining at table modification, 251-252	referential integrity, 24–28
data, modifying, 534–586	relationships, 10–16, 11, 12, 13, 14, 15, 16
DELETE statement, 551–554	exam essentials, 48-49
exam essentials, 574	key terms, 49
INSERT statement, 535–544	relational models and normalization, 28-40
multiple rows, 542–544	advanced normalization, 39-40
single rows insert, 535–538	

First Normal Form (1NF), 32–35, 32,	recovery model and, 116
33, 34	table of options values, 114-115
relational tables, 29–31	database physical modeling, 64-147
Second Normal Form (2NF), 35-36, 36	creating and managing databases. See data-
Third Normal Form (3NF), 36-39, 38	bases, creating and managing
review questions and answers, 50-61, 50, 52,	exam essentials, 133
55, 56, 58	file placement and performance, 127-131
database objects, creating and maintaining,	filegroups, 120–127
357–440	basics, 120–121, 121
exam essentials, 421–422	creating, 121–125, 122, 123
key terms, 421	maintenance and performance, 125–127
review questions and answers, 422–440, 423,	key terms, 132–133
429, 435	review questions and answers, 133–147
stored procedures, 378–395	summary, 132
creating and altering, 380–384	databases
definition and advantages, 379–380, 380	access, 659–664
error handling, 392–396	adding new users, 660–662, 660, 661, 662
executing, 386–392	adding roles and users, 663–664
using parameters, 384–385	basics, 659–660
summary, 420	user-defined roles, 662–663
transactions, 396–398	adding files and filegroups, 124
triggers, 406–420	altering, 90–94
AFTER, 407–408, 419	monitoring activity with Profiler, 733–734
AFTER INSERT, 419	names, changing, 93–94
changing firing order, 419	options values, 114–115
definition and advantages, 406–407	shrinking, 80–90
DELETE, 410–412, 411	automatically, 80–81
disabling, 419–420	manually, 82–85, 82
INSERT, 409–410	using Enterprise Manager, 85–87, 85
INSTEAD OF, 413–418	size, increasing, 86–87
multiple, 419	databases, creating and managing, 64–120
performance considerations, 418	creating simple databases, 65–72, 65
UPDATE, 412–413, 412	Create Database statement, 68
Web, 419	data and log files, 66–72, 66, 70
user-defined functions (UDFs), 399–405	with Enterprise Manager, 65–66, 65, 76–79
creating and altering, 400–404	77, 78
definition and advantages, 399–400	data files and, 66–72, 66
using, 404–405	database options, 113–120, 113
views, 359–378	compatibility levels, 118–120
creating and altering, 362–367	database options value, 114–115
defined, 360, 360	recovery Model, 116
indexed views, 369–372	managing, 73–94
partitioned views, 372–378, 372	altering databases, 90–94
uses, 361	collation, 79–80
using, 367–369	filenames, 73–74, 73
database options, 113–120, 113	shrinking databases and files, 80–90, 82,
compatibility levels, 118–120	85, 89
default ANSI NULL, 155	size and growth options, 74–75
uciuait 111 101 110 LL, 133	size and growin options, / 1 /3

space management, 94–112	logical design, See also relational models
data files, 94–107, 95, 96, 104	and normalization
log files, 107–113, 109, 110, 111	designing database systems, 2-5
datatypes	dirty pages defined, 72
attributes of, 23–24	disks, and log files, 131
changing in columns, 172	DISTINCT command, 470–471
creating tables and, 154	distributed partitioned views, 496-500, 497
system datatypes in columns, 176–184	distributed queries, 489–500
date and time, 181	about, 489–490
listed, 177–180	distributed partitioned views, 496–500, 497
numeric, 180–181	linked servers, 490–494
special, 182–183	OPENROWSET function, 494–496
strings, 181–182	using to modify data, 568–572
synonyms, 183–184	linked servers, 569
user-defined datatypes in columns, 184–187	OPENROWSET, 570–572, 571, 572
date and time, values in columns, 181	distribution statistics, and indexes, 306–311
DBCC LOG statement, 108–109	domains
DBCC SHOW CONTIG, 335–336	defined, 22
DBCC SHRINKDATABASE, 88–89	domain integrity, 22–24, 222
DBCC SHRINKFILE, options, 87–90	DSS (Decision Support System) application, 129
deadlocks, 635–638	DYNAMIC cursors, 486
Decision Support System (DSS) application, 129	Directions, 100
declarative integrity, 223	
default constraints, 228–231, 230	_
default objects, 232–234	E
default values, 227–234	edge tables, 563
basics, 227–228	ELEMENTS option, 503
default constraints, 228–231, 230	ENCRYPTION option, 364
default objects, 232–234	enterprise integrity, 28, 223
deferred name resolution defined, 383	
defragmenting data files, 339–341	Enterprise Manager
delete rules, 25	altering files, 91–93
DELETE statement, 551–554	adding, 92
DELETE statement, 331–334 DELETE triggers, 410–412, 411	modifying, 91–92
deletes, and fragmentation, 338–339	removing, 93
denormalization process, 41–47, 41, 42	cascading foreign key constraints, creating,
derived columns, adding, 45–46, 45	262–265, 263, 264, 265
	collation and, 164, 165
redundant columns, adding, 43–45, 44	columns
tables, partitioning, 46–47, 46	defining default values, 229–230, 230
derived columns, adding, 45–46, 45	warning on altering, 171
derived tables, 473	data and log files, defining, 67
design	databases
conceptual design, See also Entity/Relationship	adding new users, 660–662, 660, 661, 662
(ER) database model	creating, 65–66, 65, 76–79, 77, 78
aspects of, 28	options, 113–115, 113
importance of, 3	shrinking, 85–87, 85
vs. logical, 5 vs. relational model, 5	datatypes (user-defined), creating and managing, 186–187, 187
ve relational model \$	

filegroups	databases
adding, 124	logical modeling, 48-61
changing default, 123, 123	objects, creating and maintaining, 421–440
creating, 121, 123, 123, 168–169, 168	physical modeling, 133–147
files	indexes, 342–355
adding, modifying and removing, 91-92, 93	locking, 646–652
shrinking, 88–90, 89	security plan, developing, 686–695
locks, viewing, 639–641, 639, 640	tables, creating and maintaining, 204–219
logins, adding, 657–659, 657, 658, 659	tips for taking the exam, xxxi–xxxii
rights, viewing, 670–671, 671	types of questions, xxvi–xxxi, xxviii
tables	Web sites for, xxxvii–xxxix
creating simple, 152, 152, 155–156, 155	exclusive locks, 632
defining placement, 169–170, 170	execution plans
modifying, 171	analyzing query execution, 709–714
unique constraints, defining, 248–249, 249	basics, 709–710
entities	query operations, 710–714
attributes and, 7–10	query optimizer and, 701–714
defined, 6	stored procedures and, 386
entity integrity, 24, 223	exercises, listed, xix–xx
entity integrity, 24, 223	EXPLICIT mode, and XML, 505–506
Entity/Relationship (ER) database model, 5–28, 21	exporting. See data, importing and exporting
basics, 5–7	extended properties
defining entities and attributes, 7–10, 9	metadata and, 195
domain integrity, 22–24	tables and, 190–195, 191, 194
elements of, 6	Extensible Markup Language(XML), See also
enterprise integrity, 28	XML Path Language
entity integrity, 24	modifying data using OPENXML, 559–568
keys, 16–21	deleting rows, 566–567
foreign keys, 19–21, 19	inserting rows, 564–565
primary keys, 16–19, 18, 19	new rowset views, 561–564
referential integrity, 24–28	SP_XML_PREPAREDOCUMENT, 559–561
relationships, 10–16	updating rows, 565–566
many-to-many relationships, 14-15, 15	options, 503
one-to-many relationships, 13, 14, 14	SQL Server 2000 and, 500–514
one-to-one relationships, 13–14, 13	description, 500–501
recursive relationships, 16, 16	extracting data in XML format, 507
ER. See Entity/Relationship (ER) database model	integrating using XPATH, 514
errors, handling with stored procedures, 392–396	integrating using XSL, 511–513, 513
exam preparation	using SELECT with, 502–506
adaptive exam format, xxix	using template files to access SQL Server
data	through a URL, 508-511
accessing, 516–532	Extensible Stylesheet Language (XSL)
accessing, analyzing and optimizing,	defined, 501
757–767	extracting data in XML format and,
importing and exporting, 618-624	511–513, 513
integrity, 268–286	extents, 95–98, 95, 96
modifying, 584–586	external fragmentation, 333–336, 334

F
FAST_FORWARD cursors, 487
FETCH statements
retrieving data from cursors and, 488–489
using cursors and, 484
fields
field lengths, 598–600
field terminators, 598–600
filegroups
BLOBs and, 203
creating databases and, 120-127, 121
adding filegroups, 124
automatically creating filegroups, 121–124,
122, 123
backing up and, 127
creating tables and, 165-169
basics, 165–167, 166, 167
creating databases using new filegroup,
168–169, 168
defined, 120
maintenance and performance, 125–127
RAID and, 169
files See also data files files files files files
files, <i>See also</i> data files; filegroups; log files database files
modifying, 91–92
placement and performance, 127–131
format files, 594–600
field lengths and field terminators, 598–600
prefix lengths, 598
using, 595–596
removing from databases, 93
fill factor, and indexes, 328–331, 329, 330
First Normal Form (1NF), 32–35, 32, 33, 34
fixed point numeric attributes, 23
floating point numeric attributes, 23
FOR REPLICATION option, 382
foreign keys, 252–267, 252
basics, 19-21, 19
cascading foreign key constraints, 260-265,
263, 264, 265
defined, 19, 19
defining at table creation, 253–260
cascading deletes and updates and, 258-260
column level constraints, 253–254

creating tables and, 257-258 table-level constraints, 254-256 defining at table modification, 266-267 Entity/Relationship model and, 19–21, 19, 21 exercise to create and use, 257-258 nonclustered indexes and, 720 real world scenario, 259 format files, 594-600 field lengths and field terminators, 598-600 prefix lengths, 598 using, 595-596 forms. See normal forms FORWARD_ONLY, 486-487 fragmentation and index maintenance, 332-341 defragmenting data files, 339-341 deletes and, 338-339 fragmentation types, 333-336, 333, 334 inserts and, 336–337, 337 updates and, 337-338, 338 FROM clause, subqueries in, 473 full functional dependency defined, 31 full outer joins, 460-461 functions. See user-defined functions (UDFs)

G

GAMs. See Global Allocation Maps Generate SQL Scripts utility, 69 Global Allocation Maps (GAMs) defined, 98 table of usage, 105 global cursors, 485 globally unique identifiers. See GUIDs (globally unique identifiers) GROUP BY clause, 465 GUIDs (globally unique identifiers), See also ROWGUIDCOL creating and managing GUID columns, 162 - 163defined, 161

Н

hardware, importance of powerful, 128 HAVING clause, 466

heaps	definition and advantages, 288-296
accessing data and, 297-299, 298, 299	clustered, 291-294, 292, 293
and indexes, 289-291, 289, 290	composite, 296
defined, 289	heaps, 289–291, 289, 290
hints	nonclustered, 294–296, 294, 295
index hints, 727	unique, 296
join hints, 726–727	exam essentials, 342–343
lock hints, 728–731	fragmentation and maintenance, 332-341
query hints, 726–731	defragmenting data files, 339-341
query processing, 727–728	deletes, 338–339
horizontal partitions defined, 675	fragmentation types, 333–336, 333, 334
1	inserts, 336–337, 337
	updates, 337-338, 338
ı	Index Tuning Wizard, 741–744
1	key terms, 342
IAMs (Index Allocation Maps) defined, 98	optimizing queries and, 717–721
IDENT_CURRENT, 158–160	basics, 717–718
identifiers, See also unique identifiers	by changing, 723–729, 724, 726
conforming column names to, 153	clustered indexes, 719
identifier rules, 153	nonclustered indexes, 719-721
identifying relationship, 20–21	physically separating from tables, 126
identity, See also unique identifiers	reindexing tables, 341
defined, 156	review questions and answers, 343-355, 343
Identity, 163	344, 349, 350
identity columns, 161, 540	statistics and, 306–320
identity values, 158-160, 541	creating statistics, 331–332
identity columns, 161, 540	distribution statistics, 307–311
identity fields, 540–541	index choice, 312-315, 312, 315
identity values, 158-160, 541	statistics maintenance, 315–320
IIS (Internet Information Server) defined, 501	summary, 342
image columns, storage, 198-203, 202	inline table-valued UDFs, 402-403
importing. See data, importing and exporting	inner joins, 456–458
Index Allocation Maps (IAMs) defined, 98	insert rules, 24–25
index hints, 727	INSERT statement, 535–538
Index Tuning Wizard, 741–744	multiple rows, 542–544
indexed views, 369–372	single rows, 535–538
indexes, 288–355	single rows with identity fields, 540–541
accessing data and, 297-306	single rows with selected columns, 538–539
clustered indexes, 299-302, 300, 301	INSERT triggers, 409–410, 409
heaps, 297–299, 298, 299	inserts, and leaf level fragmentation,
nonclustered indexes, 302-306, 304, 305	336–337, 337
creating, 320–331	INSTEAD OF triggers
clustered and nonclustered, 321-324, 322	INSTEAD OF DELETE, 415
composite, 325–326	INSTEAD OF INSERT, 414–415
fill factor, 328-331, 329, 330	INSTEAD OF UPDATE, 416
on computed columns, 326–328	integrity. See data integrity
unique, 324–325	intent locks, 631–632

intermediate levels defined, 291 internal fragmentation defined, 333, 333 determining, 334–336 negative effect of deletes on, 333, 338–339 Internet Explorer 5, and viewing XML documents, 506 Internet Information Server (IIS) defined, 501	linked servers accessing data and, 490–494 modifying data with, 569 literals. See scalars local cursors, 485 lock hints queries and, 728–731 servers and, 643–644 locking, 626–652 described, 626
join hints, 726–727 joins cross joins, 462 exercise in joining tables, 463–464 inner joins, 456–458 outer joins, 458–461 full outer joins, 460–461 left and right outer joins, 459–460	exam essentials, 647 key terms, 646 lock manager, 627–634 basics, 627–629 levels of locking, 633–634 lock modes, 629–633 options, 638–644 lock hints and servers, 643–644 lock isolation levels, 642 viewing locks, 638–642, 639, 640, 641 review questions and answers, 647–652 summary, 645–646 transactions and locking, 634–638 locks
key range locks, 634 keys, <i>See also</i> foreign keys; primary keys alternate keys, 16 artificial keys, 17 candidate keys, 16 KEYSET cursors, 486	exclusive locks, 632 lock detection, 740–741 lock hints and queries, 728–731 SP_LOCK result set, 641–642 types of, 631–633 log files, <i>See also</i> transaction logs creating databases and, 66–72, 66 default placement, 67 functioning of, 69–70, 70 placement and performance, 130–131 placement, 130–131
latches, 633 lazy writer process, 72 leaf levels defined, 291 fragmentation and inserts, 336–337, 337 inserts as cause of fragmentation, 336 storage of computed columns and, 327 left and right outer joins, 459–460 legacy syntax, 460	shrinking, 87–90, 89 size and growth options, 74–75 space management and, 107–113, 109, 110, 111 log records and, 110–111 size of, 109–110 transaction logs, 107–108 vs. data files, 107 logical design. See database logical modeling login databases and, 660 SQL Sever 2000 and, 655–659, 657, 658, 659

M

mainframes, real world scenario, 601-602 managing databases. See databases, creating and managing manual shrinking, 82–86, 82, 85 many-to-many relationships, 14–15, 14, 15 materialized views In Oracle, 370 MCSE (Microsoft Certified System Engineer) described, xxi exam requirements, xxiv-xxvi types of questions, xxvi-xxxi metadata defined, 365 extended properties and, 195 Microsoft Certified System Engineer. See MCSE (Microsoft Certified System Engineer) min LSN, 110-111, 110, 111 mixed extents, 95, 96 multistatement table-valued UDFs, 403-404

N

natural order defined, 444 non-key attributes defined, 7, 9 non-leaf levels defined, 291 nonclustered indexes accessing data and, 302-306, 304, 305 creating, 321-324, 322 definition and advantages, 294-296, 294, 295 optimizing queries and, 719–721 normal forms, 31-39 Boyce/Codd Normal Form (BCNF), 39 First Normal Form (1NF), 32-35, 32, 33, 34 Second Normal Form (2NF), 35–36, 36 Third Normal Form (3NF), 36-39, 38 Fourth Normal Form (4NF), 39–40 Fifth Normal Form (5NF), 40 normalization process advanced normalization, 39-40 Boyce/Codd Normal Form (BCNF), 39 Fourth Normal Form (4NF), 39-40 Fifth Normal Form (5NF), 40 defined, 30 normal forms, 31-39

First Normal Form (1NF), 32–35, 32, 33, 34 Second Normal Form (2NF), 35-36, 36 Third Normal Form (3NF), 36–39, 38 normalized logical models, 38, 38 NOT FOR REPLICATION constraints and, 265 when defining identities, 161 ntext columns, and table storage, 198-203, 202 NULL values changing in columns, 173 defining columns and, 154-155 nullability, changing columns, 173-174 numeric datatypes attributes datatypes, 23 in columns, 180-181

0

Object Browser, 747 object rights, 667-685 basics, 667-671, 671 ownership chains, 684-685 stored procedures, 677-680 tables, 671–675 triggers, 680-681 user-defined functions (UDFs), 681-684 views, 675-677 Object Search, 747 objects, See also database objects default objects, 232-234 OLTP (OnLine Transaction Processing) application, 129 one-to-many relationships, 13, 14, 14 one-to-one relationships, 13-14, 13 OnLine Transaction Processing (OLTP) application, 129 OPENROWSET function data accessing and, 494-496 modifying data using, 570–572, 571, 572 OPENXML for modifying data, 559-568 basics, 561-564 deleting rows, 566-567 inserting rows, 564–565 new rowset views, 561-564

SET STATISTICS IO, 708

SET STATISTICS PROFILE, 709

SETSHOWPLAN_TEXT, 707-708

SET STATISTICS TIME, 709

SP_XML_PREPAREDOCUMENT, 559–561 updating rows, 565–566 OPTIMISTIC option, and cursors, 487 options. See database options; various options ORDER BY clause, 446–447 OSQL, 79 outer joins, 458–461 ownership chains, 684–685	placement data files default placement, 67 performance and, 127–131 log file placement, 130–131 tables, defining placement, 169–170, 170 positional updates defined, 556 primary data files (extension .MDF), 67 primary filegroups defined, 120
packages in DTS, 608, 612–617 creating, 613–617, 614, 615, 616 defined, 612 pages dirty pages defined, 72 types of, 98–99, 99 parameters, and stored procedures, 384–385 partitioned views, 372–378, 372 advantages and disadvantages, 376–377 conditions for, 375–376 defined, 372 distributed partitioned views, 496–500, 497 horizontal partitions defined, 675 partitioning columns, 373–375 partitioning columns, 373–375 partitioning tables, 46–47 horizontal, 47	primary keys clustered indexes and, 321, 719 defined, 16, 18, 19, 240 defining, 241–246 at table creation, 241–245, 245 at table modification, 245–246 relational model and, 16–19 procedural integrity, 224 procedure caches defined, 386–387 Profiler, 731–744 basics, 731–732, 732 creating traces using, 738–739, 739 functions and use, 733–738, 735, 736, 737 Index Tuning Wizard, 741–744 lock detection, 740–741 replaying saved trace files, 739–740 properties ACID, 396 extended metadata and, 195
vertical, 46–47, 46 partitions, vertical partitions defined, 445, 445 performance data placement and, 129–130 disk performance, 112	tables and, 190–195, 191, 194
files data files placement and, 127–131 filegroups maintenance and, 125–127 log file placement and, 130–131 performance enhancers SELECT command and, 449 stored procedures as, 380, 380 views as, 361 triggers and performance loss, 418	queries analyzing, 703–716 execution plan analysis, 709–714 exercise in, 714–716 SET FORCEPLAN, 704 SET NOEXEC, 704–705 SET SHOWPLAN_ALL, 705–707 SET statements basics, 703–704

Performance Monitor, 112

physical model defined, 28

permissions. See object rights

physical design. See database physical modeling

distributed queries, 489–500	rows
about, 489–490	deleting sets of, 553–554
distributed partitioned views, 496-500, 497	inserting single, 537–538
linked servers, 490–494	removing from tables, 552
OPENROWSET function, 494–496	updating, 545-548
using to modify data, 568-572, 571, 572	updating with OPENXML, 565–566
exercise using, 453–455	scripts and queries, opening, 79
importance of understanding processing, 71	single table queries, creating, 453–455
inserting multiple rows with, 542–543	stored procedures, granting rights to, 678–680
optimizing, 717–732	tables
changing an index, 723–726, 724, 726	granting rights to, 672–673
indexes, 717–721	granting rights to columns in, 674–675
limiting the result set, 721–723, 722, 723	joining, 463–464
query hints, 726–731	UDFs, granting rights to, 682–684
Query Analyzer procedures, See also Transact-	views
SQL procedures	creating distributed partitioned views,
aggregates, using, 468–469	497–499
application roles	granting rights to, 676–677
creating and assigning rights, 665–666	query hints, 726–731
using, 665–666	query optimizer, 699–703
columns	basics, 699–700
creating computed columns, 189–190	batch optimization, 702–703
granting rights to columns in tables,	single statement optimization, 700–702
674–675	query plans, 386–387
GUID columns, creating and managing,	query processing hints, 727–728
162–163	query trees, 386–387
inserting selected, 539	4,,
updating multiple, 549–550	
constraints	D
cascading foreign key constraints, creating	R
and using, 260–262	RAID
check constraints, creating and using,	data placement and, 129–130
238–239	log file placement and, 131
foreign key constraints, creating and using,	real world scenarios
257–258	delete dilemma, 259
primary key constraints, creating and using,	new database analysis, 4–5
244–245	operation order issue, 26–27
unique constraints, creating and using,	using Index Tuning Wizard, 744
250–251	using stored procedures, 391–392
data	using triggers to capture an audit trail, 681
deleting with OPENXML, 566-567	working with mainframes, 601–602
inserting with OPENXML, 564–565	write ahead paradigm, 112
modification with cursors, 557–558	records
storage and, 100-102	inserting, and GUIDS, 162
deadlock conditions, creating, 636–637	storage, 196–198, 196
default values, defining and testing, 233–234	recovery model, and database options, 116
indexes, creating, 322, 322	recursive relationships, 16, 16
	1 / "J "

redundant columns, adding, 43–45, 44	updating, 545–548
referential integrity, 24–28, 223	all, 545–546
relational models and normalization, 28-40	sets of rows, 547–548
advanced normalization, 39-40	rowset views, 561–564
Boyce/Codd Normal form (BCNF), 39	rules
Fourth Normal Form (4NF), 39	data integrity and, 239-240
Fifth Normal Form (5NF), 40	referential integrity and, 24–26
basics, 28–29, 41	referential integrity and, 21 20
normal forms, 31–39	
First Normal Form, 32–35, 32, 33, 34	
Second Normal Form, 35–36, 36	
Third Normal Form, 36–39, 38	S
	1
normalization defined, 30	scalar subqueries, 472
relational tables, 29–31	scalars
relational tables, 29–31	scalar UDFs, 399, 400–401
relationships	SELECT statement and, 471–472
characteristics of, 10–13, 11, 12	schema locks, 632–633
defined, 6	SCHEMABINDING option, 364–365
identifying, 20–21	SCOPE_IDENTITY, 158–160
many-to-many, 14–15, 15	scopes defined, 158
one-to-many, 13, 14, 14	scripts
one-to-one, 13–14, <i>13</i>	Create Database statement, 68
recursive, 16, 16	Generate SQL Scripts utility, 69
result sets, limiting, 721–723, 722, 723	Query Analyzer and opening, 79
right and left outer joins, 459–460	SCROLL cursors, 486
rights, viewing, 670–671, 671	SCROLL_LOCKS cursors, 487
roles	Second Normal Form (2NF), 35-36, 36
application, 664–666	secondary data files (.NDF), 67
user-defined, 662–664	security, 654–695
roots of indexes defined, 291	assigning object rights, 667–685
ROWGUIDCOL	object rights, 667–671, 671
dropping from columns, 174	ownership chains, 684-685
GUIDs and, 161–162	stored procedures, 677–680
rows, See also unique constraints; unique identi-	tables, 671–675
fiers	triggers, 680–681
deleting, 551–554	user-defined functions (UDFs), 681–684
inserting, 535–544	views, 675–677
multiple, 542–544	exam essentials, 686–687
single rows, 535–538	key terms, 686
single rows with identity fields, 540–541	linked servers and, 493
single rows with selected columns, 538–539	
OPENXML, 564–567	overview, 654–666
deleting with, 566–567	adding new database users, 660–662, 660,
inserting with, 564–565	661, 662
	adding roles and users, 663–664
updating with, 565–566	application roles, 664–666
relational tables and, 30	basics on database access, 659–660

server access, 655–659, 657, 658, 659	manual shrinking, 82-85, 82
user defined roles, 662–663	shrinking in Enterprise Manager, 85–87, 85
review questions and answers, 687-695	shrinking files, 87-90, 89, See also shrinking data-
stored procedures and, 379	bases
summary, 685	single statement optimization, 700-702
views and, 361	single table SELECT, 444–445, 445
SELECT list, subqueries in, 472–473	size
SELECT statement, 443–475	of databases
aggregate operators, 464–468	Create Database statement options and,
aliases, specifying, 450–451	74–79, 77, 78
basics, 443–444	increasing, 86–87
cross joins and, 462	managing size and growth options, 74–75
DISTINCT command, 470–471	of log files, and space management, 109–110
formal syntax for, 474–475	space management, 94–112
in views, 362–363, 367–368	data files, 94–107 , 95, 96, 104
inner joins and, 456–458	allocation tracking, 103–107, 104
joining tables exercise, 463–464	data allocation, 99–103
ORDER BY clause, 446–447	extents, 95–98, 95, 96
outer joins and, 458–461	pages, 98–99, 99
returned results, limiting, 451–453	log files, 107–113, 109, 110, 111
scalars and, 471–472	log records, 110–111
single table SELECT, 444–445, 445	size of, 109–110
subqueries and, 472–475	sp_createstats system stored procedure, 317
UNION command, 470	special attributes datatypes, 23
using aggregates exercise, 468–469	SP_LOCK result set, 641–642
using queries exercise, 453–455	SP_XML_PREPAREDOCUMENT, 559–561
using with XML, 502–506	SQL Enterprise Manager. See Enterprise Manager
WHERE clause, 447–449	SQL Profiler. See Profiler
servers, See also SQL Server 2000	SQL Query Analyzer. See Query Analyzer proce-
accessing, and security, 655-659, 657, 658,	dures
659	SQL Server 2000
extracting template files from, 508-511	accessing, 655–659
linked servers	authentication, 655
accessing data and, 490–494	login, 655–659, 657, 658, 659
modifying data with, 569	accessing data and, 442–443
lock hints and, 643–644	importance of powerful hardware, 128
SET FORCEPLAN, 704	integrating with XML, 507–514
SET NOEXEC, 704–705	uses of, 514
SET ROWCOUNT, 451–453	using template files, 508–511
SET SHOWPLAN_ALL, 705–707	XPATH (XML Path Language), 514
SET statements, 703–709	XSL, 511–513, 513
SET STATISTICS IO, 708	OSQL, 79
SET STATISTICS TIME, 709	STATIC cursors, 486
SETSHOWPLAN_TEXT, 707–708	statistics
shared locks, 631	creating on multiple columns, 331–332
shrinking databases, 80–90	index choice and, 306–320
automatic shrinking, 80–81	distribution statistics, 307–311

index choice, 312-314, 312, 315	security, 685
statistics maintenance, 315–320	tables, creating and maintaining, 204
options defined, 318–319	synonyms, system datatypes, 183–184
storage	system datatypes in columns, 176-184
computed columns storage, 327	date and time, 181
data storage, 100–102	listed, 177–180
structured storage files, 613	numeric, 180–181
table storage, 195–203	special, 182–183
BLOBs and, 182	strings, 181–182
record storage, 196–198, 196	synonyms, 183–184
text columns, 198–203, 202	-,,,
text, ntext and image storage, 198–203, 202	
stored procedures	-
advantages, 379–380, 380, 699	Т
creating and altering, 380–384	T-SQL. See Transact-SQL procedures
defined, 379, 380, 380, 678	table-valued UDFs defined, 400
error handling, 392–396	
executing, 386–392	tables, <i>See also</i> columns; data integrity; rows
compiling, 387–389	defined, 151
query tree and query plans, 386–387	edge tables, 563
running procedures, 389–392	exercise in joining, 463–464
	granting rights to 672–673
object rights and, 677–680	granting rights to columns in, 674–675
optimizing, 744–746	isolating, 26
stored procedure debugger, 746–755	object rights and, 671–675
exercise in debugging, 749–755, 752,	partitioning
753, 754	horizontal, 47
using, 746–749, 748	vertical, 46–47, 46
using parameters, 384–385	physically separating from indexes, 126
using to insert multiple rows, 543–544	reindexing, 341
striped disks, and data placement, 129–130	relational, 29–31
structured storage files, 613	tables, creating and maintaining, 150-219
subqueries, 472–475	altering, 170–176
correlated subqueries, 473	adding or dropping columns, 174–176
SELECT statement and, 472–475	altering columns, 171–174
summaries	computed columns, 188–189
data	constraints, defining
data access, analyzing and optimizing,	check constraints, 235–239
755–756	default constraints, 228-231, 230
accessing, 515–516	creating, 150–170
importing and exporting, 617-618	collation and, 163-165, 165
data integrity, 267	filegroups and, 165–170, 166, 167, 168,
modifying, 573	170
databases	GUID columns and, 162-163
database logical modeling, 48	identity, 156–158
database objects, 420	identity comparisons, 158-161
database physical modeling, 132	simple, 151–155, 151, 152
indexes, 342	simple with Enterprise Manager, 155–156
locking, 645–646	UniqueIdentifier, 161–162

INSERT statement, 535–544

UPDATE statement, 544–551

exam essentials, 205 extended properties, 190–195, 191, 194 foreign key constraints, defining at creation, 253–257 key terms, 204 placement, defining with Enterprise Manager, 169–170, 170 primary keys, 241–246 defining at creation, 241–245, 244 defining at table modification, 245–246 review questions and answers, 205–219, 207, 211, 214 storage, 195–203 record storage, 196–198, 196 text, ntext and image storage, 198–203, 202 summary, 204 system datatypes, 176–184 date and time, 181 listed, 177–180 numeric, 180–181 special, 182–183 strings, 181–182 synonyms, 183–184 unique constraints, 247–252 defining at table modification, 251–252 user-defined datatypes and, 184–187 tasks, and DTS, 610–612 template files, 508–511 templates defined, 501 text columns, and storage, 198–203, 202 Third Normal Form (3NF), 36–39, 38 time and date values, 181 TOP, 451–452 traces, 734–741 basics, 734–738, 735, 736, 737 creating using Profiler, 738–739, 739	databases adding new users, 660–662, 660, 661, 662 adding roles and users, 663–664 altering, 91–93 creating, 68 options, 113–114 files, defining data and log files, 68 inexperienced programmers and, 449 tables, creating simple, 151–152 transaction isolation levels, 627–628 transaction logs importance of, 71 space management and, 107–108 storing, 131 transactions defining, 69 locking and, 634–638 triggers, 406–420 advantages of, 406–407 AFTER, 407–408, 419 AFTER INSERT, 419 cascading updates and deletes and, 260 defined, 406–407, 680 DELETE, 410–412, 411 disabling, 419–420 firing order, changing, 419 INSERT, 409–410, 409 INSTEAD OF, 13–418 INSTEAD OF DELETE, 415 INSTEAD OF UPDATE, 416 multiple, 419 object rights and, 680–681 optimizing, 744–746 performance considerations, 418 UPDATE, 412–413, 412 vs. constraints, 225 Web, 419
replaying with Profiler, 739–740	web, 419
trace flags with lock detection, 741	
Transact-SQL procedures, See also Query Analyzer procedures: various statements	U
lyzer procedures; various statements	
data manipulation, 534	UDFs. See user-defined functions (UDFs)
DELETE statement, 551–554	Unicode vs. collation, 164

Unicode vs. collation, 164 uniform extents, 95, 96 uniform resource locators (URLs)

accessing SQL Server through, 507-514
defined, 501
UNION command, 470
unique constraints, 246–252
defining at table creation, 247–251, 249
defining at table modification, 251–252
unique identifiers, 156–163, 337
basics, 156–158
collation, 163–165, 165
comparisons of identity, 158–161
globally unique identifiers (GUIDs)
creating tables with GUID columns, using
Query Analyzer, 162–163
statement creating tables with GUID
columns, 161–162
identity, defined, 156
UniqueIdentifier, 161–162
unique indexes
creating, 324–325
described, 296
update locks, 632
update rules, 25–26
UPDATE statement, 544–551
all rows, 545–546
multiple columns, 548–550
sets of rows, 547–548
views, 550–551
UPDATE triggers, 412–413, 412
updateable cursors, 555–556
updates
fragmentation and, 337–338, 338
statistics examples, 310–320
URLs (uniform resource locators)
accessing SQL Server through, 507–514
defined, 501
user access to databases, 663–664
user-defined datatypes in columns, 184–187
user-defined filegroups defined, 120
user-defined functions (UDFs), 399–405
advantages of, 400
creating and altering UDFs, 400–404
defined, 399–400, 682
granting rights to, 682–684
object rights and, 681–684
types, 399–400
using UDFs, 404–405
user-defined roles, 662–664



values database options values, 114-115 default values, 227-234 basics, 227–228 default constraints, 228-231, 230 default objects, 232-234 identity values, 158-160, 541 **NULL** values changing in columns, 173 defining columns and, 154–155 time and date values, 181 vertical partitions defined, 445, 445 VIEW_METADATA option, 365 views, 359-378 creating and altering, 362-367 ENCRYPTION option, 364 METADATA option, 365 SCHEMABINDING option, 364-365 SELECT statement, 362-363 VIEW_METADATA option, 365 WITH CHECK OPTION option, 366-367 defined, 360, 360, 675 distributed partitioned views, 496-500, 497 granting rights to, 676–677 indexed views, 369-372 modifying new rowset views with OPENXML, 561-564 object rights and, 675-677 partitioned views, 372-378, 372 SELECT statement and, 362-363, 367-368 triggers and, 416–418 updating, 550-551 uses, 361 using, 367-369 retrieving data, 367-368 updating data, 368-369 virtual log files, 109, 109

W

Web triggers, 419 WHERE clause basics, 447-449 subqueries in, 473-474 WITH CHECK OPTION option, 366-367 workflows, in DTS, 611-612

X

XML (Extensible Markup Language) modifying data using OPENXML, 559-568 deleting rows, 566–567 inserting rows, 564-565 new rowset views, 561-564 SP_XML_PREPAREDOCUMENT, 559–561 updating rows, 565-566 options, 503 SQL Server 2000 and, 500-514 description, 500-501 extracting data in XML format, 507 integrating using XPATH, 514

integrating using XSL, 511-513, 513 using SELECT with, 502-506 using template files to access SQL Server through a URL, 508-511 XML Path Language (XPATH) defined, 501 navigating XML documents and, 514 XMLDATA option, 503 XMLTemplate1.xml, 509, 511 XMLTemplate2.xml, 510 XPATH (XML Path Language) defined, 501 navigating XML documents and, 514 XSL (Extensible Stylesheet Language) defined, 501 extracting data in XML format and, 511-513,

XSLStyle.xsl.512