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

---

**A**

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
data type attributes, 23–24
defined, 6, 7
defining, 7–9
autoparametization, 745

---

**B**

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
BINARY BASE64 option, 503
binary data, isolating, 126
Binary Large objects. See BLOBs (Binary Large Objects)
binary strings, 182
BLOBs (Binary Large Objects)
  filegroups and, 203
table storage and, 182
text in row OFF, 199–202, 200, 201, 202
text in row ON, 202–203
blocking, 634–635
Boyce/Codd Normal Form (BCNF), 39
bulk copy
  BCP (bulk copy program), 588–607
  BCP syntax, 589–594
  BCP utility, 600–601
  format files, 594–600
  BULK INSERT, 602–607
    BULK INSERT syntax, 602–605
    using, 606–607
business rules, 28

C
candidate keys, 16
cascading deletes
defined, 258
enforcing, 260
triggers and, 260
cascading updates
defined, 258
enforcing, 260
triggers and, 260
CD-ROM that comes with this book,
  xxxiv–xxxvi, xxxv
character attributes datatypes, 23
character strings, 181
check rules, 234–240
  check constraints, 235–239
  rules, 239–240
checkpoint process, 72
Chen, Peter
definition of entities and, 7
  Entity/Relationship model and, 5
clustered indexes
descending data and, 299–302, 300, 301

Codd, E. F., 28
collation
  changing in columns, 172–173
  creating databases and, 79–80
table character columns and, 163–165, 165
  Unicode vs., 164
columns
  adding, 174–176
  altering, 171–174
  collation of character columns, 163–165, 165
  computed
    basics, 188–190
    creating indexes on, 326–328
    creating statistics on multiple, 331–332
  default values, 227–234
    basics, 227–228
    default constraints, 228–231, 230
    default objects, 232–234
derived columns, 45–46, 45
dropping, 174–176
granting rights to, 674–675
GUID columns, 162–163
identity columns defined, 540
inserting rows with selected, 538–539
names, and creating tables, 153
partitioning columns, 373–375
redundant columns, 42, 43–45
relational tables and, 29–30
system datatypes in, 176–184
  date and time, 181
    listed, 177–180
    numeric, 180–181
    special, 182–183
    strings, 181–182
    synonyms, 183–184
text, ntext and image column storage,
  198–203, 200, 201, 202
updating multiple, 548–550
user-defined datatypes in, 184–187
command line utilities defined, 589
compatibility levels
  basics, 118–120
  in SQL Server 2000, 383
compilation, stored procedures and, 387–389
composite indexes
creating, 325–326
described, 296
COMPUTE clause, 467–468
conceptual design
aspects of, 28
importance of, 3
vs. relational model, 5
connections, 609–610
constraints, 659–664, See also foreign keys
default constraints, 228–231
defining at table creation, 228–230, 230
defining for existing tables, 230–231
unique constraints, 246–252
defining at table creation, 247–251, 249
defining at table modification, 251–252
vs. default objects, 233
vs. triggers, 25
correlated subqueries, 473
Create Database statement
options, 73–94
automatic shrinking, 80–81
collation, 79–80
filenames, 73–74
manual shrinking, 82–86, 82, 85
size and growth, 74–79, 77, 78
script, 68
CREATE INDEX statement, 320–322
creation scripts, and Generate SQL Scripts utility, 69
cross joins, 462
crow's feet, 12, 12
CUBE and ROLLUP, 466–467
cursors, 480–489
basics, 480
cursor declarations, 484–488, 555–556
modifying data inside, 555–558
retrieving data from, 488–489
using, 481–484

data, See also datatypes
allocation, 99–103, 99
allocation tracking, 103–107, 104
binary data, isolating, 126

D

data access, analyzing and optimizing, 698–767
analyzing queries, 703–716
execution plan analysis, 709–714
exercise in, 714–716
SET FORCERPLAN, 704
SET NOEXEC, 704–705
SET SHOWPLAN_ALL, 705–707
SET statements basics, 703–704
SET STATISTICS IO, 708
SET STATISTICS PROFILE, 709
SET STATISTICS TIME, 709
SETSHOWPLAN_TEXT, 707–708
exam essentials, 757–758
key terms, 757
optimizing queries, 717–732
changing an index, 723–726, 724, 726
indexes and, 717–721
limiting the result set, 721–723, 722, 723
query hints and, 726–731
optimizing stored procedures and triggers, 744–746
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
query optimizer, 699–703
basics, 699–700
batch optimization, 702–703
single statement optimization, 700–702
review questions and answers, 758–767
stored procedure debugger, 746–755
exercise in debugging, 749–755, 752, 753, 754
data, accessing – data, importing and exporting

access through URLs using template files, 508–511
access through URLs using XPATH, 514
access through URLs using XSL, 511–513, 513
description, 500–501
exercise in extracting data in XML format, 507
using SELECT with, 502–506
data files, See also filegroups; files
databases and
adding to, 92, 124
creating databases and, 66–72, 66
removing files, 93
defragmenting, 339–341
filenames, and database management, 73–74, 73
placement
data placement, 129–130
default placement, 67
placement and performance, 127–131
shrinking, 80–90
automatically, 80–81
files directly, 87–90, 89
manually, 82–86, 82, 85
with Enterprise Manager, 86–87, 90
size and growth options, 74–75
space management and, 94–107, 95, 96, 99, 104
allocation tracking, 103–107, 104
data allocation, 99–103
extents, 95–98, 95, 96
pages, 98–99, 99
types, 67
vs. log files, 107
data, importing and exporting, 588–624
bulk copy program (BCP), 588–601
BCP syntax, 589–594
BCP utility, 600–601
format files, 594–600
BULK INSERT, 602–607
BULK INSERT syntax, 602–605
using, 606–607
Data Transformation Services (DTS), 607–617
basics, 608–609, 608
connections, 609–610
packages, 608, 612–613
tasks, 610–612
using, 613–617, 614, 615, 616
exam essentials, 618
key terms, 618
review questions and answers, 619–624, 622
summary, 617–618
data integrity, 222–286
basics, 222
check rules, 234–240
check constraints, 235–239
rules, 239–240
default values, 227–234
basics, 227–228
default constraints, 228–231, 230
default objects, 232–234
exam essentials, 268
foreign key constraints, 252–267, 252
cascading foreign key constraints, 260–265, 264, 265
creating and using exercise, 257–258
defining at table creation, 253–260
defining at table modification, 266–267
real world scenario, 259
implementing, 223–227
key terms, 268
primary keys, 240–246
basics, 240–241
defining at table creation, 241–245, 244
defining at table modification, 245–246
review questions and answers, 269–286, 269, 271, 273, 278, 279
summary, 267
types, 22–28
domain integrity, 22–24, 222
task integrity, 28, 223
task integrity, 24, 223
referential integrity, 24–28, 223
unique constraints, 246–252
defining at table creation, 247–251, 249
defining at table modification, 251–252
data, modifying, 534–586
DELETE statement, 551–554
exam essentials, 574
INSERT statement, 535–544
multiple rows, 542–544
single rows insert, 535–538

single rows with identity fields, 540–541
single rows with selected columns, 538–539
inside cursors, 555–558
key terms, 573
review questions and answers, 574–586
summary, 573
UPDATE statement, 544–551
all rows, 545–546
multiple columns, 548–550
sets of rows, 547–548
views, 550–551
using distributed queries, 568–572
using linked servers, 569
using OPENROWSET, 570–572, 571, 572
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

Data Read and Write Log process, 70, 70
Data Transformation Services (DTS), 607–617
basics, 608–609, 608
connections, 609–610
packages, 608, 612–613
tasks, 610–612
using, 613–617, 614, 615, 616
database logical modeling, 2–61
denormalization process, 41–47, 41, 42
adding derived columns, 45–46, 45
adding redundant columns, 43–45, 44
partitioning tables, 46–47, 46
designing database systems, 2–5
Entity/Relationship (ER) database model, 5–28
basics, 5–7
defining entities and attributes, 7–10, 9
domain integrity, 22–24
task integrity, 28
task integrity, 24
keys, 16–21
referential integrity, 24–28
relationships, 10–16, 11, 12, 13, 14, 15, 16
exam essentials, 48–49
key terms, 49
relational models and normalization, 28–40
advanced normalization, 39–40
First Normal Form (1NF), 32–35, 32, 33, 34
relational tables, 29–31
Second Normal Form (2NF), 35–36, 36
Third Normal Form (3NF), 36–39, 38
review questions and answers, 50–61, 50, 52, 55, 56, 58
database objects, creating and maintaining, 357–440
exam essentials, 421–422
key terms, 421
review questions and answers, 422–440, 423, 429, 435
stored procedures, 378–395
creating and altering, 380–384
definition and advantages, 379–380, 380
derror handling, 392–396
definition and advantages, 386–392
executing, 386–392
using parameters, 384–385
summary, 420
transactions, 396–398
triggers, 406–420
AFTER, 407–408, 419
AFTER INSERT, 419
changing firing order, 419
definition and advantages, 406–407
DELETE, 410–412, 411
disabling, 419–420
INSERT, 409–410
INSTEAD OF, 413–418
multiple, 419
performance considerations, 418
UPDATE, 412–413, 412
Web, 419
user-defined functions (UDFs), 399–405
creating and altering, 400–404
definition and advantages, 399–400
using, 404–405
views, 359–378
creating and altering, 362–367
defined, 360, 360
indexed views, 369–372
partitioned views, 372–378, 372
uses, 361
using, 367–369
database options, 113–120, 113
compatibility levels, 118–120
default ANSI NULL, 155
recovery model and, 116
table of options values, 114–115
database physical modeling, 64–147
creating and managing databases. See数据库, creating and managing
database objects, creating and maintaining, 357–440
exam essentials, 133
table placement and performance, 127–131
filegroups, 120–127
basics, 120–121, 121
creating, 121–125, 122, 123
maintenance and performance, 125–127
key terms, 132–133
review questions and answers, 133–147
summary, 132
databases
access, 659–664
adding new users, 660–662, 660, 661, 662
adding roles and users, 663–664
basics, 659–660
user-defined roles, 662–663
adding files and filegroups, 124
altering, 90–94
monitoring activity with Profiler, 733–734
names, changing, 93–94
options values, 114–115
shrinking, 80–90
automatically, 80–81
manually, 82–85, 82
using Enterprise Manager, 85–87, 85
size, increasing, 86–87
databases, creating and managing, 64–120
creating simple databases, 65–72, 65
Create Database statement, 68
data and log files, 66–72, 66, 70
with Enterprise Manager, 65–66, 65, 76–79, 77, 78
data files and, 66–72, 66
database options, 113–120, 113
compatibility levels, 118–120
data files and, 66–72, 66
data options value, 114–115
recovery Model, 116
managing, 73–94
altering databases, 90–94
collation, 79–80
filenames, 73–74, 73
shrinking databases and files, 80–90, 82, 85, 89
size and growth options, 74–75
space management, 94–112
  data files, 94–107, 95, 96, 104
  log files, 107–113, 109, 110, 111

datatypes
  attributes of, 23–24
  changing in columns, 172
  creating tables and, 154
  system datatypes in columns, 176–184
    date and time, 181
    listed, 177–180
    numeric, 180–181
    special, 182–183
    strings, 181–182
  synonyms, 183–184
  user-defined datatypes in columns, 184–187
  date and time, values in columns, 181
  DBCC LOG statement, 108–109
  DBCC SHOW CONTIG, 335–336
  DBCC SHRINKDATABASE, 88–89
  DBCC SHRINKFILE, options, 87–90
  deadlocks, 635–638
  Decision Support System (DSS) application, 129
  declarative integrity, 223
  default constraints, 228–231, 230
  default objects, 232–234
  default values, 227–234
    basics, 227–228
    default constraints, 228–231, 230
    default objects, 232–234
  deferred name resolution defined, 383
  defragmenting data files, 339–341
  delete rules, 25
  DELETE statement, 551–554
  DELETE triggers, 410–412, 411
  deletes, and fragmentation, 338–339
  denormalization process, 41–47, 41, 42
    derived columns, adding, 45–46, 45
    redundant columns, adding, 43–45, 44
    tables, partitioning, 46–47, 46
  derived columns, adding, 45–46, 45
  derived tables, 473
  design
    conceptual design, See also Entity/Relationship (ER) database model
      aspects of, 28
      importance of, 3
      vs. logical, 5
      vs. relational model, 5
  logical design, See also relational models and normalization
    designing database systems, 2–5
  dirty pages defined, 72
  disks, and log files, 131
  DISTINCT command, 470–471
  distributed partitioned views, 496–500, 497
  distributed queries, 489–500
    about, 489–490
    distributed partitioned views, 496–500, 497
    linked servers, 490–494
    OPENROWSET function, 494–496
    using to modify data, 568–572
      linked servers, 569
  OPENROWSET, 570–572, 571, 572
  distribution statistics, and indexes, 306–311
  domains
    defined, 22
    domain integrity, 22–24, 222
  DSS (Decision Support System) application, 129
  DYNAMIC cursors, 486

E

  edge tables, 563
  ELEMENTS option, 503
  ENCRYPTION option, 364
  enterprise integrity, 28, 223
  Enterprise Manager
    altering files, 91–93
      adding, 92
      modifying, 91–92
      removing, 93
    cascading foreign key constraints, creating, 262–265, 263, 264, 265
    collation and, 164, 165
    columns
      defining default values, 229–230, 230
      warning on altering, 171
    data and log files, defining, 67
    databases
      adding new users, 660–662, 660, 661, 662
      creating, 65–66, 65, 76–79, 77, 78
      options, 113–115, 113
      shrinking, 85–87, 85
    datatypes (user-defined), creating and managing, 186–187, 187
entities – external fragmentation

filegroups
  adding, 124
  changing default, 123, 123
  creating, 121, 123, 123, 168–169, 168
files
  adding, modifying and removing, 91–92, 93
  shrinking, 88–90, 89
locks, viewing, 639–641, 639, 640
logins, adding, 657–659, 657, 658, 659
rights, viewing, 670–671, 671
tables
  creating simple, 152, 152
  defining placement, 169–170, 170
  modifying, 171
unique constraints, defining, 248–249, 249
entities
  attributes and, 7–10
  defined, 6
  entity integrity, 24, 223
entity integrity, 24, 223
Entity/Relationship (ER) database model, 5–28, 21
  basics, 5–7
  defining entities and attributes, 7–10, 9
  domain integrity, 22–24
  elements of, 6
  enterprise integrity, 28
  entity integrity, 24
databases
  logical modeling, 48–61
  objects, creating and maintaining, 421–440
  physical modeling, 133–147
indexes, 342–355
locking, 646–652
security plan, developing, 686–695
tables, creating and maintaining, 204–219
tips for taking the exam, xxxi–xxxi, xxviii
Web sites for, xxxvii–xxxix
exclusive locks, 632
execution plans
  analyzing query execution, 709–714
  basics, 709–710
  query operations, 710–714
  query optimizer and, 701–702
  stored procedures and, 386
exercises, listed, xix–xx
EXPLICIT mode, and XML, 505–506
exporting. See data, importing and exporting
extended properties
  metadata and, 195
  tables and, 190–195, 191, 194
Extensible Markup Language (XML), See also
XML Path 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
Extensible Stylesheet Language (XSL)
  defined, 501
  extracting data in XML format and, 511–513, 513
options, 95–98, 95, 96
external fragmentation, 333–336, 334
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
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
filenames, database management and, 73–74, 73
files, See also 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, 162–163
defined, 161

H
hardware, importance of powerful, 128
HAVING clause, 466
heaps
accessing data and, 297–299, 298, 299
and indexes, 289–291, 289, 290
defined, 289
hints
index hints, 727
join hints, 726–727
lock hints, 728–731
query hints, 726–731
query processing, 727–728
horizontal partitions defined, 675

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

**J**

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

**K**

key range locks, 634
keys, See also foreign keys; primary keys
alternate keys, 16
artificial keys, 17
candidate keys, 16
KEYSET cursors, 486

**L**

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
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
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
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, See also transaction logs
creating databases and, 66–72, 66
default placement, 67
functioning of, 69–70, 70
placement and performance, 130–131
placement, 130–131
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 Server 2000 and, 655–659, 657, 658, 659
mainframes, real world scenario – OPENXML for modifying data

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–xxx
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
NOT FOR REPLICATION
constraints and, 265
when defining identities, 161
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

O

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
OPTIMISTIC option, and cursors – queries

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

P
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
vertical, 46–47, 46
partitions, vertical partitions defined, 445, 445
performance
data placement and, 129–130
disk performance, 112
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
Performance Monitor, 112
permissions. See object rights
physical design. See database physical modeling
physical model defined, 28

Q
queries
analyzing, 703–716
exercise in, 714–716
SET FORCEPLAN, 704
SET NOEXEC, 704–705
SET SHOWPLAN_ALL, 705–707
SET statements basics, 703–707
SET STATISTICS IO, 708
SET STATISTICS PROFILE, 704
SET STATISTICS TIME, 709
SETSHOWPLAN_TEXT, 707–708
Query Analyzer procedures – recursive relationships

distributed queries, 489–500
  about, 489–490
  distributed partitioned views, 496–500, 497
  linked servers, 490–494
  OPENROWSET function, 494–496
  using to modify data, 568–572, 571, 572
exercise using, 453–455
importance of understanding processing, 71
inserting multiple rows with, 542–543
optimizing, 717–732
  changing an index, 723–726, 724, 726
  indexes, 717–721
  limiting the result set, 721–723, 722, 723
  query hints, 726–731
Query Analyzer procedures, See also Transact-SQL procedures
aggregates, using, 468–469
application roles
  creating and assigning rights, 665–666
  using, 665–666
columns
  creating computed columns, 189–190
  granting rights to columns in tables, 674–675
  GUID columns, creating and managing, 162–163
  inserting selected, 539
  updating multiple, 549–550
constraints
  cascading foreign key constraints, creating and using, 260–262
  check constraints, creating and using, 238–239
  foreign key constraints, creating and using, 257–258
  primary key constraints, creating and using, 244–245
  unique constraints, creating and using, 250–251
data
  deleting with OPENXML, 566–567
  inserting with OPENXML, 564–565
  modification with cursors, 557–558
  storage and, 100–102
deadlock conditions, creating, 636–637
default values, defining and testing, 233–234
indexes, creating, 322, 322
rows
  deleting sets of, 553–554
  inserting single, 537–538
  removing from tables, 552
  updating, 545–548
  updating with OPENXML, 565–566
scripts and queries, opening, 79
single table queries, creating, 453–455
stored procedures, granting rights to, 678–680
tables
  granting rights to, 672–673
  granting rights to columns in, 674–675
  joining, 463–464
UDFs, granting rights to, 682–684
views
  creating distributed partitioned views, 497–499
  granting rights to, 676–677
  query hints, 726–731
query optimizer, 699–703
  basics, 699–700
  batch optimization, 702–703
  single statement optimization, 700–702
query plans, 386–387
query processing hints, 727–728
query trees, 386–387

R

RAID
  data placement and, 129–130
  log file placement and, 131
real world scenarios
  delete dilemma, 259
  new database analysis, 4–5
  operation order issue, 26–27
  using Index Tuning Wizard, 744
  using stored procedures, 391–392
  using triggers to capture an audit trail, 681
  working with mainframes, 601–602
  write ahead paradigm, 112
records
  inserting, and GUIDS, 162
  storage, 196–198, 196
recovery model, and database options, 116
recursive relationships, 16, 16
redundant columns, adding, 43–45, 44
referential integrity, 24–28, 223
relational models and normalization, 28–40
  advanced normalization, 39–40
    Boyce/Codd Normal form (BCNF), 39
    Fourth Normal Form (4NF), 39
    Fifth Normal Form (5NF), 40
  basics, 28–29, 41
  normal forms, 31–39
    First Normal Form, 32–35, 32, 33, 34
    Second Normal Form, 35–36, 36
    Third Normal Form, 36–39, 38
normalization defined, 30
relational tables, 29–31
relational tables, 29–31
relationships
  characteristics of, 10–13, 11, 12
  defined, 6
  identifying, 20–21
  many-to-many, 14–15, 15
  one-to-many, 13, 14, 14
  one-to-one, 13–14, 13
  recursive, 16, 16
result sets, limiting, 721–723, 722, 723
right and left outer joins, 459–460
rights, viewing, 670–671, 671
roles
  application, 664–666
  user-defined, 662–664
roots of indexes defined, 291
ROWGUIDCOL
  dropping from columns, 174
  GUIDs and, 161–162
rows, See also unique constraints; unique identifiers
  deleting, 551–554
  inserting, 535–544
    multiple, 542–544
    single rows, 535–538
    single rows with identity fields, 540–541
    single rows with selected columns, 538–539
OPENXML, 564–567
  deleting with, 566–567
  inserting with, 564–565
  updating with, 565–566
relational tables and, 30
updating, 545–548
  all, 545–546
  sets of rows, 547–548
rowset views, 561–564
rules
  data integrity and, 239–240
  referential integrity and, 24–26
S
scalar subqueries, 472
scalars
  scalar UDFs, 399, 400–401
  SELECT statement and, 471–472
schema locks, 632–633
SCHEMABINDING option, 364–365
SCOPE_IDENTITY, 158–160
scopes defined, 158
scripts
  Create Database statement, 68
  Generate SQL Scripts utility, 69
  Query Analyzer and opening, 79
SCROLL cursors, 486
SCROLL_LOCKS cursors, 487
Second Normal Form (2NF), 35–36, 36
secondary data files (.NDF), 67
security, 654–695
  assigning object rights, 667–685
  object rights, 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
exam essentials, 686–687
key terms, 686
linked servers and, 493
overview, 654–666
  adding new database users, 660–662, 660, 661, 662
  adding roles and users, 663–664
  application roles, 664–666
  basics on database access, 659–660
SELECT list, subqueries in – statistics

server access, 655–659, 657, 658, 659
user defined roles, 662–663
review questions and answers, 687–695
stored procedures and, 379
summary, 685
views and, 361
SELECT list, subqueries in, 472–473
SELECT statement, 443–475
aggregate operators, 464–468
aliases, specifying, 450–451
basics, 443–444
cross joins and, 462
DISTINCT command, 470–471
formal syntax for, 474–475
in views, 362–363, 367–368
inner joins and, 456–458
joining tables exercise, 463–464
ORDER BY clause, 446–447
outer joins and, 458–461
returned results, limiting, 451–453
scalars and, 471–472
single table SELECT, 444–445, 445
subqueries and, 472–475
UNION command, 470
using aggregates exercise, 468–469
using queries exercise, 453–455
using with XML, 502–506
WHERE clause, 447–449
servers, See also SQL Server 2000
accessing, and security, 655–659, 657, 658, 659
extracting template files from, 508–511
linked servers
accessing data and, 490–494
modifying data with, 569
lock hints and, 643–644
SET FORCEPLAN, 704
SET NOEXEC, 704–705
SET ROWCOUNT, 451–453
SET SHOWPLAN_ALL, 705–707
SET statements, 703–709
SET STATISTICS IO, 708
SET STATISTICS TIME, 709
SET SHOWPLAN_TEXT, 707–708
shared locks, 631
shrinking databases, 80–90
automatic shrinking, 80–81
manual shrinking, 82–85, 82
shrinking in Enterprise Manager, 85–87, 85
shrinking files, 87–90, 89, See also shrinking databases
single statement optimization, 700–702
single table SELECT, 444–445, 445
size
of databases
Create Database statement options and, 74–79, 77, 78
increasing, 86–87
managing size and growth options, 74–75
of log files, and space management, 109–110
space management, 94–112
data files, 94–107, 95, 96, 104
allocation tracking, 103–107, 104
data allocation, 99–103
extents, 95–98, 95, 96
pages, 98–99, 99
log files, 107–113, 109, 110, 111
log records, 110–111
size of, 109–110
sp_createstats system stored procedure, 317
special attributes datatypes, 23
SP_LOCK result set, 641–642
SP XML_PREPAREDOCUMENT, 559–561
SQL Enterprise Manager. See Enterprise Manager
SQL Profiler. See Profiler
SQL Query Analyzer. See Query Analyzer procedures
SQL Server 2000
accessing, 655–659
authentication, 655
login, 655–659, 657, 658, 659
accessing data and, 442–443
importance of powerful hardware, 128
integrating with XML, 507–514
uses of, 514
using template files, 508–511
XPATH (XML Path Language), 514
XSL, 511–513, 513
OSQL, 79
STATIC cursors, 486
statistics
creating on multiple columns, 331–332
index choice and, 306–320
distribution statistics, 307–311
storage – tables, creating and maintaining 785

index choice, 312–314, 312, 315
statistics maintenance, 315–320
options defined, 318–319
storage
computed columns storage, 327
data storage, 100–102
structured storage files, 613
table storage, 195–203
BLOBs and, 182
record storage, 196–198, 196
text columns, 198–203, 202
text, ntext and image storage, 198–203, 202
stored procedures
advantages, 379–380, 380, 699
creating and altering, 380–384
defined, 379, 380, 380, 678
error handling, 392–396
executing, 386–392
compiling, 387–389
query tree and query plans, 386–387
running procedures, 389–392
object rights and, 677–680
optimizing, 744–746
stored procedure debugger, 746–755
exercise in debugging, 749–755, 752, 753, 754
using, 746–749, 748
using parameters, 384–385
using to insert multiple rows, 543–544
striped disks, and data placement, 129–130
structured storage files, 613
subqueries, 472–475
correlated subqueries, 473
SELECT statement and, 472–475
summaries
data
data access, analyzing and optimizing, 755–756
accessing, 515–516
importing and exporting, 617–618
data integrity, 267
modifying, 573
databases
database logical modeling, 48
database objects, 420
database physical modeling, 132
indexes, 342
locking, 645–646

security, 685
tables, creating and maintaining, 204
synonyms, system datatypes, 183–184
system datatypes in columns, 176–184
date and time, 181
listed, 177–180
numeric, 180–181
special, 182–183
strings, 181–182
synonyms, 183–184

t
T-SQL. See Transact-SQL procedures
table-valued UDFs defined, 400
tables, See also columns; data integrity; rows
defined, 151
data integrity; rows defined, 151
data integrity; rows defined, 151
edge tables, 563
exercise in joining, 463–464
granting rights to, 672–673
granting rights to columns in, 674–675
isolating, 26
object rights and, 671–675
partitioning
horizontal, 47
vertical, 46–47, 46
physically separating from indexes, 126
reindexing, 341
relational, 29–31
tables, creating and maintaining, 150–219
altering, 170–176
adding or dropping columns, 174–176
altering columns, 171–174
computed columns, 188–189
constraints, defining
check constraints, 235–239
default constraints, 228–231, 230
creating, 150–170
collation and, 163–165, 165
filegroups and, 165–170, 166, 167, 168, 170
GUID columns and, 162–163
identity, 156–158
identity comparisons, 158–161
simple, 151–155, 151, 152
simple with Enterprise Manager, 155–156
UniqueIdentifier, 161–162
786  tasks, and DTS – uniform resource locators (URLs)

databases
adding new users, 660–662, 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, 413–418
INSTEAD OF DELETE, 415
INSTEAD OF INSERT, 414–415
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

UDFs. See user-defined functions (UDFs)
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, 513
XSLStyle.xsl, 512