

Index

Symbols

- +** (addition operator), 82, 158
- *** (asterisk), 54, 70, 192
- /** (division operator), 158
- =** (equals operator), 47
- >** (greater than operator), 47
- #** (hash symbol), 58, 60, 113
- <** (less than operator), 47
- *** (multiplication operator), 158
- %** (percent sign), 70
- |** (pipe character), 85
- ?** (question mark), 70
- (subtraction operator), 158
- _** (underscore), 70

A

- ABS () function, 159–160, 181**
- absolute values, numbers, 159–160**
- Access databases (Microsoft)**
 - concatenation, 82–85
 - data type comparisons, 19
 - installing
 - blank database link, 424
 - code views, 428
 - default screen, 423
 - design views, 427

- new table creation, 425
 - query execution, 426
 - SQL code, 425–426
 - overview, 3
- access, group IDs, 332–334**
- account information, MySQL installation, 394**
- ACID (Atomic, Consistent, Isolated, Durable), 302**
- active records, transactions, 301**
- ADD CONSTRAINT constraint, 137**
- adding results, 196–197**
- addition operator (+), 82, 158**
- addresses**
 - database creation example, 36
 - UPDATE statement, 45–46
- administrators**
 - DBAs (database administrators), 313
 - SAs (system administrators), 329
- advanced design**
 - indexes
 - b-tree structure, 357–358
 - character, 168–169
 - CREATE INDEX statement, 140
 - doubly linked lists, 359
 - dropping, 360
 - multicolumn, 154
 - results, speeding up, 139–143
 - when to use, 360–361

advanced design (continued)

normalization guidelines

discussed, 117

first normal form, 118–119

second normal form, 119–121

third normal form, 121–123

transitive dependency, 121

validation

CHECK constraint, 125, 129–132

design improvement, 153–154

FOREIGN KEY constraint, 135–139

NOT NULL constraint, 124–125

performance improvement, 145–149

PRIMARY KEY constraint, 132–134

UNIQUE constraint, 125–129

aggregation

AVG () function, 198–200

COUNT () function, 192–194

defined, 189

GROUP BY clause, 189–191

MAX () function, 200–202

MIN () function, 200–202

SUM () function, 196–198

aliases

column names, 56

correlation names, 216

correlation variable, 253

spaces between, 87

ALL operator

discussed, 62

subqueries, 247–249

UNION operator, 229

alphabetical order, comparison operators, 47

ALTER COLUMN **statement, 124**

ALTER TABLE MODIFY **statement, 124**

ALTER TABLE **statement, 26–27**

ALTER USER **statement, 331**

American Standard Code for Information Interchange (ASCII), 22

AND operator

discussed, 62

WHERE clause, 48, 63

ANSI (American National Standards Institute)

discussed, 2

transaction model, 305

view update restrictions, 295

ANY operator, 245–247

applications, stand-alone, 11

arithmetic operations

addition (+) operator, 82, 158

division (/) operator, 158

functions

ABS (), 159–160, 181

CEILING (), 165

FLOOR (), 165

POWER (), 160–161, 181

RAND (), 162–163

RND (), 162

ROUND (), 163–167

SQRT (), 162

multiplication (*) operator, 158

subtraction (-) operator, 158

AS keyword, 56

ascending sorting order, 77

ASCII (American Standard Code for Information Interchange), 22

asterisk (*), 54, 70, 192

Atomic, Consistent, Isolated, Durable (ACID), 302

Attendance table

example code, 37

initial data setup, 466–469

authentication mode, Microsoft SQL Server installation, 433, 435

author and peer discussions, 5–6

autocommit, transactions, 307

averages, results, 198–200

B

Bachman, Charles W. (Turing Award), 7

balanced-tree (b-tree) structure, 357

base queries, 290

base views, 290–291

BEGIN TRANSACTION statement, 306, 308

BETWEEN operator, 62, 66–67

blank database link, Microsoft Access, 424

Book Details page, Book Errata link, 5

boxes, surrounding text, 4

brackets

data types, 25

INNER JOIN keyword, 100–101

operator precedence, 63

b-tree (balanced-tree structure), 357

C

caches

database, 354–355

hard disk, 352–353

processor, 352

CASCADE keyword, 298, 346–347

case

case-sensitivity, LIKE operator, 71

conversion functions, 170–171

CAST () function, 179–180

categories

data types, 18

database creation example, 38

Category table, initial data setup, 452

CEILING () function, 165

central processing units (CPUs), 351

char data type, 20, 22

character data type, 88

character index, 168–169

character set configuration

MySQL installation, 398

Unicode character sets, 20

character string data types

ASCII (American Standard Code for Information Interchange), 22

Unicode character set, 22–23

characters

data type selection considerations, 32

fixed-length, 22

non-English, 32

number-to-character conversions, 363

trimming, 172

variable length, 22

wildcard characters

* (asterisk), 70

multiple use, 71

% (percent sign), 70

? (question mark), 70

_ (underscore), 70

CHECK constraint, 125, 129–132

CHECK OPTION keyword, 295–298

clauses. See also statements

defined, 12

FROM, 271

GROUP BY

HAVING clause, 202–205

overview, 189–191

HAVING

GROUP BY clause, 202–205

subqueries, 252–253

ORDER BY

date functions, 178

NULL value, 113

SELECT statement, 54, 75

sorting orders, 75–79

UNION operator, 230–231

SET, 46

WHERE

AND operator, 48, 63

comparison operators, 47

DELETE statement, 49–50

DIFFERENCE () function, 177

filtering results with, 56–58

IN operator, 74

logical operators, 48

operator precedence, 64

OR operator, 48, 63

SELECT statement, 56–57

subqueries, 236, 240–242

UPDATE statement, 45–46

COALESCE () function

COALESCE () function, 180, 183–185

Codd, Ted (IBM database research), 7
code. See also syntax

ADD CONSTRAINT constraint, 137

aliases, 56

ALL operator, 247–248

ALTER TABLE statement, 27

ALTER USER statement, 331

ANY operator, 246–247

Attendance table, 37, 466–469

AVG () function, 198

BETWEEN operator, 67

brackets, around joins, 100–101

Category table, 452

CHECK constraint, 130–132

COALESCE () function, 183–185

comparison operators, 47–48

concatenation

IBM databases, 85–88

Microsoft Access, 82–84

Microsoft SQL Server, 82–84

MySQL Server databases, 88–89

Oracle databases, 85–88

correlated subqueries, 253–254

COUNT () function, 192–193

CREATE DATABASE statement, 17

CREATE INDEX statement, 140

CREATE USER statement, 330

cross joins, 213

data

deleting, 50–51

insertion, 41–44

selecting, 53–54

updates, 45–46

validation, 145–149

data type conversions, 179–180

decimal data type, 24

DROP DATABASE statement, 18

DROP INDEX statement, 141

DROP TABLE statement, 27

DROP USER statement, 331

EXISTS operator, 249–250

FavCategory table, 39, 459–461

fixed-length data types, 22

FOREIGN KEY constraint, 137

FROM clause, 271

GRANT OPTION statement, 343

GROUP BY clause, 190–191

HAVING clause, 200–201

IN operator, 73–74

indexes

creating, 140–143

dropping, 360

inner queries, 235–236

LIKE operator, 70–71

literals, 16

Location table, 458–459

logical operators, 48–49

math operations

ABS () function, 159–160

CEILING () function, 165

FLOOR () function, 166

POWER () functions, 160–161

RAND () function, 163

ROUND () function, 164

SQRT () function, 162

MAX () function, 199–200

MemberDetails table, 452–455

MIN () function, 200–201

NOT NULL constraint, 124–125

NOT operator, 66

NULL values, 181–182

ORDER BY clause, 75–79

PRIMARY KEY constraint, 132–134

queries, 58–60

READ COMMITTED statement, 319

READ UNCOMMITTED statement, 319

REPEATABLE READ statement, 319

results, filtering, 57

REVOKE statement, 344–345

rows, returning values from, 55–56

self-joins, 215

- SERIALIZABLE statement, 318
- SET TRANSACTION statement, 318
- sets, records, 102, 104–107
- spaces between, 17
- SQL syntax, 16
- string functions
 - case conversion, 170
 - DAY(), 178
 - DIFFERENCE(), 176–177
 - LENGTH(), 173–174
 - LOWER(), 170
 - MONTH(), 178
 - REVERSE(), 171
 - SOUNDEX(), 175–176
 - SUBSTRING(), 169–170
 - TRIM(), 172
 - UPPER(), 170
 - YEAR(), 178
- subqueries, 236–238
- SUM() function, 196–197
- table creation, 36–38
- timetable example, 26
- UNION operator, 227–230
- UNIQUE constraint, 126–129
- variable-length data types, 22
- views
 - base, 290–291
 - check option, 295–297
 - creating, 289
 - dropping, 298
 - field, 292
 - horizontal, 340
 - row, 291–292
 - summary, 293
 - tables and, 341–342
 - updating, 294
 - vertical, 337–338
 - windowed, 293
- code views, Microsoft Access installation, 428**
- columns, table**
 - aliases, 56
 - ALTER COLUMN statement, 124
 - deleting, 27
 - discussed, 16
 - dropping, 27
 - good design example, 30–31
 - joining, 91
 - locking, 314
 - multicolumn, 154
 - organization, 31
 - sorting order, 75–79
- combining result sets, 226–230**
- Command Center tool**
 - downloading, 416
 - Interactive tab, 418–420
 - Results tab, 422–423
 - Script tab, 416–417
- command line interface access, MySQL installation, 401**
- commands, START, 451**
- commas**
 - delimiters, 41
 - sorting using, 78
- COMMIT **statement, 306–308**
- COMMIT TRANSACTION **statement, 308**
- comparison operators, 47–48**
- compartmentalized networks, database tuning, 352**
- compression, 5**
- computer selection, Microsoft SQL Server installation, 430**
- CONCAT() **function, 85–86, 88–89**
- concatenation**
 - IBM databases, 85–88
 - Microsoft Access databases, 82–85
 - Microsoft SQL Server databases, 82–85
 - MySQL databases, 88
 - Oracle databases, 85–88
 - tables, joining, 82
- CONCAT_WS() **function, 89**

conditions, 12

configuration options

MySQL installation, 395–396

Oracle installation, 446–447

confirmation message, MySQL installation, 400

connection information

MySQL installation, 397

Query Browser tool, 402, 404–405

constraints

ADD CONSTRAINT, 137

CHECK, 125, 129–132

FOREIGN, 135–139

NOT NULL, 124–125

overview, 123

PRIMARY KEY, 132–134

UNIQUE, 125–129

contact details screen, IBM installation, 413

conventions, 4

conversions

data types, 179–180

number-to-character, 363

copying data in tables, 185

correlated subqueries, 253–255

correlation names, 216

correlation variable, 253

corruption, relational databases, 39

COUNT () function, 192–194

CPUs (central processing units), 351

CREATE DATABASE **statement, 17**

CREATE INDEX **statement, 140**

CREATE TABLE **statement, 25–26**

CREATE USER **statement, 330**

CREATE VIEW **statement, 290**

cross joins, 213–214

D

data

copying, 185

deleting from databases, 49–50

duplication, 30

efficiency improvements, 145–149

entering in databases

new data inserts, 41–44

updates, 45–46

WHERE clause, 47–49

extracting from databases

aliases, 56

BETWEEN operator, 66–67

concatenation, 82

IN operator, 73–75

LIKE operator, 70–72

NOT LIKE operator, 72

NOT operator, 66

NULL values, 113–115

operator precedence, 62–65

ORDER BY clause, 75–79

results, filtering, 56–60

rows, returning values from, 55–56

SELECT statement, 53–54

inconsistent data problems, 321–322

logical division, 29–32

numerical, delimiters around, 41

redundancy, well designed databases, 9

sharing, database design structure, 10

splitting into tables, 119

summaries, 189

uncommitted data problems, 321

validation

CHECK constraint, 125, 129–132

design improvement, 153–154

FOREIGN KEY constraint, 135–139

NOT NULL constraint, 124–125

performance improvement, 145–149

PRIMARY KEY constraint, 132–134

UNIQUE constraint, 125–129

Data Control Language (DCL), 11

Data Manipulation Language (DML), 11

data sets

combining, 226–230

joins, 102–106

data types

- brackets, 25
- categories, 18
- char, 20, 22
- character, 88
- character string, 22–23
- conversions, 179–180
- database comparisons, 19
- database creation example, 37
- date, 21, 264
- datetime, 264
- decimal
 - numerical data, 23–24
 - storage allocation, 21
- defined, 18
- descriptions, 20–21
- fixed-length, 22
- floating-point numbers, 23
- int
 - discussed, 180
 - storage allocation, 21
 - UNION operator, 227
- naming considerations, 154
- nchar, 20
- numerical, 23–24, 179
- nvarchar, 20
- real
 - numerical data, 23–24
 - storage allocation, 21
- reasons for, 19
- selection considerations, 32–33
- smallint, 21
- storage space used, 20–21
- text-based, 47
- time, 21
- varchar, 22
- variable length, 22

database administrators (DBAs), 313**database caches, 354–355****database management systems (DBMS), 8****database owner (DBO), 329****databases. See also tables**

- alternatives to, 10
- creation
 - CREATE DATABASE statement, 17
 - data type fields, 18–22
 - example database, 35–38
 - name punctuation, 18
 - Query Analyzer tool, 17
 - relational database organization, 14–16
 - requirement details, 35
 - SQL syntax, 16–17
- data redundancy, 9
- data sharing capabilities, 10
- defined, 8
- deleting
 - data deletion, 49–50
 - discussed, 18
- design principles
 - data division specifics, 29–32
 - data needs, obtaining and analyzing, 28–29
 - data type selection considerations, 32–33
 - efficiency, 30
 - primary key fields, 33–35
 - validation and efficiency, 153–154
- entering information in
 - new data inserts, 41–44
 - updates, 45–46
 - WHERE clause, 47–49
- extracting information from
 - aliases, 56
 - BETWEEN operator, 66–67
 - concatenation, 82
 - IN operator, 73–75
 - LIKE operator, 70–72
 - NOT LIKE operator, 72
 - NOT operator, 66
 - NULL values, 113–115
 - operator precedence, 62–65
 - ORDER BY clause, 75–79
 - results, filtering, 56–60
 - rows, returning values from, 55–56
 - SELECT statement, 53–54

databases (continued)

fields

- defined, 14
- field views, 292

front end programs, 10

history of, 7

Honeywell Information Systems, Inc., 7

IBM

- Command Center tool, 416
- concatenation, 85–88
- contact details screen, 413
- data type comparisons, 19
- discussed, 3
- history of, 7
- installation summary details, 415
- license agreement, 410
- login information, 412
- product links, 409–410
- protocol details, 414
- setup program, 409
- task scheduler options, 414
- Ted Codd (IBM research), 7
- tutorial information, 416
- typical installation option, 411

identification, 8

identifiers, 9, 16

keywords, 17

literals, 16

locking, 314

Microsoft Access

- blank database link, 424
- code views, 428
- concatenation, 82–85
- data type comparisons, 19
- default screen, 423
- design views, 427
- discussed, 3
- new table creation, 425
- query execution, 426
- SQL code, 425–426

Microsoft SQL Server

- authentication mode, 433
- computer selection, 430
- concatenation, 82–85
- data type comparisons, 19
- discussed, 3
- downloads, 429
- Enterprise Manager, tool, 435
- installation types, 431
- instance creation, 430
- instance name selection, 432
- Query Analyzer, 435–439
- services accounts, 433
- typical installation option, 432
- welcome screen, 429

MySQL

- account information, installation process, 394
- character set configuration, 398
- command line interface access, 401
- concatenation, 88–89
- concurrent connection selection, 397
- configuration options, 395–396
- confirmation message, installation options, 400
- data type comparisons, 19
- database install file, 391–392
- discussed, 3
- drive specification, 397
- execution options, 400
- license agreement, 392
- networking options, 398
- password information, 399
- Query Browser tool, 401–405
- typical installation option, 393
- usage options, 396–397
- Windows service options, 399

networks, 10

objects, 14

operating systems, 11

Oracle

- concatenation, 85–88
- configuration options, 446–447
- data type comparisons, 19
- discussed, 3
- download link, 444
- history of, 7
- installation types, 445
- SQL*Plus tool, 448–450
- welcome screen, 444

personal use, 10

queries

- defined, 9
- results, database extraction, 58–60

reasons for, 9–11

records, 8, 16

relational

- advantages of, 9
- corruption, 39
- defined, 8
- groups, 8
- organization, 14–16
- security control, 14
- structure of, 15

rows

- locking, 314
- returning values from, 55–56
- row views, 291

security advantages, 10

simple, 8

theory, 2

tuning

- caches, 352–355
- compartmentalized networks, 352
- files, 351
- filter redundancy, 363
- gigahertz networks, 352
- hardware, 349–350
- indexes, 357–361
- number-to-character conversions, 363
- pattern matching, 363

- processors, 351
- queries, 355–356
- reasons for, 356
- table scans, 361–362
- workstations, 350–351

well designed, 9

when to use, 9–11

date

- date and time data types, 24–25
- date data type, 21, 264
- datetime data type, 264
- day month_name year formats, 44
- literals, 58
- variations, 24–25
- year-month-day formats, 44

DAY () function, 178**day month_name year date formats, 44****DBAs (database administrators), 313****DBMS (database management systems), 8****DBMS_RANDOM package, 162****DBO (database owner), 329****DCL (Data Control Language), 11****deadlock locking level, 315–316****debugging, error messages, 26****decimals**

- decimal data type
 - numerical data, 23–24
 - storage allocation, 21
- decimal points, rounding numbers, 167

declarative languages, 12–13**default screen, Microsoft Access, 423****DELETE statement**

- subqueries, 259–260
- WHERE clause, 49–50

deleting

- columns from tables, 27
- data from databases, 49–50
- databases, 18
- tables, 27–28
- users, 331

deletion anomaly, 119

delimiters, 41

DESC **keyword, 142**

descending sorting order, 76

design

efficiency, 30

good database design principles

data division specifics, 29–32

data needs, obtaining and analyzing, 28–29

data type selection considerations, 32–33

primary key fields, 33–35

validation and efficiency, 153–154

indexes

b-tree structure, 357–358

character, 168–169

CREATE INDEX statement, 140

doubly linked lists, 359

dropping, 360

multicolumn, 154

results, speeding up, 139–143

when to use, 360–361

normalization guidelines

discussed, 117

first normal form, 118–119

second normal form, 119–121

third normal form, 121–123

transitive dependency, 121

validation

CHECK constraint, 125, 129–132

design improvement, 153–154

FOREIGN KEY constraint, 135–139

NOT NULL constraint, 124–125

performance improvement, 145–149

PRIMARY KEY constraint, 132–134

UNIQUE constraint, 125–129

design views, Microsoft Access installation, 427

DHCP (Dynamic Host Configuration Protocol), 350

DIFFERENCE () **function, 175–177**

discussion groups, author and peer, 5–6

DISTINCT **keyword**

SELECT statement, 55–56, 194

SUM () function, 197

division operator (/), 158

DML (Data Manipulation Language), 11

doubly linked lists, indexes, 359

downloading

Command Center tool, 416

Microsoft SQL Server, 429

Oracle, 444

Query Analyzer tool, 435

Query Browser tool, 401

source code, 4–5

drive specification, MySQL installation, 397

DROP COLUMN **statement, 27**

DROP DATABASE **statement, 18**

DROP INDEX **statement, 141, 143**

DROP TABLE **statement, 27**

DROP USER **statement, 331**

DROP VIEW **statement, 298**

dropping indexes, 360

duplication, data

duplicated values, avoiding, 142

overview, 30

Dynamic Host Configuration Protocol (DHCP), 350

E

efficiency improvements

data, 145–149

database design, 30

Enterprise Manager tool, Microsoft SQL Server database, 435

entries, data

new data inserts, 41–44

updates, 45–46

WHERE clause, 47–49

equals operator (=), 47

equijoins, 92, 208–210

erratas, 5

error messages

- debugging, 26
- subqueries, 238–239

escalation lock parameter, 316–317**Europe, date variations, 24****examples**

- database creation, 35–38
- normalization
 - first normal form, 118–119
 - second normal form, 120
 - third normal form, 121–122
- timetables, 26
- transactions, 303–304

Excel spreadsheets, database alternatives, 10**exclusive locking level, 315****execution options**

- Microsoft Access installation, 426
- MySQL installation, 400

EXISTS operator, 249–252**expressions, subqueries as, 238****extended privileges, 336–337****extraction, from databases**

- aliases, 56
- BETWEEN operator, 66–67
- concatenation, 82
- IN operator, 73–75
- LIKE operator, 70–72
- NOT LIKE operator, 72
- NOT operator, 66
- NULL values, 113–115
- operator precedence, 62–65
- ORDER BY clause, 75–79
- results, filtering, 56–60
- rows, returning values from, 55–56
- SELECT statement, 53–54

F**fault-tolerance, 350****FavCategory table**

- example code, 39
- initial data setup, 459–462

fields

- defined, 8, 14
- field views, 292

files

- comma-delimited, 41
- database tuning, 351
- .txt, 451

filtered windowed views, 292–293**filtering results, with WHERE clause, 56–58****first normal form, 118–119****fixed-length data types, 22****floating-point numbers, 23****FLOOR () function, 165****foreign keys**

- defined, 34
- FOREIGN KEY constraint, 135–139

foreign-based offices, date variations, 25**form formats, normalization**

- normal forms
 - discussed, 117
 - first normal, 118–119
 - second normal, 119–121
 - third normal, 121–123
- transitive dependency, 121

forums, author and peer discussions, 5–6**fractions, floating-point numbers, 23****Free Online Dictionary of Computing, 8****FROM clause, 271****front end programs, 10****FULL OUTER JOIN keyword, 225–226****functions**

- ABS (), 159–160, 181
- AVG (), 198–200
- case conversion, 170–171
- CAST (), 179–180
- CEILING (), 165
- COALESCE (), 180, 183–185
- CONCAT (), 85–86, 88–89
- CONCAT_WS (), 89
- COUNT (), 192–194
- DAY (), 178

functions (continued)

DIFFERENCE(), 175–177
FLOOR(), 165
LEN(), 172
LENGTH(), 172–174
LOWER(), 170
LTRIM(), 172
MAX(), 200–202
MID(), 169
MIN(), 200–202
MONTH(), 178
NULLIF(), 180
POWER(), 160–161, 181
RAND(), 162–163
REVERSE(), 171
RND(), 162
ROUND(), 163–167
RTRIM(), 172
SOUNDEX(), 175–177
sp_addlogin, 331
sp_defaultdb, 331
sp_denylogin, 331
sp_droplogin, 331
sp_grantdbaccess, 331
sp_grantlogin, 331
sp_helplogins, 331
sp_helpuser, 331
sp_password, 331
sp_revokedbaccess, 331
sp_revokelogin, 331
SQRT(), 162
SUBSTR(), 169
SUBSTRING(), 168–170
SUM(), 196–198
TRIM(), 172
UPPER(), 170
YEAR(), 178

G

gigahertz networks, database tuning, 352

granting privileges

GRANT ALL statement, 341

GRANT OPTION statement, 342–343

PUBLIC keyword, 342

tables and views, 341–342

granularity, locks, 313–314

greater than operator (>), 47

GROUP BY **clause**

HAVING clause, 202–205

overview, 189–191

grouped views, 340

grouping results, 189–191

groups

group access, 332–334

relational databases, 8

H

hard disk caches, 352–353

hardware, database tuning, 349–350

hash symbol (#), 58, 60, 113

HAVING **clause**

GROUP BY clause, 202–205

subqueries, 252–253

historical values, data selection, 90–94

history, databases, 7

Honeywell Information Systems, Inc.

(**database research**), 7

horizontal views, 339–340

hours, date and time data types, 24

I

IBM databases

Command Center tool

downloading, 416

Interactive tab, 418–420

Results tab, 422–423

Script tab, 416–417

concatenation, 85–88
 data type comparisons, 19
 discussed, 3
 history of, 7
 installing
 contact details screen, 413
 license agreement, 410
 login information, 412
 product links, 409–410
 protocol details, 414
 setup program, 409
 summary details, 415
 task scheduler options, 414
 tutorial information, 416
 typical installation, 411
 Ted Codd (IBM research), 7

identification

databases, 8
 group access, 332–334
 user security, 329–332

identifiers

defined, 9
 naming considerations, 25
 objects and, 16
 primary keys and, 34

IN operator

discussed, 62
 OR operator and, 73
 subqueries, 242–245
 WHERE clause, 74

inconsistent data problems, 321–322

indexes

b-tree structure, 357–358
 character, 168–169
 CREATE INDEX statement, 140
 doubly linked lists, 359
 dropping, 360
 multicolumn, 154
 results, speeding up, 139–143
 when to use, 360–361

INNER JOIN keyword

brackets around, 100–101
 as default join, 92
 linked tables, 95
 ON keyword, 91, 96
 results returned by, 94
 syntax, 91, 207

inner queries, 235–236

innermost queries, 236

input/output (I/O), 351

INSERT INTO statement

overview, 43–44
 SELECT statement, 185–187
 subqueries, 255–257
 syntax, 41

insert problems, transactions, 322

installation

IBM

contact details screen, 413
 license agreement, 410
 login information, 412
 product links, 409–410
 protocol details, 414
 setup program, 409
 summary details, 415
 task scheduler options, 414
 tutorial information, 416
 typical installation option, 411

Microsoft Access

blank database link, 424
 code views, 428
 default screen, 423
 design views, 427
 new table creation, 425
 query execution, 426
 SQL code, 425–426

Microsoft SQL Server

authentication mode, 433
 computer selection, 430
 downloads, 429
 installation types, 431

installation (continued)

Microsoft SQL Server (continued)

- instance creation, 430
- instance name selection, 432
- services accounts, 433
- setup complete screen, 434
- typical installation option, 432
- welcome screen, 429

MySQL

- account information, 394
- character set configuration, 398
- command line interface access, 401
- concurrent connection selection, 397
- configuration options, 395–396
- confirmation message, 400
- database install file, 391–392
- drive specification, 397
- execution options, 400
- license agreement, 392
- networking options, 398
- password information, 399
- typical installation option, 393
- usage options, 396–397
- Windows service options, 399

Oracle

- configuration options, 446–447
- download link, 444
- installation types, 445
- welcome screen, 444

instances, Microsoft SQL Server installation, 430, 432

int **data type**

- discussed, 180
- storage allocation, 21
- UNION operator, 227

Interactive tab (Command Center tool), 418–420

I/O (input/output), 351

IS NOT NULL **operator, 114**

IS NULL **operator, 114**

ISO (International Standards Organization), 2

isolation levels, transactions

- READ UNCOMMITTED statement, 319–320
- REPEATABLE READ statement, 319
- SERIALIZABLE statement, 318–319
- SET TRANSACTION statement, 318
- versioning, 320

italicized text, 4

J

joins

- cross, 213–214
- data sets, 102–106
- diagram, 93
- equijoins, 92, 208–210
- INNER JOIN keyword
 - brackets around, 100–101
 - as default join, 92
 - linked tables, 95
 - ON keyword, 91, 96
 - results returned by, 94
 - syntax, 91, 207
- JOIN keyword, 90
- multiple, 210–213
- non-equijoins, 209
- ON keyword, 209
- OUTER JOIN keyword
 - discussed, 218
 - FULL OUTER JOIN keyword, 225–226
 - LEFT OUTER JOIN keyword, 219–221
 - RIGHT OUTER JOIN keyword, 221–225
- reasons for, 90
- record sets, 102–106
- self, 214–218
- syntax, 91

K

keys

- foreign keys
 - defined, 34
 - FOREIGN KEY constraint, 135–139

primary keys
 database creation example, 37
 defined, 33
 identifiers and, 34
 NULL values, 132
 PRIMARY KEY constraint, 132–134
 uses for, 34

keywords

AS, 56
 CASCADE, 298, 346–347
 CHECK OPTION, 295–298
 defined, 17
 DESC, 142
 DISTINCT, 55–56, 194
 INNER JOIN
 brackets around, 100–101
 as default join, 92
 linked tables, 95
 ON keyword, 91, 96
 JOIN, 90
 ON
 INNER JOIN keyword, 91, 96
 joins, 209
 results returned by, 94
 syntax, 91, 207
 OUTER JOIN
 discussed, 218
 FULL OUTER JOIN, 225–226
 LEFT OUTER JOIN, 219–221
 RIGHT OUTER JOIN, 221–225
 PUBLIC, 342
 RESTRICT
 discussed, 298
 revoking privileges, 346–347
 rules, 17
 transaction, 307

L

languages

comparisons between, 12–13
 DCL (Data Control Language), 11

declarative, 12–13
 DML (Data Manipulation Language), 11
 procedural, 12–13
 SQL (Structured Query Language)
 procedural language comparisons, 12–13
 queries, 11–12
 SQL-86 updates, 13
 SQL-89 updates, 13
 SQL-92 updates, 13
 SQL-99 updates, 13
 SQL-2003 updates, 13
 SQL*Plus tool, Oracle database, 448–450

leaves, b-trees, 357

LEFT OUTER JOIN **keyword, 219–221**

LEN() **function, 172**

LENGTH() **function, 172–174**

less than operator (<), 47

levels, locks, 314–316

license agreements

IBM installation, 410
 MySQL installation, 392

LIKE operator

case-sensitivity, 70–72
 discussed, 62

literals

dates, 58
 defined, 16

loading

Command Center tool, 416
 Microsoft SQL Server, 429
 Oracle, 444
 Query Analyzer tool, 435
 Query Browser tool, 401
 source code, 4–5

Location table, initial data setup, 458–459

locks, transactions

granularity, 313–314
 levels, 314–316
 optimistic, 318
 parameters, setting, 316–318
 pessimistic, 318

logical operators, 48–49

login information, IBM installation, 412

logs, transaction, 312–313

lost update problems, 320–321

LOWER () function, 170

LTRIM () function, 172

M

main program screen, Query Browser tool, 403

master database records, Query Analyzer tool, 435

math operations

addition (+) operator, 158

division (/) operator, 158

functions

ABS (), 159–160, 181

CEILING (), 165

FLOOR (), 165

POWER (), 160–161, 181

RAND (), 162–163

RND (), 162

ROUND (), 163–164, 166–168

SQRT (), 162

multiplication (*) operator, 158

subtraction (-) operator, 158

MAX () function, 200–202

MemberDetails table, initial data setup, 452–455

memory

data types, 19

database caches, 354–355

methods. See functions

Microsoft Access databases

concatenation, 82–85

data type comparisons, 19

installing

blank database link, 424

code views, 428

default screen, 423

design views, 427

new table creation, 425

query execution, 426

SQL code, 425–426

overview, 3

Microsoft SQL Server databases

concatenation, 82–85

data type comparisons, 19

discussed, 3

Enterprise Manager tool, 435

installing

authentication mode, 433

computer selection, 430

downloads, 429

installation types, 431

instance name selection, 432

services accounts, 433

setup complete screen, 434

typical installation option, 432

welcome screen, 429

instance creation, 430

Query Analyzer tool

authentication options, 435

downloading, 435

master database records, 435

multiple queries, 439

Object Browser window, 437–438

temporary databases, 437

MID () function, 169

MIN () function, 200–202

minutes, date and time data types, 24

MONTH () function, 178

multiplication operator (*), 158

multiprocessing, processors, 351

MySQL Server databases

concatenation, 88–89

data type comparisons, 19

discussed, 3

installing

account information, 394

character set configuration, 398

command line interface access, 401

- concurrent connection selection, 397
- configuration options, 395–396
- confirmation message, 400
- database install file, 391–392
- drive specification, 397
- execution options, 400
- license agreement, 392
- networking options, 398
- password information, 399
- typical installation option, 393
- usage options, 396–397
- Windows service options, 399

Query Browser tool

- connection information, 402, 404–405
- downloading, 401
- main program screen, 403
- reference guide, 408
- schema information, 404
- SQL execution information, 404

N

naming considerations

- data types, 154
- database creation example, 36
- identifiers, 25
- punctuation issues, 18
- tables, 154

nchar **data type, 20**

nesting

- queries, 212
- subqueries, 256

networks

- database tuning, 352
- network databases, 10
- networking options, MySQL installation, 398

NICs (network interface cards), 352

non-English characters, 32

normalization

- normal forms
 - discussed, 117
 - first normal, 118–119

- second normal, 119–121
- third normal, 121–123
- transitive dependency, 121

NOT IN **operator, 244**

NOT LIKE **operator, 72**

NOT NULL **constraint, 124–125**

NOT **operator, 62, 65–66**

NULL values

- data extraction values, 113–115
- IS NOT NULL operator, 114
- IS NULL operator, 114
- NULLIF () function, 180
- numerics, 180–181
- ORDER BY clause, 113
- primary keys, 132
- strings and, 182
- UNION operator, 232
- unknown values, 113

numbers

- absolute values, 159–160
- data type selection considerations, 32
- floating-point, 23
- NULL values, 180–181
- number-to-character conversions, 363
- random, 162–163
- rounding, 163–167

numerical data

- data types, 23–24, 179
- delimiters around, 41

nvarchar **data type, 20**

O

Object Browser window, Query Analyzer tool, 437–438

objects

- defined, 14
- security, 328, 335

ON **keyword**

- INNER JOIN keyword, 91, 96
- joins, 209

operating systems, 11

operators

addition (+), 158

ALL

discussed, 62

subqueries, 247–249

UNION operator, 229

AND

discussed, 62

WHERE clause, 48, 63

ANY, 245–247

BETWEEN, 62, 66–67

comparison, 47–48

division (/), 158

EXISTS, 249–252

IN

discussed, 62

OR operator and, 73

subqueries, 242–245

WHERE clause, 74

IS NOT NULL, 114

IS NULL, 114

LIKE, 62, 70–72

logical, 48–49

math, 157–159

multiplication (*), 158

NOT, 62, 66

NOT IN, 244

NOT LIKE, 72

operator precedence, 62–65

OR

discussed, 62

IN operator and, 73

WHERE clause, 48, 63

SOME

discussed, 62

subqueries, 245–247

subtraction (-), 158

UNION

ALL statement, 229

discussed, 226

int data type, 227

NULL value, 232

ORDER BY clause, 230–231

SELECT statement, 228

optimistic locking, 318

OR operator

discussed, 62

IN operator and, 73

WHERE clause, 48, 63

Oracle databases

concatenation, 85–88

data type comparisons, 19

discussed, 3

history of, 7

installing

configuration options, 446–447

download link, 444

installation types, 445

welcome screen, 444

SQL*Plus tool, 448–450

ORDER BY clause

date functions, 178

NULL value, 113

SELECT statement, 54, 75

sorting orders, 75–79

UNION operator, 230–231

organization

columns, 31

database design techniques, 28–32

relational databases, 14–16

OUTER JOIN keyword

discussed, 218

FULL OUTER JOIN keyword, 225–226

LEFT OUTER JOIN keyword, 219–221

RIGHT OUTER JOIN keyword, 221–225

outer queries, 235

ownership, privileges, 337

P

pages, locking, 314

parameters, locks, 316–318

passwords

- group access, 333
- IBM installation, 412
- MySQL installation, 399
- SQL*Plus tool, 448

pattern matching, database tuning, 363**peer and author discussions, 5–6****percent sign (%), 70****performance improvement**

- table scans, 362
- validation, 145–149

personal use databases, 10**pessimistic locking, 318****pipe character (|), 85****POWER() function, 160–161, 181****precedence, operator, 62–65****primary keys**

- database creation example, 37
- defined, 33
- identifiers and, 34
- NULL values, 132
- PRIMARY KEY constraint, 132–134
- uses for, 34

privileges

- discussed, 328
- extended, 336–337
- granting
 - GRANT ALL statement, 341
 - GRANT OPTION statement, 342
 - PUBLIC keyword, 342
 - tables and views, 341–342
- ownership, 337
- revoking
 - CASCADE keyword, 346–347
 - with GRANT OPTION statement, 345–346
 - RESTRICT keyword, 346–347
 - REVOKE statement, 344–345

problems, transactions

- inconsistent data, 321–322
- inserts, 322
- lost updates, 320–321
- uncommitted data, 321

procedural languages, SQL comparisons, 12–13**processor caches, 352****product links, IBM installation, 409–410****programs, front end, 10****protocol details, IBM installation, 414****protocols, DHCP (Dynamic Host Configuration Protocol), 350****P2P forums, author and peer discussions, 5–6****PUBLIC keyword, 342****Q****queries**

- base, 290
- clauses, 12
- conditions, 12
- database tuning, 355–356
- defined, 9
- examples of, 11–12
- executing, Microsoft Access installation, 426
- inner, 235–236
- innermost, 236
- nesting, 212
- outer, 235
- results, database extraction, 58–60
- statements, 12
- subqueries
 - ALL operator, 247–249
 - ANY operator, 245–247
 - correlated, 253–255
 - DELETE statement, 259–260
 - discussed, 235
 - error messages, 238–239
 - EXISTS operator, 249–252
 - as expressions, 238
 - HAVING clause, 252–253
 - IN operator, 242–245
 - INSERT INTO statement, 255–257
 - nesting, 256
 - scalar, 236
 - SELECT statement, 236–240

queries (continued)

- subqueries (continued)
 - SOME operator, 245–247
 - UPDATE statement, 257–259
 - WHERE clause, 236, 240–242
- writing queries
 - difficult queries, 270–274
 - good queries, 283–285

Query Analyzer tool

- authentication options, 435
- database creation example, 17
- downloading, 435
- master database records, 435
- multiple queries, 439
- Object Browser window, 437–438
- temporary databases, 437

Query Browser tool, MySQL

- connection information, 402, 404–405
- downloading, 401
- main program screen, 403
- reference guide, 408
- schema information, 404
- SQL execution information, 404

question mark (?), 70

R

RAND () **function, 162–163**

random numbers, 162–163

range of values, retrieving, 66–67

READ UNCOMMITTED **statement, 319–320**

real **data type**

- numerical data, 23–24
- storage allocation, 21

records

- active, 301
- defined, 8, 16
- sets
 - combining, 226–230
 - joins, 102–106
- updating, 48

redundancy

- normalization, 121
- well designed databases, 9

reference guide, Query Browser tool, 408

REFERENCES **statement**

- discussed, 139
- extended privileges, 336–337

registration, P2P forums, 5

relational databases

- advantages of, 9
- corruption, 39
- defined, 8
- groups, 8
- organization, 14–16
- security control, 14
- structure of, 15

REPEATABLE READ **statement, 319**

requirement details, database creation, 35

RESTRICT **keyword**

- discussed, 298
- revoking privileges, 346–347

restrictions, updating views, 295

results

- adding, 196–197
- averages, 198–200
- combining, 226–230
- counting, 192–194
- database extraction, 56–60
- filtering, 57
- grouping, 189–191
- indexes, 139–143
- ordering, 75–79

Results tab (Command Center tool), 422–423

REVERSE () **function, 171**

revoking privileges

- CASCADE keyword, 346–347
- with GRANT OPTION statement, 345–346
- RESTRICT keyword, 346–347
- REVOKE statement, 344–345

RIGHT OUTER JOIN **keyword, 221–225**

RND () **function, 162**

ROLLBACK **statement**, 307–308
 ROLLBACK TRANSACTION **statement**,
 310–311

ROUND () **function**, 163–167

rows, databases

locking, 314
 returning values from, 55–56
 row views, 291

RTRIM () **function**, 172

S

SAs (system administrators), 329

SAVE TRANSACTION **statement**, 309

savepoints, 309

scalar subqueries, 236

schema information, Query Browser tool, 404

Script tab (Command Center tool), 416–417

second normal form, 119–121

seconds, date and time data types, 24

security

authentication, 433, 435
 concepts, 328
 database advantages, 10
 DCL (Data Control Language), 11
 objects, 328, 335
 privileges
 discussed, 328
 extended, 336–337
 granting, 341–343
 ownership, 337
 revoking, 344–347
 usage, 337
 relational databases, 14
 user security
 ALTER USER statement, 331
 CREATE USER statement, 330
 deleting users, 331
 discussed, 328
 DROP USER statement, 331

group access, 332–334

user IDs, 329–332

validation

CHECK constraint, 125, 129–132
 design improvement, 153–154
 FOREIGN KEY constraint, 135–139
 NOT NULL constraint, 124–125
 performance improvement, 145–149
 PRIMARY KEY constraint, 132–134
 UNIQUE constraint, 125–129

views and

grouped views, 340
 horizontal views, 339–340
 limitations, 341
 vertical views, 337–338

SELECT **statement**

AS keyword, 56
 difficult queries, 271
 DISTINCT keyword, 55–56, 194
 INSERT INTO statement, 185–187
 ORDER BY clause, 54, 75
 subqueries, 236–240
 syntax, 53
 UNION operator, 228
 WHERE clause, 56–57

self-joins, 214–218

SERIALIZABLE **statement**, 318–319

services accounts, Microsoft SQL Server
 installation, 433

SET **clause**, 46

SET TRANSACTION **statement**, 318

sets, records

combining, 226–230
 joins, 102–106

setup complete screen, Microsoft SQL Server
 installation, 434

setup program, IBM installation, 409

shared locking level, 315

sharing data, 10

simple databases, 8

size, locking parameters, 316

`smallint` **data type, 21**

SOME operator

- discussed, 62
- subqueries, 245–247

sorting orders

- ascending, 77
- descending, 76
- `ORDER BY` clause, 75–79
- random numbers, 163
- using commas, 78

`SOUNDEX()` **function, 175–177**

source code, downloading, 4–5

spaces

- between aliases, 87
- between code, 17

`sp_addlogin` **function, 331**

`sp_defaultdb` **function, 331**

`sp_denylogin` **function, 331**

`sp_droplogin` **function, 331**

`sp_grantdbaccess` **function, 331**

`sp_grantlogin` **function, 331**

`sp_helplogins` **function, 331**

`sp_helpuser` **function, 331**

splitting data into tables, 119

`sp_password` **function, 331**

spreadsheets, database alternatives, 10

`sp_revokedbaccess` **function, 331**

`sp_revokelogin` **function, 331**

SQL (Structured Query Language)

- procedural language comparisons, 12–13
- queries, 11–12
- SQL-86 updates, 13
- SQL-89 updates, 13
- SQL-92 updates, 13
- SQL-99 updates, 13
- SQL-2003 updates, 13
- SQL*Plus tool, Oracle database, 448–450

`SQRT()` **function, 162**

square root functions, 162

stand-alone applications, 11

standards

ANSI (American National Standards Institute), 2, 305

ASCII (American Standard Code for Information Interchange), 22

ISO (International Standards Organization), 2

`START` **command, 451**

statements. See also clauses

`ALTER COLUMN`, 124

`ALTER TABLE`, 26–27

`ALTER TABLE MODIFY`, 124

`ALTER USER`, 331

`BEGIN TRANSACTION`, 306, 308

`COMMIT`, 306–308

`COMMIT TRANSACTION`, 308

`CREATE DATABASE`, 17

`CREATE INDEX`, 140

`CREATE TABLE`, 25–26

`CREATE USER`, 330

`CREATE VIEW`, 290

defined, 12, 16

`DELETE`

- subqueries, 259–260

- `WHERE` clause, 49–50

`DROP COLUMN`, 27

`DROP DATABASE`, 18

`DROP INDEX`, 141, 143

`DROP TABLE`, 27

`DROP USER`, 331

`DROP VIEW`, 298

`GRANT ALL`, 341

`GRANT OPTION`, 342–343

`INSERT INTO`

- overview, 43–44

- `SELECT` statement, 185–187

- subqueries, 255–257

- syntax, 41

`READ UNCOMMITTED`, 319–320

`REFERENCES`

- extended privileges, 336–337

- overview, 139

- REPEATABLE READ, 319
- REVOKE, 344–345
- ROLLBACK, 307–308
- ROLLBACK TRANSACTION, 310–311
- SAVE TRANSACTION, 309
- SELECT
 - AS keyword, 56
 - difficult queries, 271
 - DISTINCT keyword, 55–56, 194
 - INSERT INTO statement, 185–187
 - ORDER BY clause, 54, 75
 - subqueries, 236–240
 - syntax, 53
 - UNION operator, 228
 - WHERE clause, 56–57
- SERIALIZABLE, 318–319
- SET TRANSACTION, 318
- UPDATE
 - addresses, 45–46
 - SET clause, 46
 - subqueries, 257–259
 - syntax, 45
 - WHERE clause, 45–46
- USAGE, 337
- VALUES, 41
- storage**
 - data types
 - discussed, 20–21
 - selection considerations, 32
 - databases, history of, 7
 - design practices, 28
 - indexes, 358
- stored procedures, 331**
- strings**
 - case conversion functions, 170–171
 - character string data types, 22–23
 - date functions, 178
 - DIFFERENCE() function, 175–177
 - LENGTH() function, 172–174
 - LOWER() function, 170
 - LTRIM() function, 172
 - NULL values and, 182
 - REVERSE() function, 171
 - RTRIM() function, 172
 - SOUNDEX() function, 175–177
 - SUBSTR() function, 169
 - SUBSTRING() function, 168–170
 - TRIM() function, 172
 - UPPER() function, 170
- Structured Query Language. See SQL styles, text, 4**
- subqueries**
 - ALL operator, 247–249
 - ANY operator, 245–247
 - correlated, 253–255
 - DELETE statement, 259–260
 - discussed, 235
 - error messages, 238–239
 - EXISTS operator, 249–252
 - as expressions, 238
 - HAVING clause, 252–253
 - IN operator, 242–245
 - INSERT INTO statement, 255–257
 - nesting, 256
 - scalar, 236
 - SELECT statement, 236–240
 - SOME operator, 245–247
 - UPDATE statement, 257–259
 - WHERE clause, 236, 240–242
- SUBSTR() **function, 169**
- SUBSTRING() **function, 168–170**
- subtraction operator (-), 158**
- SUM() **function, 196–198**
- summaries**
 - summary details, IBM installation, 415
 - summary of data, 189
 - summary views, 293–294
- symbols, aliases, 56**
- syntax. See also code**
 - CAST() function, 180
 - CEILING() function, 165
 - CREATE TABLE statement, 25

syntax (continued)

- cross joins, 213
- DAY () function, 178
- defined, 16
- DIFFERENCE () function, 176
- DROP TABLE statement, 27
- DROP VIEW statement, 298
- equijoins, 208
- FLOOR () function, 165
- FOREIGN KEY constraint, 137
- FULL OUTER JOIN keyword, 225
- INNER JOIN keyword, 91, 207
- INSERT INTO statement, 41, 185
- joins, 91
- LEFT OUTER JOIN keyword, 219
- MONTH () function, 178
- POWER () function, 160
- RIGHT OUTER JOIN keyword, 221
- ROUND () function, 167
- SELECT statement, 53
- SOUNDEX () function, 175
- SQRT () function, 162
- SUBSTRING () function, 168
- SUM () function, 196
- UPDATE statement, 45
- YEAR () function, 178

system administrators (SAs), 329

T

table scans, 361–362

tables. See also databases

- altering, 26–27
- Attendance
 - example code, 37
 - initial data setup, 466–469
- Category, initial data setup, 452
- columns
 - aliases, 56
 - ALTER COLUMN statement, 124
 - defined, 16

- deleting, 27
- dropping, 27
- good design example, 30–31
- joining, 91
- locking, 314
- multicolumn indexes, 154
- organization, 31
- sorting order, 75–79
- creating, 25–26, 39
- data
 - copying, 185
 - summaries, 189
- defined, 8
- deleting, 27–28
- example of, 14
- FavCategory, initial data setup, 459–462
- good design example, 29–30
- joining
 - cross joins, 213–214
 - multiple joins, 210–213
 - self-joins, 214–218
- Location, initial data setup, 458–459
- locking, 314
- MemberDetails, initial data setup, 452–455
- naming considerations, 154
- normalization
 - first normal form, 118–119
 - second normal form, 119–121
 - third normal form, 121–123
- privileges, granting, 341–342
- records, sets, 102–106
- relationships between, 135
- splitting data into, 119
- table join views, 290
- views and, 341
- virtual, 288

tabs, Command Center tool

- Interactive tab, 418–420
- Results tab, 422–423
- Script tab, 416–417

task scheduler options, IBM installation, 414

telephone numbers, data type selection**considerations, 32****temporary databases, Query Analyzer tool, 437****text**

italicized, 4

styles, 4

text-based information, data type selection considerations, 32

text-based operators, 47

text files, database alternatives, 10**third normal form, 121–123****time**

date and time data types, 24–25

time data type, 21

timetable example, 26

timeout lock parameter, 317–318**tools**

Command Center

downloading, 416

Interactive tab, 418–420

Results tab, 422–423

Script tab, 416–417

Query Analyzer

authentication options, 435

database creation example, 17

downloading, 435

master database records, 435

multiple queries, 439

Object Browser window, 437–438

temporary databases, 437

Query Browser

connection information, 402, 404–405

downloading, 401

main program screen, 403

reference guide, 408

schema information, 404

SQL execution information, 404

SQL*Plus, 448–450

transactions

ACID (Atomic, Consistent, Isolated, Durable) test, 302

active records, 301

ANSI standard, 305

autocommit, 307

BEGIN TRANSACTION statement, 306, 308

COMMIT TRANSACTION statement, 308

example data, 303–304

isolation levels

READ UNCOMMITTED statement, 319–320

REPEATABLE READ statement, 319

SERIALIZABLE statement, 318–319

SET TRANSACTION statement, 318

versioning, 320

keywords, 307

locks

granularity, 313–314

levels, 314–316

optimistic, 318

parameters, setting, 316–318

pessimistic, 318

overview, 301

problems

inconsistent data, 321–322

inserts, 322

lost updates, 320–321

uncommitted data, 321

ROLLBACK statement, 307–308

ROLLBACK TRANSACTION statement, 310–311

SAVE TRANSACTION statement, 309

savepoints, 309

transaction logs, 312–313

transitive dependency, 121**TRIM() function, 172****tuning databases**

caches

database, 354–355

hard disk, 352–353

processor, 352

tuning databases (continued)

- compartmentalized networks, 352
- files, 351
- filter redundancy, 363
- gigahertz networks, 352
- hardware, 349–350
- indexes
 - b-tree structure, 357–358
 - database storage requirements, 358
 - doubly linked lists, 359
 - dropping, 360
 - when to use, 360–361
- number-to-character conversions, 363
- pattern matching, 363
- processors, 351
- queries, 355–356
- reasons for, 356
- table scans, 361–362
- workstations, 350–351

Turing Award (Charles W. Bachman), 7

tutorial information, IBM installation, 416

.txt files, 451

typical installation option

- IBM database, 411
- Microsoft SQL Server installation, 432
- MySQL database, 393

U

uncommitted data problems, 321

underscore (_), 70

Unicode character set, 20, 22

UNION operator

- ALL statement, 229
- discussed, 226
- int data type, 227
- NULL value, 232
- ORDER BY clause, 230–231
- SELECT statement, 228

UNIQUE constraint, 125–129

United Kingdom, date variations, 25

United States, date variations, 24

unknown values, NULL values, 113

UPDATE statement

- addresses, 45–46
- SET clause, 46
- subqueries, 257–259
- syntax, 45
- WHERE clause, 45–46

updates

- database records, logical operators and, 49
- lost update problems, 320–321
- SQL, 13
- views
 - CHECK OPTION keyword, 295–298
 - restrictions, 295

upgrades, workstations, 350

UPPER() function, 170

U.S. (United States), date variations, 24

usage options, MySQL installation, 396–397

USAGE statement, 337

user security

- ALTER USER statement, 331
- CREATE USER statement, 330
- deleting users, 331
- discussed, 328
- DROP USER statement, 331
- group access, 332–334
- user IDs, 329–332

V

validation

- CHECK constraint, 125, 129–132
- design improvement, 153–154
- FOREIGN KEY constraint, 135–139
- NOT NULL constraint, 124–125
- performance improvement, 145–149
- PRIMARY KEY constraint, 132–134
- UNIQUE constraint, 125–129

values

- absolute, 159–160
- duplicate, avoiding, 142

historical, data selection, 90–94

NULL values

data extraction values, 113–115

IS NOT NULL operator, 114

IS NULL operator, 114

NULLIF () function, 180

numerics, 180–181

ORDER BY clause, 113

primary keys, 132

strings and, 182

UNION operator, 232

unknown values, 113

retrieving

ranges, 66–67

from rows, 55–56

VALUES statement, 41

varchar **data type, 22**

variable length data types, 22

versioning, isolation levels, 320

vertical views, 337–338

views

base, 290–291

benefits, 287–288

CREATE VIEW statement, 290

creation, 288–289

defined, 287

dropping, 298

field, 292

grouped, 340

horizontal, 339–340

limitations, 287, 341

privileges, granting, 341–342

row, 291

summary, 293–294

table join, 290

tables and, 341

updating

CHECK OPTION keyword, 295–298

overview, 294

restrictions, 295

vertical, 337–338

windowed, 292–293

virtual tables, 288

W

welcome screen

Microsoft SQL Server installation, 429

Oracle installation, 444

WHERE clause

AND operator, 48, 63

comparison operators, 47

DELETE statement, 49–50

DIFFERENCE () function, 177

filtering results with, 56–58

IN operator, 74

logical operators, 48

operator precedence, 64

OR operator, 48, 63

SELECT statement, 56–57

subqueries, 236, 240–242

UPDATE statement, 45–46

wildcard characters

* (asterisk), 70

multiple use, 71

% (percent sign), 70

? (question mark), 70

_ (underscore), 70

Window service options, MySQL installation, 399

windowed views, 292–293

workstations, database tuning, 350–351

Wrox, P2P forums, 5–6

Y

YEAR () function, 178

year-month-day data formats, 44

