

Index

Symbols and Numerics

- * (asterisk), 458
- ^ (caret), 457
- [^] (caret within square brackets), 457
- :
- \$ (dollar sign), 457
- .
- () (parentheses), 459
- | (pipe symbol), 458
- + (plus sign), 458
- ? (question mark), 457
- ;
- [] (square brackets), 457
- \ (backslash), 458
- \n (backreference), 459
- 1 to 1, arc tangent of ($\text{ACOS}(n)$), 275
- 1NF (First Normal Form), 56–59
- 2NF (Second Normal Form), 59–60
- 2.71828183 raised to the exp power ($\text{EXP}(\text{exp})$), 277
- 3NF (Third Normal Form), 60

A

- absolute value ($\text{ABS}(n)$), 275
- access control
 - ACL security, 533–535
 - described, 78
 - encryption, 80–81
 - PL/SQL security, 348
 - views, 79–80
 - VPD, 81–85
 - XML DB repository, 522–533
- access path, 717–718
- accountability, security, 85–88
- ACL (access control list), 533–535
- actions
 - FOREIGN KEY constraint, setting, 224
 - users, auditing, 85–87

adding

- data creating phantom read, 32–33
- data (INSERT statement), 153–155
- months ($\text{ADD_MONTHS}(\text{arg1}, \text{num})$), 288–289
- returned value of $\text{exp}(\text{SUM}(\text{exp}))$, 274

administration page, 591–593

administrator account, HTML-DB, 584, 590

Advanced Encryption Standard (AES), 91

Advanced Queuing (AQ)

- capture, 256–257
- consumption, 258
- rules, 258
- staging, 257
- streams, 255–256, 635–637

Advanced Security Option (ASO), 91–92

AES (Advanced Encryption Standard), 91

aggregate, cumulative, 675–678

aggregate functions

- coefficient of correlation of pair of numbers
 - ($\text{CORR}(\text{exp1}, \text{exp2})$), 269
- column, average ($\text{AVG}(\text{col_name})$), 269
- described, 268
- information (GROUP BY clause), 144–146
- inverse distribution with continuous model
 - ($\text{PERCENTILE_CONT}(\text{exp} \dots) \text{ WITHIN GROUP (ORDER BY exp)}$), 272
- inverse distribution with discrete model
 - ($\text{PERCENTILE_DISC}(\text{exp} \dots) \text{ WITHIN GROUP (ORDER BY exp)}$), 273
- maximum value of exp argument ($\text{MAX}(\text{exp})$), 271–272
- median value of exp argument ($\text{MEDIAN}(\text{exp})$), 272
- minimum value of exp argument ($\text{MIN}(\text{exp})$), 272
- number, assigning to groups ($\text{GROUP_ID}()$), 271
- percent rank of selected row
 - ($\text{PERCENT_RANK}(\text{exp} \dots) \text{ WITHIN GROUP (ORDER BY exp)}$), 273
- population covariance of pair of numbers
 - ($\text{COVAR_POP}(\text{exp1}, \text{exp2})$), 270
- population variance minus NULL values
 - ($\text{VAR_POP}(\text{exp})$), 274

aggregate functions (continued)

- rank of expression `exp` (`RANK (exp ...)` WITHIN GROUP (ORDER BY `exp`)), 273
- rank of row within group (`DENSE_RANK (exp1, ...)` WITHIN GROUP (ORDER BY)), 271
- relative position of row within group (`CUME_DIST (exp1, ...)` WITHIN GROUP (ORDER BY)), 270–271
- rows, counting non-null (`COUNT ([DISTINCT] exp)`), 269–270
- sample covariance of pair of numbers (`COVAR_SAMP (exp1, exp2)`), 270
- sample standard deviation of `exp` (`STDDEV (exp)`), 273
- sample variance minus NULL values (`VAR_SAMP (exp)`), 274
- SQL trace file (TKPROF), 712–714
- square root of cumulative population standard deviation (`STDDEV_POP (exp)`), 274
- square root of cumulative standard deviation (`STDDEV_SAMP (exp)`), 274
- sums returned value of `exp` (`SUM (exp)`), 274
- variance of values in `exp` (`VARIANCE (exp)`), 275

aliases, 137–138

`ALTER statement`, 133–134

`ALTER TABLE command`, 233–234

alternate keys, 61

American National Standards Institute (ANSI), 130, 150

analysis, business intelligence

- cumulative and moving aggregates, 675–678
- data mining, 686–687
- first and last functions, 679–680
- lag and lead functions, 678–679
- linear regression, hypothetical ranking, and width
 - bucket functions, 680–682
- OLAP, 682–686
- ranking and percentiles, 672–675
- tools, 671–672

Analytic Workspace (AW), 652

Analytic Workspace Manager (AWM), 683, 685

annotation, 548–553

anonymous block, PL/SQL, 327

ANSI (American National Standards Institute), 130, 150

Apache Tomcat, 573–574

API (Application Programming Interface)

- Java, 401, 506
- OCI, 124
- OLAP, 685
- OracleAS TopLink, 410–411

application developer. See developer

Application Server Control, 635–637

Application Server (Oracle), 407–408

applications

- client
 - installing Oracle, 123–127
 - regular expressions presenting data, 461
- context, limiting views, 82
- home, creating, 588–591
- regular expressions presenting data, 461
- requests, handling
 - background processes, 3
 - clustering, 6
 - control file, 4
 - illustrated, 2
 - initialization files, 3–4
 - Listener process, 3
 - memory used by, 4–5
 - redo log files, 4
 - rollback segments, 4
 - starting, 2–3
- rule checking from, 240

AQ (Advanced Queuing)

- capture, 256–257
- consumption, 258
- rules, 258
- staging, 257
- streams, 255–256, 635–637

ARC (Archiver), 3

arc sine (ASIN(*n*)), 275

arc tangent

- of (`ATAN(n)`), 276
- of -1 to 1 (`ACOS(n)`), 275
- of two arguments (`ATAN2(n, m)`), 276

architecture

- instance, 2–6
- regular expressions, 475
- relational databases, 1, 2

Archiver (ARC), 3

argument

- arc tangent of two (`ATAN2(n, m)`), 276
- comparing (`NULLIF (exp1, exp2)`), 306
- concatenating (`XMLFOREST (exp AS alias_name, ...)`), 312
- length of (`LENGTH (arg1)`), 282
- size, (`VSIZE (arg1)`), 309

argument, first raised to the power of the second

(`POWER(n, n2)`), 278

arithmetic operators, 331

arrays, associative

- collections, 364–365, 369
- SQL within PL/SQL, 364–365

ASO (Advanced Security Option), 91–92

assigning, from one collection to another, 366–367

association, UML mapping, 500

associative arrays

- collections, 364–365, 369
- SQL within PL/SQL, 364–365

asterisk (*), 458

attributes

- dependencies, verifying (3NF), 60
- elementary, 478
- Java classes, 402
- SQL cursors, 353
- table column, assigning set, 479–480
- UML mapping, 500
- value constructor, OT, 498

auditing user actions

- actions, specific types, 86
- details of actions, 86–87
- privileges, 86
- proxy user, 88
- recording, 87
- SQL statements, 85
- tool (AUDIT), 85

Ault, Michael (Oracle Administration And Management), 7

authenticating users

- links, 317
- smart cards and biometric identification, 70
- SQL statements governing (CREATE USER and ALTER USER), 70–73
- user ID and password, 69–70

authorizing users

- described, 73
- object privileges, 74
- roles, 75–78
- stored procedures, 78
- system privileges, 74

automatic tracing of SQL statements (AUTOTRACE), 709

averaging column, 269

AW (Analytic Workspace), 652

AWM (Analytic Workspace Manager), 683, 685

B

background processes, 3

backreference (\n), 459

backslash (\), 458

backups, 90

batch updates, 418

BFILE function (BFILENAME(dir, file)), 303

binary data

- alternate value with NaN (NANVL(n, n2)) (BINARY_FLOAT or BINARY_NUMBER), 278

format (BINARY), 11

more than 4,000 characters (BLOB), 10

bind variables

- performance, 23–25
- to SQL statement, 20–21

bitmap index

- accessing, 701
- business intelligence query, 658
- described, 202–203
- impact, 204–206
- joins, 206–207
- structure, 203–204

block header, PL/SQL

- overloading, 327
- parameter notation, 327
- syntax, 326

block size, tablespace, 7

BluePrints (Java)

- described, 406–408
- inside database, 412–413
- JDBC and persistence frameworks, 408–411
- outside database, 411–412

body code, PL/SQL listed, 384–386

boolean values

- CHECK constraints, 226–229
- PL/SQL literals, 334
- regular expressions, 463–464
- triggers, 443

branch pages. See B-tree index

branching, PL/SQL conditional logic, 338

B-tree index

- components, 193–194
- regular expressions, 470
- reorganizing, 195–196
- unbalanced, 194–195

buffer pool assignments, 260–261

BULK COLLECT

- dynamic SQL, 376
- PL/SQL, 369–372, 387

business intelligence

- analysis
 - cumulative and moving aggregates, 675–678
 - data mining, 686–687
 - first and last functions, 679–680
 - lag and lead functions, 678–679
 - linear regression, hypothetical ranking, and width bucket functions, 680–682
 - OLAP, 682–686
 - ranking and percentiles, 672–675
 - tools, 671–672

business intelligence (continued)

- described, 645
- materialized views, 664–665
- proactive management, complex query workloads, 659–660
- schema
 - described, 646–650
 - dimensions, 650–651, 652–653
 - hierarchies, 660
- SQL Access Advisor, 655–656
- SQL aggregation (ROLLUP and CUBE), 665–667
- summary tables, 661–664

business rules, 215–216. See also constraints

bytecode, Java, 398–399

C

calendar pages

- attributes, 622–624
- browser access, 625–626
- creating, 618–622

callout, 462–463

candidate keys, 60–61

capture, AQ, 256–257

cardinality

- collection object type, 492
- UML mapping, 500

caret (^), 457

caret within square brackets ([^]), 457

catalog application, 501–503

cell

- existence, testing (PRESENTV(*cell_ref*, *exp1*, *exp2*)), 307
- not null, finding (PRESENTNNV(*cell_ref*, *exp1*, *exp2*)), 306

Change Data Capture tool, 644–645

changing data. See UPDATE; updating

character

- data types
 - binary data over 4,000 characters (BLOB), 10
 - double-byte languages (NCHAR and NVARCHAR2), 10
 - double-byte over 4,000 characters (NCLOB), 10
 - filling specified space (CHAR), 9
 - fitting user-entered length (VARCHAR2 and VARCHAR), 9–10
 - more than 4,000 characters (LONG and CLOB), 10
- functions
 - concatenating (CONCAT(*arg1*, *arg2*)), 281–282
 - declared type, changing (TREAT(*expr* AS [REF] *schema.type*)), 288

- initial caps with multibyte encoding (NLS_INITCAP(*arg1*, ['NLS_SORT=x'])), 283
 - leading or trailing, trimming (TRIM([LEADING] [TRAILING] [BOTH] *char* FROM *source*)), 288
 - length of argument (LENGTH(*arg1*)), 282
 - lowercase (LOWER(*arg1*)), 282
 - lowercase with multibyte encoding (NLS_LOWER(*arg1*, ['NLS_SORT=x'])), 283
 - multiple replacements (TRANSLATE(*arg1*, *match*, *replace*)), 287–288
 - padded strings (LPAD(*arg3*)), 283
 - padding (RPAD(*arg1*, *n*, *arg3*)), 286–287
 - phonetic representation (SOUNDEX(*arg1*)), 287
 - POSIX replacing (REGEXP_INSTR(*source*, *regex*, [*pos*], [*occurrence*], [*return_option*], [*match*])), 284–285
 - POSIX searching (REGEXP_SUBSTR(*source*, *regex*, [*pos*], [*occurrence*], [*match*])), 285–286
 - removing left specified (LTRIM(*arg1*, *arg2*)), 283
 - removing right specified (RTRIM(*arg1*, *arg2*)), 287
 - replacing (REPLACE(*arg1*, *search*, *replace*)), 285–294
 - sorting (NLSSORT(*arg1*, ['NLS_SORT=x'])), 284
 - specified, returning (CHR(*arg1* [using *nchar_cs*])), 281
 - substring, finding (INSTR(*arg1*, *to_find*, *pos*, *occurrence*)), 282
 - substring from specified position (SUBSTR(*arg1*, *pos*, *len*)), 287
 - uppercase (UPPER(*arg1*)), 288
 - uppercase with multibyte encoding (NLS_UPPER(*arg1*, ['NLS_SORT=x'])), 284
 - PL/SQL language set, 331
 - position, matching (REGEXP_INSTR, 464–466 [=*character*=] (**equivalence class**), 460
- ## character set functions
- ID (NLS_CHARSET_ID(*charset*)), 305
 - name (NLS_CHARSET_NAME(*ID*)), 305
- ## charts, 616–617
- ## CHECK database constraint, 226–229
- ## Chen, Peter (entity-relationship diagram theorist), 48
- [*:class*:] (**character class**), 459
- ## classes
- Java, 402–405, 448–449
 - UML mapping, 500
- ## CLASSPATH
- JPub, 516–517
 - setting, 413–414

client application

- installing Oracle, 123–127
- regular expressions presenting data, 461

closing SQL cursors, 353, 356**clusters/clustering**

- defined, 6
- factor, index and table, 196, 693
- index, 207–208, 700

CMAN (Oracle Connection Manager), 91**COBOL, 55****Codd, Dr. E. F. (relational database theorist), 2, 54, 129****coefficient of correlation, 269****collection**

- assigning from one to another, 366–367
- associative arrays, 364–365, 369
- column, creating nested table of
(COLLECT(column_name)), 303
- defined, 363
- indexed by sequential integers (nested tables),
365–366, 369
- nested table, number of records
(CARDINALITY(table_name)), 303
- nested tables, 369
- operations, 367–368
- OT, 492
- PL/SQL, SQL within, 366–369
- SET, converting nested table to (SET(table_name)),
303
- sparse, 374
- SQL type, 551
- statistics, 694
- value, adding, 366
- variable arrays, 366, 369

colon (:), 20**column**

- access, limiting, 79–80
- alias, specifying, 137–138
- average (AVG(column_name)), 269
- calendar, 621
- composite type object, 504
- creating nested table of (COLLECT(column_name)), 303
- data type, specifying, 9
- defined, 6
- importing spreadsheet data, 596–597
- labeling, 603
- multiple values, 62–63
- NCHAR length
(NLS_CHARSET_DECL_LEN(byte_length,
charsetID)), 305
- never null, 60

- number associated with table, 152–153
- number returned, specifying, 136
- object_type (SYS_TYPEID(object_type)), 308
- 1NF, 56–59
- statistics, types for, 693
- table, assigning attribute set, 479–480
- 2NF multiple part key, 59–60
- XML, 537–538, 552

comment, single line, 332**COMMIT**

- two-phase, 319–320
- write contention, avoiding, 39

comparing

- arguments (NULLIF(exp1, exp2)), 306
- OT methods (map and order methods), 495–497

comparison operators, 139**compilation**

- native PL/SQL, 349
- PL/SQL sample procedure, 344–348
- preparing, PL/SQL sample procedure, 344

complex query workloads, 667–668**component selector, 331****component/remote interface (Entity Beans), 410****composite OT (object types), 492–493, 500, 504****compression, data, 243–245, 645****concatenating**

- arguments (XMLFOREST(exp AS alias_name,
...)), 312
- characters (CONCAT(arg1, arg2)), 281–282
- type values (XMLCONCAT(XMLType, ...)), 312

concurrent integrity problems, 30–33**conditional logic, PL/SQL**

- branching, 338
- CASE expression, 337–338
- CASE statement, 336–337
- IF...THEN...ELSE, 335–336

confidentiality, 67–68**connecting to database**

- JDBC, 414–416
- SQL statements, 16–18

consolidating distributed databases, 315–316**constraints**

- ALTER TABLE command, 233–234
- application-side rule checking, 240
- CHECK, 226–229
- declaring, 216
- DEFAULT, 230–231
- deferrable, 238
- described, 215
- direct path operations, 238–239

constraints (continued)

- export/import, 239
- FOREIGN KEY, 222–226
- indexes and, 236–238
- naming, 217
- NOT NULL, 217–219
- PL/SQL block, declaring, 328
- PRIMARY KEY, 219–221
- REF, 231–232
- regular expressions, 474, 475
- states, 234–236
- table triggers, mutating, 239
- UNIQUE, 221–222
- views, 239–240

constructor methods, OT, 494–495

consumption, AQ, 258

containers, J2EE

- CLASSPATH, 413–414
- described, 401, 407

content

- sample, creating and storing, 568–572
- saving, 572
- XML schema, 563–568

content management example. See also intranet Web site, vendors'

- InfoPath
 - described, 558–559
 - form, creating, 559–563
 - saving content, 572
- Java servlet to display HTML, 572–574
- sample content, creating and storing, 568–572
- XML schema for content, 563–568

contention, reducing

- MVRC, 35–36
- performance issues, 37
- problem, 34
- snapshot database views (integrity and), 37

control file, instance, 4

conversion functions

- expression (`SYS_XMLGEN(exp, [format])`), 311
- to national character set (`UNISTR(string)`), 302
- time and date to character string (`TO_CHAR (date-time, format, ['NLS_DATE_LANGUAGE = language'])`), 294
- time and date to **TIMESTAMP**
 - (`TO_TIMESTAMP(string, [format], [NLS_TIMESTAMP_FORMAT])`), 294
- time and date to **TIMESTAMP with TIMEZONE** value (`TO_TIMESTAMP_TZ(string, format, [NLS_TIMESTAMP_FORMAT])`), 294

- to **TIMESTAMP with TIMEZONE** value (`TO_TIMESTAMP_TZ(string, format, [NLS_TIMESTAMP_FORMAT])`), 294

Coordinated Universal Time (UTC), 293, 308

correlated subquery, 151

correlation, coefficient of, 269

cosine (COS(n)), 276

cost

- optimizer based on, 690–691
- statistics, 692

counting

- months between dates (`MONTHS_BETWEEN(date1, date2)`), 290
- non-null rows (`COUNT([DISTINCT] exp)`), 269–270

CPU management, 667–668

CREATE statement

- tables, 131–132
- views, 132–133

creating

- materialized views, 664–665
- SQL cursors, 352
- stored outlines, 722–723
- triggers, 439–440

cumulative aggregate, 675–678

cumulative distribution function, 673–674

cumulative population standard deviation, 274

current date (CURRENT_DATE), 289

current session

- current, time zone (`SESSIONTIMEZONE`), 293
- defined, 17
- information function (`USERENV('param')`), 308–309
- OracleAS TopLink, 424–425

current system

- hardware management, 667–668
- operating system clock (`SYSDATE`), 293
- Oracle requirements, 116, 582
- timestamp, 289, 293–294

cursor, SQL

- attributes, 353
- closing, 353, 356
- creating, 352
- declaring, 354
- fetching data, 352–353, 355–356
- FOR, 359–360
- implicit, 360–361
- opening, 352, 354–355
- within PL/SQL, 352–357
- procedure, running, 356–357
- references, passing (`REF CURSOR`), 362
- statement, establishing, 18
- variables, declaring, 354

D**dangling REF, 491****data**

- accepting from client application, 462
 - access
 - execution plan, 700–701
 - indexes, 701
 - joins, 701
 - tables, 700
 - changes, extracting from source system, 644–645
 - dictionary
 - accessing, 94
 - constraint names, 217
 - DBA (DBA_TABLES), 97–98
 - dynamic SQL, 110–112
 - execution plan and statistics (V\$SQL_PLAN and V\$SQL_PLAN_STATISTICS), 715–716
 - fixed tables (V_\$FIXED_TABLE), 99–100
 - set of views, determining, 103–107
 - SQL generating SQL, 108–110
 - structure, 94–95
 - synonyms, 253–254
 - table schema (USER_TABLES), 95–96
 - tables, viewing accessible (ALL_TABLES), 96–97
 - tablespaces, 93, 633
 - three-column view (TAB), 98–99
 - triggers, 451–453
 - updating, 107–108
 - user account owning (SYS), 93
 - views, locating and describing, 101–103
 - HTML-DB, importing, 593–599
 - indexed by value, 364–365
 - integrity
 - concurrent, 30–33
 - users, multiple, 28–29
 - list, path-separated (SYS_CONNECT_BY_PATH (col, char)), 307
 - logical and physical units, 6–7
 - manipulating with regular expressions, 462
 - mining, 686–687
 - partitions, 8–9
 - presenting to client application, 461
 - returning from write operations, 183–184
 - segments and extents, 8
 - tablespaces, 7–8
 - text string, creating, 389–390
 - typing, 214–215
- data definition language (DDL) statements**
- ALTER, 133–134

- COMMIT, invisible, 134
- CREATE, 131–133
- data dictionary, updating, 108
- described, 19–20, 130–131
- DROP, 134
- triggers and, 453

data manipulation language (DML)

- COMMIT/ROLLBACK/SAVEPOINT, 156
- DELETE, 155
- described, 130–131
- INSERT, 153–155
- Java database, executing, 416–417
- JPub, 517–518
- rollback segments, 243
- SELECT
 - aggregating information (GROUP BY clause), 144–146
 - aliases, 137–138
 - basic, 135–137
 - multiple tables, accessing, 147–150
 - order, specifying (ORDER BY clause), 141–144
 - rows, restricting (WHERE clause), 138–141
 - subqueries, 150–153
- UPDATE, 155

Data Pump, 630–632**data type**

- character, 9–10
- code (DUMP (arg1, format, [start], [length])), 304
- date, 12
- external storage (BFILE), 10
- non-converted (RAW and LONG RAW), 12
- numeric, 11
- objects, creating, 13
- special
 - column, associating (%TYPE), 357–358
 - row, associating (%ROWTYPE), 358
 - SQL within PL/SQL, 357–358
- specifying, 9
- trigger restrictions, 453
- XML DB
 - columns and tables, creating, 537–538
 - structured versus unstructured storage, 536–537
 - views, 538–540

data warehouse

- bitmap indexes, 202–206
- bitmap join indexes, 206–207
- bulk load indexes, 235
- partitioning, 632, 645–647

Data Workshop, 580, 593–594

database

- connecting, 16–18
- deleting objects (DROP), 134
- enterprise security, 90
- moving data between, 7
- roles, user authorization, 75–76
- security at, 68–69
- time zone (DBTIMEZONE), 289
- users and authentication rules, 70

database administrator (DBA)

- data dictionary (DBA_TABLES), 97–98
- design, optimal, 43–44
- memory allocation, 5
- password rules, 71
- storage responsibilities, handling, 1

database design

- conceptual phase, 45
- denormalization, 63–64
- ERDs, 49–52
- logical phase, 45–46
- normalization, 54–61
- object-oriented options, 66
- philosophy, 43–45
- physical options, miscellaneous, 64–65
- physical phase, 46–47
- practical phase, 47–48
- process, 53–54
- tables, 62–63
- tools, 48–49
- UML, 52–53

Database Design for Mere Mortals (Hernandez), 48

database integrity features

- ALTER TABLE command, 233–234
- application-side rule checking, 240
- CHECK, 226–229
- declaring, 216
- DEFAULT, 230–231
- deferrable, 238
- described, 213, 215
- direct path operations, 238–239
- export/import, 239
- FOREIGN KEY, 222–226
- indexes and, 236–238
- naming, 217
- NOT NULL, 217–219
- PRIMARY KEY, 219–221
- REF, 231–232
- states, 234–236
- table triggers, mutating, 239

triggers and stored procedures, 215–216

UNIQUE, 221–222

views, 239–240

database links, 255

Database Writer (DBWR), 3

date and time functions

character string, converting to (TO_CHAR (date-time, format, ['NLS_DATE_LANGUAGE = language'])), 294

Coordinated Universal Time

(SYS_EXTRACT_UTC (datetime_with_timezone)), 293

current (CURRENT_DATE), 289

database time zone (DBTIMEZONE), 289

dates, number of months between

(MONTHS_BETWEEN (date1, date2)), 290

DATETIME WITH TIMEZONE value, 308

extracting parts (EXTRACT (datepart FROM expr)), 289

interval day, converting to second (NUMTODSINTERVAL (n, interval_name)), 291

interval day to second (TO_DSINTERVAL (arg1, [NLS_NUMERIC_CHARACTERS = "dg"])), 294–295

interval year, converting to month (NUMTOYMINTERVAL (n, interval_name)), 291–292

interval year to month (TO_YMINTERVAL (arg1)), 295

last day of month (LAST_DAY (arg1)), 290

local timestamp (LOCALTIMESTAMP ([precision])), 290

machine operating system clock (SYSDATE), 293

months, adding (ADD_MONTHS (arg1, num)), 288–289

next day (NEXT_DAY (date, day_to_find)), 291

offset time zone (TZ_OFFSET (timezone_param)), 295

operating system timestamp (SYSTIMESTAMP), 293–294

rounding (ROUND (date, format)), 292–293

in specified time zone (NEW_TIME (the_date, tz1, tz2)), 290–291

time zone, current session (SESSIONTIMEZONE), 293

TIMESTAMP, converting to (TO_TIMESTAMP (string, [format], [NLS_TIMESTAMP_FORMAT])), 294

timestamp, current system

(CURRENT_TIMESTAMP ([precision])), 289

TIMESTAMP with TIMEZONE value, converting to

(TO_TIMESTAMP_TZ (string, format, [NLS_TIMESTAMP_FORMAT])), 294

timestamp with timezone value (FROM_TZ

(timestamp, timezone)), 289–290

truncated format (TRUNC (date, [format])), 295

dates

- data type, 12
- formats, Oracle, 292–293
- number of months between
(MONTHS_BETWEEN(date1, date2)), 290

day

- interval, converting to second (NUMTODSINTERVAL(n, interval_name)), 291
- next (NEXT_DAY(date, day_to_find)), 291

DBA (database administrator)

- data dictionary (DBA_TABLES), 97–98
- design, optimal, 43–44
- memory allocation, 5
- password rules, 71
- storage responsibilities, handling, 1

DBWR (Database Writer), 3**DDL (data definition language) statements**

- ALTER, 133–134
- COMMIT, invisible, 134
- CREATE, 131–133
- data dictionary, updating, 108
- described, 19–20, 130–131
- DROP, 134
- triggers and, 453

decimal places, truncating by specified (TRUNC(n, n2)), 280–281**declaration section, PL/SQL, 328, 386–387****declared type, changing, 288****declaring SQL cursors, 354****defaults**

- database constraints, 230–231
- ID for imported data, 597
- NULL value, replacing with (NVL(exp1, exp2)), 306

deleting

- employees, 181–183
- imported spreadsheet data, 598
- mutating tables, 449–451
- objects from database (DROP), 134
- recycle bin, 250–252
- rows, fixing violations caused by (FOREIGN KEY constraints), 224–226
- triggers, 441–442, 451
- updated rows with inappropriate values, 171
- without log entries (TRUNCATE), 174

delimiters, PL/SQL, 331**denormalization, 63–64****departments, listing employees by, 161****dependencies, PL/SQL**

- package, 382
- sample procedure, 346–348

deployment descriptors, 410**design, database**

- conceptual phase, 45
- denormalization, 63–64
- ERDs, 49–52
- logical phase, 45–46
- normalization, 54–61
- object-oriented options, 66
- philosophy, 43–45
- physical options, miscellaneous, 64–65
- physical phase, 46–47
- practical phase, 47–48
- process, 53–54
- tables, 62–63
- tools, 48–49
- UML, 52–53

details of user actions (fine-grained), 86–87**deterministic functions, indexing, 201****developer**

- creating from administration page, 591–593
- home page, 580–581
- RAC, 6
- role, 28, 43

The Devil's DP Dictionary (Kelly-Bottle), 69**dictionary, data**

- accessing, 94
- constraint names, 217
- DBA (DBA_TABLES), 97–98
- dynamic SQL, 110–112
- execution plan and statistics (V\$SQL_PLAN and V\$SQL_PLAN_STATISTICS), 715–716
- fixed tables (V_\$FIXED_TABLE), 99–100
- set of views, determining, 103–107
- SQL generating SQL, 108–110
- structure, 94–95
- synonyms, 253–254
- table schema (USER_TABLES), 95–96
- tables, viewing accessible (ALL_TABLES), 96–97
- tablespaces, 93, 633
- three-column view (TAB), 98–99
- triggers, 451–453
- updating, 107–108
- user account owning (SYS), 93
- views, locating and describing, 101–103

dimension tables, 202–203**dimensions, business intelligence schema, 650–651, 652–653****direct path operations**

- data block, compressing, 243–244
- database constraints, 238–239

dirty read, 35

disabling triggers, 451

discrete model, inverse distribution

(PERCENTILE_DISC (exp ...) WITHIN GROUP
(ORDER BY exp)), 273

disk storage (extent), 8

display HTML, Java servlet, 572–574

displaying charts, 617

distributed databases

consolidating, 315–316

managing, 315

non-Oracle systems, accessing (Heterogeneous

Services)

ODBC, 321–322

setting up, 320–321

Transparent Gateways, 322–323

Oracle

distributed transactions and two-phase commit,

319–320

linking, 316–319

distributed transactions, 319–320

DML (data manipulation language)

COMMIT/ROLLBACK/SAVEPOINT, 156

DELETE, 155

described, 130–131

INSERT, 153–155

Java database, executing, 416–417

JPub, 517–518

rollback segments, 243

SELECT

aggregating information (GROUP BY clause), 144–146

aliases, 137–138

basic, 135–137

multiple tables, accessing, 147–150

order, specifying (ORDER BY clause), 141–144

rows, restricting (WHERE clause), 138–141

subqueries, 150–153

UPDATE, 155

document

XML, aggregating (SYS_XMLAGG (exp, [format])),
310–311

XML Schema, creating, 541–543

document type definitions (DTDs), replacement for.

See XML, Schema

dollar sign (\$), 457

domain, index, 202

dot (.), 457

double-byte languages

character data (NCHAR and NVARCHAR2), 10

data over 4,000 characters (NCLOB), 10

drivers

choosing, 126–127

Java, 415

dropping triggers, 451

dynamic SQL

BULK COLLECT, 376

data dictionary, 110–112

described, 375

EXECUTE IMMEDIATE, 376

within PL/SQL, 375–376

E

earlier queries, obtaining. See Flashback

editing

HTML-DB application, 612–614

materialized views, 665

stored outlines, 723

EJBs (Enterprise Java Beans), 401

[.element.] (collating element), 460

elements, value of (EXTRACTVALUE (XMLType,
XPath, [namespace])), 310

e-mail

address pattern, matching, 460

alerts, programming, 428–434

employees

departments, showing specified, 161

list of jobs held by, 167, 370–372, 383–392

restoring deleted, 181–183

empty value, setting (EMPTY_BLOB, EMPTY_CLOB()),
304

encapsulation, 398

encryption

access, controlling, 80–81

ASO, 91–92

network security, 90

Enterprise Java Beans (EJBs), 401

Enterprise Manager (Oracle)

business intelligence query, 658–660

execution plan, viewing, 715

OLAP cube, creating, 684, 686

SQL Access Advisor, 663–664

user authentication, 317–318

enterprise security

database, 90

LDAP services, 89

network, 90–92

objective, 88–89

roles, 78

shared schemas, 89

users, 89

Entity Beans (Entity Enterprise Java Beans)

impedance framework, 406
interface, 410

Entity-Relationship Diagrams (ERDs), 46, 48–52
equal

collections, comparing, 367
next integer (`FLOOR(n)`), 277

ERDs (Entity-Relationship Diagrams), 46, 48–52**error-handling functions. See exception****errors, reducing. See also constraints**

inappropriate data, blocking, 214–215
sparse collections, 374

ERwin Data Modeler, 48**ETL (extraction, transformation, and loading) tools**

Change Data Capture, 644–645

described, 639–640

external tables

defining, 641–642
loading from, 642–643

Oracle Warehouse Builder

described, 647

nonrelational targets, 652

sample, 648–651

typical build and deploy, 647–648

Partitioning Option, 645–647

SQL*Loader, 640–641

transformations, 643–644

Excel (Microsoft) data, importing, 593–599**exception**

catching and handling, PL/SQL code architecture,
329–330

handling procedure, sample, 343–344

information, relating, 330

section, PL/SQL code architecture, 329

write operations (`FOR ALL`), 373

exclusive locks, 34**executing**

`EXECUTE IMMEDIATE`, dynamic SQL, 376

order of, triggers, 438

section, PL/SQL code architecture, 328

SQL in JDBC, 416–418

SQL statement, 21

execution plan

data access, 700–701

described, 699–700

execution statistics

described, 702–703

example, 704–709

listing (`V$SQL_PLAN` and `V$SQL_PLAN_`
`STATISTICS`), 715–716

overall, 703–704

exporting

database constraints, 90, 239

high-speed data movement, 630–632

Expression Filter

defining attribute set, 479

described, 455

elementary attributes, 478

populating expressions, 480–484

table column, assigning attribute set, 479–480

usefulness, 476–478, 484–485

expressions. See also regular expressions

argument

hash (`ORA_HASH(exp, [max_bucket],`
`[seed])`), 306

maximum value (`MAX(exp)`), 271–272

median value (`MEDIAN(exp)`), 272

minimum value (`MIN(exp)`), 272

converting (`SYS_XMLGEN(exp, [format])`), 311

parameters, passing (`XMLCOLATTVAL(exp AS`
`alias_name, ...)`), 312

populating, 480–484

power, 2.71828183 raised to (`EXP(exp)`), 277

rank (`RANK(exp ...) WITHIN GROUP`
`(ORDER BY exp)`), 273

sample standard deviation (`STDDEV(exp)`), 273

unformatted (`XMLAGG(XMLType,`
`order_by_clause)`), 311

variance of values (`VARIANCE(exp)`), 275

eXtensible Markup Language. See XML; XML DB**eXtensible Stylesheet Language Transformer (XSLT)**

processor, 575

transformations, 557–558

eXtensible Stylesheet Language (XSL), 313**extents, data organization, 8****external data storage types (BFILE), 10****external roles, user authorization, 77****external tables**

defining, 641–642

loading from, 642–643

extracting date and time parts (EXTRACT (datepart
FROM expr)), 289**extraction tools. See ETL tools****F****fact tables, 202–203****Fahrenheit, converting to Celsius, 266****Federal Information Processing Advanced, U.S. (FIPS)**

encryption standard, 91

fetching data, 352–353, 355–356**File Transfer Protocol (FTP), 527–528**

FIPS (U.S. Federal Information Processing Advanced) encryption standard, 91

firewalls, 91

first argument raised to the power of the second
(POWER(*n*, *n2*)), 278

first functions, business intelligence analysis, 679–680

first non-null value, returning (COALESCE
(*arg1*, ...)), 303

1NF (First Normal Form), 56–59

fixed tables, data dictionary (V_\$FIXED_TABLE), 99–100

Flashback

- caveats, 183
- described, 179–180
- example, 180–183
- extended capabilities, 183
- recycle bin contents, restoring, 252
- syntax, 180

flat files

- accessing, 260
- defining external tables, 641–642
- loading, 640–641, 642–643

flow, redirecting (GOTO), 338

flows. See applications

FOR cursor, 359–360

FOR . . . LOOP, 339–340

FOREIGN KEY constraint

- actions, setting, 224
- creating, 223–224
- functions, 222
- index and, 238
- nulls, handling, 226
- referencing table, 222
- violations, 225–226

foreign keys, 61

form, InfoPath

- creating, 559–563
- saving completed, 571–572

formatting

- date, 292–293
- SQL trace file (TKPROF), 712–714
- truncated date (TRUNC (*date*, [*format*])), 295
- view with regular expression, 473–474

fragment

- value of (EXTRACT (XML, XPath,
[*namespace*])), 309–310
- XML, aggregating (SYS_XMLAGG (*exp*, [*format*])),
310–311

FTP (File Transfer Protocol), 527–528

function-based index

- caveats, 201–202

described, 197–198

sample, 198–201

functions. See also aggregate functions; conversion functions; date and time functions

arguments' first not null value, returning
(COALESCE(*arg1*, ...)), 303

BFILE (BFILENAME(*dir*, *file*)), 303

character

concatenating (CONCAT(*arg1*, *arg2*)), 281–282

declared type, changing (TREAT(*expr* AS [REF]
schema.type)), 288

initial caps with multibyte encoding (NLS_
INITCAP(*arg1*, ['NLS_SORT=x'])), 283

leading or trailing, trimming (TRIM([LEADING]
[TRAILING] [BOTH] *char* FROM
source)), 288

left, removing (LTRIM(*arg1*, *arg2*)), 283

length of argument (LENGTH(*arg1*)), 282

lowercase (LOWER(*arg1*)), 282

lowercase with multibyte encoding
(NLS_LOWER(*arg1*, ['NLS_SORT=x'])), 283

multiple replacements (TRANSLATE(*arg1*, *match*,
replace)), 287–288

padded strings (LPAD (*arg3*)), 283

padding (RPAD(*arg1*, *n*, *arg3*)), 286–287

phonetic representation (SOUNDEX(*arg1*)), 287

replacing POSIX (REGEXP_INSTR(*source*,
regex, [*pos*], [*occurrence*],
[*return_option*], [*match*])), 284–285

replacing (REPLACE(*arg1*, *search*, *replace*)),
285–294

right, removing (RTRIM(*arg1*, *arg2*)), 287

searching POSIX (REGEXP_SUBSTR(*source*,
regex, [*pos*], [*occurrence*],
[*match*])), 285–286

sorting (NLSSORT(*arg1*, ['NLS_SORT=x'])), 284

specified, returning (CHR(*arg1* [using
nchar_cs])), 281

substring, finding (INSTR(*arg1*, *to_find*, *pos*,
occurrence)), 282

substring from specified position (SUBSTR(*arg1*,
pos, *len*)), 287

uppercase (UPPER(*arg1*)), 288

uppercase with multibyte encoding
(NLS_UPPER(*arg1*, ['NLS_SORT=x'])), 284

character set

ID (NLS_CHARSET_ID(*charset*)), 305

name (NLS_CHARSET_NAME(ID)), 305

collection

column, creating nested table of (COLLECT
(*column_name*)), 303

- nested table, number of records
(`CARDINALITY(table_name)`), 303
- SET, converting nested table to
(`SET(table_name)`), 303
- comparing arguments (`NULLIF(exp1, exp2)`), 306
- creating
 - deleting, 268
 - general form, 265–266
 - information, viewing, 267–268
 - Java, 267
 - permissions, 266
- data type code (`DUMP(arg1, format, [start], [length])`), 304
- described, 259, 265
- empty value, setting (`EMPTY_BLOB, EMPTY_CLOB()`), 304
- FOREIGN KEY constraint, 222
- greatest value, returning (`GREATEST(arg1, arg2, ...)`), 304
- GUID, 16-byte (`SYS_GUID()`), 308
- hash of `exp` argument (`ORA_HASH(exp, [max_bucket], [seed])`), 306
- least value, returning (`LEAST(arg1, arg2, ...)`), 305
- MODEL rule
 - cell existence, testing (`PRESENTV(cell_ref, exp1, exp2)`), 307
 - not null (`PRESENTNNV(cell_ref, exp1, exp2)`), 306
- namespace information (`SYS_CONTEXT(namespace, param, [length])`), 307
- NCHAR column length
(`NLS_CHARSET_DECL_LEN(byte_length, charsetID)`), 305
- NULL and NOT NULL return values, specifying
(`NVL2(exp1, exp2, exp3)`), 306
- NULL value, replacing with default (`NVL(exp1, exp2)`), 306
- numeric
 - absolute value (`ABS(n)`), 275
 - alternate value for `BINARY_FLOAT` or `BINARY_NUMBER` that has a NaN (`NANVL(n, n2)`), 278
 - arc sine (`ASIN(n)`), 275
 - arc tangent of (`ATAN(n)`), 276
 - arc tangent of two arguments (`ATAN2(n, m)`), 276
 - cosine (`COS(n)`), 276
 - decimal places, truncating by specified (`TRUNC(n, n2)`), 280–281
 - first argument raised to the power of the second
(`POWER(n, n2)`), 278
 - first argument rounded by the number of digits specified by the second argument (`ROUND(n, n2)`), 279
 - hyperbolic cosine (`COSH(n)`), 276–277
 - hyperbolic sine (`SINH(n)`), 280
 - hyperbolic tangent (`TANH(n)`), 280
 - integer, next greatest (`Ceil(n)`), 276
 - log of the second argument with base of argument 1
(`LOG(n, n2)`), 277
 - 1 to 1, arc tangent of (`ACOS(n)`), 275
 - natural log (`LN(n)`), 277
 - next integer less than or equal (`FLOOR(n)`), 277
 - remainder of the first argument divided by the second argument (`REMAINDER(n, n2)`), 278
 - remainder of the first argument divided by the second
(`MOD(n, n2)`), 278
 - sign of the first argument, specifying (`SIGN(n)`), 279
 - sine, in radians (`SIN(n)`), 279
 - square root (`SQRT(n)`), 280
 - tangent (`TAN(n)`), 280
 - 2.71828183 raised to the `exp` power (`EXP(exp)`), 277
- object_type column (`SYS_TYPEID(object_type)`), 308
- path-separated list of data, creating
(`SYS_CONNECT_BY_PATH(col, char)`), 307
- search term, comparing value or expression
(`DECODE(arg1, search, result, search2, result2 ... , default)`), 303–304
- session information (`USERENV('param')`), 308–309
- size of `arg1` argument (`VSIZE(arg1)`), 309
- user ID (UID), 308
- username (USER), 308
- UTC from `DATETIME WITH TIMEZONE` value
(`SYS_EXTRACT_UTC(Datetime_With_TZ)`), 308
- XML
 - arguments, concatenating (`XMLFOREST(exp AS alias_name, ...)`), 312
 - documents or fragments, aggregating
(`SYS_XMLAGG(exp, [format])`), 310–311
 - elements, value of (`EXTRACTVALUE(XMLType, XPath, [namespace])`), 310
 - `exp` parameters, passing (`XMLCOLATTVAL(exp AS alias_name, ...)`), 312
 - expression, converting (`SYS_XMLGEN(exp, [format])`), 311
 - fragment, value of (`EXTRACT(XML, XPath, [namespace])`), 309–310
 - nodes, existence of (`EXISTSNODE(XML_type, XPath, [namespace])`), 309

functions (continued)

- top-level nodes, splitting (XMLSEQUENCE (Cursor, XMLFormat) XMLSEQUENCE (XMLType)), 313
- type values, concatenating (XMLCONCAT (XMLType,)), 312
- unformatted expression (XMLAGG (XMLType, order_by_clause)), 311
- updating values (UPDATEXML (XMLType, XPath, new_val, [namespace])), 311
- XSL style sheet (XMLTRANSFORM (XMLType, XSL_XMLType)), 313

G

global roles, user authorization, 78

global temporary tables, 250

greatest value, returning (GREATEST (arg1, arg2,)), 304

gridlock. See contention, reducing

group

- HTML-DB data columns, 604
- ID, 16-byte (SYS_GUID ()), 308
- number, assigning (GROUP_ID ()), 271
- rank of row within (DENSE_RANK (exp1,) WITHIN GROUP (ORDER BY)), 271

H

hard parse, 19

hash

- cluster, 209, 700
- of exp argument (ORA_HASH (exp, [max_bucket], [seed])), 306
- joined tables, 701
- statement validity, checking, 19

header, PL/SQL block

- overloading, 327
- parameter notation, 327
- syntax, 326

Hernandez, Michael J. (*Database Design for Mere Mortals*), 48

Heterogeneous Services

- ODBC, 321–322
- setting up, 320–321
- Transparent Gateways, 322–323

hierarchies, business intelligence schema, 660

high-speed data movement

- described, 629–630
- export/import and Data Pump, 630–632
- streams
 - advanced queues, configuring and monitoring, 635–637

- advantages, 634
- phases and processes, 634
- Transportable Tablespaces, 632–634

hints, optimization

- access path, 717–718
- advantages and disadvantages of, 721–722
- join, 718–719
- optimizer mode, 716–717
- parallel operation, 720
- query transformation, 719–720
- syntax, 716

histograms

- described, 696
- SQL statements and, 698–699
- syntax, 696–697

history. See Flashback

home interface (Entity Beans), 410

home page, HTML-DB

- application, 612
- Application Builder, 600
- developer, 580–581
- returning to, 615–616

Hot Spot, 399

HTML (HyperText Markup Language), 572–574

HTML-DB (HyperText Markup Language-Database)

- application developer, creating from administration page, 591–593
- browser, running application from, 625–626
- described, 579–580
- developer's home page, 580–581
- functionality, 610–611, 610–617
- importing data, 593–599
- installing, 581–587
- modules, creating application, 599–610
- page attributes, modifying, 622–625
- pages, adding new, 618–622
- SQL interface to Oracle database, 626
- updates, obtaining, 627
- workspace, creating, 588–591

HTTP Server (Oracle)

- installing, 584
- URL access, 586

hyperbolic cosine (COSH (n)), 276–277

hyperbolic sine (SINH (n)), 280

hyperbolic tangent (TANH (n)), 280

HyperText Markup Language (HTML), 572–574

HyperText Markup Language-Database. See HTML-DB
hypothetical ranking, business intelligence analysis, 680–682

I**ID**

- character set (`NLS_CHARSET_ID(charset)`), 305
- data partitioned by, 675–676
- group, 16-byte (`SYS_GUID()`), 308
- importing data from spreadsheet table, 597
- index access, 701
- row, accessing, 700
- transformed flat files, generating, 648
- user, 69–70
- VPD security, 83–84

identifiers

- Java classes, 402
- PL/SQL language, 332

IEC (International Electrotechnical Commission), 130

`IF...THEN...ELSE` **logic**, 335–336

impedance mismatch and persistence frameworks

- Java, 405–406, 502–503
- OO languages in RDBMS, 488
- PL/SQL's advantage over Java, 413

implementation/Bean class (Entity Beans), 410**implicit cursors, 360–361****importing**

- database constraints, 90, 239
- database integrity features, 239
- high-speed data movement, 630–632
- HTML-DB, 593–599
- JDBC packages, 414

index

- attributes
 - consistency in performance, 191
 - NULL values, 193
 - sort order, 191–192
 - transparency, 191
 - uniqueness, 192
- bitmap
 - described, 202–203
 - impact, 204–206
 - join index, 206–207
 - structure, 203–204
- B-tree
 - components, 193–194
 - reorganizing, 195–196
 - unbalanced, 194–195
- clusters, 207–208
- collection by sequential integers (nested tables), 365–366
- cost-based optimizer and, 690–691
- data access, 701
- data by value, 364–365

- database constraints, 236–238
 - design and performance tips
 - keys, compressing, 210–211
 - small, starting, 209–210
 - SQL Access Advisor, 211
 - domain, 202
 - FOREIGN KEY constraints and, 238
 - function-based
 - caveats, 201–202
 - described, 197–198
 - sample, 198–201
 - hash cluster, 209
 - keys, 190
 - number associated with table, 152–153
 - PRIMARY KEY and UNIQUE constraints and, 236–237
 - regular expressions, 470–472, 476
 - retrieval performance and, 185–186, 187–188
 - reverse key, 196–197
 - SQL pool and data buffer, flushing, 186–187
 - statistics, types for, 693
 - tables, organizing, 207
 - tablespaces and, 7
 - when to use, 188–190
 - write operations (FOR ALL), 374
- index-organized tables (IOT), 207**
- indicators, PL/SQL, 331**
- InfoPath form**
- creating sample, 558–563
 - saving completed, 571–572
- information**
- OracleAS TopLink session, 424–425
 - viewing functions, 267–268
- inheritance**
- Java, 398
 - ODBMS, 497–499
 - UML mapping, 500
- initial caps, with multibyte encoding (NLS_INITCAP(arg1, ['NLS_SORT=x'])), 283**
- initialization files, 3–4**
- inner joins, 148–149**
- inserting**
- data, 20
 - DEFAULT data, 230–231
 - mutating tables, 449–451
 - triggers, 437, 443
- installing**
- Apache Tomcat in Java servlet, 573–574
 - HTML-DB, 581–587
- installing Oracle**
- accessing database, 122–123
 - client software, 123–127

installing Oracle (continued)

- process, 117–122
- software, obtaining, 113–116
- system requirements, 116

instance

- background processes, 3
- clustering, 6
- control file, 4
- illustrated, 2
- initialization files, 3–4
- Listener process, 3
- memory used by, 4–5
- redo log files, 4
- rollback segments, 4
- starting, 2–3

Instant Client software, installing, 125–126

INSTEAD OF **triggers**, 444–447

integer

- next greatest (`Ceil(n)`), 276
- numeric literals, PL/SQL, 333
- sequential, collection by, 365–366

integrity

- ALTER TABLE command, 233–234
- application-side rule checking, 240
- CHECK, 226–229
- concurrent, 30–33
- declaring, 216
- DEFAULT, 230–231
- deferrable, 238
- described, 213, 215
- direct path operations, 238–239
- export/import, 239
- FOREIGN KEY, 222–226
- indexes and, 236–238
- naming, 217
- NOT NULL, 217–219
- PRIMARY KEY, 219–221
- REF, 231–232
- snapshot database views and, 37
- states, 234–236
- table triggers, mutating, 239
- triggers and stored procedures, 215–216
- two-phase commit, 319–320
- UNIQUE, 221–222
- users, multiple, 28–29
- views, 239–240

intelligence, business

- analysis
 - cumulative and moving aggregates, 675–678
 - data mining, 686–687

- first and last functions, 679–680
- lag and lead functions, 678–679
- linear regression, hypothetical ranking, and width
 - bucket functions, 680–682

OLAP, 682–686

ranking and percentiles, 672–675

tools, 671–672

described, 645

materialized views, 664–665

proactive management, complex query workloads,
659–660

schema

described, 646–650

dimensions, 650–651, 652–653

hierarchies, 660

SQL Access Advisor, 655–656

SQL aggregation (`ROLLUP` and `CUBE`), 665–667

summary tables, 661–664

internal logic, PL/SQL package, 388–389

International Electrotechnical Commission (IEC), 130

International Standards Organization (ISO), 130

INTERSECT **operator**, 168–169

interval day

- converting to second (`NUMTODSINTERVAL(n, interval_name)`), 291
- to second (`TO_DSINTERVAL(arg1, [NLS_NUMERIC_CHARACTERS = "dg"])`), 294–295

interval year

- converting to month (`NUMTOYMINTERVAL(n, interval_name)`), 291–292
- to month (`TO_YMINTERVAL(arg1)`), 295

intranet Web site, vendors'

- HTML, displaying content as, 572–574
- InfoPath form, 558–563
- information content schema, 563–568
- storing content, 568–572

inventory

- Java application with ORDBMS, 501–503
- ranking from fewest to most, 672–673

inverse distribution

- with continuous model (`PERCENTILE_CONT(exp ...) WITHIN GROUP (ORDER BY exp)`), 272
- with discrete model (`PERCENTILE_DISC(exp ...) WITHIN GROUP (ORDER BY exp)`), 273

invoke

- Java stored procedures, 432–434
- PL/SQL rights, 348–349

IOT (index-organized tables), 207

ISO (International Standards Organization), 130

isolation

- activity during transaction, 33–34
- levels, 38–39
- users, multiple, 29

iSQL*Plus tool

- accessing database, 122–123
- business intelligence query, 656–658
- compiling PL/SQL, 348
- indexing, 186–190, 198–201

item separator, PL/SQL, 331**iterative logic, PL/SQL**

- FOR . . . LOOP, 339–340
- LOOP, 339
- WHILE . . . LOOP, 340

J**J2EE (Java 2 Enterprise Edition), 400–401, 406–408****J2SE (Java 2 Standard Edition), 400–401, 412****Java**

- BluePrints
 - described, 406–408
 - inside database, 412–413
 - JDBC and persistence frameworks, 408–411
 - outside database, 411–412
- classes, 402–405
- CLASSPATH, setting, 413–414
- database connection, 17
- drivers, installing, 124
- functions, creating, 267
- impedance mismatch and persistence frameworks, 405–406
- JDBC
 - connecting, 414–416
 - execute SQL, 416–418
 - import packages, 414
 - resources, releasing, 419
 - results, processing, 418–419
- JVM and bytecode, 398–399
- language, 398
- Oracle support, 397
- OracleAS TopLink
 - controller application, 425–426
 - goal, 419
 - mappings, 420–424
 - package and deploy, 427
 - session information, 424–425
- performance, 399
- PL/SQL and, 413
- pre-fetch data retrieval, 21

servlet

- to display HTML, 572–574
- installing in Apache Tomcat, 573–574
- stored procedures
 - code, 428–431
 - invoke, 432–434
 - load and resolve, 431
 - methods, 428
 - OracleJVM installation, verifying, 427–428
 - publish, 431–432
 - trigger class, 448–449

Java Architecture for XML Binding (JAXB), 575**Java Messaging Service (JMS), 401****Java Server Pages (JSPs), 401****Java Stored Procedures, 518–519****Java 2 Enterprise Edition (J2EE), 400–401, 406–408****Java 2 Standard Edition (J2SE), 400–401, 412****Java Virtual Machine (JVM), 398–399, 463****JavaBeans, 576. See also Entity Beans****JavaMail, 428–434****JAXB (Java Architecture for XML Binding), 575****JDBC (Java Database Connectivity)**

- connecting, 414–416
- described, 401
- execute SQL, 416–418
- import packages, 414
- object-relational structure, supporting, 506–510
- persistence framework, 405–406, 408–411
- resources, releasing, 419
- results, processing, 418–419
- standalone application, 411
- statement batching, 418

JDeveloper, 48**JIT (just-in-time) compiler, 399****JMS (Java Messaging Service), 401****joins**

- business intelligence queries, 654–655
- data access, 701
- index, 206–207
- INSTEAD OF triggers, 444–447
- optimization, 718–719

JPub (Oracle JPublisher)

- configuring and running, 516–517
- described, 515–516
- Java Stored Procedures, 518–519
- object types, 519–520
- SQL and DML statements, 517–518
- Web services support, 520

JSPs (Java Server Pages), 401**just-in-time (JIT) compiler, 399****JVM (Java Virtual Machine), 398–399, 463**

K

KEEP buffer pool, 260–261

Kelly-Bottle, Stan (*The Devil's DP Dictionary*), 69

keys

- alternate, 61
- candidate, designating, 60
- compressing index, 210–211
- encryption, 80–81
- FOREIGN KEY constraint
 - actions, setting, 224
 - creating, 223–224
 - functions, 222
 - index and, 238
 - nulls, handling, 226
 - referencing table, 222
 - violations, 225–226
- index, 190
- multiple part, 59–60
- primary
 - database constraints, 219–221, 234
 - importing data from spreadsheet table, 597–598
 - index, 236–237
 - source, selecting, 607–608

KPRB driver, 415

L

Label Security option, VPD, 84–85

labels, column, 603

lag functions, 678–679

language

- Java, 398
- other, triggers in, 448–449
- theory, regular expressions and, 461

large structures, storing in multiple segments.

See partition

last day of month (LAST_DAY (arg1)), 290

last functions, business intelligence analysis, 679–680

LDAP (Lightweight Directory Access Protocol) services

- ASO, 92
- described, 89
- roles, 78
- security certificates, 81

lead functions, business intelligence analysis, 678–679

leading characters, trimming (TRIM ([LEADING] [TRAILING] [BOTH] char FROM source)), 288

leaf pages

- components, 193–194
- regular expressions, 470

reorganizing, 195–196

unbalanced, 194–195

least value, returning (LEAST (arg1, arg2, ...)), 305

length of argument (LENGTH (arg1)), 282

less than next integer (FLOOR (n)), 277

LGWR (Log Writer), 3

Lightweight Directory Access Protocol (LDAP) services

- ASO, 92
- described, 89
- roles, 78
- security certificates, 81

line item-stock item association, 491

linear regression, 680–682

linking

- databases, 255
- Oracle distributed databases, 316–319
- tables (UNION), 166–168

Listener process, 3

literal characters, regular expression, 457

literals, PL/SQL

- Boolean, 334
- datetime and interval, 334–335
- numeric, 333
- string, 333–334

load and resolve, Java stored procedures, 431

loading tools. See ETL tools

local timestamp (LOCALTIMESTAMP ([precision])), 290

locking memory use, 37

log

- row deletion, omitting, 174
- of the second argument with base of argument 1 (LOG (n, n2)), 277

Log Writer (LGWR), 3

logging in

- HTML-DB, 588–589, 593, 611
- XML in Oracle Repository, 522–523

logical units, organizing data, 6–7

loops

- fetching rows, 355–356
- FOR ALL, 373–375
- nested, 701
- PL/SQL iterative logic, 339

lowercase

- characters (LOWER (arg1)), 282
- with multibyte encoding (NLS_LOWER (arg1, ['NLS_SORT=x']), 283

M**machine operating system clock (SYSDATE), 293****mappings, OracleAS TopLink, 420–424****matches, replacing (REGEXP_REPLACE), 468–469****materialized views**

creating and editing, 664–665

described, 248, 653–654

SQL Access Advisor, 655–656

mathematical operators, 331**maximum value of exp argument (MAX (exp)), 271–272****median value of exp argument (MEDIAN (exp)), 272****member methods OT (object types), 493–494****memory**

HTML-DB requirement, 582

instances, 4–5

insufficient, multiple connections and, 18

locks, 37

runtime usage, 382–383

tablespaces, temporary, 242–243

MERGE operator

with flat files, 643–644

with relational tables, 171–174

messaging, Java, 401**meta-characters, 457–460****methods**

Java classes, 402

Java stored procedures, 428

UML mapping, 500

Microsoft Excel data, importing, 593–599**Microsoft .NET, support for, 321–322****Microsoft Office InfoPath form**

creating sample, 558–563

saving completed, 571–572

Microsoft Windows

installing Oracle server software, 117–120

requirements, Oracle server software, 116

Microsoft Word, 527–529**minimum value of exp argument (MIN (exp)), 272****MINUS operator, 169–171****MODEL rule functions**

cell existence, testing (PRESENTV (cell_ref, exp1, exp2)), 307

not null (PRESENTNNV (cell_ref, exp1, exp2)), 306

modules

HTML-DB, creating application, 599–610

workspace, creating, 588–591

months

adding (ADD_MONTHS (arg1, num)), 288–289

interval year, converting (NUMTOYMINTERVAL (n, interval_name)), 291–292

interval year to (TO_YMINTERVAL (arg1)), 295

last day (LAST_DAY (arg1)), 290

number between dates (MONTHS_BETWEEN (date1, date2)), 290

moving aggregates, 675–678**multibyte characters**

initial caps encoding (NLS_INITCAP (arg1, ['NLS_SORT=x'])), 283

lowercase (NLS_LOWER (arg1, ['NLS_SORT=x'])), 283

uppercase (NLS_UPPER (arg1, ['NLS_SORT=x'])), 284

multiple PL/SQL package, 391–396**multiple replacement characters (TRANSLATE (arg1, match, replace)), 287–288****multiple tables, accessing**

inner joins, 148–149

insert, 154–155

INSTEAD OF triggers, 444–447

outer joins, 149–150

selecting, 147–148

mutating tables, 449–451**MVRC (multiversion read consistency), 35–36****N****name**

character set (NLS_CHARSET_NAME (ID)), 305

SQL, 551

synonyms, 253–254

naming

columns, 603

database constraints, 217

HTML-DB applications, 606

triggers, 438

national character set (UNISTR (string)), 302**native compilers, 399****natural join, 149****natural log (LN (n)), 277****NCHAR column length**

(NLS_CHARSET_DECL_LEN (byte_length, charsetID)), 305

nested loop, 701**nested table**

collections, 365–366, 369, 492

columns, creating from (COLLECT (column_name)), 303

number of records (CARDINALITY (table_name)), 303

SET, converting to (SET (table_name)), 303

SQL within PL/SQL, 365–366

.NET (Microsoft), support for, 321–322

Net Services (Oracle), 91

network security

- ASO, 91–92
- encryption, 90
- firewalls, 91
- Oracle Net Services, 91

new values, accessing (:new), 440

next integer less than or equal (FLOOR(n)), 277

nodes, existence of (EXISTSNODE(XML_type, XPath, [namespace])), 309

non-null value, returning first (COALESCE (arg1, ...)), 303

non-Oracle distributed databases (Heterogeneous Services)

- ODBC, 321–322
- setting up, 320–321
- Transparent Gateways, 322–323

nonrelational targets, 652

nonrepeatable read, 31–32

normalization

- candidate keys, 60–61
- importance, 54–56
- 1NF, 56–59
- rules, 62
- 3NF, 60
- 2NF, 59–60

NOT NULL value

- database constraints, 217–219
- MODEL rule (PRESENTNV (cell_ref, exp1, exp2)), 306
- return, specifying (NVL2 (exp1, exp2, exp3)), 306

NULL value

- FOREIGN KEY constraint, 226
- index, 193
- population variance minus (VAR_POP (exp)), 274
- replacing with default (NVL (exp1, exp2)), 306
- return, specifying (NVL2 (exp1, exp2, exp3)), 306

number

- groups, assigning to (GROUP_ID ()), 271
- rows, assigning to, and renumbering specified groups, 177–179
- sequences, 248–249

numbers, pair of

- population covariance (COVAR_POP (exp1, exp2)), 270
- sample covariance (COVAR_SAMP (exp1, exp2)), 270

numeric data

- basic (NUMBER), 11
- binary format (BINARY), 11

numeric functions

- absolute value (ABS (n)), 275
- alternate value for BINARY_FLOAT or BINARY_NUMBER that has a NaN (NANVL (n, n2)), 278
- arc sine (ASIN (n)), 275
- arc tangent (ATAN (n)), 276
- arc tangent of two arguments (ATAN2 (n, m)), 276
- cosine (COS (n)), 276
- decimal places, truncating by specified (TRUNC (n, n2)), 280–281
- first argument raised to the power of the second (POWER (n, n2)), 278
- first argument rounded by the number of digits specified by the second argument (ROUND (n, n2)), 279
- hyperbolic cosine (COSH (n)), 276–277
- hyperbolic sine (SINH (n)), 280
- hyperbolic tangent (TANH (n)), 280
- integer, next greatest (Ceil (n)), 276
- log of the second argument with base of argument 1 (LOG (n, n2)), 277
- 1 to 1, arc tangent of (ACOS (n)), 275
- natural log (LN (n)), 277
- next integer less than or equal (FLOOR (n)), 277
- remainder of the first argument divided by the second argument (REMAINDER (n, n2)), 278
- remainder of the first argument divided by the second (MOD (n, n2)), 278
- sign of the first argument, specifying (SIGN (n)), 279
- sine, in radians (SIN (n)), 279
- square root (SQRT (n)), 280
- tangent (TAN (n)), 280
- 2.71828183 raised to the exp power (EXP (exp)), 277

numeric literals, PL/SQL, 333

O

object database management systems. See ODBMS

object privileges, 74

object types (OT)

- collection, 492
- comparison methods, 495–497
- composite, 492–493
- constructor methods, 494–495
- defined, 490
- member methods, 493–494
- reference, 491
- simple, 491
- static methods, 497

object-relational impedance mismatch, 405–406

objects/object-oriented design

access, isolating from, 103
 column (`SYS_TYPEID(object_type)`), 308
 data types, creating, 13
 database design, 49, 66
 described, 258–259
 design methods, 52
 integrity, ensuring with `REF` constraints, 231–232
 Java classes, 402–405
 JPub types, 519–520

OCA API installation, 124**OCI (Oracle Call Interface)**

API software, 124
 Java driver, 409, 415

ODBC (Open DataBase Connectivity), 321–322**ODBMS (object database management systems)**

inheritance, 497–499
 Java class
 described, 501–503
 instances, creating, 504–506
 interacting with database objects, 506–510
 JPub

 configuring and running, 516–517

 described, 515–516

 Java Stored Procedures, 518–519

 object types, 519–520

 SQL and DML statements, 517–518

 Web services support, 520

Oracle objects, 489–490

OT

 collection, 492

 comparison methods, 495–497

 composite, 492–493

 constructor methods, 494–495

 defined, 490

 member methods, 493–494

 reference, 491

 simple, 491

 static methods, 497

RDBMS and ORDBMS, 488–489

relational database management systems versus, 487

schema evolution, 499–500

UML class mapping, 500

views on relational data, 511–515

Office (Microsoft) InfoPath form

 creating sample, 558–563

 saving completed, 571–572

offset time zone (TZ_OFFSET(timezone_param)), 295**OID (Oracle Internet Directory), 89****OLAP (online analytical processing) cube, 682–686****OLTP (online transaction processing), 204, 653****1NF (First Normal Form), 56–59****Open DataBase Connectivity (ODBC), 321–322****opening SQL cursors, 354–355****operating system timestamp (SYSTIMESTAMP), 293–294****operations, 367–368****optimization**

 automatic tracing of SQL statements (`AUTOTRACE`), 709

 cost-based optimizer, 653, 661, 690–691

 described, 689–690

 execution plan

 data access, 700–701

 described, 699–700

 execution statistics

 described, 702–703

 detailed, 704

 example, 704–709

 overall, 703–704

 hints

 access path, 717–718

 advantages and disadvantages of, 721–722

 join, 718–719

 optimizer mode, 716–717

 parallel operation, 720

 query transformation, 719–720

 syntax, 716

 histograms

 described, 696

 SQL statements and, 698–699

 syntax, 696–697

 modes

 described, 691

 desupported, 691

 setting, 692

 necessary data, transferring only, 318–319

 results, storing (`EXPLAIN PLAN`), 710–711

 rule-based optimizer, 690–691

 sorting, 702

 SQL

 statements, 20

 trace file, formatting and aggregating (`TKPROF`),
 712–714

 Trace utility, 712, 713–714

 statistics

 change and, 694–695

 collecting, 694

 cost and, 692

 production and test environments, 695

 types, 693–694

 stored outlines

optimization (continued)

creating, 722–723

described, 722

editing, 723

using, 723

views, execution plan and statistics (V\$SQL_PLAN

and V\$SQL_PLAN_STATISTICS), 715–716

optimizer mode, 716–717

Oracle

distributed databases

distributed transactions and two-phase commit,
319–320

linking, 316–319

Java support, 397

ODBMS objects, 489–490

PL/SQL package endorsement, 383

Oracle Administration And Management (Ault), 7

Oracle Application Server, 407–408

Oracle Call Interface (OCI)

API software, 124

Java driver, 409, 415

Oracle Connection Manager (CMAN), 91

Oracle Enterprise Manager

business intelligence query, 658–660

execution plan, viewing, 715

OLAP cube, creating, 684, 686

SQL Access Advisor, 663–664

user authentication, 317–318

Oracle HTTP Server

installing, 584

URL access, 586

Oracle Internet Directory (OID), 89

Oracle Publisher (JPub)

configuring and running, 516–517

described, 515–516

Java Stored Procedures, 518–519

object types, 519–520

SQL and DML statements, 517–518

Web services support, 520

Oracle Net Services, 91

Oracle Portal, 580

Oracle SOAP Server, 577

Oracle Technology Network (OTN)

described, 113–116

Instant Client, downloading, 125

Oracle Warehouse Builder

described, 647

nonrelational targets, 652

sample, 648–651

typical build and deploy, 647–648

Oracle XDK, 574–577

OracleAS TopLink

controller application, 425–426

goal, 419

Java interaction, 410–412

mappings, 420–424

package and deploy, 427

session information, 424–425

OracleJVM

installation, verifying, 427–428

outside database, 412

ORDBMS, 488–489

order entry, 194–195

order, specifying (ORDER BY clause)

reading data (SELECT statement), 141–144

scalar data types, 495–497

organization, PL/SQL package, 381

orthogonal persistence, 488

OT (object types)

collection, 492

comparison methods, 495–497

composite, 492–493

constructor methods, 494–495

defined, 490

member methods, 493–494

reference, 491

simple, 491

static methods, 497

OTN (Oracle Technology Network)

described, 113–116

Instant Client, downloading, 125

outer joins, 149–150

outlines, stored, 722–723

overloading PL/SQL block header, 327

P

package

OracleAS TopLink, 427

PL/SQL

body code, listed, 384–386

data, creating text string from, 389–390

declaration section, 386–387

dependencies, 382

described, 379–380

employee listing procedure, 387

impact, 380–381

internal logic, 388–389

multiple, using, 391–396

Oracle's endorsement, 383

- organization, 381
- running, 390–391
- runtime memory usage, 382–383
- scope, 381–382
- specification, 383–384
- visibility, 381
- padded strings (, LPAD (arg3)), 283**
- padding characters (RPAD(arg1, n, arg3)), 286–287**
- page, HTML-DB**
 - adding new, 618–622
 - attributes, modifying, 622–625
- pair of numbers**
 - coefficient of correlation (CORR (exp1, exp2)), 269
 - population covariance (COVAR_POP (exp1, exp2)), 270
 - sample covariance (COVAR_SAMP (exp1, exp2)), 270
- parallel operation, 25–26, 720**
- parallel pipelining, 640**
- parallel server processes, managing, 25**
- parameter, 326, 327**
- parentheses (()), 459**
- parser, XML, 575**
- parsing**
 - execution statistics, 703
 - SQL statements, 19–20
- partition**
 - accessing, 700
 - business intelligence, 654
 - large databases, storing, 8–9, 245–246
 - moving with Transportable Tablespaces, 632–634
- Partitioning Option tool, 645–647**
- password**
 - described, 69–70
 - HTML-DB, 584
 - Oracle Net Services, 91
 - system accounts, installing software, 117–118
- patterns**
 - regular expressions, matching, 456, 463–464
 - string, searching (REGEXP_SUBSTR), 466–468
- pay**
 - bonuses, identifying lower-paid employees, 172–173
 - highest salary in each department, retrieving, 179
 - status, functions listing, 266, 267–268
- payload, 255–256**
- percent rank of selected row, 273**
- percentiles, business intelligence analysis, 674–675**
- performance. See also optimization**
 - audit, 88
 - complex query workloads, managing, 667–668
 - contention, reducing, 37
 - declarative constraints, 215
 - index, 191
 - Java, 399
 - partitions, 9, 246
 - regular expressions, 475–476
 - text patterns, 460
- permissions**
 - ACL, 535
 - to create, trigger of, 439
 - functions, creating, 266
 - synonyms, 254
- PGA (Program Global Area)**
 - cursor, establishing, 18
 - memory, 5
- phantom read, 32–33**
- phases and processes, stream, 634**
- phonetic character representation (SOUNDEX (arg1)), 287**
- physical database design options, 6–7, 64–65**
- pipe symbol (|), 458**
- PKI (Public Key Infrastructure) security certificate, 81**
- PL/SQL**
 - code architecture
 - block header, 326–327
 - declaration section, 328
 - described, 325–326
 - error-related functions, 330
 - exceptions, catching and handling, 329–330
 - execution section, 328
 - scoping and notation, 330
 - compilation, native, 349
 - conditional logic
 - branching, 338
 - CASE expression, 337–338
 - CASE statement, 336–337
 - IF . . . THEN . . . ELSE, 335–336
 - constructing SQL statement, 110–112
 - doing nothing (NULL construct), 340
 - inside database, 413
 - iterative logic
 - FOR . . . LOOP, 339–340
 - LOOP, 339
 - WHILE . . . LOOP, 340
 - Java and, 431–434
 - language
 - character set, 331
 - identifiers, 332
 - literals, 333–335
 - reserved words, 332
 - symbols, special, 331–332
 - package
 - body code, listed, 384–386

PL/SQL (continued)

- data, creating text string from, 389–390
- declaration section, 386–387
- dependencies, 382
- described, 379–380
- employee listing procedure, 387
- impact, 380–381
- internal logic, 388–389
- multiple, using, 391–396
- Oracle's endorsement, 383
- organization, 381
- running, 390–391
- runtime memory usage, 382–383
- scope, 381–382
- specification, 383–384
- visibility, 381
- records, 363, 364
- sample procedure
 - code, starting, 341
 - compiling, 344–345
 - exception handling, 343–344
 - logic, adding, 342–343
 - purpose, 341
 - running, 345–346
 - source code and dependencies, 346–348
 - variables, adding, 342
- security
 - access, 348
 - program unit rights, 348–349
- SQL
 - basic within, 351
 - collection indexed by sequential integers, 365–366
 - collections, 366–369
 - FOR cursor, 359–360
 - cursors, 352–357
 - data indexed by value, 364–365
 - data types, special, 357–358
 - dynamic, 375–376
 - implicit cursors, 360–361
 - records, 363–364
 - REF CURSOR, 362
 - rows, retrieving group (BULK COLLECT), 369–372
 - variable arrays, 366
 - write statements, multiple (FOR ALL), 373–375
 - uses, 350
- plus sign (+), 458
- PMON (Process Monitor), 3
- polymorphism, 398
- population
 - covariance of pair of numbers (COVAR_POP (exp1, exp2)), 270

- cumulative standard deviation, 274
- standard deviation, 274
- variance minus NULL values (VAR_POP (exp)), 274

Portable Operating System Interface. See POSIX

Portal (Oracle), 580

position

- matching character (REGEXP_INSTR), 464–466
- relative, row within group (CUME_DIST (exp1, . . .) WITHIN GROUP (ORDER BY)), 270–271
- specified, character from (SUBSTR (arg1, pos, len)), 287

POSIX (Portable Operating System Interface)

- characters, replacing (REGEXP_INSTR (source, regex, [pos], [occurrence], [return_option], [match])), 284–285
- searching (REGEXP_SUBSTR (source, regex, [pos], [occurrence], [match])), 285–286

price

- minimum, first/last analysis, 679–680
- product change, e-mail alert, 428–434

primary key

- database constraints, 219–221, 234
- importing data from spreadsheet table, 597–598
- index, 236–237
- source, selecting, 607–608

privacy issues, 67–68

privileges

- ACL, 534–535
- auditing user actions, 86
- objects, isolating, 103
- PL/SQL program, 348–349, 383

procedures, stored

- authorizing users, 78
- database integrity features, 215–216
- described, 259

Java

- code, 428–431
- invoke, 432–434
- load and resolve, 431
- methods, 428
- OracleJVM installation, verifying, 427–428
- publish, 431–432

process, handling requests from applications.

See instance

Process Monitor (PMON), 3

processing cycle, 15–16

processor, XSLT, 575

production environment, 695

Program Global Area (PGA)

- cursor, establishing, 18
- memory, 5

program unit rights, 348–349
proxy user, auditing, 88
Public Key Infrastructure (PKI) security certificate, 81
purchase order application
 comparing data, 496–497
 impedance framework, 406
 Java classes, 402–405
 XML, formatting customer addresses as, 493–494

Q

queries
 complex workloads, proactive management, 667–668
 earlier, obtaining, 179–183
 rewriting, XML DB, 552–554
 transformations, 643, 719–720
question mark (?), 457
queues, 635–637

R

RAC (Real Application Clusters), 6
radians, 279
rank
 business intelligence analysis, 672–675
 of expression `exp (RANK (exp ...) WITHIN GROUP (ORDER BY exp))`, 273
 percent rank (`PERCENT_RANK (exp ...) WITHIN GROUP (ORDER BY exp)`), 273
 of row within group (`DENSE_RANK (exp1, ...) WITHIN GROUP (ORDER BY)`), 271
RDBMS, 488–489
READ COMMITTED isolation level, 38
reading data (SELECT statement)
 aggregating information (`GROUP BY` clause), 144–146
 aliases, 137–138
 basic, 135–137
 order, specifying (`ORDER BY` clause), 141–144
 results, limiting (`HAVING` clause), 146–147
 rows, restricting (`WHERE` clause), 138–141
Real Application Clusters (RAC), 6
real-time data, nearly, 630
recompiling triggers, 452
recording (trails) user actions, 87
records
 number in nested table
 (`CARDINALITY (table_name)`), 303
 PL/SQL and SQL, 364
 SQL within PL/SQL, 363–364
Recycle Bin, 250–252
RECYCLE buffer pool, 261

redo log files
 instance, 4
 memory, 5
REF, 231–232
REF CURSOR, 362
reference OT, 491
references, passing (REF CURSOR), 362
referencing table, foreign key, 222
referential integrity, 222, 448
regular expressions
 accepting data from client application, 462
 architecture and performance, 475
 callout, 462–463
 character position, matching (`REGEXP_INSTR`), 464–466
 constraints, 474
 described, 455, 456
 indexes, 470–472
 JVM, 463
 language theory and, 461
 manipulating data, 462
 meta-characters, 457–460
 NLS support, 474–475
 pattern matching (`REGEXP_LIKE`), 463–464
 presenting data to client application, 461
 replacing matches (`REGEXP_REPLACE`), 468–469
 SQL operators and procedural code, 462
 string, searching for pattern (`REGEXP_SUBSTR`), 466–468
 views, 472–474
relation, 56
relational data
 object view, 504
 XML, viewing as, 540
relational database
 architecture, 1, 2
 loosely related data, 521
 ODBMS versus, 487
 operators, 331
relative position, row within group
 (`CUME_DIST (exp1, ...) WITHIN GROUP (ORDER BY)`), 270–271
removing
 left characters (`LTRIM (arg1, arg2)`), 283
 right characters (`RTRIM (arg1, arg2)`), 287
 rows matching criteria (`DELETE` statement), 155
 specified (`LTRIM (arg1, arg2)`), 283
reorganizing index B-tree, 195–196
replacing
 characters (`REPLACE (arg1, search, replace)`),
 285–286
 matches (`REGEXP_REPLACE`), 468–469

replacing (continued)

replacing (continued)

- multiple characters (`TRANSLATE(arg1, match, replace)`), 287–288
- NULL value with default (`NVL(exp1, exp2)`), 306
- POSIX characters (`REGEXP_INSTR(source, regex, [pos], [occurrence], [return_option], [match])`), 284–285

repository, XML DB

- ACL-based security, 533–535
- described, 521–522
- protocol-based access, 522–529
- schema, enabling new, 533
- SQL-based access, 529–533

reserved words, PL/SQL, 332

resources, releasing JDBC, 419

response time, improving. *See* optimization

restoring deleted employees, 181–183

results

- JDBC processing, 418–419
- limiting (`HAVING` clause), 146–147
- optimization, storing (`EXPLAIN PLAN`), 710–711
- preparing for return, 20
- values, finding common (`IN` and `EXISTS`), 160–164

retrieval performance

- index, 185–186, 187–188
- SQL statement, 22–23

retrieving

- group rows (`BULK COLLECT`), 369–372
- rows, 352–353, 355–356

returned values

- of `exp` (`SUM(exp)`), 274
- NULL and NOT NULL condition, specifying (`NVL2(exp1, exp2, exp3)`), 306

returning

- PL/SQL statement, 326, 338
- SQL statement, 21

reverse key index, 196–197

roles, user authorization

- database, 75–76
- enterprise, 78
- external, 77
- global, 78
- predefined database, 76–77
- secure application, 77

rollback

- buffers, 35, 37, 39
- Flashback queries, 179–183
- instance segments, 4
- row versions, reading, 35
- tablespaces, 243
- transactions, 30

- trigger, 88
- two-phase commit, 319

rounding

- dates (`ROUND(date, format)`), 292–293
- first argument by the number of digits specified by the second argument (`ROUND(n, n2)`), 279

row

- access, limiting, 79–85
- all, retrieving, 22–23
- comparing (`ANY`, `SOME`, `ALL`), 164–166
- counting non-null (`COUNT([DISTINCT] exp)`), 269–270
- data, changing, 155
- defined, 6
- denormalization, 63
- FOR cursor, associating (`%ROWTYPE`), 359–360
- group, retrieving (`BULK COLLECT`), 369–372
- nonrepeatable read, 31–32
- objects, 505–506
- 1NF, 56–59
- ordering and limiting (`ROWNUM`), 174–177
- percent rank (`PERCENT_RANK(exp...) WITHIN GROUP(ORDER BY exp)`), 273
- rank within group (`DENSE_RANK(exp1, ...) WITHIN GROUP(ORDER BY)`), 271
- relative position within group (`CUME_DIST(exp1, ...) WITHIN GROUP(ORDER BY)`), 270–271
- restricting (`WHERE` clause), 138–141
- SQL cursors, retrieving, 352–353, 355–356
- two result sets, returning (`INTERSECT`), 168–169
- 2NF multiple part key, 59–60
- values, computing based on groups of, 177–179
- version, marking, 35–36

rule, AQ, 258

rule checking, 240

rule-based optimizer, 690–691

rules, business, 215–216. *See also* constraints

run time, SQL

- `BULK COLLECT`, 376
- data dictionary, 110–112
- described, 375
- `EXECUTE IMMEDIATE`, 376
- parsing, 388
- within PL/SQL, 375–376

running

- HTML-DB application, 610–611, 625–626
- JPub, 516–517
- PL/SQL package, 390–391
- PL/SQL sample procedure, 345–346
- procedure, SQL cursors, 356–357

runtime memory usage, 382–383

S**sample covariance of pair of numbers**`(COVAR_SAMP(exp1, exp2)), 270`**sample standard deviation of exp (STDDEV (exp)), 273****sample variance, minus NULL values (VAR_SAMP (exp)), 274****SAVEPOINT, 30****saving**

- content, 572
- statistics before updating, 695

scalar data types

- comparing, 495–497
- grouping, 491

schema

- business intelligence
 - described, 654–658
 - dimensions, 658–659, 660–661
 - hierarchies, 660
- enabling new, 533
- evolution, ODBMS, 499–500
- HTML-DB workspace, 590
- shared and private, developing, 103–107
- XML
 - annotation, 551
 - Oracle XDK processor, 575

scope, PL/SQL

- code architecture, 330
- package, 381–382

scripting

- loading flat files, 650–651
- SQL statements, 108–110

searching

- HTML-DB tables, 614–616
- POSIX characters (`REGEXP_SUBSTR(source, regex, [pos], [occurrence], [match])`), 285–286
- string for pattern (`REGEXP_SUBSTR`), 466–468
- value or expression, comparing (`DECODE(arg1, search, result, search2, result2 ... , default)`), 303–304

second

- interval day, converting (`NUMTODSINTERVAL(n, interval_name)`), 291
- interval day to (`TO_DSINTERVAL(arg1, [NLS_NUMERIC_CHARACTERS = "dg"])`), 294–295

2NF (Second Normal Form), 59–60**Secure Sockets Layer (SSL), 90****security**

- access, controlling, 78–85

accountability, 85–88

ACL-based, 533

authenticating users, 69–73

authorizing users, 73–78

benefits of database-level, 68–69

confidentiality and privacy, 67–68

database, 90

enterprise, 88–92

integrity, 68

LDAP services, 89

MERGE statement, 174

network, 90–92

objective, 88–89

PL/SQL, 348–349, 383

practices, 92

roles, 78

roles, user authorization, 77

shared schemas, 89

triggers, 88

users, 89

segments, 8**SELECT statement. See also aggregate functions**

receiving, PL/SQL records, 364

triggers, 453

view definition, using as, 246–248

selecting multi-table access, 147–148**semicolon (;), 328****sequences, 248–249****serial writers, changes caused by, 40–41****SERIALIZABLE isolation level, 38****serialization, multiple users, 29****server**

- parallel processes, managing, 25
- Web CMAN, configuring, 91

Server-Side Driver, 409**Server-Side Thin Driver, 409****servlets, 401****session**

- current, time zone (`SESSIONTIMEZONE`), 293
- defined, 17
- information function (`USERENV('param')`), 308–309
- OracleAS TopLink, 424–425

SET, converting nested table to (SET(table_name)), 303**set of views, determining, 103–107****set operations, 166–171****SGA (System Global Area), 5****shared lock, 33–34****shared schemas, 89****shared servers, 17–18**

sharing data and events. See streams

sign of the first argument, specifying (`SIGN(n)`), 279

similar words (`LIKE` and `REGEXP_LIKE`), 159–160

simple OT (object types), 491

sine

arc (`ASIN(n)`), 275

in radians (`SIN(n)`), 279

size, of `arg1` argument (`VSIZE(arg1)`), 309

smart cards and biometric identification, 70

SMON (System Monitor), 3

SMTP traffic, Java, 428–434

snapshot database views, 37

snowflake schema, 656

SOAP Server (Oracle), 577

Social Security number, matching. See patterns

soft parse, 19

software, obtaining Oracle, 113–116

sorting

characters (`NLSSORT(arg1, ['NLS_SORT=x'])`), 284

index order, 191–192

optimization, 702

scalar data types, 495–497

temporary tablespaces, 242

space, characters filling specified, 9

splitting top-level nodes (`XMLSEQUENCE(Cursor, XMLFormat) XMLSEQUENCE(XMLType)`), 313

spreadsheet data, importing, 593–599

SQL

access based on, 529–533

adding data (`INSERT` statement), 153–155

aggregation (`ROLLUP` and `CUBE`), 665–667

`ALTER` statement, 133–134

calendar, 619

changing data in row (`UPDATE` statement), 155

`CREATE` statement, 131–133

data dictionary, 94, 108–110

data, returning from write operations, 183–184

deleting

objects from database (`DROP`), 134

without log entries (`TRUNCATE`), 174

earlier queries, obtaining (Flashback), 179–183

extended set operations, 166–171

history, 129

HTML-DB interface to Oracle database, 626

JDBC execution, 416–418

limitations, 46–47

multi-table access, 147–150

operators and procedural code, 462

PL/SQL

basic within, 351

collection indexed by sequential integers

(nested tables), 365–366

collections, 366–369

`FOR` cursor, 359–360

cursors, 352–357

data indexed by value (associative arrays), 364–365

data types, special, 357–358

dynamic, 375–376

implicit cursors, 360–361

records, 363–364

`REF CURSOR`, 362

rows, retrieving group (`BULK COLLECT`), 369–372

variable arrays, 366

write statements, multiple (`FOR ALL`), 373–375

pool and data buffer, flushing, 186–187

reading data (`SELECT` statement), 135–147

records, 364

regular expressions, 462

removing rows matching criteria (`DELETE` statement), 155

result set values, finding common (`IN` and `EXISTS`), 160–164

rows, comparing (`ANY`, `SOME`, `ALL`), 164–166

rows, ordering and limiting (`ROWNUM`), 174–177

similar words (`LIKE` and `REGEXP_LIKE`), 159–160

standards, 130

statements

auditing user actions, 85

authenticating users (`CREATE USER` and `ALTER USER`), 70–73

automatic tracing (`AUTOTRACE`), 709

bind variables performance, 23–25

connecting to database, 16–18

cursor, establishing, 18

grouping, 130–131

histograms, 698–699

JPub, 517–518

parallel operation performance, 25–26

processing cycle illustrated, 15–16

receiving data, 21

retrieval performance, 22–23

submitting, 18–21

subqueries, 150–153

tables, combining (`MERGE`), 171–174

trace file, formatting and aggregating (`TKPROF`), 712–714

transaction boundaries, marking (`COMMIT`, `ROLLBACK`, and `SAVEPOINT`), 156

values, computing based on groups of rows (analytics), 177–179

to XML, 554–557

SQL Access Advisor, 211, 655–656

SQL Trace utility, 712, 713–714**SQL Workshop, 580****SQLJ object type, 501–503****SQL*Loader**

advantages and disadvantages, 640–641
constraints, 238

SQL/XML and Query Rewrite, 553–554**square brackets ([]), 457****square root**

of cumulative population standard deviation
(`STDDEV_POP (exp)`), 274
of cumulative standard deviation
(`STDDEV_SAMP (exp)`), 274
function (`SQRT (n)`), 280

SSL (Secure Sockets Layer), 90**staging AQ, 257****standard deviation**

cumulative, square root of (`STDDEV_SAMP (exp)`), 274
sample, of `exp` (`STDDEV (exp)`), 273
square root of (`STDDEV_SAMP (exp)`), 274

standards, SQL, 130**star schema, 654–655, 657****statement**

batching, 418
grouping, 130–131
terminator, 331

states, 234–236**static methods, OT (object types), 497****statistics**

execution
described, 702–703
example, 704–709
listing (`V$SQL_PLAN` and `V$SQL_PLAN_`
`STATISTICS`), 715–716
overall, 703–704
optimization
change and, 694–695
collecting, 694
cost and, 692
production and test environments, 695
types, 693–694

stock item-line item association, 491**stock market**

interests, populating, 478–484
PE ratio, returning by, 477–478
portfolio application, 476–477

storage responsibilities, DBAs handling, 1**stored outlines, 722–723****stored procedures**

authorizing users, 78
database integrity features, 215–216

described, 259

Java

code, 428–431
invoke, 432–434
load and resolve, 431
methods, 428
OracleJVM installation, verifying, 427–428
publish, 431–432

storing

optimization results (`EXPLAIN PLAN`), 710–711
sample content, 568–572

streams

advanced queues, configuring and monitoring,
635–637
advantages, 634
AQ, 255–256
phases and processes, 634

string

literals, PL/SQL, 333–334
padded character (`, LPAD (arg3)`), 283
searching for pattern (`REGEXP_SUBSTR`), 466–468
time and date, converting (`TO_CHAR (datetime,`
`format, ['NLS_DATE_LANGUAGE =`
`language'])`), 294
unbounded XML, 552

structured storage, 536–537**style sheet, 313****submitting SQL statements, 18–21****subqueries, SQL, 150–153****substring characters**

finding (`INSTR (arg1, to_find, pos,`
`occurrence)`), 282
from specified position (`SUBSTR (arg1, pos,`
`len)`), 287

summary information, HTML-DB tables, 605**summary tables, business intelligence**

described, 661–664
SQL Access Advisor, 655–656

sums. See adding**symbols, special PL/SQL, 331–332****synonyms**

benefits of using, 253
location transparency, preserving illusion of, 318
schemas, shared and private, 105–107
working with, 253–254

system

hardware management, 667–668
operating system clock (`SYSDATE`), 293
Oracle requirements, 116, 582
timestamp, 289, 293–294

System Global Area (SGA), 5

System Monitor (SMON), 3

system privileges

- authorizing users, 74
- system account passwords, setting, 117–118

T

tables

- access, limiting, 79–80
- accessible data dictionary, viewing (`ALL_TABLES`), 96–97
- alias, 137
- building application based on, 600–602
- column, assigning attribute set, 479–480
- combining (`MERGE`), 171–174
- `CREATE` statement, 131–132
- data access, 700
- data dictionary schema (`USER_TABLES`), 95–96
- database design, 62–63
- defined, 6
- direct path loading restrictions, 640
- external, 641–643
- fixed, data dictionary (`V_$FIXED_TABLE`), 99–100
- flat files, accessing external, 260
- importing spreadsheet data, 595–596
- index or column, number associated, 152–153
- index, organizing, 207
- multiple, accessing
 - inner joins, 148–149
 - insert, 154–155
 - `INSTEAD OF` triggers, 444–447
 - outer joins, 149–150
 - selecting, 147–148
- multiple part key, 59–60
- nested
 - columns, creating from (`COLLECT(column_name)`), 303
 - number of records (`CARDINALITY(table_name)`), 303
 - `SET`, converting to (`SET(table_name)`), 303
 - SQL within PL/SQL, 365–366
- organizations or customers, storing (VPD), 81–84
- separating, linking (`UNION`), 166–168
- statistics, types for, 693
- tablespaces and, 7
- Transportable Tablespaces, 632–634
- triggers, mutating, 239, 449–451
- XML
 - data type, creating, 537–538
 - populating, 552

tablespaces

- data organization, 7–8
- described, 241–242
- special, data dictionary, 93
- temporary, 242–243
- UNDO, 243

tabs, calendar page, 620

tangent, arc

- of `(ATAN(n))`, 276
- of -1 to 1 (`ACOS(n)`), 275
- of two arguments (`ATAN2(n, m)`), 276

tangent (`TAN(n)`), 280

TCP/IP (Transmission Control Protocol/Internet Protocol) encryption, 90

telephone numbers, matching. See patterns

temporary tables, global, 250

temporary tablespaces, 242–243

test environments, 695

text

- data, creating from, 389–390
- regular expressions, matching, 456, 463–464
- searching string (`REGEXP_SUBSTR`), 466–468
- spreadsheet data, importing as, 594
- trace file, formatting and aggregating, 712–714

theme, HTML-DB, 609

Thin Driver, 408, 411, 415

3NF (Third Normal Form), 60

three-column data dictionary view, 98–99

time. See date and time functions

time machine. See Flashback

time zone

- current session (`SESSIONTIMEZONE`), 293
- database (`DBTIMEZONE`), 289
- offset (`TZ_OFFSET(timezone_param)`), 295
- returning specified (`NEW_TIME(the_date, tz1, tz2)`), 290–291
- time and date converting to `TIMESTAMP` with (`TO_TIMESTAMP_TZ(string, format, [NLS_TIMESTAMP_FORMAT])`), 294
- timestamp with (`FROM_TZ(timestamp, timezone)`), 289–290

timestamp

- current system (`CURRENT_TIMESTAMP([precision])`), 289
- local (`LOCALTIMESTAMP([precision])`), 290
- operating system (`SYSTIMESTAMP`), 293–294
- time and date, converting (`TO_TIMESTAMP(string, [format], [NLS_TIMESTAMP_FORMAT])`), 294
- with timezone value (`FROM_TZ(timestamp, timezone)`), 289–290

TOAD, 345–346, 356–357

Tomcat (Apache), 573–574

tools. See also ETL tools; iSQL*Plus tool

- auditing user actions (AUDIT), 85
- business intelligence analysis, 654, 671–672
- database design, 48–49

top-level nodes, splitting (XMLSEQUENCE(Cursor, XMLFormat) XMLSEQUENCE(XMLType)), 313

TopLink (OracleAS)

- controller application, 425–426
- goal, 419
- Java interaction, 410–412
- mappings, 420–424
- package and deploy, 427
- session information, 424–425

tracing SQL statements (AUTOTRACE), 709

trailing characters, trimming (TRIM([LEADING] [TRAILING] [BOTH] char FROM source)), 288

transaction

- boundaries, marking (COMMIT, ROLLBACK, and SAVEPOINT), 156
- distributed, 319–320
- isolating activity during, 33–34
- logical order, 29
- users, multiple, 29–30

transformations. See also ETL tools

- flat files, loading, 640
- tools, 643–644

Transmission Control Protocol/Internet Protocol (TCP/IP) encryption, 90

transparency index, 191

Transparent Gateways, 322–323

Transportable Tablespace, 632–634

TransX Utility, 577

trickle feed, 630

triggers

- creating, 439–440
- database integrity features, 215–216
- database table, mutating, 239
- delete, 441–442
- deleting and dropping, 451
- described, 259, 437–438
- disabling, temporarily, 451
- execution, order of, 438
- fire, controlling, 442–443
- inserting or updating, 443
- INSTEAD OF, 444–447
- languages, other, 448–449
- limitations, 453
- mutating tables, 449–451
- naming, 438

- new and previous values, accessing (:new and :old), 440

- permissions to create, 439

- recompiling, 452

- referential integrity, 448

- security, 88

- update, 441

- viewing in data dictionary, 452–453

trimming leading or trailing characters (TRIM([LEADING] [TRAILING] [BOTH] char FROM source)), 288

TRUNCATE operator, 174

truncated format (TRUNC(date, [format])), 295
truncating decimal places, specified (TRUNC(n, n2)), 280–281

tuple, 56

2NF (Second Normal Form), 59–60

2.71828183 raised to the exp power (EXP(exp)), 277
type

- characters, changing (TREAT(expr AS [REF] schema.type)), 288

- SQL, 551

- values, concatenating (XMLCONCAT(XMLType,)), 312

type map, JDBC, 508

U

UML (Unified Modeling Language)

- composite object type, 492–493
- database design, 52–53
- ODBMS class mapping, 500
- simple object type, 491

unbalanced index B-tree, 194–195

UNDO tablespaces, 4, 243

undoing deletions, 181–183

unformatted expression (XMLAGG(XMLType, order_by_clause)), 311

Unified Modeling Language. See UML

Uniform Resource Locator (URL), 586

UNION operator, 166–168

UNIQUE constraints, 221–222, 236–237

uniqueness, index, 192

Unix command line

- JPub CLASSPATH configuration, 516–517
- security hole, 70

unstructured storage, 536–537

UPDATE

- mutating tables, 449–451
- triggers, 437, 441
- write contention, 41

updating

- data dictionary, 107–108
- HTML-DB, obtaining, 627
- statistics and, 694–695
- triggers, 443
- values (UPDATEXML (XMLType, XPath, new_val, [namespace])), 311
- uploading XML Schema, 543–547**
- uppercase characters, 284, 288**
- URL (Uniform Resource Locator), 586**
- U.S. Federal Information Processing Advanced (FIPS) encryption standard, 91**
- user**
 - application developer, creating, 591–593
 - enterprise security, 89
- user ID**
 - described, 69–70
 - function (UID), 308
- user-entered length, 9–10**
- username, 308**
- users**
 - actions, auditing, 85–87
 - authenticating
 - links, 317
 - smart cards and biometric identification, 70
 - SQL statements governing (CREATE USER and ALTER USER), 70–73
 - user ID and password, 69–70
 - authorizing
 - described, 73
 - object privileges, 74
 - roles, 75–78
 - stored procedures, 78
 - system privileges, 74
 - multiple
 - concurrent integrity problems, 30–33
 - contention, reducing, 34–39
 - data integrity, 28–29
 - isolating activity during transaction (locks), 33–34
 - isolation levels, 29, 38–39
 - problems created by, 27
 - serial writers, changes caused by, 40–41
 - serialization, 29
 - transactions, 29–30
 - writers, contention between competing, 39–40
- UTC (Coordinated Universal Time), 293, 308**
- UTL_FILE procedures, 260**

V

- validity. See also constraints**
 - mapping flat files, 649
 - SQL statements, checking, 19–20
- values**
 - collections, 366
 - computing based on groups of rows, 177–179
 - database, partitioning by, 632
 - inappropriate, deleting updated rows, 171
 - inserting into table, 154
 - write operations (FOR ALL), 374–375
- variable arrays**
 - collections, 366, 369, 492
 - SQL within PL/SQL (VARRAYS), 366, 553
- variables**
 - adding in PL/SQL sample procedure, 342
 - binding to SQL statement, 20–21
 - declaring, SQL cursors, 354
- variance of values in exp (VARIANCE (exp)), 275**
- Venn diagram, 168–169**
- viewing**
 - in data dictionary, triggers, 452–453
 - information, creating functions, 267–268
 - recycle bin contents, 251
- views**
 - access, controlling, 79–80
 - applicable to task, finding, 101–103
 - CREATE statement, 132–133
 - database constraints, 239–240
 - described, 246–248
 - execution plan and statistics (V\$SQL_PLAN and V\$SQL_PLAN_STATISTICS), 715–716
 - materialized
 - creating and editing, 664–665
 - described, 248, 653–654
 - SQL Access Advisor, 655–656
 - regular expressions, 472–474
 - XML data type, 538–540
- violations, FOREIGN KEY constraint, 225–226**
- visibility, PL/SQL package, 381**
- VPD (Virtual Private Database), 81–85**

W

- Warehouse Builder (Oracle)**
 - described, 647
 - nonrelational targets, 652
 - sample, 648–651
 - typical build and deploy, 647–648

warehouse, data

- bitmap indexes, 202–206
- bitmap join indexes, 206–207
- bulk load indexes, 235
- partitioning, 632, 645–647

Web services, 520**Web site, vendors'**

- HTML, displaying content as, 572–574
- InfoPath form, 558–563
- information content schema, 563–568
- storing content, 568–572

WebDB, 580**WHILE...LOOP, 340****width bucket function, 680–682****Windows (Microsoft)**

- installing Oracle server software, 117–120
- requirement, Oracle server software, 116

Word (Microsoft), 527–529**workers**

- departments, showing specified, 161
- list of jobs held by, 167, 370–372, 383–392
- restoring deleted, 181–183

workflows, 261–262**workspace**

- HTML-DB, creating, 588–591
- manager, 262–263

write locks, 34**write operations**

- data, returning, 183–184
- FOR ALL
 - exceptions, 373
 - indices of, 374
 - syntax, 373
 - values of, 374–375
- locking rows, 36

write statements, multiple, 373–375**writers, contention between competing, 39–40****X****XDK (Oracle), 574–577****XML (eXtensible Markup Language)**

- Class Generator, 576
- Compressor, 577
- functions
 - arguments, concatenating (XMLFOREST (exp AS alias_name, ...)), 312
 - documents or fragments, aggregating (SYS_XMLAGG (exp, [format])), 310–311
 - elements, value of (EXTRACTVALUE (XMLType, XPath, [namespace])), 310

- exp parameters, passing (XMLCOLATTVAL (exp AS alias_name, ...)), 312
- expression, converting (SYS_XMLGEN (exp, [format])), 311
- fragment, value of (EXTRACT (XML, XPath, [namespace])), 309–310
- nodes, existence of (EXISTSNOE (XML_type, XPath, [namespace])), 309
- top-level nodes, splitting (XMLSEQUENCE (Cursor, XMLFormat) XMLSEQUENCE (XMLType)), 313
- type values, concatenating (XMLCONCAT (XMLType, ...)), 312
- unformatted expression (XMLAGG (XMLType, order_by_clause)), 311
- updating values (UPDTEXML (XMLType, XPath, new_val, [namespace])), 311
- XSL style sheet (XMLTRANSFORM (XMLType, XSL_XMLType)), 313

outside database, 574–577

parser, 575

Pipeline Definition Language, 576

Schema

- annotations, 548–553
- for content, 563–568
- described, 540–541
- document, creating, 541–543
- processor, 575
- uploading, 543–547

spreadsheet data, importing as, 594

SQL to, 554–557

SQL Utility (XSU), 576

XML DB (eXtensible Markup Language Database)**data type**

- columns and tables, creating, 537–538
- structured versus unstructured storage, 536–537
- views, 538–540

repository

- ACL-based security, 533–535
- described, 521–522
- protocol-based access, 522–529
- schema, enabling new, 533
- SQL-based access, 529–533

SQL to XML, 554–557

SQL/XML and Query Rewrite, 553–554

XML Schema

- annotations, 548–553
- described, 540–541
- document, creating, 541–543
- uploading, 543–547

XSLT transformations, 557–558

XSL (eXtensible Stylesheet Language)

XSL (eXtensible Stylesheet Language), 313

XSLT (eXtensible Stylesheet Language Transformer)

processor, 575

transformations, 557–558

XSQL servlet, 576

XSU (XML SQL Utility), 576

Y

year

interval, converting to month (`NUMTOYMINTERVAL (n, interval_name)`), 291–292

interval to month (`TO_YMINTERVAL (arg1)`), 295

yes/no values. See boolean values

