



Index

Note: *Italicized page locators refer to tables/figures.*

- A**
- Abbreviations, in database naming conventions, 78-79
 - Absolute positioning, 329
 - Access
 - authorized, 385
 - concurrent, 416-418
 - and DBMS, 624
 - of distributed data, 509-510
 - unauthorized, 402
 - Accessibility, of DBAs, 611
 - Access path choices, 326-335
 - hashed access, 334
 - indexed access, 328-334
 - parallel access, 334-335
 - table scans, 327
 - Access paths, 161, 199
 - forcing, 341-343
 - reviewing, 338-343
 - Accounts, 387, 389
 - ACF2 (Computer Associates), 24, 386
 - ACID (atomicity, consistency, isolation, and durability), properties, 171-173, 176
 - Acquire/release specification, 183-184
 - Action items, and design reviews, 201
 - Active database logs, dual copies for, 424
 - Active databases, 366
 - Active logs, 420, 479
 - DBMS, 62, 63
 - and point of consistency, 418-419
 - Active system catalog, 567
 - ActiveX Data Objects, 24, 167
 - OLE DB and, 168
 - Adabas (Software AG), 7, 50, 52, 627
 - Adamski, Joseph J., 624
 - Adaptive Ltd., 635
 - Adaptive Server Anywhere, 45
 - AD/Cycle (IBM), 573
 - Add-on tools, database security, 586
 - Ad hoc SQL, 169
 - Adjectives, tracking those used by business experts, 104
 - Adjust tables, in index record, 477
 - ADLC. *See* Application development life cycle
 - ADO. *See* ActiveX Data Objects
 - Advanced Queueing feature (Oracle), 504
 - Advanced reorganization tools, 238
 - Advanced SQL class, 85

- Advisory tools, 262
- Agents, 589
- Aggregate records, 530
- “Airline magazine syndrome,” 222
- AIX (IBM), 74
- Algorithms, randomizing, 136
- Allen Systems Group, 632, 635
- Allied agents, and system performance, 269–270
- Allied agent software, 292
- Allocation units, 474
- ALLOW UPDATES parameter, 290
- ALL privilege, granting, 392
- ALTER statement, 154, 210, 213, 214, 215, 241, 582
 - and DDL script, 217
 - and free space, 305
 - limitations of, 211–213
 - and relational database modification, 579
 - and space management, 473
- ALTER TABLE statement, 375, 376
- ALTER tools, functions of, 580
- American National Standards Institute, Web site for, 644
- Analysis
 - and change management, 205, 206
 - of environment, 610
 - and performance management, 255
 - of tasks, 609
- Analysis tools, for DBMS, 53
- Analytical processing, transaction processing *vs.*, 516–518
- AND logical operator
 - and check conditions, 360
 - and multi-index access, 332
- Animation, with Java, 554
- ANSI. *See* American National Standards Institute
- Anti-SQL, and UNDO recovery, 435
- APIs. *See* Application Programming Interfaces
- Applets, 554, 555
- Application-centric repository products, 570
- Application code design review
 - participants in, 199–200
 - and SQL, 199–200
- Application code generators, warning about, 348
- Application component metadata, 571
- Application data files, and Oracle tablespaces, 272
- Application DBAs
 - focus of, 28
 - pros/cons on staffing of, 27–29
 - reporting structure, 34
- Application design, 159–186
 - batch processing, 185–186
 - database application development and SQL, 160–171
 - defining transactions, 171–175
 - locking, 176–185
- Application developers, 320
 - and database change requests, 218
 - working with, 611
- Application development life cycle, 7, 8, 9–10, 189
 - cost of performance problems across, 256
 - design reviews in, 194, 195
- Application development personnel, in design review, 192
- Application-enforced relationships, 418
- Application failures, 408, 437
- Application integration, 503
- Application interfaces, and XML, 551
- Application migration and turnover procedures, 83–84
- Application performance, 319–349
 - additional optimization considerations, 335–338
 - designing applications for relational access, 319–320
 - relational optimization, 320–335
 - reviewing access paths, 338–343
 - SQL coding and tuning for efficiency, 343–349
 - tools, 590–592
- Application performance tuning, and indexes, 298
- Application problems, and availability problems, 233–234
- Application program, and SQL analysis, 592
- Application Programming Interfaces
 - SQL middleware and, 165–166
 - and transaction processing systems, 173
- Applications, 249
 - and change, 209
 - database administrators and type of, 32
 - database administrator staffing and number of, 31
 - disaster recovery plan and ranking of, 449–450
- Application servers, 66, 175, 539
- Application test beds, maintaining, 500–501
- Application tuning, 261
- ARCH. *See* Archiver
- Architect, and metadata management, 573
- Architecture
 - DBMS, 56–57
 - of Oracle, 272–273
 - and recovery, 409
- Archive logs, 232, 285
 - amount of time on disk, 479
 - DBMS, 62, 63
 - file protection, 404
- Archiver, 273
- ASCII, 499
- Assembler, 161, 165

- Associative entities, 107, 108
- ATMs, and distributed data management model, 544
- Atomic data, 109
- Atomicity, 171-172, 623
- Attribute class words, sample, 99
- Attributes, 97-101, 117
 - attribute naming guidelines, 98-99
 - domains, 98
 - identifying, relating, and describing by, 97
 - nulls and lack of value, 100-101
 - transformation of, to columns, 122-123
- Attribute values, 99
- Audit data files, protecting, 404
- Auditing, 401-403, 406, 583
- Auditing tools, 579, 583-584
- Audit records, selective creation of, 402
- Authentication, 386
- Authority, granting and revoking, 390-396
- Authorization, 585. *See also* Security
 - availability and problems with, 234
 - database, 20
 - dropping, 579
 - granting to PUBLIC, 394
 - groups, 398-399
 - for recovery operations, 453, 456
 - roles, 397
 - and UNLOAD utility, 498
- Authorized users, unauthorized access by, 402
- Automated rollback, restart, and recovery, 5
- Automation, 242. *See also* Technology
 - of backup and recovery procedures, 439
 - and change management, 205, 206
 - of code review process, 591
 - and database reorganization, 315-316
 - by DBAs, 608
 - of routine maintenance tasks, 549
 - of security, 386
- Autonomy, distributed databases and, 505, 506
- Availability, 466
 - around-the-clock, 316, 408
 - and change management, 206
 - and clustering, 57, 59
 - components of, 223
 - and database administrators, 17, 19-20
 - defining, 222-226
 - downtime *vs.*, 228
 - ensuring, 239-245
 - full-time, 225
 - increased requirements for, 223-224
 - and Internet-connected databases, 548-549
 - and Java, 556
 - need for, 221-222
 - problems, 246
 - and recovery strategy, 438
 - and redoing transactions, 436
 - and service level, 258
 - sufficiency of, 227-228
- Availability requirements, for database administrators, 31
- Available pages, in data caches, 279
- AVG function, 530
- B**
- Bachmann diagramming technique, 94
- Background mode, 588
- Background processes, Oracle, 273
- Backlogs, 168
- Backup, 538. *See also* Disaster recovery; Image copy
 - backups; Recovery
 - consistency, 23, 418-419
 - database, 240
 - and database administration standards, 81
 - and database administrators, 17, 21
 - of database object definitions, 426-427
 - and database server, 542
 - for data warehouse, 533-534
 - DBMS instance, 423-424
 - documenting strategy for, 426
 - files, 353
 - hot and cold, 417, 44
 - and log archiving, 419-420
 - management, 242
 - retention periods for, 409
 - RMAN for, 417
 - scheduling, 420, 422-423
 - and solid state devices, 271
 - storage management, 458-459
 - tape, 456-458
 - tools, 53, 592-593
 - of transaction logs, 286
- Backup and recovery alternatives, 443-445
 - disk mirroring, 445
 - replication, 444-445
 - standby databases, 443-444
- Backup-and-recovery DBAs, 29
- Backup copies
 - of database files and logs, 231
 - and standby databases, 232
 - storage management software for making, 425-426
- BACKUP LOG command, 421
- BACKUP utility, 409, 593
- Backward log rolling, 433
- Bankruptcies, e-business, 9
- Batch jobs, 18

- Batch processing, 185-186, 537
 - and application performance, 320
 - Batch reporting, 589
 - Batch scheduling software, 24
 - Batch workload, and physical design review, 197
 - BCNF. *See* Boyce Codd normal form
 - BCP executions, 430
 - Benchmarks
 - and DBMS products, 53
 - TPC, 55
 - BETWEEN, 360
 - Bitmap indexes, 129, 133-134, 527, 528
 - Bitmaps, 474
 - Blizzards, 448
 - Blocks
 - and database locks, 176
 - size of, 150, 309-310
 - BMC PATROL, 24
 - BMC Software, 290, 548, 631
 - Booch, Grady, 94
 - Borland International, 627
 - Boyce Codd normal form, 114
 - Bridges, 24
 - Broken blocks, recovering, 442
 - Brokerages, and downtime, 226
 - b-tree, 24
 - B-tree indexes, 129
 - structure of, 132, 314
 - B-tree structure, 352
 - Budgets, 7. *See also* Costs
 - data warehousing, 523
 - disk system evaluation, 485
 - storage, 479
 - Buffer cache detail, and DBCC command, 355
 - Buffer hit ratios, 257
 - Buffer pools (or data caches), 63, 64, 276
 - efficiency of, 280
 - hiperpools defined for, 281
 - Buffers, 19, 132
 - Bugs, 68, 353, 437. *See also* Errors
 - and application outages, 234
 - and availability, 246
 - and corrupt data, 234
 - and data loss, 236
 - and DBMS software failure, 233
 - and DBMS vendors, 72
 - and declarative RI, 377
 - and fallback, 75
 - and locks, 179
 - and operating system failure, 233
 - and outages, 238
 - in system software, 434
 - and UNLOAD data files, 500
 - Bulk data movement, 502-504
 - ETL software, 502
 - with messaging software, 503-504
 - other methods of, 504
 - with replication and propagation, 502-503
 - Bulk load operations, 286
 - BULK LOAD utility, 380
 - Bulk-logged recovery, 430
 - Bundled query tools, 596
 - Bursting pipes, 448
 - Business, 207
 - and change management, 203-204
 - and client/server computing, 538-539
 - data at center of, 3
 - and disaster recovery planning, 448
 - and repositories, 571
 - service interruptions, 449
 - understanding, 610
 - Business-critical applications, 450
 - Business descriptions, analyzing, 104
 - Business intelligence, 515
 - tools, 595-597
 - vendors, 636
 - Business logic, in client/server applications, 540, 543
 - Business metadata, 566, 571
 - Business Objects, 636
 - Business process, and data models, 91
 - Business rules, and check constraints, 360, 361, 365
 - Bytecodes, Java, 556
- C**
- C, 24, 161, 165, 199, 269, 349, 597
 - C++, 24, 165, 167, 261, 554
 - CA-7, 405
 - Cabling, 24
 - Cache controllers, 251
 - Caches, 19, 275, 278, 298
 - CALL, and stored procedures, 366
 - Callable routines, 166
 - Call-level interface, 166
 - Candidate keys, 97, 101, 106, 124, 130
 - Candle Corporation, 290, 633
 - Capacity, and data sharing, 245
 - Capacity planning, 488-489, 578
 - Capacity planning tools, 53, 262
 - Capital letters, entity names with, 96
 - Cardinality, 93, 103, 108, 134
 - Cartesian products, avoiding, 346
 - Cascading DELETES, 368, 374, 377-378
 - Cascading DROP effect, 210, 579

- Cascading REVOKES, 395
 - eliminating, 586
 - group-level security and, 399
- Cascading UPDATES, 366, 368, 373
- CASE tools, 165, 569, 573
- Catalog query and analysis tools, 579, 584-585
- Catalog visibility tools, 584
- CA Unicenter, 24
- Celko, Joe, 624
- Centralized administration, of privileges, 391
- Centralized data management model, 544
- Centralized processing, distributed processing
 - vs.*, 542
- Certification, DBA, 46-47
- Change management
 - and database administrators, 206-207, 219
 - facets of, 203-204
 - requirements, 204-206
 - tools, 579-586
- Change requests, standardized, 218-219
- Changes, 203, 204
 - effective migration of, 581
 - examining impact of, 581
 - proactive, 204
 - repositories and control of, 569
 - types of, 207-209
- CHANGE scripts, 242
- Chargebacks, and data warehouses, 532-533
- CHECKALLOC option, 354
- Check conditions, 360
- Check constraints, 22, 78, 124, 127, 359-366
 - benefits with, 360-361
 - for code and reference tables, 381
 - and dropped objects, 442
 - examples, 361-366
 - and LOAD utility, 495
 - and null, 363
 - restrictions on creation of, 360
 - RI *vs.*, *vs.* program logic, 379-380
- Checklists, checking, 218-219
- Checkpoint, background process, 273
- Checkpoint frequency, setting, 284
- Checkpoint log truncations, enabling, 421
- Checkpoint/restart tools, 598
- CHECK utility, DB2, 353
- Chen diagramming technique, 94
- Chicago Loop district, flood in, 448
- Chief Data Officer, data administrator as, 12
- Child tables, 365, 372, 381, 560
- CICS, 24, 173, 269
- CIFS, 487
- CKPT. *See* Checkpoint
- Class words, attribute, 98, 99
- CLI. *See* Call-level interface
- Client computer, 540
- Client nodes, distributed data residing on, 506
- Client/server applications, software layers in, 540
- Client/server component layers, recommended
 - hardware for, 541
- Client/server computing, 537-547
 - and business issues, 538-539
 - and database gateways, 546
 - description of, 539-542
 - historical look at, 537-538
 - network traffic, 546-547
 - types of applications with, 542-545
- Client/server network configurations, 543
- Client/server processing, 541
- Clustered indexes, 129, 137, 302
 - accessing, 330
 - and pointers, 477
- Cluster failover, 230
- Clustering, 136-137, 243, 296, 302-305, 330
 - and database management systems, 57-59
 - and database reorganization, 316
 - and failover techniques, 20
 - and interleaving data, 305
 - and mirror tables, 143
- Clustering technology, exploiting, 243-244
- Cluster ratios, 314, 315, 327
- Clusters, 77, 243
 - configuring to failover, 244
 - database examples of, 244-245
- COBOL, 24, 161, 165, 199, 261, 269, 349, 597
- CODASYL, 621
 - data models, 620, 621
 - database models, 50
- Codd, E. F., 108, 109
- Code generators, 165
 - warning about, 348
- Code review process, automation of, 591
- Code size, and DBCC command, 355
- Code tables, 126, 296
- Code walkthroughs, 592
- Coding, SQL, 343-349
- Cold backup, 417, 444
- ColdFusion, 269
- Collision resolution algorithm, 136
- Column-level check constraints, 362
- Columns, 77, 210, 212. *See also* Rows; Tables
 - adding to middle of table, 215-216
 - and database locks, 176
 - default values for, 359
 - defined as integer, 22

- Columns *continued*
- and derivable data, 148
 - functions, 40
 - in horizontally split tables, 143
 - and identity property, 125
 - in indexes, 130
 - lengths of, 476
 - minimum number of, in SELECT list, 345
 - nullable, 124, 363
 - ordering, 125-126
 - overstuffing, 560
 - and redundant data, 146
 - renaming, 214
 - in reverse key indexes, 134
 - and row size, 128
 - rules defined for, 364
 - for speed tables, 150
 - splitting long text, 144-145
 - from tables, 153
 - transform attributes to, 122-123
 - in vertically split tables, 143
 - from views, 153
- COM. *See* Component Object Module
- Combined tables, 145, 301
- COMMIT statement, 171, 174, 284
- and batch programs, 185
 - distributed two-phase, 510-511
 - frequent issuance of, 348
- COMMIT strategy, and application performance, 320
- COMMITTED READ isolation, 181, 182
- Communication
- and database administrators, 2, 42
 - and change management, 219
 - and performance management, 264
- Community, building, 609
- Company image, and downtime, 227
- Comparison tools, 217, 581-582
- Complexity, of DBMS environment, 71-72
- Component-based technologies, 24
- Component Object Module, 24, 167
- Compression, 128-129, 296, 306-307
- data, 521-522
 - and disaster recovery backups, 461
 - tools, 262, 599-600
 - trade-offs with, 307
- Computer Associates, 52, 92, 570, 627, 629, 632, 634, 635, 636
- Computer-based training, 85
- Computer viruses, 448
- Conceptual data models, 14, 15, 17, 19, 92, 105, 106, 108
- Conceptual design review, 194, 195-196
- Concurrency, 623
- and LOAD utility, 497
 - and locking problems, 185
 - and performance, 287
 - problems, 176
 - and UNLOAD utility, 498
- Concurrent access, 416-418
- and lock granularity, 177
- Conference on Data Systems Languages.
- See* CODASYL
- Conferences, 611
- config.ora files, and Oracle database files, 272
- Configuration options, 289-290
- Configuration parameters, impacts of, 290
- Configured memory, and DBCC command, 355
- Connections number, SP_MONITOR, 291
- Connectivity problems, 237
- Consistency, 172
- backup, 418-419
 - and check constraints, 361
 - checking, 354
 - in naming entities, 96
- Constraints, 77, 382
- applying to columns, 123
 - check, 359-366
 - contradictory, 365
 - and LOAD utility, 495
 - naming, 78
 - primary key, 356
 - self-referencing, 375
 - types of, 22
 - unique, 357
 - violations, 360
- Consultant Web sites, 642
- Consumer spending patterns, 224
- Contention
- and database performance, 19, 251
 - and locking, 287-288
- Contingency planning, 447, 448
- and change management, 205
 - Web sites, 462
- Contingency Planning and Research, 226
- Continuing education, through user groups, 612
- Contracts, vendor, 604
- Contradictory constraints, 365
- Control files, in Oracle databases, 272
- Control-M, 405
- Convergence, of features and functionality in DBMS software, 55
- Conversions, advice on, 534
- Cooperative processing, 542
- Copybooks, 569

- COPY command, 288
- COPY utility, 409
 - DB2 for OS/390 use of, 415, 416
- CORBA, 24
- Corporate data, searching for patterns in, 518
- Corporate databases, seamless access to, 538
- Corporate data security unit, DBMS security handled by, 82
- Corporate passwords, standards for, 389
- Correlated subqueries, and report tables, 142
- Corrupt data, 234-235
- Costs
 - of clusters, 244
 - and compression algorithm, 600
 - CPU and I/O, 322
 - and data warehouse projects, 532
 - disaster recovery plans and minimizing of, 449
 - of downtime, 226-227
 - of indexes, 131
 - justification of, 603
 - and optimization, 337, 338
 - of performance problems across application development life cycle, 256
 - and RAID storage solutions, 485
 - and recovery process, 438
 - with reorganization, 315
 - with solid state devices, 271
 - of upgrades, 69
- COUNT function, 530
- COURSE Entity
 - in first normal form, 111
 - in second normal form, 111, 112
- CPU
 - and availability problems, 230, 231
 - costs, 322
 - DBMS requirements, 61
 - parallelism, 335
- cpu busy number, SP_MONITOR, 291
- Crashes, recovery from, 238, 622
- CREATE database objects, 585
- CREATE INDEX, 286
- CREATE statement, 154, 210, 358
 - for EMP table, 362, 363
 - and free space, 305
- CREATE TABLE DDL statement, 358
- CREATE TABLE statement, 144, 375, 376
- Critical applications, 450
- Critical data, backing up, 420, 422
- Criticality, defining, 449
- Cross-platform portability, with Java, 554
- Currency, data types for, 358, 359
- Current run number, SP_MONITOR, 291
- Cursors, 164, 182
- Customers, Web, 221, 222
- D**
- DAs. *See* Data administrators
- DAFS. *See* Direct access file system
- DAFS Collaborative, 488
- DAMA. *See* Data Management Association
- Data, 2. *See also* Metadata
 - accessing from views, 335-336
 - application by application copying of, 458-459
 - availability of, 19
 - backup and recovery of, 21
 - at center of applications, 3
 - compressing/decompressing, 128, 129, 306-307
 - corruption of, 234-235
 - denormalized, 521
 - derived, 116, 148
 - dropping, 579
 - from, to knowledge, 564-565
 - in global locations, 512
 - growth of, 467
 - at heart of e-business, 560
 - interleaving, 137-138, 296, 305-306
 - loading and unloading, 493-501
 - loss of, 236
 - movement of, 493
 - nature and types of, 420, 422
 - and new technology, 38-39
 - on PDAs, 45
 - privacy policies and, 9
 - purging, 532
 - redundant, 146
 - remote mirroring of, 459
 - replication of, 444-445
 - requests for unnecessary, 345
 - residing at server, 507
 - sample, 118
 - storage and size terminology, 468
 - tampering with, 402
 - unclustered, 310-311
 - usage metadata, 572
 - usage of, 531-532
 - volatility, 422, 423
- Data abstraction levels, and DBMS, 622
- Data access, 133
 - control of, 5
 - and DBMS, 624
- Data acquisition, consistent, 523
- Data administration, 12-15
- Data administration group, 1
- Data Administration Newsletter, 643

- Data administration representatives, in design
 - review, 192
- Data administration standards, 79, 81
- Data administrators, 12, 27, 56
 - database administrators contrasted with, 12, 13, 14, 15, 16
 - responsibilities of, 17
- Data aggregation, and indexes, 298
- Data availability, 221-246, 466
 - defining, 222-226
 - ensuring, 239-245
- Data availability problems, 228-239. *See also*
 - Availability
 - application problems, 233-234
 - database objects loss, 235-236
 - data center loss, 229
 - data corruption, 234-235
 - data loss, 236
 - data replication and propagation failures, 236-237
 - DBA mistakes, 238
 - DBMS software failure, 233
 - disk-related outages, 231-232
 - downtime costs, 226-228
 - network problems, 229-230
 - operating system failure, 233
 - outages, 238-239
 - recovery issues, 237-238
 - security and authorization problems, 234
 - server hardware loss, 230-231
 - severe performance problems, 237
- Database administration, 12, 15, 228
 - challenge of, 4-5
 - management discipline of, 7-11
 - necessity for, 1
 - and performance requirements, 32
 - practice of, 607
 - reason for learning, 3
- Database Administration class, 85
- Database administration representatives, in design
 - review, 192
- Database administration standards, 81
- Database administration system versions/releases
 - complexity of DBMS environment, 71-72
 - and DBA staff skill set, 73
 - DBMS upgrade strategy, 75-76
 - fallback planning, 74-75
 - features and complexity, 71
 - migration verification, 75
 - and organization style, 73
 - platform support, 74
 - reputation of DBMS vendor, 72
 - supporting software, 74
 - support policies of DBMS, 72-73
 - upgrading, 67-76
- Database administration tools, 24, 53
- Database administrator certification, information
 - sources on, 47
- Database administrator groups, DBMS decision making by, 50, 51
- Database administrators, 56, 90, 123, 164, 213, 347
 - and application development life cycle, 8-10
 - and applications changes, 209
 - and architecture of Oracle, 272
 - automating functions of, 242
 - and availability, 19-20, 228-239, 246
 - backup and recovery planning by, 446
 - certification of, 46-47
 - and change management, 206-207, 219
 - communication between DA team, technicians, and application programming staff via, 15
 - communication skills needed by, 2
 - data administrators contrasted with, 12, 13, 14, 15, 16
 - database backup and recovery planning by, 407
 - and database change implementation, 215-216
 - and database design denormalization, 140
 - and database development support, 66
 - database gateway installation/configuration done by, 546
 - database objects created by, 393
 - database-related Usenet newsgroups of interest to, 640
 - database security managed by, 386, 388
 - database structures compared by, 216
 - and data modeling, 89, 90
 - and data warehouse administration, 534
 - day in life of, 10-11
 - and DBMS, 398
 - DBMS performance basics for, 263-264
 - in design reviews, 189
 - disaster recovery plan updating by, 452
 - on disaster recovery teams, 462
 - and distributed environments, 506-508
 - e-DBAs, 43, 45
 - and enterprise performance management, 250
 - and external security, 404
 - and filegroups, 128
 - formula for calculating level of effort by, 33
 - functions of, 3
 - and hardware configuration changes, 208
 - and increased availability requirements, 223
 - and indexing, 129, 135, 298-301
 - Java code understood by, 557-558
 - job offer evaluations for, 11

- lack of understanding about, 1-2
- as leaders of design reviews, 191
- and locking levels, 176
- mean salary for full-time, 4
- and metadata management, 573
- mistakes by, 238
- and multiplatform environment management, 35-36
- need for, 1
- new technology and, 38-46
- optimal number of, on staff, 30-33
- page sizes chosen by, 309-310
- and performance problems, 19
- personal digital assistant, 45-46
- procedural, 41, 42
- reporting structures, 33, 34
- responsibilities of, 17
- rules of thumb for, 607-613
- salaries for, 4-5
- security reporting by, 396
- space management by, 472
- special skills and, 186
- and SQL tuning and coding, 343-349
- staff experience, 32
- and standardized change requests, 218
- storage management by, 465
- storage options understood by, 490
- success for, 613
- and system administrators, 16
- and system performance, 268, 292
- tables mapped to tablespaces by, 127
- and technicians, 54
- and test and production, 37-38
- unique vantage points of, 3
- and XML, 553
- Database administrator tasks, 16-25
 - availability, 17, 19-20
 - backup and recovery, 17, 21
 - database design, 17-18
 - database security and authorization, 17, 20-21
 - data integrity, 17, 22-23
 - DBMS release migration, 17, 23
 - jack-of-all-trades, 23-25
 - performance monitoring and tuning, 17, 18-19
- Database administrator types, 25-30
 - application DBA, 27-29
 - database analyst, 26-27
 - database architect, 26
 - data modeler, 27
 - data warehouse administrator, 30
 - system DBA, 25-26
 - task-oriented DBA, 29
- Database alteration tools, 579
- Database analysts, 26-27
- Database applications
 - design review phases for, 194
 - development standards, 82
 - optimal hardware environment for, 270
- Database architects, tasks of, 26
- Database auditing tools, aspects captured by, 583
- Database backup and recovery, 240, 407-446
 - alternatives to, 424-426, 443-445
 - image copy backups, 408-427
 - preparing for problems, 407-408
 - recovery, 427-443
- Database change management, 203-219
 - impact of change on database structures, 209-219
 - requirements for, 204-207
 - types of changes, 207-209
- Database change management tools, 579-586
 - auditing tools, 583-584
 - catalog query and analysis tools, 584-585
 - change management tools, 579-581
 - database comparison tools, 581-582
 - database object migration tools, 582
 - purchasing, 213
 - referential integrity tools, 582-583
 - security tools, 585-586
- Database changes
 - application changes synchronized with, 209
 - examples of, 214-216
 - requesting, 217-218
 - scenarios, 213-216
 - standardized forms for implementing, 218
- Database checking, 354
- Database clusters, and new DBMS versions, 69
- Database comparison tools, 579, 581-582
- Database connectivity, 537-561
 - client/server computing, 537-547
 - Internet, the Web and, 547-561
- Database descriptor, 277
- Database design, 121-156, 558-561, 612
 - and database administrators, 17-18, 27
 - database performance design, 129-138
 - and Data Definition Language, 154
 - and denormalization, 138-152
 - from logical data model to physical database, 121-129
 - process, 189
 - views, 152-154
- Database disorganization, reasons for, 310-311
- Database environment creation, 49-86
 - choosing DBMS, 51-54
 - database standards and procedures, 76-84

- Database environment creation *continued*
 - DBMS architectures, 56–57
 - DBMS clustering, 57–59
 - DBMS education, 84–85
 - DBMS proliferation, 59–60
 - defining organization's DBMS strategy, 49–50
 - hardware issues, 60
 - installing DBMS, 60–67
 - upgrading DBMS versions and releases, 67–76
- Database exports, for creating logical backups, 424–425
- Database failover, 230
- Database files
 - fault-tolerant RAID levels for, 486
 - in Oracle database, 272
 - temporary, 472
- Database gateways, 546
- Database IDs, 390
- Database implementations, future planning for, 488
- Database instance failure, recovering from, 439
- Database integration, and eXtensible Markup Language, 553
- Database kernels, 251, 588, 590
- Database logs, 283–287, 419
 - caches, 277
 - configuration considerations, 285–286
 - and DBMS, 623
 - and disasters, 457
 - information recorded in, 284
 - placement of, 308
- Database maintenance
 - and availability, 241
 - and DBMS, 398
- Database management, integrating with Web, 221
- Database management software, convergence of features and functionality in, 55
- Database management systems, 164
 - and access paths, 161
 - advantages with use of, 621–624
 - and allied agents, 269–270
 - amount of memory needed by, 278
 - architectures, 56–57
 - audit facilities, 402–403
 - and availability, 19
 - benefits with, 624
 - caches, 298
 - and change, 206
 - choosing and installing, 49, 50, 51–52
 - and client/server systems, 540, 543
 - and clustering, 57–59, 303
 - complexity of, 71–72
 - components of, 271
 - and compression, 128
 - control over backup and recovery by, 415–416
 - database administrators and variety of, 33
 - database logs in, 283
 - database resources controlled by, 385
 - data distribution standards supported by, 508–509
 - and data integrity, 22
 - and data interleaving, 137–138
 - defined, 5
 - direct index lookup performed by, 328–329
 - and distributed database usage guidelines, 508
 - distributed environment *vs.*, 505
 - distribution capabilities of, 506
 - domains transformed to data types, 123
 - education, 84–85
 - environment, 66–67
 - factors in choosing, 52–54
 - fundamentals of, 619–624
 - and index updates, 131
 - instance backup and recovery for, 423–424
 - knowledge of, by DBAs, 15
 - in larger environment, 268
 - and lock types, 178
 - memory consumption by, 277–278
 - modern disk usage, 466
 - and multiplatform DBA issues, 35
 - multiple, within organizations, 50
 - page splitting with, 304–305
 - parallelism types supported by, 334–334
 - performance basics, 263–264
 - and physical database design, 121
 - proliferation of, 59–60
 - reasons for using, 620–624
 - relationship of, to databases, 6
 - release migration and DBAs, 17, 23
 - situations/commands not logged in, 286–287
 - space allocation by, 599
 - special physical implementation needs for, 150
 - statistics collected by, 323
 - storage requirements, 62–63
 - support *vs.* exploit with versions/releases, 75
 - understanding backup capabilities of, 417
 - upgrade strategies for, 70–76
 - vendors, 611, 612
- Database management systems installation/
 - configuration, 60–67, 274–290
 - basics of, 61
 - configuring DBMS, 65
 - connecting DBMS to supporting infrastructure software, 65–66
 - database logs, 283–287
 - data cache details, 279–282

- DBMS environments, 66-67
 - hardware requirements, 61-62
 - locking and contention, 287-288
 - memory requirements, 63-65
 - memory usage, 274-279
 - "open" database objects, 282
 - other configuration options, 289-290
 - storage requirements, 62-63
 - system catalog, 288-289
 - types of, 274
 - verification of, 66
- Database management system software, 2
 - and change, 207
 - and complexity, 225
 - failure, 233
- Database management system strategy
 - choosing DBMS, 51-54
 - DBMS architectures, 56-57
 - DBMS clustering, 57-59
 - DBMS proliferation, 59-60
 - defining for organization, 49-50
 - hardware issues, 60
- Database Modeling and Database Design class, 85
- Database naming conventions, 76-77
 - standard abbreviations, 78-79
- Database object definitions, backing up, 426-427
- Database object hierarchy, 211
- Database object migration tools, 582
- Database object privileges, 391, 392-393
- Database object recovery, general steps for, 429-431
- Database objects
 - and backups, 414-415, 420
 - concurrent access to, 416
 - and Data Definition Language, 154
 - DBMS support for, 77
 - and disaster recovery, 449
 - and free space, 214, 306
 - "free-standing," 364
 - full image copy backups of, 411
 - loss of, 235-236
 - quick migration of, 582
 - and recovery, 430, 440
 - and security, 387
 - small, 413
- Database operations, logging, 286-287
- Database optimizer, 241
- Database optimizing techniques, 295-310
 - clustering, 302-305
 - compression, 306-307
 - denormalization, 301
 - file placement and allocation, 307-309
 - free space, 305-306
 - indexing, 298-301
 - interleaving data, 305
 - page size, 309-310
 - partitioning, 295, 296-297
 - raw partition *vs.* file system, 297-298
- Database outages, 229
- Database performance, 18, 223, 295-316
 - and database reorganization, 310-316
 - defining, 250-251
 - design, 129-138
 - and I/O dependence, 466
 - roadmap, 251-253
 - techniques for optimizing databases, 295-310
 - tools, 588, 590
 - tuning tips, 344
- Database performance monitors, 238
 - evaluating, 588-589
- Database performance tuning, and indexes, 298
- Database portals, 642-643
- Database programming, in Microsoft environment, 166-167
- Database Programming class, 85
- Database-related Usenet newsgroups, 639
 - of interest to DBAs, 640
- Database reorganization, 239, 310-316
 - automating, 315-316
 - scheduling, 314-315, 316
- Databases, 3, 77, 249
 - active, 366
 - availability of, 19, 223
 - backup and recovery, 242
 - building from data model, 91
 - database administrator staffing and number of, 31
 - database administrator staffing and size of, 31
 - and database locks, 176
 - defined, 5
 - description of, 619-620
 - development of, 201, 569, 570
 - and disaster recovery, 448, 456-461
 - distributed, 505-512
 - free space within, 128
 - fundamentals of, 5
 - growth in, 224
 - hostile, 559, 560, 561
 - hosting, 547
 - index creation for, 131
 - Internet, the Web, and, 547-561
 - Internet-connected, 548-549
 - Oracle, 272
 - parallel, 527
 - relationship of DBMS to, 6
 - restoring, 231

- Databases *continued*
 - security, 585
 - space usage by, 472
 - storage of, in DBMS, 39
 - “zapping,” 355
- Database security, 385-405
 - auditing, 401-403
 - authorization roles and groups, 397-399
 - basics of, 386-390
 - and database administrators, 17, 20-21
 - external, 404-405
 - granting and revoking authority, 390-397
 - standards, 82-83
 - stored procedures used for, 400-401
 - threats to, 402
 - views used for, 399-400
- Database servers, 539
 - amount of memory for, 279
 - application logic coupled to, 39
 - distributed data residing on, 506
 - release upgrade strategy and location of, 71
 - using, 174
- Database standards and procedures, 76-84
 - application migration and turnover procedures, 83-84
 - data administration standards, 79, 81
 - database administration standards, 81
 - database application development standards, 82
 - database naming conventions, 76-79
 - database security standards, 82-83
 - design review guidelines, 84
 - operational support standards, 84
 - roles and responsibilities, 79
 - standard abbreviations, 78-79
 - system administration standards, 82
- Database statistics, and relational optimization, 322-323
- Database storage and data files, 469
- Database structure integrity, 351, 352-355
- Database structures
 - changing, 204
 - comparing, 216-217
 - impact of change on, 209-219
 - mapping files to, 127
- Database support roles and responsibilities, 80
- Database tables
 - bulk inserts of data into, 494
 - mapping options for, 296
- Database technology, 5-7
- Database tools, and database performance, 261
- Database tool vendors, selecting, 601-604
- Database transactions, logging of, 283
- Database Trends and Applications, Web site
 - for, 642
- Database tuning, 260-261
- Database users, 389-390
- Database utilities, 53, 593-595
- Database views, 152-154
- Database writer, 273
- Data caches, 63, 275, 276, 279-281, 589
 - and free space, 306
 - monitoring and tuning, 279-281
 - read efficiency of, 280-281
 - utilization statistics, 589
- Data center, loss of, 229
- Data cleansing, 523-526, 528
 - data quality issues, 525
 - operational problems, 526
- Datacom, 50
- Data compression, 521-522, 527
- Data content, 531
- Data Control Language, 390
- Data Definition Language, 122, 154, 210, 217, 390
 - column-level constraints defined in, 362
 - CREATE statements, 582
 - recoveries and changes to, 409
- Data definitions, data dictionaries and management
 - of, 573
- Data degradation, 408
- Data dictionaries, 211, 215, 216-217, 573
 - query tools, 584
 - tables, 570
- Data distribution standards, 508-509
- Data elements, and repositories, 571
- Data encoding scheme, and UNLOAD utility, 499
- Data encryption software, 404
- Data feeds, failure of, 235
- Data files, Oracle database files, 272
- Data freshness, 530-531
- Data independence, and DBMS, 622
- Data integrity, 5, 351-382, 563, 620
 - and audit trails, 402
 - and DA function, 15
 - and database administrators, 17, 22-23
 - database structure integrity, 352-355
 - and data model, 91
 - and DBMS, 623-624
 - and index recovery, 440
 - and locking, 176, 184
 - and logical design review, 197
 - maintaining, 544
 - protecting, 524
 - and recovery strategy, 437
 - semantic data integrity, 355-382

- and storage media, 466
 - types of, 351-352
- DataJoiner (IBM), 510
- Data Junction, 633, 636
- Data latency, and disaster recovery, 460
- Data lengths, 357, 358, 551
- Data loss
 - and error messages, 462
 - minimizing, 451
 - preventing, 468
 - risks associated with, 449
- Data management, 527
- Data marts, 225, 515
 - and bitmap indexes, 133
 - defined, 516
- Data mining, 517, 518
- Data mirroring, 481
- Data model components, 96-104
 - attributes, 97-101
 - entities, 96-97
 - keys, 101-102
 - relationships, 102-104
- Data modelers, 27
- Data modeling, 89, 104
 - advanced issues, 115-116
 - concepts, 90-94
 - and design tools, 578
 - and homonyms/synonyms, 99, 100
 - logical, 105
 - metadata, 568, 571
 - purpose of, 90
 - tool vendors, 634-635
- Data modeling terms, relationship of, 106
- Data models, 14, 15
 - conceptual, 105, 106, 108
 - DBMS, 620
 - enterprise, 91
 - fragment, 104
 - goal of, 91
 - logical, 106, 108, 117, 155, 156
 - multiple experts and development of, 105
 - normalized, 108, 109, 114, 115
 - physical, 108
- Data movement, 522-523
 - bulk, 502-504
 - consistent data acquisition, 523
 - and logical backups, 425
 - vendors, 636
- Data normalization, 90
- Data objects, changes to, 241
- Data ownership, 81
- Data ownership metadata, 568
- Data page layouts, 473-476
 - allocation pages, 474
 - calculating table size, 476
 - data record layouts, 474-476
 - sample, 473
- Data placement, in distributed systems, 507
- Data prefetch, 327
- Data quality
 - and DA function, 15
 - issues, 525
- Data recovery, auditing for, 403
- Data redundancy, and normalization, 108
- Data replication failures, 236-237
- Data resource management, 33
 - recommended reporting structure for, 35
- Data rows, in data page layout, 473
- Data scrubbing, 518, 523, 528
- Data security, 5, 621, 623
- Data semantics, defining, 551
- Data sets, 465
 - protecting, 404
 - storage of, 468-471
- Data sharing, and DB2 for z/OS, 245
- Data spaces, 127
- Data stewards, 566
- Data stewardship policy, 566
- Data synchronization technology, 46
- Data transmissions, failure of, 235
- Data types, 22, 357-359, 551
 - domains transformed to, 123-124
 - user-defined, 77, 358-359
- Data warehouse administration, 515-534
 - backup and recovery, 533-534
 - data cleansing, 523-526
 - data content, 531
 - data freshness, 530-531
 - data movement, 522-523
 - data usage, 531-532
 - data warehouse design, 519-522
 - data warehouse performance, 527-530
 - data warehouse scalability, 526-527
 - financial chargeback, 532-533
- Data warehouse administrators
 - experience of, 30
 - and metadata management, 573
- Data warehouses/warehousing, 52, 183, 224, 225, 240, 643
 - and availability, 224
 - beyond technology, 519
 - and bitmap indexes, 133
 - and change, 534
 - complexity of, 518

- Data warehouses/warehousing *continued*
 - and DBMS, 61
 - as decision support vehicles, 528
 - denormalizing design of, 521
 - description of, 515-518
 - design of, 519-522
 - and ETL metadata, 568
 - and mirror tables, 143
 - and performance, 527-530
 - purpose of, 522
 - and repositories, 571
 - scalability of, 526-527
 - technologies for, 30
 - tools for, 30, 53
- Data warehousing queries, and dirty reads, 183
- Date, C. J., 624
- DBADMs. *See* Database administrators
- DBAs. *See* Database administrators
- dBase, 629
- DBA tools, 74, 85, 238, 577-605
 - add-on, 632
 - application tools, 590-592
 - auditing tools, 583-584
 - backup and recovery, 592-593
 - business intelligence tools, 595
 - catalog query and analysis tools, 584-585
 - checkpoint/restart tools, 598
 - for comparing database components, 216
 - compression tools, 599-600
 - database change management, 579-581
 - database comparison tools, 581-582
 - database object migration tools, 582
 - database performance tools, 590
 - database utility tools, 593-594
 - data modeling and design, 578
 - data warehousing tools, 595
 - and DBA staffing, 33
 - debugging tools, 598
 - ETL tools, 595-596
 - evaluating, 605
 - homegrown, 604-605
 - and multiplatform environment issues, 36
 - online standards manuals, 600
 - performance management, 587-588
 - programming and development tools, 597-598
 - query and reporting tools, 596-597
 - referential integrity tools, 582-583
 - security tools, 585-586
 - space management tools, 599
 - system performance tools, 588-590
 - table editors, 587
 - testing tools, 598
 - types and benefits of, 577-578
 - utility management tools, 595
 - various and new, 600-601
- DBA tool vendors, 631-636
 - evaluating, 601-604
 - Web sites, 641
- DBA Web resources, 637-645
 - mailing lists, 639-640
 - Usenet newsgroups, 637-638
 - Web sites and portals, 641-645
- DBAzone.com, 643
- DBCC CHECKALLOC(database_name), 354
- DBCC CHECKCATALOG(database_name), 354
- DBCC CHECKDB(database_name), 354
- DBCC CHECKTABLE(table_name), with DBCC utility, 354
- DBCC command, and memory usage, 354
- DBCC MEMUSAGE, 354
- DBCC REINDEX(table_name), with DBCC utility, 354
- DBCC utility, 353
 - care in running of, 354
 - consistency checking with, 354
- DBD. *See* Database descriptor
- DBE Software, 633
- DBMAINT. *See* Database maintenance
- DBMS Overview class, 84
- DBMSs. *See* Database management systems
- DBMS vendors
 - Big Three, 625, 626
 - nonrelational, 625, 629
 - object-oriented, 625, 629
 - open-source offerings, 625, 628-629
 - PC-based, 625, 629-630
 - reputation of, 72
 - second-tier providers, 625, 626-627
 - significant players, 625, 627-628
 - support policies of, 72-73
 - tier-1, 51
 - tier-2, 52
- DB2, 6, 8, 33, 50, 51, 52, 108, 280, 341, 502, 619, 620, 643
 - archiving by transaction log by, 286
 - certification program for, 46
 - CHECK and REPAIR utilities, 353
 - database modifications logged by, 125
 - and data types, 358
 - db2cckbcp operation, 411
 - and DSN1COPY, 441, 442
 - and EDM Pool, 64n.1, 277, 282
 - hiperpools, 281
 - links and news, 643
 - LOB columns, 352, 476

- and lock escalation, 184
- parameters provided by, 290
- and relational data model, 621
- Web site for, 641
- DB2 Developer's Guide* (Mullins), 447
- DB2 Everyplace, 45, 57
- DB2 Extended Enterprise Edition, and shared-nothing clustering, 59
- DB2 for OS/390, 289
 - COPY utility used by, 415, 416
 - Data Sharing and Parallel Sysplex, 59
 - and page sizes, 310
 - STOGROUPS with, 470
- DB2 for z/OS, 245
- DB2 magazine, Web site for, 642
- DB2 REORG utility, logging disabled with, 287
- DB2 UDB, DB2LOOK utility, 4426
- DBWR. *See* Database writer
- DCL. *See* Data Control Language
- DDL. *See* Data Definition Language
- Deadlines, for database change implementation, 218
- Deadlocks, 179, 180, 184, 185
 - detecting, 287, 288
 - minimizing, 288
- "Deadly embrace," 180
- Deallocation, 474
- Debugging tools, 582, 598
- Decentralized administration, of privileges, 391
- Decentralized user presentation model, 544
- Decimal data type, 123, 358
- Decision Support System, 517, 522
- Declarative referential constraints, 375, 376, 377
- Dedicated hardware, for database server, 547-548
- Default configuration options, avoiding, 290
- Default databases, 387
- Default data files, and Oracle tablespaces, 272
- Default language, 387
- Defaults, 77
- Default values
 - and DBMS software, 274
 - standardizing, 524
- Defragmentation, 224
- Degree, of relationship, 103
- DELETED table, 369
- DELETE privilege, granting, 392
- DELETE RI constraint, 365
- DELETE rule, 373-374
- DELETE statement, 66, 162, 185, 283, 371, 587, 593
 - and data modification, 310
 - log records for, 419
 - and transition tables, 370
 - and triggers, 40, 366, 368
- DELETE trigger, for referential constraints, 376
- Delivery, and change management, 206
- Demographics, 224
- Denormalization, 122, 138-152, 296
 - and database design, 560
 - and database performance, 301
 - documenting decisions for, 139-140, 151
 - guidelines for, 139
 - of hierarchies, 150
 - need for, 138
 - and performance, 152
 - and repeating groups, 146
 - and splitting long text columns, 144-145
 - types of, 151, 521
- Denormalized logical data models, avoiding, 141
- Denormalized tables, synchronizing with normalized tables, 139
- Density, 323, 324
- Departmental DBMS, 56, 57
- Dependent tables, 379
- DEPT_NO primary key, 375
- Derived data, 116, 148, 301
- Design
 - database, 558-561
 - data warehouse, 519-522
- Design reviews, 189-201
 - areas addressed by, 190
 - conceptual, 194, 195-196
 - description of, 189
 - guidelines for, 84
 - logical, 194, 196-197
 - organizational, 194, 198-199
 - output, 201
 - participants in, 191-194
 - physical, 194, 197-198
 - post-implementation, 194, 200
 - pre-implementation, 194, 200
 - rules of engagement, 190-191
 - SQL and application code, 194, 199-200
 - types of, 194-200
- Design review team, knowledge and skills required by, 193-194
- Desktops, 249
- Determinants, defined, 115
- Development life cycle, 83
- Development tools, 597-598
- Devices, and database memory consumption, 277
- DFSMS backups, IBM, 425
- Dialup connections, 547
- DICE.com, 4
- Differential backup, 412
- Dimension, 517

- Direct access file system, 488
- Direct index lookup, 328-329, 334
- Dirty reads, 181, 183, 529
- Disaster planning, 229, 447-462
 - adhering to written plan, 459-460
 - need for, 447-451
 - and order of recovery, 460
 - and personnel, 455-456
 - recovery guidelines for, 451-456
 - and remote site, 451-452
 - testing of, 454-455
 - Web sites, 462
 - written procedures and policies for, 452-454
- Disaster recovery, 437
 - backing up database for, 456-461
 - business aspect of, 456
 - and data latency, 460
 - and data warehouses, 533-534
 - replication for, 445
 - service providers, 451
 - standby databases for, 444
- Disaster recovery plans, 76, 81
 - as living document, 452-454
 - sections in written plan, 453
 - testing, 460
 - usable, 462
- Disasters
 - and availability restoration, 229
 - database log and, 457
 - defined, 447
 - preventing, 461-462
 - recovery from, 437
- Discussion forums, 613
- Disk allocation, 309
- Disk devices, for storage, 480
- Disk drives, 466
 - failure of, 231
 - variety of, 480
- Disk mirroring, 445
- Disk-related outages, and availability, 231-232
- Disks, file placement on, 308, 469-471
- Disk space, for index storage, 131
- Disk storage
 - and data warehouses, 532
 - DBMS, 62
 - devices, 251
 - and I/O, 270-271
- Disk striping, 481
- Disk subsystems, and availability problems, 230
- Disk systems, evaluating, 485-486
- DISTINCT clause
 - and queries, 131
 - and sorting, 333
- Distributed data, accessing, 509-510
- Distributed database implementation, sample, 507
- Distributed databases, 290, 505-512
 - levels of support for, 510
 - standards for, 508-509
 - and two-phase COMMIT, 510-511
- Distributed data management model, 544
- Distributed data placement, 308-309
- Distributed environment, setting up, 506-508
- Distributed performance problems, 511-512
- Distributed processing, centralized processing
 - vs.*, 542
- Distributed Relational Database Architecture, 508
- Distributed request, 510
- Distributed unit of work, 510
- Distributed user presentation model, 543
- DML, 390
- Documents
 - backup strategies, 426
 - by DBAs, 607-608, 610
 - disaster recovery plans, 452-454
 - for initialized devices, 309
 - remote site recovery, 458
- Document type declaration, for XML document, 550, 551
- Document Type Definitions, 550
- Domains, 22, 98, 116
 - enforcing, 380
 - transforming to data types, 123-124
- Dotcoms, and downtime, 227
- Downsizing, 538
 - and complexity, 225-226
- Downtime, 224
 - availability *vs.*, 228
 - cost of, 226
 - database administrators and impact of, 31
 - and database reorganization, 313
 - and DBMS upgrades, 69
 - e-business, 222
 - and errors, 238
 - and e-availability, 548, 549
 - minimizing, 206, 438, 446, 451
 - and outages, 238
 - and reorganizations, 315
 - for system maintenance, 224
- Drag-and-drop technology, 597
- DRDA. *See* Distributed Relational Database Architecture
- Drivers, ODBC, 166
- DRM. *See* Data resource management
- "Drop analysis," on SQL DROP statements, 585
- DROP database objects, 585

- Dropdown menus, 538
 - Dropped objects
 - recovering, 441-442
 - statistics on, 314
 - DROP statement, 154, 210
 - DSN1COPY, and DB2 for OS/390, 441, 442
 - DSS. *See* Decision Support System
 - DTDs. *See* Document Type Definitions
 - Dual active logging, 479
 - Dual logs, 285
 - Dumb terminals, and centralized processing, 542
 - DUMP utility, 409, 594
 - Duplicate tables, 142
 - Durability, 172, 623
 - Dynamic alerting, 291
 - Dynamic parameters, 274
 - Dynamic performance tables, Oracle, 314, 315
 - Dynamic SQL, 170, 557
- E**
- Earthquakes, 448, 461
 - EBCDIC, 499
 - e-business, 206, 221, 222
 - and bankruptcies, 9
 - and database design, 560
 - and downtime, 227
 - and e-DBAs, 43, 45
 - and Java, 556, 558
 - and storage management backups, 458
 - e-DBAs, 43, 45, 548-549, 558
 - Edge Rock Alliance Ltd., 226
 - Edit-checking, 559
 - EDM Pool, 64n.1, 277, 282
 - Education, 83
 - continuing, 612
 - and database changes, 219
 - DBMS, 84-85
 - Efficiency, SQL coding and tuning for, 343-349
 - Efficient delivery, and change management, 206
 - 80/20 rule (Pareto Principle), 252
 - EJB, 24
 - Electrical failure, 448
 - e-mail, and mailing lists, 640
 - Embarcadero Technologies, 632, 634
 - Embedded SQL, 169
 - Employability, and DBA certification, 46-47
 - Employee information, and database security, 399
 - EMP table, CREATE statement for, 362, 363
 - emp_type, 357, 362, 364, 365
 - Encryption, 404
 - Encryption key, 404
 - End user management, in design review, 193
 - End users
 - and DBAs, 32
 - in design review, 193
 - Enhancement requests, 604
 - ENROLLMENT Entity, in second normal form, 111, 112
 - Enterprise data models, 91
 - Enterprise DBMS, 56, 57
 - Enterprise performance management, 250
 - Enterprise storage servers, 24
 - Entities, 96-97
 - of data model, 92
 - discovering, 104
 - naming guidelines, 96-97
 - occurrences, 97
 - transformation of, to tables, 122
 - Entity instance, 97
 - Entity-relationship (ER) diagrams, 92-95
 - clockwise reading of relationships in, 103
 - methods, 94
 - sample, 93
 - Environmental descriptor manager pool.
 - See* EDM Pool
 - Environmental hazards, 448
 - Error processing files, DBMS, 62
 - Errors, 217, 542. *See also* Bugs
 - application, 209
 - and availability, 246
 - and conversions, 534
 - and database object alteration, 579
 - and data integrity, 525
 - and data warehouse, 524
 - DBA, 234
 - DBA tools and reduction of, 577
 - DBMS and recovery from, 622
 - design review and correction of, 189
 - and downtime, 238
 - and dropping database objects, 236
 - and formalized review processes, 219
 - and load process, 494
 - “log full,” 421
 - messages, 461-462
 - and outages, 238
 - and panic, 609-610
 - scheduling, 237
 - and server failure, 231
 - ERwin (Computer Associates), 24, 92
 - ESCON, 487
 - Ethernet, 487
 - ETL (Extract, Transform, and Load)
 - metadata, 571
 - software, 502, 525
 - tools, 570, 595-596

- e-availability, 548
- Excelsior, 573
- Exclusive locks, 178
- Executable libraries, backing up, 423
- EXECUTE privilege, granting, 393
- Expand Beyond, 633
- EXPLAIN command, 130, 199, 338, 339, 591, 592
- EXPLAIN process, 338
- EXPORT utility, 409, 426, 495, 501, 512
- eXtensible Markup Language, 45, 549-553
 - benefits and drawbacks with, 552-553
 - and database integration, 553
 - DBAs and understanding of, 612
- eXtensible Stylesheet Language, 551
- Extents, file, 311, 312
- External security, 404-405
- Extraction function, in XML Extender, 552
- Extract performance, 527
- Extract tools, 596

- F**
- Facts, 517
- Failover, 59, 244
- Failover technology, 408
- Failures
 - categories of, 408
 - and database administrators, 40-41
 - of DBMS instance or subsystem, 423-424
 - identifying, 429-430
 - matching type of, to type of recovery, 439
 - reacting to, 407
- Fallback planning, with new releases/versions, 74-75
- Fat clients, 545
- Fat server/thin client, 24
- Fault tolerance
 - with fiber channel, 486
 - and RAID, 480
 - and storage options, 479
- FDDI, 487
- Federated multi-database setup, 506
- Fiber Channel technology, 486
- Fifth normal form (5NF), 115
- File extents, and database disorganization, 311, 312
- Filegroups, 77, 128
- File I/O, 257
- Filemaker, 50, 629
- Filenames, database objects mapped to, 77
- File placement and allocation, 296, 307-309
 - database log placement, 308
 - disk allocation, 309
 - distributed data placement, 308-309
- File processing, and batch database program development, 815
- Files
 - mapping to database structures, 127
 - multiple storage devices for, 469
 - raw, 128
 - storage of, 468-472
- File servers, 539
- File structures, in Oracle, 272
- File system caching, raw partitions used for avoiding, 297
- File systems, raw partitions *vs.*, 296, 297-298, 471-472
- Fill factor, 305
- Filter factor, 322
- Finance, and 24/24 availability, 225
- Financial chargebacks, and data warehouses, 532-533
- Financial loss, 449
- Fires, 448
- Firing triggers, 367-368
- First normal form (1NF), 109, 115
 - COURSE entity in, 111
 - STUDENT entity in, 110
- Five nines, and availability, 227
- Fixed-length columns, 124
- Fixed length index keys, 477
- Fixed-length rows, size of, 475
- Floating-point data
 - loading into tables, 496
 - unloading, 499
- Floating point data types, 123, 358
- Floods, 448, 461
- Focus, maintaining, 609
- FORCEPLAN option, with Microsoft SQL Server, 341
- Foreground mode, 588
- Foreign key columns, 371, 380
 - and clustered indexes, 303
 - and denormalization, 140
- Foreign key perspective, 373
- Foreign keys, 97, 102, 106, 212, 371, 582. *See also*
 - Primary keys
 - and clustering tables, 137
 - and combined tables, 145
 - in dependent tables, 375
 - dropping, 579
 - and index creation, 130
 - and referential constraints, 126
- Formalized review processes, 219
- FORTLAN, 165
- Forward log rolling, 433
- Fourth-generation languages (4GL), 161, 597
- Fourth normal form (4NF), 115

- Fractured silos, 259
 - Fragmentation
 - and database disorganization, 311, 312
 - and distributed data placement, 309
 - statistics on, 314
 - Frame relay, 547
 - FREEPAGE parameter, 305
 - Free space, 296, 305-306, 311, 312, 472, 476
 - disadvantages with, 306
 - and page size, 309, 310
 - percentage changes, 214-215
 - "Free-standing" database objects, 364
 - FROM clause, 163, 338
 - Full image copy backup, incremental image copy
 - backup *vs.*, 412
 - Full recovery, 430
 - Functionality, and new releases, 71
 - Functions, user-defined, 77, 552
 - Future, planning for, 488-489
- G**
- Gartner Group, 3, 73
 - Gateways, 509
 - Generators, backup, 461
 - Gerstner, Lou, 467
 - Giga Research Group, 467
 - Global economy, 225, 449
 - Grant authorization, 585
 - GRANT statement, 390, 391, 394, 396, 585
 - Granularity, trigger, 371
 - Graphical SHOWPLAN example, 340
 - Graphical user interfaces, 154, 540
 - and catalog tools, 584-585
 - with query and reporting tools, 596
 - Graphic data types, 123
 - GROUP BY
 - and clustering tables, 137
 - and queries, 131
 - and sorting, 333
 - GROUP BY SQL, 262
 - Group-level security, and cascading REVOKES, 399
 - Groups, authorization of, 398-399
 - Growth. *See also* Changes
 - planning for, 488-489
 - in storage capacity, 467
 - GUEST users, 390
 - GUIs. *See* Graphical user interfaces
- H**
- Hackers, 404
 - Hackett Benchmarking & Research, 76
 - Handheld devices, 51
 - and DBMS, 61
 - and mobile DBMS, 57
 - Hardware. *See also* Software
 - for client/server component layers, 541
 - and DBMS selection criteria, 60
 - failures, 21, 238
 - Hardware configuration
 - and change, 208
 - and system performance, 270
 - Hash, 334
 - Hashed access, 334
 - Hashing, 136
 - Hashing algorithms, data retrieval based on, 334
 - Hashing indexes, 129
 - Hashing structures, 334
 - Hash keys, 212
 - Header, 353
 - Header information, in index record, 477
 - Health hazards, 448
 - Heating failures, 448
 - Heterogeneous database migration, and logical
 - backups, 425
 - Hierarchical data models, 620
 - Hierarchical database models, 50
 - Hierarchies, 149-150
 - Hierarchy tables, for departmental organization,
 - 149
 - High-availability, exploiting, 243
 - High-performance Java, 556
 - High-speed utility, backup and recovery with,
 - 593
 - Hints, in SQL queries, 342
 - Hiperpools, DB2, 281
 - Historical performance indicators, maintaining,
 - 257
 - HOLAP, 30
 - Homegrown DBA tools, 604-605
 - Homonyms, 99, 100
 - Horizontally split table, 143
 - Horizontal restriction, 400
 - Hostile databases, 559, 560, 561
 - Hot backup, 417
 - Hot-swappable drives, 481
 - How-to documents, 613
 - HPJ. *See* High-performance Java
 - HP-UX (Hewlett-Packard), 74
 - HTML, 549, 550, 551, 555
 - Hubs, 24
 - Hurricane Andrew, 448
 - Hurricanes, 448

I

- IBM, 52, 467, 626, 629
 - AD/Cycle, 573
 - AIX, 74
 - DataJoiner, 510
 - DB2 Everyplace, 45
 - mainframes, 244
 - MQSeries, 504
 - RACE, 386
 - Sysplex, 244, 245
 - vendor partnerships with, 603
- IBM DFHSM, 24
- IBM-Link, 611
- Icons, 538
- Identity property, 124, 125
- Identity values, 289
- Idle number, SP_MONITOR, 291
- IDMS, 33, 50, 621
- IDs, 387, 623
- IEBGENER, 60
- IF-THEN-ELSE statements, in SQL WHERE clauses, 345
- Image, and downtime, 227
- Image copy backups, 408, 413, 436, 593
 - alternate approaches to database backup, 424-426
 - concurrent access issues, 416-418
 - consistency with, 418-419
 - database object definition backups, 426-427
 - database objects and, 414-415
 - and DBMS control, 415-416
 - and DBMS environment, 424
 - DBMS instance backup, 423-423
 - documenting, 426
 - full *vs.* incremental, 412-414
 - guidelines on, 409
 - invalid, 439
 - log archiving and, 419-420
 - post-recovery, 461
 - restoring, 431
 - scheduling, 420, 422-423
 - unloading from, 498-499
- Impact analysis, and change management, 205
- Impedance mismatches, 164
- IMPORT utility, 501, 512, 587
- IMS, 33, 50, 502, 620, 643
- IMS/TM, 173
- IN, 346, 360
- Incremental copies, merging, 414
- Incremental image copy backup, full image copy backup *vs.*, 412
- Independent software vendors, 593, 631
- Index consistency, and internal DBMS integrity, 23
- Index covering, 331
- Index design, 129-136
 - bitmap indexes, 133-134
 - b-tree indexes, 132-133
 - index summary, 135-136
 - ordered indexes, 135
 - partitioned indexes, 135
 - reverse key indexes, 134-135
- Indexed access, 328-334
- Indexes, 19, 77, 128, 137, 212, 216, 349
 - for avoiding sorts, 332-333
 - bitmap, 132
 - calculating size of, 477-478
 - clustered and unclustered, 302
 - copying, 414-415
 - corruption of, 352
 - costs of, 131
 - creating, 130-131
 - damaged, 237
 - and database tuning, 261
 - data warehouse, 528
 - defined, 129
 - dropping, 235, 579
 - and efficient loading, 496
 - on foreign keys, 375
 - improperly defined, 237
 - locking, 177
 - ordered, 132
 - partitioned, 132
 - and physical design review, 198
 - and poorly performing SQL, 252
 - and query analysis, 325
 - reasons for avoiding use of, 333-334
 - recovery of, 440, 457
 - reorganizing, 314-315
 - reverse key, 132
 - screening, 331
 - on segments, 470
 - space for, 468
 - and system catalog, 288
- Indexing, 296, 298-301
 - importance of, 135
 - and mirror tables, 143
 - and overloading, 300-301
 - and performance enhancement, 298, 299
 - times to avoid, 300
- Index key density, 323, 324
- Index key values, in index record, 477
- Index-only access, 130-131, 331, 332
- Index page layouts, and calculating index size, 477-478

- Index pages
 - number of records on, 478
 - single index rows stored on, 477
- Index records
 - calculating size of, 478
 - items in, 477
- Index scans, types of, 329
- Index structures, size of, 128
- Indicator byte, and nulls, 495
- Industry standards, current awareness of, 612
- InfiniBand, 488
- Information, 564
- Information centers, 517, 518
- Information Engineering (Martin diagramming technique), 94
- Information technology, 1
 - and certification, 46-47
 - and change management, 203
 - and database administration, 4
 - growing complexity of, 225-226
- Information technology infrastructure
 - database administrator interactions with, 24-25
 - and system administrator, 16
 - tools in, 24
- Information technology organizations
 - data policies of, 12
 - and object-oriented programming, 168
- Information technology silos, in fractured environment, 259
- Informix, 6, 50, 51, 52, 626
 - TBCHECK utility, 353
 - Web site for, 641
- InfoShark, 633
- Ingres (Computer Associates'), 7, 50, 52, 627, 628
- Initialization, disk, 309
- Inmon, William H., 515
- Inner table, 325, 326
- Input buffers, 285
- Input file, describing, 495-496
- INSERTED table, 369
- INSERT privilege, granting, 392
- INSERT processing, 360
- INSERT rule, 372-373
- Inserts, and free space, 306
- INSERT statement, 66, 162, 185, 587, 593
 - and data modification, 310
 - and transition tables, 370
 - and triggers, 40, 366, 368
- INSERT trigger, for referential constraints, 377
- Installation. *See also* Database management systems
 - installation/configuration
 - database gateway, 546
 - DBMS, 60-67
 - of system catalog, 288
- Instance, Oracle, 273
- Instances
 - failures, 408
 - Oracle, 272
- INTEGER, 123
- Integer data types, 358
- Integrated data, and data warehouse, 516
- Integration
 - of system catalog, 567-568
 - testing, 38, 83
- Integrity. *See also* Data integrity; Referential integrity
 - checking, 241, 593
 - types of, 351-352
 - violations, 403
- Intelligence, and change management, 204, 205, 206
- Intent locks, 178-179, 183, 184
- Interactive SQL, 233
- Interbase (Borland), 627
- Interfaces, and SQL, 165
- Interleaving data, 137-138, 296, 305
- Interleaving table data, 138
- Internal integrity, of database, 22, 23
- Internal security threats, 402
- Internal structure caches, 277
- International finance, and 24/24 availability, 225
- Internet, 547, 637. *See also* Web
 - coupling businesses to, 221
 - from DBA to e-DBA, 43, 45
 - and keeping up-to-date, 612
 - mailing lists, 640
- Internet age, never-ending uptime during, 227
- Internet-connected databases, 548-549
- Internet-enabled databases/applications, 24
- Internet service providers, 547
- Internet support, in database management systems/
 - applications, 243
 - "Internet time," 222, 558-559
- Intranets, and Java applications, 555
- Intrusion detection, 402
- In-use pages, in data caches, 279
- Invalid image copy backups, 439
- Invasiveness, and recovery strategy, 438
- Invasive system performance tools, evaluating, 589
- I/O
 - costs, 322
 - disk storage and, 270-271
 - efficiency, 253
 - parallelism, 334-335
- io busy number, SP_MONITOR, 291

- I/O operations
 - and database performance, 466
 - and disk devices, 470
- ISDN, 547
- ISO. *See* International Standards Organization
- Isolation, 172
 - distributed databases and, 505, 506
 - levels, 181-183, 185
- ISPs. *See* Internet service providers
- ISVs. *See* Independent software vendors
- IT. *See* Information technology

- J**
- Jacobson, Ivar, 94
- Jasmine, 621, 629
- Java, 24, 45, 165, 261, 269, 349, 549, 554-558
 - applets, 554, 555
 - applications, 554
 - program types, 554
 - qualities of, 555
 - servlets, 554, 555
 - and SQLJ, 166
- Java Database Connectivity, 166, 556-557
- Java Virtual Machine, 556
- JBOD, 486-488
 - direct access file system, 488
 - network-attached storage, 487-488
 - storage area networks, 486-487
- JDBC. *See* Java Database Connectivity
- Job control software, and DBMS, 66
- Job-entry subsystems, 24
- Job offers, evaluating, 11
- Job schedulers, 405
- Job scheduling, and security, 404-405
- Join columns, and clustered indexes, 303
- Join criteria, and data interleaving, 137
- Joining, 325
- Join methods, and poorly performing SQL, 253
- Join order, 326
- JOINS
 - and clustering tables, 137
 - and queries, 131
- Joins, 276
 - avoiding, 345
 - and indexes, 298
 - and relational optimization, 325-326
 - subqueries *vs.*, 163
 - of tables, 325
- Journals, writing for, 609
- JScript, 167
- Junior DBAs, 26
- Just a bunch of disks. *See* JBOD

- Just In Time (JIT) compiler, 556
- JVM. *See* Java Virtual Machine

- K**
- Kerberos, 24
- Kernel, and DBCC command, 355
- Keys, 101-102
 - candidate, 101
 - design of and database usability, 560
 - dropping, 579
 - foreign, 102
 - primary, 101-102
- Key values, and hashing, 136
- KISS principle, 344
- Knowledge
 - from data to, 564-565
 - definition of, 565
 - sharing, 608-609

- L**
- Large objects, 75
- Last run number, SP_MONITOR, 291
- Late-binding languages, 556
- Latency, and database change tracking, 214
- Lawsuits, and downtime, 226
- Leader, of design review, 191
- Leaf distance, 315
 - and index reorganization, 314-315
- Leaf pages, 328, 330
 - in b-tree indexes, 132, 133
 - in indexes, 352
- Lefkovits, Henry C., 573
- Legal responsibilities, 449, 450
- Legibility, of data models, 103
- Levels, and index reorganization, 314
- LGWR. *See* Log writer
- License cost, of DBMS, 54
- LIKE logical operator, 347, 360
- LIMIT parameter, 500
- Linux, 24, 56, 74, 628
- Listserv, 639
- List servers, 639
- Load balancing, and clustering, 59
- Loading, efficient, 496-497
- LOAD parameters, generation of, 499
- LOAD utility, 20, 131, 142, 241, 502, 512, 523, 549, 587, 593, 594
 - bulk inserts of data into database tables with, 494
 - and data movement, 493, 494-495
 - and efficient loading, 496-497
 - and nulls, 495
 - and running of other utilities, 497

- test beds of data maintained with, 500
 - used for program testing, 501
 - LOB columns, DB2, 352
 - LOBs. *See* Large objects
 - Lock duration, 181-184
 - acquire/release specification, 183-184
 - isolation level, 181-183
 - Locking, 176-185, 320
 - and contention, 287-288
 - granularity, 176, 180, 185
 - logins, 387, 388
 - memory required for, 278
 - and transactions, 173
 - Locking problems, 237
 - deadlocks, 179-180
 - duration of, 181-183
 - escalation of, 184
 - lock timeouts, 179
 - programming techniques for minimizing, 184-185
 - Locking strategy, and application performance, 320
 - Lock manager settings, 287
 - Locks
 - and DBMS memory consumption, 278
 - granularity and concurrent access, 177
 - types of, 178-179
 - Lock suspensions, minimizing, 288
 - LOCK TABLE command, 177
 - Lock timeouts, 179
 - deadlocks, 180
 - and lock duration, 181
 - Lock timeout values, 179
 - Log archival process, 419, 420
 - Log archiving, and backup, 419-420
 - Log-based recovery tools, 593
 - Log files, 62, 479
 - "Log full" error, 421
 - Logging
 - dual, 285
 - LOAD utility and turning off, 497
 - options, 253
 - Logical backups, 424-425
 - Logical data independence, 622
 - Logical data models, 14, 15, 81, 92, 105, 106, 108, 117, 155, 156
 - and design reviews, 190
 - from, to physical database, 121-129
 - and logical design review, 196
 - normalized, 139, 141
 - and nullability of attributes, 124
 - and primary keys, 124
 - synchronizing with physical database, 208
 - Logical design, and change, 208
 - Logical design review, 194, 196-197
 - Logical transactions, 171
 - Logic-oriented security, 401
 - Logins, 386, 389
 - administrating, 388
 - attempts, 403
 - DBMS and database, 390
 - information about, 387
 - Logoff attempts, 403
 - Log offloading, 63, 285, 419
 - Log read caches, 277
 - Log records, 277, 409
 - Log shipping, 460
 - Log switches, 257
 - Log write caches, 277
 - Log writer, 273
 - Long text columns, splitting, 144-145
 - Lookup tables, 183, 296
 - Loss
 - of data, 236
 - of database objects, 235-236
 - of data center, 229
 - of server hardware, 230-231
- M**
- Magazines, writing for, 609
 - Magazine Web sites, 641-642
 - Mailing lists, 639-640
 - Mainframe computers, 58, 538, 541, 542
 - Main-memory database management systems.
 - See* MMDBMS
 - Maintenance
 - charges, 604
 - and clustering, 244
 - Majordomo, 639
 - MAJOR Entity, in third normal form, 113
 - Malicious attacks, and data loss, 236
 - Manageability, and availability, 223
 - MANAGED_BY_DEPT column, 375
 - Management discipline, of database administration, 7-11
 - MANAGER role, 397
 - Man-made disasters, 448, 462
 - Manual database maintenance, reducing risks and errors with, 316
 - Manual reorganization, steps for, 313
 - Manuals, 613
 - retaining, 608
 - Many-to-many associative entity, 107
 - Many-to-many relationships, 108
 - E/R diagramming method, 94

- Mapping
 - entity-to-table, 122
 - files to database structures, 127
 - options for tables, 296
- Market Compensation Survey (1999), 3
- Martin diagramming technique, 94, 103
- Mass deletes, 236, 497
- Matching index scan, 329, 330, 331
- Materialized views, 530
- Matrices, roles and responsibilities, 79, 80
- MAX function, 530
- MAX values, and ordered indexes, 135
- Mean time between failure, 227
- Media failures, 353, 408
 - and disk mirroring, 445
 - recovering from, 439
- Mediator, role of in design review, 192
- Memory
 - amounts of, 278
 - and availability problems, 230
 - database performance and allocation of, 253
 - and hardware configuration, 270
 - and "open" database objects, 282
 - and operating system, 268
 - value of caching resources in, 275
- Memory consumption, areas of, 277
- Memory structures, in Oracle, 272
- Memory-to-memory transfer, 488
- MEMUSAGE keyword, 354
- MERANT, 636
- MERGE COPY utility, 413
- Mergers and acquisitions, and complexity, 226
- Merge-scan join, 326
- Message queueing software, 16, 269, 503
- Message queues, and DBMS, 66, 69
- Messaging software, data movement with, 503-504
- Metadata, 13-14, 211, 524
 - data warehousing and, 530, 566
 - description of, 563-564
 - management, 81, 563-573
 - strategy, 565-566
 - types of, 566-568
- META Group, 5, 33
- Metalanguages, 550, 551
- Microcode, 251
- Microsoft, 52, 626, 634
 - database programming, 166-167
 - Knowledge Base, 611
 - ODBC interface invented by, 166
 - vendor partnerships with, 603
- Microsoft Access, 50, 57, 630
- Microsoft Repository, 570
- Microsoft SMS, 24
- Microsoft SQL Server, 6, 50, 51, 53, 108, 127, 274, 280, 429, 502, 619, 620, 626, 643
 - Analysis services, 597
 - backing up transaction logs, 421
 - backup and recovery for, 415
 - certification program for, 46
 - constraints in, 363
 - and data types, 358
 - DBCC utility program, 353
 - filegroups, 128, 470
 - FORCEPLAN option with, 341
 - links and news, 643
 - and lock escalation, 184
 - log options, 287
 - memory requirements for, 278
 - recovery models, 430
 - and relational data model, 621
 - and rules, 364
 - and SHOWPLAN command, 338
 - SQL cache in, 64
 - system parameters in, 65
 - text columns in, 476
 - and transaction log file backups, 286
 - transition tables, 369, 370
 - Web site for, 641
- Microsoft Transaction Server, 173, 269
- Microsoft Visual Studio, 24
- Middleware, 30
- Midrange computers, 538, 541
- Migration tools, 582
- Migration utilities, 289
- MIN function, 530
- MIN values, and ordered indexes, 135
- Mirrored disks, 408
- Mirroring, 459, 481
- Mirror tables, 142-143, 301
- MMDBMS technology, 480
- Mnemonic devices, and passwords, 388
- Mobile DBMS, 56, 61-62
- Mobile workers, and PDAs, 45, 46
- Modeling and design tools, choosing, 577
- MODIFY utility, DB2, 416
- MOLAP, 30
- Monitoring, management *vs.*, 254-255
- Monotonic page splits, 304, 305, 311
- MQSeries (IBM), 269, 504
- MSMQ (Microsoft), 269, 504
- MTBF. *See* Mean time between failure
- zMulticolumn indexes, 129
- Multidimensional views, of detail, summary, and aggregate data, 517

- Multi-index access, types of, 332
- Multiplatform DBA issues, 35-36
- Multiple database environments, establishing, 38
- Multiple database management systems, guidelines and support for, 36
- Multiple-DBMS environment, 596
- Multiple distributed database, 506
- Multiple joins, and report tables, 142
- Multiple release upgrades, 70
- Multiple tables mapped to single files, 296
- Multitier client/server implementation, 544, 545
- Multitier techniques, 24
- MVS, 24
- MySQL, 52, 628, 629
- N**
- Names
 - constraint, 362, 375
 - for initialized devices, 309
 - minimizing changes in, 77
 - newsgroup, 637
 - problems with, 559
 - user, 387, 390
- Naming conventions/guidelines
 - attribute, 98-99
 - database, 76-79
 - entity, 98-99
 - for physical columns, 123
 - for remote site backup files, 453
 - and repositories, 569
- NAS. *See* Network-attached storage
- NASDAQ, 449
- Natural disasters, 448
- Nested-loop joins, 326, 342
- Nested trigger calls, 289
- Nested triggers, 368-369, 377
- Network-attached storage, 24, 467
 - storage area network *vs.*, 487-488
- Network cards, 229
- Network data models, 620-621
- Network File System, 487
- Networking, 611
- Network protocols
 - database gateways and, 546
 - system administrators and configuration of, 16
- Networks, 249
 - and DBMS, 66
 - fast connections to, 547, 548
 - monitoring, 291
 - problems with, 229-230
 - tasks distributed across, 543
- Network specialists, assistance from, 611
- Network traffic, 546-547
 - and distributed performance, 511
 - reducing, 546-547
- Neutralizing DELETE, 374
- Neutralizing UPDATE, 373
- NEW, 369, 370
- Newsgroups, Usenet, 637-639
- Newsletters, vendor, 602
- Newsreader software, 638
- NFS. *See* Network File System
- Niche tools, 599
- NIST. *See* National Institute of Standards and Technology
- Nodes
 - in b-tree indexes, 133
 - and clustering, 244
- Nonatomic data, 109
- Nonclustered indexes, 129, 477
- Noncritical applications, 450
- Non-DBMS DBA security, 405
- Nondisruptive utility, 240
- Nondynamic parameters, 274
- Nonleaf pages, 328
- Nonmatching index-only scan, 332
- Nonmatching index scan, 329, 330, 331
- Nonrelational DBMS vendors, 629
- Nonstandard abbreviations, 78
- Nonsubvertibility, of system catalog, 568
- Nonunique indexes, 129
- Nonvolatile data, and data warehouse, 516
- Nonvolatile storage, 465
- Normal forms
 - Boyce Codd, 114
 - fifth, 115
 - first, 109
 - fourth, 115
 - second, 111-112
 - third, 112-113
- Normalization, 90, 116, 138, 301
 - and database design, 560
 - definition of, 108
 - in practice, 115
 - and repeating groups, 146
- Normalized data models, 90, 108, 114
- Normalized tables, synchronizing with denormalized tables, 139
- Normal page splits, 304, 305, 311
- Notes, retaining, 608
- Noun phrases, tracking, 104
- Nouns
 - entities as, 96
 - tracking, 104

- Novell, 24
- NULL, 360
- Nullable columns, 124, 363
- nulls, 100-101, 363, 495
- NYSE, 449
- O**
- OBIDXLAT option, in DSN1COPY, 442
- ObjectDesign, 52
- Object Linking and Embedding Database, 166, 167
 - and ADO, 168
- Object migration tools, 582
- Object orientation, and SQL, 167-169
- Object-oriented database management systems, 629
- Object-oriented data models, 621
- Object-oriented DBMS vendors, 629
- Object oriented (OO) programming, 167-168, 554
- Object-oriented technologies, 24
- Object recovery, and logical backups, 424
- Object/relational databases, 169
- Object Store, 621, 629
- Occurrence, entity, 97
- ODBC. *See* Open Database Connectivity
- ODBMS. *See* Object-oriented database management systems
- Offset tables
 - in data page layout, 474
 - in index record, 477
 - in table record, 475
- Off-site disaster recovery, 437
 - written plan for, 452-453
- OLAP. *See* Online analytical processing
- OLAP Council, The, Web site for, 645
- OLD, 369, 370
- OLE, 24
- OLE DB. *See* Object Linking and Embedding Database
- OLTP, 570
 - applications, 32
 - and data freshness, 530
 - OLAP *vs.*, 517
 - systems, 528
- Omegamon (Candle Corporation), 290
- One-to-many relationships, 102, 107
 - and combined tables, 145
 - E/R diagramming method, 94
 - and hierarchies, 149
- One-to-one relationships, 116
 - and combined tables, 145
 - E/R diagramming method, 94
- Online analytical processing, 30, 517
 - applications, 32
 - activities, 597
 - and data mining, 518
 - OLTP *vs.*, 517
- Online change request system, 218-219
- Online database reorganization, 241
- Online event monitoring, 589
- Online forums, 609
- Online processing, 320, 537
- Online standards manuals, 600
- Online technical support, 602
- Ontos, 629
- Open Database Connectivity, 166, 557
- “Open” database objects, and memory consumption, 278, 282
- Open-source DBMS offerings, 628-629
- Open-source software, 628
- “Open-source software” movement, 52
- OPER. *See* Operations control
- Operating system experts, 56
- Operating system parameters, system administrators
 - and configuration of, 16
- Operating systems
 - changes in, 534
 - and DBMS releases, 69
 - failures of, 233
 - monitoring, 291
 - support for DBMS, 52
 - and system performance, 268-269
- Operational metadata, 568, 572
- Operational support representatives, in design
 - review, 193
- Operational support standards, 84
- Operations control, and DBMS, 398
- Optical disk, 480
- Optical storage, 465
- Optimization
 - and database performance, 18-19, 251
 - and performance management, 255
 - query rewrite, 336-337
 - relational, 320-335
 - rule-based, 337-338
 - view access, 335-336
- Optimizers, 320, 321, 322, 349
 - and data scans, 327
 - indexes not chosen by, 333-334
 - and query rewrite, 336-337
 - and restrictive predicate placement, 344
 - rule-based, 338
 - and summary tables, 530
- Opting in, to mailing lists, 639

- Optionality, 103-104
- Oracle, 5, 8, 33, 50, 51, 52, 108, 184, 341, 502, 557, 619, 626, 634, 643
 - Advanced Queueing feature, 504
 - architecture of, 272-273
 - backup and recovery for, 415
 - certification program for, 46
 - column alterations in, 212
 - COMMIT issued in, 348
 - databases, 272
 - data interleaving supported by, 137, 138
 - and data types, 358
 - dynamic performance tables, 314, 315
 - Export utility, 426
 - instances, 272
 - links and news, 643
 - memory structures, 273
 - MetaLink database, 611
 - optimization-mode parameter provided by, 290
 - optimization types supported by, 338
 - Oracle8i Lite, 45
 - parameter files, 272
 - PGA and shared pool in SGA, 64n.1
 - and relational data model, 621
 - sort area, 273
 - standby databases, 232, 244, 443
 - system parameters set in, 65n.2
 - transition tables, 370
 - transportable tablespaces, 504
 - vendor partnerships with, 603
 - Web site for, 641
- Oracle data, RMAN for backup and recovery of, 417
- Oracle DBAs, and impact of COMMIT on rollback segments, 348
- Oracle Enterprise Manager, 263
 - SQL Worksheet in, 66n.3
- Oracle8i Lite, 45
- Oracle9i, 6, 620
 - Real Application Clusters, 59
 - Virtual Private Database, 401
- Oracle processes, 273
- ORDER BY, 262
 - and clustering tables, 137
 - and queries, 131
 - and sorting, 333
- Ordered indexes, 135
- Organizational design review, 194, 198-199
- Organizations, types A, B, and C, 73
- Organization style, and DBMS releases, 73
- Organization type, and DBMS choice, 53
- Organized tablespace, 312
- OR logical operator
 - and check conditions, 360
 - judicious use of, 346-347
 - and multi-index access, 332
- OR 0=1 component, 343
- OS. *See* Operating system
- OS/2, 628
- OS/390, 24
 - DB2 for, 59, 282, 289, 310, 415, 416, 470
 - images, 245
- Outages, 226, 231, 241, 461
 - avoiding, 480
 - and CPU failures, 230, 231
 - database, 63
 - disk-related, 231-232
 - and e-availability, 548, 549
 - and media failures, 408
 - and network problems, 229-230
 - and operating system failure, 233
 - planned and unplanned, 238-239, 239
 - and severe performance problems, 257
 - and stock exchanges, 449
 - warnings about, 19
- Outer joins, and report tables, 142
- Outer table, 325, 326
- "Out of space" conditions, 238, 286
- Output, and database design, 559
- Output buffers, 285
- Overhead, and index costs, 131
- Overloading, indexes, 300-301
- Overstuffing, 560
- Ownership
 - costs, 54
 - data, 81
- P**
- Packet errors number, SP_MONITOR, 291
- Packets received number, SP_MONITOR, 291
- Packets sent number, SP_MONITOR, 291
- Page cache, and DBCC command, 355
- Page header
 - corruption of, 352
 - in data page layout, 473
- Page locking, 177
- Page pointer, in index record, 477
- Pages
 - of b-tree indexes, 133
 - and database locks, 176
 - in data caches, 279
 - and hiperpools, 281
 - recovering, 442
- Page size, 296, 309-310

- Page splits, 304
 - and database disorganization, 311
 - and free space, 306
 - normal, 304
 - statistics on, 314
- Palm Pilots, 24, 45
- Panic, avoiding, 609-610
- Paradox, 50, 630
- Parallel access, 334-335
- Parallel databases, 527
- Parallelism, 297, 334, 342, 522
- Parallel processing, 61, 244, 245
- Parallel processors, 527
- Parallel Sysplex, 245
- Parallel technology, 243
- Parameter files, Oracle, 272
- Parent tables, 372, 379
- Pareto Principle (80/20 rule), 252
- Parity bits, 481
- Partial recovery, 432
- Partitioned indexes, 135
- Partitioned tablespaces, 210, 211, 212
- Partitioning, 295, 296-297, 308
- Partition scans, 327
- Pascal, Fabian, 624
 - Web site for, 642
- Passwords, 405, 623
 - guidelines for, 387, 388
 - for login IDs, 386, 387
 - profile parameters for, 389
- Patches, 233
- PATROL (BMC Software), 290
- PC-based DBMS vendors, 629-630
- PCTFREE parameter, 305
- PDA database administrators, 45-46
- PDAs. *See* Personal digital assistants
- Peers, knowledge shared with, 608-609
- Pendant DELETE, 366, 374, 377, 583
- PeopleSoft, 545
- Performance
 - application, 319-349
 - and change, 206
 - and code generation tools, 165
 - and column ordering, 126
 - and concurrency, 287
 - for data access requests, 133
 - database, 223, 295-316
 - data warehouse, 527-530
 - defining, 249-253
 - degradation, 252, 402, 512
 - and denormalization, 140, 152
 - as design issue, 159
 - with direct access file system, 488
 - distributed, 511-512
 - estimation tools, 262
 - and fast network connections, 548
 - and hashing, 136
 - and index locking, 177
 - and Java, 556
 - and locking, 184
 - monitoring, 529
 - monitoring *vs.* management of, 254-255
 - and network traffic, 546
 - and RAID, 480
 - RAID levels and, 485
 - and redundant data, 146
 - and repeating groups, 146
 - severe problems with, 237
 - and simplicity, 344
 - SQL coding for, 170-171
 - and storage options, 479
 - system, 267-292
 - and upgrades, 69
- Performance analysts, 29
- Performance benchmarks, DBMS, 53
- Performance management, 249-264
 - and database server, 542
 - DBMS performance basics, 263-264
 - monitoring *vs.* management, 254-257
 - performance tuning tools, 261-263
 - reactive *vs.* proactive, 255-256
 - service-level management, 257-260
 - types of performance tuning, 260-261
- Performance management components, 254
 - analysis, 255
 - monitoring, 254
 - optimization, 255
- Performance management tools, 264, 587-592
 - application performance tools, 590-592
 - database performance tools, 590
 - system performance tools, 588-590
- Performance monitoring, 264
 - and database administrators, 17, 18-19
 - and data usage, 532
 - tools for DBMS, 53
- Performance monitors, 36, 261, 280, 588
- Performance optimization tools, 262
- Performance requirements, and database administrators, 32
- Performance trace files, protecting, 404
- Performance tuning, 264
- Performance tuning tools, 261-263
- Performance tuning types, 260-261
 - application tuning, 261

- database tuning, 260–261
 - system tuning, 260
- Persistence, and solid state devices, 271
- Personal computers, 537–538
- Personal DBMS, 56
- Personal digital assistants, 24, 45
- Personal Oracle, 57
- Personnel
 - and disaster recovery, 453, 455–456
 - on recovery team, 453
 - written disaster recovery plans for, 452
- Pervasive computing, and DBMS, 61
- PGA. *See* Program global area
- PGQ, in Oracle, 64n.1
- Phantoms, and isolation levels, 182
- Physical databases, 155
 - change and structure of, 209
 - logical data models synchronized with, 208
 - from logical models to, 121–129
 - and views, 152–154
- Physical data independence, 321, 622
- Physical data models, 108, 121, 190
- Physical data structures, building, 127–129
- Physical denormalization, 151, 301
- Physical design, and change, 208
- Physical design review, 194, 197–198
- Physical integrity, of database, 22
- Physical pages, and allocation pages, 474
- PIT recovery. *See* Point-in-time recovery
- Planned outages, 238, 239
- Planned SQL, 169
- Planning analysis, and change management, 205
- PLAN_TABLE, 339, 340, 341, 591
- PLATINUM Repository, 570
- PL/SQL, 598
- PMON. *See* Process monitor
- PocketPCs, 24, 45
- Poet, 629
- Point-and-click technology, 597
- Pointer consistency, and internal DBMS integrity, 23
- Pointer management, 554
- Pointers, 352
- Point-in-time recovery, 21, 411, 432, 433, 434–435, 439
- Point of consistency, 416, 418–419
- Point releases, 67
- Policies and procedures, for change requests/implementation, 217–218
- Portals, database, 642–643
- Postal codes, 560
- PostgreSQL, 52, 628
- Post-implementation design review, 194
- Power losses/outages, 231, 232
- Powersoft (Open Tools Division of Sybase), 634
- Power spikes, 231
- Power surges, 461
- Pratt, Philip J., 624
- Predicates
 - and check conditions, 360
 - and indexed access, 328
- Predicate transitive closure, 336, 337
- Predictability, and change management, 205, 206
- Pre-implementation design review, 194
- Prejoined tables, 141
 - and denormalization, 301
- Prepositional phrases, 104
- Preproduction performance estimation, 256–257
- Presentation logic, in client/server applications, 540, 543
- Primary database, 232
- PRIMARY filegroup, 128
- Primary key columns, 371, 380
- Primary key constraints, 357
 - example, 356
- Primary key perspective, 373
- Primary keys, 101–102, 106, 117, 212, 371, 582.
 - See also* Foreign keys
 - and clustering tables, 137
 - and denormalization, 140
 - design of and database usability, 560
 - dropping, 579
 - and first normal form, 109
 - and indexes, 130, 300
 - in parent tables, 375
 - and referential constraints, 126
 - and second normal form, 111
 - specification of, 124
 - for speed tables, 150
 - and split keys, 144
- Primary key values, 592
- Print servers, 539
- Privacy policies, and data, 9
- Privileges, 386, 394–395
- Privileges types, 391–394
 - database object, 391, 392–393
 - program and procedure, 391, 393–394
 - system, 391, 393
 - table, 391, 392
- Proactive database administrators, 7
- Proactive performance management, reactive performance management *vs.*, 255–256
- Proactive performance plans, 255
- Proactivity, and change management, 204, 206
- Problems, preparing for, 407–408

- Problem solving
 - by database administrators, 3, 19
 - resources for, 611-612
 - by vendors, 603
 - Procedural database objects, 40
 - Procedural DBAs
 - administering stored procedures, triggers, and UDFs, 40-43
 - duties of, 41, 42
 - involvement by object, 42
 - managing database logic, 39-43
 - offloading coding-related tasks to, 43
 - stored procedures, 39
 - triggers, 40
 - user-defined functions, 40
 - Procedure buffers/headers, and DBCC command, 355
 - Procedure cache detail, and DBCC command, 355
 - Procedure caches, 276, 281-282
 - Procedure privileges, 391
 - granting, 393
 - Procedures, database, 76
 - Proceedings and presentations, retaining, 608
 - Processes, in Oracle, 272
 - Process monitor, Oracle, 273
 - Production database backup, populating test environment with, 443
 - Production environment, and quality database implementation, 37
 - Productivity, loss in, 6
 - Product vendors, nature and stability of, 601
 - Program cache, 64
 - Program files, protecting, 404
 - Program global area, for Oracle instance, 273
 - Program logic, RI *vs.* check constraints *vs.*, 379-380
 - Programmers, education classes for, 84
 - Programming
 - object-oriented, 167, 168
 - tools, 597-598
 - Programming experts, 56
 - Programming languages
 - and application performance, 320
 - and SQL, 165
 - Programming staff experience, and database administrators, 32
 - Program privileges, 391
 - granting, 393
 - Programs, 77
 - batch database, 185
 - retaining, 608
 - SQL embedded in, 165
 - Program source libraries, backing up, 423
 - Program testing, LOAD AND UNLOAD used for, 501
 - PROJECT_STATUS codes, 382
 - Propagation, 503
 - Propagation failures, 236-237
 - Propagation tools, 596
 - ProTech, 85
 - PUBLIC, granting authorization to, 394
 - Publications, Web-based, 609
 - PUBLIC privileges, revoking, 395
 - Publishing databases, problems with, 237
 - Punched cards, 537
- Q**
- Qualifying row, 326
 - Quality assurance, 83, 234
 - Quality assurance environment, and multiple database environments, 38
 - Queries
 - and bitmap indexes, 134
 - and clustering tables, 137
 - and indexing, 298, 299
 - and prejoined tables, 141
 - and relational optimization, 321
 - Query analysis, and relational optimization, 323-325
 - Query parallelism, 334
 - Query performance, 300, 344, 527
 - Query processing, and indexes, 129, 130
 - Query rewrite, 336-337
 - Query tools, 53, 233, 596-597
 - Quest Software, 632
 - QUIESCE utility, 416, 418, 419, 433
- R**
- RACF (IBM), 24, 386
 - RAD. *See* Rapid application development
 - RAID, 408, 466, 470, 480-486
 - devices, 271
 - disk systems, 231
 - evaluating, 485-486
 - levels and performance, 485
 - levels of, 481-486
 - RAID-0, 481, 485
 - RAID-0+1, 484, 485, 486
 - RAID-1, 481, 482, 485, 486
 - RAID-2, 481, 482
 - RAID-3, 482
 - RAID-4, 482, 483
 - RAID-5, 482-483, 486
 - RAID-6, 483
 - RAID-10, 483, 484
 - RAID-53, 484

- storage, 232
- storage vendors, 484
- Random access
 - memory chips, 251
 - and unclustered indexes, 303
- Randomizer, 136
- Range access, and clustered indexes, 303
- Range columns, and clustered indexes, 303
- Rapid application development, 559
- RAS. *See* Reliability, availability, and scalability
- Rational Rose, 24
- Rational Software, 634, 635
- Raw disk usage, 269
- Raw files, 128
- Raw partitions, file systems *vs.*, 296, 297-298, 471-472
- RDA. *See* Remote Database Access
- RDBMS. *See* Relational database management system
- Reactive database administrators, 7
- Reactive performance management, proactive performance management *vs.*, 255-256
- Read efficiency
 - of data caches, 280-281
 - of procedure caches, 282
- Read locks, 178
- Rebuilding, recovery *vs.*, 415
- RECO. *See* Recover background process
- RECONFIGURE command, 274
- Record length, for tables, 475
- Records, 474
 - aggregate, 530
 - index, 477
 - on single index page, 478
- Recover background process, 273
- Recoverability, and availability, 223
- RECOVER command, 288
- RECOVER function, of DBMS, 236
- RECOVER operation, 277, 283, 285
- Recover to current recovery, 21, 431-432, 434
- RECOVER utility, 20, 416, 429, 443, 456, 549, 593
- Recovery, 427-443. *See also* Backup; Disaster recovery
 - and availability, 237-238
 - of broken blocks and pages, 442
 - complexity of, 427
 - and database administration standards, 81
 - and database administrators, 17, 21
 - and database server, 542
 - and data warehouse, 533-534
 - designing DBMS environment for, 424
 - from disk-related outages, 231
 - of dropped database objects, 441-442
 - duration of, 409, 438-439
 - failure type matched to type of, 439
 - index, 440
 - management, 242
 - off-site disaster, 437
 - optimum strategy for, 437-439
 - options, 428-429
 - order of, 460
 - partial, 432
 - point-in-time, 418, 432
 - populating test databases, 443
 - recover to current, 431-432, 434
 - and risk, 449-451
 - RMAN for, 417
 - and solid state devices, 271
 - SQL Server models, 430
 - steps in, 429-431
 - testing plan for, 440-441
 - tools, 592-593
 - transaction, 433-434
 - and transaction logs, 285
 - types of, 431-439
- Recovery managers, 238
- Recovery point, selecting, 433
- Recursive triggers, 377
- Redo log files, in Oracle, 272
- Redo logs, 232, 272
- REDO recovery, 435, 436
- Redundancy, 22-23, 169
 - and denormalization, 138
 - reducing, 90
- Redundant arrays of inexpensive disks. *See* RAID
- Redundant constraints, 365
- Redundant data, 146, 301
- Redundant network switches, 229
- Redundant power supplies, 231
- Reference manuals, retaining, 608
- Referential constraints, 22, 78, 143, 215, 369, 372, 418
 - building for relationships, 126-127
 - and dropped objects, 442
 - and loss of database objects, 235
- Referential integrity, 126-127, 130, 143, 241, 371-382, 582
 - bypassing, 380
 - check constraints *vs.* program logic *vs.*, 379-380
 - DBMS support for, 376
 - declarative RI constraints, 375-376
 - DELETE rule, 373-374
 - INSERT rule, 372-373
 - pendant DELETE, 374
 - relationship set-up, 375
 - rules, 374
 - rules of thumb, 380-381

- Referential integrity *continued*
 - tools, 579, 582-583
 - and triggers, 376-379
 - triggers used for implementing, 369
 - UPDATE rule, 373
 - user-managed *vs.* system-managed, 379
- Referentially related tables, backing up/recovering together, 381
- Relational access, applications designed for, 319-320
- Relational closure, 164
 - and set-at-a-time processing, 162-165
- Relational data, 127
 - fourth-generation languages for accessing, 597
 - updating, 587
- Relational database access, and SQL, 160
- Relational database management systems, 17, 38, 480
 - and data modification, 310
 - identity property supported by, 125
 - relational optimizers in, 321
 - triggers fired by, 40
- Relational databases, 77, 210, 264
 - amount of memory needed by, 278
 - changes made to, 549
 - denormalizing, 301
 - and hierarchies, 149
 - and locking process, 288
 - and memory usage, 274
 - and object-oriented programming, 169
 - and optimization, 251
 - rows retrieved from, 262
 - security in, 586
- Relational database technology, 5
- Relational data models, 621
- Relational design, and performance, 18
- Relational optimization, 320, 321
 - access path choices, 326-335
 - CPU and I/O costs, 322
 - database statistics, 322-323
 - joins, 325-326
 - query analysis, 323-325
- Relational optimizers, 320, 321, 322, 347, 349
 - access paths chosen by, 342
 - and indexed access, 328
 - and index use for avoiding sorts, 333
- Relational performance, poor, 558
- Relational queries, and optimization, 18
- Relational theory, 17
- Relations, 621
- Relationships, 102-104
 - and cardinality, 103
 - of data model, 92
 - and optionality, 103-104
 - referential constraints built for, 126-127
 - and referential integrity, 371, 372, 373
 - and referentially related tables, 381
 - setting up, 375
- Relative positioning, 330
- Release migration, DBMS, 23
- Release migration strategy
 - and platform support, 74
 - and support policies of DBMS, 72
- Releases, 289
 - DBMS, 16, 243
 - DBMS upgrades, 68-70
 - knowing about, 612
 - retired, 72-73
 - skipping, 70
 - upgrades, 424
 - versions *versus*, 67
- Release schedules, and DBMS, 54
- Reliability
 - and availability, 223
 - and change management, 205, 206
 - and clustering, 243
 - and mean time between failure, 227
- Reliability, availability, and scalability, 60
- Remote Database Access, 508, 509
- Remote request, 509
- Remote sites. *See also* Data warehouses/
warehousing
 - additional data/files for backup at, 460-461
 - database log backups shipped to, 457
 - and disaster recovery, 451-452
 - and storage management backups, 458
 - WANs used for backup deliveries to, 459
- Remote unit of work, 509
- Remote workers, and PDAs, 45
- Removable storage, 465
- RENAME statement, 211
- REORG, scheduling after loading data, 497
- Reorganization, 296
 - database, 310-316
 - and image copy backups, 411
 - manual, 313
 - tools, 238, 262
- REORG command, 288
- REORG process, online, 241
- REORG tool, 594
- REORG utility, 20, 131, 312, 313, 549, 593
- REPAIR utility, DB2, 353
- REPEATABLE READ isolation, 181, 182
- Repeating groups, 146-147, 301
- Replication, 444-445, 460, 503
 - data moved through, 502-503

- and distributed data placement, 309
- Replication tools, choosing, 596
- Reporting tools, 596–597
- Reports
 - at recovery site, 453
 - retaining, 608
- Report tables, 141–142, 301
- Repositories, 569–573
 - benefits with, 570–571
 - capabilities of, 569
 - centralized, 572
 - challenges with, 571–572
 - defined, 569
 - populating, 571, 572
- Repository Manager (IBM), 573
- Required applications, 450
- Resources
 - and auditing, 403
 - caching in memory, 275
 - and database performance, 251
 - of system, 18
- Response time, and performance in distributed environment, 511
- Responsive Systems, 633
- Restarts, and recovery, 411
- RESTORE command, RMAN, 417
- RESTORE function, of DBMS, 236
- RESTORE operation, 286
- Restricted DELETE, 373
- Restricted-INSERT RI rule, 378
- Restricted UPDATE, 373
- Retention of materials, by DBAs, 608
- Retrieval function, in XML Extender, 552
- Return on investment, 60, 167, 213
- Reusability, and repositories, 571
- Reverse key indexes, 134–135
- “Reverse” RI, 377
- Review processes, 219
- REVOKEs
 - cascading, 395–396
 - chronology and, 396
- REVOKE statement, 20, 390, 391, 394, 585
 - analyzing effects of, 586
 - timing of, 396
- RI. *See* Referential integrity
- Rightsizing, 538, 539
- Risk
 - categories of, 449
 - and recovery, 449–451
- Risk analysis, and change management, 205
- RMAN (Recovery Manager), 415, 416, 417
- ROI. *See* Return on investment
- ROLAP, 30
- Roles, authorization, 397
- Roles and responsibilities, database support, 79, 80
- Rollback files, and Oracle tablespaces, 272
- ROLLBACK operation, 277, 283, 284, 285
- Roll backs, transaction, 171
- Rollback segments
 - DBMS, 62
 - in Oracle, 272, 348
- Root authority, 405
- Root pages, in b-tree indexes, 132, 133
- Ross diagramming technique, 94
- Routers, 24
- Routine maintenance, 240–241
- Row chaining
 - and database disorganization, 311, 312
 - and free space, 306
 - statistics on, 314
- Row data, in table record, 475
- Row header, in table record, 475
- ROWID data types, 124
- Row length, in index record, 477
- Row-level locking, 179
- Row-level triggers, 371
- Row locking, 177
- Row migration
 - and database disorganization, 311
 - and free space, 306
 - statistics on, 314
- Row recovery, and logical backups, 424
- Rows. *See also* Columns; Tables
 - and Cartesian products, 346
 - and clustering, 136
 - and cluster ratio, 314
 - data, 473
 - and database locks, 176
 - and density, 324
 - in first normal form, 109
 - formulas for calculating physical size of, 475
 - and free space, 306
 - in horizontally split tables, 143
 - and indexes, 130, 298
 - and LOAD utility, 494
 - minimizing number of to be returned, 345
 - and page sizes, 309
 - and repeating groups, 146, 147, 301
 - retrieving from relational databases, 262
 - in second normal form, 111
 - size, 128
 - in speed tables, 150
 - from tables, 153
 - in third normal form, 113

- Rows *continued*
 - unloading, 500
 - in vertically split tables, 143
 - and views, 153, 400
- Rule-based optimization, 337-338
- Rule-based optimizers, 338
- Rules, 77, 364, 372-374
- Rumbaugh, James, 94
- Rumbaugh diagramming technique, 94
- RUNSTATS command, 322-323

- S**
- SA. *See* System administrator
- Sabotage, 448
- Salaries
 - DBA, 4-5, 11
 - mean salary for full-time DBAs, 4
- SAMPLE parameter, 500
- SANs. *See* Storage area networks
- SAP, 545
- SAS Institute, 636
- SA users, limiting number of, 398-399
- Scalability
 - and clustering, 57
 - of data warehouses, 526-527
 - and DBMS, 53
 - and shared-nothing clustering, 58
- Scalar functions, 40
- Scans, 298
 - and free space, 306
 - indexed, 329
 - matching index, 329
 - nonmatching index, 331
 - partition, 327
 - table, 327
 - tablespace, 327
- Scheduling errors, 237
- Scribe, role of in design review, 192, 201
- Script libraries, 613
- Scripts, 212, 549, 611
 - and database statistics, 323
 - DDL, 217
 - files of, 404
 - and loss of database objects, 235
 - recovery procedures and, 453
 - retaining, 608
- SCSI. *See* Small computer system interface
- searchdatabase.com, 4, 643
- Search engines, 643
- Secondary databases, 232, 236
- Second normal form (2NF), 111-112
 - COURSE Entity in, 112
 - ENROLLMENT Entity in, 112
- Seconds number, SP_MONITOR, 291
- Second-tier DBMS providers, 626-627
- Security, 402. *See also* Database security
 - and add-on tools, 586
 - and auditing tools, 584
 - availability and problems with, 234
 - and change, 207
 - data, 5, 623
 - database, 20-21, 82-83, 385-405
 - and Java servlets, 554
 - options, 289
 - preventing breaches of, 20
 - replacement products, 586
 - reporting, 396-397
 - tools, 585-586
 - threats to, 402
 - and UNLOAD utility, 498
- Security administrators
 - and DBMS, 398
 - and security reporting, 396
- Security authorizations, 215, 216
 - and dropped objects, 442
 - for recovery operations, 453, 456
 - tools, 579
- Segmented tablespaces, 210
- Seibel Technologies, 545
- SELECT DISTINCT, and clustering tables, 137
- SELECT INTO/BULKCOPY database option, in SQL Server, 286
- SELECT INTO statement, 286, 430
- SELECT list
 - specifying minimum number of columns in, 345
 - of SQL statements, 332
- SELECT privilege, 399, 400
 - granting, 392
- SELECT statements, 66, 162, 163, 171, 212, 338
 - prefixing with EXPLAIN command, 339
 - and read locks, 178
 - and report tables, 142
 - and views, 153
- Self-description, 550, 552
- Self-referencing constraints, 375
- Semantic data integrity, 351, 352, 355-382
 - check constraints, 359-366
 - data types, 357-359
 - default values, 359
 - entity integrity, 356-357
 - referential integrity, 371-382
 - triggers, 366-371
 - unique constraints, 357
- Semantic database integrity, 22-23
- Sequences, 77
- Sequential scans, and data caches, 281

- SERIALIZABLE isolation, 181, 182
- Server hardware, loss of, 230-231
- Server performance, 527
- Server processes, Oracle, 273
- Servers, 249, 539
 - clustering and reliability of, 243
 - data residing at, 507
 - deployment of, in client/server implementation, 545
 - and throughput, 511
 - timely response from, 541
 - and Web access, 547
- Server user IDs (SUIDs), 389
- Serviceability, and availability, 223
- Service disruptions, reacting to, 407
- Service expectations, unrealistic, 219
- Service-level agreements, 31, 258, 299
- Service-level management, 257-260
 - Web site for, 644
- Service levels, 258
- Servlets, 555
- Set-at-a-time processing, 162-165, 186
- SET SYSPARM command, 243
- Set theory, 164
 - normalization and, 108
 - and relational data model, 621
- SET TRANSACTION ISOLATION LEVEL statement, 181
- SGA. *See* System global area
- SGML. *See* Standard Generalized Markup Language
- Shadow copies, 241
- Shadow objects, 466
- Shared-disk architecture, 59
 - for clustering, 57
 - shared-nothing architecture compared to, 59
- Shared locks, 178
- Shared-nothing architecture, 58
 - for clustering, 57, 58
 - shared-disk architecture compared to, 59
- SHOW PLAN command, 130, 199, 338, 591, 592
- SHOWPLAN example
 - graphical, 340
 - textual, 339
- Signed applets, 554
- Sign-offs, and standardized change requests, 218
- Silos, 24
 - IT, in fractured environment, 259
- Simple recovery, 430
- Simplifying tasks, 609
- Single column indexes, 129
- Single distributed databases, 506
- Single tables mapped to multiple files, 296
- Single tables mapped to single files, 296
- Singleton SELECT, 592
- Size
 - of data caches, 279-280
 - and data warehouse scalability, 527
 - of pages, 296
 - of procedure caches, 282
 - of system catalogs, 289
- SLAs. *See* Service-level agreements
- SLM. *See* Service-level management
- Small computer system interface, 486, 487
- Small database objects, full image copies of, 413
- SMALLINT, 123
- SMON. *See* System monitor
- SMS. *See* System-managed storage
- SNA, 24, 269
- Snapshot replication, 444, 445
- Snapshot tables, and distributed data placement, 309
- Snowflake schema, for data warehouse, 520, 521
- Social security numbers, 560
- Softbase Systems Inc., 633
- Softlab Corporation, 635
- Software, 537
 - allied agent, 269, 292
 - auditing, 583
 - backup and recovery, 242
 - database gateway, 546
 - database management system, 2
 - data encryption, 404
 - DBMS, 54, 55, 207, 225, 612, 620
 - ETL, 502, 525
 - failures, 21, 237
 - message queuing, 269
 - messaging, 503
 - newsreader, 638
 - new versions/releases of, 67
 - open source, 628
 - personal database, 57
 - storage management, 425, 436
 - supporting, 74
 - tape-compression, 461
- Software AG, 52, 552, 628
- Software fixes, vendor, 603
- Software tools, and DBMS, 53
- Solaris (Sun Microsystems), 74
- Solid state devices, for optimizing disk access, 271
- Solid state disk, 465
- Solid state storage, 24
- Sort area, for Oracle instance, 273
- Sort caches, 276
- Sorting, 298
 - avoiding, 349
 - and index creation, 131

- Sorting *continued*
 - indexes used for avoiding, 332-333
 - tools, 262, 601
- Source database, 232
- Space
 - for databases, 468
 - for index storage, 477, 478
 - for tables, 476
- Space calculators, 600
- Space management, 472-479
 - data page layouts, 473-476
 - index page layouts, 476-478
 - transaction logs, 479
 - tools, 579, 599
- Space map page, 474
- Space usage, 474
- SP_BINDRULE system procedure, 364
- SP_DBOPTION, in SQL Server, 287
- Speed, and recovery strategy, 438
- Speed tables, 150, 301
- Spikes, disk usage, 466
- Split tables, 143-145, 301
- SP_MONITOR (Sybase), 291
- SPUFI, 66n.3
- SP_UNBIND system procedure, 364
- SQL. *See* Structured Query Language
- SQL Central (Sybase), 263
- SQL data definition language, physical database
 - objects created with, 154
- SQLJ, 166, 556, 557
- SQL*Loader, 504
- SQL*Plus, 66n.3
- SQL Server. *See* Microsoft SQL Server
- SQL statements, 161-162, 165, 214, 253, 587
 - ALTER, 211
 - and application performance tools, 590-591
 - columns grouped/sorted in, 303
 - COMMIT, 320, 348
 - CREATE, 427
 - DELETE, 497
 - DROP, 585
 - GRANT, 20
 - and indexing, 135-136, 298
 - INSERT, 283, 419
 - and parallelism, 297
 - prefixing with EXPLAIN command, 338
 - and query analysis, 323-325
 - reviewing, 199
 - SELECT, 300, 345, 498
 - SELECT list of, 332
 - and triggers, 40
 - and Virtual Private Database, 401
- SQLSTATES, 82
- SQL tuning
 - additional tips, 348-349
 - and DBA, 343
- SSOs. *See* Security administrators
- Staffing considerations, 30-35
 - DBA reporting structures, 33-35
 - optimal number of DBAs, 30-33
- Stand-alone SQL, 170
- Standard abbreviations, 78-79
- Standard Generalized Markup Language, 549, 550
- Standardization, and change management, 205, 206
- Standardized change requests, 218-219
- Standards
 - data administration, 79, 81
 - database, 76, 81
 - database application development, 82
 - database security, 82-83
 - system administration, 82
- Standby databases, 232, 236, 443-444, 459
- Standby instances, 232
- Standby systems, 230
- Standby tables, 232
- Star schema, for data warehouse, 519, 520, 521
- START command, 528
- STATEMENT_ID clause, 340
- Statement-level triggers, 371
- Static data, backing up, 422
- Static SQL, 170
- Statistics, database, 322-323
- Statistics gathering utilities, 241
- STATUS_CODE column, in PROJECT_STATUS table, 381, 382
- STATUS column, 495, 496
- Stewardship metadata, 568
- Stock values, and downtime, 227
- STOGROUP-defined tablespaces, 578
- Storage
 - of backup materials, 452
 - and compression tools, 600
 - and data interleaving, 137
 - with DBMS, 621
 - of derived data, 148
 - growing field of, 490
 - index, 131
 - multiple devices for, 469
 - network-attached, 467, 487
 - options, 479-480
 - planning for future, 488-489
 - RAID, 232
 - requirements, 62-63
 - short-term persistent, 472

- and size terminology, 468
- system-managed, 471
- for tables, 128, 475
- Storage area networks, 24, 232, 467, 486-487
 - benefits with, 487
 - network-attached storage *vs.*, 487-488
- Storage consumption, views on, 489
- Storage function, in XML Extender, 552
- Storage management, 465-468
 - backups, 458-459
 - software, 425, 426, 436
- Storage media, data sets in, 465
- Storage systems, building, 468
- Storage technologies, evaluating, 465-466
- Stored data, and DTD, 551
- Stored procedure privileges, 391
- Stored procedures, 39, 77, 348, 366
 - administering, 40, 41, 42
 - for security, 400-401
- Striping, 481
- Structural data integrity, 241
- Structural problem management, 353-355
 - consistency checking, 354
 - database checking, 354
 - memory usage, 354-355
 - other DBCC options, 355
- Structural problems, types of, 352-353
- Structured Query Language, 31, 194, 624
 - analysis and application, 592
 - analysis tools, 262, 341, 591
 - and application code design review, 199-200
 - application performance and types of, 319
 - classes in, 85
 - coding and/or tuning, 82, 170-171, 343-349
 - and database administrators, 32
 - database application development and, 160-171
 - debugging tools, 598
 - design review, 199
 - embedding in program, 165
 - flexibility of, 162, 163, 347
 - functions and summary tables, 530
 - interactive, 233
 - Introduction class, 85
 - middleware, 165-166
 - monitors, 253, 349
 - object orientation and, 167-169
 - and performance problems, 252
 - performance tips and techniques, 82
 - queries, 342
 - rules of thumb, 344-348
 - standard, 612
 - standard Web site, 644
 - tweaking, 342
 - types of, 169-170
 - usage considerations, 162, 170
 - and view referencing, 336
 - WHERE clauses, 130, 300, 360
- STUDENT data, unnormalized, 110
- STUDENT data model, 114
- STUDENT Entity
 - in first normal form, 110
 - in third normal form, 113
- Subject-oriented data, and data warehouse, 516
- Subqueries, joins *vs.*, 163
- Subscribers, and replicated/propagated data, 237
- Subsystem failure, recovering from, 439
- Subtypes, 116
- SUM function, 530
- Summary tables, automated, 529-530
- Sungard Recovery Services, 447
- Sun Microsystems, 74, 554
- Support charges, 612
- Support numbers, for vendors, 601
- Surge protectors, 461
- Swap area, 268, 269
- Sybase, 45, 50, 51, 338, 356, 626, 627
 - Adaptive Server Anywhere, 45
 - ALLOW UPDATES parameter provided by, 290
 - BCP utility, 411
 - constraints in, 363
 - and data types, 358
 - DBCC utility program, 353
 - DUMP utility, 594
 - and rules, 364
 - SP_MONITOR, 291
 - SQL Central, 263
 - transition tables, 369, 370
 - triggers supported by, 377
 - vendor partnerships with, 603
 - Web site for, 641
- Sybase segments, 470
- Symmetric replication, 444
- Synchronization of data, from PDAs, 46
- Synchronous writes, and data caches, 279
- Synonyms, 99, 100
- Syntax
 - check constraint, 360
 - and DBA certification tests, 47
 - SQL, 161
- SYSADM authority, and job scheduler, 405
- SYSADMs. *See* System administrators
- SYSOPR. *See* Operations control
- Sysplex (IBM), 244, 245
- System administration, 15-16

- System administration standards, 82
 - System administrators, 56
 - assistance from, 611
 - and corrupt data, 235
 - and database administrators, 16
 - and DBMS, 398
 - education classes for, 84
 - responsibilities of, 15-16, 17
 - and security, 405
 - and security reporting, 396
 - System capacity, measuring against requirements, 489
 - System catalog, 215, 216
 - backing up, 409, 423
 - and DB2 COPY utility, 416
 - file protection for, 404
 - as metadata source, 567
 - placement of, 288-289
 - and query tools, 584
 - recovering at remote site, 458
 - security of, 396
 - System catalog tables, and auditing, 403
 - System checkpoint, 284
 - System data files, and Oracle tablespaces, 272
 - System DBAs, tasks of, 25-26
 - System dump files, DBMS, 62
 - System global area, for Oracle instance, 273
 - System libraries, backing up, 423
 - System maintenance, shrinking window on, 224
 - System-managed referential integrity, user-managed referential integrity *vs.*, 379
 - System-managed storage, 471
 - System monitor, Oracle, 273
 - System monitoring, 290-291
 - System parallelism, 335
 - System parameters of DBMS, configuring, 65
 - System performance, 267-292
 - larger environment, 268-271
 - tools, 588-590
 - System privileges, 391
 - granting, 393
 - Systems analysis and tuning tools, 262
 - Systems management software, and DBMS, 66
 - Systems management tools, 24
 - Systems programming representatives, in design review, 193
 - System tuning, 260
- T**
- Table access, and index design, 131
 - Table data, interleaving, 138
 - Table editing tools, data movement with, 504
 - Table editors, 587
 - Table-level check constraints, 362-363
 - Table names, encoding, 78
 - Table privileges, 391
 - granting, 392
 - Table records, elements in, 475
 - Tables, 77, 210, 212
 - adding/dropping declarative RI with, 376
 - after denormalization, 147
 - clustered, 137, 302, 303
 - columns added to end of, 214
 - columns added to middle of, 215-216
 - columns from, 153
 - combined, 145
 - creating correct indexes on, in database, 298
 - and database locks, 176
 - and data interleaving, 137
 - denormalized, 141, 301
 - disorganized, 311, 312
 - dropping, 235, 579
 - dynamic performance, 314, 315
 - entities transformed to, 122
 - floating-point data loaded into, 496
 - hierarchy, 149
 - inner, 325, 326
 - joining, 325
 - limiting size of, 470
 - loading with nullable columns, 496
 - LOAD utility for populating, 495
 - mirror, 142-143
 - number of indexes for, 299
 - outer, 325, 326
 - and page sizes, 309
 - and poorly performing SQL, 252
 - prejoined, 141
 - primary keys identified for, 124-125
 - recovery of, 414
 - redundant data stored in, 301
 - report, 141-142
 - rows from, 153
 - sequential access of, and clustering, 303
 - speed, 150
 - split, 143-145
 - storage for, 128
 - tracker, 257
 - transition, 369
 - transition variables and, 369-370
 - unclustered, 311
 - Table scans, 130, 133, 134, 327, 330, 332
 - and data caches, 281
 - and poorly performing SQL, 252

- Table size, calculating, 476
- Tablespaces, 77, 127, 289, 593
 - and database locks, 176
 - disorganized, 311, 312
 - dropping, 235
 - free space in, 215, 305
 - organized, 312
 - and page sizes, 309
 - partitioned, 296
 - recovery of, 414, 442
 - reorganizing, 314
 - transportable, 504
- Tablespace scans, 332, 327, 330
- Tags, 549, 550, 551
- Tamino (Software AG), 552, 627
- Tampering with data, 402
- Tape
 - backups, 456-458
 - DBMS, 63
 - degradation, 353, 408
 - devices, 465
 - storage, 480
- Tape-compression software, 461
- Tape machines, 24
- Tape management libraries, backing up, 423
- Target database, 232
- Task-oriented DBAs, 29
- TBCHECK utility (Informix), 353
- TCP/IP, 24, 269
- Teams, in DBMS environment, 56
- Technical education classes, 84-85
- Technical support, 538
 - and DBAs, 611, 612
 - in design review, 193
 - online, 602
- Technical support numbers, response of, 602, 603
- Technicians, for DBMS, 54
- Technology
 - and business, 610-611
 - and database administrators, 38-46
 - data synchronization, 46
 - Java, 554-558
 - keeping up-to-date on, 612-613
 - metadata, 566
 - new, 549-558
 - XML, 549-553
- Temporary files, and Oracle tablespaces, 272
- Teradata (NCR), 52
- Terrorist attacks, 448
- Test beds, maintaining, 500-501
- Test databases, populating, 443
- Testing, 37
 - and indexing, 299
 - of invasive system performance tools, 590
 - procedures, 610
 - program, 234
 - recovery plans, 440-441, 460
 - tools, 594, 598
 - utility tools, 594
- Textbooks, retaining, 608
- Textual SHOWPLAN example, 339
- Themis, 85
- Thin clients, 545
- Thin server/fat client, 24
- Third-generation languages, 161
- Third normal form (3NF), 112-113, 196
 - MAJOR Entity in, 113
 - STUDENT Entity in, 113
- Third-party software, and transaction recovery, 433-434
- Third-party tools, 238, 261, 349, 601
 - for automating reorganizations, 315
 - and dropped database objects, 236
 - OLAP, 597
 - recovery, 456
- Third-party utilities, requirements for, 594
- Third-party vendors
 - and database utilities, 594
 - DBA tools from, 577
 - gateway software through, 546
 - import and export products through, 502
- Throughput, 408, 512
 - and contention, 19
 - and database performance, 18, 251
 - and performance in distributed environment, 511
- Tier-1 DBMS vendors, 51, 52
- Tier-2 DBMS vendors, 52
- Time dimension, 517
- Timeouts, 185
 - and deadlocks, 180
 - lock, 179
 - minimizing, 288
- TimesTen Performance Systems, 480
- Time-variant data, and data warehouse, 516
- Time zones, and 24/24 availability, 225
- TINYINT, 123
- T1/T3 lines, 547
- Tool vendors
 - data modeling, 634-635
 - DBA, 631-636
- Top Secret (Computer Associates), 386
- Total errors number, SP_MONITOR, 291
- Total read number, SP_MONITOR, 291

- Total write number, SP_MONITOR, 291
 - Toysmart.com, 9
 - TPC. *See* Transaction Processing Performance Council
 - TPC-C benchmark, 55
 - TPC-H benchmark, 55
 - TPC-R benchmark, 55
 - TPC-W benchmark, 55
 - Trace information, 588
 - Tracker tables, 257
 - Training. *See also* Education
 - for DBAs, 11, 238
 - specialists, 85
 - vendor, 602
 - Transaction design/processing, and application performance, 320
 - Transaction failures, 408, 439
 - Transaction identification, and recovery strategy, 437
 - Transaction logs, 283, 284, 419, 479
 - backing up, 286, 420, 421, 470
 - and data loss, 236
 - raw partition for, 471
 - and recovery scenarios, 285
 - sizes of, 479
 - space for, 468-469
 - Transaction processing, analytical processing *vs.*, 516-518
 - Transaction processing monitors, 66, 173
 - Transaction Processing Performance Council, 53, 55
 - Transaction processing (TP) systems, 24, 173-175
 - Transaction processors, 269
 - and DBMS releases, 69
 - physical design review and choice of, 197
 - system administrators and configuration of, 16
 - Transaction recovery, 21, 433-434, 437
 - Transactions
 - and ACID properties, 172-173
 - defining, 171-173
 - guidelines, 173
 - Transaction servers, 173, 174
 - monitoring, 291
 - using, 175
 - Transact-SQL, 598
 - Transition tables, 369, 377
 - Transition variables, and tables, 369-370
 - Translators, 557
 - Transparency, distributed databases and, 505, 506
 - Transportable tablespaces, Oracle, 504
 - Trigger-based RI, declarative RI favored over, 377
 - Triggers, 39, 77, 78, 139, 212, 215, 216, 382, 418
 - administering, 40, 41, 42
 - and declarative RI, 376, 377
 - dropping, 579
 - firing times, 367-368
 - granularity, 371
 - "hidden" impact of, 349
 - for implementing referential integrity, 369
 - and LOAD utility, 494
 - nested, 368-369
 - referential integrity using, 376-379
 - sample, 370
 - scenarios supported by, 367
 - statement-level, 371
 - synopsis, 371
 - transition variables and tables, 369-370
 - TRUNC LOG ON CHKPT database option, 287, 421
 - Tuning, SQL, 343-349
 - Tuning boxes, 267
 - Tuxedo, 24, 173
 - Tweaking SQL, 342
 - 24/7 availability, 221, 224, 225, 316
 - 24/7 uptime, 246
 - 24/24 availability, 225
 - Two-phase COMMIT, 511
- U**
- UDFs. *See* User-defined functions
 - UDTs. *See* User-defined data types
 - UML. *See* Unified Modeling Language
 - Unclustered data, and data disorganization, 310
 - Unclustered index access, 330
 - Unclustered indexes, 302
 - UNCOMMITTED READ isolation, 181, 182, 183, 529
 - Understanding Relational Databases* (Pascal), 624
 - UNDO recovery, 435, 436
 - Unfederated multidatabase setup, 506
 - UNICODE, 499
 - Unified Modeling Language, 94
 - sample class diagram, 95
 - UNION operation, 276
 - and clustering tables, 137
 - and queries, 131
 - and sorting, 333
 - UniQL, 629
 - Unique constraints, 22, 78, 495
 - Unique indexes, 129
 - Unit of work, 173, 177
 - Unit testing, 38, 83
 - University of California, Berkeley, 627
 - UNIX, 24, 53, 51, 56, 628
 - buffers, 471
 - environment and root authority, 405
 - machines based on, 541
 - platforms, 6, 74

- raw partition and file system in, 297
 - servers, 50
 - UNLOAD data, limiting, 499–500
 - Unloads, 424
 - UNLOAD utility, 142, 241, 443, 495, 497, 502, 512, 523, 593
 - concurrency, 498
 - data encoding scheme, 499
 - and data movement, 493, 494
 - floating-point value, 499
 - generation of LOAD parameters, 499
 - limiting UNLOAD data, 499–500
 - purpose of, 498
 - test beds of data maintained with, 500
 - unloading from image copy backups, 498–499
 - unloading from views, 500
 - used for program testing, 501
 - Unnamed constraints, 362
 - Unplanned outages, 238, 239
 - Unplanned SQL, 169
 - UOW. *See* Unit of work
 - Updated pages, in data caches, 279
 - Update function, in XML Extender, 552
 - Update locks, 178
 - UPDATE privilege, granting, 392
 - UPDATE processing, 360
 - UPDATE rule, 373
 - UPDATE statement, 66, 162, 185, 283, 587
 - and data modification, 310
 - log records for, 419
 - and transition tables, 370
 - and triggers, 40, 366, 368
 - UPDATE STATISTICS command, 322
 - UPDATETEXT statement, 286
 - UPDATE trigger, for referential constraints, 376, 377
 - Upgrades
 - benefits *vs.* risks with, 68–70
 - and change, 207
 - fees with, 604
 - multiple release, 70
 - Upsizing, 538–539
 - UPS systems, 231, 408
 - Uptime, 222, 227. *See also* Downtime
 - Usage patterns, and repositories, 570–571
 - Usenet newsgroups, 637–639
 - USE_NL hint, 342
 - User acceptance testing, 83
 - User connections, and memory consumption, 277
 - User-defined data types, 123, 358–359, 364, 552
 - User-defined functions, 39, 40, 41, 42, 552
 - User errors, and database recovery, 437
 - User groups, 611, 644
 - attending, 612
 - and mailing lists, 640
 - User IDs, 387, 405
 - User-level transactions, examples of, 434
 - User-managed referential integrity, system-managed referential integrity *vs.*, 379
 - User names, 390
 - User processes, Oracle, 273
 - User references, and DBMS vendors, 54
 - Users
 - database administrator staffing and number of, 31
 - and error messages, 461–462
 - and security, 389–390
 - talking to, 610
 - Utility management tools, 595
 - Utility manager, 595
 - Utility tools, testing, 594
- V**
- Value, nulls and lack of, 100–101
 - Values
 - attribute, 99
 - and direct index lookup, 328
 - identity, 289
 - lock timeout, 179
 - Vandalism, 448
 - Variable-length columns, 124, 128, 300
 - Variable-length index keys, 477
 - Variable-length rows
 - and free space, 306
 - size of, 475
 - VBScript, 167
 - VCAT. *See* Volume catalog
 - Vendors
 - data modeling tools, 92, 634–635
 - data movement and business intelligence, 636
 - DBA tools, 601–604, 631–636
 - DBMS, 49, 60, 68, 85, 625–630
 - and mailing lists, 640
 - relational optimizers of, 321–322
 - and release schedules for DBMS, 54
 - repository, 635
 - reputation of DBMS, 72
 - support for RAID levels by, 481
 - technical support by, 611, 612
 - tier-1 DBMS, 51
 - tier-2 DBMS, 52
 - and versions/releases, 67
 - Web sites for, 641
 - and XML-based DBMSs, 552
 - Verbs, tracking, 104

- Versant, 52
- Versions
 DBMS, 16, 67-68
 releases *versus*, 67
 and repositories, 569
- Vertically split tables, 143
- Vertical restriction, 400
- Very critical applications, 449-450
- Very large databases, 52
- Very large objects, 352
- VI, 488
- Views, 77, 152-154, 216
 access to, 335-336
 columns from, 153
 database, 152-154
 dropping, 236, 579
 materialization of, 336
 merging, 336
 rows from, 153
 for security, 399-400
 unloading from, 500
 uses of, 154
- Virtual Private Database, Oracle9i, 401
- Viruses, 448
- Visible Systems, 635
- Visual Basic, 165, 167, 199, 261, 597
- Visual dBase, 57
- Visual Explain tool, DB2, 341
- Visual Foxpro, 630
- Visual Studio, 570
- VLDBs. *See* Very large databases
- VLDB Report (Winter Corporation), 467
- Volatility
 of data, 422, 423
 and database administrators, 32
- Volume catalog, 578
- VPD. *See* Virtual Private Database
- VSAM, 24, 502
- V\$ tables, 315
- VTAM, 24
- W**
- Walkthroughs, 592
- WANs. *See* Wide-area networks
- War, 448
- Warehousing, 18. *See also* Data warehouses/
 warehousing
- Web, 637. *See also* Internet
 database connection to, 547
 database management integrated with,
 221
 keeping up-to-date with, 612
 XML and future of, 552
- Web-based applications, and eDBAs, 43
- Web-based training, 85
- Web browsers, Java-enabled, 554
- Web-enabled databases/applications, 24
- “Web month,” 558
- Web pages, and Java capabilities, 554
- Web portals, 609, 640
- Web servers
 and DBMS, 66
 Java applets on, 554
- Web sites, 548, 609, 611, 643-645
 consultant, 642
 DAFS Collaborative, 488
 disaster and contingency planning, 462
 magazine, 641-642
 vendor, 641
- WebSphere (IBM), 175
- Webster's New Collegiate Dictionary*, 565
- Web support personnel, in design review, 193
- Web-to-database capabilities, complex infrastructure
 enabling, 44
- WHEN clause, 500
- WHERE clause, 171, 310, 328, 334, 592
 clustered indexes and predicates in, 303
 mass deletes and, 497
 and row returns, 345
 and Virtual Private Database, 401
- White papers, retaining, 608
- Wide-area networks, 459
- Wild-card character (%), 347
- Windows NT servers, 50, 244
- Windows NT systems, CIFS on, 487
- Windows NT/2000, 56
- Windows operating system, 24
- Windows 2000, 6-7
- Winter Corporation, 467
- Wisdom, 565
- WITH CHECK OPTION, 400
- WITH GRANT OPTION, 390, 391, 396, 399
- Work files, DBMS, 62
- Workgroup DBMS, 56
- Workload, and database performance, 18, 250-251
- World Trade Center bombings (1993, 2001), 448
- World Wide Web. *See* Web
- WORM (write once, read many) technologies, 480
- Wrappers, 551
- Write-ahead logs, 284
- Write locks, 178
- WRITETEXT statement, 286

X

XML. *See* eXtensible Markup Language
XMLCLOB, UDT defined for, 552
XML Extender, 552
XMLFILE, UDT defined for, 552
XML portal Web site, 645
XML Schema, 551
XMLVARCHAR, UDT defined for, 552
XSL. *See* eXtensible Stylesheet language

Y

Yevich, Lawson & Associates, Web site for, 642

Z

“Zapping” database, 355
Zip codes, 560
z/OS, data sharing and DB2 for, 245