Index

A	performing tasks on behalf of another	merge scan join and, METHOD,
ABEND command, 69t	in, DBADM and, 111–112	772–773
ABEXP, $60t$	PERMIT command and, 102	nested loop joins and,
ABIND, $60t$	privileges and. See privileges	METHOD/PRIMARY_ACCES
access control, 16, 99-137. See also	RACF and, 136	STYPE 771–772
security	remote, 103	parallelism and
Application Transparent Transport	Remote Access Control Facility	(PARALLELISM_MODE),
Layer Security (AT-TLS) and,	(RACF) and, 101, 104, 105, 106	777–778
104–105	restrictive/advisory states and,	partition scans and,
audits in, 100	417–418, 419–422 <i>t</i>	PAGE_RANGE, 769–770
authentication and, 99	roles and, 107, 109, 136, 140	prefetching, PREFETCH and, 769
authorities and. See authorities	Secure Sockets Layer (SSL) and,	SORT, SORTN, SORTC and,
authorization and, 99	104–105	770–771
authorization IDs in, 105, 106–107,	SecureWay and, 104	star joins and, METHOD/JOIN
136	security threats and, 99	TYPE, 774–777
catalog table information on, 129, 130 <i>t</i>	SQL IDs and, SET CURRENT for,	subqueries and, 778–779, 778t, 779t
CICS and, 103–104, 136	107	table spaces, 767–768
confidentiality and, 100	stem integrity in, 100	tables and, 767–768
data integrity and, 99	subsystem and, 100–105	topology check and, 775
data set protection and, 105	trusted connections and, 108	unique index check and, 774
denial of service attacks and, 105	trusted contexts and, 107–108,	accessing distributed data. See
DSNR resource class and, 101	109–110, 137	distributed data
exit routines and, for authorization control, 102	views for, 130 ACCESS DATABASE command, 70 <i>t</i>	accounting
*		performance issues and, 832
EXPLAIN and, 804–805	Access Method Services (AMS), REORG utility, 372–373	trace for, 836–838, 842–843t
explicit privileges and, 112 IMS and, 103–104, 136	access paths, 389–390, 756, 765–803.	ACCUMACC, 60t
Integrated Cryptographic Service	See also access plans	ACCUMUID, 60t
Facility (ICSF) and, 105	catalog statistics used in selection	Activity Monitor, 33, 37
Kerberos and, 104, 136	of, 810, 811–812 <i>t</i>	adaptive memory allocation, 11, 12
local, 103	optimization hints for, 805	ADD CLONE keywords, 147–148, 213
logical terminal (LTERMs) and,	performance issues and, 815–816	ADD CONSTRAINT, 179
103–104	access plans, 756. See also access paths	ADD MONTHS, 164
multilevel security and, 131	dimension tables and, 774	address spaces, 39, 40–42, 41 , 96
object access and, 105–130. See	DSNZPARM and, 774–777	allied, 43, 44
also specific objects	fact table and, 774	attachment facilities and, 45–46
PassTickets for, 103	hybrid joins and, METHOD, 773–774	database services (DSAS), 41,
passwords and, 103	indexes and, 765–767	42–43, 92
1	· · · · · · · · · · · · · · · · · · ·	- , -

address spaces, continued	ALTER TABLE, 185–186, 243, 251	ASCCSID, 61t
distributed data facility (DDF)	ADD CLONE and, 147–148	ASCII, 161–162, 228, 247
services, 41, 43	clone tables and, 213	Assembler, 590, 612
internal resource lock manager in,	constraints and, 179, 180	ASSIT, 61t
40, 42	materialized query tables (MQTs)	asterisk wildcard character, SELECT, 252
priority of, 44–45	and, 213	ASUTIME setting, 625–626
stored procedure (SPAS), 44	partitioned table spaces and, 193	asynchronous reads/writes, 860-861
stored procedures and, 613	REORG utility and, 384–385	atomic key, 220, 240
system services (SSAP), 40, 42	ALTER TABLE ADD PART, 197	ATOMIC settings, 592
ADDRESS, 110t	ALTER TABLE ALTER PART	attachment facilities, 39, 44, 45–46
administration, 1	ROTATE, 197	attributes, 232, 239
Administration Console, 19	ALTER TABLESPACE, 207, 357	audio extenders, 27, 715–716
administration tools, 28–29	COMPRESS clause, 205–206	AUDIT TRACE option, 135
administrative authority, 117	PRIQTY and SECQTY clauses,	audits, 100, 132–136, 137
ADO.NET, 21	204–205	authorization IDs, 135
Advanced Access Control, 16	universal table spaces and, 198	automatic trace start, with AUDIT
Advanced Database Management	ALTER UTILITY, 70t, 376	TRACE option, 135
Facility (ADMF), 42	ALTERIN privilege, 115t, 115	event classes for trace in, 134t
advanced functionality, 667–720	AMCCSID, 60 <i>t</i> , 60 analyzing data's physical organization,	identifying trace, with DISPLAY
Advanced Program to Program	364–365	TRACE, 135
Communications (APPC), 644		overhead of, 133
advanced SQL coding. See SQL advisory state, 345	AND, 255–256, 333 anomalies, 235–236, 236 , 237	roles, 135 starting/stopping trace in, with
Advisory REORG pending (AREO)	answers to sample exam, 919–934	START /STOP TRACE, 135
status, 384–385	ANY, 296, 326	table, 136
advisory states, 417–418, 419–422 <i>t</i>	APPENSCH, 60 <i>t</i> , 60	trace and, 132–134, 134 <i>t</i> , 839, 844 <i>t</i>
AEXITLIM, 60 <i>t</i>	application access, EXPLAIN, 804–805	utilities and, 133
affinity processing, 504–505	application analysis, data sharing, 502	AUDITST, 61 <i>t</i>
after triggers, 669, 672–673	application design	AURHCACH, 61 <i>t</i>
AGCCSID, 60t	distributed data and, 655, 656	AUTH, 61 <i>t</i>
agent services manager, 42	locking and, 747–748	authentication, 99
AIX, 2, 13, 17, 23	application development, 1, 4, 5, 10,	authorities, 106, 117–122, 118–121 <i>t</i> , 136
ALCUNIT, 60 <i>t</i>	23, 25, 26	administrative, 117
aliases, 142, 144, 644	application header files, 22	catalog table information on, 129, 130 <i>t</i>
ALL, 60 <i>t</i> , 296, 326	application process, 573–574	DBADM. See DBADM
unions and, 300–301	application program features, 573–607	DBCTRL. See DBCTRL
allied address space, 41, 43, 44	application programming interface	DBMAINT. See DBMAINT
Alphablox, 6, 20	(API), 590	GRANTing, 121–122
ALTER, 150–151, 243, 244, 652	application servers (AS), 85, 637	PACKADM. See PACKADM
auditing and, 136	Application Transparent Transport	REVOKE/ing, 121-122
unqualified names and, 128	Layer Security (AT-TLS), 104–105	SYSADM. See SYSADM
unqualified objects and, 567-568	ARC2FRST, 60t	SYSCTRL. See SYSCTRL
ALTER BUFFERPOOL, 70t, 89,	ARCHIVE LOG, 70t, 466	SYSOPR. See SYSOPR
857-858, 859, 863, 866	archive log data sets, 430	WITH GRANT OPTION and, 122
ALTER DATABASE, 228	archive logs, 465	authorization, 99
ALTER GROUPBUFFERPOOL, 70t,	ARCHIVE privilege, 114t	exit routines and, for authorization
498	ARCPFX1, 60t	control, 102
ALTER INDEX, 226-227, 357, 445	ARCPFX2, 60t	IDs for, 105, 106-107, 135, 136
ALTER INDEX NOT CLUSTER,	ARCRETN, 60t	package execution, and BIND, 129
partitioned table spaces, 196	ARCWRTC, 60t	plan execution, VALIDATE for, 568
ALTER PART ROTATE, 195	ARCWTOR, 60t	plan execution, and BIND, 129
ALTER privilege, 113t, 115t	arithmetic expressions, XPath, 328-330	Authorized Program Facility (APF), 69
ALTER PROCEDURE, 616, 622	ARM architectures, 18	automatic rebind, 563-565
ALTER SEQUENCE, 189	ARM/XSCALE architectures, 17	Automatic Restart Manager (ARM), 489
ALTER STOGROUP, 229	AS, 266–267	automatic storage management, 11, 12

automation, system, 14	BIND PACKAGE in, 556–561,	Bootstrap Data Sets (BDSs), 412,
autonomic computing, 9, 10	566, 568, 650–651, 686	431–432, 507, 644
auxiliary indexes, 224	BIND PLAN in, 553, 568, 651–652,	bottom up vs. top down approach to
auxiliary tables, 143, 183–184	686	design, 231
large object (LOB) and, 183-184	CALL in, 550–551	BSDS privilege, 114 <i>t</i>
Auxiliary Warning (AUXW) status,	CICS and, 553	buffer critical threshold, 867
467–468	collections and, 552, 554–555	buffer manager, 43
availability, 8	CURRENT PACKAGESET	buffer pools, 11, 12, 88–89, 92, 572,
available pages, in buffer pool, 858	register and, 555	857–875
	Database Request Module (DBRM)	ALTER BUFFERPOOL, 857–859,
В	and, 549, 550–551, 556, 561, 568	863, 866
BACKODUR, 61t	DISCONNECT and, 649 distributed data and, 85, 649, 654	asynchronous reads/writes and, 860–861
BACKUP SYSTEM, 457–461	environmental descriptor manager	buffer critical threshold in, 867
backups, 8, 31, 428	(EDM) pool and, 553	checkpoints and, CHKFREQ and,
COPY utility and, 428	EXPLAIN and, 565	861–863
full copy in, 428	fragmentation and, 553	creating, with ALTER
image copies in, 433–447. See also	inoperative packages and plans and,	BUFFERPOOL, 89
image copies	565	data manager threshold in, 867
incremental copy in, 428	invalidation and, 562	data sharing and, group, 487,
object level recovery with system	load modules and, 549	497–499, 497 , 510–511, 514
level backup, 460	migration testing, 566	design strategies for, virtual pool,
point of consistency and, 428–429	ownership of plans/packages, 566–567	868–869
SYSIBM.SYSCOPY table and, 433	package lists (PLIST) and, 563	DISPLAY BUFFERPOOL, 857
base tables. See permanent (base)	packages and, 552–554	DSNZPARM and, 859
tables	PATH bind option and, 686	dynamic SQL caching and, 874-875
basic row format, 158	plan execution authorization and,	efficiency ratios for, 874–875
Basic Sequential Access Method (BSAM)	VALIDATE for, 568	environmental descriptor manager
UNLOAD utility and, 362	plan to package ratio in, 553	(EDM) pool in, 872–874
batch processing, 8, 39	plans and, 552–553	first in first out (FIFO) processing
distributed data and, 653	precompile and, 549–551, 649	and, 860
DSNUTILB, utilities and, 74	preliminary steps in, 561	GETPAGE requests and, 857
monitoring performance of, 832	QUALIFER option in, 554	I/O requests and externalization in, 860–861
before triggers, 669, 673–674	REBIND PACKAGE, 686	immediate write threshold in, 868
BETWEEN, 255, 274, 275–276	REBIND PLAN, 686	installation/migration and, 59
BIGINT, 6, 153, 152t, 154, 170t	rebinding and, 556–561, 558–561t,	internal thresholds in, 867
BINARY, 152t, 156, 159, 170t	562–563	least recently used (LRU) queues
BIND, 53, 69t. See also binding	removing plans/packages in, with	in, 859–860
package execution authorization	FREE, 566	page externalization in, 861–863
and, 129	runtime reoptimization and, 823	page fixing and, 866
plan and package ownership with, 127	SQL communication area (SQLCA)	page size and, 858, 859 <i>t</i>
plan execution authorization and, 129	and, 551, 565	pages in, 858–859
trusted context objects and,	static, 553	parallelism and, VPPSEQT and, 866
ownership of, 128–129	triggers and, 679	performance issues and, 857–875
unqualified names and, 126–127	unqualified objects and, 567-568	queue management in, 859–860
BIND PACKAGE, 556–561, 566, 568,	versioning and, 555	random processing and, VPSEQT
650–651, 686	BINDNV, 61t	and, 863
BIND PLAN, 553, 568, 651–652, 686	BLKSIZE, 61 <i>t</i>	row identifier (RID), 869-871
BIND privilege, 113 <i>t</i>	BLOB, 152t, 156, 160–161, 170t, 688,	sequential least recently used
bind support, 22	BLOB, 704. See also large objects	(SLRU) queues in, 859
BINDADD privilege, 114t	(LOB)	sequential prefetch threshold in, 867
BINDAGENT, 114 <i>t</i> , 127	block fetch, 655	sequential processing and, VPSEQT
binding, 549–572, 550	BMPTOUT, 61 <i>t</i>	and, 863
automatic rebind and, 563-565	Boolean operators, 255–256, 333	sequential steal threshold in, 859

buffer pools, continued	functions and, 325	check-pending (CHKP) status and,
size of, 863, 870	casting, 688–690	179–180
sort pool in, 872	large objects (LOB) and, 708	modifying, using ALTER TABLE,
statistics on, monitoring, 870–871	castout, data sharing, 499–500, 499	180
stealing method in, VPSTEAL, 866	catalog, 39, 77, 78–83 <i>t</i> , 92, 97	triggers vs., 682–683, 682
synchronous reads/writes and, 860–861	access control and, 129, 130t	CHECK DATA utility, 404–405
table spaces and, 202, 202 <i>t</i>	auditing and, 136 consistency queries, 83–84	LOAD utility and, 356 recovery and, 456–457
tuning, using DISPLAY	conversion and, levels of, 55	remove CHKP status using, 180
BUFFERPOOL, 869	DROP definitions from, 150	CHECK INDEX, 404, 405–406, 425
virtual, 514, 859	DSN1CHKR utility, 413	CHECK LOB, 404, 406–407
writes in, deferred write threshold	filter factors and, 806–808	CHECK pending (CHKP) status,
(DWQT) and, 864-865	histogram statistics and, 808-810	179–180, 355
BUFFERPOOL parameter	image copies and, 445–446	CHECK utilities, 345, 403-407
indexes and, 216	Integrated Catalog Facility (ICF). See	checkpoint intervals, restarting DB2, 472
table spaces and, 201	Integrated Catalog Facility (ICF)	checkpoints, buffer pools, CHKFREQ,
BUILD phase	locking and, 723	861–863
LOAD utility and, 347	merging, using data sharing, 503-504	CHGDC, 61t
REORG utility and, 366	partitioned table statistics and, 810	CHKFREQ, 61 <i>t</i> , 861–863
built-in data types, 151–152, 152–153 <i>t</i>	production environment modeling	CICS. See Customer Information
built-in functions, 267	and, 403, 810, 811–812 <i>t</i>	Control System
user defined data types (UDTs) and, 690–691	recovery and, 461–463, 479	claim locks, 740–741, 740 <i>t</i> CLASST threshold, data sharing, 500
business intelligence (BI), 2, 6, 8, 23	REORG utility and, 387–388 REORG utility and, determining	CLI. See Command Line Interface
business intelligence (B1), 2, 6, 8, 23	when to use, 381–383	Client. See DB2 Client
	RUNSTATS utility and, reporting	client/server, 23
C	and performing updates to,	CLIST
C/C++, 4, 590, 612, 692	391–392, 397	DSNU CLIST command and, 73
CACHE, 187	statistics from, 806-812	installation, migration and, 56
cache structures, 487. See group buffer	tables in, 77, 78–83 <i>t</i>	CLOB, 152t, 156, 158–159, 160–161,
pools	text extenders, 714	169, 170t, 688, 704. See also large
cache table, 782, 783–784 <i>t</i>	triggers and, 682	objects (LOB)
cache, dynamic SQL, buffer pools,	user defined data types (UDTs)	clone tables, 144, 147–148, 213–215
874–875	and, 691	ADD CLONE option for, 213
CACHEDYN, 61t	user defined functions (UDFs)	creating, using ALTER TABLE, 213
CACHEPAC, 61t	and, 703	creating, using CREATE TABLE, 213
CACHERAC, 61t	CATALOG, 61 <i>t</i>	exchanging data between, using EXCHANGE, 214
CAF, 52 calculations, derived columns, 265–267	CDSSRDEF, 61 <i>t</i> CEEDUMP, 627	restrictions for use of, 214
CALL	CHANGELIMIT, 440–441	CLOSE, 538
binding and, 550–551	CHAR, 152 <i>t</i> , 156, 157, 169, 170 <i>t</i>	DB2 private protocol and, 640
stored procedures and, 610,	character sets, 228, 247	dynamic SQL and, 544
613–614, 619	coded character set identifier	CLOSE CURSOR, 537
utilities and, 74	(CCSID) and, 159, 169, 228	Cloudscape, 2, 5, 17, 18
Call Attach Facility (CAF), 44, 45, 50,	double byte character set (DBCS), 713	CLUSTERing indexes, 216, 217–218
538	single vs. multibyte, 158-159	clustering. See multidimensional data
CANCEL THREAD command, 70t	UCS-2 Universal Character Set, 169	clustering
Cartesian products and SELECT,	UTF-16 Unicode Transformation	CMSTAT and thread use, 658–659
256–258, 293	Format, 169	CMTSTAT, 61 <i>t</i>
CASCADE DELETE, 178, 681	UTF-8 Unicode Transformation	COROL 1 10 500 612 602
CASCADE REVOKE, 116	Format, 169	COBOL, 1, 10, 590, 612, 692 code pages, 169
cascading triggers, 669, 681 CASE expressions, 278, 295, 324–326,	CHARSET, 61 <i>t</i> check constraints, 175, 179, 182	Coded Character Set Identifier
337, 343	adding, with ADD CONSTRAINT,	(CCSID), 159, 169
END keyword for, 325	179	CODESET code, 169
2.12 10, 1014 101, 323	117	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5

coding, SQL advanced. See SQL	catalog and, 77	CHECK pending (CHKP) status in,
coherency controls, 493	distributed data and, 87, 641-642	355
collections	communications protocols, 86-87, 88,	check-pending (CHKP) status and,
binding and, 552, 554-555	640–641	179–180
privileges for privilege, 113t	comparison expressions, XPath, 328-330	deferred unique, 176
columns, 141, 143, 239-240, 244	comparison operators, SELECT, 255	DELETE rule for referential, 177, 178
change order of (permutation) using	COMPAT, 61t	dependent tables and, 177
SELECT, 254	compatibility mode, 57, 58	dropping, with DROP
derived, 265–267	conversion process and, 55	CONSTRAINT, 180
functions for, 267, 268–269	installation, migration and, 57	ENFORCE CONSTRAINTS and, 356
identity. See identity columns	composite key, 145, 220, 240	ENFORCE NO option in, 355
join, 259	compound predicates, 333	foreign keys in, 177
LOAD utility and, 356-357	COMPRESS, 205–206, 205	INSERT and, 279
maximums for, 181, 181 <i>t</i>	indexes and, 216, 217	INSERT rule for referential, 177, 178
projecting from rows, using	table spaces and, 202	keys in, 177, 182. See also keys
SELECT, 253–254	compression, 9	labeling, 179
renaming, 265	DSN1COMP utility, 413–414	LOAD utility and, 346, 353–355, 356
ROWID, 184, 356–357	indexes and, 216, 217	modifying, using ALTER TABLE,
updating, with cursor and FOR	large objects (LOB) and, 704, 720	180
UPDATE, 533-534	storage optimization and, 15, 16	NOT NULL and, 175, 178
Command Center, 29, 32	concurrency, 33, 493, 574, 575, 721,	parent keys in, 177
Command Editor, 34	746–748	primary keys in, 177
Command Line Interface (CLI), 21, 25	commit scope and, 722	referential, 175, 176–177, 176 , 182,
trusted contexts and, 108	database design for, 746–748	353–355
Command Line Processor (CLP), 18, 37	optimistic locking and, 601–602	table-check, vs. triggers, 682–683
commands, 39, 68–71, 92	serialization and, 722	triggers vs., 682–683
Authorized Program Facility (APF)	concurrent access and LOAD utility,	unique, 182, 247
and, 69	SHRLEVEL, 353	unique, 175–176, 177
consoles for, 69, 96	concurrent copy, 442–443	UPDATE and, 282
DB2 type, 69	CONDBAT, 61 <i>t</i>	UPDATE rule for referential, 177, 178
DSN type, 68, 69 <i>t</i>	conditional operations using SELECT,	views and, 289
DSN90221 message for, 71	255–256	Content Management (CM), 2, 3
DSN90231 message for, 71	conditional restart, CRESTART, 470–471	contention, locks/locking and, 496-497
issuing, consoles for, 69, 96	confidentiality, 100	CONTINUE, REORG utility and, 377
COMMENT, 652	• •	continuous performance monitoring,
COMMENT ON	Configuration Assistant, 22, 29, 37	with trace, 854
unqualified names and, 128	Connect, 659–661	Control Center, 22, 29, 31, 32, 33
unqualified objects and, 567–568	trace and, 855	utilities and, 73–74
COMMIT, 55, 538, 548, 574, 575,	CONNECT, 85, 647–649, 662	CONTSTOR, 61t
603, 606, 751	savepoints and, 577, 582	conversion, 55. See also installation
commit scope and, 722	Connect Unlimited, 18	and migration
declared temporary tables (DTTs)	Connection Concentrator, 12, 15	catalog levels and, 55
in, 586–588	connection pooling, 659–661	compatibility mode and, 57, 58
stored procedures and, 618, 620	connection trust attributes, 110, 110 <i>t</i>	DISPLAY GROUP command, 58–59
two-phase commit and, 652-654	connectivity, 1, 6, 21	DSNZPARM parameters for,
commit process, distributed data, 85–86	trusted connections and, 108	59–60, 60–68 <i>t</i>
commit scope, 722	consistency queries, catalog, 83–84	enable-new-function mode and, 58
common quiesce point. See point of	consistency, point of. See point of	new-function mode and, 58
consistency	consistency	COORDNTR, 61t
common table expressions, 295	consistent state, 345	COPACT, 61t
SELECT and, 277, 306–307	consoles for starting DB2 commands, 69	copies, 7. See also backups
communications	constraints, 175–183, 244	DSN1COPY utility, 414–415
catalog and, 77	check, 175, 179, 182	inline, LOAD utility, 357–358
data sharing and, 483	CHECK DATA utility and, to	COPY parameter, for indexes, 216
Communications Database (CDB)	remove CHKP status, 180	COPY privilege, 113 <i>t</i>

COPY utility, 428, 439–440 auditing and, 133 CHANGELIMIT feature of, 440–441 image copies and, 434–435 SHRLEVEL, 441 table spaces and, 190 using TEMPLATE statement, 76 COPYTOCOPY utility, 436, 450 correlated reference/predicate, 296, 343 correlated subqueries, 298 correlation names, 262–263 COUNT function, 272 couple data sets, 487 Coupling Facility (CF), 484–487, 485, 509 Coupling Facility Control Code (CFCC), 484 Coupling Facility Resource Management (CFRM) policy, 488, 488, 499 CREATE, 111, 148–149, 243, 244, 652 auditing and, 136 ownership of objects and implicit privileges, 122–129, 126t qualified objects and, 124–125 table creation using, 144 trusted context objects and, 125 unqualified names and, 128 unqualified objects and, 122–124, 567–568	materialized query tables (MQTs) and, 211–212 null values and NOT NULL in, 167–168 partitioned table spaces and, 195–196 string data encoding schemes and (ASCII, EBCDIC, etc.), 161–162 CREATE TABLESPACE, 146, 192, 200–202, 357 COMPRESS clause, 205–206 large object (LOB) options in, 160 PRIQTY and SECQTY clauses, 204–205 universal table spaces and, 197–198 CREATE TRIGGER, 679–676 NEXTVAL/PREVVAL and, 188 CREATE TYPE, 687–688 CREATE VIEW, 208–209, 251, 254 common table expressions and, 306–307 CREATEALIAS privilege, 114t created temporary tables (CCT), 583–586, 583 CREATEDBC privilege, 115t CREATES privilege, 111t CREATETAB privilege, 113t CREATETMTAB privilege, 111t CREATETTAB privilege, 111t CREATETS privilege, 111t	FETCH and, 535–536, 540, 588–592 holding, WITH HOLD, 538–539, 548 LOAD utility and, 361–362 multi-row operations using, 590–592 nonscrollable, 539–540 OPENing, 534–535 positioned deletes and, 537, 548 positioned updates and, 536–537 scrollable, 539–543 sensitivity of, 540–541, 541 <i>t</i> sequence objects, NEXTVAL and, 598 sequence objects, PREVVAL and, 599 Skeleton Cursor Table (SKCT) and, 723 SQL and, 532–535 stability of, 572, 733–734, 734 <i>t</i> types of, 539–540, 539 <i>t</i> Customer Information Control System (CICS), 6, 8, 39, 40, 45, 46, 47, 52 access control and, 103–104, 136 attachment facility for, 44, 46 binding and, 553 command issuance from, 69 COMMIT/ROLLBACK and, 575 data sharing and, 483 distributed data and, 652, 653, 655 open transaction environment (OTE) and, 854 security and, 103–104, 136
CREATE AUXILIARY TABLE, 144 CREATE DATABASE, 228, 239 CREATE DISTINCT, 689–690, 707–708	CRESTART, 470–471 Cross System Coupling Facility (XCF), 487, 490–491, 490	stored procedures and, 611, 612 trace and, 854, 855 Customer Relationship Management
CREATE FUNCTION, 692–695, 696, 700 NEXTVAL/PREVVAL and, 188	Cross System Extended Services (XES), 489, 490 cross-invalidation, 497	(CRM), 3, 6, 14, 23 CYCLE, 187
CREATE GLOBAL TEMPORARY TABLE, 144 CREATE IN privilege, 113t CREATE INDEX, 214–216, 357, 445 CREATE INDEX PARTITIONED, 197 CREATE INDEX VALUES, 197 CREATE PROCEDURE, 614, 616, 622, 623, 629, 630 NEXTVAL/PREVVAL and, 188 CREATE SCHEMA, 148 CREATE SEQUENCE, 188 CREATE STOGROUP, 229 CREATE TABLE, 144, 180–183, 240, 251, 254 basic row format and, 158 clone tables and, 213 identity columns and, 171–174, 172–173t LIKE statement and, 184–185	CTHREAD, 61 <i>t</i> cube modeling, 19 Cube Views. <i>See</i> OLAP Acceleration CURRENT PACKAGESET register, binding and, 555 CURRENT PATH special register, 686 CURRENT SCHEMA special register, 687 current SQL ID, SET CURRENT, 107 CURRENTDATA, 736–738 cursor stability (CS) isolation level, 733–734, 734 <i>t</i> cursors, 532–535 CLOSEing, 537 column update using FOR UPDATE and, 533–534 DECLARE, 533 dynamic scrollable, 542–543 dynamic, 548	DASD recovery and, 460, 509 utilities and, 75–76 data anomaly. See anomalies data change tables, 277, 295, 307–309 Data Communications Resource Manager (DCRM), 43 data conditioning, triggers and, 668 Data Control Language (DCL), 77, 92, 116, 142 Data Definition Language (DDL), 77, 92, 142, 243, 881 Data Facility Storage Management System (DFSMS) concurrent copy, 442–443 data integrity, 99 data maintenance, 364

status monitoring services in XCF

structure duplexing in, 511 structures for, 487

and, 491

data manager, 43	Coupling Facility Control Code
data manager threshold, 867	(CFCC) and, 484
data manipulation, 249–293	Coupling Facility Resource
Data Manipulation Language (DML) in, 249, 289	Management (CFRM) policy in, 488, 488 , 499
DELETE, 250, 278, 285–286, 289	Cross System Coupling Facility
DROP, 284–285	(XCF) and, 487, 490–491, 490
INSERT, 250, 278–282, 289	Cross System Extended Services
MERGE, 250, 278, 284, 289	(XES) and, 489, 490
privileges and, 250	cross-invalidation and, 497
retrieving data. See SELECT	current environment evaluation
SELECT, 250–278, 289. See also	using, 503
SELECT	DASD and, 509
UPDATE, 250, 278, 282-284, 289	Distributed Data Facility (DDF)
views and, 287–289	and, 481
Data Manipulation Language (DML), 140, 142, 249, 289	distributed processing and, 505–506 DRDA and, 483, 507
data mining, 19, 20, 23	group buffer pool dependent data
data models, 230-231	and, 493
data only copies, 458-459	group buffer pools and, 487,
Data Partitioned Secondary Index	497–499, 497 , 510–511, 514
(DPSI), 223–224, 223 , 224 , 449, 747	group services in XCF and, 491
data partitioned tables, 14	groups for, 481, 644
Data Partitioning Feature, 32	image copies and, 514
data recovery, 427	integrity and, 492–493
data set protection, 105	inter DB2 read/write (R/W) interest
data sets, 428	and, 493
archive, 430 Bootstrap Data Sets (BSDS) in,	Internal Coupling Facility (ICF) for, 484, 511
431–432, 507, 644	Internal Resource Lock Manager
couple (data sharing), 487	(IRLM) and, 487, 495, 496
image copies and, 439-440	links in, 489
log, 430	lock structure in, 486, 510
recovery and, 449	locking in, 493-497, 493, 514. See
table spaces and, 191	also locks/locking
data sharing, 8, 481–514, 482. See also	logging and, 508, 508
distributed data	members of data sharing groups
affinity processing and, 504–505	and, 481
application analysis using, 502	migration and, 503
applications amenable to, 501–505	MVS and, 483, 489
Automatic Restart Manager (ARM)	naming conventions and, 504
in, 489	Online Transaction Processing
benefits of, 482–483	(OLTP) and, 505
Bootstrap Data Sets (BSDS) in, 507	Parallel Sysplex and, 487
castout in, 499–500, 499	performance and, 500–501
catalog merging and, 503–504	policies for, 487
CICS and, 483	processing costs of, 501
CLASST threshold and, 500	recovery and, 507–511
coherency controls in, 493	Shared Communications Area (SCA)
communications and, 483	and, 486, 507, 509, 510, 511
concurrency controls in, 493 couple data sets and, 487	Shared Data Architecture (SDA) and, 483
Coupling Facility (CF) for,	shared data in, 491-492, 492
484–487, 485 , 509	signaling services in XCF and, 491

Sysplex Failure Management (SFM) policy in, 488, 489 Sysplex query parallelism and, 506–507, **506**, 824–827 Sysplex Timer and, 489, 490 virtual buffer pools and, 514 VTAM and, 505-506 workload management and, 504-505 XES contention and, 497 Data Source Administrator, 21 data sources, 21 data space manager, 43 data statistics with RUNSTATS. See RUNSTATS utility; statistics Data Stream Engine, 16, 17 Data System Control Facility (DSCF), 42 data types, 6, 151-175, 186, 244, 720 basic row format and, 158 BIGINT, 152t, 153, 154, 170t BINARY, 152t, 156, 159, 170t BLOB, 152t, 156, 160-161, 170t built in vs. user defined, 151-152, 152-153t casting and, 688-690 CHAR, 152t, 156, 157, 169, 170t choosing, 170, 170t CLOB, 152t, 156, 158-159, 160-161, 169, 170t Coded Character Set Identifier (CCSID) and, 159, 169 CREATE DISTINCT and, 707-708 CREATE DISTINCT TYPE and, 689-690 CREATE TYPE and, 687-688 DATE, 153t, 162, 164–165, 164t date/time, 152, 162-166 DBCLOB, 152t, 156, 159, 169, 170t DEC, 152t, 153, 155, 170t DECFLOAT, 152t, 153, 155-156, 170t DECIMAL/DEC/NUMERIC, 152t, 153, 155, 170*t* distinct types and, 167 DOUBLE/FLOAT, 152t, 153, 155, 170t encoding schemes for (ASCII, etc.), 161 - 162FLOAT, 152t, 153, 155, 170t FOR BIT DATA clause and, 159 GRAPHIC, 152t, 156, 159, 169

data types, continued	attributes and, 232, 239	tables in. See tables
identity columns and, 170–174,	bottom up vs. top down approach to	views in. See views
172–173 <i>t</i> , 593	design of, 231	WORKFILE, 227–228
indirect reference rows and, 157	character sets for, 228	DATE, 61 <i>t</i> , 153 <i>t</i> , 162, 164–165, 164 <i>t</i>
INTEGER, 152 <i>t</i> , 153, 154, 170 <i>t</i>	communications, for distributed	scalar functions for, 164–165
large objects (LOB) and, 160, 704,	data, 87	date/time data types, 152, 162–166
707–708	concurrency of, 746–748	labeled duration and, 283, 377–378
LONG VARCHAR, 157, 169	creating objects in, with CREATE, 148–149	DAY 164
LONG VARGRAPHIC, 157, 169	creating, using CREATE	DAY, 164
Multibyte Character Set (MBCS) and, 158–159	DATABASE, 228, 239	DAYOFMONTH, 164 DAYOFWEEK, 164
null values and, 167–168	Data Definition Language (DDL)	DAYOFWEEK, 104 DAYOFWEEK ISO, 164
NUMERIC, 152, 152 <i>t</i> , 153–156, 170 <i>t</i>	and, 881	DAYOFYEAR, 164
precision in, 153	data model for, 230–231	DAYS, 164
REAL, 152 <i>t</i> , 153, 155, 170 <i>t</i>	data structures in, 142, 143	DB2, 1–37
reordered row format and, 158	data types for. See data types	address spaces in, 40–42, 41
row change timestamps and, 174–175	DECLARE and, 149–150	buffer pools in, 88–89
ROWID, 153 <i>t</i> , 166	definition of a, 147	catalog in, 77, 78–83 <i>t</i> , 92, 97,
Single Byte Character Set (SBCS)	design and implementation of,	387–388, 397, 445–446,
and, 158–159	230–243, 230	461–463, 479
SMALLINT, 152t, 153, 154, 170t	DROP and, 150	commands in, 68-71
string, 152, 156–162	entities in, 231	DB2 Interactive (DB2I) and, 52-53,
strong typing and, 167	Entity Relationship Diagrams	53 , 54 , 92
termination characters and, 158	(ERD) for, 238, 881, 882	directory for, 84, 84 <i>t</i> , 92, 387–388,
TIME, 153 <i>t</i> , 162, 165, 165 <i>t</i>	hierarchy of data structures/objects	445–446, 461–463, 479
TIMESTAMP, 162, 163	in, 142, 143	distributed data and, 85–88
TIMESTAMP, 153 <i>t</i> , 165–166	index spaces in. See index spaces	Environmental Descriptor Manager
Unicode support in, 168–169	indexes in. See indexes	(EDM) pools for, 89–91
updating character fields and, 158	logical design of, 230	interfaces for, 52–55
user defined (UDTs), 151–152, 167,	modifying, using ALTER	Parallel Sysplex and, 52
170t, 687–688	DATABASE, 228	Row Identifier (RID) pool in, 90
VARBINARY, 152t, 156, 160, 170t	monitoring of, 831–834	sort pools in, 90 SQL Processing Using File Input
VARCHAR, 152 <i>t</i> , 156, 157–158, 169, 170 <i>t</i>	normalization in, 232–235, 233 , 234 , 235	(SPUFI) and, 52, 54–55, 55 , 92
VARGRAPHIC, 152 <i>t</i> , 156, 157, 169	objects in, 141. See also specific	Storage Management Subsystem
XML, 153 <i>t</i> , 166–167, 170 <i>t</i>	objects`	(DFSMS) and, 52
Database Access Threads (DBATs), 658	partitioning of, 16	subsystem pools in, 88–91
Database Administrator (DBA), 10	physical design of, 237	utilities in, 72–77
database copy pool, FROMDUMP,	privileges for privilege, 113–114 <i>t</i>	DB2 9 Express, 4, 5, 6, 11, 12, 13
450, 460	production environment modeling	DB2 9 for Linux, Unix, Windows
Database Descriptor (DBD), 723	and, 403, 810, 811–812 <i>t</i>	(LUW), 4, 11
partitioned table spaces and, 194	relationships in, 231	DB2 9 for z/OS, 3
Database Object Identifier (DBID), 432	removing, using DROP	DB2 Client, 21, 22, 23, 25, 28, 29
Database Partitioning Feature, 14, 16	DATABASE, 228	DB2 command, 69t
Database Request Module (DBRM),	rows and columns in, 141, 143. See	DB2 Connect, 24, 23, 32
549, 550–551, 556, 561, 568, 756	also rows; columns	DB2 Connect Unlimited Edition for
user defined functions (UDFs) and,	sample implementation of, 238,	zSeries, 5
692	881–889	DB2 Data Warehouse, 19, 20
Database Services Address Space	schemas and. See schemas	DB2 Developer Workbench, 25
(DSAS), 41, 42–43, 92	sequence objects and, 148, 187–189	DB2 Enterprise, 5, 14, 15, 16, 17, 18
databases, 31, 227–228, 230–243, 244.	SQL to create/manage objects in,	DB2 Enterprise Developer, 5, 18, 19
See also data manipulation aliases in, 142, 144	141, 148 storage groups in 142, 147	DB2 Everyplace 9, 5, 17, 18 DB2 Express C 9, 4, 13
ALTER and, 150–151	storage groups in, 142, 147 synonyms in, 142, 144	DB2 Express C 9, 4, 13 DB2 for i5/OS, 4, 9, 10, 11
anomalies in, 235–236, 236 , 237	table spaces in. See table spaces	DB2 for z/OS, 6, 7, 8, 9, 37, 40
anomanes in, 255–250, 250 , 25 7	more spaces in. Dee table spaces	202 101 2/03, 0, 1, 0, 3, 37, 40

DB2 Interactive (DB2I), 49, 52–53, 53 , 54 , 92	DECLARE GLOBAL TEMPORARY TABLE, 182, 251
	declared tables. <i>See</i> temporary
command issuance from, 69	(declared/global) tables
DSN commands and, 68, 69t	Declared Temporary Table (DTT),
utilities and, interface for, 72, 73 DB2 Personal, 5, 18	586–588, 647
DB2 private protocol, 640, 662	decomposition or shredding, XML, 332
DB2 Universal Driver, 25	DEF_DECFLOAT_ROUND_MODE,
DB2 Workgroup, 6, 13, 18	62 <i>t</i>
DB2 Workgroup 9, 5	default subsystem name (DSN), 49
DB2_SECURE_VAR function, 131	DEFAULT/ WITH DEFAULT, 280
DB2I. See DB2 Interactive	DEFERRED, materialized query tables
DB2IMAGE extender, 710	(MQTs) and, 212
DB2SUPLD, 61t	deferred unique constraints, 176
DBA analysis of need for REORG,	DEFINE parameter
386–387	indexes and, 216, 217
DBACRVW, 61t	table spaces and, 201
DBADM, 117, 121t, 122, 136	DEFLANG, 62t
DROP command and, 284	DEFLTID, 62t
performing tasks on behalf of	DELETE, 145, 208–209, 250, 251,
another with, 111–112	278, 285–286, 289, 606, 652. <i>See</i>
DBCLOB, 152t, 156, 159, 169, 170t, 688,	also mass delete
704. See also large objects (LOB)	all rows, 286
DBCTRL, 121 <i>t</i> , 117, 136, 140	CASCADE DELETE and, 681
DBD01 directory table, 84t	data change tables and, 307–309
DBINFO clause, stored procedures	DB2 private protocol and, 640
and, 616, 617 <i>t</i>	DSNTIAUL program vs., 346, 362
DBM1, 44, 45, 96	dynamic SQL and, 544
DBMAINT, 117, 121 <i>t</i>	mass DELETE, 190, 285 multi-row operations using, 591–592
DBPROTCL, 61t	NEXTVAL/PREVVAL and, 188
DCLGEN and DECLARE, 53, 69t,	performance issues and. See
520–521, 521– 522	performance and tuning
DD cards, utilities and, 75	positioned deletes and, 285, 537, 548
DDF ALIAS, 644	privileges for, 113 <i>t</i> , 285
DDF, 61 <i>t</i>	REORG DISCARD vs., 346, 362,
DEADLINE, REORG utility and,	379–380
377–378	REORG UNLOAD EXTERNAL
deadlocks, 575, 741–744, 743t	vs., 346, 362, 379–380
DEALLCT, 61t	REORG utility vs., 364
DEBUGSESSION, 114t, 140	searched deletes and, 285
DEC data type, 152t, 153, 155, 170t	SELECT and, 286
DECARTH, 62t	triggers and, 667, 669, 720
DECDIV3, 62t	TRUNCATE and, 285, 286
DECFLOAT data type, 6, 152t, 153,	UNLOAD utility vs., 346
155–156, 170 <i>t</i>	views and, 287, 288
DECIMAL data type, 62t, 152t, 155,	WHERE clause and, 286
153, 170 <i>t</i>	DELETE rule for referential
Declarations Generator (DCLGEN),	constraints, 177, 178
53, 69 <i>t</i> , 520–521, 521– 522	DELIM, 62t
declarative referential integrity, 243	delimited loads and LOAD utility, 353
DECLARE, 149-150, 516-518, 520	delimited UNLOAD, 364
dynamic SQL and, 544	denial of service attacks, 105
DECLARE CURSOR, 533	denormalization and joins, 323
SELECT and, 251	dependent tables, 177, 571

derived columns, 265-267 DESCRIBE, dynamic SQL and, 544 DESCRIBE PROCEDURE, 619 DESCSTAT, 62t Design Advisor, 32, 37 Design Studio, 19 detailed cost table, 793, 794–796t detailed performance monitoring, 855-856 deterministic functions, 697 Developer Workbench, 25, 26 Developer Workbench, 632-633 Development Center. See Developer Workbench DFSMS, utilities and, 75 DIAGNOSE utility, 411, 425 diagnostics CEEDUMP and, 627 GET DIAGNOSTICS, 528-532, 529**–532**, 548 workload manager (WLM) and, 627 dimension tables, 774 direct row access, 166 directories and subdirectories, 39 directory, 84, 84t, 92 DSN1CHKR utility, 413, 425 image copies and, 445-446 recovery and, 461-463, 479 REORG utility and, 387-388 DISABSCL, 62t disaster recovery, 426, 463-466. See also recovery/RECOVER and backup DISCARD phase, of LOAD utility, 348 DISCARD, 379-380 DISCONNECT, 649 DISPLAY, performance issues and, 856-857 DISPLAY ARCHIVE, 70t DISPLAY BUFFERPOOL, 70t, 857, 869 DISPLAY DATABASE, 70t, 195 restrictive/advisory states and, 417-418, 419-422t DISPLAY DATABASE LOCKS, 748, 750, 754 DISPLAY DDF, 70t, 643, 665 DISPLAY FUNCTION, 701 DISPLAY FUNCTION SPECIFIC, 70t DISPLAY GROUP, 58-59, 70t DISPLAY GROUPBUFFER, 70t DISPLAY GROUPBUFFERPOOL, 498 DISPLAY LOCATION, 70t DISPLAY LOG, 70t DISPLAY privilege, 115t

DISPLAY PROCEDURE, 70t, 624 DISPLAY PROFILE, 70t

LOAD utility and, 284 partitioned table spaces and, 196 unqualified names and, 128 unqualified objects and, 567–568 DROP CONSTRAINT, 180 DROP DATABASE, 228, 284 DROP INDEX, 227 DROP privilege, 113t DROP PROCEDURE, 622–623 DROP SEQUENCE, 189 DROP STOGROUP, 229 DROP TABLE, 187, 284 REORG utility and, 367 DROP TABLESPACE, 208, 284 DROP TRIGGER, 684–685 DROP VIEW, 210 DROPIN privilege, 115t DSCVI, 62t DSHARE, 62t DSMAX, 62t DSN command processor, 49, 92 DSN commands, 68, 69t DSN_DETCOST_TABLE, 793, 794–796t DSN_FILTER_TABLE, 792, 793t DSN_FUNCTION_TABLE, 781, 782t DSN_GROUP_TABLE (parallel group), 789, 789–791t DSN_PGRANGE_TABLE, 799, 799t DSN_PREDICATE_TABLE, 799, 799t DSN_PREDICATE_TABLE, 790, 801t DSN_DRASK_TABLE, 791, 791–792t DSN_QUERY_TABLE, 800, 801t DSN_SORT_TABLE, 796, 796–797t DSN_SORTKEY_VALUE, 797, 798–799t DSN_STATEMENT_CACHE_TABL E, 782, 783–784t DSN_STRUCT_TABLE, 787, 788–789t DSN_VIEWREF_TABLE, 800, 800t DSN_ICHKR utility, 413, 425 auditing and, 133 DSN1COMP utility, 413–414 DSN1COPY utility, 413–414 DSN1LOGP utility, 415	DSN90221 message, command processing, 71 DSN90231 message, command processing, 71 DSNACCOR stored procedure, 402 DSNJLOGF (preformat active log) utility, 412 DSNJU003 (change log inventory), 412 DSNJU004 (print log map), 412–413, 432 DSNR resource class, 101 DSNTIAUL program, 346, 362, 422 Installation Verification Procedure (IVP) and, 362 DSNTPSMP stored procedure, 631–632 DSNU CLIST command, 73 DSNUPROC procedure, utilities and, 73 DSNUTILB, 74 DSNUTILB, 74 DSNUTILU, 75 DSNZPARM, 40, 59–60, 60–68t, 92, 96 access plans and, 774–777 buffer pools and, 859 distributed data and, 661–662, 665 image copies and, 443 locking and, 738, 739t, 754 logging and, 430, 431 recovery and, 464, 466 restarting DB2 and, 472 DSNZPARM STATSINST, 401–402 DSQLDELI, 62t DSSIZE parameter partitioned table spaces and, 194 table spaces and, 200, 203, 203t DSSTIME, 62t dual indexes, 713 dump, DSN1SDMP (IFC selective dump) utility, 416 DUMP/DUMPONLY, 460 duplexing, structural (in data sharing), 511 duration, labeled, 283 dynamic cursors, 548 Dynamic Logical Partitioning, 10 dynamic prefetch, 769 dynamic SQL, 515, 543–545, 548, 571,	e-commerce, 23 EBCDIC, 161–162, 228 Eclipse, 25 EDMBFIT, 62t EDMDBDC, 62t EDMPOOL, 62t EDMPOOL, 62t EDMPOOL, 62t electronic commerce, 3 Embedded Linux, 5, 17 ENABLE SERVER, 714 enable-new-function mode, 55, 57, 58, 97 encryption, 7, 9 Integrated Cryptographic Service Facility (ICSF) and, 105 ENCRYPTION, 110t END command, 68, 69t END keyword, 325 END-EXEC, 516 ENFORCE phase, of LOAD utility, 348 ENSCHEME, 62t Enterprise JavaBeans (EJB), 632 Enterprise Resource Planning (ERP), 3, 6, 8, 14, 23 Enterprise. See DB2 Enterprise 9 entities, 231 Entity Relationship Diagrams (ERD), 238, 881, 882 environment analysis, data sharing and, 503 Environmental Descriptor Manager (EDM), 59, 89–91, 553, 872–874 EPOC, 17 equal-to operator, 255 equal unique index, 819–820 escalation of locks, 744–745, 745 EVALUNC, 62t Event Analyzer, 29 event classes, trace, 134t Everyplace. See DB2 Everyplace 9 EXCEPT/EXCEPT ALL, 251, 303, 343 exception tables, recovery and, 457 excepts, 277, 295, 303, 343 EXCHANGE, 148 clone tables and, 214
• •	-	exception tables, recovery and, 457
,		* ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '
	•	
DSN1MSTR, 42, 46	756, 821, 874–875 dynamic SQL cache, removing	exclusive (X) lock, 728–731, 729 <i>t</i> , 736 EXEC card, 51
DSN1PRNT utility, 133, 415–416, 415		
DSN1SDMP (IFC selective dump)	statements with RUNSTATS, 398–399	EXEC SQL, 516
utility, 416 DSN1SPAS, 44	598–599 DYNRULES, 62 <i>t</i>	EXECUTE, 140, 518 dynamic SQL and, 544
DUNIUI AU, TT	DITAROLES, 02t	dynamic SQL and, 544

(OLTP) and, 804-805

EXECUTE ON FUNCTION privilege, 115t EXECUTE ON PROCEDURE privilege, 115t EXECUTE privilege, 113t executing statements in SQL, 535–537 execution validation, SQL, 524–532 existence checking, FETCH and, using FIRST clause, 590 existence subqueries, 296, 297, 299 EXISTS, 296, 297, 298, 299 exit routines, 51 authorization control and, 102 EXPLAIN, 29, 30, 31, 756–758, 758–765t access control and, 804–805 access paths and, 765–803. See also access paths application access and, 804–805 binding and, 565 DSN_DETCOST_TABLE in, 793, 794–796t DSN_FILTER_TABLE in, 792, 793t DSN_FILTER_TABLE (parallel group) in, 789, 789–791t DSN_PGRANGE_TABLE in, 799, 799t DSN_PREDICATE TABLE in,	Optimization Service Center and, 758, 801–803 optional tables populated by, 779–801, 780–801t partitioned table statistics and, 810 PLAN_TABLE in, 757–758, 758–765t production environment modeling using, 810 statement cache table and, 757 statement tables in, 757 subqueries and, 778–779, 778t, 779t using output from, 803 Explicit Hierarchical Locking (EHL), 493–494 explicit joins, 310 explicit privileges, 112 Express. See DB2 9 Express expressions, indexes and, 221–222 Extended Recovery Facility (XRF), 47 extenders, 10, 25, 27, 708–716 audio, 715–716 catalog view for text extenders in, 714 DB2IMAGE, 710 ENABLE SERVER and, 714 enabling, 710–711 image, 715–716 indexing text extenders in, 712–714	fact table, 774 fallback recovery, 451–452 false lock contention, 496–497 Fast Log Apply (FLA) feature, FLA buffers, 453 FASTSWITCH keyword, REORG utility and, 373 federated databases, 13, 17, 24 FENCED stored procedures, 631, 636 FETCH, 282, 535–537, 540, 588–592 block fetch and, 655 DB2 private protocol and, 640 Distributed Data Facility (DDF) and, 591–592 dynamic prefetch and, 769 dynamic SQL and, 544 existence checking with, using FIRST clause, 590 FIRST clause for, 251, 295, 323–324, 589, 590, 603 multi-row operations using, 590–592, 607 OPTIMIZE FOR clause for, 589, 657–658 prefetching, PREFETCH and, 769 sequence objects, NEXTVAL and, 598 sequence objects, PREVVAL and, 599 Universal Driver and, 591
785, 785–787 <i>t</i>	large objects (LOB) and, 708-710	FETCH FIRST, 251, 295, 323–324, 589, 590, 603
DSN_PTASK_TABLE in, 791, 791–792 <i>t</i>	metadata tables and, 708 Software Developers Kit (SDK)	filter expressions, XPath and, 328–330 filter factors, 806–808
DSN_QUERY_TABLE in, 800, 801t	and, 710 text, 711–714	filter table, 792, 793 <i>t</i> filtering, 295, 332–335, 335–337 <i>t</i>
DSN_SORT_TABLE in, 796, 796–797 <i>t</i>	video, 715–716 XML, 716	SELECT and, 251 first-in first-out (FIFO) processing,
DSN_SORTKEY_VALUE in, 797, 798–799 <i>t</i>	Extensible Markup Language. See XML	buffer pools and, 860 First Steps, 22
DSN_STATEMENT_CACHE_TABLE in, 782, 783–784 <i>t</i>	extensions, object-related. See object-relational extensions	FIRSTKEYCARD, 392–393 FLA buffers, 453
DSN_STATEMENT_TABLE in, 779–780, 780–781 <i>t</i>	EXTERNAL, stored procedures and,	FLOAT, 152 <i>t</i> , 153, 155, 170 <i>t</i> FOR BIT DATA clause, 159
DSN_STRUCT_TABLE in, 787, 788–789 <i>t</i>	631–632 external UDFs, 692–694	FORCE, 460 FORCE mode, restarting DB2 and, 470
DSN_VIEWREF_TABLE in, 800, 800t	externalization buffer pools and, 860–861	foreign keys, 177, 186, 220, 241, 243 FORMAT DELIMITED, LOAD utility
filter factors and, 806–808	page, 861	and, 353
function tables in, 757	externalizing statistics, using	fragmentation, binding and, 553
histogram statistics and, 808–810	DSNZPARM STATSINST,	FREE, 53, 69 <i>t</i> , 566
indexes and, 803–804	401–402 EXTRAGO 62t	free space, LOAD utility and, 357
locking and, 748, 749	EXTRAEQ, 62 <i>t</i> EXTRASRV, 62 <i>t</i>	FREEPAGE
Online Transaction Processing	LATRASKY, 021	indexes and, 216, 226

EXTSEC, 62t

LOAD utility and, 357

table spaces and, 201, 203-204	Declared Temporary Tables (DTTs)	histogram statistics, 396–397, 808–810
frequency distribution stats,	in, 586–588, 647	historical statistics, HISTORY, 399–400
RUNSTATS utility and, 393-396	Distributed Data Facility (DDF)	homogeneous federation, 13, 17
FROM, 143, 253, 257, 261, 269, 293, 306	and, 583	HOPAUTH, $63t$
joins and, 309, 310, 312, 318	Information Management System	host variables/host structures,
read only views and, 210	(IMS) and, 583	518-520, 571
subqueries and, 299	locks and, 583	HOUR, 165
views and, 287	Recoverable Resource Services	HP-UX, 2, 23
FROMDUMP, 450, 460	(RRS) and, 583	hybrid joins, METHOD, 773–774
	temporary tables, 583–588, 636	
full copies, 428, 437–439, 458–459	Units Of Work (UOW) in, 583	
full outer joins, 318–321	VSAM and, 584	1
FULLKEYCARD, 392–393	governing, predictive vs. reactive, 834	I/O
fullselects, 251, 323–324	Governor, 13, 834	asynchronous reads/writes and,
function table, 757, 781, 782 <i>t</i>	GRANT, 102, 106, 111, 116, 137, 652	860–861
functions	authorities and, 121–122	buffer pools and, 860–861
built-in, 267		
CASE expressions in, 325	unqualified names and, 128	parallelism and, 824–827
column, 267, 268-269	unqualified objects and, 567–568	synchronous reads/writes and,
deterministic vs. nondeterministic, 697	WITH GRANT OPTION and, 122	860–861
row, 267, 268	GRANT ALL privilege, 113t	writes in, Deferred Write Threshold
scalar, 267, 268, 693	GRAPHIC, 152 <i>t</i> , 156, 159, 169	(DWQT) and, 864–865
SQL, 267–269	greater than/greater than equal to	i5/OS, 2, 21
string, 268	operators, 255	DB2 for, 4, 9, 10, 11
substring (SUBSTR), 268	group buffer pool dependent data, 493	IBM Data Encryption, 9
table, 695–696	group buffer pools, 487, 497–499, 497 ,	IBM DB2 9 for z/OS Installation
user-defined, 267. See also	510–511, 514	Guide, 56
user-defined functions (UDFs)	GROUP BY, 250, 251, 269–271	IBM DB2 9 for z/OS Utility Guide and
and, 691–703	functions using, 267	Reference 76
fuzzy copies, 441	read only views and, 210	IDBACK, $63t$
ruzzy copies, 441	views and, 287	identity columns, 170–174, 172–173 <i>t</i> ,
	group manager, 42	184, 593–602, 603
G	group services in XCF, 491	GENERATED options and, 593
GBPCACHE parameter	groups, data sharing, 481, 644	INSERT and, 594–595
*	GRPNAME, $63t$	SELECT and, 595
indexes and, 216		sequence objects and,
table spaces and, 201		NEXT/PREVIOUS VALUE
GCCSID, $63t$	Н	and, 596–600
general command processor, 42	Handheld PC, 18	sequence objects vs., 600, 600t
Generalized Trace Facility (GTF), 835	HAVING, 251, 271, 333	UPDATE and, 594-595
GENERATED options, identity	host variables/host structures in,	values from, using SELECT, 595
columns, 593	518-520	IDFORE, 63t
geodetic data management, 16	joins and, 320–321	idle agent pool, 661
Geodetic Extender, 27	predicates and, 333	IDTHTOIN, 63t
GET DIAGNOSTICS, 528–532,	read only views and, 210	IDXBPOOL, 63t
529–532 <i>t</i> , 548	views and, 287	if-then-else, 295
GET INDEX STATUS, 714	Health Center, 29, 32	IFCID 16
global lock contention, 496-497	held cursors, 538-539, 548	triggers and, 681–682
Global Lock Manager (GLM), 496	Hewlett-Packard, 2	IFI, command issuance from, 69
global locks, 494	hierarchy of data structures/objects,	IMAGCOPY privilege, 114t
global tables. See temporary	142, 143	image copies, 427, 433–447, 464–465,
(declared/global) tables	Hierarchical Storage Management	479
global temporary tables, 583, 636	(HSM), 457, 458	access during process of, 441
global transactions, 583–588	high availability, 8, 12, 13	catalog and, 445-446
Created Temporary Tables (CTTs)	High Availability Disaster Recovery	CHANGELIMIT feature of,
and, 583–586	(HADR), 12	440–441

	1.055	1 11 (7.07) 224
image copies, continued	trace and, 855	large object (LOB), 224
COPY utility and, 434–435, 439–440	transaction management, 6, 39, 40	large tables and, 8
COPYTOCOPY utility and, 436	IMSplexes, 34	LEAFNEAR/LEAFFAR and, 386
Data Facility Storage Management	IN, 255, 277, 296	linguistic, 713
System (DFSMS) concurrent	joins and, 313	LOAD utility and, 347
copy and, 442-443	IN list index scan, 817–818	LOAD utility and, parallel builds
data sets an, 439–440	IN list subqueries, 296, 297	and, UNIQUE WHERE NOT
data sharing and, 514	in-use pages, in buffer pool, 858	NULL and, 360
directory and, 445–446	inactive threads, 658	locking and, 723
DSNZPARM and, 443	INCREMENT BY, 187	matching vs. nonmatching,
dual, 434–435	incremental copies, 428, 437–439, 452	766–767, 816
frequency of, 434	index matching predicates, 815	modifying, using ALTER INDEX,
full copies in, 437–439	INDEX privilege, 113 <i>t</i>	226–227
fuzzy copies and, 441	index spaces, 142, 147, 182, 428	multiple index access and,
incremental copies in, 437–439	REORG utility and, 382	ACCESSTYPE and, 818–819
index copies and REBUILD	shadow, 372–373	ngram, 713
INDEX utility in, 445	Virtual Storage Access Method	Nonpartitioned Index (NPI) and,
inline copies in, 442	(VSAM) and, 147	145, 449
LOAD LOG and, 438	index-only access, 819	Nonpartitioned Secondary (NPSIs),
LOAD REPLACE and, 434, 442	indexable predicate, 334–335,	194, 198–199, 222, 361
LOAD RESUME and, 438	335–337 <i>t</i> , 813–815	NOT PADDED parameter in, 216
LOGPOINTs and, 437	indexes, 31, 32, 142, 145, 215–227,	null values and NOT NULL option
MERGECOPY utility and,	244, 428, 815–821	and, 220, 221
437–439, 443–444	access path efficiency and, 815–816	one-fetch access and, 819
partition copies and, 439	access plans and, 765–767, 816	PART parameter in, 216
REORG and, 434, 438, 442	auxiliary, 224	PARTITIONED parameter in, 216,
REPORT utility and, 445	BUFFERPOOL parameter in, 216	218–219
REPORTONLY option and, 441	CHECK INDEX and, 404,	partitioning and, 145, 195–197, 196 <i>t</i>
retention period for, 434	405–406, 425	performance issues and, 215, 226,
SHRLEVEL and, 441–442, 446	CLUSTER parameter in, 216,	815–821
storage of, 435	217–218	PIECESIZE parameter in, 216
SYSIBM.SYSCOPY table, 445	COMPRESS parameter in, 216, 217	precise, 713
SYSIBM.SYSLGRNX table, 445	COPY parameter in, 216	predicates and, 334–335, 335–337 <i>t</i> ,
tape vs. disk, 436–437	creating, using CREATE INDEX	813–815
utility mode for, 441	and options, 215–216	rebalancing, 388–389
image extenders, 27, 715–716	Data Partitioned Secondary (DPSI),	REBUILD INDEX utility and, 445,
immediate write threshold, buffer	223–224, 223 , 224 , 449, 747	448
pools and, 868	DEFINE parameter in, 216, 217	Record ID (RID) in, 215
IMMEDWRI, 63 <i>t</i>	dual, 713	recovery and RECOVER utility and, 448
IMPDB, 63t	equal unique, 819–820	removing, using DROP INDEX, 227
IMPDSDEF, 63 <i>t</i> implicit joins, 257	EXPLAIN and, 803–804 expressions and, 221–222	renaming, using RENAME, 227
implicit joins, 237 implicit privileges, 122–129, 126 <i>t</i>	FREEPAGE and PCTFREE	REORG utility and, 370, 380–381,
IMPTSCMP, 63 <i>t</i>	parameter in, 216, 226	383, 386
IMPTSSEG, 63t	GBPCACHE parameter in, 216	REORGANIZE INDEX, 714
	*	screening of, 817
IMS, 6, 34, 39, 40, 47, 48 access control and, 103–104, 136	general guidelines for, 226 GET INDEX STATUS, 714	shadow, 372–373
attachment facility for, 44, 46	image copies and, 445	sorting and, 264, 820–821
call attachment facility (CAF) and, 50	IN list index scan and, 817–818	storage groups (stogroups) and, 229
command issuance from, 69	index matching predicates and, 815	text extenders and, 712–714
COMMIT/ROLLBACK and, 575	index spaces and, 147, 182	UNIQUE clause in, 215, 220
distributed data and, 652, 653	index spaces and, 147, 182	unique index check and, 774
global transactions and, 583	INDEXSPACE column, 215	unique vs. non-unique, 220
security and, 103–104, 136	joins and, 260	UPDATE INDEX, 714
stored procedures and, 611	keys in, 220. <i>See also</i> keys	uses for, 215
stored procedures und, orr	11. 15 iii, 220. 500 also keys	4040 101, 210

USING clause in, 216	VALUES clause in, 279, 523	STOSPACE utility and, 399-400
VALUES parameter in, 216	views and, 287, 289	Integrated Cryptographic Service
VSAM data set storage of,	INSERT privilege, 113t	Facility (ICSF), 105
INDEXSPACE column, 215	INSERT rule for referential	Integrated Development Environment
XML, 225–226	constraints, 177, 178	(IDE), 19
INDEXSPACE, 215	Installation Verification Procedure	integrity, 9
INDEXVAL phase, LOAD utility	(IVP), 362	advisory states and, 417-418,
and, 347	installation and migration, 39, 55-68.	419–422 <i>t</i>
indirect reference rows, 157	See also conversion	coherency controls in, 493
INDREFLIMIT, 383–384	buffer pools and, 59	concurrency controls in, 493
Information Center, 25	call attachment facility (CAF) and, 50	data sharing and, 492-493
information integration, 1, 2	CLIST for, 56	declarative referential, 243
Information Management products, 1,	compatibility mode and, 57, 58	DSN1CHKR utility, 413, 425
5, 18	customer information control	group buffer pool dependent data
Information Management System	system (CICS) and, 46, 47	and, 493
(IMS). See IMS	DISPLAY GROUP command, 58–59	inter DB2 read/write (R/W) interest
Informix, 2, 14, 17	distributed data facility (DDF) and, 56	and, 493
Informix Dynamic Server (IDS), 5	DSNZPARM parameters for,	LOAD utility and, violations of,
inherited privileges, 116	59–60, 60–68 <i>t</i>	355–356
initialization procedures, 42	enable-new-function mode and, 57,	referential, 175, 176–177, 176
inline copies, 442	58, 97	restrictive states and, 417–418,
LOAD utility and, 357–358	Environmental Descriptor Manager	419–422 <i>t</i>
inline views, nested table expressions, 305	(EDM) and, 59	triggers and, 668
INLISTP, 63 <i>t</i>	IBM DB2 9 for z/OS Installation	Intel, 2, 21
inner joins, 309–311, 337	Guide in, 56	intent exclusive (IX) lock, 728–731, 729 <i>t</i>
inoperative package/plan, 565	Information Management System	intent share (IS) lock, 728–731, 729 <i>t</i>
INSERT, 145, 182, 208–209, 240, 250,	(IMS) and, 47, 48 , 47	inter DB2 read/write (R/W) interest, 493
251, 278–282, 289, 523, 652	Interactive System Productivity	Interactive System Productivity
common table expressions and,	Facility (ISPF), 56	Facility (ISPF), 52, 56
306–307	JCL for, 56	interfaces for DB2, 52–55
constraints and, 279	libraries and, 57	Internal Coupling Facility (ICF), 484, 511
data change tables and, 307–309, 307	new-function mode and, 57, 58, 97	Internal Resource Lock Manager
DB2 private protocol and, 640	Parallel Sysplex environments and, 57	(IRLM), 40, 42, 44, 45, 92, 96, 722,
DEFAULT and WITH DEFAULT,	recoverable resource services	738, 751
280	attachment facility (RRSAF)	data sharing and, 487, 495, 496
dynamic SQL and, 544	and, 50–51 security and, 51	internal thresholds, buffer pools and, 867
identity columns and, 594–595	SET SYSPARM command and, 59	INTERSECT/INTERSECT ALL, 251, 304
inserting into specific columns using WITH DEFAULT, 280	steps in, 56–57	
large amounts of data, using LOAD	TCP/IP and, 56	intersects, 277, 295, 304 INTO TABLE option, LOAD utility
utility, 282	Time Sharing Option (TSO) and,	and, 352–353
large objects (LOB) and, 705–707	48–49, 49	INTO, 522–523
LOAD utility vs., 282, 346	Virtual Telecommunications Access	invalid copies, 452
multi-row operations using,	Method (VTAM) and, 56	invalidation, binding and, 562
ATOMIC settings, 590, 592	instances, 31	IPLIST catalog table, 78 <i>t</i>
NEXTVAL/PREVVAL and, 188	INSTEAD OF, 668	IPNAMES catalog table, 78t
null values and NOT NULL, 280	views and, 287	IRLMAUT, 63 <i>t</i>
performance issues and. See	INSTEAD OF triggers, 669, 674–675	IRLMPRC, 63 <i>t</i>
performance and tuning	instrumentation facilities, 42	IRLMPROC, 42
preformatting with PREFORMAT,	Instrumentation Facility IDs (IFCIDs),	IRLMRWT, 63 <i>t</i>
359–360	835, 841, 842–853 <i>t</i>	IRLMSID, 63t
sequence objects and, using INTO, 599	INTEGER, 152 <i>t</i> , 153, 154, 170 <i>t</i>	IRLMSWT, 63t
sets of values, using SELECT, 281	Integrated Catalog Facility (ICF)	IS/IS NOT DISTINCT FROM clause, 276
table spaces and, 191	recovery and, 465	isolation levels, 572, 733–734, 734 <i>t</i>
triggers and 279 667 669	storage groups (stogroups) and 229	IXOTY 63t

storage groups (stogroups) and, 229 IXQTY, 63t

triggers and, 279, 667, 669

J	keys, 145, 177, 182, 186, 240-241	User-Defined Data Types (UDTs)
J2EE, 10	atomic, 220, 240	and, 707–708
Java, 1, 4, 10, 17, 24, 25, 26, 28, 591,	composite, 145, 220, 240	LAST_DAY, 164
612, 632, 692	dependent tables and, 177	LBACKOUT, 63t
Java Database Connectivity (JDBC),	foreign, 177, 186, 220, 241, 243	LC_CTYPE, 63t
17, 21, 25, 108, 516	parent, 177	LEAFNEAR/LEAFFAR, 386
Job Control Language (JCL), 51	primary, 177, 186, 220, 241-242	Least Recently Used (LRU) queues,
installation, migration and, 56	REORG utility and, 366, 370	859–860
utilities and, 72	RUNSTATS utility and, key	left outer joins, 312–317
JOBNAME, 110 <i>t</i>	correlation statistics and,	LEMAX, 63t
join columns, 259	392–393	less-than/less-than equal-to operators, 255
join predicate, 261, 333	unique, 177, 220, 241, 242	libraries
joins, 256, 258–262, 278, 293, 295,		installation, migration and, 57
309–323, 337		recovery and, 465–466
COALESCE function and, 321	L	Lightweight Directory Access Protocol
combining outer, 321–322	LABEL, 652	(LDAP), 22
denormalization vs., 323	Label Based Access Control (LBAC), 16	LIKE, 184–185, 255, 272–273, 275–276
explicit, 310	labeled duration, 283	linguistic indexes, 713
FROM and, 261, 309, 310, 312, 318	REORG utility and, 377-378	LINKNAME, distributed data, 87
full outer, 318–321	labels, security, 131	links, data sharing, 489 Linux, 1, 2, 5, 11, 13, 17, 21, 22, 23,
HAVING, 320–321	laptops, 5, 18	25, 34
hybrid, 773–774	large object manager (LOBM), 43	DB2 9 for Linux, Unix, Windows
implicit, 257	large objects (LOB), 7, 703–708, 717	(LUW) and, 4, 11
IN, 313	auxiliary tables and, 183-184	trace and, 855
indexes and, 260	Auxiliary Warning (AUXW) status	LIST COPYPOOL, 460
inner, 309–311	and, 467–468	LOAD DATA operation, 346,
join columns in, 259	BLOB, 152 <i>t</i> , 156, 160–161, 170 <i>t</i> , 704.	348–349. <i>See also</i> LOAD utility
join predicate in, 261	casting and, 708	LOAD LOG, image copies, 438
left outer, 312–317	CHECK LOB and, 404, 406–407	load modules, 549
merge, 772	CLOB, 152 <i>t</i> , 156, 158–159,	LOAD privilege, 114 <i>t</i>
merge scan join and, METHOD,	160–161, 169, 170 <i>t</i> , 704	LOAD REPLACE, 148
772–773	compression and, 704, 720	image copies and, 434, 442
nested loop joins and, METHOD,	CREATE DISTINCT and, 707–708	LOAD RESUME
771–772	CREATE TABLESPACE options	image copies and, 438
null-supplying table in, 312	for, 160	LOAD utility, 182, 345, 346–362, 422
ON clause in, 310–311, 343	data types and, 160, 704	auditing and, 133
outer, 311–322, 312	DBCLOB, 152 <i>t</i> , 156, 159, 169, 170 <i>t</i> , 688, 704	BUILD phase in, 347
preserved row tables and, 312	extenders and, 708–710	CHECK DATA utility and, 356
right outer, 317–318	implementation of, 704	CHECK pending (CHKP) status
sort merge joins, 772–773	indexes and, 224	in, 355
star joins and, METHOD/JOIN TYPE, 774–777	INSERT and, 705–707	concurrent access and, using
VALUE function and, 321	LOAD and, 705–707	SHRLEVEL, 353
WHERE clause in, 261, 310,	locking and, 725–726	constraints and, 353–355, 356 constraints and, ENFORCE
313–317, 320–321, 343	MERGE and, 705	CONSTRAINTS on, 346
Journal, 33, 37	metadata tables and, 708	cursors for, 361–362
JULIAN DAY, 164	object-relational extensions and,	delimited loads using, FORMAT
<u> </u>	685, 688	DELIMITED, 353
	recovery of, 451, 467–468	DISCARD phase in, 348
K	REORG utility and, 368, 385-386	DROP command and, 284
Kerberos, 9, 104	table spaces for, 146, 189, 198–199,	ENFORCE CONSTRAINTS in,
access control and, 136	368, 385–386, 451, 704	356
security and, 136	tables and, 704	ENFORCE NO option in, without
key correlation statistics, 392-393	UPDATE and, 705	constraints, 355

ENFORCE phase in, 348	location name, VTAM, 86-87
free space and,	LOCATIONS catalog table, 78t
FREEPAGE/PCTFREE and, 357	Lock Detail Analysis report, 832
historical statistics with, HISTORY	lock structure, in data sharing, 486–487
and, 399–400	LOCK TABLE/TABLESPACE,
INDEXVAL phase in, 347	727–728
inline copies and, 357–358	locks/locking, 493-497, 514, 574,
inline statistics and, 358, 397–398	601–602, 721, 722–746
INSERT vs., 282, 346	application design and, 747-748
integrity violations and, correcting,	attributes for, 723
355–356	avoiding, with CURRENTDATA
large objects (LOB) and, 705-707	setting, 736–738, 738 <i>t</i>
LOAD DATA operation in, 346,	catalog and, 723
348–349	claim, 740–741, 740 <i>t</i>
logging, using LOGGED attributes,	concurrency and database design
351	for, 746–748
ordered rows, 351	contention and, 496-497
parallel index builds and, UNIQUE	cursor stability (CS) isolation level
WHERE NOT NULL and, 360	and, 733–734, 734t
parallelism, partitioned table spaces	data sharing and, 486-487,
and, 361	493–497, 493 , 510, 514
partition rebalancing and,	Database Descriptor (DBD) and, 723
REBALANCE keyword, 358	deadlocks and, 575, 741–744, 743 <i>t</i>
partitioned table spaces and, 194	DISPLAY DATABASE LOCKS
partitions, with INTO TABLE	for, 748, 750, 754
option, 352–353	drain, 740, 741
phases of, 346	DSNZPARM and, 738, 739t, 754
preformatting and, with	duration of, 732
PREFORMAT, 359–360	errors in, coding retry logic for,
referential constraints and, 353-355	743–744
referential integrity and, 353-355	escalation of, 744–745, 745
RELOAD phase in, 346-347	exclusive (X), 728-731, 729t, 736
REORG pending status in, 349	Explain for, 748, 749
REPLACE option in, 349-350	explicit hierarchical locking (EHL)
REPORT phase in, 348	in, 493–494
RESUME option in, 349–350	false lock contention and, 496-497
ROWID columns, 356-357	global lock contention and, 496-497
SHRLEVEL and, 353, 359, 361	Global Lock Manager (GLM) and,
SORT phase in, 347	496
SORTBLD phase in, 347	global transactions and, 583
sorts and SORTKEYS in, 347,	global, 494
358–359	indexes and, 723
table spaces and, 204	intent exclusive (IX), 728-731, 729t
UTILINIT phase (initialization) in,	intent share (IS), 728–731, 729t
346	Internal Resource Lock Manager
UTILTERM (termination) in, 348	(IRLM) and, 40, 42, 92, 487,
LOB parameter, table spaces, 200	495, 496, 722, 738, 751
LOBVALA, 63t	isolation levels and, 733–734, 734t
LOBVALS, 63t	large objects (LOB), 725–726
local access control, 103	Local Lock Manager (LLM) and, 496
local copies, 452	local, 494
local DB2, distributed data, 85, 637	Lock Detail Analysis report and, 832
Local Lock Manager (LLM), 496	LOCK TABLE/TABLESPACE
local locks, 494	and, 727–728
local predicates, 333	logical or L locks, 495

modes for, 728-731, 729t, 754 modified resource list for, 495 modify, 495 monitoring of, 748-750 objects amenable to, 722-723 optimistic, 601-602 Optimization Service Center (OSC) and, 748 page physical or P locks, 494-495 page, 725, 731-732 parent/child, 493, 493, 493 partition, 724, 732 physical or P locks, 494-495 promotion of, 744, 745-746 read stability (RS) isolation level and, 733-734, 734t recovery and, 510 REORG utility and, 376 repeatable read (RR) isolation level and, 733-734, 734t retained, 496 ROW CHANGE TIMESTAMP and, 602 row, 725, 731-732 SELECT and, 736-737 serialization and, 722 share (S), 728-731, 729t, 735 share with intent exclusive (SIX), 728-731, 729t size of, 201-202, 723-724, 746 Skeleton Cursor Table (SKCT) and, 723 Skeleton Package Table (SKPT) and, 723 SKIP LOCKED DATA option and, 728, 754 statistics on, 748, 749-750 system parameters for, 738, 739t table space, 724, 727–731, 732 table, 724, 727-728, 729-731, 732 timeouts and, 741-744, 743t, 754 traces and, 748, 750, 754 uncommitted read (UR) isolation level and, 733-734, 734t universal table space, 724 update (U), 728-731, 729t, 735-736 X locks, 495 XML, 726 6 LOCKSIZE parameter, table spaces, 201-202 log data sets, 430 LOG phase, REORG utility, 366 Log Record Sequence Number (LRSN), 430, 432, 508, 508

LOGAPPLY phase, in recovery,	LONG VARGRAPHIC, 157, 169, 688	adaptive memory allocation and,
447–448, 450	loops, nested loop joins, METHOD,	11, 12
LOGAPSTG, 63t	771–772	buffer pools in, 88–89
LOGGED parameter, table spaces, 202	LRDRTHLD, 63t	partitioned table spaces and, 192
logging, 427, 429-433, 875-876	LULIST catalog table, 78t	storage groups and, 142, 147
ARCHIVE LOG and, 466	LUMODES catalog table, 78t	STOSPACE utility and, 399-400
archive log data sets and, 430	LUNAMES catalog table, 78t	Memory Visualizer, 29
archive logs and, 465	G ,	MERGE, 240, 250, 251, 278, 284, 289,
Bootstrap Data Sets (BSDS) in,		600–601
431–432, 507	M	data change tables and, 307-309
buffers for, 875-876, 875	MAINTAINED BY USER, materialized	large objects (LOB) and, 705
data sets, log, 430	query tables (MQTs), 212	triggers and, 667
data sharing and, 508, 508	maintaining data, 31, 345–426	merge joins, 772
Database Object Identifier (DBID)	MAINTYPE, 63t	merge scan join, METHOD, 772-773
and, 432	mapping table, REORG utility, 374–375	MERGECOPY utility, 437–439, 443–444
DSN1LOGP utility, 415	mass DELETE, 190, 285	message generator, 42, 44
DSNJLOGF (preformat active log)	universal table spaces and, 197	metadata tables, 708
utility, 412	Massachusetts Institute of Technology	MGEXTSZ, 64t
DSNJU003 (change log inventory),	(MIT), 104	MICROSECOND, 166
412	matching indexes, 766–767, 816	Microsoft, 5, 10, 17, 24
DSNJU004 (print log map),	Materialized Query Table (MQT), 15,	middleware, 1, 21
412–413, 432	32, 143, 144, 147, 211–213	migration. See installation and migration
DSNZPARM and, 430, 431	changing, using ALTER TABLE, 213	MIN function, 269
Fast Log Apply (FLA) feature in,	defining, with CREATE TABLE,	MINDVSCL, 64t
FLA buffers, 453	211–212	MINRBLK, 64t
large objects (LOB) and, 467–468	MAINTAINED BY USER and, 212	MINSTOR, 64t
LOAD utility and, with LOGGED	optimization and, 213	MINUTE, 165
attributes, 351	options for, using DEFERRED and	MINVAL, 187
Log Record Sequence Number	REFRESH, 212	MIPS, 18
(LRSN) and, 430, 432, 508, 508	mathematical operators, 265–267	MIXED, 64t
Object Identifier (OBID) and, 432	MAX function, 268–269	mobile devices, 24
performance issues and, 875–876	MAX NUM CUR, 64t	MODE attribute, conversion/migration,
reads/writes to, 875–876	MAX ST PROC, 64t	58
redo records, 430	MAXARCH, 63t	MODESELECT catalog table, 78 <i>t</i>
Relative Byte Address (RBA) and,	MAXDBAT, 64t	modified resource list, locks/locking, 495
430, 432	MAXKEEPD, 64t	modify locks, 495
REORG utility and, 371	MAXOFILR, 64t	MODIFY TRACE, 70t, 841
controlling iterations of with	MAXPARTITION clause	MODIFY utility, 403, 407–410
MAXRO, 375–377 long log situations and, 377	universal table spaces and, 197-198	RECOVERY option for, 407–409 statistics and, with STATISTICS,
set log suspend/resume and, 471–472	table spaces and, 201, 206, 206t	409–410
SYSIBM.SYSCOPY table and, 433	MAXRBLK, 64t	409–410 MON, 64 <i>t</i>
SYSIBM.SYSLGRNX table and,	MAXRO, 375–377	monitor trace, 839–840, 844–846 <i>t</i>
432–433	MAXROWS, 201, 202	MONITOR1 privilege, 115 <i>t</i>
undo records, 430	MAXRTU, 64t	MONITOR1 privilege, 115 <i>t</i>
VSAM and, 431	MAXTEMPS, 64t	monitoring the database, 831–834
logical design of database, 230	MAXTYPE1, 64t	MONSIZE, 64t
logical expressions, XPath, 328–330	MAXVAL, 187	MONTH, 164
logical or L locks, 495	MCCSID, 64t	MONTHS BETWEEN, 164
logical terminal (LTERMs), 103–104	member-specific routing, using DDF	MQSeries, 576, 632
Logical Unit name (LU name),	ALIAS, 644	MSTR, 42, 44, 45, 96
VTAM, 86–87	members of data sharing groups, 481	multi-row operations using FETCH,
logical unit of work, 575–576	MEMBNAME, 64 <i>t</i>	590–592, 607
LOGPOINTs, 437	memory, 24. See also buffer pools;	Multibyte Character Set (MBCS),
LONG VARCHAR, 157, 169, 688	storage/storage groups	158–159
	· -	

Multidimensional Clustering Tables	NOT NULL WITH DEFAULT, 168	object-relational extensions for,
(MDCs), 32	NOT operator, 275–276, 277	685–691
multidimensional data clustering, 15	NOT PADDED parameter, indexes, 216	plan and package, ownership of, 127
multilevel security, 131 Multiple Virtual Storage (MVS), 6, 45,	NPGTHRSH, 64t	qualified, ownership of, 124–125
483, 489	NULL predicate, 274–276	recoverable, 428
463, 469	null-supplying table, joins, 312	sequence. See sequence objects
	null values, 167–168, 240	trusted context, ownership of, 125, 128–129
N	indexes and, 220, 221	unqualified names and, 122–124,
Named Pipe, 22	INSERT and, NOT NULL, 280	126–127, 567–568
names, unqualified, 126–127	NOT NULL and, 167–168, 240	OFFLOAD, 64 <i>t</i>
namespace, XML, 328	NOT NULL WITH DEFAULT, 168	OFFPOSLIMIT, 383–384
naming conventions, data sharing, 504	SELECT and, 274–276	OJPERFEH, 64t
negative conditions,	NUMERIC, 152 <i>t</i> , 153–156, 170 <i>t</i> NUMLKTS, 64 <i>t</i>	OLAP Acceleration, 19
SELECT/LIKE/BETWEEN/NULL,	NUMLKUS, 64 <i>t</i>	OLE DB, 21, 632
275–276	NUMPARTS parameter, table spaces,	OMEGAMON performance
nested loop joins, METHOD, 771-772	201, 206, 206 <i>t</i>	monitoring, 832, 833
nested stored procedures, 620-621	201, 200, 2001	ON, 333
nested table expressions, 277, 295,		joins and, 310–311, 343
304–306, 337, 343	0	predicates and, 333
nested views, 210	Object Identifier (OBID), 432	On Demand business features, 2, 3, 9,
.NET, 4, 10, 18	Object Linking and Embedding	10, 23
Net Search Extender, 27	Database (OLE DB), 21, 632	On/Off Capacity Upgrade on Demand, 10
Neutrino, 5, 17	Object Maintenance Policy Wizard, 24	one-fetch access, indexes, 819
new-function mode, 55, 57, 58, 97	object-relational extensions, 685–691	Online Analytical Processing (OLAP),
NEWFUN, 64t	casting and, 688–690	6, 15, 19, 23, 295
NEXT VALUE, 188 NEXT/PREVIOUS VALUE, 596–600,	CURRENT PATH special register	Online Monitor, 832
606	and, 686	Online Reorganization (OLR) using
NEXT DAY, 164	CURRENT SCHEMA special	REORG, 12, 371–372
ngram indexes, 713	register and, 687	read/write, 373–374
NO ACTION, DELETE rule, 178	distinct types and, 685, 688	read-only, 372–373
nodes, XPath, 329-330	extenders and, 708-716	Online Transaction Processing
noncorrelated subqueries, 297	large objects (LOB) and, 685, 688,	(OLTP), 8, 20, 23, 37
nondeterministic functions, 697	703–808	data sharing and, 505
nonmatching indexes, 766–767, 817	PATH bind option and, 686	EXPLAIN and, 804–805
Nonpartitioned Index (NPI), 145, 449	schemas and, 685–686, 685	OPEN, 518
Nonpartitioned Secondary Indexes	user-defined data types (UDTs) and,	DB2 private protocol and, 640
(NPSIs), 198–199, 222, 361	687–688	dynamic SQL and, 544
partitioned table spaces and, 194	user-defined functions (UDFs) and,	OPEN CURSOR, 534–535
nonread only views, 287, 288	685, 691–703	Open Database Connectivity (ODBC),
nonsargable predicates, 334–335,	objects, 31, 244. <i>See also</i> ownership of	21, 25, 516 tmustad contexts and 108
335–337 <i>t</i> , 813–815	objects and implicit privileges access control and, 129, 130 <i>t</i> ,	trusted contexts and, 108 open development, 10
nonscrollable cursor, 539–540	105–130. See also specific	Open Transaction Environment (OTE),
normal forms, 233–235, 233 , 234 , 235	objects	854
normalization, 233–235, 233 , 234 , 235 anomalies corrected by, 235–236,	Database Object Identifier (DBID)	operators
236, 237	and, 432	Boolean, 255–256, 333
de-, vs. joins, 323	database, 141–247. See also	comparison, 255
joins and, 323	databases; specific objects	mathematical, 265–267
not equal-to operator, 255	hierarchy of, in databases, 142, 143	OPTHINTS, 64t
NOT NULL, 167–168, 240	lockable, 722–723	optimistic locking, 601–602
constraints and, 175, 178	Object Identifier (OBID) and, 432	optimization, 7, 12, 13, 16, 29, 30, 31, 756
indexes and, 220, 221	object-level recovery with system	access paths and, 765-803, 805. See
INSERT and, 280	level backup, 460	also access paths; access plans

optimization, continued	Skeleton Package Table (SKPT)	adding partitions to, using ALTER
materialized query tables (MQTs)	and, 723	TABLE, 193
and, 213	triggers and, 679	creating, 192–193
Optimization Service Center and, 758	PADIX, 64t	creating, using CREATE TABLE,
OPTIMIZE for n ROWS and,	PADNTSTR, 64t	195–196
656–658, 665	page physical or P locks, 494–495	database descriptor (DBD) locks
runtime reoptimization and, 821–824	page range table, 799, 799 <i>t</i>	and, 194 DSSIZE parameter and, 194
SQL, 7	pages, 428, 858–859	limits to number of, 194
storage, 15, 16	available, in buffer pool, 858	LOAD utility and, 194, 361
Optimization Service Center (OSC), 29, 30, 31, 758, 801–803	externalization of, 861–863	modifying key ranges/partitions to
locking and, 748	fixing, in buffer pool, 866 in use, 858	rebalance, using ALTER, 193
OPTIMIZE, 589, 820	locking and, 725, 731–732	nonpartitioned secondary indexes
OPTIMIZE, 589, 620 OPTIMIZE for n ROWS, 656–658, 665	recovery and, 449	(NPSIs) and, 194, 198–199, 222, 361
optimizer, 756	size of, 202, 202 <i>t</i> , 858, 859 <i>t</i>	parallelism and, 361
OPTIONS PREVIEW, 76	updated, 858	PARTITION ENDING AT clause
OPTPREF, 64t	Palm OS, 5, 17	and, 196
OR, 255–256, 333	parallel group table, 789, 789–791 <i>t</i>	REBALANCE, 388–389
Oracle, 17	parallel index builds	REORG utility and, 367, 388-389
ORDER BY, 251, 263–265, 266, 270,	LOAD utility and, UNIQUE	RESET option and, 194
293, 295, 323–324	WHERE NOT NULL and, 360	rotating, using ALTER PART
orthogonality of SQL, 251	REORG utility and, 370	ROTATE, 194–195, 195
OS/390, 34	parallel recovery, 449-450, 480	size of, 192
OS/400, 2	Parallel Sysplex, 8, 9, 52	stogroup vs. VCAT defined, 193 table- vs. index-controlled
OUTBUFF, 64t	data sharing and, 487	partitioning in, 195–197, 196 <i>t</i>
outer joins, 311–322, 312 , 337	distributed data and, 644	universal table spaces and, 197
combining, 321–322	installation, migration and, 57	viewing, with DISPLAY
full, 318–321	Sysplex Failure Management	DATABASE, 195
left, 312–317	(SFM) policy in, 488, 489	partitioning, 14, 428, 746
right, 317–318	Sysplex query parallelism and,	access plans and, partition scans
ownership of objects and implicit	506–507, 506 , 824–827	and, PAGE_RANGE, 769–770
privileges, 122–129, 126 <i>t</i> , 136	Sysplex Timer and, 489, 490	database, 16
plans/packages, 127, 566–567	parallel task table, 791, 791–792 <i>t</i>	image copies and, 439
qualified objects and, 124–125	parallelism, 10, 345, 824–827. <i>See also</i> Parallel Sysplex	indexes and, 216, 218-219
trusted context objects and, 125, 128–129	access plans and,	LOAD utility and, with INTO
unqualified names and, 126–127	PARALLELISM_MODE,	TABLE option, 352–353
unqualified objects and, 122–124	777–778	locking and, 724, 732
unquanned objects and, 122 124	buffer pools and, VPPSEQT and, 866	rebalancing with LOAD utility, 358
	LOAD utility and, 361	recovery and, 449
Р	partitioned table spaces and, 361	REORG utility and, REBALANCE and, 388–389
PACKADM, 117, 120t, 136	query, 7, 15, 824–827	statistics on partitioned tables and, 810
Package Lists (PLIST), 563	Sysplex query parallelism and,	PARTKEYU, 64t
packages	506–507, 506 , 824–827	PassTickets, 103
binding and, 552-554	PARAMDEG, 64t	passwords, 103
execution authorization, BIND	parameters, stored procedures, 614-616	PATH bind option, 686
and, 129	parent keys, 177	path expressions, XPath, 328-330
inoperative, 565	parent/child locks, 493, 493	pattern matching using
migration testing for, 566	PARM, 76	SELECT/LIKE, 272–273
ownership of objects within, 127,	PART parameter, indexes, 216	PCLOSEN, 64t
566–567	PARTITION ENDING AT clause, 196	PCTFREE
package lists (PLIST) and, 563	partitioned indexes, 145, 216, 218–219	indexes and, 216, 226
privileges for privilege, 113t, 127	partitioned table spaces, 146, 189,	LOAD utility and, 357
removing, with FREE, 566	192–197	table spaces and, 201, 203–204

performance and tuning, 7, 755–880 access paths and, 756, 765–803	Resource Limit Facility (Governor) and, 834	pool, database copy, FROMDUMP, 450, 460
access plans and, 756	runtime reoptimization and, 821-824	pooled threads, 658
accounting and, 836–838, 842–843 <i>t</i>	SQL and, 755	POOLINAC, 65t
accounting reports and, 832	statement cache table and, 757	pools, subsystem. See subsystem pools
Activity Monitor and, 33	statement tables and, 757	positioned deletes, 285, 537, 548
audit trace and, 839, 844t	statistics for, 832, 835-836	positioned updates, 282, 536-537, 536
batch processing and, 832	System Management Facility	postponed units of recovery (URs),
buffer pools and, 857-875. See also	(SMF) and, 835	427, 473–474
buffer pools	triggers and, 669, 680-681	precise indexes, 713
catalog statistics and, 806-812	tuning guidelines for, 828–830	precision, numeric data types, 153
continuous performance monitoring	upper limits of tuning in, 830–831	precompile and bind, 22, 549–551
and, 854	User-Defined Functions (UDFs)	precompilers, 22
data sharing and, 500-501	and, 702, 703	distributed data and, 649
database monitoring and, 831–834	Performance Expert, 12	predicate table, 785, 785–787 <i>t</i>
Database Request Module (DBRM)	Performance Optimization, 12	predicates, 255, 295, 332–335,
and, 756	Performance Specification/Installation	335–337 <i>t</i> , 338, 813–815
detailed performance monitoring	Control Specification (IPS/ICS)	Boolean terms and, 333
and, 855–856	table, 45	compound, 333
DISPLAY command and, 856–857	performance trace, 838–839, 847–852 <i>t</i>	evaluation of, 334–335, 335–337 <i>t</i>
dynamic SQL and, 756, 821	periodic performance monitoring,	index matching, 815
elements of, 827–828	854–855	indexable, 334–335, 335–337 <i>t</i> ,
exception performance monitoring	permanent (base) tables, 143	813–815
and, 856	PERMIT command, 102	join, 261, 333
EXPLAIN and, 756–758, 758–765 <i>t</i> function tables in, 757	permutation, 254	local, 333
Generalized Trace Facility (GTF)	personal digital assistants (PDAs), 5, 17	simple, 334 stage 1 or sargable, 334–335,
and, 835	PHP, 4	335–337 <i>t</i> , 813–815
histogram statistics and, 808–810	physical design of database, 237	stage 2 or nonsargable/residual,
improvement process for, 830	physical or P locks, 494-495	334–335, 335–337 <i>t</i> , 813–815
indexes and, design of, 215, 226,	PIECESIZE parameter, indexes, 216	WHERE and, 333
815–821	PL/1, 1, 590, 612	predictive governing, 834
informal approach to, 831	PLAN_TABLE, 31, 757–758, 758–765 <i>t</i>	prefetching, PREFETCH, 769
Instrumentation Facility IDs	plans	PREFORMAT, 359–360
(IFCIDs) in, 835, 841, 842–853 <i>t</i>	binding and, 552–553	PREPARE, 518
Lock Detail Analysis report and, 832	execution authorization and,	dynamic SQL and, 544
logging and, 875–876	VALIDATE for, 568	preserved row tables, joins, 312
monitor trace in, 839–840, 844–846 <i>t</i>	execution authorization, BIND and, 129	PREVIEW, 76
OMEGAMON XE for, 832, 833	inoperative, 565	PREVIOUS VALUE, 188
Online Monitor for, 832	migration testing for, 566	primary authorization ID. See
Open Transaction Environment	ownership of, 127, 566–567	authorization
(OTE) and, 854	privileges for, 113 <i>t</i> , 127	primary expression, XPath, 328–330
optimization and, 756	removing, with FREE, 566	primary keys, 177, 186, 220, 241–242
Optimization Service Center and, 29, 30, 31, 758, 801–803	PLCLOSET, 64 <i>t</i>	PRINT LOG MAP, 460 printing, DSN1PRNT utility, 415–416
optimizer for, 756	Pocket PC, 5, 18	PRIQTY clause, 204–205
partitioned table statistics and, 810	Point-In-Time (PIT) recovery, 453–456	PRIQTY, 65 <i>t</i>
periodic performance monitoring	large objects (LOB), 467	private protocol, 640, 662
and, 854–855	REORG utility and, 373	privileges, 106, 136, 250
PLAN TABLE in, 757–758,	point of consistency, 428-429, 446, 576	catalog table information on, 129,
758–765 <i>t</i>	QUIESCE utility and, 446–447	130 <i>t</i>
predicate types and, 813-815	SHRLEVEL and, 447	categories of, 112
predictive vs. reactive governing, 834	policies for data sharing, 487	collection, 113t
problem tracing and, 834–835	polymorphisms, User-Defined	database, 113–114 <i>t</i>
guary parallalism and 924 927	Functions (LIDEs) 600, 700	distinct type 1154

Functions (UDFs), 699-700

distinct type, 115t

query parallelism and, 824-827

privileges, continued	OPTIMIZE for n ROWS and,	RECOVER pending (RECP) state, 457
explicit, 112	656–658, 665	RECOVER POSTPONED, 70t, 473–474
GRANTing, 116	parallelism in, 7, 15, 824-827	RECOVER privilege, 115t
implicit, 122–129, 126 <i>t</i>	remote processing of, 656–662	RECOVER_RESTORE_FROMDUM
ownership of objects and, 122–129,	Sysplex query parallelism and,	P, 65 <i>t</i>
126t	506–507, 506 , 824–827	RECOVER utility. See recovery and
package, 113 <i>t</i> , 127 plan, 113 <i>t</i> , 127	Query Management, 25 Query Management Facility (QMF), 7, 28	RECOVER utility
PUBLIC keyword and, 116	Query Patroller, 6, 12, 13, 20	Recoverable Resource Services (RRS), 50, 583
qualified objects and, 124–125	query table, 800, 801 <i>t</i>	Recoverable Resource Services
related and inherited, 116	queue management, 859–860	Attachment Facility (RRSAF), 44,
REVOKE/ing, 116	QUIESCE mode, restarting DB2, 470	46, 50
routine, 115 <i>t</i>	quiesce point. See point of consistency	RECOVERDB privilege, 114t
schema, 115t	QUIESCE utility, 446–447	RECOVERY BSDS command, 70t
SELECT, 112	QUIESCE, 65t	recovery log manager, 42
sequence object, 115 <i>t</i>	quiescing, 466	recovery manager, 42
subsystem, 114–115 <i>t</i> table, 113 <i>t</i>		recovery to current, 429
trusted context objects and, 125,	R	recovery, RECOVER, 427–490, 574.
128–129	RACF. See Remote Access Control	See also backups; restarting DB2 archive logs and, 465
unqualified names and, 126-127	Facility	auditing and, 133
unqualified objects and, 122-124	RAISE_ERROR trigger invalidation,	auxiliary warning (AUXW) status
usage, 115t	679–680	and, 467–468
user-defined data types (UDTs) and, 691	random processing, buffer pools, VPSEOT, 863	BACKUP SYSTEM in, 457-461
problem tracing, 834–835, 834	range-partitioned tables, 14, 198	backups and, 428
processing costs, data sharing, 501. See	ranges, using SELECT/BETWEEN, 274	catalog and, 461–463, 479
also performance and tuning	Rational Data Architect (RDA), 19	CHECK DATA utility and, 456–457
production environment modeling, 403	reactive governing, 834	checkpoint intervals in, 472 concepts of, 427–429
catalog statistics in, 810, 811–812t	read stability (RS) isolation level,	conditional restart, CRESTART,
projection, 253–254	733–734, 734 <i>t</i>	470–471
prolog, XPath, 328	read-only OLR, REORG utility, 372–373	COPYTOCOPY utility and, 450
promotion of locks, 744, 745–746 PROTECT, 65 <i>t</i>	read-only views, 287–288 REAL, 152 <i>t</i> , 153, 155, 170 <i>t</i>	coupling facilities and, 509
protocols	Real Time Statistics (RTS) facility,	DASD and, 460, 509
communications, 86–87, 88, 640–641	400–402	data-only copies in, 458-459
DB2 private protocol and, 640, 662	realtime insight, 16, 17	Data Partitioned Secondary Indexes
pruning a subquery, 302–303, 302	REBALANCE, 193, 358, 388-389	(DPSI) and, 449
PTASKROL, 65t	REBIND/rebinding, 53, 69t, 402, 403,	data recoveries in, 427 data sets, 449
PUBLIC, 116	556–561, 558–561 <i>t</i>	data sets, 449 data sharing and, 507–511
PureXML, 6, 9, 12, 13, 15, 24, 326.	plan and package ownership with, 127	data sharing and, 507–511 database copy pool for,
See also XML; XPath; XQuery	trusted context objects and, ownership of, 128–129	FROMDUMP and, 450, 460
	REBIND PACKAGE, 562–563, 686	directory and, 461-463, 479
Q	REBIND PLAN, 686	disaster recovery in, 427, 463-466
QNX, 5, 17	REBIND TRIGGER PACKAGE	DSN1LOGP utility, 415
QUALIFIER option, 126-127, 554	command, 69t	DSNZPARM and, 464, 466
qualifying rows, 256	REBUILD INDEX, 445, 448	DUMP, DUMPONLY and, 460
quantified reference/predicate, 296, 326	inline statistics and, 397–398	exception tables and, 457
QUARTER, 164 queries, 37	REBUILD utility, historical statistics with, HISTORY, 399–400	fallback, 451–452 Fast Log Apply (FLA) feature in,
catalog consistency, 83–84	RECALL, 65 <i>t</i>	FLA buffers, 453
distributed data and, 85–86, 639	RECALLD, 65t	FORCE mode in, 470, 460
Materialized Query Table (MQT)	record ID (RID), 215	full copies in, 458-459
and, 15, 143, 144, 147, 211–213	RECOVER INDOUBT command, 70t	group buffer pools and, 510-511

(HSM) and, 457, 458 image copies and, 427, 433-447, 464-465, 479, 514 incremental copies and, 452 indexes and, 448 Integrated Catalog Facility (ICF), 465, 511 invalid copies and, 452 large objects (LOB), 467-468 libraries and, 465-466 LOB tables and, 451 local copies and, 452 locks and, 510 LOGAPPLY phase in, 447-448, 450 logging in, 427, 429-433. See also logging minimizing data loss in, with ARCHIVE LOG, 466 MODIFY utility and, with RECOVERY option, 407-409 multiple object, using PARALLEL option, 449-450 Nonpartitioned Index (NPI) and, 449 NOT LOGGED tables and, 451 object-level recovery with system level backup, 460 objects you can recover in, 428 pages, 449 parallel, 449-450, 480 partitions, 449 Point In Time (PIT), 373, 453-456, 467 point of consistency and, 428-429, 446 Postponed Units Of Recovery (URs) and, 427, 473–474 quiescing, QUIESCE mode in, 466, RECOVER pending (RECP) state and, 457 RECOVER POSTPONED and, 473-474 recovery to current in, 429 REORG and, 452 REPORT RECOVERY utility and, 452-453 RESET INDOUBT and, 475 RESTART LIGHT, 509 restarting DB2 and, 427, 469-475. See also restarting DB2 RESTORE phase in, 447–448 RESTORE SYSTEM in, 457-461 RESTORE/RECOVER FROM DUMP and, 460

Hierarchical Storage Management

RETAIN and, 450 ROLLBACK/ROLLBACK TO SAVEPOINT and, 451 savepoints and, 577-582 SET LOG SUSPEND/RESUME, 471 Shared Communications Area (SCA), 509, 510, 511 situations requiring, 428 Storage Management Subsystem (SMS) and, 457, 458 structure duplexing in, 511 SYSIBM.SYSCOPY table, 445, 452 SYSIBM.SYSLGRNX table, 445, 452 system-level, 427, 457-461 System Recovery pending mode in, 459 table spaces and, 447-448, 466 TAPEUNITS and, 460 Tracker Site recovery in, 468-469, 468 Unit Of Recovery (UR) in, 429, 479, 576 Unit Of Work and, 429 Virtual Tape Storage (VTS), 508 VSAM and, 465 recursive triggers, 680 redo records, 430 REFERENCES privilege, 113t references, 935-936 REFERENCING clause, 677-678 referential constraints, 175, 176-177, **176**, 182 DELETE rule for, 177, 178 INSERT rule for, 177, 178 LOAD utility and, 353-355 UPDATE rule for, 177, 178 referential integrity, 175, 176-177, 176 declarative, 243 referential relationships, sequence objects, 599 REFRESH, Materialized Query Tables (MQTs), 212 REFRESH DB2, EARLY command, 71tREFSHAGE, 65t registering a UDF, 694 related privileges, 116 Relational Data System (RDS), 43 Relational Database Management Systems (RDBMS), 6, 7, 10, 17 relationships, 231 Relative Byte Address (RBA), 430, 432 Relative Byte Address/Log Record Sequence Number (RBA/LRSN), 401 RELEASE, 648-649 RELEASE SAVEPOINT, 581-582

RELOAD phase LOAD utility and, 346-347, 346 REORG utility and, 366 remote access control, 103 Remote Access Control Facility (RACF), 51, 92, 101, 104 access control and, 136 authorization IDs and, 106-107 data set security and, 105 GRANT and REVOKE, 106 multilevel security and, 131 security and, 136 remote query processing, 656-662 Remote Servers (RS), 85, 637 Remote Unit Of Work (RUW), 638 RENAME, 652 RENAME INDEX, 227 RENAME TABLE, 181 REOPTEXT, 65t reordered row format, 158 REORG DISCARD, 346, 362, 379-380 REORG INDEX, 380-381, 714 REORG privilege, 114t REORG UNLOAD EXTERNAL, 346, 362, 379–380 REORG utility, 140, 190, 345, 364, 402, 422 Access Method Services (AMS) and, 372-373 advisory REORG pending (AREO) status and, 384-385 ALTER TABLE and, 384-385, 384 ALTER UTILITY and, 376 analyzing data's physical organization and, 364-365 BUILD phase in, 366 catalog and, 387-388 CONTINUE and, 377 data maintenance and, 364 DBA analysis of need for, 386-387 DEADLINE for, 377-378 directory and, 387-388 DISCARD and, 379-380 DRAIN and, 376, 377 DROP TABLE and, 367 FASTSWITCH keyword and, 373 historical statistics with, HISTORY and, 399-400 image copies and, 434, 438, 442 index spaces and, 382 indexes and, using REORG INDEX, 380-381, 383, 386 inline statistics during, STATISTICS and, 378-379, 397-398 key/RID pairs in, 366, 370

REORG utility, continued	when to use, catalog queries for,	restrictive state, 345, 417–418, 419–422 <i>t</i>
labeled durations and, 377–378	381–383	result set/result table, 252, 255, 532
LOAD utility and, 349	REPAIR privilege, 114t	of stored procedures, 617-619
locks and, 376	REPAIR utility, 403, 410-411	RESUME, LOAD utility, 349–350
LOG phase in, 366	auditing and, 133	RESYNC, 65t
logging and, 371	repeatable read (RR) isolation level,	RETAIN, 450
controlling iterations of with	733–734, 734 <i>t</i>	retained locks, 496
MAXRO, 375–377	REPLACE, 284, 349-350	retention period, for image copies, 434
long log situations and, 377	Replication Center, 29, 32	RETLWAIT, 65t
mapping table in, 374–375	REPORT phase, LOAD utility, 348	retrieving data. See SELECT
MODIFY utility and, with	REPORT RECOVERY utility, 452–453	retry logic, for lock errors, 743–744
RECOVERY, 408–409	REPORT utility, 391–392	RETVLCFK, 65t
online reorganization (OLR) using.,	image copies and, 445	REVOKE, 106, 116, 137, 652
371–372	REPORTONLY option, 441	authorities and, 121–122
partitioned table spaces and,	RESET GENERICLU, 71t	cascaded, 116
REBALANCE option, 193, 358,	RESET INDOUBT, 71t, 475	unqualified names and, 128
388–389	residual predicates, 334–335,	•
phases of, 366, 426	335–337 <i>t</i> , 813–815	unqualified objects and, 567–568
Point In Time (PIT) recovery and, 373	Resource Limit Facility (Governor), 834	REXX, 516, 518, 612
preformatting with PREFORMAT,	resource recovery services, 48	stored procedures and, 631
359–360	Resource Recovery Services	RGFCOLID, 65t
read/write OLR using, 373-374	Attachment Facility (RRSAF), 538	RGFDBNAM, 65t
read-only OLR using, 372–373	resource release, 574	RGFDEDPL, 65tR, 65
Real Time Statistics (RTS) facility	RESTART LIGHT, 509	RGFDEFLT, 65t
for, 400–402	RESTART WITH, 187	RGFESCP, 65t
REBALANCE option, 193, 358,	RESTART/DEFR, 65t	RGFFULLQ, 65t
388–389	restarting DB2, 427, 469, 475, 574	RGFINSTL, 65t
recovery and, 452	checkpoint intervals in, 472	RGFNMORT, 65t
RELOAD phase in, 366	conditional, CRESTART and,	RGFNMPRT, 65t
REORG DISCARD and, 379-380,	470–471	right outer joins, 317–318
379	DSNZPARM and, 472	RLF, 65 <i>t</i>
REORG UNLOAD EXTERNAL	FORCE mode in, 470	RLFAUTH, 65t
and, 379–380	minimizing outages and, 472	RLFERR, 65t
Row ID (RID) and, 366, 370	NOT LOGGED tables and, 471	RLFERRD, 65t
rows and, 382	phases of, 470	RLFTBL, 66t
RUNSTATS utility and, 390	postponed Units Of Recovery	ROLE AS OBJECT OWNER, 109, 128
shadow index/index spaces and,	(URs) and, 473–474	roles, 107, 109, 136, 137, 140
372–373	QUIESCE mode in, 470	auditing and, 135
SHRLEVEL and, 367, 368-371	RECOVER POSTPONED and,	ROLLBACK, 451, 538, 574, 575, 577,
SORT phase in and SORTDATA	473–474	603, 751
in, 366, 369	RESET INDOUBT and, 475	savepoints and, 577–582
SORTBLD phase in, 366	RESTART LIGHT option, 509	triggers and, 680
SWITCH phase in, 367, 372-373	set log suspend/resume and, 471-472	rotating partitions, 194–195, 195
table spaces and, 204, 365-368,	stopping DB2, STOP DB2 and,	ROUTCDE, 66t
382, 383, 385–386	469–470	routine privileges, 115t
large object (LOB), 368, 385-386	threads affected by failure,	row triggers, 675
partitioned, 367	DISPLAY THREAD, 474–475	ROW CHANGE TIMESTAMP, 602
segmented, 367	RESTORE phase, in recovery, 447–448	row change timestamps, 174–175
tables and, 382–385	RESTORE SYSTEM, 457–461	row expressions, 278, 293, 295, 326
TERM and, 377	RESTORE/RECOVER FROM	row fullselect, 284
triggers for, OFFPOSLIMIT and	DUMP, 460	Row ID (RID) pool, 90, 869–871
INDREFLIMIT as, 381, 383–384	RESTORE_TAPEUNITS, 65t	buffer pools and, 869–871
UNLOAD phase of, 366	RESTRICT, DELETE rule, 178	REORG utility and, 366, 370
UTILINIT phase of, 366	restricted systems, distributed data, 652	ROWID, 153 <i>t</i> , 166, 184
UTILTERM (termination) phase in, 367	restriction, 255	LOAD utility and, 356-357

rows, 141, 143, 244	sampling using, 392	Secure Sockets Layer (SSL), 7, 9, 104–105
basic format, 158	SQL cache invalidation using,	SecureWay, 51, 92, 104
conditional operations on, using	398–399	data set protection and, 105
SELECT, 255–256	SYSCOLDIST and	Kerberos and, 104
DELETE all, 286	SYSCOLDISTATS for, 395	security, 7, 9, 16, 51, 99–137. See also
direct access to, 166	when to use, 391	access control
expressions of, 278, 293, 326	Runtime Client, 21, 22	Application Transparent Transport
FETCH and, multi-row operations	runtime reoptimization, 821–824	Layer Security (AT-TLS) and,
and, 590–592		104–105
functions for, 267, 268		audits and, 100, 132-136
indirect reference, 157	S	authentication and, 99
LOAD utility and, ordered, 351	sample exam answers, 919-934	authorities and. See authorities
locking and, 725, 731–732	sample exam questions, 891–917	authorization and, 99
maximums for, 181, 181 <i>t</i>	sampling, RUNSTATS utility, 392	authorization IDs in, 105, 106–107,
qualifying, 256	sargable predicates, 334–335,	136
reordered row format and, 158	335–337 <i>t</i> , 813–815	CICS and, 103–104, 136
REORG utility and, 382	SAVEPOINT, 578–579, 579t	confidentiality and, 100
restricting, using SELECT, 255	savepoints, 574, 577-582, 603, 606	data integrity and, 99
row change timestamps and, 174–175	CONNECT and, 577, 582	data set protection and, 105
row fullselect and, 284	distributed environments and, 582	DB2_SECURE_VAR function in, 131
ROWID data type and, 166 SELECT single, using INTO,	DRDA and, 577	denial of service attacks and, 105
522–523	establishing, with SAVEPOINT,	DSNR resource class and, 101
RPG, 10	578–579, 579 <i>t</i>	exit routines and, for authorization
RRULOCK, 66t	releasing, with RELEASE	control, 51, 102
RUN command, 69t	SAVEPOINT, 581–582	explicit privileges and, 112
runaway stored procedures, ASUTIME	restoring to, 579-581	IMS and, 103–104, 136
setting, 625–626	scalability, 10, 16	Integrated Cryptographic Service
RUNSTATS, 30, 37, 345, 387,	scalar functions, 267, 268, 693	Facility (ICSF) and, 105
389–400, 402, 403, 422	scalar UDFs, 692, 694-695	Kerberos and, 104, 136
access during, SHRLEVEL for, 392	scalar-fullselect, 251	local access control in, 103
access path determination and,	SCCSID, 66t	Logical Terminal (LTERMs) and,
389–390	scheduling and Task Center, 33	103–104
catalog and, 397	schemas, 31, 148	multilevel, 131
catalog consistency queries and, 83–84	creating, with CREATE SCHEMA,	PassTickets for, 103
catalog updates and, using	148	passwords and, 103
REPORT, 391–392	CURRENT SCHEMA special	performing tasks on behalf of another
externalizing statistics, using	register and, 687	in, DBADM and, 111–112
DSNZPARM STATSINST for,	object-relational extensions and,	PERMIT command and, 102
401–402	685–686	privileges and. See privileges
frequency distribution stats and,	privileges for privilege, 115t	Remote Access Control Facility
393–396	star, 774	(RACF) and, 51, 92, 101, 104,
histogram statistics and, 396-397,	stored procedures and, qualification	105, 106, 136
808-810	and, 623	remote access control in, 103
historical statistics with, HISTORY	screening, index, 817	roles in, 107, 109, 136, 140
and, 399–400	Script Center, 33	Secure Sockets Layer (SSL) and,
inline stats with, 397–398	scrollable cursor, 539–543	104–105
key correlation statistics and, using	SCT02 directory table, 84 <i>t</i>	SecureWay and, 51, 92, 104
FIRST/FULLKEYCARD,	searched deletes, 285	security labels in, 131
392–393	searched updates, 282	SQL IDs and, SET CURRENT for,
MODIFY utility and, with	searching data, 523–524	107
STATISTICS, 409–410	SECOND, 165	stem integrity in, 100
Real Time Statistics (RTS) facility	secondary authorization ID. See	threats to, 99
and, 400–402	authorization IDs	trusted connections and, 108
REORG and, 390	SECQTY clause, 66t, 204–205	trusted contexts and, 107–110, 137

security labels, 131 segmented table spaces, 146, 189, 190–192 REORG utility and, 367 SEGSIZE, 191, 191 <i>t</i> , 201, 206, 206 <i>t</i> SELECT, 208–209, 208, 250–278, 289 advanced use of, 277 AS keyword in, 266–267 asterisk wildcard character in, 252 BETWEEN and, 255, 274, 275–276 CASE expressions and, 278, 324–326 column renaming and, 265 common table expressions and, 277, 306–307 comparison operators and, 255 conditional operations using, AND and OR, 255–256, 333 correlation names and, 262–263 cursors and, 532–535 data change tables and, 277, 307–309 DB2 private protocol and, 640 DECLARE CURSOR and, 251 DELETE and, 286 derived columns and, 265–267 DISTINCT in, 251, 271–272, 276, 293 duplicate elimination using DISTINCT, 271–272 dynamic SQL and, 544 EXCEPT clause of, 251 excepts and, 277, 303, 343 FETCH FIRST in, 251, 323–324 filtering with, 251, 332–335, 335–337 <i>t</i> FROM in, 253, 257, 261, 269, 293, 306, 309. <i>See also</i> joins fullselects in, 251, 323–324 functions and, 267–269 GROUP BY in, 250, 251, 267, 269–271 HAVING in, 251, 271, 333 identity columns and, 595 implicit joins and, 257 IN predicate for, 255, 277 INSERTing result of, 281 INTERSECT clause of, 251 intersects and, 277, 304 INTO and, 522–523 IS/IS NOT DISTINCT FROM clause in, 276	multiple table operations an joins, 256, 258–262, 29, negative conditions and, 27 nested table expressions an 304–306, 343 NEXTVAL/PREVVAL an NOT and, 275–276, 277 null values and NULL pred 274–276 ON, 333 ORDER BY in, 251, 263–2 270, 293, 323–324 pattern matching using LIKE, performance issues and. See performance issues and. See performance and tuning permutation using, 254 predicates and, 255, 332–3 335–337t projection using, 253–254 qualifying rows from, 256 quantified predicates and, 3 range operator for using BETWEEN, 274 restricting data sets using F 271 restriction using, 255 result set/result table from, 255, 532 retrieve entire table using, row expressions and, 278, 270 rows and, 522–523 scalar-fullselect in, 251 select list from, 253 set of values to retrieve, us clause, 277 sorting with, 263–265 SPUFI and, 251 subqueries and, 251, 277, 2 subselects in, 251, 323–324 substring functions and, us SUBSTR, 268 TABLE clause and, 306 UNION clause of, 251 unions and, 277, 300–303 UPDATE and, 283 views and, 287 WHERE in, 251, 253, 255, 258, 261, 266, 272, 333
joins and, 278, 309–323	wildcard characters and, 27
LIKE predicate for, 255	XPath and, 278, 326–332
LIKE in, 272–273, 275–276	XQuery and, 278, 326–332
locking and, 736–737	SELECT INTO,
mathematical operators and, 265-267	NEXTVAL/PREVVAL, 18
multiple table operations and, using	select list, 253
Cartesian products, 256–258, 293	SELECT privilege, 112, 113 <i>t</i>
1	1 , , ,

le operations and, using 6, 258–262, 293 nditions and, 275-276 expressions and, 277, , 343 PREVVAL and, 188 75-276, 277 and NULL predicate in, in, 251, 263–265, 266, , 323-324 ning using LIKE, 272–273 e issues and. See ance and tuning using, 254 nd, 255, 332-335, sing, 253-254 ows from, 256 redicates and, 326 tor for using EN. 274 lata sets using HAVING, sing, 255 sult table from, 252, re table using, 251–252 ions and, 278, 293, 326 22-523 elect in, 251 om, 253 s to retrieve, using IN 77 , 263–265 251 and, 251, 277, 296–299 n, 251, 323–324 nctions and, using R, 268 use and, 306 use of, 251 277, 300-303 nd. 283 287 251, 253, 255, 257, , 266, 272, 333 aracters and, 273 278, 326-332 1, 278, 326–332 PREVVAL, 188

self-tuning memory allocation, 24 Self-Tuning Memory Manager, 11, 12 self-management. See autonomic computing sensitivity of cursor, 540-541, 541t SEQCACH, 66t SEQPRES, 66t sequence objects, 148, 187-189, 596-600, 603, 747 attributes supported by, 187 benefits of using, 187 creating, with CREATE SEQUENCE, 188 identity columns vs., 600, 600t INSERT INTO and, 599 modifying, using ALTER, 189 NEXT/PREVIOUS VALUE and, 596–600, 606 privileges for privilege, 115t programming with, 596-597 referential relationship populating with, 599 removing, using DROP, 189 using, NEXT/PREVIOUS VALUE FOR, 188 Sequential Least Recently Used (SLRU) queues, 859 sequential prefetch threshold, buffer pools, 867 sequential processing, buffer pools, VPSEQT, 863 sequential steal threshold, 859 serialization, 722 SERVAUTH, 107, 110t server management, 2, 6 distributed data and, application and remote, 85 service controller, 43 Service Oriented Architecture (SOA), 2 SET, 283 NEXTVAL/PREVVAL and, 188 SET ARCHIVE command, 71t SET CURRENT, 107 SET LOG command, 71t SET LOG SUSPEND/RESUME, 471-472 SET NULL, DELETE rule, 178 SET SYSPARM command, 59, 71t shadow indexes/index spaces, 372-373 share (S) lock, 728-731, 729t, 735 share with intent exclusive (SIX) lock, 728–731, 729*t* Shared Communications Area (SCA), 486, 507, 509, 510, 511 Shared Data Architecture (SDA), 483

shredding, XML, 332	REORG utility and, SORT phase,	Extenders for, 10, 25, 27
SHRLEVEL	366, 369	FETCH FIRST and, 295
image copies and, 441-442, 446	SELECT and, 263-265	FETCH, 535-536
LOAD utility and, 353, 359, 361	sort pools, 90	filtering and, 295, 332-335,
point of consistency and, 447	tournament, 90	335–337 <i>t</i>
recovery and, 448	sourced UDFs, 692, 694	fullselects and, 323-324
REORG utility and, 367, 368-371	SPACE keyword, 76	functions in, 267–269
RUNSTATS utility and, 392	SPRMEDX, 66t	GET DIAGNOSTICS and,
SIGNAL statement, triggers, 680	SPRMLTD, 66t	528–532, 529–532 <i>t</i> , 548
signaling services in XCF, 491	SPT01 directory table, 84t	host variables/host structures in,
simple predicates, 334	SPUFI. See SQL Processing Using File	518–520, 571
simple table spaces, 146, 189, 190	Input	intersects and, 295, 304
Single Byte Character Set (SBCS),	SPUFI command, 68, 69t	Java Database Connectivity (JDBC)
158–159	SQL, 2, 4, 6, 7, 19, 22, 25, 26, 27, 28,	and, 516
single-level store, 10	30, 33, 34, 37, 92, 250, 289–290,	joins and, 295, 309-323
single-result subqueries, 296–297	295–343, 515–548	longest size of, 250
SITETYP, 66t	advanced coding in, 295-343	nested table expressions and, 295,
SJMXPOOL, 66 <i>t</i>	ALTER. See ALTER	304–306, 343
SJTABLES, 66t	binding and. See binding	Open Database Connectivity
Skeleton Cursor Table (SKCT), 723	block fetch and, 655	(ODBC) and, 516
Skeleton Package Table (SKPT), 723	CASE expressions and, 295, 324–326	optimization and, 7
SKIP LOCKED DATA option, 728, 754	catalog and, 77	ORDER BY and, 295
SKIPUNCHI, 66t	catalog consistency queries and, 83-84	orthogonality of, 251
slash character, in XPath, 329–330	common table expressions and, 295	performance issues and, 755
SLQ Warehousing Tool, 19	CREATE. See CREATE	predicates and, 295, 332–335,
SMALLINT, 152 <i>t</i> , 153, 154, 170 <i>t</i>	creating/managing database objects	335–337 <i>t</i>
smart phones, 17	with, 141, 148	REXX and, 516, 518
SMF89, 66 <i>t</i>	current IDs and access control in,	row expressions and, 295, 326
SMFACCT, 66t	SET CURRENT for, 107	RUNSTATS utility and, 398–399
SMFSTAT, 66t	cursors and, 532–535	runtime reoptimization and, 821–824
SMSDCFL, 66t	data change tables and, 295	SQL Communication Area
SMSDCIX, 66t	Data Control Language (DCL) and,	(SQLCA) and, 524, 524– 526 ,
SNA. See System Network	116, 142	551, 565. See also SQL
Architecture	Data Definition Language (DDL)	Communication Area (SQLCA)
Software Developers Kit (SDK) for	in, 142, 243, 881	SQL Descriptor Area (SQLDA)
extenders, 710	Data Manipulation Language	and, 619. See also SQL
Solaris, 2, 11, 13, 23	(DML) in, 142, 249, 289	Descriptor Area (SQLDA)
SOME, 296, 326	Database Request Module (DBRM)	SQL Procedure Language for,
sort merge joins, 772–773	and, 549, 550–551, 556, 561,	627–632
SORT phase, LOAD utility, 347	568	SQL Processing Using File Input
sort pools, 90, 872	DCLGEN and DECLARE,	(SPUFI) and, 52, 53, 54–55, 55 ,
sort table, 796, 796–797 <i>t</i>	520–521, 521– 522	92. See also SQL Processing
SORTBLD phase	DECLARE. See DECLARE	Using File Input (SPUFI)
LOAD utility and, 347	delimiting of, in a program, EXEC	SQLCODE and, 527
REORG utility and, 366	SQL and END-EXEC, 516	SQLSTATE and, 527
SORTDATA, REORG utility, 366, 369	Developer Workbench for, 632–633 distributed data and, 85, 654	static, 515, 548
sortkey value table, 797, 798–799 <i>t</i>		stored procedures and, 612, 627–632
sorts	DROP. See DROP	subqueries and, 295, 296–299
access plans and, SORT, SORTN,	dynamic, 515, 543–545, 548, 571,	subselects and, 323–324
SORTC and, 770–771	756, 821 dynamic, removing statements using	table definition in, using DECLARE, 516–518
avoiding, by using indexes, 820–821	, ,	
indexes and, 264	RUNSTATS, 398–399, 398 excepts and, 295, 303, 343	trusted contexts and, 108 unions and, 295, 300–303
· · · · · · · · · · · · · · · · · · ·	executing statements in, 535–537	User-Defined Functions (UDFs)
LOAD utility and, 347, 358–359	executing statements in, 535–537	ond 602

execution validation in, 524-532

and, 692

parallel index builds, REORG and, 370

SQL, continued view definition in, using	statistics, 345, 832. See also RUNSTATS	storage. See also storage groups (stogroups); storage spaces (stospace)
DECLARE, 516–518 XPath and, 295, 326–332	access paths based on, 389–390 buffer pools and, monitoring	automatic storage management and, 11, 12
XQuery and, 295, 326–332	performance of, 870–871	Hierarchical Storage Management
SQL Communication Area (SQLCA),	catalog, 806–812	(HSM) and, 457, 458
524, 524– 526 , 551, 565 SQL Descriptor Area (SQLDA), 619	DSNACCOR stored procedure and, 402	storage groups and. See storage groups (stogroups)
SQL Procedure Language stored procedures and, 627–632, 627	externalizing, using DSNZPARM STATSINST for, 401–402	storage management subsystem (DFSMS) and, 52
SQL Processing Using File Input (SPUFI), 52, 53, 54–55, 55 , 92	frequency distribution, 393–396 histogram, 396–397	Storage Management Subsystem (SMS) and, 457, 458
catalog consistency queries from, 83–84	historical, HISTORY and, 399-400	system managed storage (SMS) and, 228–229
SELECT and, 251	inline collection of, using RUNSTATS, 397–398	storage groups (stogroups), 142, 147,
SQL scalar UDFs, 692, 694–695 SQLCODE, 527	inline, using REORG and	228–229 creating, using CREATE
SQLCODE, 327 SQLDELI, 66 <i>t</i>	STATISTICS, 378–379 key correlation, 392–393	STOGROUP, 229
SQLJ, 25, 26, 632	LOAD utility and, 358	indexes and, 229
SQLSTATE, 527	locking and, 748, 749-750	Integrated Catalog Facility (ICF) and, 229
trigger invalidation and, 679–680 user-defined functions (UDFs)	logging and, 409–410	modifying, using ALTER
and, 694	Real Time Statistics (RTS) facility for, 400–402	STOGROUP, 229
SRTPOOL, 66t	Relative Byte Address/Log Record	partitioned table spaces and, 193 removing, using DROP
SSID, 66 <i>t</i> stage 1 predicates, 334–335, 335–337 <i>t</i> ,	Sequence Number (RBA/LRSN)	STOGROUP, 229
813–815	and, 401 RUNSTATS utility, 389–400	system managed storage (SMS)
stage 2 predicates, 334–335, 335–337 <i>t</i> ,	table space, 425	and, 228–229
813–815 standalone utilities, 44, 72, 412	trace for, 835–836, 853 <i>t</i>	table spaces and, 201, 229 Storage Management Subsystem
star joins, METHOD/JOIN TYPE,	triggers and, IFCID 16 and, 681–682 user-defined functions (UDFs) and,	(SMS), 52, 457, 458
774–777	702	storage manager, 42
star schema, 774 STARJOIN, 66t	STATISTICS keyword, 358	storage optimization, 15, 16 storage spaces (stospace)
START command, 69	STATISTICS, 378–379	Integrated Catalog Facility (ICF)
START DATABASE, 71t, 441, 479, 510	STATROLL, 66 <i>t</i> STATS privilege, 114 <i>t</i>	and, 399–400
START DB2 command, 71t	STATS privilege, 114 <i>i</i> STATSINT, 66 <i>t</i>	STOSPACE utility and, 399–400 Stored Procedure Builder, 25. <i>See also</i>
START DDF command, 71 <i>t</i> START FUNCTION, 701	status monitoring services in XCF, 491	Developer Workbench
START FUNCTION SPECIFIC	STDDEV, 269	stored procedures, 8, 609-636
command, 71 <i>t</i>	STDSQL, 66 <i>t</i> stealing method, buffer pools,	address space for, SPAS, 41, 44, 613
START PROCEDURE command, 71 <i>t</i> START PROFILE command, 71 <i>t</i>	VPSTEAL, 866	ALTER PROCEDURE for, 616, 622 benefits of, 610–612, 610
START RLIMIT command, 71t	stem integrity, 100	CALL and, 610, 613–614, 619
START TRACE, 71 <i>t</i> , 135, 835–836, 840–841	STOP DATABASE command, 71 <i>t</i> STOP DB2 command, 71 <i>t</i>	CICS and, 611, 612 COMMIT and, 618, 620
START/STOP PROCEDURE, 624, 627	STOP DDF command, 71t	CREATE PROCEDURE for, 614,
STARTDB privilege, 114t	STOP FUNCTION, 701–702	616, 622, 623, 629, 630
statement cache table, 757	STOP FUNCTION SPECIFIC, 71 <i>t</i> STOP PROCEDURE, 71 <i>t</i> , 624, 627	DBINFO clause in, 616, 617t
statement table, 757, 779–780, 780–781 <i>t</i> statement triggers, 675–676	STOP RLIMIT, 71 <i>t</i>	defining, 622 DESCRIBE PROCEDURE and, 619
STATHIST, 66t	STOP TRACE, 71t, 135, 841	Developer Workbench for, 632-633
static binding, 553	STOPALL privilege, 115t	developing, 631
static SQL, 515, 548 STATIME, 66 <i>t</i>	STOPDB privilege, 114 <i>t</i> stopping DB2, STOP DB2, 469–470	DISPLAY PROCEDURE and, 624 distributed data and, 655
,	11 5 , , , , , , , , , , , , , , , , , ,	· · · · · · · · · · · · · · · · · · ·

SYSKEYTGTDIST catalog table, 80t

DRDA and, 618	correlated reference/predicate in,	SYSCOLSTATS catalog table, 79t
DSNTPSMP, 631–632	296, 343	SYSCOLUMNS catalog table, 79t
DSNUTILS, utilities and, 74–75, 74	existence type, 296, 298	SYSCOLUMNS_HIST catalog table, 79t
execution environments for,	EXISTS used in, 296, 297, 298, 299	SYSCONSTDEP catalog table, 79t
START/STOP PROCEDURE,	FROM clause in, 299	SYSCONTEXT catalog table, 79t
624, 627	IN-list type, 296, 297 IN used in, 296, 297, 298	SYSCONTEXTAUTHIDS catalog
EXTERNAL, 631–632	noncorrelated, 297	table, 79 <i>t</i> SYSCOPY catalog table, 79 <i>t</i>
FENCED, 631, 636	NOT IN/NOT EXISTS and, 299	SYSCTRL, 117, 118–119 <i>t</i> , 127, 136, 140
IMS and, 611	pruning of, 302–303, 302	SET SYSPARM command and, 60
language environment for, 613 language support for, 612	quantified reference/predicate in, 296	SYSCTXTTRUSTATTRS catalog
nesting, 620–621	SELECT and, 298	table, 79t
parameters and, passing, 613–616	single result type, 296–297	SYSDATABASE catalog table, 79t, 83
removing, DROP PROCEDURE	SOME in, 296	SYSDATATYPES catalog table, 79t
and, 622–623	WHERE clause and, 299	SYSDBAUTH catalog table, 79t
result sets from, 617–619	subselects, 251, 323-324	SYSDBRM catalog table, 79t
REXX and, 631	SUBSTR function, 268	SYSDEPENDENCIES catalog table, 79t
runaway, ASUTIME setting and,	subsystem pools, 88-91	SYSDUMMY1 catalog table, 79t
625–626	subsystem support, 42, 44	SYSENVIRONMENT catalog table, 79t
schema qualification and, 623	subsystem utilities, 72	SYSFIELDS catalog table, 79t
SQL and, 612	subsystems, 141	SYSFOREIGNKEYS catalog table, 80t
SQL Descriptor Area (SQLDA)	access control to, 100–105. See also	SYSFUN schema, 623
and, 619	acces control	SYSIBM.IPNAMES, 87
SQL Procedure Language for,	distributed data and, 85	SYSIBM.LOCATIONS, 87
627–632	privileges for privilege, 114–115 <i>t</i> SUM function, 271	SYSIBM.LULIST, 87 SYSIBM.LUMODES, 87
triggers and, 684	Sun Microsystems, 2	SYSIBM.LUNAMES, 87
Units Of Work (UOW) and, 618, 619	Sun UNIX, 17	SYSIBM.MODESELECT, 87
VSAM and, 611, 612	SUPERRS, 66t	SYSIBM.SYSCOPY table, 433, 445, 452
Workload Manager (WLM) and,	Supply Chain Management (SCM), 3, 14	SYSIBM.SYSLGRNX table, 432–433,
613, 625–628	SVOLARC, 67t	445, 452
writing, 612	SWITCH phase, of REORG utility,	SYSIBM.USERNAMES, 87
Stored Procedures Address Space	367, 372–373	SYSINDEXPART catalog table, 80t
(SPAS), 44	Sybase, 17	SYSINDEXPART_HIST catalog
stored procedures manager, 43	Symbian, 5, 17, 18	table, 80 <i>t</i>
STORMXAB, 66t STORPROC, 66t	Symmetric Multiprocessing (SMP), 10	SYSINDEXS catalog table, 80t
STORTIME, 66t	synchronous reads/writes, 860–861	SYSINDEXS_HIST catalog table, 80t
STOSPACE privilege, 115 <i>t</i>	SYNCVAL, 67t	SYSINDEXSTATS catalog table, 80t
STOSPACE utility, 399–400	synonyms, 142, 144	SYSINDEXSTATS_HIST catalog
string data types, 152, 156–162	SYOPR, 67t	table, 80t
encoding schemes for, 161–162	SYROLES catalog table, 81 <i>t</i>	SYSJARCLASS_SOURCE catalog
string functions, 268	SYSADM, 67 <i>t</i> , 117, 118 <i>t</i> , 119 <i>t</i> , 127, 136 current SQL IDs and, 107	table, 80 <i>t</i> SYSJARCONTENTS catalog table, 80 <i>t</i>
strong typing, 167	DROP command and, 284	SYSJARDATA catalog table, 80 <i>t</i>
STRONGARM/XSCALE	SET SYSPARM command and, 60	SYSJAROBJECTS catalog table, 80 <i>t</i>
architectures, 17	SYSADM2, 67t	SYSJAVAOPTS catalog table, 80 <i>t</i>
structure duplexing, 511	SYSAUXRELS catalog table, 78 <i>t</i>	SYSJAVAPATHS catalog table, 80 <i>t</i>
structure table, 787, 788–789 <i>t</i>	SYSCHECKDEP catalog table, 78t	SYSKEYCOLUSE catalog table, 80t
subprograms, 636	SYSCHECKS/SYSCHECKS2 catalog	SYSKEYS catalog table, 80t
Workload Manager (WLM) and, 626	table, 78 <i>t</i>	SYSKEYTARGETS catalog table, 80t
subqueries, 251, 277, 295, 296–299, 337	SYSCOLAUTH catalog table, 78t	SYSKEYTARGETS_HIST catalog
access plans and, 778–779, 778t	SYSCOLDIST catalog table, 78t, 395	table, 80t
ALL in, 296	SYSCOLDIST_HIST catalog table, 79t	SYSKEYTARGETSTATS catalog
ANY in, 296	SYSCOLDISTSTATS catalog table,	table, 80t
correlated 208	70± 305	SVSKEVTGTDIST catalog table 80t

79t, 395

correlated, 298

SYSKEYTGTDIST HIST catalog

FREEPAGE and PCTFREE table, 80t 86-87, 92, 639, 640, 641, 642, 643 SYSKEYTGTDISTATS catalog system parameter manager, 42 parameters for, 201, 203-204 system parameters, 39 GBPCACHE parameter for, 201 table, 80t SYSLGRNX directory table, 84t System Recovery pending mode, 459 INSERT and, 191 SYSLOBSTATS catalog table, 81t System Services Address Space large object (LOB), 146, 189, SYSLOBSTATS HIST catalog table, 81t (SSAP), 40, 42 198-199, 199, 368, 385-386, SYSOBJROLEDEP catalog table, 81t System Z. See z/OS 451, 704 SYSOPR, 117, 120t SYSTEM LEVEL BACKUPS, 67t LOB parameter for, 200 SET SYSPARM command and, 60 SYSTEMPL, 75 locking and, 724, 727-728, SYSPACKAGE catalog table, 81t SYSTIN data sets, 49 729-731, 732 SYSPACKAUTH catalog table, 81t SYSTOGROUP catalog table, 82t LOCKSIZE parameter for, 201-202 SYSPACKDEP catalog table, 81t SYSTRIGGERS catalog table, 82t LOGGED parameter for, 202 SYSPACKLIST catalog table, 81t SYSTROUTINES SRC catalog table, 82t mass DELETE or DROP TABLE SYSPACKSTMT catalog table, 81t SYSUSERAUTH catalog table, 82t commands and, 190 SYSPARMS catalog table, 81t SYSUSERNAMES catalog table, 83t MAXPARTITIONS for, 201, 206, 206t SYSPKSYSTEM catalog table, 81t SYSUTILX directory table, 84t MAXROWS parameter for, 201, 202 SYSPLAN catalog table, 81t SYSVIEWDEP catalog table, 82t modifying, using ALTER SYSPLANAUTH catalog table, 81t SYSVIEWS catalog table, 83t TABLESPACE, 207 SYSPLANDEP catalog table, 81t SYSVOLUMES catalog table, 83t naming, 181 Sysplex Failure Management (SFM) SYSXSRCOMPONENT catalog table, 83t NUMPARTS parameter for, 201, policy, 488, 489 SYSXSROBJECTCOMPONENTS 206, 206t Sysplex Timer, 489, 490 catalog table, 83t options to set, parameters for, 200-202 Sysplex. See Parallel Sysplex SYSXSROBJECTGRAMMER catalog page sizes for, 202, 202t SYSPLSYSTEM catalog table, 81t table, 83t partitioned, 146, 189, 192-197, 367 SYSPRINT file, SYSIBM.SYSPRINT SYSXSROBJECTHIERARCHIES recovery and, 447-448 utilities, 74 catalog table, 83t removing, using DROP SYSRELS catalog table, 81t SYSXSROBJECTPROPERTY catalog TABLESPACE, 208 SYSRESAUTH catalog table, 81t table, 83*t* REORG utility and, 365-368, 382, SYSXSROBJECTS catalog table, 83t 383, 385–386 SYSROUTINEAUTH catalog table, 81t SYSROUTINES catalog table, 81t SYSXSRPROPERTY catalog table, 83t scan of, ACCESSTYPE, SYSROUTINES_OPTS catalog table, 81t PREFETCH, 767-768 SYSROUTINESTEXT catalog table, 82t segmented, 146, 189, 190-192, 367 SEGSIZE parameter for, 201, 206, 206t SYSSCHEMAAUTH catalog table, 82t SYSSEQUENCES catalog table, 82t TABLE clause, 306 simple, 146, 189, 190 SYSSEQUENCESDEP catalog table, 82t table functions, 695-696 size of segments in, SEGSIZE table scans, 190 SYSSTMT catalog table, 82t clause for, 191, 191*t* SYSSTRINGS catalog table, 82t table spaces, 31, 142, 145-146, 181, statistics on, 425 189-208, 428 storage groups (stogroups) and, 229 SYSSYNONYMS catalog table, 82t access plans and, 767-768 SYSTABAUTH catalog table, 82t table scans and, 190 SYSTABCONST catalog table, 82t allocation for, using PRIQTY and taking offline, 466 SECQTY clauses, 204-205 thresholds for, 191, 191t SYSTABLEPART catalog table, 82t SYSTABLEPART HIST catalog buffer pools for, 202, 202t TRACKMOD parameter for, 202 BUFFERPOOL parameter for, 201 table, 82t type of, combining clauses to COMPRESS parameter for, 202 SYSTABLESPACE, 83 create, 206, 206t compression of, using COMPRESS universal, 146, 189, 197-198, 247, 746 SYSTABLESPACE catalog table, 82t clause, 205-206 SYSTABSTATS HIST catalog table, 82t USING clause in, 201 system automation, 14 COPY utility and, 190 USING STOGROUP parameter creating, using CREATE System Automation for Multiplatforms for, 201 (SAMP), 12 TABLESPACE, 146, 192, USING VCAT parameter for, 201 200-202 XML, 146, 189, 200, 451 system-level backup and recovery, data partitioned secondary index 427, 457-461 table-check constraints, 682-683 (DPSI) and, 223-224, 223, 224 tables, 31, 141, 142, 143-145, System-Managed Storage (SMS), 175-187, 238-240, 244 228-229 data sets needed and, 191 System Management Facility (SMF), 835 DEFINE parameter for, 201 access plans and, 767-768

System Network Architecture (SNA), 43,

DSSIZE parameter for, 200, 203, 203t

aliases and, 144
ALTER TABLE and, 147–148
auditing and, 136
auxiliary, 143, 183-184
cache, 782, 783–784 <i>t</i>
Cartesian products of, using
SELECT, 256-258, 293
catalog and, 77, 78-83t
changing order (permutation) of
columns in, using SELECT, 254
clone, 144, 147–148, 213–215
column and row maximums in, 181,
181 <i>t</i>
columns in, 239–240
common expressions. See common
table expressions
communications database, 87
conditional operations on, using
SELECT, 255–256
constraints upon. See constraints
copy definition of, using LIKE statement, 184–185
correlation names and, 262–263
created temporary (CTT), 583–586
creating, using CREATE TABLE,
144, 180–183, 240
data change, 277, 295, 307–309
data partitioned, 14
data types in. See data types
declarative referential integrity and,
243
DECLARE and, 149-150, 516-518
declared temporary (DTT),
586–588, 647
DELETE all rows, 286
dependent, 571, 177
detailed cost, 793, 794–796t
dimension, 774
directory, 84, 84 <i>t</i>
distributed data and, in
communications database,
641–642
DROP definitions and, 150
DSN1COPY to add data to, 182 entering data into, using INSERT,
MERGE, UPDATE, 240
EXCHANGE data between, 148
EXPLAIN, 29, 779–801, 780–801 <i>t</i>
fact, 774
filter, 792, 793 <i>t</i>
FROM clause to reference, 143
function, function tables and
EXPLAIN, 757, 781, 782 <i>t</i>
functions, table functions, 695–696
global temporary, 583, 636

```
identity columns in, 184, 593
indexes and. See indexes
INSERTing data into, 182
joins and, using SELECT, 256,
   258-262, 293
keys in, 145, 186, 240-241
large, 8
large objects (LOB) and, 704
LOAD REPLACE clone and, 148
LOADing data into, 182
locking and, 724, 727-728,
   729-731, 732
mapping, when using REORG,
   374-375
Materialized Query (MQT), 15,
   143, 144, 147, 211–213. See also
   Materialized Query Tables
metadata, 708
modifying, with ALTER TABLE,
   185-186, 243
nested. See nested table expressions
NOT LOGGED, recovery of, 451, 471
null-supplying, in joins, 312
null values and NOT NULL, 240
page range, 799, 799t
parallel task, 791, 791-792t
parent-child relationships between,
   243
partitioning in, table- vs.
   index-controlled, 14, 195-197, 196t
permanent (base), 143
predicate, 785, 785-787t
preserved row, in joins, 312
privileges for, 113t
projecting columns from, using
   SELECT, 253-254
query, 800, 801t
range-partitioned, 14, 198
recovery and, 451
removing, with DROP TABLE, 187
renaming, with RENAME TABLE,
   181
REORG utility and, 382-384
restarting DB2 and, 471
restricting rows of, using SELECT,
   255
ROWID columns in, 184
SELECT entire, 251-252
sort, sort table, 796, 796-797t
sortkey value, 797, 798-799t
statement cache, 757
statement, statement table, 757,
   779-780, 780-781t
structure, 787, 788-789t
synonyms and, 144
```

table spaces and. See table spaces temporary (declared/global), 143, 149-150, 182, 583-588, 636 three-part names for, in distributed environments, 645-646 transition, 676, 677–678 triggers and, 668, 676 types of, 143 UNION compatibility in, 300 view reference, 800, 800t views and. See views volatile, 747 XML, 144 TAPE, 75-76 tape copies, 436 TAPEUNITS, 460 Task Center, 33, 37 Task Control Block (TCB), 51 TBSBP16K, 67t TBSBP32K, 67t TBSBP8K, 67t TBSBPOOL, 67t TCP/IP, 22, 43, 92 Application Transparent Transport Layer Security (AT-TLS) and, 104-105 catalog and, 77 distributed data and, 86-87, 639, 640, 641, 642, 643 installation, migration and, 56 TCPALVER, 67t TCPKPALV, 67t TEMPLATE, utilities, 75-76 temporary tables, 143, 583-588, 603, 606, 636 created (CTT), 583-586 DECLARE and, 149-150 DECLARE GLOBAL TEMP TABLE for, 182 declared (DTTs), 586-588, 647 global, 583, 636 TERM, 71t, 377 Terminal Monitor Program (TMP), 49 terminals, logical. See logical terminal (LTERMs) TERMINATE THREAD, 538 termination characters, data types, 158 territory codes, 169 text extenders, 27, 711-714 threads affected by failure, DISPLAY THREAD, 474-475 CMTSTAT and, 658-659 database access threads (DBATs) and, 658

threads, continuted	identifying particular, with	monitoring of, IFCID 16 and,
DISPLAY THREAD, 659	DISPLAY TRACE, 135	681–682
distributed, 636, 659	Instrumentation Facility IDs	order of firing in, 671, 680
inactive, 658	(IFCIDs), 835, 841, 842–853 <i>t</i>	packages of, 679
pooled, 658	invoking, with START/DISPLAY	performance and, 669, 680–681
reuse of, 571	TRACE, 840–841	RAISE_ERROR invalidation of,
threats to security, 99	locking and, 748, 750, 754	679–680
TIME, 67t, 153t, 162, 165, 165t	monitor, 839–840, 844–846 <i>t</i>	recursive, 680
scalar functions for, 165	Open Transaction Environment	REORG utility and, 381
TIME function, 165	(OTE) and, 854 performance, 838–839, 847–852 <i>t</i>	REORG utility and,
Time Sharing Option (TSO), 8, 39,	periodic performance monitoring	OFFPOSLIMIT and INDREFLIMIT as, 383–384
48–49, 49 , 52, 92	and, 854–855	· · · · · · · · · · · · · · · · · · ·
attachment facility for, 44, 46	START TRACE, 835–836	ROLLBACK and, 680 row, 675
call attachment facility (CAF) and, 50	starting/stopping, with	SIGNAL statement and, 680
command issuance from, 69	START/STOP TRACE, 135	SQLSTATE invalidation of, 679–680
DB2 Interactive (DB2I) and, 52	statistics and, 835–836, 853 <i>t</i>	statement, 675–676
distributed data and, 653	System Management Facility	stored procedures and, 684
DSN commands and, 68, 69t	(SMF) and, 835	table-check constraints vs., 682–683
recoverable resource services	TRACE privilege, 115 <i>t</i>	tables and, 668, 676
attachment facility (RRSAF)	Tracker Site recovery, 468–469, 468	transition tables and, 676
and, 51	TRACKMOD parameter, 202	transition tables and, with
utilities and, DSNU CLIST	TRACLOC, 67t	REFERENCING clause, 677–678
command and, 73	TRACSTR, 67 <i>t</i>	transition variables and, 676
TIMELEN, 67t	TRACTBL, 67t	types of, 670, 671
timeouts, locking, 741–744, 743 <i>t</i> , 754	Transaction Management, 50	UPDATE and, 282, 667, 669
TIMESTAMP, 153 <i>t</i> , 162, 163, 165–166	transaction processing, 2	User-Defined Functions (UDF) and,
row change timestamps and, 174–175	global. See global transactions	669, 677, 681, 683–684
scalar functions for, 166	transition tables, triggers, 676, 677–678	uses for, 668
TIMESTAMP function, 166	transition variables, triggers, 676	views and, 668
TIMESTAMP_FORMAT, 166	TRIGGER privilege, 113t	TRKRSITE, 67t
Tivoli software, 2, 12	triggers, 31, 571, 667–685,720	TRUNCATE, 284, 285, 286
Tivoli system automation, 14	activation of, 669-670	trusted connections, 108
top-down approach to design, 231	adding new, 671–672	trusted contexts, 7, 9, 107-108, 137
topology check, 775	after, 669, 672-673	connection trust attributes for,
tournament sort, 90	before, 669, 673-674	110, 110 <i>t</i>
trace, 132–134, 134 <i>t</i> , 137, 834–835	binding of, 679	defining, 109-110
accounting and, 836–838, 842–843 <i>t</i>	CASCADE DELETE and, 681	objects within, ownership of, 125,
audit, 839, 844 <i>t</i>	cascading, 669, 681	128–129
automatic, with AUDIT TRACE	catalog information on, 682	performing tasks on behalf of another
option, 135	combinations of, 678, 678t	in, DBADM and, 111–112
changing events for, using	creating, with CREATE TRIGGER,	TSO. See Time Sharing Option
MODIFY TRACE, 841	670–676	TSQTY, 67t
CICS and, 854, 855	declarative RI and, 683	TSTAMP, $67t$
classes of, 841	defining, 668	tuning guidelines, 828–830, 869. See
continuous performance monitoring	DELETE and, 667, 669, 720	also performance and tuning
and, 854	dropping, using DROP TRIGGER,	two-phase commit, 652–654
detailed performance monitoring	684–685	TWOACTV, 67t
and, 855–856	execution modes for, 670	TWOARCH, 67t
ending, using STOP TRACE, 841	external action of, 683	TWOBSDS, 67t
event classes for, 134t	INSERT and, 279, 667, 669	
exception performance monitoring and, 856	INSTEAD OF, 668, 669, 674–675 invalidation of, SQLSTATE and	U
and, 856 Generalized Trace Facility (GTF)	RAISE ERROR, 679–680	
and, 835	MERGE and, 667	U2, 2 UCS-2 Universal Character Set, 169
anu, oss	MERGE and, 00/	OCS-2 Universal Character Set, 109

USE OF TABLESPACE privilege, 115t

UGCCSID, 67t	
UIFCIDS, 67t	
UMCCSID, 67t	
UMIT2, 67 <i>t</i>	
uncommitted read (UR) isolation level, 733–734, 734 <i>t</i>	
undo records, 430	
Unicode, 161–162, 168–169, 228, 244	
utilities and, DSNUTILU and, 75	
UNION, 251, 300–303	
unions, 277, 295, 300–303, 337	u
ALL clause in, 300–301	u
compatibility of tables for, 300	J
DISTINCT clause in, 300	
subquery pruning and, 302–303, 302	
views and, UNION ALL in,	
301–303	
UNIQUE clause, 215, 220	
unique constraints, 175-176, 182, 247	
deferred, 176	
unique index check, 774	
unique keys, 177, 220, 241, 242	
UNIQUE WHERE NOT NULL, 360	
Unit Of Recovery (UR), 429, 473–474, 479, 576	
Unit Of Work (UOW), 429, 473–474,	
574, 575–576	
distributed (DUW), 638-639	
global transactions and, 583	
remote (RUW), 638	
stored procedures and, 618, 619	
UNIT, 67 <i>t</i>	
Universal Driver, 25, 591	
universal table space, 146, 189,	
197–198, 247, 746	
ALTER TABLESPACE and, 198	
creating, using CREATE	
TABLESPACE, 197–198	u
locking and, 724	
MAXPARTITION clause and,	J
197–198	J
range-partitioned, 198	J
UNIX, 1, 2, 13, 21, 23, 25, 34 DB2 9 for Linux, Unix, Windows	
(LUW) and, 4, 11	u U
distributed data and, TCP/IP and, 86	J
trace and, 855	u
UNIX System Services, 8	J
recoverable resource services	
attachment facility (RRSAF)	J
and, 51	J
UNLOAD phase, REORG utility, 366	
UNLOAD utility, 345, 422	J
Basic Sequential Access Method	J
(BSAM) and, 362	J
(-),	•

CONTINUE, 379-380 DELETE vs., 346 delimited, 364 EXTERNAL, 379-380 ONLY, 379-380 PAUSE, 379-380 phases of, 363 UNLOAD phase of, 363 UTILTERM (termination) phase in, 363 unqualified names, 126-127 unqualified objects, 567–568 UPDATE, 145, 208-209, 240, 250, 251, 278, 282–284, 289, 523, 652 constraints and, 282 data change tables and, 307-309 DB2 private protocol and, 640 distributed data and, coordinating, 652-654 dynamic SQL and, 544 FETCH and, 282, 536-537 identity columns and, 594-595 labeled duration and, 283 large amounts of data and, 284 large objects (LOB) and, 705 multi-row operations using, 591-592 NEXTVAL/PREVVAL and, 188 performance issues and. See performance and tuning positioned updates and, 282, 536-537 row fullselect and, 284 searched updates and, 282 SELECT used with, 283 SET clause and, 283 triggers and, 282, 667, 669 views and, 287, 288 WHERE clause and, 283 update (U) lock, 728–731, 729t, 735-736 UPDATE INDEX, 714 UPDATE privilege, 113t UPDATE rule for referential constraints, 177, 178 updated pages, in buffer pool, 858 URCHKTH, 67t URLGWTH, 67t usage privileges, 115t USAGE ON DISTINCT TYPE privilege, 115t USAGE ON JAR privilege, 115t USAGE ON SEQUENCE privilege, 115t USCCSID, 67t USE OF BUFFERPOOL privilege, 115t USE OF STOGROUP privilege, 115t

User-Defined Data Types (UDTs), 151–152, 167, 170*t*, 687–688, 717 built-in functions for, 690-691 casting and, 688-690 catalog information on, 691 comparison operators allowed in, 689 CREATE DISTINCT TYPE and, 689-690 CREATE TYPE and, 687–688 large objects (LOB) and, 707-708 privileges for, 691 User-Defined Functions (UDFs), 267, 632, 691–703, 717, 720 catalog information on, 703 CREATE FUNCTION and, 692-695, 696, 700 database request module (DBRM) and, 692 deterministic vs. nondeterministic, 697 DISPLAY FUNCTION and, 701 external execution of, 700, 720 external, 692-694 invoking, 696-699 languages supporting, 692 monitoring and controlling, 701 object-relational extensions and, 685 performance and cost information on, 702, 703 polymorphisms and, 699-700 referencing, 698 registering, 694 sourced, 692, 694 SOL and, 692 SQL scalar, 692, 694-695 SQLSTATE and, 694 START FUNCTION and, 701 statistics on, 702 STOP FUNCTION and, 701-702 table functions and, 695-696 TABLE keyword and, 698 triggers and, 669, 677, 681, 683-684 Workload Manager (WLM) and, 700 USING clause, 201 USING STOGROUP parameter, 201 USING VCAT, 201 UTF-16 Unicode Transformation Format, 169. See also Unicode UTF-8 Unicode Transformation Format, 169. See also Unicode UTILINIT phase (initialization) LOAD utility and, 346 REORG utility and, 366 UNLOAD utility and, 363

utilities, 8, 39, 43, 44, 72–77, 574 auditing and, 133 batch processing and, 74 CALL (SQL) and, 74 categories of, 72 CLIST command and, 73 Control Center and, 73–74 DASD or TAPE allocation parameters and, 75–76 DB2I interface and, 72, 73 DD name/DD cards and, 75 DFSMS parameters and, 75 displaying, to view information on, 77 displaying, using DISPLAY UTILITY, 416–417 DSNU CLIST command and, 73 DSNUPROC procedure and, 73 DSNUPROC procedure and, 74 DSNUTILB and, 74 DSNUTILS and, 74–75, 74 DSNUTILU and, 75	versioning, 555 video extenders, 27, 715–716, 715 view reference table, 800, 800t views, 31, 142, 144–145, 208–210, 244, 287–289 access control and, 130 check options, WITH CHECK OPTION for, 209–210 common table expressions and, 306–307 constraints and, 289 creating, with CREATE VIEW, 208–209 DECLARE/ing, 516–518 DELETE and, 287, 288 DISTINCT and, 287 DML statements for, SELECT, INSERT, UPDATE, DELETE, 208–209 EPOM and 287	Virtual Telecommunications Access Method (VTAM) catalog and, 77 data sharing and, 505–506 distributed data and, 86–87, 640, 641, 642 installation, migration and, 56 Vista, 2 Visual Explain, 28, 29, 30, 37 visualization, 28 visualization, data, 20 volatile tables, 747 VOLTDEVT, 68t VSAM. See Virtual Storage Access Method VSE/VM, 2, 21 VTAM. See Virtual Telecommunications Access Method
executing, 72 JCL and, 72 standalone, 72 subsystem type, 72 SYSPRINT file, SYSIBM.SYSPRINT and, 74 SYSTEMPL and, 75 templates for, 75–76 utility mode, for image copies, 441 UTILS_DUMP_CLASS_NAME, 67t UTILTERM (termination) phase LOAD utility and, 348 REORG utility and, 367 UNLOAD utility and, 363 UTIMOUT, 68t	FROM and, 287 GROUP BY and, 287 HAVING and, 287 inline, using nested table expressions, 305 INSERT and, 287, 289 INSTEAD OF triggers and, 287 modifying, 210 nested, WITH CHECK OPTION and, 210 nonread only, 287, 288 read-only, 287–288 read-only, using FROM, GROUP BY, HAVING, DISTINCT, 210 removing, using DROP VIEW, 210 SELECT and, 287 triggers and, 668 unions and, UNION ALL and,	warehousing, 5, 15, 19, 20, 23 DB2 Warehouse 9 and, 6 Web applications, 23, 24 Web servers, 8 Web Services, 10 WebSphere Portal, 2 WebSphere, 2, 10, 13, 19 COMMIT/ROLLBACK and, 575 trace and, 855 trusted contexts and, 108 WebSphere Business Modeler, 2 WebSphere Developer, 1 WebSphere Host Access Transformation Services (HATS), 2 WebSphere MQ, 2 WEEK, 164
VALIDATE, 568 validation, using triggers, 668 VALUE function, joins, 321 VALUES, 523 indexes and, 216 INSERT and, 279 NEXTVAL/PREVVAL and, 188 VALUES INTO, NEXTVAL/PREVVAL, 188 VARBINARY, 6, 152t, 156, 160, 170t VARCHAR data type, 152t, 156, 157–158, 169, 170t VARGRAPHIC, 152t, 156, 157, 169 VARIANCE, 269 VCAT partitioned table spaces and, 193 table spaces and, 201	301–303 UPDATE and, 287, 288 virtual buffer pools, 514, 859 Virtual IP Address (VIPA), 644 Virtual Storage Access Method (VSAM) DSNJLOGF (preformat active log) utility, 412 global transactions and, 584 index spaces and, 147 indexes and, 215 logging and, 431 recovery and, 465 space allocation, 247 stored procedures and, 611, 612 unit of recovery (UR) and, 576 Virtual Tape Storage (VTS), 508	WEEK_ISO, 165 WHERE, 251, 253, 255, 257, 258, 261, 266, 272, 283, 286, 333 host variables/host structures in, 518–520 joins and, 310, 313–317, 320–321, 343 predicates and, 333 subqueries and, 299 WHERE NOT NULL, indexes, 221 wildcard characters, SELECT, 273 Win32, 5 Windows, 1, 2, 5, 11, 13, 17, 18, 22, 23, 25, 34 DB2 9 for Linux, Unix, Windows (LUW) and, 4, 11 trace and, 855 Windows CE, 17

WITH CHECK OPTION, 209-210 XML, 1, 2, 4, 6, 12, 14, 15, 25, 26, steps in, 329 XML namespace and, 328 632. See also PureXML; XPath; WITH GRANT OPTION, 122 XQuery XMLEXISTS and, 330-331 WLMENV, 68t Collections in, 27 XMLPARSE and, 331 WORKFILE database, 227-228 XMLQUERY and, 328-330, 343 data types and, 153t, 166-167, 170t Workgroup, 5, 37 XOuery, 22, 26, 295 decomposition or shredding in, 332 workload management, 5, 8, 9, 12, 13, SELECT use and, 278, 326-332 Extender for, 27, 716 504-505 XSCALE architecture, 18 indexes and, 225-226 Workload Manager (WLM), 8, 12, 41, locking and, 726 44, 504–505, 625–628, 633, 636 namespace and, 328 diagnostic information from, using PureXML, 12 YEAR, 165 CEEDUMP, 627 recovery and, 451 managing environments for, 627 table spaces for, 146, 189, 200, 451 program types for, 626 tables in, 144 runaway stored procedures and XML Collections, 27 z/OS, 1, 2, 21, 34, 37, 39, 40-45 ASUTIME setting and, 625–626 XMLEXISTS, 326, 327, 330-331 address spaces in, 40-42, 41 XMLPARSE, 331 stored procedures and, 613, 625-628 call attachment facility (CAF) and, XMLQUERY, 326, 327, 328-330, 343 subprograms in, 626 50 XPath, 295 user-defined functions (UDFs) customer information control arithmetic expressions in, 328–330 and, 700 system (CICS) and, 46, 47 comparison expressions in, DB2 9 for, 3 VARY and, starting/stopping, 627 328-330 DB2 Connect and, 23 World Wide Web Consortium, 327 decomposition or shredding in, 332 DB2 for, 6, 7, 8, 9, 40 writes, buffer pools, deferred write expressions in, 327–328 information management system threshold (DWQT), 864-865 filter expressions in, 328-330 (IMS) and, 47, 48 logical expressions in, 328–330 recoverable resource services nodes in, 329-330 attachment facility (RRSAF) X path expressions in, 328-330 and, 50-51 X locks, 495 primary expression in, 328-330 time sharing option (TSO) and, XDBDECOMPXML, 332 prolog in, 328 48-49, **49** XES contention, locks/locking, 497 SELECT use and, 278, 326-332 z9 Integrated Information Processors

slash character in, 329-330

(zIIP), 7

XLKUPDT, 68t