

Index

A

Activation group, 293-295
 default (DFACTGRP parameter), 297
 name, 300
 reclaim (RCLACTGRP command), 245

ADDLFM (Add Logical File Member) command, 184

ADDLIBL (Add Library List Entry), 165-166

ADDMSGD (Add Message Description) command, 98, 101

ADDPFM (Add Physical File Member) command, 112, 184-185

ADDPGM (Add Program) command, 265

ADDRPYLE (Add Reply List Entry) command, 133

ALCOBJ (Allocate Object) command, 212-215, 243

Alignment of code lines, 31, 74

Allocation
 ALCOBJ command in, 212-215, 243
 DLCOBJ command in, 212, 214-215

AND, 63-65, 71-73, 75-76, 274

Apostrophe, 24-25, 197

Arithmetic operators, 43-44, 48, 64

Array, simulating, 61

AS/400, 1, 8

Asterisk (*) as comment delimiter, 20-21, 195

Attribute
 initial program (INLPGM), 255
 job, 171, 298
 RTVJOBA (Retrieve Job Attributes) and, 149-150, 170-172, 225-227
 security, 251-252
 use adopted authority, 251

Authority

 adopted, from other programs in call stack, 251

 adopted, risks of, 251

 adopting, 249-251

 CHGOBJOWN (Change Object Owner) command in, 249

 EDTOBJAUT (Edit Object Authority) command in, 248-249

 GRTOBJAUT (Grant Object Authority) command in, 248

 ownership and, 249

 *PUBLIC and, 248

 RVKOBJAUT (Revoke Object Authority) command in, 248-249

 Authorization list, 248, 299

 RTVAUTLE (Retrieve Authorization List Entry) command in, 175

B

Backup, 206, 247
 RTVBCKUP (Retrieve Backup) command in, 175

Based variables, 39

Basic operators and functions, 41-67

Batch job
 debugging and, 279-283

 DUPJOB OPT (Duplicate Job Option) command in, 283

 job queues for, 200, 217-219

 processing, 2, 217-227

 QSYSOPR message queue and, 223-224

 self-submitting programs and, CALL command and, 224-227

 SBMJOB (Submit Job) command in, 218-219, 283-284

 STRSRVJOB (Start Service Job) command in, 283-284

 WRKACTJOB (Work with Active Job) command in, 224

- WRKSBMJOB (Work with Submitted Jobs) command in, 223-224
- WRKSBSJOB (Work with Subsystem Job) command in, 223-224
- WRKUSRJOB (Work with User Jobs) command in, 223-224
- %BIN or %BINARY. *See* Binary conversion (%BIN, %BINARY)
- Binary conversion (%BIN, %BINARY), 61-63
- Binding, 289-293
- Blank lines (in source code), 19-20
 - RTVCLSRC command and, 246
- Body of procedure, 6-7
- Branching, GOTO command in, 83-85
- Break
 - character, 28-29
 - a line of code, 16-17
 - message, 130, 262-263
- BREAK debugger command, 276, 278
- Breakpoint, 270-272, 274-278, 285
 - in ILE source debugging commands, 276
- C**
- CALL command, 18-19, 87-88
 - data queues and, sending/receiving data with, 154-158
 - dynamic calls and, 291
 - parameters use of, 143-146
 - self-submitting (to batch) programs and, 224-227
- SBMJOB (Submit Job) command and, 220-222
- TFRCTL (Transfer Control) command and, 91-92
- CALLPRC (Call Procedure) command, 87-88, 143
- CALLSUBR (Call Subroutine) command, 85-87
- Case-conversion functions (%UPPER and %LOWER), 49-50
- Case sensitivity, 14, 28
 - constants and, 23-24, 26
 - variables and, 29, 34
- *CAT/*BCAT/*TCAT. *See* Concatenation (*CAT/BCAT/TCAT)
- CHGCMD (Change Command) command, 252
- CHGCURLIB (Change Current Library) command, 165, 167
- CHGDTAARA (Change Data Area) command, 147-148
- CHGJOB (Change Job) command, 66-67, 134, 149, 170-172, 298
 - variables used with, 35-36
- CHGJOB (Change Job Description) command, 255
- CHGLIBL (Change Library List) command, 165-166
- CHGLFM (Change Logical File Member) command, 184
- CHGMSGD (Change Message Description) command, 98
- CHGMSGQ (Change Message Queue) command, 95, 120
- CHGOBJD (Change Object Description) command, 211-212
- CHGOBJOWN (Change Object Owner) command, 249
- CHGPFM (Change Physical File Member) command, 184
- CHGPRF (Change Profile) command, 173-174
- CHGSYSLIBL (Change System Library List), 165-167, 261
- CHGSYSVAL (Change System Value) command, 170
- CHGUSRPRF (Change User Profile) command, 173-174, 252
- CHGVAR (Change Variable) command, 12-17, 38, 41-50, 60, 74, 77
 - %BIN function and, 63
 - arithmetic operators in, 43-44
 - for data conversion, 52-53

- DOWHILE and, 80, 82
 - and quotes in code, 197-199
 - to turn on indicator, 182
- CHAR type, 6, 31
- Character constant, 16-17, 24-25, 27, 88, 145, 198
- Character strings, quotes and, 198-199
- Character variables, translate, using QDCXLATE API, 242-243
- CHKOBJ (Check Object) command, 112, 205-207, 250
 - escape messages for, 206-207
- CL
 - applications and uses for, 1-2
 - capabilities of, 2
 - history of, 1
 - limitations of, 2
 - procedure, parts of, 3-8
- Cleanup
 - RTVCLNUP (Retrieve Cleanup) command, 175
- CLRDTAQ (Clear Data Queue) utility command, 154-155
- CLRMSGQ (Clear Message Queue) command, 133
- CLRPFM (Clear Physical File Member) command, 184, 220
- CLOSE command, 183
- COBOL, 1, 240, 289
- Code. *See* Program execution; Source code
- Command line and security, 251-253
- Command strings, quotes and, 199, 219, 236
- Command-level (global) MONMSG, 113-114
- Comment line, 20-21
- Comparison operator, 69-71
- Compiling CL, 6, 8-9, 11, 17-18
 - CRTBNDCL (Create Bound CL Program) command in, 17-18
- Completion message, 96, 118, 124, 291
- Complex logical expression, 71-73
- Concatenation
 - (*CAT/*BCAT/*TCAT), 47-48, 64-65, 200-201, 221, 273
- Configuration, CL used for, 2, 175
- Constants, 23-28
 - character, 23-25
 - decimal, 25-26
 - expressions using, 64-65
 - hexadecimal, 26-27, 90
 - integer, 26
 - logical, 27
 - *NULL, 27-28
 - passing as parameters, 90, 145
 - quotation marks used with, 23-27
- Continuing code to next line, 13, 16-17
- Control characters, selective prompting and, 232-234
- Control languages, 177
- Control statements, 69-92
 - ENDPGM (End Program) command as, 91
 - RETURN command as, 91
 - TFRCTL (Transfer Control) command as, 91-92
- CPYSPLF (Copy Spooled File) command, 194
- Copy, binding by, 289-291
- COPYRIGHT command, 4-5
- CRTxxx (Create) commands, 203-204
- CRTBNDCL (Create Bound CL Program) command, 6, 17-18, 82, 293, 296, 298
- CRTCLMOD (Create CL Module) command, 6, 82, 292-293
- CRTCMD (Create Command) command, 252
- CRTDTAARA (Create Data Area) command, 146, 148, 203-204
- CRTDTAQ (Create Data Queue) command, 153
- CRTDUPOBJ (Create Duplicate Object) command, 15, 191, 210-212
- CRTJOB (Create Job Description) command, 255

CRTMSGF (Create Message File)
command, 97

CRTMSGQ (Create Message Queue)
command, 94

CRTOUTQ (Create Output Queue)
command, 203

CRTPF (Create Physical File)
command, 178, 183, 239

CRTPGM (Create Program) command,
249, 292-293

CRTSRVPGM (Create Service
Program) command, 249, 292-293

CRTSBSD (Create Subsystem
Description) command, 210-211

CRTTBL (Create Table) command,
109, 243

CRTWRKF (Create Work File) utility
command, 191

CVTDAT (Convert Date) command,
65-67

CVTPRTF (Convert Print to Physical
File) utility command, 195

D

Data areas, 143, 146-148

- CHGDTAARA (Change Data Area)
command in, 147-148
- CRTDTAARA (Create Data Area)
command in, 146-148, 203-204
- DLTDTAARA (Delete Data Area)
command in, 146, 148
- DSPDTAARA (Display Data Area)
command in, 147-148
- group, 148
- local, 46, 143, 148-149
- RTVDTAARA (Retrieve Data Area)
command in, 147-148, 175
- special types of, 148

Data queues, 94, 143, 153-164

- advantages and disadvantages of
using, 163-164
- clearing data from, 154-155, 158
- clearing, QCLRDTAQ command for,
158

CRTDTAQ (Create Data Queue)
command in, 153

- description, retrieving with
QMHQRDQD API, 158-160

DLTDTAQ (Delete Data Queue)
command in, 153-154

- *FIFO type, 153-154, 160
- keyed, 153-158, 160-162
- *LIFO type, 153-154, 160
- receiving from, QRCVDTAQ
program for, 156-157, 160
- RGZDTAQ utility command for, 162
- sending and receiving data to/from,
CALL command and, 154-158
- sending to, QSNDDTAQ program
for, 155-156
- types of, 153
- utility commands for, 162

Data type, 2, 31

Database management

- ADDLFM (Add Logical File
Member) command in, 184
- ADDPFM (Add Physical File
Member) command in, 184-185
- CHGLFM (Change Logical File
Member) command in, 184
- CHGPFM (Change Physical File
Member) command in, 184
- CLRPFM (Clear Physical File
Member) command in, 184
- DLTF (Delete File) command in,
110-111, 113-114, 183, 204
- DSPFFD (Display File Field
Description) command in, 192
- DSPRCDLCK (Display Record
Locks) command in, 215
- OVRDBF (Override with Database
File) command and, 179-181, 185-
186, 188-189, 251
- RGZPFM (Reorganize Physical File
Member) command in, 184, 195,
214, 249
- RMVM (Remove Member)
command in, 184-185

- RTVMBRD (Retrieve Member Description) command in, 176, 209-210
- Date and time
 - CVTDAT (Convert Date) command for, 65-67
 - DLYJOB (Delay Job) command and, 243-244
- Debugging, 265-287
 - ADDPGM (Add Program) command for, 265
 - breakpoints in, 270-272, 274-278, 285
 - commands for, summary of, 276
 - DSPMODSRC (Display Module Source) command in, 266, 285
 - DMPCLPGM (Dump CL Program) command in, 285-287
 - DUPJOB OPT (Duplicate Job Option) command in, 283
 - ENDDBG (End Debug) command in, 266, 273, 285
 - EVAL (Evaluation) command in, 271-274, 278
 - example of interactive session in, 266-270
 - Integrated Language Environment (ILE) programs in, 265-266
 - list view in, 276-277
 - Original Program Model (OPM) programs and, 279
 - PGM parameter in, 265
 - RMVPGM (Remove Program) command for, 265
 - source view in, 270-275
 - SRVPGM parameter in, 265
 - STRDBG (Start Debug) command in, 265-266, 270, 277, 279, 284
 - STRSRVJOB (Start Service Job) command in, 283-284
 - statement view in, 277-278
 - STEP command in, 275
 - UPDPROD (Update Production Files) in, 265
 - views in, 266
 - WATCH command in, 275
 - within another job, simultaneous use of, 279-285
- Decimal constant, 24-27, 45, 88, 145
- Declarations, 5-6, 28-31, 37
- DCL (Declare CL Variable) command, 5-6, 28-31, 84, 112
 - clear coding of, with variables, 31-36
 - parameters for, 36
 - variable declaration using, 28-31
- DCLF (Declare File) command, 6, 84, 112, 142, 177-179, 183, 277
- DCLPCOPT (Declare Processing Option) command, 6, 84, 87, 279
- DLYJOB (Delay Job) command, 243-244
- DLTxxx (Delete) commands, 204-205
- DLTDTAARA (Delete Data Area) command, 146, 148
- DLTDTAQ (Delete Data Queue) command, 153-154
- DLTF (Delete File) command, 110-111, 113-114, 183, 204
- Delete line of code, 13
- DLTSPLF (Delete Spooled File) command, 194
- Diagnostic message, 96, 104, 118, 120, 124, 134, 234-235
- DSPCMD (Display Command) command, 239, 252
- DSPDTAARA (Display Data Area) command, 147-148
- DSPFFD (Display File Field Description) command, 192
- Display file
 - message subfiles in, 134-138, 142
 - OVRDSPF (Override with Display File) command in, 186
- DSPJOB (Display Job) command, 149, 252, 298
- DSPLIB (Display Library) command, 34-36, 296
 - variables used with, 34-36

DSPMSG (Display Message)
command, 23, 131-132, 142, 199,
223-224, 229, 252, 256, 262

DSPMSGD (Display Message
Description) command, 98

DSPMODSRC (Display Module
Source) command, 266, 285

DSPOBJD (Display Object Description)
command, 191-192

DSPOVR (Display Overrides)
command, 187

DSPPGM (Display Program) command,
191-192

DSPRCDLCK (Display Record Locks)
command, 215

DSPUSRPRF (Display User Profiles)
command, 194

DO command, 17, 73-76, 83, 112
ELSE with, 77
nesting, 74-75, 82
single-level groups in, 73-74

DOFOR command, 81-82

DOUNTIL command, 80-82

DOWHILE command, 80, 82

DMPCLPGM (Dump CL Program)
command, 87, 285-287

DUPJOB OPT (Duplicate Job Option)
command, 283

Dynamic calls, 289, 291-292

E

EDTOBJAUT (Edit Object Authority)
command, 248-249

ELSE command, 76-78
DO with, 77-78

Embedded quotes, 13, 25, 198-201

ENDDBG (End Debug) command, 266,
273, 285

ENDPGM (End Program) command, 7-
8, 20, 84, 91

ENDRCV (End Receive) command,
178-179

ENDSUBR (End Subroutine)
command, 85-87

ENDDO command, 73-78, 80, 112

ENDSELECT command, 79

*EQ, 70

Error handling
error messages in, 110-111
CRTDTAARA (Create Data Area)
command and, 203-204
INCLUDE command for, 8
MONMSG (Monitor Message)
command in, 6, 87, 110-115
command-level (global), 113-114
program-level (global), 112-113
MONMSG and global error trapping
in, 6
selective prompting and, 234
specific vs. generic monitoring in,
114-116

Error messages, 110-111

Escape messages, 55, 96, 118, 142, 172,
178, 203, 214, 230, 234, 239, 250,
283, 299
for CHKOBJ, 206-207

EVAL (Evaluation) command, 271-274,
278

Expressions, 41, 44, 64-65
logical, 69-73, 274
quotes used in, 199-201

F

F4 key to format CL statements, 10-13,
16-17

*FIFO data queues, 153-154, 160

File management, 169-187

ADDLFM (Add Logical File
Member) command in, 184

ADDPFM (Add Physical File
Member) command in, 184-185

CHGLFM (Change Logical File
Member) command in, 184

CHGPFM (Change Physical File
Member) command in, 184

CLRPFM (Clear Physical File
Member) command in, 184

CLOSE command in, 183

- CRTDUPOBJ (Create Duplicate Object) command in, 210-212
- CRTPF (Create Physical File) command in, 178, 183
- CRTWRKF (Create Work File) utility command in, 191
- database file member processing in, 184-185. *See also* database management
- DCLF (Declare File) command in, 177-179, 183
- DLTF (Delete File) command in, 110-111, 113-114, 183, 204
- DSPFFD (Display File Field Description) command in, 192
- DSPOVR (Display Overrides) command in, 187
- ENDRCV (End Receive) command in, 178-179
- outfiles and, 191-194
- override commands in, 179, 186-190
- OVRDBF (Override with Database File) command and, 179-181, 185-186, 188-189, 251
- OVRDSPF (Override with Display File) command in, 186
- OVRPRTF (Override with Printer File) command in, 186
- printing output from, using OUTPUT(*PRINT), 194-195
- QTEMP library to capture output in, 189-194
- random input and, using RCVF for, 179-181
- RCVF (Receive File) command in, 178-181
- record-by-record processing of files in, 177-183
- RMVM (Remove Member) command in, 184-185
- RGZPFM (Reorganize Physical File Member) command in, 184, 195, 214, 249
- RTVMBRD (Retrieve Member Description) command in, 176, 209-210
- SNDF (Send File) command in, 181-182
- SNDRCVF (Send/Receive File) command in, 181-182
- sort files with OPNQRYF (Open Query File) command in, 187-189
- WAIT command in, 178-179
- whole-file processing in, 183-187
- work files (permanent) in, 190-191
- FNDOBJ program, 207-208
- Floating point data, 90-91
- Formatting statements using F4, 10-13, 16-17
- FWDPGMSG (Forward Program Message) utility command, 207-208
- Function keys, selective prompting and, 230-234
- Functions, 45-63
- ## G
- *GE logical operator, 70
- Generic messages, 114
- Global error trapping and MONMSG, 6
- GOTO command, 7, 15-16, 83-84, 87, 113
- GRTOBJAUT (Grant Object Authority) command, 248
- Group data areas, 148
- Group profiles, change all, 192-194
- *GT logical operator, 70
- ## H
- Hexadecimal constants, 26-27, 90
- Hierarchy of operators, 44
- High-level languages, 1, 151
- ## I
- IBM i operating system, 1-2, 8, 174
- executable code types allowed by, 289
- job queues in, 217-218

- messaging in, 93-94, 100, 133
- QDCXLATE provided by, 242-243
- security in, 247, 250, 252
- SQL support in, 195

IF command, 69-73

- complex logical expressions and, 71-72
- logical expressions and, 69-73
- nesting, 75-76
- THEN and, 75

ILE. *See* Integrated Language Environment

Indenting source code, 11, 13, 17, 74-75, 78, 159

Informational messages, 96, 104, 107, 119, 124, 129-131, 134

Initial programs, 255. *See* Sign-on programs

INLPGM attribute, sign-on programs and, 255

Inquiry messages, 95, 105, 108-109, 118-119

Insert line code, 13

Integer constant, 26

Integrated Language Environment (ILE), 289-300

- activation groups in, 284-286
- binding in, 289-293
- compilation in, 292-293
- compilation, parameter descriptions for, 295-300
- CRTBNDCL (Create Bound CL) command in, 293
- CRTCLMOD (Create CL Module) command in, 292
- CRTPGM (Create Program) command in, 293
- CRTSRVPGM (Create Service Program) command in, 292
- debugging and, 265-266, 295, 298, 300
- dynamic calls in, 289, 291-292
- object code in, 289
- procedures in, 289

- programs in, 289

Interprogram/intermodule communications, 143-164. *See also* database management; parameters; data areas; switches; messages; data CALL command and, 143, 145

- data areas for, 146-148
- data queues in, 153-164. *See also* Data queues
- Data queues
- message for, 151-152, 160-161. *See also* Message management
- parameters for, 143-146
- switches for, 149-151. *See also* Switches
- TFRCTL (Transfer Control) command and, 143, 146

ITERATE command, 7, 82

J

Job management, 165-176. *See also* Switches

- ADDLIB (Add Library List Entry) in, 165-166
- ALCOBJ (Allocate Object) command in, 212-215
- attributes or settings of, manipulating, 170-172
- batch job processing in. *See* Batch job processing
- CHGCURLIB (Change Current Library) in, 165, 167
- CHGJOB (Change Job) command and, 170-172
- CHGJOB (Change Job Description) command in, 255
- CHGLIBL (Change Library List) in, 165-166
- CHGPRF (Change Profile) command in, 173-174
- CHGSYSLIBL (Change System Library List) in, 165-167
- CHGUSRPRF (Change User Profile) command in, 173-174, 252

- CRTJOB (Create Job Description)
 command and, 255
 data areas for, 146-148
- DLCOBJ (Deallocate Object)
 command in, 212, 214-215
- DLYJOB (Delay Job) command in,
 243-244
- DSPJOB (Display Job) command in,
 149, 298
- DUPJOB (Duplicate Job Option)
 command in, 283
 interactive jobs and, 215, 217, 226
 job message queues for, 93-94
 job queues for, 210
 library list support in, 165-167
- QSYSOPR message queue, 223-224
- RMVLIBLE (Remove Library List
 Entry) in, 165-166
- RTVxxx (Retrieve) commands used
 in, 175-176
- RTVJOBA (Retrieve Job Attributes)
 command and, 149-150, 170-172,
 225-227
- RTVNETA (Retrieve Network
 Attributes) command in, 174, 176
- RTVUSRPRF (Retrieve User Profile)
 command in, 173-176
- scheduler program for, using
 RTVSYSVAL command, 167-168
- sign-on programs and job
 descriptions, 255-256
- STRSRVJOB (Start Service Job)
 command in, 283-284
- SBMJOB (Submit Job) command in,
 218-221
- switches in, 149-151
- system values and, 167-170
- user profiles in, manipulating, 173-
 174
- WRKACTJOB (Work with Active
 Job) command in, 224
- WRKJOBQ (Work with Job Queue)
 command in, 223
- WRKSBJMJOB (Work with
 Submitted Jobs) command in, 223-
 224
- WRKSBSJOB (Work with
 Subsystem Job) command in, 223-
 224
- WRKUSRJOB (Work with User
 Jobs) command in, 223-224
- Job message queue, 93-94
- Job queue, 217-223, 227
- WRKOBJQ (Work with Job Queue)
 command in, 223
- Job scheduler program, using
 RTVSYSVAL command, 167-168
- ## K
- Keyed data queue, 153-158, 160-162
- Keys, message, KEYVAR parameter,
 106, 120
- KEYVAR parameter, 106, 120
- Keywords, 5, 12-16
- ## L
- Label, 7, 13-14, 115, 150, 227, 232,
 236, 297
- GOTO command and, 83-84
- subroutine use of, 83-85
- *LE logical operator, 70
- LEAVE command, 7, 82
- LEN parameter in a variable, 5, 30-31,
 37
- Library/library lists, 2, 9, 18, 36, 49, 87-
 88, 94, 97-98, 125, 155, 160, 165-
 167, 175-176
- ADDLIBLE (Add Library List Entry)
 in, 165-166
- CHGCURLIB (Change Current
 Library) in, 165, 167
- CHGLIBL (Change Library List) in,
 165-166
- CHGSYSLIBL (Change System
 Library List) in, 165-167
- DSPLIB (Display Library) command,
 34-36, 296

QTEMP library to capture output in, 189-194
RMVLIBLE (Remove Library List Entry) in, 165-166
RTVLIBD (Retrieve Library Description) command in, 176
selection of, 9
utility commands placed in, 293
*LIFO data queues, 153-154, 160
Limitations of CL, 2
List view debugging, 276-277
Literals, 14, 222, 241. *See also* Constants
Locks and locking, 212-215
 DSPRCDLCK (Display Record Locks) command in, 215
 WRKOBJLCK (Work with Object Locks) command in, 215
Logical constant, 27
Logical expression, 69-73
 complex, 71-73
Logical operator, 64-65, 70-71, 75, 182
Logical variable, 29-31, 63-64, 70-71, 149, 181-182, 260-261
 AND, OR, NOT and, 63-64
Loops
 DOFOR command and, 81-82
 DOUNTIL command and, 80-82
 DOWHILE command and, 80, 82
 GOTO command in, 83-84
 ITERATE command and, 71, 71
 LEAVE command and, 71, 71
%LOWER. *See* Case-conversion functions
*LT logical operator, 70

M

Menu program (PRTCTLMNU), using subfiles, 135-142
Message management, 93-142, 143
 ADDMSGD (Add Message Description) command in, 98, 101
 ADDRPYLE (Add Reply List Entry) command in, 133
 CHGMSGD (Change Message Description) command in, 98
 CHGMSGQ (Change Message Queue) command in, 95, 120
 CLRMSGQ (Clear Message Queue) command in, 133
 command-level (global) MONMSG in, 113-114
 completion messages in, 96, 118, 124
 CRTMSGF (Create Message File) command in, 97
 CRTMSGQ (Create Message Queue) command for, 94
 descriptions of messages in, 98-100
 diagnostic messages in, 96, 104, 118, 120, 124, 134
 DSPMSG (Display Message) command in, 23, 131-132, 142, 199, 223-224, 229, 252, 256, 262
 DSPMSGD (Display Message Description) command in, 98
 error messages in, 110-111
 escape messages in, 96, 118, 142
 FWDPGMMMSG (Forward Program Message) utility command in, 207-208
 generic messages in, 114
 impromptu vs. predefined messages in, 93, 96-97, 100, 104, 107, 121, 125, 129-130
 informational messages in, 96, 104, 107, 119, 124, 129-131, 134
 inquiry messages in, 95, 105, 108-109, 118-119
 interprogram/intermodule communications and, 151-152, 160-161
 job message queues in, 93-94
 keys with, KEYVAR parameter for, 106, 120
 Menu program for (PRTCTLMNU), using subfiles, 135-142
 message files in, 97

- MONMSG (Monitor Message)
 command in, 110-115
 monitored messages in, 110-116
 new versus old messages in, 96-97, 100
 notify messages in, 96-97, 104
 permanent message queues in, 94, 105, 107, 116-117, 120, 127, 129
 predefined message queues for, 94
 predefined messages in, 94, 96-100
 program message queues for, 94, 96, 100-101, 104-105, 107, 116-117, 126-128, 137-138, 142
 program-level (global) MONMSG in, 112-113
 purpose of message in, categorization by, 95-96
 QSYSOPR message queue and, 223-224
 queues in, 93-94
 RCVMSG (Receive Message)
 command in, 95, 105-106, 115-126
 receiving replies to, MSGRPY parameter for, 108-109
 recipient who should get message in (TOPGMQ parameter), defining, 101-104, 116
 recipient who should get message in (TOUSR parameter), defining, 103-104, 108
 RMVMSGD (Remove Message Description) command in, 98
 RMVMSG (Remove Messages)
 command in, 106, 126-129
 remove received messages in, 126
 replies to, requesting in, RPYMSGQ parameter for, 105-106, 130-131
 reply messages in, 95
 request message in, 95
 RTVMSG (Retrieve Message)
 command in, 176
 return types in, 124-125
 SNDBRKMSG (Send Break Message) command in, 130-131
 SNDMSG (Send Message) command in, 129-130, 199, 229-233
 SNDRPY (Send Reply) command in, 126, 129
 SNDUSRMSG (Send User Message) command in, 107-109
 severity levels of messages in, 99, 121, 132
 specific vs. generic monitoring in, 114-116
 status messages in, 96
 subfiles for, 134-138, 142
 system reply list in, 133-134
 TRNTBL (translate) parameter in, 108-109
 types of messages in, 94-97
 types of messages in, defining with MSGTYPE parameter, 104, 107, 117-120, 131, 233
 wait time for, 125-126
 what to say in message (contents of), 100-101
 WRKMSGD (Work with Message Descriptions) command in, 98
 WRKMSG (Work with Messages) command in, 131-133
 Message queues, MONMSG (Monitor Message) command in, 96
 Message subfiles, 134-138, 142
 Minus (-) sign as continuation character, 16-17
 Modules, 17
 interprogram/intermodule communications in, 143-164. *See* interprogram/intermodule communications
 MONMSG (Monitor Message)
 command, 5-6, 87, 96, 110-115, 142, 194, 199, 214
 global, 5-6, 20, 84, 263

- selective prompting and, 232, 234-239
- trapping errors with, 203-205

Monitored messages, 110-116

MOV OBJ (Move Object) command, 211-212

MSGTYPE parameter, defining

- message type, 104, 107, 117-120, 131, 233

MYLIB library, 9, 18, 88

message management and, 97-99

N

Naming variables, 29

*NE logical operator, 70

Nested DO, 74-75, 82

Nested IF, 75-76

Networks, RTVNETA (Retrieve Network Attributes) command, 174, 176

*NG logical operator, 70

Nibble, 26

*NL logical operator, 70

NOT, 63-64

Notify messages, 96-97, 104

*NULL, 27-28

O

Object code, ILE, 289

Object management, 2, 203-215

- ALCOBJ (Allocate Object) command in, 212-215
- CHGOBJD (Change Object Description) command in, 211-212
- CHGOBJOWN (Change Object owner) command in, 249
- CHKOBJ (Check Object) command in, 112, 205-207, 250
- CRTxxx (Create) commands, 203-204
- CRTDUPOBJ (Create Duplicate Object) command in, 210-212
- DLCOBJ (Deallocate Object) command in, 212, 214-215

- DLTxxx (Delete) commands in, 204-205
- DSPOBJD (Display Object Description) command in, 191-192
- DSPRCDLCK (Display Record Locks) command in, 215
- EDTOBJAUT (Edit Object Authority) command in, 248-249
- escape messages for CHKOBJ and, 206-207
- FND OBJ program in, 207-208
- GRTOBJAUT (Grant Object Authority) command in, 248
- manipulating objects in, 211-212
- MOV OBJ (Move Object) command in, 211-212
- ownership of, 249
- *PUBLIC and, 248
- RNMOBJ (Rename Object) command in, 211-212
- RTVMBRD (Retrieve Member Description) command in, 176, 209-210
- RTVOBJD (Retrieve Object Description) command in, 176, 207-208
- RVKOBJAUT (Revoke Object Authority) command in, 248-249
- securing *PGM object in, 247-248
- WRKOBJLCK (Work with Object Locks) command in, 215

OPNQRYP (Open Query File) command, 187-189, 199-201, 237-238, 294

Operators, 41-67

- arithmetic, 43-44, 48, 64
- comparison, 69-71
- hierarchy of, 44
- logical (AND, OR, NOT), 63-64

OPM. *See* Original Program Model (OPM)

OR, 63-64

Original Program Model (OPM), 17, 87, 91, 244, 293

debugging in, 265, 279
 OS/400. *See* IBM i operating system
 OTHERWISE command, 79
 Outfiles, 191-194
 Output queue management, CRTOUTQ
 (Create Output Queue) command in,
 203
 OUTPUT(*PRINT), 194-195
 Overlaid/overlying variables, 37, 46-
 47, 54
 OVRDBF (Override with Database
 File) command, 179-181, 185-186,
 188-189, 194, 251
 OVRDSPF (Override with Display File)
 command, 186
 OVRPRTF (Override with Printer File)
 command, 186
 Override commands, 185-187
 Ownership and authority, 249

P

Parameters, 14-16
 CALL command and, 87-88, 143-146
 command prompter and, 13
 constants for, 90, 145
 interprogram/intermodule
 communication using, 143-146
 keywords as, 14-16
 PARM parameter to list, 4
 passing constants as, 90-91
 passing variables as, 88-90
 positional, 14-16
 sign-on programs and, 255
 TFRCTL (Transfer Control)
 command and, 143-146
 variables as, 88-90, 143-146
 PARM parameter, 4
 Passing constants as variables, 90-91
 Passing parameters, 88-91, 143-146
 Patterns, scan, using QCLSCAN API,
 239-242
 Permanent message queues, 94, 105,
 107, 116-117, 120, 127, 129
 *PGM object, security and, 247-248

Physical file, 9
 Plus (+) sign as continuation character,
 16
 Pointers/pointer variables, 5, 28-29, 37-
 38
 Positional parameters, 14-16
 power schedules, RTVPWRSCDE
 (Retrieve Power Schedule Entry)
 command in, 176
 Power up/down, 2
 Predefined message queues, 94
 Predefined messages, 94, 96-100. *See*
 also Message management
 Printer management
 CPYSPLF (Copy Spooled File)
 command in, 194
 DLTSPLF (Delete Spooled File)
 command in, 194
 OVRPRTF (Override with Printer
 File) command in, 186
 Printing output to, using
 OUTPUT(*PRINT), 194-195
 Procedures in CL, 3-8, 10-11, 15, 35
 binding in, 289-293
 blank lines in, 19-20
 body of, 6-7
 CALL command for, 87-88
 CALLPRC (Call Procedure)
 command in, 87-88
 commands in, 2,
 comment lines in, 20-21
 compiling, 17-18
 COPYRIGHT command in, 4-5
 declarations in, 5-6
 DCL (Declare) command in, 5-6
 DCLF (Declare File) command in, 6
 DLYJOB (Delay Job) command in,
 243-244
 ENDPGM (End Program) command
 in, 7-8
 global error trapping and MONMSG
 in, 6
 keywords in, 5, 12-16
 labels in, 7

- Monitor Message (MONMSG)
 - command in, 6
 - optional components of, 19-21
 - parameters in, 8, 36
 - PARM parameter in, 4
 - PGM (Program) command in, 4-5, 7
 - program execution and, 15, 18-19
 - program message queues for, 94, 96
 - RTVUSRPRF (Retrieve User Profile) in, 7
 - selective prompting within. *See* selective prompting
 - source code entry in, using SEU, 8-17
 - starting SEU for, 9-10
 - structure of, 3-8
 - subroutines used in, 84-87
 - uppercase/lowercase in, 14
 - Program (PGM) command, 6-7, 7, 9
 - Program Development Manager (PDM), 10
 - Work with Members Using PDM (WRKMBRPDM) in, 10
 - Program execution, 15, 18-19
 - activation groups in, 284-286
 - binding in, 289-293
 - command-level (global) MONMSG in, 113-114
 - compilation in, 292-293
 - compilation, parameter descriptions for, 295-300
 - control statements in, 69-92
 - CRTBNDCL (Create Bound CL) command in, 293
 - CRCTLMOD (Create CL Module) command in, 292
 - CRTPGM (Create Program) command in, 293
 - CRTSRVPGM (Create Service Program) command in, 292-293
 - DSPPGM (Display Program) command in, 191-192
 - DMPCLPGM (Dump CL Program) command in, 285-287
 - dynamic calls in, 289
 - interprogram/intermodule communications in, 143-164. *See also* interprogram/intermodule communications
 - program message queues for, 94, 96
 - program-level (global) MONMSG in, 112-113
 - QCMDCHK API for, 234-236, 239
 - QCMDEXC API for, 236-239
 - RCLRSC (Reclaim Resources) command in, 244-245
 - subroutines and, 84-87
 - Program message queues, 94, 96, 100-101, 104-105, 107, 116-117, 126-128, 137-138, 142
 - Program-level (global) MONMSG, 112-113
 - Programming languages, 1
 - Program, as executable code type, 289
 - Prompting, selective. *See* selective prompting
 - PRTCTLMNU menu program, using subfiles, 135-142
 - *PUBLIC, 248
- ## Q
- QCLRDTAQ program for clearing data queue, 158
 - QCLSCAN API to scan for patterns, 239-242
 - QCLSRC physical source file, 8-9, 296
 - QCMD, security and, 251, 253
 - QCMDCHK API, 234-236, 239
 - QCMDEXC API, 35, 60, 205, 236-239, 251
 - unallowed commands with, 239
 - QDCXLATE API to translate characters, 242-243
 - QMHQRDQD API, data queue description, 158-160, 162
 - QRCVDTAQ program for receiving from data queues, 156-157, 160

- QSNDDTAQ program for sending to data queues, 155-156
- QSYS, security and, 252
- QSYSOPR message queue, 223-224
- QSYSTRNTBL translation table, 234
- QTEMP
to capture file output, 189-194
CRTDUPOBJ (Create Duplicate Object) command in, 191
CRTWRKF (Create Work File) utility command in, 191
work files (permanent) in, 190-191
- Question mark (?), selective prompting and, 229
- Queue management, 2
- Queues, message, 93-94. *See also* Message management
- "E variable, 200-201
- Quotes, 13-14, 23-27, 145, 150, 197-201
"E variable and, 200-201
apostrophe vs., 197
character strings and, 197-199
command strings and, 199
embedded, 13, 25, 198-201
expressions using, 199
multiple, 199-200
single vs. double, 197
- QUSCMDLN, security and, 253
- R**
- Random input, using RCVF, 179-181
- RCVF (Receive File) command, 178-181
- RCVMSG (Receive Message)
command, 95, 105-106, 115-126
command lines and, 253
from where, PGMQ/MSGQ parameters for, 105, 116-117
interprogram/module communication using, 152
remove received messages in, 126
return types in, 124-125
wait time for, 125-126
which message to receive, MSGTYPE/MSGKEY parameters for, 104, 107, 117-120, 131, 233
- Recipient of message (TOPGMQ parameter), defining, 101-104, 116
- Recipient of message (TOUSR parameter), defining, 103-104, 108
- RCLRSC (Reclaim Resources) command, 244-245
- Record-by-record file processing, 177-183
- Reference, binding by, 289, 291
- RMVLIBLE (Remove Library List Entry), 165-166
- RMVM (Remove Member) command, 184-185
- RMVMSGD (Remove Message Description) command, 98
- RMVMSG (Remove Messages) command, 106, 126-129
- RMVPGM (Remove Program) command, 265
- RNMOBJ (Rename Object) command, 211-212
- RGZPFM (Reorganize Physical File Member) command, 184, 195, 214, 249
- Replies to messages, RPYMSGQ, 105-106, 130-131
- Reply messages, 95
- Request messages, 95
- Resource management
RCLRSC (Reclaim Resources) command in, 244-245
- RTVxxx (Retrieve) commands, 175-176
QCMDEXC API not allowed with, 239
- RTVAUTLE (Retrieve Authorization List Entry) command, 175
- RTVBCKUP (Retrieve Backup) command, 175
- RTVCLSRC (Retrieve CL Source) command, 245-246

- RTVCLNUP (Retrieve Cleanup)
command, 175
- RTVCFGSTS (Retrieve Configuration Status) command, 175
- RTVDTAARA (Retrieve Data Area)
command, 147-148, 175
- RTVJOBA (Retrieve Job Attributes)
command, 149-150, 170-172, 225-227
- RTVLIBD (Retrieve Library Description) command, 176
- RTVMBRD (Retrieve Member Description) command, 176, 209-210
- RTVMSG (Retrieve Message)
command, 176
- RTVNETA (Retrieve Network Attributes) command, 174, 176
- RTVOBJD (Retrieve Object Description) command, 176, 207-208
- RTVPWRSCDE (Retrieve Power Schedule Entry) command, 176
- RTVSYSVAL (Retrieve System Value)
command, 167-169, 171-176
- RTVUSRPRF (Retrieve User Profile)
command, 7, 173-176, 257-258, 260, 262
- RETURN command, 91
- Return types, messages, 124-125
- RVKOAJAUT (Revoke Object Authority) command, 248-249
- RPG, 1-2, 8, 10, 23, 45
- RPYMSGQ parameter, requesting message replies, 105-106, 130-131
- S**
- Scan for patterns using QCLSCAN API, 239-242
- Scheduler program, using RTVSYSVAL command, 167-168
- Security, 2, 247-253
adopting authority in, 212, 249-251
- CHGOBJOWN (Change Object owner) command in, 249
command lines and, 251-253
- EDTOBJAUT (Edit Object Authority) command in, 248-249
- GRTOBJAUT (Grant Object Authority) command in, 248
objects and, securing, 247
ownership, authority, and, 249
*PGM object and, 247-248
*PUBLIC and, 248
- RVKOAJAUT (Revoke Object Authority) command in, 248-249
- SELECT command, 79
- Selective prompting, 229-234
common mistakes in, 230-232
control characters for, 232-233
function keys and, 230
- MONMSG (Monitor Message) and, 232, 234
- QCMDCHK API for, 234-236, 239
- QCMDEXC API for, 236-239
- question mark used in, 229
- SNDMSG (Send Message) command
example of, 229-230
- Self-submitting (to batch) programs and CALL command, 224-227
- SNDBRKMSG (Send Break Message)
command, 130-131
- SNDF (Send File) command, 142, 178, 181-182
- SNDMSG (Send Message) command, 129-130, 199, 229-233
selective prompting and, 229-230, 232-234
- SNDPGMMSG (Send Program Message) command, 100-106, 115-116, 172, 174
interprogram/module communication using, 151
- SNDRPY (Send Reply) command, 126, 129
- SNDUSRMSG (Send User Message)
command, 107-109
- SNDRCVF (Send/Receive File)
command, 142, 178, 181-182

- Separator characters, in
 - CVTDAT/dates, 65, 67
- SET CAPS OFF/ON command, 14
- SEU. *See* Source Entry Utility
- Severity levels of messages, 99, 121, 132
- Sign-on programs, 255-264
 - CHGJOB (Change Job Description) command in, 255-256
 - CHGUSRPRF (Change User Profile) command in, 256
 - CRTJOB (Create Job Description) command and, 255
 - INLPGM attribute and, 255
 - job descriptions and, 255-256
 - parameters forbidden in, 255
 - sample of, 256-257
 - writing, 255
- Sort files with OPNQRYF (Open Query File), 187-189
- Source code, 7-21
 - blank lines in, 19-20
 - command-level (global) MONMSG in, 113-114
 - comment lines in, 20-21
 - continuing to next line, 13, 16-17
 - formatting statements in, using F4, 10-13, 16-17
 - indentation in, 11, 13, 17, 74-75, 78, 159
 - physical files for, 9
 - program-level (global) MONMSG in, 112-113
 - QCLSRC physical file in, 8-9
 - RTVCLSRC (Retrieve CL Source) command in, 245-246
 - starting SEU with STRSEU for, 9
 - uppercase/lowercase in, 14
 - variables and, clarity of, 31-36
- Source Entry Utility (SEU), 8-17. *See also* source code
- Source view debug session, 270-275
- Specific vs. generic monitoring, 114-116
- Spooled files
 - CPYSPLF (Copy Spooled File) command in, 194
 - DLTSPLF (Delete Spooled File) command in, 194
- %SST. *See* substring function
- Stack for subroutines, 87
- STRSRVJOB (Start Service Job) command, 283-284
- STRSEU (Start SEU) command, 9
- Statement view debugging, 277-278
- Status messages, 96, 170, 174, 258
- STEP command, 275
- Storage management
 - data areas in, 146-148
 - RCLRSC (Reclaim Resources) command in, 244-245
- String manipulation
 - "E variable and, 200-201
 - character strings and, quotes in, 198-199
 - command strings and, quotes in, 199, 219, 236
 - concatenation
 - (*CAT/*BCAT/*TCAT) in, 47-48, 64-65, 200-201, 221, 273
 - embedded quotes in, 13, 25, 198-201
 - expressions in, 199-200
 - overlaid variables as alternative to, 46-47
 - quotes used in, 197-201
 - substring function for, 45-46
- Subfiles, message, 134-138, 142
- SBMJOB (Submit Job) command, 53-54, 199-200, 218-219, 222, 224, 227, 283
 - CALL command and, 220-221
 - problems with, 220
- SUBR (Subroutine) command, 85-86
- Subroutines, 84-87
 - CALLSUBR (Call Subroutine) command in, 85-87
 - DCLPCOPT (Declare Processing Option) command for, 84, 87

DMPCLPGM (Dump CL Program)
command and, 87

ENDSUBR (End Subroutine)
command for, 85-87
stack for, 87
SUBR command for, 85-86
syntax of, 85-87

Substring function
(%SST/%SUBSTRING), 45-48

%SUBSTRING. *See* Substring function
(%SST/%SUBSTRING)

Subsystem management

CRTSBSD (Create Subsystem
Description) command in, 210-211

WRKSBSJOB (Work with
Subsystem Job) command in, 223-
224

Switches, 143, 149-151

CHGJOB (Change Job) command
and, 149

DSPJOB (Display Job ()) command
and, 149

on/off, 149

Retrieve Job Attributes (RTVJOBA)
command and, 140-141, **141**

%SWITCH function for, 149-150
testing, 149-150

%SWITCH function, 149-150

System reply list, 133-134

System values

CHGSYSVAL (Change System
Value) command in, 170

job management and, 167-170
list of, 169-170

RTVSYSVAL (Retrieve System
Value) command in, 167-168

WRKSYSVAL (Work with System
Values) command and, 169

T

Table management

CRTTBL (Create Table) command
in, 109, 243

translation table QSYSTRNTBL in,
234

Temporary files, 185. *See also* QTEMP

TFRCTL (Transfer Control) command,
91-92, 143-146

THEN, 75

TOPGMQ parameter, defining message
recipients, 101-104, 116

TOUSR parameter, defining message
recipients, 103-104, 108

TRNTBL (Translate) parameter,
messages, 108-109

Translate characters using QDCXLATE
API, 242-243

Translation table QSYSTRNTBL, 234

TRUE/FALSE logical statements, 70

TYPE parameter, 5, 226

U

%UPPER. *See* Case-conversion
functions

Uppercase/lowercase, 14
translate using QDCXLATE API,
242-243
translation table QSYSTRNTBL for,
234

User profiles, 173-174, 176, 192-194
change group profile of all, 192-194

CHGPRF (Change Profile) command
in, 173-174

CHGUSRPRF (Change User Profile)
command in, 173-174, 252

DSPUSRPRF (Display User Profiles)
command in, 194

RTVUSRPRF (Retrieve User Profile)
command in, 7, 173-176

Uses for CL, 1-2

Utility commands, 154-155, 162

V

VALUE parameter, 5, 30, 44-46, 63,
199

VAR parameter, 45-46, 63, 81

variables, 28-39

arrays and, simulating, 61
 based, 39
 binary conversion
 (%BIN/%BINARY) in, 61-63
 CHGVAR (Change Variable)
 command for, 12-17, 38, 41-50,
 60, 74, 77
 coding of, striving for clarity in, 31-
 36
 declaring, using DCL command, 5-6,
 28-31, 84, 112
 expressions using, 64-65
 floating point data and, 90
 LEN (length) parameter of, 5, 30-31,
 37
 logical type, 28-31, 41
 names for, 29
 overlaid/overlying, 37, 46-47, 54
 parameters as, 88-90, 143-146
 passed as parameters, 88-90
 pointer, 5, 23, 27-29, 37-38, 144
 scan for patterns in, using
 QCLSCAN API, 239-242
 translate characters in, using
 QDCXLATE API, 242-243
 types of, 31
 where used, 34-36
 views, in debugging, 266

W

WAIT command, 178-179
 WATCH command, 275
 WHEN command, 68
 WRKxxx (Work) commands, command
 line security and, 252-253
 Work files (permanent), 190-191
 Work management, 2
 WRKACTJOB (Work with Active Job)
 command, 224
 WRKJOBQ (Work with Job Queue)
 command, 223
 WRKMBRPDM (Work with Members
 Using PDM), 10

WRKMSGD (Work with Message
 Descriptions) command, 98
 WRKMSG (Work with Messages)
 command, 131-133
 WRKOBJLCK (Work with Object
 Locks) command, 215
 WRKSBMJOB (Work with Submitted
 Jobs) command, 223-224, 252, 284
 WRKSBSJOB (Work with Subsystem
 Job) command, 223-224
 WRKSYSVAL (Work with System
 Values) command, 169
 WRKUSRJOB (Work with User Jobs)
 command, 223-224, 284