Index

Absolute value, 19
Ackermann function, 179
ADJ, 287
Adjacency matrix, 280
Adjacency structure, 286
Adjacent nodes, 277
Algebraic expression, 6, 215
Algorithm, 9, 17
Algorithmic notation, 21
Ancestor, 215
Arithmetic expression, 168
Array, 2, 67
  circular, 190
  jagged, 87
  multidimensional, 81, 84
  parallel, 92
  pointer, 86
Assignment statement, 23
Atoms, 90
Attributes, 1
AVAIL list, 123
Average case, 28

BACK, 445
Base address, 69
Base criteria, 176
Base values, 176
Big O notation, 29
Binary search, 9, 78
  complexity of, 80
Binary search tree, 233
  deleting in, 238
  inserting in, 234
  searching in, 234
Binary tree, 214
  complete, 216
  depth of, 216
  extended, 217
  height of, 216
  traversing, 221
Bit matrix, 280
Boolean matrix, 280
Branch, 215
Breadth-first search, 294
Brothers, 215
Bubble sort, 73–75
  complexity of, 75

Ceiling function, 18
Chaining, 337
Character set, 41
Character type, 31, 46
Child, 215
CHILD, 256
Circular array, 190
Circular list, 140, 143
Coding, 254
Collision resolution, 335
Column, 3, 81, 84
Column-major order, 83, 84
Complete binary tree, 216
Complete graph, 277
Complexity of algorithms, 5, 9, 27
Concatenation, 48
Conditional flow, 24
Connected graph, 279
  strongly, 279, 282
Control, flow of, 23
Copying, 133
Cycle, 277

Data, 1
Data base management, 2
Data modification, 332
Data structure, 2
Decision tree, 319
Degree of a node, 277
Deleting, 8, 50
Dense list, 114
Depth, 178, 216
Depth-first search, 296
Deque, 192
Descendent, 215
DEST, 287
Diagonal, 95
Digraph, 279
Directed graph, 279
Divide-and-conquer, 179
Division method, 334
Double hashing, 336

Edge, 215, 277
Elementary item, 1
Empty string, 41
Entity, 1
Exit, 22
Exponents, 20
Extended binary tree, 217
External node, 217
External path length, 249

Factorial function, 19, 177
Father, 215
Fibonacci sequence, 178
Field, 1, 90
FIFO (first-in-first-out), 7, 164, 188

File, 1, 90
File management, 2
File searching, 333
File sorting, 320
Finite graph, 278
FIRST, 145
Fixed-length records, 2
Fixed-length storage, 42
Floor function, 18
Folding method, 334
FORW, 145
Free-storage list, 123
Front, 7, 188
FRONT, 189
Function subalgorithm, 30

Garbage collection, 127
General tree, 255
  representation of, 256
Generation, 216
Global variables, 32
Graph, 8, 277
  complete, 277
  deleting from, 291
  directed, 279
  inserting in, 289
  labeled, 277
  linked representation of, 286
  searching in, 289
  sequential representation of, 280
  simple, 280
  weighted, 277
Group item, 1
Growth, rate of, 29

Hanoi, Towers of, 180–183
Hash addressing, 333
Hash function, 334
Hashing, 333
  double, 336
Header linked list, 140
Header list, two-way, 146
Header node, 140
Heap, 243
  deleting the root of, 246
  inserting into, 243
  reheaping, 246
Heapsort, 243
  complexity of, 248
Height of a tree, 216
Horner's method, 113
Huffman's algorithm, 249, 251

Identifiers, 96
Identifying numbers, 22
Incedence matrix, 310

Indegree, 279
Index, 67, 82
Indexing, 91
Infix notation, 169
INFO, 116, 217
Initial point, 279
Inorder threading, 230
Inorder traversal, 221, 226
Input-restricted deque, 192
Inserting, 8, 49
Insertion sort, 322
  complexity of, 323
Integer value, 19
Internal node, 217
Internal path length, 249
Isolated node, 277
Item, 1
Iteration logic, 26

Jagged array, 87

Key, 1, 318

Labeled graph, 277
LAST, 145
Leaf, 215
Left child, 215
Left subtree, 214
Left successor, 214
LEFT, 217
Length:
  of path, 249
  of string, 41, 49
Level, 216
LIFO (last-in-first-out), 7,
Linear array, 2, 67
  deleting from, 71
  inserting in, 71
  traversing, 70
Linear probing, 335
Linear search, 9, 28, 76
  complexity of, 77
LINK, 116
Link field, 115
Linked list, 4, 114
  circular, 143
  copying, 133
  deleting from, 134
  header, 140, 146
  inserting into, 127
  searching, 121
  traversing, 120
  two-way, 144, 153
Linked storage, 45

List, 4, 114
  AVAIL, 123
  free-storage, 123
Load factor, 335
Local variables, 32
Logarithms, 20
Logic, 23
Logical type, 32
Loop, 278
Lower bound, 67, 82
  for sorting, 319

Matrix, 3, 81, 94
  adjacency, 280
  bit, 280
  Boolean, 280
  incedence, 310
  path, 281
  reachability, 281
  sparse, 97
  triangular, 97
  tridiagonal, 97, 104
  weight, 284
Matrix multiplication, 96
  complexity of, 96–97
Maxheap, 243
Mean, 31
Memory, 2
Memory allocation, 123
Merge-sort, 328
  complexity of, 330
Merging, 8, 325
  algorithm, 327
  complexity of, 327
Midsquare method, 334
Minheap, 243
Modules, 17, 23
Modulus arithmetic, 18
Multidimensional arrays, 81, 84
Multigraph, 278
Multiple edges, 278

Neighbor, 277, 286
NEXT, 287
Nextpointer field, 115
Node, 115, 214, 255, 277
  external, 217
  header, 140, 229
  internal, 217
  isolated, 277
  terminal, 214
  trailer, 143
NODE, 287
Nonlocal variables, 33
NULL, 116, 219
Null pointer, 115
Null string, 41
Null tree, 214
Number, priority, 193

O notation, 29–30
One-dimensional array, 3
One-way list, 115
Open addressing, 335
Operations, 8
  on graphs, 289
  string, 47
Outdegree, 279
Output-restricted deque, 192
Overflow, 127
  stack, 167–168

Page, 84
Parallel arrays, 92
Parent node, 215
Partial ordering, 298
Pass (in an algorithm), 73
Path, 215, 277
  simple, 277
Path length, 249, 271
  external, 249
  internal, 249
  weighted, 250
Path matrix, 281–282
Pattern matching, 53, 55
  complexity of, 57
Permutations, 20
Pointers, 4, 86
  searching, 333
  sorting, 320
Polish notation, 169
Polynomials, 143
POP, 167
Pop operation, 165
Poset, 297
Postfix notation, 169
Postorder traversal, 221, 228
Prefix notation, 169
Preorder traversal, 221, 224
Primary key, 1, 318
Prime number, 37
Priority number, 193
Priority queue, 193
Probe, 335
Probing, 335
  linear, 335
  quadratic, 336
Procedure, 23, 30
PUSH, 167
Push operation, 165
Push-down list, 164

Quadratic probing, 336
Qualification, 92
Queue, 7, 164, 188
  deleting from, 192
  inserting into, 192
  priority, 193
Quicksort, 173, 175, 200
  complexity of, 176

Radix sort, 330
  complexity of, 332
Reachable in a graph, 279
Reachability matrix, 281
Real type, 32
Rear, 7, 188
REAR, 189
Record, 1, 90
  fixed-length, 2
  variable-length, 2
Record structure, 6
Recursion, 176
Recursive procedure, 183
Recursively defined, 176
Regular array, 82
Rehcap, 246
Remainder function, 18
Repeat-for loop, 26
Repeat-while loop, 27
Repetitive flow, 26
Replacement, 51
RIGHT, 217
Right son, 216
Right subtree, 214
Right successor, 214
Root, 214, 279
ROOT, 217
Rooted tree, 279
Row, 3, 81, 84
Row-major order, 83, 84

$S(\lambda)$, 335
Scalor, 90
Search:
  binary, 9, 78
  linear, 9, 28, 76
  sequential, 76
Searching, 8, 76, 318, 332
  binary search tree, 234
  files, 333
  graph, 289
  linked list, 121
  pointers, 333
  two-way list, 147
Selection logic, 24
Selection sort, 324
  complexity of, 325
Sequence logic, 23
Sequential sort, 76
Shortest-path algorithm, 284
SIBL, 256
Sibling, 216
Side effect, 33
Sigma (Σ), 19
Similar graphs, 303
Similar trees, 215
Simple graph, 280
Simple path, 277
Son, 215–216
Sorting, 8, 73, 318
  bubble, 73
  heapsort, 243
  insertion, 322
  lower bound complexity, 318–320
  merge-sort, 328
  quicksort, 173
  radix, 330
  selection, 324
  topological, 297
Sparse matrix, 97
Square matrix, 95
Stack, 7, 164
STACK, 166
START, 116
STATUS, 294
Status of a node, 294
Strings, 41
Strongly connected graph, 279
Subalgorithm, 30
Subscript, 2, 68
Substring, 41, 47
Subtree, 214
Successor, 214, 286
Summation symbol (Σ), 19
SWITCH, 31
Symmetric matrix, 97

Table, 3, 81
Terminal node, 214
Terminal point, 279
Text, 49
Thread, 230
Threaded tree, 230
Time-space tradeoff, 10, 15
TOP, 166
Top of a stack, 7, 165
Topological sorting, 297
Towers of Hanoi, 180, 185
Trailer node, 143
Transitive closure, 282
Traversing, 8
  binary tree, 221
  graph, 294

Traversing (*continued*)
linear array, 70
linked list, 120
two-way list, 147
Tree, 5, 214, 255
binary, 214
decision, 319
depth of, 216
general, 255
height of, 216
null, 214
threaded, 230
Triangular matrix, 97
Tridiagonal matrix, 94, 104
Two-dimensional array, 3
Two-way header list, 146
Two-way list, 144, 153
deleting from, 147
inserting into, 148
Type, 31

$U(\lambda)$, 335
Underflow, 127
Upper bound, 67, 82

Variable, 31
global, 32–33
local, 32
subscripted, 2
Variable length, 2
Variable-length records, 2
Variable-length storage, 44
Vertex, 277
Visiting, 70

Warshall's algorithm, 282
Weight, 277
Weight matrix, 284
Weighted graph, 277
Weighted path length, 250
Word processing, 49
Worst case, 28