
Description: A friendly and accessible introduction to the most useful algorithms

Computer algorithms are the basic recipes for programming. Professional programmers need to know how to use algorithms to solve difficult programming problems. Written in simple, intuitive English, this book describes how and when to use the most practical classic algorithms, and even how to create new algorithms to meet future needs. The book also includes a collection of questions that can help readers prepare for a programming job interview.

- Reveals methods for manipulating common data structures such as arrays, linked lists, trees, and networks
- Addresses advanced data structures such as heaps, 2-3 trees, B-trees
- Addresses general problem-solving techniques such as branch and bound, divide and conquer, recursion, backtracking, heuristics, and more
- Reviews sorting and searching, network algorithms, and numerical algorithms
- Includes general problem-solving techniques such as brute force and exhaustive search, divide and conquer, backtracking, recursion, branch and bound, and more

In addition, Essential Algorithms features a companion website that includes full instructor materials to support training or higher ed adoptions.

Contents:

Introduction xv

Chapter 1 Algorithm Basics 1

Approach 2

Algorithms and Data Structures 3

Pseudocode 3

Algorithm Features 6

Big O Notation 7

Common Runtime Functions 11

Visualizing Functions 17

Practical Considerations 17

Summary 19

Exercises 20

Chapter 2 Numerical Algorithms 25

Randomizing Data 25

Generating Random Values 25

Randomizing Arrays 31

Generating Nonuniform Distributions 33

Finding Greatest Common Divisors 33
Removing Items 174
Liner Probing 174
Quadratic Probing 176
Pseudorandom Probing 178
Double Hashing 178
Ordered Hashing 179
Summary 181
Exercises 182
Chapter 9 Recursion 185
Basic Algorithms 186
Factorial 186
Fibonacci Numbers 188
Tower of Hanoi 189
Graphical Algorithms 193
Koch Curves 193
Hilbert Curve 196
Sierpiński Curve 197
Gaskets 200
Backtracking Algorithms 201
Eight Queens Problem 203
Knight's Tour 206
Selections and Permutations 209
Selections with Loops 210
Selections with Duplicates 211
Selections Without Duplicates 213
Permutations with Duplicates 214
Permutations Without Duplicates 215
Recursion Removal 216
Tail Recursion Removal 216
Storing Intermediate Values 218
General Recursion Removal 220
Summary 222
Minimal Spanning Trees 338
Finding Paths 339
Finding Any Path 339
Label-Setting Shortest Paths 340
Label-Correcting Shortest Paths 344
All-Pairs Shortest Paths 345
Summary 350
Exercises 351
Chapter 14 More Network Algorithms 355
Topological Sorting 355
Cycle Detection 359
Map Coloring 359
Two-coloring 360
Three-coloring 362
Four-coloring 362
Five-coloring 363
Other Map-coloring Algorithms 367
Maximal Flow 368
Work Assignment 370
Minimal Flow Cut 372
Summary 374
Exercises 375
Chapter 15 String Algorithms 377
Matching Parentheses 378
Evaluating Arithmetic Expressions 379
Building Parse Trees 380
Pattern Matching 381
DFAs 381
Building DFAs for Regular Expressions 383
NFAs 386
String Searching 387
Detection, Reporting, and Optimization Problems 427
Detection \(= p \) Reporting 427
Reporting \(= p \) Optimization 428
Reporting \(= p \) Detection 428
Optimization \(= p \) Reporting 429
NP-Complete Problems 429
Summary 431
Exercises 432
Chapter 18 Distributed Algorithms 435
Types of Parallelism 436
Systolic Arrays 436
Distributed Computing 438
Multi-CPU Processing 440
Race Conditions 440
Deadlock 444
Quantum Computing 445
Distributed Algorithms 446
Debugging Distributed Algorithms 446
Embarrassingly Parallel Algorithms 447
Mergesort 449
Dining Philosophers 449
The Two Generals Problem 452
Byzantine Generals 453
Consensus 455
Leader Election 458
Snapshot 459
Clock Synchronization 460
Summary 462
Exercises 462
Chapter 19 Interview Puzzles 465
Fax Order Form
To place an order via fax simply print this form, fill in the information below and fax the completed form to 646-607-1907 (from USA) or +353-1-481-1716 (from Rest of World). If you have any questions please visit http://www.researchandmarkets.com/contact/

Order Information
Please verify that the product information is correct.

Web Address: http://www.researchandmarkets.com/reports/2488430/
Office Code: SCAV6PR7

Product Format
Please select the product format and quantity you require:

<table>
<thead>
<tr>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Copy (Paper back):</td>
</tr>
<tr>
<td>USD 107 + USD 28 Shipping/Handling</td>
</tr>
</tbody>
</table>

* Shipping/Handling is only charged once per order.

Contact Information
Please enter all the information below in BLOCK CAPITALS

Title: Mr [ ] Mrs [ ] Dr [ ] Miss [ ] Ms [ ] Prof [ ]
First Name: ___________________________ Last Name: ___________________________
Email Address: * ___________________________
Job Title: ___________________________
Organisation: ___________________________
Address: ___________________________
City: ___________________________
Postal / Zip Code: ___________________________
Country: ___________________________
Phone Number: ___________________________
Fax Number: ___________________________

* Please refrain from using free email accounts when ordering (e.g. Yahoo, Hotmail, AOL)
Payment Information

Please indicate the payment method you would like to use by selecting the appropriate box.

☐ Pay by credit card: You will receive an email with a link to a secure webpage to enter your credit card details.

☐ Pay by check: Please post the check, accompanied by this form, to:
Research and Markets,
Guinness Center,
Taylors Lane,
Dublin 8,
Ireland.

☐ Pay by wire transfer: Please transfer funds to:
Account number 833 130 83
Sort code 98-53-30
Swift code ULSBIE2D
IBAN number IE78ULSB98533083313083
Bank Address Ulster Bank,
27-35 Main Street,
Blackrock,
Co. Dublin,
Ireland.

If you have a Marketing Code please enter it below:

Marketing Code: ________________________________

Please note that by ordering from Research and Markets you are agreeing to our Terms and Conditions at http://www.researchandmarkets.com/info/terms.asp

Please fax this form to:
(646) 607-1907 or (646) 964-6609 - From USA
+353-1-481-1716 or +353-1-653-1571 - From Rest of World