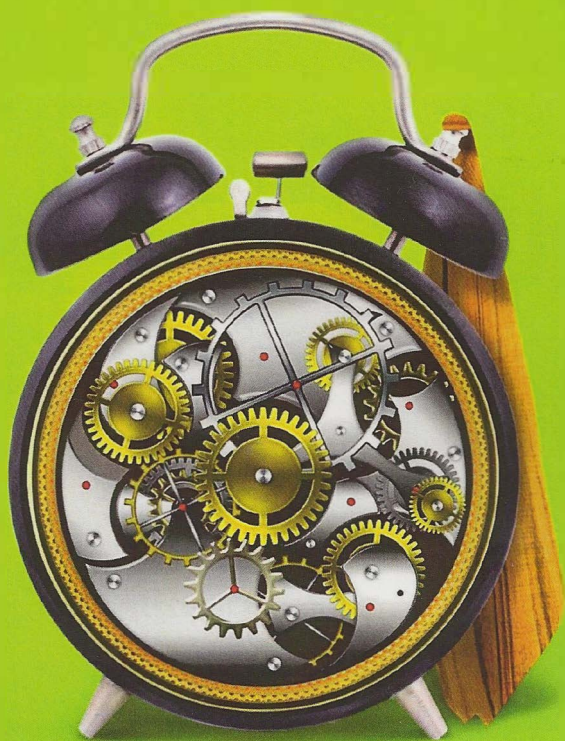


CRACKING *the* CODING INTERVIEW

189 PROGRAMMING QUESTIONS & SOLUTIONS



GAYLE LAAKMANN MCDOWELL

Author of Cracking the PM Interview and Cracking the Tech Career

6TH
EDITION

CRACKING
the
CODING INTERVIEW

6TH EDITION

ALSO BY GAYLE LAAKMANN McDOWELL

CRACKING THE PM INTERVIEW

HOW TO LAND A PRODUCT MANAGER JOB IN TECHNOLOGY

CRACKING THE TECH CAREER

INSIDER ADVICE ON LANDING A JOB AT GOOGLE, MICROSOFT, APPLE, OR ANY TOP TECH COMPANY

CRACKING *the* **CODING INTERVIEW**

6th Edition

189 Programming Questions and Solutions

GAYLE LAAKMANN MCDOWELL
Founder and CEO, CareerCup.com

CareerCup, LLC
Palo Alto, CA

CRACKING THE CODING INTERVIEW, SIXTH EDITION

Copyright © 2015 by CareerCup.

All rights reserved. No part of this book may be reproduced in any form by any electronic or mechanical means, including information storage and retrieval systems, without permission in writing from the author or publisher, except by a reviewer who may quote brief passages in a review.

Published by CareerCup, LLC, Palo Alto, CA. Compiled Feb 10, 2016.

For more information, contact support@careercup.com.

978-0-9847828-5-7 (ISBN 13)

*For Davis and Tobin,
and all the things that bring us joy in life.*

Introduction	2
I. The Interview Process	4
Why?	4
How Questions are Selected	6
It's All Relative	7
Frequently Asked Questions	7
II. Behind the Scenes.	8
The Microsoft Interview	9
The Amazon Interview	10
The Google Interview	10
The Apple Interview	11
The Facebook Interview	12
The Palantir Interview	13
III. Special Situations	15
Experienced Candidates	15
Testers and SDETs	15
Product (and Program) Management	16
Dev Lead and Managers	17
Startups	18
Acquisitions and Acqui hires	19
For Interviewers	21
IV. Before the Interview	26
Getting the Right Experience.	26
Writing a Great Resume	27
Preparation Map.	30
V. Behavioral Questions	32
Interview Preparation Grid	32
Know Your Technical Projects.	33
Responding to Behavioral Questions.	34
So, tell me about yourself.	36
VI. Big O	38
An Analogy	38
Time Complexity.	38
Space Complexity.	40
Drop the Constants	41
Drop the Non-Dominant Terms	42

Multi-Part Algorithms: Add vs. Multiply	42
Amortized Time	43
Log N Runtimes	44
Recursive Runtimes	44
Examples and Exercises	45
VII. Technical Questions	60
How to Prepare	60
What You Need To Know	60
Walking Through a Problem	62
Optimize & Solve Technique #1: Look for BUD	67
Optimize & Solve Technique #2: DIY (Do It Yourself)	69
Optimize & Solve Technique #3: Simplify and Generalize	71
Optimize & Solve Technique #4: Base Case and Build	71
Optimize & Solve Technique #5: Data Structure Brainstorm	72
Best Conceivable Runtime (BCR)	72
Handling Incorrect Answers	76
When You've Heard a Question Before	76
The "Perfect" Language for Interviews	76
What Good Coding Looks Like	77
Don't Give Up!	81
VIII. The Offer and Beyond	82
Handling Offers and Rejection	82
Evaluating the Offer	83
Negotiation	84
On the Job	85
IX. Interview Questions	87
Data Structures	88
Chapter 1 Arrays and Strings	88
Hash Tables	88
ArrayList & Resizable Arrays	89
StringBuilder	89
Chapter 2 Linked Lists	92
Creating a Linked List	92
Deleting a Node from a Singly Linked List	93
The "Runner" Technique	93
Recursive Problems	93

Chapter 3 Stacks and Queues	96
<i>Implementing a Stack</i>	96
<i>Implementing a Queue</i>	97
Chapter 4 Trees and Graphs	100
<i>Types of Trees</i>	100
<i>Binary Tree Traversal</i>	103
<i>Binary Heaps (Min-Heaps and Max-Heaps)</i>	103
<i>Tries (Prefix Trees)</i>	105
<i>Graphs</i>	105
<i>Graph Search</i>	107
Concepts and Algorithms	112
Chapter 5 Bit Manipulation	112
<i>Bit Manipulation By Hand</i>	112
<i>Bit Facts and Tricks</i>	112
<i>Two's Complement and Negative Numbers</i>	113
<i>Arithmetic vs. Logical Right Shift</i>	113
<i>Common Bit Tasks: Getting and Setting</i>	114
Chapter 6 Math and Logic Puzzles	117
<i>Prime Numbers</i>	117
<i>Probability</i>	119
<i>Start Talking</i>	121
<i>Develop Rules and Patterns</i>	121
<i>Worst Case Shifting</i>	122
<i>Algorithm Approaches</i>	122
Chapter 7 Object-Oriented Design	125
<i>How to Approach</i>	125
<i>Design Patterns</i>	126
Chapter 8 Recursion and Dynamic Programming	130
<i>How to Approach</i>	130
<i>Recursive vs. Iterative Solutions</i>	131
<i>Dynamic Programming & Memoization</i>	131
Chapter 9 System Design and Scalability	137
<i>Handling the Questions</i>	137
<i>Design: Step-By-Step</i>	138
<i>Algorithms that Scale: Step-By-Step</i>	139
<i>Key Concepts</i>	140

<i>Considerations</i>	142
<i>There is no "perfect" system.</i>	143
<i>Example Problem.</i>	143
Chapter 10 <i>Sorting and Searching.</i>	146
<i>Common Sorting Algorithms</i>	146
<i>Searching Algorithms</i>	149
Chapter 11 <i>Testing.</i>	152
<i>What the Interviewer Is Looking For</i>	152
<i>Testing a Real World Object</i>	153
<i>Testing a Piece of Software</i>	154
<i>Testing a Function</i>	155
<i>Troubleshooting Questions</i>	156
Knowledge Based	158
Chapter 12 <i>C and C++</i>	158
<i>Classes and Inheritance.</i>	158
<i>Constructors and Destructors.</i>	159
<i>Virtual Functions</i>	159
<i>Virtual Destructor</i>	160
<i>Default Values</i>	161
<i>Operator Overloading.</i>	161
<i>Pointers and References</i>	162
<i>Templates.</i>	163
Chapter 13 <i>Java.</i>	165
<i>How to Approach.</i>	165
<i>Overloading vs. Overriding</i>	165
<i>Collection Framework.</i>	166
Chapter 14 <i>Databases.</i>	169
<i>SQL Syntax and Variations.</i>	169
<i>Denormalized vs. Normalized Databases.</i>	169
<i>SQL Statements.</i>	169
<i>Small Database Design.</i>	171
<i>Large Database Design.</i>	172
Chapter 15 <i>Threads and Locks</i>	174
<i>Threads in Java</i>	174
<i>Synchronization and Locks</i>	176
<i>Deadlocks and Deadlock Prevention.</i>	179