

Contents

Foreword **xiii**

Preface and Acknowledgments **xv**

About the Authors **xix**

Introduction **xxiii**

Are You a “Mere Mortal”? xxiii

About This Book xxiv

How to Use This Book xxv

Reading the Diagrams Used in This Book xxvi

Sample Databases Used in This Book xxx

“Follow the Yellow Brick Road” xxxi

PART I Relational Databases and SQL **1**

CHAPTER 1 What Is Relational? **3**

Topics Covered in This Chapter 3

Types of Databases 3

A Brief History of the Relational Model 4

 In the Beginning... 4

 Relational Database Software 5

Anatomy of a Relational Database 6

 Tables 6

 Fields 7

 Records 8

 Keys 8

 Views 10

 Relationships 10

What's in It for Me?	15
"Where Do I Go from Here?"	16
Summary	17

CHAPTER 2 Ensuring Your Database Structure Is Sound 19

Topics Covered in This Chapter	19
Why Is This Chapter Here?	19
Why Worry about Sound Structures?	20
Fine-tuning Fields	21
What's in a Name? (Part One)	21
Smoothing Out the Rough Edges	23
Resolving Multipart Fields	25
Resolving Multivalued Fields	27
Fine-tuning Tables	29
What's in a Name? (Part Two)	29
Ensuring a Sound Structure	31
Resolving Unnecessary Duplicate Fields	33
Identification Is the Key	37
Establishing Solid Relationships	41
Establishing a Deletion Rule	43
Setting the Type of Participation	45
Setting the Degree of Participation	45
Is That All?	48
Summary	49

CHAPTER 3 A Concise History of SQL 51

Topics Covered in This Chapter	51
The Origins of SQL	52
Early Vendor Implementations	53
"...And Then There Was a Standard"	54
Evolution of the ANSI/ISO Standard	56
Other SQL Standards	59
Commercial Implementations	60
What the Future Holds	60
Why Should You Learn SQL?	61
Summary	63

PART II SQL Basics 65

CHAPTER 4 Creating a Simple Query 67

Topics Covered in This Chapter	67
Introducing SELECT	67
The SELECT Statement	68
Major Clauses in a SELECT Statement	69
A Quick Aside: Data vs. Information	71
Translating Your Request into SQL	72
Expanding the Field of Vision	77
Eliminating Duplicate Rows	80
Sorting Information	82
First Things First: Collating Sequences	83
Let's Now Come to Order	83
Saving Your Work	86
Sample Statements	87
Summary	96
Problems for You to Solve	97

CHAPTER 5 Getting More Than Simple Columns 99

Topics Covered in This Chapter	99
The SELECT Clause: Take Two	100
Specifying Explicit Values	101
Moving Beyond Basic Information	105
What Is an Expression?	105
What Are You Trying to Express?	106
Data Types in SQL	106
Types of Expressions	108
Concatenation	109
Mathematical	113
Date and Time Arithmetic	116
Using Expressions in a SELECT Clause	119
A Brief Digression: Value Expressions	125
That "Nothing" Value—NULL	127
Introducing Null	128
Sample Statements	131

Summary	139
Problems for You to Solve	141

CHAPTER 6 Filtering Your Data 143

Topics Covered in This Chapter	143
Refining What You See Using WHERE	144
The WHERE Clause	144
Using a WHERE Clause	146
Defining Search Conditions	148
Comparison	148
Range	156
Set Membership	159
Pattern Match	161
Null	165
Excluding Rows with NOT	167
Using Multiple Conditions	170
Introducing AND and OR	170
Excluding Rows: Take Two	176
Order of Precedence	178
NULLs Revisited: A Cautionary Note	183
Expressing Conditions in Different Ways	187
Sample Statements	188
Summary	195
Problems for You to Solve	196

PART III Working with Multiple Tables 199

CHAPTER 7 Thinking in Sets 201

Topics Covered in This Chapter	201
What Is a Set, Anyway?	202
Operations on Sets	203
Intersection	204
Intersection in Set Theory	204
Intersection between Result Sets	205
Problems You Can Solve with INTERSECT	208

Difference	210
Difference in Set Theory	210
Difference between Result Sets	212
Problems You Can Solve with Difference	216
Union	217
Union in Set Theory	217
Combining Result Sets Using UNION	219
Problems You Can Solve with UNION	221
SQL Set Operations	222
“Classical” Set Operations vs. SQL	222
Finding Common Values—INTERSECT	222
Finding Missing Values—EXCEPT (DIFFERENCE)	226
Combining Sets—UNION	228
Summary	231

CHAPTER 8 INNER JOINS 233

Topics Covered in This Chapter	233
What Is a JOIN?	233
The INNER JOIN	234
What’s “Legal” to JOIN?	234
Syntax	235
Check Those Relationships!	249
Uses for INNER JOINS	250
Find Related Rows	250
Find Matching Values	251
Sample Statements	252
Two Tables	252
More Than Two Tables	257
Looking for Matching Values	263
Summary	271
Problems for You to Solve	272

CHAPTER 9 OUTER JOINS 275

Topics Covered in This Chapter	275
What Is an OUTER JOIN?	275
The LEFT/RIGHT OUTER JOIN	277
Syntax	278

The FULL OUTER JOIN	295
Syntax	296
FULL OUTER JOIN on Non-Key Values	298
UNION JOIN	299
Uses for OUTER JOINS	299
Find Missing Values	300
Find Partially Matched Information	300
Sample Statements	301
Summary	313
Problems for You to Solve	314

CHAPTER 10 UNIONS 317

Topics Covered in This Chapter	317
What Is a UNION?	317
Writing Requests with UNION	320
Using Simple SELECT Statements	320
Combining Complex SELECT Statements	323
Using UNION More Than Once	326
Sorting a UNION	328
Uses for UNION	330
Sample Statements	331
Summary	342
Problems for You to Solve	342

CHAPTER 11 Subqueries 345

Topics Covered in This Chapter	345
What Is a Subquery?	346
Row Subqueries	346
Table Subqueries	347
Scalar Subqueries	347
Subqueries as Column Expressions	348
Syntax	348
An Introduction to Aggregate Functions—COUNT and MAX	351
Subqueries as Filters	353
Syntax	353
Special Predicate Keywords for Subqueries	355

Uses for Subqueries	366
Column Expressions	366
Filters	366
Sample Statements	368
Subqueries in Expressions	369
Subqueries in Filters	374
Summary	380
Problems for You to Solve	381

PART IV Summarizing and Grouping Data 385

CHAPTER 12 Simple Totals 387

Topics Covered in This Chapter	387
Aggregate Functions	388
Counting Rows and Values with COUNT	389
Computing a Total with SUM	392
Calculating a Mean Value with AVG	394
Finding the Largest Value with MAX	395
Finding the Smallest Value with MIN	397
Using More Than One Function	398
Using Aggregate Functions in Filters	400
Sample Statements	402
Summary	409
Problems for You to Solve	409

CHAPTER 13 Grouping Data 413

Topics Covered in This Chapter	413
Why Group Data?	414
The GROUP BY Clause	416
Syntax	417
Mixing Columns and Expressions	421
Using GROUP BY in a Subquery in a WHERE Clause	423
Simulating a SELECT DISTINCT Statement	424
“Some Restrictions Apply”	425
Column Restrictions	425
Grouping on Expressions	427

Uses for GROUP BY	429
Sample Statements	429
Summary	439
Problems for You to Solve	439

CHAPTER 14 Filtering Grouped Data 441

Topics Covered in This Chapter	441
A New Meaning of “Focus Groups”	442
When You Filter Makes a Difference	446
Should You Filter in WHERE or in HAVING?	446
Avoiding the HAVING COUNT Trap	448
Uses for HAVING	453
Sample Statements	454
Summary	462
Problems for You to Solve	462

In Closing 465

APPENDICES 467

A SQL Standard Diagrams 469

B Schema for the Sample Databases 477

C Recommended Reading References 483

Index 485