

# **FileMaker® Pro 9 Bible**

**Ray Cologon, PhD  
with Dennis R. Cohen**



WILEY

Wiley Publishing, Inc.



# **FileMaker® Pro 9 Bible**

**Ray Cologon, PhD  
with Dennis R. Cohen**



WILEY

Wiley Publishing, Inc.

## FileMaker® Pro 9 Bible

Published by  
**Wiley Publishing, Inc.**  
10475 Crosspoint Boulevard  
Indianapolis, IN 46256  
[www.wiley.com](http://www.wiley.com)

Copyright © 2008 by Wiley Publishing, Inc., Indianapolis, Indiana

Published simultaneously in Canada

Library of Congress Control Number: 2008922123

ISBN: 978-0-470-17743-3

Manufactured in the United States of America

10 9 8 7 6 5 4 3 2 1

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning or otherwise, except as permitted under Sections 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 646-8600. Requests to the Publisher for permission should be addressed to the Legal Department, Wiley Publishing, Inc., 10475 Crosspoint Blvd., Indianapolis, IN 46256, (317) 572-3447, fax (317) 572-4355, or online at <http://www.wiley.com/go/permissions>.

---

**LIMIT OF LIABILITY/DISCLAIMER OF WARRANTY: THE PUBLISHER AND THE AUTHOR MAKE NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THE ACCURACY OR COMPLETENESS OF THE CONTENTS OF THIS WORK AND SPECIFICALLY DISCLAIM ALL WARRANTIES, INCLUDING WITHOUT LIMITATION WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. NO WARRANTY MAY BE CREATED OR EXTENDED BY SALES OR PROMOTIONAL MATERIALS. THE ADVICE AND STRATEGIES CONTAINED HEREIN MAY NOT BE SUITABLE FOR EVERY SITUATION. THIS WORK IS SOLD WITH THE UNDERSTANDING THAT THE PUBLISHER IS NOT ENGAGED IN RENDERING LEGAL, ACCOUNTING, OR OTHER PROFESSIONAL SERVICES. IF PROFESSIONAL ASSISTANCE IS REQUIRED, THE SERVICES OF A COMPETENT PROFESSIONAL PERSON SHOULD BE SOUGHT. NEITHER THE PUBLISHER NOR THE AUTHOR SHALL BE LIABLE FOR DAMAGES ARISING HEREFROM. THE FACT THAT AN ORGANIZATION OR WEBSITE IS REFERRED TO IN THIS WORK AS A CITATION AND/OR A POTENTIAL SOURCE OF FURTHER INFORMATION DOES NOT MEAN THAT THE AUTHOR OR THE PUBLISHER ENDORSES THE INFORMATION THE ORGANIZATION OR WEBSITE MAY PROVIDE OR RECOMMENDATIONS IT MAY MAKE. FURTHER, READERS SHOULD BE AWARE THAT INTERNET WEBSITES LISTED IN THIS WORK MAY HAVE CHANGED OR DISAPPEARED BETWEEN WHEN THIS WORK WAS WRITTEN AND WHEN IT IS READ.**

---

For general information on our other products and services or to obtain technical support, please contact our Customer Care Department within the U.S. at (800) 762-2974, outside the U.S. at (317) 572-3993 or fax (317) 572-4002.

**Trademarks:** Wiley, the Wiley logo, and related trade dress are trademarks or registered trademarks of John Wiley & Sons, Inc., and/or its affiliates, in the United States and other countries, and may not be used without written permission. FileMaker is a registered trademark of FileMaker, Inc. in the United States and other countries. All other trademarks are the property of their respective owners. Wiley Publishing, Inc., is not associated with any product or vendor mentioned in this book.

Wiley also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic books.

# About the Authors

---

**Ray Cologon** began using FileMaker in 1990, after having taught and worked with a number of other database tools. He subsequently used FileMaker to compile and analyze data for his doctoral thesis, as well as to design databases for a wide range of other purposes.

Ray has had a diverse career in the creative arts, education, and consulting. Over the past decade, he has developed his own business, NightWing Enterprises, which specializes in the design and development of bespoke FileMaker Pro solutions and provides consulting services to developers and clients in various parts of the world. In 2005, Ray was recipient of the FileMaker Excellence Award for Leadership and Technical Excellence in FileMaker Pro, and he has been a presenter at recent FileMaker Developer Conferences in the United States. He has also been a significant contributor to and moderator of a number of public forums on FileMaker and is a FileMaker Certified Developer.

Ray lives in Melbourne, Australia, where he is known for his sculpture and music, as well as his innovative work with FileMaker Pro.

**Dennis R. Cohen** has been developing and writing about software since the late 1970s, when he wrote and maintained the database software used at the Jet Propulsion Laboratory (JPL) to schedule which Deep Space Network tracking stations tracked which spacecraft and when. Following his time at JPL, Dennis developed and managed the development of software products and technologies at Ashton-Tate, Claris (now FileMaker, Inc.), and Aladdin Systems (now part of Smith Micro Software). For the past ten years, he has concentrated on writing and editing books and magazine articles on his favorite software and hardware products.

With over a dozen titles to his credit as author or coauthor (including the last three editions of *FileMaker Pro Bible*), he has also been the technical editor of almost 200 titles.

Dennis resides in Sunnyvale, California, with Spenser, a magnificent Boston terrier.

*Ray: To Heather, Aris, and Drue, whose patience, love,  
and support have been immeasurable*

*Dennis: To my friends and family, in particular,  
Spenser, my Boston terrier best buddy*

## Credits

---

### **Acquisitions Editor**

Kyle Looper

### **Project Editors**

Kelly Ewing

Elizabeth Kuball

### **Copy Editors**

Kelly Ewing

Elizabeth Kuball

Beth Taylor

### **Technical Editors**

Corn Walker

Jason DeLooze

Mark Hammer

Michael Cohen

### **Editorial Manager**

Jodi Jensen

### **Vice President & Executive Group Publisher**

Richard Swadley

### **Vice President and Publisher**

Andy Cummings

### **Editorial Director**

Mary C. Corder

### **Project Coordinator**

Lynsey Stanford

### **Graphics and Production Specialists**

Claudia Bell

Stacie Brooks

Carl Byers

Shane Johnson

### **Quality Control Technicians**

John Greenough

Todd Lothery

### **Proofreading and Indexing**

Potomac Indexing, LLC

Christine Sabooni

# Contents

<b>Acknowledgments . . . . .</b>	<b>xxvii</b>
----------------------------------	--------------

<b>Preface . . . . .</b>	<b>xxix</b>
--------------------------	-------------

About This Book .....	xxix
About This Book's Target Audience .....	xxx
How This Book Is Organized .....	xxxi
Part I: The Fundamentals .....	xxxi
Part II: Introduction to Database Design .....	xxxi
Part III: Beyond the Basics .....	xxxi
Part IV: Integrity and Security .....	xxxi
Part V: Raising the Bar .....	xxxi
Part VI: Appendixes .....	xxxi
Icons Used in This Book .....	xxxii
Where to Go from Here .....	xxxii

<b>Part I: The Fundamentals</b>	<b>1</b>
---------------------------------	----------

---

<b>Chapter 1: Databases: The What, Why, and How . . . . .</b>	<b>3</b>
---	----------

The Many Faces of Databases: Lists, Tables, and Forms .....	4
Understanding the limitations of paper-based databases .....	4
Entering the digital age .....	5
Preparing to get organized .....	5
The Concept of a Relational Database .....	6
Flat-file databases and data redundancy .....	6
Opportunities for making connections .....	7
The Anatomy of a Database Solution .....	7
The data: Foundation and substance .....	7
The interface: Screens, letters, forms, and reports .....	8
The hidden helper: Process management .....	11
How FileMaker Fits In .....	12
Knowing what FileMaker Pro calls things .....	12
Using familiar ideas from the real world .....	17
Integrating processes and information .....	17
Recognizing that knowledge is power — personal and professional .....	18

## Contents

### Chapter 2: Putting FileMaker Pro in Perspective. . . . . 19

What Makes FileMaker Pro Different from Other Database Development Tools? .....	20
Some common misperceptions .....	20
A unique approach to design .....	22
The FileMaker Product Family .....	23
Desktop and server .....	24
Scalability and flexibility .....	24
FileMaker's Hidden Talents .....	25
The cross-platform chameleon .....	26
Multiple technologies and formats .....	26
Plug-ins and extensibility .....	28
The FileMaker calculation engine: Simplicity and power .....	28
Resources and Exemplars .....	29
Examples and brainteasers .....	30
Other resources and opportunities .....	30

### Chapter 3: Getting Acquainted with FileMaker . . . . . 31

Getting FileMaker Working for You .....	31
Starting and exiting from FileMaker .....	32
Creating, saving, and closing files .....	33
Handling files and data safely .....	35
Earlier file formats and conversion issues .....	36
Finding Your Way Around .....	37
The modes and their uses .....	38
Navigating and viewing data .....	39
Searching and the FileMaker Find/Omit puzzle .....	40
Screen elements and what they're for .....	42
Entering and Editing Data .....	43
Creating and duplicating records .....	44
Field definitions: Validation and dependencies .....	44
The significance of commitment .....	45
The Ins and Outs .....	46
Importing and exporting data .....	46
Previewing and printing options .....	48
Send/Save as PDF and Excel .....	49
Getting to Know the Relatives .....	49
Ways to view and edit related data .....	49
The importance of context .....	50
Making complexity simple in practice .....	50
Optimizing the Application .....	51
Preference settings for your workstation .....	51
File options for the current database .....	54



**Chapter 4: What's New in FileMaker 9 . . . . . 59**

The FileMaker Quick Start Screen .....	59
The Help Menu .....	60
Learn More Links on Critical Dialogs .....	61
Scheduled Software Update Notification .....	62
New Calculation Functions .....	63
Self .....	63
Get (TemporaryPath) .....	64
Get (HostApplicationVersion) .....	64
Asin (number) .....	64
Acos (number) .....	64
Conditional Formatting .....	65
Append to PDF .....	66
The Send E-Mail Link for Database Sharing .....	67
Script Grouping and Editing Tools .....	69
Automatic Resizing of Layout Objects .....	70
Enhanced Tab Control .....	71
Default tab selection .....	72
Tab width settings .....	72
Web Viewer Feature Enhancements .....	72
Progress indicator, location, lock icon.....	72
Support for data URLs .....	74
Field-Specific Enabling of Visual Spell-Checking .....	74
Multiple Levels of Text Undo and Redo in Fields and ScriptMaker .....	75
Additional Toolbar Controls .....	76
Save/Send as PDF or Excel, Undo and Redo .....	76
Layout alignment toolbar .....	76
Additional Avery Label Formats .....	77
Enhanced External SQL Data Source Support .....	77
Supplemental Fields for ESS Tables .....	80
Creating supplemental fields .....	80
Using supplemental fields.....	80
Considering design.....	81
FileMaker Pro 9 Advanced .....	82
Script Debugger enhancements.....	82
Launching scripts from within the Script Debugger .....	82
Working with restricted-access scripts .....	83
Making multiple selections in the Script Debugger window .....	84
Understanding the Pause on Error and Last Error code.....	84
Using step buttons when a script is paused.....	84
Data Viewer enhancements.....	85
The Current and Watch tabs.....	85
Authenticating to view-restricted data.....	86
Identifying other usability improvements .....	86

The PHP Site Assistant .....	87
Database Design Report enhancements.....	88

## Part II: Introduction to Database Design 89

### Chapter 5: Creating a Database. . . . . 91

Creating a New Database File .....	92
Adding tables and fields .....	94
OrderLines .....	97
Invoices .....	97
InvoiceLines .....	97
Contacts .....	97
Working with the Field Options dialog: Validation and auto-entry .....	97
Setting up simple calculations .....	103
Capturing simple metadata .....	106
Creating relationships between tables .....	108
Adding aggregating calcs .....	111
Viewing and Interacting with Data .....	113
Looking at the multiple uses of layouts.....	114
Creating records and entering data .....	114
Editing or deleting data .....	118
Finding and sorting data you've already entered .....	119
Using special find symbols .....	120
Searching with the range and wildcard operators .....	120
Avoiding the Need for Data Duplication .....	121
Recognizing the visual cues to data relationships .....	121
Information has a logical flow.....	122
Anticipating the user .....	123
Making complex things simple .....	125
Getting Started with File Security .....	125
Working with accounts and privilege sets .....	125
Setting a default account and password .....	128
Thinking About Usability .....	129
Moving between records.....	129
Managing context .....	130
Moving between tables .....	130
Using and changing views .....	130
Using buttons for static and dynamic actions .....	130

### Chapter 6: The Interface: Layout Mode . . . . . 131

Initial Layouts .....	131
A map of Layout mode .....	134
Selection then Action tools .....	135
Drag-to-Layout tools.....	136
Palette and Menu controls.....	136

Organizing the presentation of information .....	136
Applying formats to field and text objects.....	137
Setting up layouts for printing .....	141
Understanding lists and forms .....	144
Layout parts and their purposes .....	145
The Importance of Visual Structure .....	146
Adding visual pointers and aids .....	147
Using white space.....	149
Ergonomics and avoiding visual fatigue .....	149
Giving information meaning.....	150
Different Kinds of Layout Objects.....	150
Static and dynamic objects .....	151
Inherent object properties.....	152
Conditional format attributes .....	152
FileMaker as a Graphical Environment.....	154
Building graphic objects in FileMaker.....	154
Default object formats and attributes .....	155
Controlling stacking and alignment .....	156
Bringing in graphics from other applications .....	157
Interacting with Layout Objects .....	158
Keyboard control of a layout.....	158
Setting the tab order .....	159
Assigning names to layout objects .....	160
Controlling visual spell-checking .....	160
The Tab Control and Its Uses .....	160
Defining and creating a tab panel .....	161
Navigating between tab panels .....	162
Tab panel limitations .....	163
Displaying Related Data .....	163
Working within layout context .....	163
Setting up a portal .....	164
The Magic of Buttons .....	167
Defining buttons.....	168
Button scope and button commands .....	170
The button as an object .....	171
The Web Viewer: Inviting in the World .....	172
Setting up a Web viewer .....	172
Controlling a Web viewer .....	173
Complementary data concepts .....	174
Reports and Data Output .....	174
Considerations for printed output .....	174
Using fonts .....	174
Page sizes and page setup .....	175
Paper output versus PDF or Excel output .....	176
Composite PDFs from multiple layouts .....	176

## Chapter 7: The Structure: The Manage Database Dialog. . . . . 177

Working with Tables .....	178
Table concepts: A room with a view .....	178
Adding, deleting, and renaming tables .....	178
Moving tables between files .....	180
Importing tables .....	180
Specifying Fields .....	183
Adding, deleting, and renaming fields .....	184
Understanding field/data types and their significance .....	185
Auto-entry options .....	187
Field validation options .....	188
Storage and indexing options .....	191
Summary and Calculation fields .....	192
Working with global fields .....	196
Basic Calculations.....	197
Creating a Calculation field .....	198
Defining a calculation formula .....	201
Entering literal text .....	202
Referencing fields .....	203
Understanding calculation functions and their syntax .....	204
The List() function.....	204
The Count() function.....	204
The Date() function .....	204
The Round() function .....	205
The Length() function .....	205
Doing some simple calculations .....	206
Number of days an item is overdue.....	206
Calculating initials from a person's name .....	206
Compound interest at a known rate over a given period .....	207
Current quarter of the calendar year .....	207
Changing ampersands to "and" in a block of text .....	207
Record navigation text (record n of nn).....	208
The Relationships Graph .....	208
Common misconceptions about the Relationships Graph.....	209
Tables versus table occurrences .....	210
Avoiding circular references .....	210
Named and unnamed data sources .....	212
Creating references to other FileMaker files .....	213
Working with External SQL Data Sources.....	214
Configuring ODBC drivers: Setting up a DSN.....	214
Integrating SQL tables with FileMaker data .....	219
Adding supplemental fields .....	222
The Concept of Data Relationships.....	223
Why bother with relationships anyway? .....	223
How relationships work .....	224

Solving problems using relationships .....	224
Deciding what goes where .....	225
The FileMaker relational model .....	225
<b>Chapter 8: The Processes: ScriptMaker . . . . .</b>	<b>227</b>
ScriptMaker: What It Is and What It Offers You .....	227
Building blocks of automation .....	230
Context is everything .....	232
Doing things in sequence .....	232
Addressing objects by name .....	233
Defining and Editing Scripts.....	234
Script Editor windows .....	234
Setting up a basic script .....	237
How script commands function .....	239
Changing the order of commands.....	239
Assigning attributes to a command.....	241
Using the Script Menu .....	243
Managing the Scripts menu .....	244
Other ways to trigger a script .....	244
Using the single-threaded script engine .....	244
Working with the script stack and paused scripts .....	245
Controlling Script Execution .....	245
Using conditional statements .....	246
Using repetition .....	247
Pausing for user input .....	248
Some Notable Script Uses.....	249
Navigation and view controls .....	249
Editing information via scripts .....	250
Printing and managing files .....	251
Ease of Editing in ScriptMaker .....	251
Selecting and duplicating multiple commands .....	252
Copying and pasting scripts .....	252
Copying and pasting script steps .....	253
Organizing Scripts .....	253
Creating list separators .....	254
Script commenting .....	254
Creating script groups .....	255
Reordering and grouping scripts.....	257
Filtering scripts by group .....	257
Searching for scripts by name .....	258
Some Examples to Start With .....	259
Performing a Find.....	259
Printing a report .....	259
Acting on user input.....	260

## Part III: Beyond the Basics 261

### Chapter 9: The FileMaker Power User . . . . . 263

Making Browse Mode Work for You .....	264
Using multiple windows and views .....	264
Filtering portals and creating pick lists .....	264
Jump buttons: Shortcut navigation .....	270
Controlling one window from another .....	274
Performing Complex Search Operations.....	275
Compound Find criteria: The AND Find .....	275
Stacking Find requests: The OR Find .....	276
Constraining and extending the found set .....	276
Saving Finds and found sets .....	277
Sorting Records .....	280
Multiple sort keys.....	281
Dynamic sort techniques .....	281
Creating click-sort columns .....	284
Sorting related data.....	288
Understanding Formatting .....	290
The management of formatting: A three-tiered approach .....	291
Character-level formatting .....	291
Paragraph-level formatting .....	292
Layout format filters .....	292
Precedence of number, date, and time formats .....	293
Controlling formatting programmatically .....	293
Creating style buttons.....	294
Some Notes on Variables .....	295
The three kinds of variables .....	296
Variables and memory usage.....	296
Instantiating and destroying variables.....	296
Keeping track of variables.....	297
Understanding Indexing.....	298
Text index types .....	298
The word index .....	298
The value index .....	299
Indexing myths exploded .....	299
Differences between numeric and text indexing .....	301
Unicode and alternate language indexes .....	301
Optimizing field index configurations .....	302
The Table of Dependencies.....	303
Cascading calculation operations .....	303
The limits of dependency .....	303
Tiers of dependency .....	304

Caching Join Results.....	304
What caching does for you .....	304
Solving caching problems.....	304
Gaining control of the cache .....	306
Understanding Global Fields .....	306
The behavior of global fields.....	306
Uses for global fields.....	307
When to avoid global fields .....	307
Using global calculation fields .....	307
<b>Chapter 10: Building Advanced Interfaces . . . . .</b>	<b>309</b>
Developing for Mac and Windows Users .....	310
Selecting fonts .....	310
Paying attention to differences in screen rendering .....	311
Considering platform-specific window behavior.....	312
Using Dynamic Screen Elements .....	314
Disappearing/reappearing objects .....	314
The portal invisibility trick .....	314
Concealed and remotely operated tab control .....	316
Using conditional formatting as a visibility control .....	317
The hidden power of conditional formatting .....	318
Multi-state buttons and objects.....	319
Working with Sub-Summary Parts and Part Controls .....	320
Building adaptable screens .....	320
Stacking up multiple Sub-summary parts.....	320
Using multiple break fields.....	322
Controlling pagination and page breaks .....	324
Designing for Print .....	325
Non-printing objects .....	325
Sliding objects and reducing parts .....	326
Using Merge fields .....	328
Creating a letter generator .....	329
Using Multiple Windows and Views.....	330
Managing window placement and size .....	330
Windows as pop-ups and drill-downs .....	331
Simulating modal window behavior .....	332
Employing Custom Dialogs as an Interface Tool .....	332
Dialogs as a data-entry device .....	332
Dynamic dialog attributes.....	334
Looking at Anchors and Resizable Layout Objects .....	334
Objects that move according to window size .....	334
Objects that grow and shrink .....	336
Managing complex layout resizing .....	336
Resizing behavior of enclosing objects .....	338
Centering objects within the viewable area .....	339

## Contents

Implementing Shortcut Navigation.....	339
The power of the Go to Related Record command .....	339
One interface, many paths .....	340
Building Back button functionality .....	340
Building Depth and Dimensionality .....	341
Using embossing and engraving effects.....	342
Spatial cues for added meaning .....	342
Delineation of element groups .....	342
Color .....	343
Transparency and translucency.....	343
Working with Tab Controls .....	343
Organizers and space savers .....	344
Tab navigation via keyboard .....	344
Scripting tab operations .....	344
Recognizing the Flexibility of Portals .....	345
Lists in many guises .....	345
Portals as a navigation device .....	346
Dynamically sorted portals .....	346
Innovative portal implementations .....	347
Using Advanced Web Viewer Techniques .....	347
Access to advanced functionality .....	347
Rendering internally calculated content .....	348
Scraping data from Web pages .....	349
Progress Bars and Native Charting Techniques .....	350
Creating script progress monitors.....	351
Native indicators and graphical displays.....	352
Using Interface Elements .....	353
Splash screens .....	353
Main menus .....	354
About and version info .....	354
Online Help for your users .....	354
Handling User Preferences .....	355
A user-centric development philosophy .....	355
Capturing state by user.....	355
Example — a multi-lingual solution interface.....	356
<b>Chapter 11: Data Modeling in FileMaker . . . . .</b>	<b>359</b>
Background in Relational Theory .....	359
Set Theory in the management of data .....	360
Modeling the real world .....	360
Think about clarity of organization .....	361
Keep the big picture in view .....	361
Remembering some guiding principles .....	362
Separate entities by type .....	362
Delineate fields clearly .....	363



Place multiples in a separate table.....	363
Store everything once only .....	363
Identify the major players .....	364
Put it into practice .....	364
FileMaker Relationships Graph Symbols .....	364
Visual cues and clues .....	364
The TO as a pointer .....	365
Understanding the graph metaphor .....	366
Relationship Operators.....	366
Equi-joins and non-equal joins.....	367
Comparative operators (theta joins) .....	368
Cartesian joins .....	369
Multi-predicate relationships .....	369
Alternative Relationship Techniques.....	370
Multi-key fields .....	370
Compound keys .....	372
One-way relationships .....	372
Join tables.....	373
Naturally occurring joins .....	373
Working with Data Arrays .....	374
Repeating fields as an array handler .....	374
Collapsing and expanding arrays .....	374
Relationship-based techniques for managing data.....	375
Allowing creation via relationship.....	375
Using self joins .....	376
The isolating relationship .....	376
Graph Techniques — Spiders, Squids, and Anchor-Buoy .....	377
Constellations and modular centers .....	377
A satellite-based graph solution .....	379
Segmentation on functional lines .....	379
Documenting the Database Structure .....	380
Graph annotations .....	381
Naming conventions.....	382
Field commenting .....	382
Ancillary notes and documentation .....	384
The Concept of Layers .....	385
“Back end” and “front end” .....	385
The business or procedural layer .....	386
FileMaker as an integrated environment .....	387
Separation anxiety .....	387
File Architecture versus Data Structure.....	388
Multi-file solutions .....	388
The modular approach .....	389
Interface files .....	389

## Contents

Approaches to separation of data .....	391
Costs and benefits of separation .....	392
Separation and External SQL Sources.....	393
Understanding the rules .....	393
Working within constraints .....	393
Supporting the user .....	394
Implementing Separation in an Existing Solution .....	395
Establishing data source(s) .....	395
Re-pointing table occurrences.....	396
Creating separate graphs.....	397
Deployment Considerations .....	398
Your remotest dreams .....	398
The model of adaptability .....	398
<b>Chapter 12: Calculation Wizardry. . . . .</b>	<b>399</b>
Compound Calculation Expressions.....	400
The language of logic .....	401
Functions and schema references .....	402
Structured syntax and nesting .....	404
Putting it all together .....	405
Order of Operations .....	406
Boolean Operations .....	408
Zero, empty, and everything else.....	408
Implicit Boolean coding .....	409
Explicit Boolean coding .....	409
Variables — Calculation, Script, and Global .....	410
Declaring calculation variables — the Let( ) function .....	410
Understanding variables' scope.....	411
Benefiting from variables in a calculation .....	412
Text Processing and Parsing Functions .....	412
Substitute, Replace, and Trim .....	413
Left, Right, and Middle.....	414
Position and PatternCount .....	415
The xWords suite .....	417
Parsing in practice .....	418
Text Formatting Operations .....	419
Applying text formatting.....	419
Removing text formatting .....	419
Applying selective formatting .....	420
Creating a Format button .....	420
Dates, Times, and Timestamps .....	421
How FileMaker manages dates .....	421
Plotting time.....	422
The number of seconds in 2007 years .....	423
Juggling days, months, and years .....	423

Summary Data .....	424
Using aggregate functions .....	425
The ballad of Max and Min .....	426
Referencing summary fields .....	426
Lists and Arrays .....	427
Retrieving values as a list .....	427
Managing lists — the xValues functions .....	428
Extracting one value from a list .....	429
Adding or inserting a list value .....	430
Removing a value from a list .....	430
Layers of Abstraction .....	431
Building blocks with GetField( ) .....	432
The value of Evaluate( ) .....	432
Unstored Calculations .....	434
Why and when calculations are unstored .....	434
Understanding the benefits and trade-offs of unstored calculations .....	435
Discovering the hidden secrets of unstored calcs .....	435
Calculation Fields versus Auto-Enter Calculations .....	436
The user over-ride capability .....	436
Auto-enter calculations and storage .....	438
The Do Not Replace option .....	439
Global Calculations .....	439
The moon follows you everywhere .....	440
Managing global dependencies .....	440
The freedom and efficiency of global calculations .....	442
Environment and Metadata .....	442
The Get( ) functions .....	442
Design functions .....	443
Calculations Using Custom Functions .....	444
Your Code's Documentation .....	447
Code formatting .....	447
Code commenting .....	448
<b>Chapter 13: Scripting in Depth .....</b>	<b>449</b>
Scripting the Control of Objects and Interface .....	450
Addressing objects by name .....	450
Locking down the interface .....	452
Managing user interaction .....	452
Trapping for Errors .....	454
Retrieving error codes appropriately .....	455
What the error codes mean .....	456
Why bother with error handling? .....	456
Handling errors .....	457

## Contents

Scripts and Access Privileges .....	460
Privilege-based errors .....	461
Run script with full access privileges .....	461
Determining the substantive privileges .....	462
Automating the Automation .....	462
Defining a script to run on file open .....	463
Housekeeping practices for start-up scripts .....	464
Scripts that run on file close .....	465
Harnessing the Power of Parameters, Results, and Variables .....	466
Getting data into a script .....	466
Branching according to state .....	467
Declaring variables .....	468
Passing and retrieving multiple parameters .....	470
Specifying and retrieving a script result .....	473
Storing and accumulating data as you go .....	474
Dynamic and Indirect Controls in ScriptMaker .....	475
Example – Go to Layout by name or number .....	476
Dynamic file paths using variables .....	477
Dynamically building Find criteria .....	478
Editing field data on the fly (indirection) .....	479
Using Nonlinear Logic .....	480
Nested and sequential If/Else conditions .....	481
Looping constructs .....	481
Specifying exit conditions .....	482
Modular Script Code .....	484
Using sub-scripts .....	484
Script recursion .....	485
Scripted Window Management .....	485
Addressing windows by name (title) .....	486
Moving and resizing windows .....	488
Determining window dimensions .....	488
Creating windows off-screen .....	489
Freezing and refreshing the screen .....	489
Scripting Data Import and Export .....	490
Exporting field contents .....	490
Exporting table data .....	491
Selecting fields for export .....	492
Import options .....	493
Data matching for import .....	494
Synchronizing and updating data .....	494
Other import options .....	495
Loading and unloading container objects .....	496
Pivoting Data between Tables .....	497
Using utility relationships .....	497
Managing related data (walking through related records) .....	498

Going over Some Practical Examples .....	499
Locating unique records .....	499
Building a multi-part PDF report .....	499

## **Part IV: Integrity and Security** **501**

### **Chapter 14: In Control with FileMaker Security . . . . . 503**

Concepts of Security.....	503
Balance and perspective .....	504
Identifying threats.....	504
Assessing value .....	504
Protecting your investment.....	504
Interface vulnerabilities .....	505
Taking things at interface value.....	505
More than a semblance of security .....	505
File-based security .....	506
The Privilege Set.....	506
Concepts of role-based security .....	507
Defining and constraining access .....	508
Schema privilege controls.....	509
Granular Security .....	510
Access to value lists and scripts .....	510
The two dimensions of layout access .....	511
Privileges for table, record, and field access .....	511
Using and managing extended privileges .....	513
User Authentication .....	514
Creating user accounts .....	515
Internal and external authentication.....	516
Scripted Account Management .....	517
Provision for automation of database security.....	517
Working with multi-file solutions.....	518
Safe scripting implementations .....	519
Creating a Custom Logout Option .....	520
The locked-down database .....	520
Structuring a solution for logging out .....	521
Security logging .....	522
How Much Security Is Enough? .....	523
Ways to evaluate risk .....	523
A balanced view of threats .....	523
A strategic model for response .....	524
The Importance of Physical File Security .....	524
Layers of protection .....	524
Alternative forms of protection .....	525
A multi-faceted approach .....	525

## Contents

Security in Deployment: FileMaker Server .....	526
Filtered display of files .....	526
Secure Socket Layer encryption .....	527
Server checks and logs .....	527
<b>Chapter 15: Maintaining Referential Integrity . . . . .</b>	<b>529</b>
Pinpointing Common Causes of Referential Integrity Problems .....	529
The potential impact on your solution .....	530
Costs and benefits .....	530
Using Unique Keys.....	530
Key safeguards .....	531
Keys and meaning (existence, persistence, uniqueness) .....	532
Generating Keys .....	532
Serial numbers .....	532
Record IDs .....	534
Unique identification (UID) values .....	535
Exploring Keys and Data Type .....	536
Retrofitting Keys.....	537
Deleting Redundant Records .....	539
The use of cascading deletion .....	539
Configuring relationships for referential integrity .....	540
Privilege requirements for cascade delete .....	541
Controlled cascading deletes at runtime .....	542
Considering Other Integrity Issues .....	543
Lookups and when to use them .....	543
Auto-entry lookups and references .....	544
Data design issues.....	544
Managing Dependencies.....	544
Literal text references .....	545
Indirect object/element references .....	545
Filename references .....	545
Structural anomalies .....	546
<b>Chapter 16: Making FileMaker Systems Fail-Safe. . . . .</b>	<b>547</b>
Expecting the Unexpected .....	547
Successful backup strategies .....	548
Backup frequency .....	548
An appropriate backup cycle .....	548
The integrity of backups .....	549
The location of backups .....	549
Back up the code, not just the data .....	549
The hazards of copying open files.....	549
Backing up local files .....	550
Backing up hosted files.....	551

A Comprehensive Approach to Error Trapping .....	551
Dealing with record locking .....	552
Techniques to avoid in multi-user or multi-window environments .....	554
Replace Field Contents .....	554
Record marking and flagging techniques .....	555
Uses of global fields .....	555
Opening Remote Files .....	555
Peer-to-peer hosting .....	556
File sharing risks .....	558
Network spaghetti .....	558
Opener files .....	559
Sending an e-mail link .....	560
Temporary Edit Interface Techniques .....	561
The data viewer concept .....	562
The legitimate purpose of record locking .....	563
Creating double-blind entry systems .....	563
Field Masking, Filtering, and Error Rejection .....	564
Applying standard data formations .....	565
Dealing with trailing spaces and carriage returns .....	566
Rejecting out-of-scope characters .....	567
Handling styled source text .....	567
Built-In Logging Capabilities .....	567
Making use of auto-enter options .....	567
Capturing and extending standard metadata .....	568
Script Logging .....	569
Infrastructure for script logging .....	569
Tracking script execution .....	570
Script-specific context variables .....	571
Script diagnostics .....	571
Capturing User Edits in Detail .....	571
Trapping edits, field-by-field .....	572
Incorporating ancillary data .....	573
Logging record deletions .....	574
Managing the Accumulation of Log Data .....	575
Archiving options .....	575
Generating secondary output .....	575
Implementing Roll-Back Capabilities .....	576
Chronological roll-back .....	576
Alternative undo and roll-back capabilities .....	577
Using logs to roll forward .....	578
Alternative Logging Approaches .....	578
Logs as Data .....	579
Scripted and triggered logging .....	579

### **Chapter 17: Maintaining and Restoring Data. . . . . 581**

Some Notes on File Recovery .....	581
Debunking common myths and misconceptions .....	582
The Recover process .....	582
Salvaging data.....	583
Understanding file corruption .....	584
Exporting and Importing Data .....	585
File format considerations .....	586
Exporting to and importing from a folder.....	587
Delimiters and EOL markers .....	589
Data Cleansing Operations .....	589
Extract, transform, and load .....	589
Data format considerations .....	590
Data organization .....	590
Data presentation .....	591
Data domain .....	592
Filtering capabilities in FileMaker.....	592
Synchronizing Data Sets .....	594
Import matching .....	595
Importing selectively .....	596
Handling Embedded Images and Stored Files.....	597
Assigning and retrieving paths .....	599
Scripted field updates.....	599
Text-Handling Considerations .....	600
Export field contents .....	600
Designing a custom export process.....	601

### **Part V: Raising the Bar 603**

### **Chapter 18: FileMaker Pro Advanced Features . . . . . 605**

Script Debugger .....	605
Watching code in action .....	606
Debugging restricted privilege scripts .....	607
Getting used to the Debugger controls .....	607
Data Viewer .....	609
Current and Watch panels .....	610
The Current panel .....	610
The Watch panel.....	612
Using the Viewer with the Debugger.....	613
The Data Viewer sand pit .....	613
The Data Viewer and variables .....	614
Database Design Report .....	615
DDR capabilities .....	616
Mining the DDR for information.....	616
Tools and techniques for interpreting DDR data .....	617



File Maintenance .....	617
Compact File .....	618
Optimize File .....	618
The Save a Copy As / Compacted alternative .....	618
Defining Tooltips .....	619
Using conditional tooltips.....	620
Keeping track of tooltips.....	620
Creating Custom Menus.....	621
Defining menus .....	621
Editing individual menus .....	622
Benefits of the Script Step action.....	623
Benefits of window widgets.....	624
Adding menus to sets .....	624
Assigning menu sets throughout your file.....	624
Setting the default menu set for a file .....	624
Determining a menu set for each layout .....	625
Controlling menu sets via script .....	626
Custom Functions .....	627
Defining custom functions .....	627
Custom functions as an aid to syntax readability .....	629
Maximizing efficiency and ease of use.....	630
Custom Functions and Recursion.....	631
Things that only custom functions can do .....	632
The stack and the limits of recursion .....	633
Tail recursion in practice .....	633
Some useful examples.....	634
Creating an acronym from a supplied phrase .....	634
Extracting a character set from a supplied block of text .....	634
Removing an unspecified number of leading carriage returns .....	635
Creating Runtime Applications.....	635
Generating a stand-alone solution.....	636
Binding for each platform.....	637
Hosting runtime files .....	637
<b>Chapter 19: Efficient Code, Efficient Solutions . . . . .</b>	<b>639</b>
Designing for Scale: Size Considerations .....	639
The elephant in the cherry tree.....	640
Predicting what will scale well .....	640
Eliminating Redundancy .....	641
Avoiding duplication of elements .....	641
Using portable and reusable code .....	642
Appropriate use of sub-scripts .....	642
Appropriate use of custom functions .....	643
Designing for Flexibility and Adaptability .....	643
Layouts and adaptable design .....	644
Concepts of reusability applied to the Relationships Graph .....	644

## Contents

Traveling the Shortest Distance Between Two Points.....	645
Optimal calculation syntax .....	645
Alternative syntax examples .....	647
Working with modifier keys .....	648
Working with Boolean values .....	649
Avoiding dependency “spaghetti” .....	650
Applying simplicity principles .....	653
Transaction Modeling.....	654
Live versus batch data.....	654
Posting edits and propagating edits to related records.....	655
Offline updates and processing.....	655
Robots and batch automation .....	656
Host/server script execution .....	656
Managing File Size .....	658
Dealing with data in chunks .....	658
Modularization strategies .....	658
Considering segmentation .....	659
Data archiving .....	659
Images and Media in Databases .....	660
<b>Chapter 20: Extending FileMaker’s Capabilities . . . . .</b>	<b>661</b>
External Scripting Calls .....	661
Using Send Event and VBScript .....	662
Using VBScript with FileMaker Pro .....	662
Perform AppleScript .....	665
Cross-platform solutions and external script calls .....	667
Third-party helpers and macros .....	668
Rendering HTML and JavaScript .....	669
Harnessing HTTP .....	669
Bringing services to your solution.....	669
Handling hypertext.....	670
Web Viewer Widgets .....	671
Charting with Flash .....	671
Applets and servlets .....	671
FileMaker Plug-Ins .....	672
Installing and enabling plug-ins .....	672
Using external functions.....	674
Script triggering .....	675
Robust triggering implementations .....	675
Available script triggering plug-ins .....	677
Dialog capabilities .....	677
File and media handling.....	678
E-mail, HTTP, and FTP.....	679
Charting and other functionality.....	679

Web Deployment Options .....	680
Instant Web publishing .....	680
Custom Web publishing .....	681
Working with XML and XSLT .....	681
The FileMaker PHP API .....	682
FileMaker's PHP Site Assistant.....	682
Finding Third-Party Tools .....	683
Developer tools.....	683
Analysis and documentation.....	683
Shared information.....	684
<b>Part VI: Appendixes</b> .....	<b>685</b>
<b>Appendix A: Glossary</b> .....	<b>687</b>
<b>Appendix B: Expanding Your Knowledge with Additional Resources</b> .....	<b>703</b>
From the Horse's Mouth.....	703
Professional Consulting and Development Services .....	704
Online Design and Development Tips and Tricks .....	705
Online Forums and Mailing Lists .....	706
Books and Periodicals.....	707
<b>Appendix C: About the Web Site</b> .....	<b>709</b>
What's on the Web Site.....	709
Troubleshooting .....	710
<b>Index</b> .....	<b>711</b>



# Acknowledgments

As is often the case in a project of this scope, there are too many people involved to thank all of them individually. However, we would be remiss if we didn't acknowledge the fine folks at FileMaker, Inc., on the development and testing teams who continue to improve our favorite database application without compromising its ease of use or requiring unnecessary changes to our established work habits. Additionally, we would like to thank our editors, Elizabeth Kuball and Kelly Ewing, and our technical editors, Mark Hammer, Jason DeLooze, and Corn Walker, for their attention to detail and support in making this book a work of which we're proud.

