

ADVANCED MAG OS X PROGRAMMING THE BIG NERD RANCH GUIDE



ADVANCED MAC OS X PROGRA

THE BIG NERD RANCH GUIDE

MARK DALRYMPLE

Advanced Mac OS X Programming: The Big Ranch Guide

by Mark Dalrymple

Copyright © 2011 Big Nerd Ranch, Inc.

All rights reserved. Printed in the United States of America. This publication is protected by copyright, an obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmiss any means, electronic, mechanical, photocopying, recoring, or likewise. For information regarding permiss

Big Nerd Ranch, Inc. 154 Krog Street Suite 100 Atlanta, GA 30307 (404) 478-9005

http://www.bignerdranch.com/ book-comments@bignerdranch.com

The 10-gallon hat with propeller logo is a trademark of Big Nerd Ranch, Inc.

Exclusive worldwide distribution of the English edition of this book by

Pearson Technology Group 800 East 96th Street Indianapolis, IN 46240 USA http://www.informit.com

The authors and publisher have taken care in writing and printing this book but make no expressed or impl kind and assume no responsibility for errors or omissions. No liability is assumed for incidental or conseq connection with or arising out of the use of the information or programs contained herein.

Aperture, Apple, Apple, Share, Aqua, Bonjour, Carbon, Cocoa, Cocoa Touch, Final Cut Pro, Finder, iChat, Builder, iOS, iTunes, Keychain, Leopard, Mac, Mac OS, MacBook, Objective-C, Quartz, QuickTime, Ros Spotlight, Tiger, Time Machine, and Xcode are trademarks of Apple, Inc., registered in the U.S. and other

Many of the designations used by manufacturers and sellers to distinguish their products are claimed as tra designations appear in this book, and the publisher was aware of a trademark claim, the designations have initial capital letters or in all capitals.

ISBN 10 0321706250 ISBN 13 978-0321706256

Library of Congress Control Number 2011931708

First printing, August 2011

Dedication

For Zoe. May she grow up to be as geeky as her Weird Uncle Bork.



Acknowledgments

This book is based upon the experiences teaching a five-day class at The Big Nerd Re Advanced Mac OS X Bootcamp. The patience and curiousity of my students has made complete and comprehensible introduction to the plumbing that makes Mac OS X a rand high-performance system.

Special thanks go to Jeremy Sherman. Jeremy stepped up and taught one of the Adva when I was unable to so. Along the way he made numerous improvements to this boc course materials, helping to modernize and robusticize the code. Jeremy is also respo excellent under-the-hoods look at Blocks.

Incredible thanks go to Aaron Hillegass, my co-author on the first two editions of this moons ago Aaron took a chance on this random guy sitting in the back of a Cocoa cle Over the years I've learned from Aaron more than I imagined possible about writing, treating others well.

Susan Loper, the tireless editor, performed acts of magic on the purple prose she was

In preparing this book, many people reviewed the drafts and brought errors to our attemost astonishing quantity of corrections over the years came from Bill Monk. It wou overstate Bill's contributions. Other technical reviewers who submitted errors or offer John Vink, Juan Pablo Claude, Carl-Johan Kihlborn, Mike Morton, Ajeya Vempati, E Ridd, Michael Simmons, David Southwick, Jeremy Wyld, Richard Wolf, Tom Van L Zarzycki, James Spencer, Greg Miller, Anne Halsall, Roy Lovejoy, Jonathan Saggau, Rob Rix. They made this book better with their useful corrections and suggestions. A remain in this book are completely my fault.

I would also like to thank my wife, my "Spousal Overunit" Sharlotte DeVere, for her and understanding.



Table of Contents

Man OC V. Duilt to Evolve

For hingry considerations

Foreword

Advanced Mac OS X Programming

When To Copy
Blocks in Collections
Block Retain Cycles
New API Using Blocks
For the More Curious: Blocks Internals
Implementation
Debugging
Dumping runtime information
Evolving the implementation
Compiler-generated names
Exercises
4. Command-Line Programs
The Basic Program
Inside the Central Loop
Changing Behavior By Name
Looking at the Environment
Parsing the Command Line
getopt_long()
User Defaults
5. Exceptions, Error Handling, and Signals
errno
setjmp, longjmp
Signals
Handling a signal
Blocking signals
Signal issues
Exception Handling in Cocoa
Classic exception handling
Native exception handling
Subclassing NSApplication to catch exceptions
64-bit Objective-C runtime
NSError
Logging
syslog()
ASL
For the More Curious: Assertions
Static assertions
AssertMacros.h
Exercises

dlopen()
dlsym()
BundlePrinter
For the More Curious: libtool
For the More Curious: otool
For the More Curious: Runtime Environment Variables
Exercises
7. Memory
Virtual Memory
Program Memory Model
Memory Lifetime
Dynamic Memory Allocation
malloc()
free()
realloc()
calloc()
alloca()
Memory Ownership Issues
Nodepools
Debugging Memory Problems
Common API issues
Memory corruption
Memory leaks
Other Tools
ps
Resource limits
Miscellaneous tools
vm_stat
Objective-C Garbage Collection
How to use it
How it works
Strong and weak references
Finalize methods
Non Objective-C objects
External reference counts
The "new" collection classes
GC and threads
Debugging

Exercises

Debugging With GDB
What Is a Debugger?
Using GDB from the Command Line
A sample GDB session
GDB Specifics
Help
Stack Traces
Program Listings
Breakpoints

8.