ROB NAPIER | MUGUNTH KUMAR

iOS 5 PROGRAMMING

PUSHING THE LIMITS

Advanced Application Development
for Apple iPhone®, iPad® and iPod® Touch

ROB NAPIER | MUGUNTH KUMAR

iOS 5 PROGRAMMING

PUSHING THE LIMITS

Advanced Application Development
for Apple iPhone®, iPad® and iPod® Touch

Pushing the Limits with iOS 5 Programming: Advanced Application Development for Apple iPhone®, iPad®, and iPod® Touch

Table of Contents

Introduction

- Who This Book Is For
- What This Book Covers
- How This Book Is Structured
  - Part I: What's New?
  - Part II: Getting the Most Out of Everyday Tools
  - Part III: The Right Tool for the Job
  - Part IV: Pushing the Limits
- What You Need to Use This Book
- Finding Apple Documentation
- Source Code

Part I: What's New?

Chapter 1: The Brand New Stuff

The History of iOS
What's New

iCloud
LLVM 3.0 Compiler
Automatic Reference Counting
Storyboards—Draw Your Flow
UIKit Customization—Appearance Proxy
Twitter Framework and Accounts Framework
Other New Features

Summary
Further Reading

Apple Documentation
Other Resources

Chapter 2: Getting Comfortable with Xcode 4

Getting to Know the New User Interface

Tabbed Editor
Changes to Key Bindings
Project Settings Editor
Integrated Version Control
Workspaces

All in One Window
Navigating the Navigators

- Project Navigator
- Symbol Navigator
- Search Navigator
- Issue Navigator
- Debug Navigator
- Breakpoint Navigator
- Log Navigator

Help from Your Assistant
Integrated Interface Builder

- Interface Builder Panels

LLVM Compiler 3.0: A Tryst with the Brain

- The Clang Front End
- I’m a Bug! Fix Me

Git Your Versions Here

- Integrated Git Version Control System
- Versions Editor
- Git Best Practices

Schemes

- Why Schemes?
- Think of Schemes as Implementing Your Intentions
- Creating a Scheme
- Sharing Your Schemes

Build Configurations You Can Comment

Creating an xcconfig File
Refactoring the Build Configuration File

Xcode 4 Organizer

Automatic Device Provisioning
Viewing Crash Logs and Console NSLog Statements
Viewing Applications' Sandbox Data
Managing Repositories
Accessing Your Application Archives
Viewing Objective-C and SDK Documentation

Summary
Further Reading

Apple Documentation
Blogs
Web Resources
Books

Part II: Getting the Most Out of Everyday Tools

Chapter 3: Everyday Objective-C

Naming Conventions
Automatic Reference Counting
Properties

Property Attributes
Property Best Practices
Private Ivars

Accessors
Categories and Extensions

+load
Category Data using Associative References
Category Data using the Flyweight Pattern
Class Extensions

Formal and Informal Protocols
Summary
Further Reading

Apple Documentation
Other Resources

Chapter 4: Hold On Loosely: Cocoa Design Patterns

Understanding Model-View-Controller

Using Model Classes
Using View Classes
Using Controller Classes

Understanding Delegates and Data Sources
Working with the Command Pattern

Using Target-Action
Using Method Signatures and Invocations
Using Trampolines
Using Undo

Working with the Observer Pattern
Working with the Singleton Pattern
Summary
Further Reading

Apple Documentation
Other Resources

Chapter 5: Getting Table Views Right

UITableView Class Hierarchy
Understanding Table Views

UITableViewController
UITableViewCell
Speed Up Your Tables
Custom Nonrepeating Cells
Advanced Table Views
Animating a UITableView
Table View Best Practices: Writing Clean Code with Lean Controllers

Storyboards

Getting Started with Storyboards
Segues
Building Table Views with Storyboard
Custom Transitions

Customizing Your Views Using UIAppearance Protocol
Summary
Further Reading

Apple Documentation
WWDC Videos
Other Resources

Chapter 6: Better Drawing

iOS’s Many Drawing Systems
UIKit and the View Drawing Cycle
View Drawing versus View Layout
Custom View Drawing

Drawing with UIKit
Paths
Understanding Coordinates
Resizing and contentMode
Transforms
Drawing with Core Graphics
Mixing UIKit and Core Graphics
Managing Graphics Contexts

Optimizing UIView Drawing

Avoid Drawing
Caching and Background Drawing
Custom Drawing Versus Prerendering
Pixel Alignment and Blurry Text
Alpha, Opaque, Hidden

CGLayer
Summary
Further Reading

Apple Documentation

Other Resources

Chapter 7: Layers Like an Onion: Core Animation

View Animations
Managing User Interaction
Drawing with Layers

Setting Contents Directly
Implementing Display
Custom Drawing
Drawing in Your Own Context

Moving Things Around

Implicit Animations
Explicit Animations
Model and Presentation
A Few Words on Timings

Into the Third Dimension
Decorating Your Layers
Auto-animate with Actions
Animating Custom Properties
Core Animation and Threads
Summary
Further Reading

Apple Documentation
Other Resources

Chapter 8: Tackling Those Pesky Errors

Error Handling Patterns
Assertions
Exceptions
Catching and Reporting Crashes
Errors and NSError

Error Localization
Error Recovery Attempter

Logs

Logging Sensitive Information
Getting Your Logs

Summary
Further Reading

Apple Documentation
Other Resources

Part III: The Right Tool for the Job

Chapter 9: Controlling Multitasking

Best Practices for Backgrounding: With Great Power Comes Great Responsibility
Understanding Run Loops
Threading
Developing Operation-Centric Multitasking
Multitasking with Grand Central Dispatch

Creating Synchronization Points with Dispatch Barriers

Queue Targets and Priority
New in iOS 5

Summary
Further Reading

Apple Documentation
WWDC Sessions
Other Resources

Chapter 10: REST for the Weary

The REST Philosophy
Choosing Your Data Exchange Format

Parsing XML on iOS
Parsing JSON on iOS
XML Versus JSON
Model Versioning

A Hypothetical Web Service
Important Reminders
RESTEngine Architecture (iHotelApp Sample Code)

Creating the RESTEngine
Authenticating Your API Calls with Access Tokens
Canceling Requests
Request Responses
Key Coding JSONs
List Versus Detail JSON Objects
Nested JSON Objects

Less Is More
Error Handling
Localization
Handling Additional Formats Using Category Classes
Tips to Improve Performance on iOS

Summary
Further Reading

Apple Documentation
Other Resources

Chapter 11: Batten the Hatches with Security Services

Understanding the iOS Sandbox
Securing Network Communications

How Certificates Work
Checking Certificate Validity
Determining Certificate Trust

Employing File Protection
Using Keychains

Sharing Data with Access Groups

Using Encryption

Overview of AES
Converting Passwords to Keys with PBKDF2

Applying PKCS7 Padding
Selecting the Mode and the Initialization Vector (IV)
Performing One-Shot Encryption
Improving CommonCrypto Performance
Combining Encryption and Compression

Summary
Further Reading

Apple Documentation
WWDC Sessions
Other Resources

Chapter 12: Running on Multiple iPlatforms and iDevices

Developing for Multiple Platforms

Configurable Target Settings: Base SDK Versus Deployment Target
Considerations for Multiple SDK Support:Frameworks, Classes, and Methods
Checking the Availability of Frameworks, Classes, and Methods

Detecting Device Capabilities

Detecting Devices and Assuming Capabilities
Detecting Hardware and Sensors

In App Email and SMS
Checking Multitasking Awareness

Obtaining the UIDevice+Additions Category

UIRequiredDeviceCapabilities
Summary
Further Reading

Apple Documentation
Other Resources

Chapter 13: Internationalization and Localization

What is Localization?
Localizing Strings
Auditing for Nonlocalized Strings
Formatting Numbers and Dates
Localizing Nib Files
Summary
Further Reading

Apple Documentation

Chapter 14: Selling Past the Sale with In App Purchases

Before You Start
In App Purchase Products

Prohibited Items
Rethinking Your Business Model

Setting Up Products on iTunes Connect

- Step 1: Create a New App ID for Your App
- Step 2: Generate Provisioning Profiles
- Step 3: Create the App's Product Entry
- Step 4: Create the In App Purchase Product Entries
- Step 5: Generating the Shared Secret
- Step 6: Creating Test User Accounts

In App Purchase Implementation
Introduction to MKStoreKit

- Why MKStoreKit?
- Design of MKStoreKit
- Customizing MKStoreKit

Making the Purchase
Testing Your In App Purchase
Troubleshooting

- Invalid Product IDs
- Cannot Connect to iTunes Store
- You Have Already Purchased This Product, but It's Still Not Downloaded

Summary
Further Reading

- Apple Documentation
- Blogs
- Other Resources

Part IV: Pushing the Limits

Chapter 15: Cocoa’s Biggest Trick: Key-Value Coding and Observing

Key-Value Coding

Setting Values with KVC
Traversing Properties
KVC and Collections
KVC and Dictionaries
KVC and Nonobjects
Higher-Order Messaging with KVC
Collection Operators

Key-Value Observing

KVO and Collections
How Is KVO Implemented?

KVO Tradeoffs
Summary
Further Reading

Apple Documentation

Chapter 16: Think Different: Blocks and Functional Programming

What Is a Block?

Why Use Functional Programming?
A ‘Functional’ UIAlertView

- Declaring a Block
  - Scope of Variables
  - Stack Versus Heap
- Implementing a Block
  - Blocks-based UIAlertView
  - Blocks-based RESTEngine
- Blocks and Concurrency
  - Dispatch Queues in GCD
  - NSOperationQueue Versus GCD
  - Dispatch Queue
- Block-based Cocoa Methods
  - UIView Animations using Blocks
  - Presenting and Dismissing View Controllers
  - TweetComposer Versus In App Email/SMS
  - Dictionary Enumeration Using NSDictionary enumerateWithBlock
  - Looking for Block-based Methods
- Supported Platforms
- Summary
- Further Reading
  - Apple Documentation
  - Blogs

Source Code References

Chapter 17: Going Offline

Reasons for Going Offline
Strategies for Caching

Methods for Storing Your Cache
Cache Versioning

AppCache Architecture
Cache Versioning

Invalidating the Cache

Creating an In-Memory Cache

Designing the AppCache
Handling Memory Warnings
Handling Termination and Enter Background Notifications

Caching Images

Components of ImageCache

Using iCloud

Managing Document and Key-Value Data Storage on iCloud
Understanding the iCloud Data Store

Summary
Further Reading

Apple Documentation
Books
Other Resources

Chapter 18: Fancy Text Layout

The Normal Stuff: Fields, Views, and Labels
Web Views for Rich Text

Displaying and Accessing HTML in a Web View
Responding to User Interaction
Drawing Web Views in Scroll and Table Views
Rich Editing with Web Views

Core Text

Understanding Bold, Italic, and Underline
Attributed Strings
Paragraph Styles
Simple Layout with CTFramesetter
Creating Frames for Noncontiguous Paths
Typesetters, Lines, Runs, and Glyphs
Drawing Text Along a Curve

Comparison of Rich Text Options
Third-Party Options

NSAttributedString-Additions-for-HTML
CoreTextWrapper
OmniUI

Summary
Further Reading

Apple Documentation
WWDC Sessions
Other Resources

Chapter 19: Building a (Core) Foundation

Core Foundation Types
Naming and Memory Management
Allocators
Introspection
Strings and Data

Constant Strings
Creating Strings
Converting to C Strings
Other String Operations
Backing Storage for Strings
CFData

Collections

CFArray
CFDictionary
CFSet, CFBag
Other Collections

Callbacks

Toll-free Bridging
Summary
Further Reading

Apple Documentation
Other Resources

Chapter 20: Deep Objective-C

Understanding Classes and Objects
Working with Methods and Properties
How Message Passing Really Works

Dynamic Implementations
Fast Forwarding
Normal Forwarding
Forwarding Failure
The Flavors of objc_msgSend

Method Swizzling
ISA Swizzling
Method Swizzling Versus ISA Swizzling
Summary
Further Reading

Apple Documentation
Other Resources

Pushing the Limits with iOS 5 Programming

Advanced Application Development for Apple iPhone®, iPad®, and iPod® Touch

Rob Napier and Mugunth Kumar

A John Wiley and Sons, Ltd, Publication

This edition first published 2012

© 2012 John Wiley and Sons, Ltd.

Registered office

John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, United Kingdom

For details of our global editorial offices, for customer services and for information about how to

apply for permission to reuse the copyright material in this book please see our website at www.wiley.com.

The right of the author to be identified as the author of this work has been asserted in accordance with the Copyright, Designs and Patents Act 1988.

All rights reserved. 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 or otherwise, except as permitted by the UK Copyright, Designs and Patents Act 1988, without the prior permission of the publisher.

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

Designations used by companies to distinguish their products are often claimed as trademarks. All brand names and product names used in this book are trade names, service marks, trademarks or registered trademarks of their respective owners. The publisher is not associated with any product or vendor mentioned in this book. This publication is designed to provide accurate and authoritative information in regard to the subject matter covered. It is sold on the understanding that the publisher is not engaged in rendering professional

services. If professional advice or other expert assistance is required, the services of a competent professional should be sought.

Trademarks: Wiley and the John Wiley & Sons, Ltd. logo are trademarks or registered trademarks of John Wiley and Sons, Ltd. and/ or its affiliates in the United States and/or other countries, and may not be used without written permission. iPhone, iPad and iPod are trademarks of Apple Computer, Inc. All other trademarks are the property of their respective owners. John Wiley & Sons, Ltd. is not associated with any product or vendor mentioned in the book. This book is not endorsed by Apple Computer, Inc.

A catalogue record for this book is available from the British Library.

ISBN 978-1-119-96132-1 (paperback); ISBN 978-1-119-96158-1 (ebook); 978-1-119-96159-8 (ebook); 978-1-119-96160-4 (ebook)

Set in 9.5/12 Myriad Pro Regular by Wiley Composition Services

Printed in the United States by Bind-Rite

Dedication

To Neverwood. Thanks for your patience.
Rob

To my mother who shaped the first twenty years of my life
Mugunth

Publisher's Acknowledgements

Some of the people who helped bring this book to market include the following:

Editorial and Production

VP Consumer and Technology Publishing Director: Michelle Leete

Associate Director–Book Content Management: Martin Tribe

Associate Publisher: Chris Webb

Acquisitions Editor: Chris Katsaropolous

Assistant Editor: Ellie Scott

Development Editor: Tom Dinse

Copy Editor: Maryann Steinhart

Technical Editor: Mithilesh Kumar

Editorial Manager: Jodi Jensen

Senior Project Editor: Sara Shlaer

Editorial Assistant: Leslie Saxman

Marketing

Associate Marketing Director: Louise Breinholt

Marketing Executive: Kate Parrett

Composition Services

Compositor: Wiley Indianapolis Composition Services

Proofreaders: Laura Albert, Lindsay Amones, Melissa D. Buddendeck, Melissa Cossell

Indexer: Potomac Indexing, LLC

About the Authors

Rob Napier is a builder of tree houses, hiker, and proud father. He began developing for the Mac in 2005, and picked up iPhone development when the first SDK was released, working on products such as The Daily, PandoraBoy, and Cisco Mobile. He is a major contributor to Stack Overflow and maintains the *Cocoaphony* blog (cocoaphony.com).

Mugunth Kumar is an independent iOS developer based in Singapore. He graduated in 2009 and holds a Masters degree from Nanyang Technological University, Singapore, majoring in Information Systems. He writes about mobile development, software usability, and iOS-related tutorials on his blog (blog.mugunthkumar.com).Prior to iOS development he worked for Fortune 500 companies GE and Honeywell as a software consultant on Windows and .NET platforms. His core areas of interest include programming methodologies (Object Oriented and Functional), mobile development and usability engineering. If he were not coding, he would probably be found at some exotic place capturing scenic photos of Mother Nature.

About the Technical Editor

Mithilesh Kumar is a software engineer with a passion for user interface design, Internet protocols, and virtual worlds. He likes to prototype and build applications for iOS and Mac OS X platforms. He has extensive experience in developing UI and core components for telephony clients capable of voice, video, instant messaging, presence, and voicemail.

Mithilesh graduated with a Masters degree in Computer Science from Virginia Tech with emphasis on Human-Computer Interaction. While at graduate school, he co-authored several research papers in the area of user interfaces, computer graphics and network protocols.