

# CONTENTS

INTRODUCTION

xxiii

## **PART I: BUILDING APPLICATIONS WITH SWIFT**

<b>CHAPTER 1: A SWIFT PRIMER</b>	<b>3</b>
What Is Swift?	4
Why Learn Swift?	5
Working with Constants and Variables	5
Understanding Swift Data Types	6
Using Numerical Types	6
Boolean Types	7
Using Character Types	8
Using Arrays	10
Using Dictionaries	10
Using Tuples	11
Working with Type Annotations	12
Minimizing Annotation with Type Inference	13
Clarifying Code with Type Aliasing	14
Working with Operators	15
Using Basic Operators	15
Using Compound Assignment Operators	17
Using Overflow Operators	17
Using Range Operators	18
Using Logical Operators	18
Using Comparison Operators	19
Using Custom Operators	19
Making Decisions with Control Flow	19
Using Conditional Statements	20
Using Loops	23
Control Transfer Statements	25
Grouping Types with Enumerations	26
Working with Functions	27
Declaring Functions	27
Specifying Parameter Names	28
Defining Default Parameters	29

---

Specifying Variadic Parameters	29
Specifying Constant, Variable, and In-Out Parameters	30
Function Types	31
Using Closures	32
Summary	34
<b>CHAPTER 2: WRITING A SWIFT PROGRAM</b>	<b>35</b>
<hr/>	
<b>Setting Up Xcode</b>	<b>36</b>
Downloading from Apple's Developer Portal	36
Downloading Xcode	36
<b>Experimenting with Playgrounds</b>	<b>38</b>
Using Playgrounds in Xcode	38
A Simple Example in Playground	38
A More Exciting Playground Example	40
<b>Writing Swift in Xcode</b>	<b>41</b>
Creating a New Swift Project	42
Creating the Swiftisms App	44
Creating the Interface	45
Creating Connections between the View Controller and the Object	46
Connecting the Buttons and the Action	50
Displaying Random Strings	51
What Next?	53
<b>Debugging Swift Applications</b>	<b>53</b>
Understanding Breakpoint Types	54
Setting Breakpoints	54
Using the Debugger	55
Using the Hierarchical View	56
Using the Debugger View and the po Command	56
Executing the Program	58
Summary	59
<b>CHAPTER 3: CLASSES, STRUCTS, AND ENUMS</b>	<b>61</b>
<hr/>	
<b>Working with Classes and Structs</b>	<b>62</b>
Defining Classes and Structs	62
Initializing Classes and Structs	64
Creating an Initial Value	64
Defining Your Own Initializer	65
Writing an Initializer	66
Working with Multiple Initializers	68
Deinitializing Classes	69

---

<b>Working with Properties</b>	<b>70</b>
Using Simple Properties	70
Using Lazy Properties	72
Using Computed Properties	72
Observing Property Changes	73
<b>Understanding Methods</b>	<b>74</b>
<b>Understanding the Difference between Classes and Structs</b>	<b>76</b>
<b>Working with Enumerations</b>	<b>78</b>
<b>Summary</b>	<b>79</b>
<hr/> <b>CHAPTER 4: CONCURRENCY IN SWIFT</b>	<hr/> <b>81</b>
<b>What Is Concurrency?</b>	<b>82</b>
Understanding Processes	82
Understanding Threads	84
Why Concurrency?	85
Designing Concurrent Programs	85
<b>Concurrency in iOS and OS X</b>	<b>86</b>
Understanding Event Loops	86
Understanding Run Loops	87
Understanding Asynchronous Methods	87
Understanding NSTimer	89
Understanding NSThread	91
Understanding Grand Central Dispatch	92
<b>Summary</b>	<b>94</b>
<hr/> <b>CHAPTER 5: INTERFACING WITH WEB SERVICES</b>	<hr/> <b>95</b>
<b>Understanding Web Services</b>	<b>95</b>
<b>Implementing a Web Services Client</b>	<b>97</b>
Signing Up for a Firebase Account	97
Laying Out the User Interface	98
Hooking Up the Add Album View Controller	101
Adding the Album Creation View Controller	103
Hooking Up the Segue	104
Creating the Album Model	104
Communicating with Firebase	106
Creating the Firebase Connector	106
Making Asynchronous Web Requests	109
Processing JSON Data	110
Creating New Albums	111
Deleting Albums	112
Wiring Up the View and Data Models	112

---

Wiring Up the Segue	115
Run the Application	116
Summary	118
<b>CHAPTER 6: STORING DATA WITH CORE DATA</b>	<b>119</b>
<hr/>	
What Is Core Data?	120
The Core Data Stack	120
Using Core Data with Swift	121
Setting Up the Birthdays Application	122
Getting User Input	128
Examining Xcode Files	129
Adding Methods to the AppDelegate Class	134
Handling the Dialog Sheet	135
Hooking Up the Dialog Sheet	137
Displaying Data	137
Implementing the Table View's Behavior	138
The Completed Application Delegate	140
Summary	145
<hr/>	
<b>PART II: ADVANCED SWIFT CONCEPTS</b>	
<hr/>	
<b>CHAPTER 7: EXTENDING CLASSES</b>	<b>149</b>
<hr/>	
Working with Class Extensions	150
Adding Methods to Classes	150
Adding Properties to Classes	152
Mutating Classes in Extensions	153
Specifying Behavior with Protocols	153
Adopting Protocols	154
Declaring Properties and Methods	154
Working with Optional Methods and Properties	156
Protocols Are Types	158
Checking for Protocol Conformance	158
Using Protocol Types in Collections	159
Composing Protocols	160
Inheriting from Other Protocols	160
Adopting Protocols in Class Extensions	161
Working with Generics	163
Generic Classes	164
Working with Type Constraints	165
Summary	166

---

<b>CHAPTER 8: ADVANCED DATA TYPES</b>	<b>167</b>
<b>Working with Enums and Algebraic Data Types</b>	<b>168</b>
Matching Patterns	168
Putting It All Together with JSON	170
<b>Working with Optional Types</b>	<b>172</b>
Working with Null Values	172
Excluding Null Values	173
Understanding Swift's Version of Null	173
Chaining Optional Values	174
<b>Understanding Type Casting</b>	<b>175</b>
<b>Grouping Values with Tuples</b>	<b>177</b>
<b>Custom Operators</b>	<b>179</b>
Defining Custom Operators	183
Defining Precedence and Associativity	183
A Final Word about Operators	186
<b>Using Functions and Closures</b>	<b>187</b>
<b>Summary</b>	<b>188</b>
<b>CHAPTER 9: BRIDGING SWIFT AND OBJECTIVE-C</b>	<b>189</b>
<b>The Successor to Objective-C</b>	<b>190</b>
<b>Introducing Namespaces and Modules</b>	<b>191</b>
Organizing Code with Namespaces	191
Distributing Code with Modules	193
Using Access Modifiers	193
Specifying an Access Level	194
<b>How Swift and Objective-C Interact</b>	<b>194</b>
Using Swift Classes in Objective-C	195
Generating an Objective-C Header	195
Objective-C and Swift-Only Features	196
Using Swift Code in an Objective-C Application	196
Using Objective-C in Swift	198
Generating a Bridging Header	198
Calling Objective-C Code from Swift	199
<b>Using C and C++ Code with Swift</b>	<b>202</b>
Working with C Scalar Types	202
Accessing Memory with C Pointers	203
Working with Global Constants and Defines and Swift	204
Calling C Code from Swift	204
Using C++ Code in Swift	206
<b>Summary</b>	<b>206</b>

---

<b>CHAPTER 10: DEBUGGING SWIFT APPLICATIONS</b>	<b>207</b>
<b>The Art of Debugging</b>	<b>208</b>
<b>Creating CircleView</b>	<b>208</b>
Drawing the Circle	209
Adding Sliders	210
Completing the Project	211
<b>Printing Values</b>	<b>213</b>
<b>Working with Debuggers</b>	<b>215</b>
<b>Examining Errors with lldb, the LLVM Debugger</b>	<b>216</b>
Basic Breakpoints	216
Using lldb to Inspect Programs	218
Using the Variable Pane	218
Entering Commands in the lldb Command Prompt Pane	218
Displaying Code Hierarchy with the lldb Ribbon	219
Walking through a Program with the lldb Ribbon	221
Removing or Disabling Breakpoints	222
Setting Conditional Breakpoints	222
Setting Symbolic Breakpoints	223
Exploring the Debugger	225
Summary	228
<b>CHAPTER 11: THE SWIFT RUNTIME</b>	<b>229</b>
<b>What Is a Runtime?</b>	<b>230</b>
<b>Understanding the Objective-C Runtime</b>	<b>231</b>
Dispatching Methods Dynamically in Objective-C	231
Message Passing	233
Resolving Methods	233
Messages and Methods	237
<b>Exploring the Swift Runtime</b>	<b>238</b>
Understanding Virtual Method Tables	239
Loading Swift Programs	241
Summary	245
<b>APPENDIX: AN OVERVIEW OF C</b>	<b>247</b>
<b>Comparing Procedural and Object-Oriented Programming Styles</b>	<b>248</b>
<b>Understanding the Importance of C Language Syntax</b>	<b>249</b>
Defining Data with Variables and Arrays	249
Integral Data Types	249
Floating-Point Data Types	251
Arrays	252

---

Typedefs	253
Enums	254
Performing Calculations with Operators	254
Arithmetic Operators	254
Logical Operators	256
Relational Operators	258
Bitwise Operators	258
Bitshift Operators	259
Referencing Data with Pointers	260
Organizing Data with Structs	261
Generalizing Data with Unions	261
Referencing Functions with Function Pointers	262
<b>INDEX</b>	<b>265</b>