Beginning App Development with Flutter

Create Cross-Platform Mobile Apps

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Printed on acid-free paper

This book is dedicated to the men and women of the Flutter Community. I've never seen a group more devoted to the success of others. You're an inspiration and example to me.

Particular thanks to these members of the community who've helped me with Flutter issues. This Texan owes y'all!

Andrew "Red" Brogdon (Columbus, Ohio),

Brian Egan (Montana),

Emily Fortuna (San Francisco),

Frederik Schwieger (Düsseldorf, Germany), Jeroen "Jay" Meijer (Rotterdam, Netherlands), Martin Rybak (New York), Martin Jeret (Estonia), Nash Ramdial (Trinidad), Nilay Yenner (San Francisco), Norbert Kozsir (Karlsruhe, Germany), Pooja Bhaumik (Bengaluru, India), Raouf Rahiche (Casablanca by way of Algeria), Remi Rousselet (Paris), Rohan Tanaja (Berlin), Scott Stoll (Cleveland, Ohio),

But especially Simon Lightfoot (London), who we all call "The Flutter Whisperer" He taught me much of what I know about Flutter.

Praise for Beginning App Development with Flutter

“Rap has written a great starting guide full of information for those who are new to developing multi-platform apps with Flutter.”

—Frederik Schwieger (Düsseldorf, Germany), Organizer of the
International Flutter Hackathon and creator of flutter school

“A great read! This covers everything a beginner might want to know, and more. It explains not only what Flutter is but why it exists works the way it does. It also provides great tips for common pitfalls along the way. Definitely recommended.”

—Jeroen “Jay” Meijer (Rotterdam, Netherlands),
Leader of Flutter Community Github

“Rap’s book is a great book to get started with Flutter. It covers every important topic to write your very first app but also contains valuable information for more seasoned developers.”

—Norbert Kozsir (Karlsruhe, Germany)
Flutter Community Editor

“As a non-native English speaker, I’m totally impressed by the simplicity of this book and how much I can read and understand without getting bored.”

—Raouf Rahiche (Algeria) Flutter speaker,
developer, and instructor

PRAISE FOR BEGINNING APP DEVELOPMENT WITH FLUTTER

“As an early adopter and one of the original members of the Flutter Community, Rap is one of the world’s foremost authorities on Flutter. Where documentation is written for Engineers, by Engineers, Rap is a human who (thankfully!) writes in an enjoyable style that can easily be understood by other humans.”

—Scott Stoll (Cleveland, Ohio), Contributor to the Flutter codebase and Co-founder of the Flutter Study Group

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About the Author

Rap Payne has focused on mobile development since he started Agile Gadgets, a mobile app development company, in 2003. He is a consultant, trainer, and entrepreneur who has written apps, mentored developers, and taught software development classes for Fortune 500 companies like Boeing, Walmart, Coca-Cola, Wells Fargo, Honda, CVS, GE, Chase, HP, Lockheed, ExxonMobil, Lowe's, Nike, J.C. Penney, USAA, and Walgreens; government agencies like the NSA, the US Air Force, Navy, Army, NASA, Britain's GCHQ, and Canada's postal service; and several provincial governments, to name a few.

As a professional mentor and trainer, Rap has developed a talent for communicating highly complex ideas in easy-to-understand ways. And as a real-world developer, he understands the need to teach these topics using practical and realistic examples and exercises.

About the Technical Reviewer

Massimo Nardone has more than 22 years of experience in Security, Web/Mobile development, Cloud, and IT Architecture. His true IT passions are Security and Android.

He has been programming and teaching how to program with Android, Perl, PHP, Java, VB, Python, C/C++, and MySQL for more than 20 years.

He holds a Master of Science in Computing Science from the University of Salerno, Italy.

He has worked as a Project Manager, Software Engineer, Research Engineer, Chief Security Architect, Information Security Manager, PCI/SCADA Auditor, and Senior Lead IT Security/Cloud/SCADA Architect for many years.

His technical skills include Security, Android, Cloud, Java, MySQL, Drupal, Cobol, Perl, Web/Mobile development, MongoDB, D3, Joomla, Couchbase, C/C++, WebGL, Python, Pro Rails, django CMS, Jekyll, Scratch, and so on.

He works as Chief Information Security Officer (CISO) for Cargotec Oyj.

He worked as visiting lecturer and supervisor for exercises at the Networking Laboratory of the Helsinki University of Technology (Aalto University). He holds four international patents (PKI, SIP, SAML, and Proxy areas).

Who is this book for?

If you're a developer with experience in some object-oriented language like Java, C#, C++, or Objective-C and you want to create Android apps, iOS apps, or web apps with Flutter, this book is for you. It is especially important for you if you want to create an app that runs on multiple platforms and if you are new to Flutter.

If you've got some experience already with Flutter, you'll undoubtedly learn something, but we're not expecting that you have any prerequisite knowledge or experience with Flutter. All of our chapters are written with the assumption that everything in Flutter is completely new to you.

If you know anything about iOS development, Android development, or web development, that will certainly help with understanding the topics because there are lots of analogies in them for Flutter. The more you know about those things, the better, especially JavaScript and React. But if you know none of them, don't fret. They're by no means necessary.

Knowledge of the Dart language also will help. We've found that Dart has got its unique features for sure, but it is extremely easy to pick up if you understand object-oriented concepts. Heck, if you know Java or C#, most code snippets are understandable without any explanation of the language. Read a few and you'll be writing your own in no time.

At the same time, there are some unique but very cool Dart features that we consider best practices. We could have "simplified" the code for Java devs by not using these best practices, but in the long run that's not doing you any favors. Instead, we go ahead and use them, but we do explain those things in "Appendix A: Dart Language Overview." In there, we give you a cheat sheet with just enough detail to write code, followed by a more in-depth explanation of the features that will be unexpected by developers of other languages. Pay special attention to the section called “Unexpected things about Dart.”

What is covered?

This book teaches you how to create fully functioning and feature-rich apps that run on iOS, Android, and the Web. We do this in three sections.

Part I: Introduction to Flutter

1. **Hello Flutter** – We’re setting the stage for the book. Giving you a feel for why you’re here. What problems does Flutter solve? Why the boss would choose Flutter vs. some other solution.
2. **Developing in Flutter** – Flutter has a unique set of tools, but it isn’t always straightforward what each tool does and how to use it. This chapter guides you through the process of write-debug-test-run. We get an understanding of the tooling including installation and maintenance.

Part II: Foundational Flutter

3. **Everything Is Widgets** – Widgets are super important to Flutter since they’re the building blocks of every Flutter app. We show why and provide the motivation and basic tools to create widgets. Topics include composition, UI as code, widget types, keys, and stateless vs. stateful widgets.

4. **Value Widgets** – A deep dive into widgets that hold a value, especially user-input fields. Topics include the pubspec.yaml file; Text, Image, and Icon widgets; and how to create forms in Flutter.

5. **Responding to Gestures** – How to make your program do things in response to user actions like taps, swiping, pinching, and the like. We'll show you the button family and the GestureDetector widget.

6. **Laying Out Your Widgets** – We'll learn how to lay out a view, controlling how widgets are placed side by side and/or above and below, defining the amount of space between widgets, and aligning them vertically and horizontally.

7. **Navigation and Routing** – Navigation is making the app hide one widget and show another in response to user actions. This makes them feel like they're moving from one scene to another. We'll cover stack navigation, tab navigation, and drawer navigation.

8. **Styling Your Widgets** – Then we'll look at how to control each widget's color, borders, decorations, shapes, and other presentational characteristics. We handled light styling as we introduced each widget earlier, but this is where we answer all the questions needed to get a real-world app looking good and staying consistent throughout with themes.

9. **Managing State** – How to get data from one widget to another and how to change that data. We cover how to create StatefulWidgets and design them in the best way. We also provide a high-level overview of tools to handle real-world complex state management.

Part III: Above and Beyond

10. **Your Flutter App Can Work with Files** – Using libraries. Futures, async, await. Bundling files with your app. Reading and writing a file. JSON serialization.

11. **Making RESTful API Calls with Ajax** – How to read from and write to an HTTP API server. This is where we show how to make GET, POST, PUT, DELETE, and PATCH requests.

12. **Using Firebase with Flutter** – We will show you a real-world, robust cloud solution that works like a dream with Flutter. No surprise that it is also a Google offering.

What is not covered and where can I find it?

As importantly, you should know what not to expect in the book. We will not give you a primer on the Dart programming language beyond the aforementioned appendix. We simply didn't think it was the best use of your time and wanted to dive right into Flutter. If you feel you need a primer later on, go here: `https://dart.dev/guides/language/language-tour` followed by `https://dart.dev/tutorials`. We chose not to discuss deploying to the app stores. The stores already do a fine job of explaining how to submit an app. That, and the process, changes so frequently that your definitive resource ought to be the stores themselves. You'll find instructions at `https://developer.apple.com/ios/submit/` and here: `https://play.google.com/apps/publish`. And we aren't going to cover certain advanced topics like device-specific development in iOS and Android or adding Flutter to an existing iOS/Android project. This is a beginner's book and we didn't want to overwhelm you. These and so many other topics can be found on the Web by searching and through some of the other resources we'll point you to in the last chapter of book.