

Flutter in 7 Days

*Build user-friendly apps with
widgets and navigation*

Ipsi Patro



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Dedicated to

*To my beloved husband, **Sanat Patro**,
and my two sons, **Arnav Patro** and **Vivaan Patro***

About the Author

Ipsi Patro is a software engineer with extensive experience in mobile platforms, excelling in both native and hybrid environments. She graduated with a B.Tech degree and has since worked at renowned companies such as Tata Consultancy Services in India, Vitality, and OvalMoney in the UK, among several others. Currently serving as the Head of Engineering at Twyn in the UK, Ipsi has consistently showcased outstanding leadership and managerial skills, effectively guiding mobile development teams with proficiency.

Motivated by an insatiable curiosity and a dedication to remaining at the forefront of technology, Ipsi immersed herself in mastering Flutter and Dart, swiftly achieving proficiency in both. Her technical expertise spans various programming languages, frameworks, and tools, complemented by a deep understanding of software architecture, agile methodologies, and DevOps practices. These capabilities have empowered her to successfully oversee complex projects from conception through deployment.

Beyond her technical accomplishments, Ipsi is passionate about knowledge-sharing. Her extensive hands-on experience with Flutter projects, coupled with a natural talent for teaching, enables her to articulate complex concepts clearly and accessibly. She firmly believes in the transformative impact of education and is committed to empowering aspiring developers to fulfill their potential.

When not deeply engaged in coding or teaching, Ipsi enjoys pursuits such as listening to music, gardening, cooking, and exploring the outdoors. Actively involved in developer communities, she collaborates with peers to exchange insights and deepen her knowledge.

Ipsi's book, **Flutter in 7 Days**, reflects her deep expertise and passion for Flutter development. She hopes this guide will empower readers to embark on their own Flutter journey and create exceptional mobile applications.

About the Reviewer

SriSindhu Pydimukkala is a seasoned software engineer with a strong foundation in Android development and a burgeoning expertise in Flutter. With seven years of experience in Android development, SriSindhu brings a wealth of knowledge and a fresh perspective to the world of cross-platform mobile app development.

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Acknowledgement

I would like to express my deepest gratitude to my family and friends for their unwavering support and encouragement throughout the writing of this book. A special thanks to my beloved husband, Sanat Patro, and my two sons, Arnav Patro and Vivaan Patro, whose love and patience have been my greatest source of strength.

I am also profoundly grateful to BPB Publications for their guidance and expertise in bringing this book to fruition. This journey involved numerous revisions and benefited immensely from the participation and collaboration of reviewers, technical experts, and editors.

I would like to acknowledge the valuable contributions of my colleagues and co-workers during my many years in the tech industry. Their insights and feedback have significantly shaped my understanding and approach to mobile app development.

Finally, I extend my heartfelt thanks to all the readers who have shown interest in my book. Your support and enthusiasm have been invaluable in making this book a reality. Thank you for embarking on this journey with me.

Preface

Welcome to *Flutter in 7 Days*! If you are holding this book, you have taken the first step towards mastering one of the most versatile and powerful frameworks for building cross-platform applications. Whether you are a seasoned developer looking to expand your skill set or a newcomer eager to dive into the world of mobile app development, this book is designed to be your comprehensive guide to learning Flutter in just seven days.

In today's fast-paced world, the demand for high-quality mobile applications is ever-increasing. Flutter, with its robust set of features and unparalleled flexibility, has emerged as a frontrunner in the realm of cross-platform development. With Flutter, you can create stunning user interfaces, leverage a single codebase to deploy apps on multiple platforms, and enjoy blazing-fast performance – all without compromising on quality or user experience.

Flutter in 7 Days is structured to provide you with a step-by-step journey through the fundamentals of Flutter development. Each day is carefully crafted to build upon the concepts learned in the previous days, ensuring a smooth and progressive learning experience. From setting up your development environment to building complex UI layouts, handling user input, and integrating with backend services, this book covers everything you need to know to become proficient in Flutter development.

Throughout this book, you will find a balance of theoretical explanations, practical examples, and hands-on exercises to reinforce your learning. Whether you prefer to read through concepts, follow along with code examples, or roll up your sleeves and dive into coding challenges, you'll find something here to suit your learning style.

As you embark on this seven-day journey, remember that learning Flutter – like any new skill – takes time, patience, and practice. Do not be discouraged by challenges or setbacks along the way. Embrace them as opportunities to deepen your understanding and grow as a developer.

By the end of *Flutter in 7 Days*, you will have the knowledge and confidence to tackle real-world Flutter projects with ease. Whether you are building your own apps, contributing to open-source projects, or launching your career as a Flutter developer, this book will serve as your trusted companion on your Flutter journey.

So, without further ado, let us embark on this exciting adventure into the world of Flutter development. Get ready to unleash your creativity, build amazing apps, and take your skills to new heights. The next seven days are going to be both challenging and rewarding – let us make the most of them!

Chapter 1: Day 1– Getting Started with Flutter and Dart

This chapter introduces Flutter and Dart, guiding you through setting up your development environment and creating your first Flutter project. You will gain an understanding of the Flutter project structure and write your first Dart code.

Chapter 2: Day 2– Basic Programming Concepts

In this chapter, you will learn about variables and data types in Dart, control flow mechanisms such as loops and conditionals, and the fundamentals of functions and methods. Additionally, you will explore object-oriented programming basics in Dart and engage in hands-on exercises to reinforce these concepts.

Chapter 3: Day 3– First Flutter App

This chapter delves into the Flutter widget tree, teaching you how to create layouts with widgets and handle user input through gestures and interactions. You will learn to navigate between screens and build a simple app from scratch.

Chapter 4: Day 4– Flutter Widgets

Here, you will get an overview of commonly used Flutter widgets, including container widgets for layout and styling, and text and image widgets for displaying content. The chapter also covers ListView and GridView for creating scrolling lists and grids, as well as exploring advanced widgets and customizing their behavior.

Chapter 5: Day 5– Prep Up with Advanced Flutter

This chapter focuses on state management in Flutter, understanding the widget lifecycle, and using packages and plugins to extend Flutter’s functionality. Additionally, you will explore Flutter’s animation capabilities and learn techniques for optimizing performance and debugging.

Chapter 6: Day 6– Fetching Data Internet

In this chapter, you will learn how to make HTTP requests in Flutter and handle asynchronous operations using Futures and Streams. You will also learn to parse JSON data, display remote data in your Flutter app, and implement error handling and loading indicators.

Chapter 7: Day 7– Firebase Integration to Flutter App

This chapter introduces Firebase and its services, guiding you through setting up Firebase for your Flutter project. You will learn to integrate Firebase Authentication, store and retrieve data with Cloud Firestore, and implement real-time updates with Firebase Cloud Messaging.

Chapter 8: Miscellaneous

The final chapter offers tips and best practices for Flutter development, guidance on deploying your Flutter app to different platforms, and resources for further learning and exploration. It also addresses troubleshooting common issues and exploring advanced topics and next steps in your Flutter journey.

Code Bundle and Coloured Images

Please follow the link to download the
Code Bundle and the *Coloured Images* of the book:

<https://rebrand.ly/077b4d>

The code bundle for the book is also hosted on GitHub at

<https://github.com/bpbpublications/Flutter-in-7-Days>.

In case there's an update to the code, it will be updated on the existing GitHub repository.

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CHAPTER 1

Getting Started with Flutter and Dart

Introduction

Hello readers welcome onboard to the journey of becoming a Flutter developer. In this chapter, first we will go through the installation steps to bring your machine ready for Flutter development and then we will go through some basic concepts of Flutter and Dart.

Structure

The chapter covers the following topics:

- Introduction to Flutter and Dart
- Understanding Flutter
- Defining Dart
- Installation in Windows
- Installation in Mac
- IDEs for Flutter
- Compilation logic of flutter
- Dartpad
- Function
- Dart data types

- Dart Variables
- Dart Classes and Objects
- Dart List
- Dart Map
- Null Safety in Dart
- String Interpolation

Objectives

By the end of this chapter, your machine must be ready for Flutter development, and you will get a good understanding of which IDE to pick and some important features provided by the IDE to make your development easier and faster. Along with that, some important and fundamental Flutter and Dart concepts will also be discussed.

Introduction to flutter and dart

In this book, we will learn Flutter from scratch to build fast, beautiful, native-quality iOS and Android Apps using just one code base and one programming language called **Dart**. **Flutter** is a tool developed by Google that can be used to build cross-platform iOS, Android, and web apps. It comes with loads of pre-built widgets, which makes it easier to layout any app. Flutter widgets are built using a modern framework inspired by Web Design.

Flutter just asks for a blank window and draws the widgets in it. Everything in a Flutter app is a widget, so we build a widget upon a widget. You can create your own widget or customize the pre-built widgets as per your requirements. One good thing about Flutter is when you are working with it, you get access to the original source code because it is open-source. If you want to know how an App bar is implemented, just click on the widget, and you can view it. If you are from an iOS development background, you must have noticed that the same thing is not possible in iOS. In iOS, many components are proprietary, so you will not be able to access them.

The term Flutter refers to two major things:

- The SDK contains many tools to compile the dart code to native machine code, which can run on iOS and Android platforms.
- It is a widget library that helps build beautiful apps.

In addition to Flutter, Dart is a fundamental aspect of app development with Flutter. Dart is the programming language utilized for writing code in Flutter. It was developed by Google and is designed for building fast, scalable, and efficient applications. Dart is a statically typed language with a syntax that is familiar to those who have experience with languages like Java or JavaScript.

Here are some key features of Dart:

- **Object-oriented:** Dart is an object-oriented language, which means it supports concepts like classes, objects, inheritance, and polymorphism. This makes it easy to organize code and build complex applications.
- **Strongly typed:** Dart is a statically typed language, meaning that variables are explicitly declared with their data types. This helps catch errors at compile-time and improves code robustness.
- **Asynchronous programming:** Dart provides built-in support for asynchronous programming using features like `async` and `await`. This allows developers to write code that can handle multiple tasks concurrently, such as making network requests or performing file I/O operations, without blocking the main execution thread.
- **Garbage collection:** Dart includes automatic memory management through garbage collection. Developers do not need to manually allocate and deallocate memory, making memory management less error-prone.
- **Package management:** Dart has a robust package management system called Pub. Developers can use Pub to easily manage dependencies and share their own packages with the community.
- **Cross-platform development:** While Dart is primarily associated with Flutter for mobile app development, it can also be used for server-side and web development. This versatility allows developers to use Dart for a wide range of projects beyond just mobile apps.

Understanding Dart is essential for effectively utilizing Flutter's capabilities to build powerful and feature-rich mobile applications. By mastering Dart, developers can leverage their strengths to write clean, efficient code that powers Flutter apps across multiple platforms.

Let us delve into a comprehensive comparison between Flutter and other popular frameworks to understand their respective strengths, weaknesses, and unique features in the realm of cross-platform mobile app development.

- **Flutter vs. React Native**
 - React Native, developed by *Facebook*, allows developers to build cross-platform mobile apps using JavaScript and React.
 - In Flutter, everything is a widget, which provides a more consistent and streamlined development experience compared to React Native's mix of native components and JavaScript.
 - Flutter uses a compiled programming language (Dart), which can result in better performance and more predictable behavior compared to React Native's JavaScript runtime.

- o Hot Reload in Flutter offers a faster development cycle compared to React Native's Hot Reload, as it updates the entire UI tree rather than just the JavaScript code.
- **Flutter vs. Xamarin**
 - o Xamarin, owned by *Microsoft*, enables developers to build cross-platform mobile apps using C# and .NET.
 - o Flutter's UI is rendered using Skia, a high-performance 2D graphics library, which can result in smoother animations and transitions compared to Xamarin's native UI approach.
 - o Flutter offers a more consistent development experience across platforms since it uses a single codebase, while Xamarin requires separate UI code for each platform.
 - o Dart's **Ahead-of-Time (AOT)** compilation in Flutter can lead to faster startup times and reduced runtime overhead compared to Xamarin's **Just-in-Time (JIT)** compilation.
- **Flutter vs. Native Development (iOS/Android)**
 - o Native development involves using platform-specific languages (Swift/Objective-C for iOS, Java/Kotlin for Android) and APIs to build apps.
 - o Flutter offers faster development cycles and a more productive workflow compared to native development, thanks to features like Hot Reload and a single codebase for multiple platforms.
 - o While native development provides access to platform-specific APIs and features, Flutter's extensive widget library and platform channels allow developers to achieve native-like behavior and performance.
 - o Flutter's UI is rendered using Skia, which may result in slightly different visual rendering compared to native components, though Flutter's customizable widgets can often achieve the desired look and feel.

In summary, Flutter's use of a single codebase, fast development cycles, high-performance rendering engine, and customizable widgets make it a compelling choice for cross-platform mobile app development, offering unique advantages over other frameworks like React Native, Xamarin, and native development. Additional advantages of Flutter, such as Hot Reload and strong community support, can provide further insights into its appeal. Here is an expanded comparison with these advantages:

- **Hot Reload for Rapid Development:**
 - o Flutter's Hot Reload feature allows developers to instantly see changes made to the code reflected in the app's UI without restarting the app or losing its current state.

- o This iterative development process significantly reduces development time by enabling developers to experiment, iterate, and refine UI elements and features rapidly.
- o In contrast, other frameworks like React Native and Xamarin offer similar features, but Flutter's Hot Reload is often praised for its speed and reliability, making the development experience smoother and more efficient.
- **Strong community support:**
 - o Flutter benefits from a large and active community of developers, enthusiasts, and contributors who provide extensive support, resources, and collaboration opportunities.
 - o The Flutter community actively shares knowledge, best practices, libraries, packages, and plugins through platforms like GitHub, Stack Overflow, Medium, and various forums and meetups.
 - o This vibrant community ecosystem fosters innovation, accelerates learning curves, and addresses challenges faced by developers, making it easier to find solutions and resources for building Flutter apps.
 - o Additionally, Google's continued investment in Flutter and its commitment to open-source development further bolster community engagement and contribute to the framework's growth and evolution.

Understanding Flutter

Google has introduced Flutter for native mobile app development on Android, iOS, and Windows. Flutter is a mobile app SDK, complete with framework, widgets, and tools, that gives developers a way to build and deploy mobile apps written in Dart. So, before moving ahead with learning Flutter, we will cover Dart basics later in this chapter. If you have prior experience of software development with any language, you must be familiar with these basics, but if you do not have any, it will be helpful for you in this journey.

Defining Dart

Dart is a programming language designed for client development, such as for the web and mobile apps. It is developed by Google and can also be used to build server and desktop applications. It is an object-oriented, class-based, garbage-collected language with C-style syntax.

Flutter Architecture

With UI as code, there is no visual editor in Flutter like native iOS and Android development. Therefore, no drag and drop of widgets; instead, write the code for adding and updating