

# FLUTTER

**SUCCINCTLY**

*BY* **ED FREITAS**

# Flutter Succinctly

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Foreword by Daniel Jebaraj



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# Introduction

With the rapid rise of cross-platform mobile frameworks such as [Ionic](#), [React Native](#), and [Xamarin](#), the folks at Google decided to step into the game and develop their own framework with support for both Android and iOS using the same codebase—this is how [Flutter](#) came to be.

Flutter is an open-source mobile application development SDK primarily developed and sponsored by Google, used for developing applications for [Android](#) and [iOS](#)—as well as being the primary method of creating applications for the [Google Fuchsia](#) operating system.

Flutter is written in [C](#), [C++](#), and [Dart](#), and uses the [Skia Graphics Engine](#). It offers a rich set of fully customizable widgets for building native interfaces, including the beautiful [Material Design](#) library and Cupertino (iOS-flavored) widgets, rich motion APIs, smooth natural scrolling, platform awareness, and hot reload—which helps to quickly build UIs without losing state on emulators, simulators, and any hardware for iOS and Android.

All these great features have helped Flutter take off very quickly, and developers are flocking to the framework. It's also one of the [trending projects in GitHub](#), which has helped it gain even more popularity.

With Flutter gaining momentum, it seems unlikely that it will fade away anytime soon, so I decided to give it a whirl and write an application with it. My personal experience: I was blown away. I felt immediately productive, even though I had never programmed in Dart before.

Throughout this book, I want to go on that same journey with you. We'll do this by creating a fully functional app, which will allow you to get a good grasp of the framework—whether you are coming from another mobile development framework, or have no previous mobile development experience.

I'm quite excited to embark on this journey with you. I hope that by the end of it, you'll have a great impression of the framework and be able to assess whether Flutter is the right choice for your mobile development needs. So, without further ado, let's get going.

# Chapter 1 Setup

## Project overview

The application that we'll be building throughout this book is one that we can use to keep track of important personal documents that have an expiration date, such as passports, driver's licenses, or credit cards.

This type of application is handy to have so we know when we need to renew these important documents before they expire. If you have read my other book, [Electron Succinctly](#), this is the same application concept we explored back then.

Using the [Dart programming language](#) with Flutter, we will take our application one step further—we'll also explore how to use a local SQLite database.

Awesome—let's get our engines ready so we can start setting up our development environment straight away.

## Installation

The Flutter setup is incredibly easy, with all the installation steps well documented within the official Flutter [documentation site](#).

I'll be using Windows 10, so I'll be describing [setup steps](#) and information related to this operating system; however, there are also easy-to-follow setup guidelines for both [macOS](#) and [Linux](#).

On Windows, there are some essential system requirements that need to be in place, which include having [PowerShell 5.0](#) (or later) and [Git for Windows 2.X](#) (or later) installed.

Even though you can write Flutter apps in any editor of your choice—personally, I'm a big fan of [Visual Studio Code](#)—Flutter relies on a full installation of [Android Studio](#) to supply its Android platform dependencies. You'll also need to set up an Android device emulator. These steps are described in the [official documentation](#).

With the prerequisites in place for Windows, all we need to do is download the installation bundle of the Flutter SDK—at the time of writing, it is [Flutter's 1.0.0 stable version for Windows](#).

Once you've downloaded the zip file, extract it to a desired folder within your drive, such as C:\Flutter. Don't extract the Flutter files to C:\Program Files or C:\Program Files (x86), which require elevated or admin permissions.

Once the files are in the desired folder, locate the file Flutter\_console.bat file—this is how it looks on my machine.

Name	Date modified	Type	Size
.pub-cache	05-Sep-18 4:53 AM	File folder	
bin	08-Dec-18 9:29 PM	File folder	
dev	08-Dec-18 9:29 PM	File folder	
examples	08-Dec-18 9:29 PM	File folder	
packages	22-Sep-18 8:45 PM	File folder	
.cirrus.yml	08-Dec-18 9:29 PM	Yaml Source File	8 KB
.gitattributes	05-Sep-18 4:53 AM	Git Attributes Sour...	1 KB
.gitignore	08-Dec-18 9:29 PM	Git Ignore Source ...	2 KB
analysis_options.yaml	08-Dec-18 9:29 PM	Yaml Source File	8 KB
AUTHORS	08-Dec-18 9:29 PM	File	2 KB
CODE_OF_CONDUCT.md	08-Dec-18 9:29 PM	Markdown Source ...	3 KB
CONTRIBUTING.md	08-Dec-18 9:29 PM	Markdown Source ...	4 KB
dartdoc_options.yaml	08-Dec-18 9:29 PM	Yaml Source File	1 KB
flutter_console.bat	08-Dec-18 9:29 PM	Windows Batch File	2 KB
flutter_root.iml	05-Sep-18 4:53 AM	IML File	1 KB
LICENSE	05-Sep-18 4:53 AM	File	2 KB
PATENTS	05-Sep-18 4:53 AM	File	2 KB
README.md	08-Dec-18 9:29 PM	Markdown Source ...	7 KB
version	24-Jan-19 2:40 PM	File	1 KB

Figure 1-a: The Flutter SDK files

In principle, you are now ready to run the Flutter console by executing the **Flutter\_console.bat** file. It's recommended—although not strictly necessary—to add the **Flutter\Bin** folder to the **System Path Environment** variable in Windows.

If you are unsure how to add a folder to the Windows Path variable, please refer to [this nice article](#) that explains how to do it, step by step, with screenshots.

In my machine, this looks as follows.

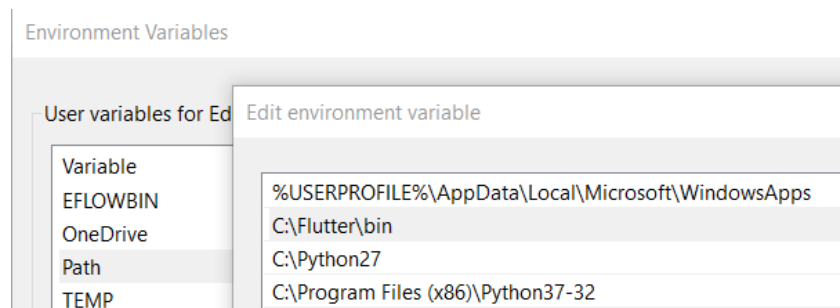


Figure 1-b: Flutter added to the Path variable in Windows

With the SDK file in place, we can now run the **Flutter\_console.bat** file—this is what you should see.

```
Flutter Console

#####  ##      ##      ## ##### ##### #####
##      ##      ##      ##      ##      ##      ##
##      ##      ##      ##      ##      ##      ##
#####  ##      ##      ##      ##      ##### #####
##      ##      ##      ##      ##      ##      ##
##      ##      ##      ##      ##      ##      ##
##      ##### #####      ##      ##      ##### ##      ##

WELCOME to the Flutter Console.
=====

Use the console below this message to interact with the "flutter" command.
Run "flutter doctor" to check if your system is ready to run Flutter apps.
Run "flutter create <app_name>" to create a new Flutter project.

Run "flutter help" to see all available commands.

Want to use an IDE to interact with Flutter? https://flutter.io/ide-setup/

Want to run the "flutter" command from any Command Prompt or PowerShell window?
Add Flutter to your PATH: https://flutter.io/setup-windows/#update-your-path
```

Figure 1-c: The Flutter console running

On the prompt, type the following command to check if Flutter is fully operational.

Code Listing 1-a: The “flutter doctor” command

```
flutter doctor
```

After you execute this command, you will get a result with any issues found—in my case, because I had previously installed [Android Studio](#) and [Visual Studio Code](#), I get the following information.

When you run the Android Studio installer, please make sure you follow the official [documentation](#) so that you end up with a successful Android Studio and SDK setup.

```
Doctor summary (to see all details, run flutter doctor -v):
[✓] Flutter (Channel beta, v1.0.0, on Microsoft Windows [Version 10.0.17763.253], locale en-US)
[!] Android toolchain - develop for Android devices (Android SDK 28.0.2)
    ! Some Android licenses not accepted. To resolve this, run: flutter doctor --android-licenses
[✓] Android Studio (version 3.2)
[✓] VS Code, 64-bit edition (version 1.30.2)
[!] Connected device
    ! No devices available

! Doctor found issues in 2 categories.
```

Figure 1-d: Results from running the flutter doctor command

In my case, Flutter is telling me that I need to run the **flutter doctor --android-licenses** command to resolve an issue with some Android licenses not being accepted.

It also highlighted that I don’t have a physical device connected, which is fine for now.

Make sure that you resolve all the conflicts highlighted by the **flutter doctor** command before proceeding.

## Setting up an editor

Once you have completed all the installation steps, it is necessary to set up Flutter to work with your editor of choice. Although I usually use Visual Studio Code for my projects, this time I decided to use Android Studio to code our Flutter application—to me, it felt more natural, and a better fit for mobile development.

The official Flutter documentation describes how to configure Android Studio (IntelliJ) and Visual Studio Code to work with Flutter—please follow [these steps](#).

If you will also be using Android Studio, once you have followed the steps described, you should see the Dart and Flutter plugins installed. On my machine, this looks as follows.

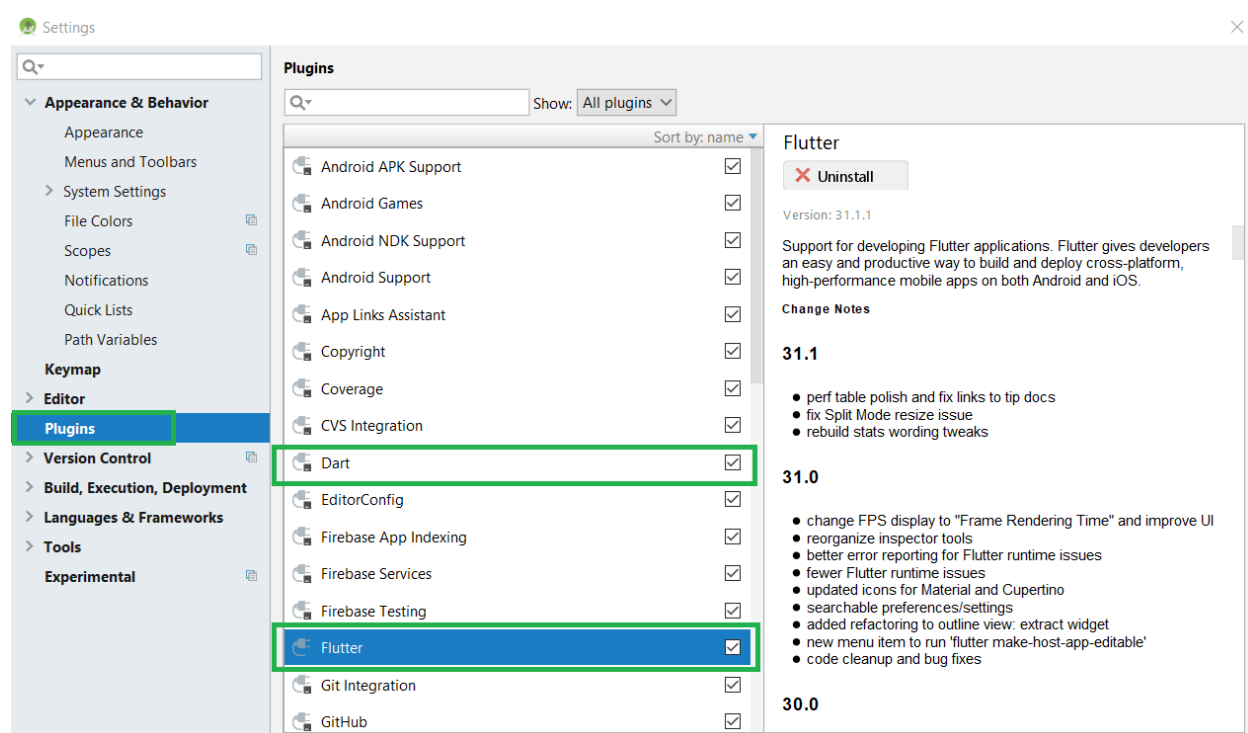


Figure 1-e: The Dart and Flutter plugins installed on Android Studio

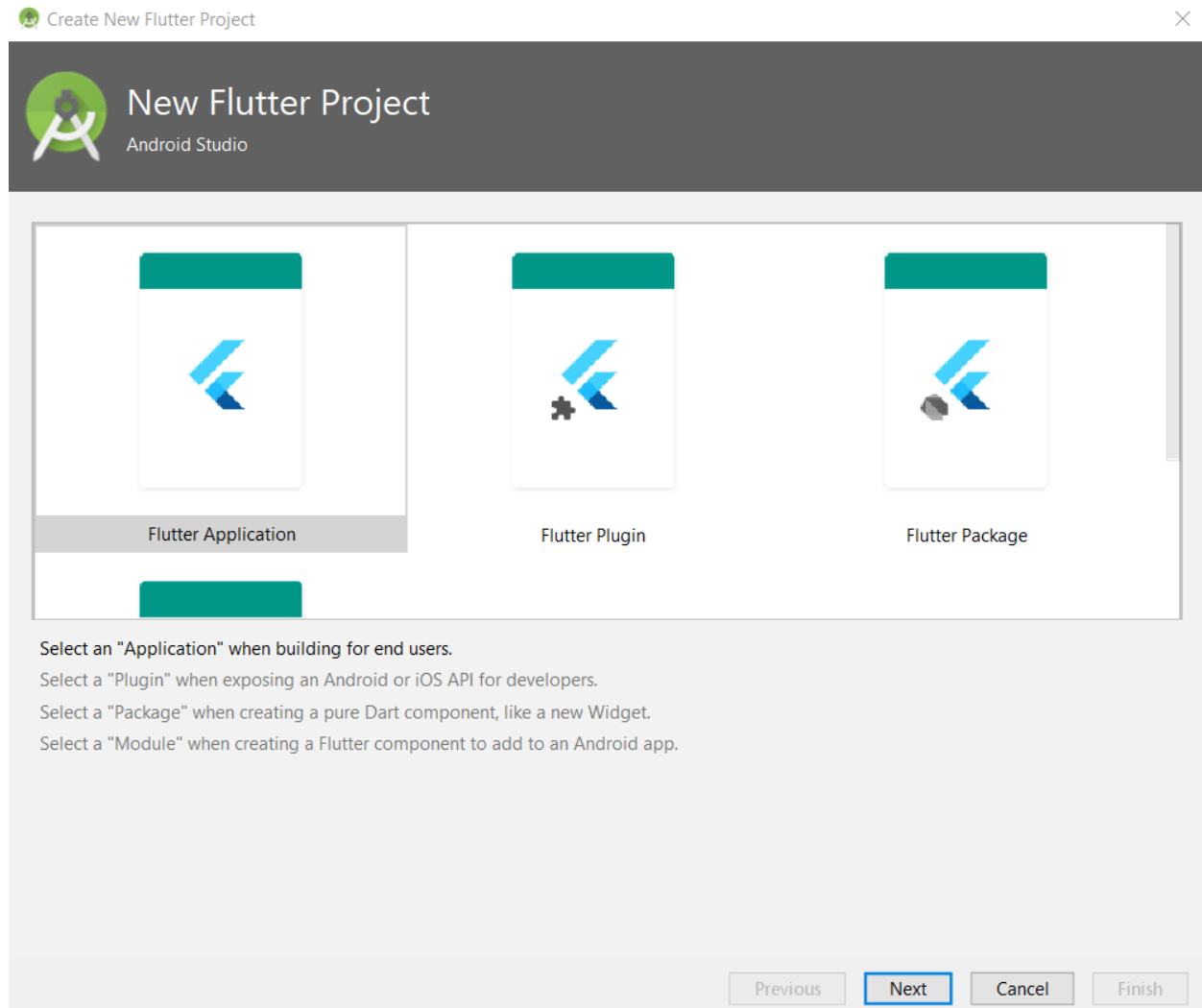
## Creating the app

Once your editor of choice has been correctly set up following the official documentation guidelines and my previous suggestions, it's time to perform a quick test. We'll create a demo application from one of the predefined templates, and then experience the "hot reload" mechanism after making a change to the app.



The [official documentation](#), which covers the steps that are described and explained in this section, is worth checking.

Open Android Studio and navigate to **File > New > New Flutter Project**. The following screen will be displayed.



*Figure 1-f: Create new Flutter project option (step 1)*

Choose the **Flutter Application** option, and then click **Next**. We'll then be presented with a screen where we can enter the **Project name**, **Flutter SDK path**, **Project location**, and a **Description** for the application—we can see this as follows.

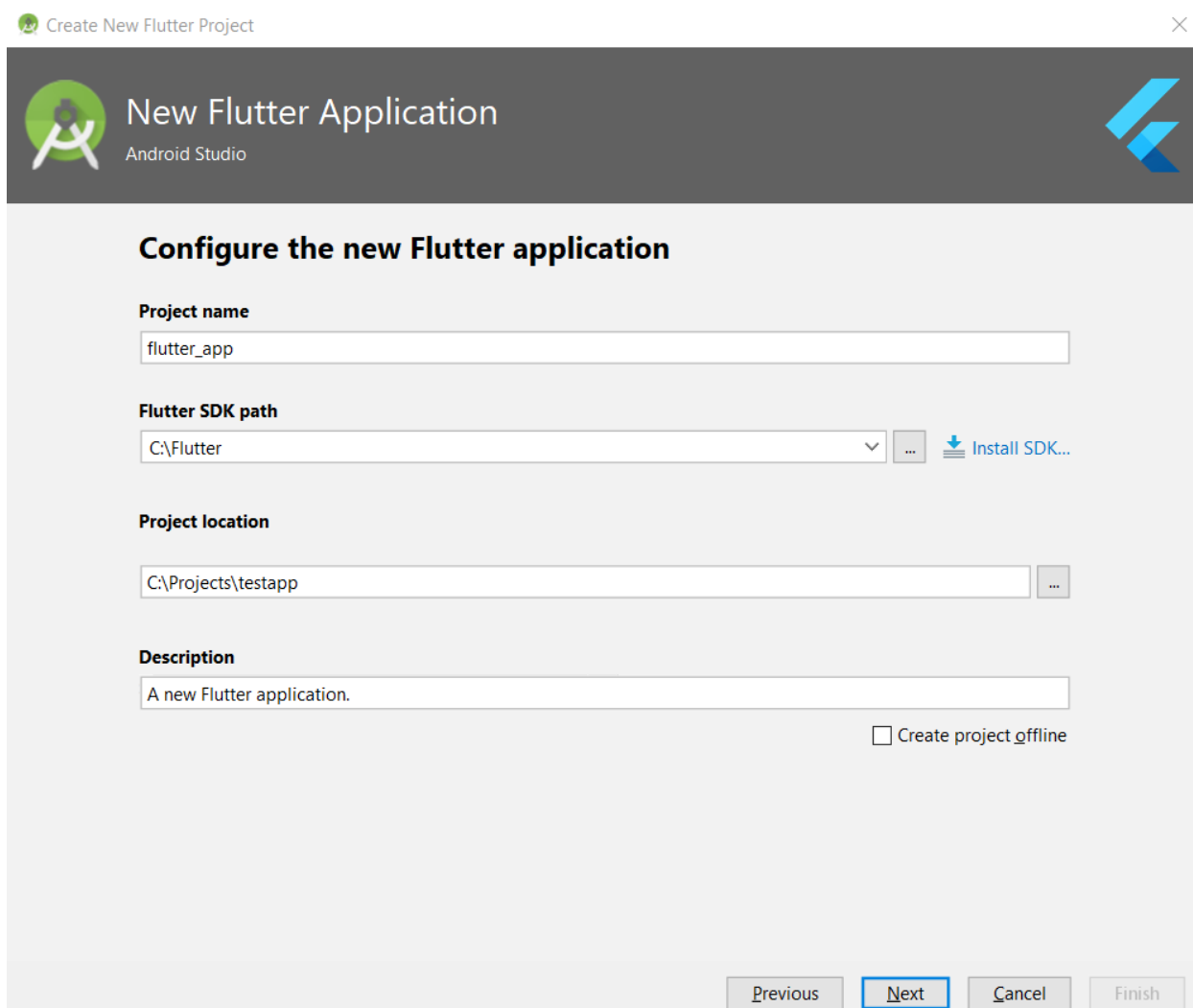
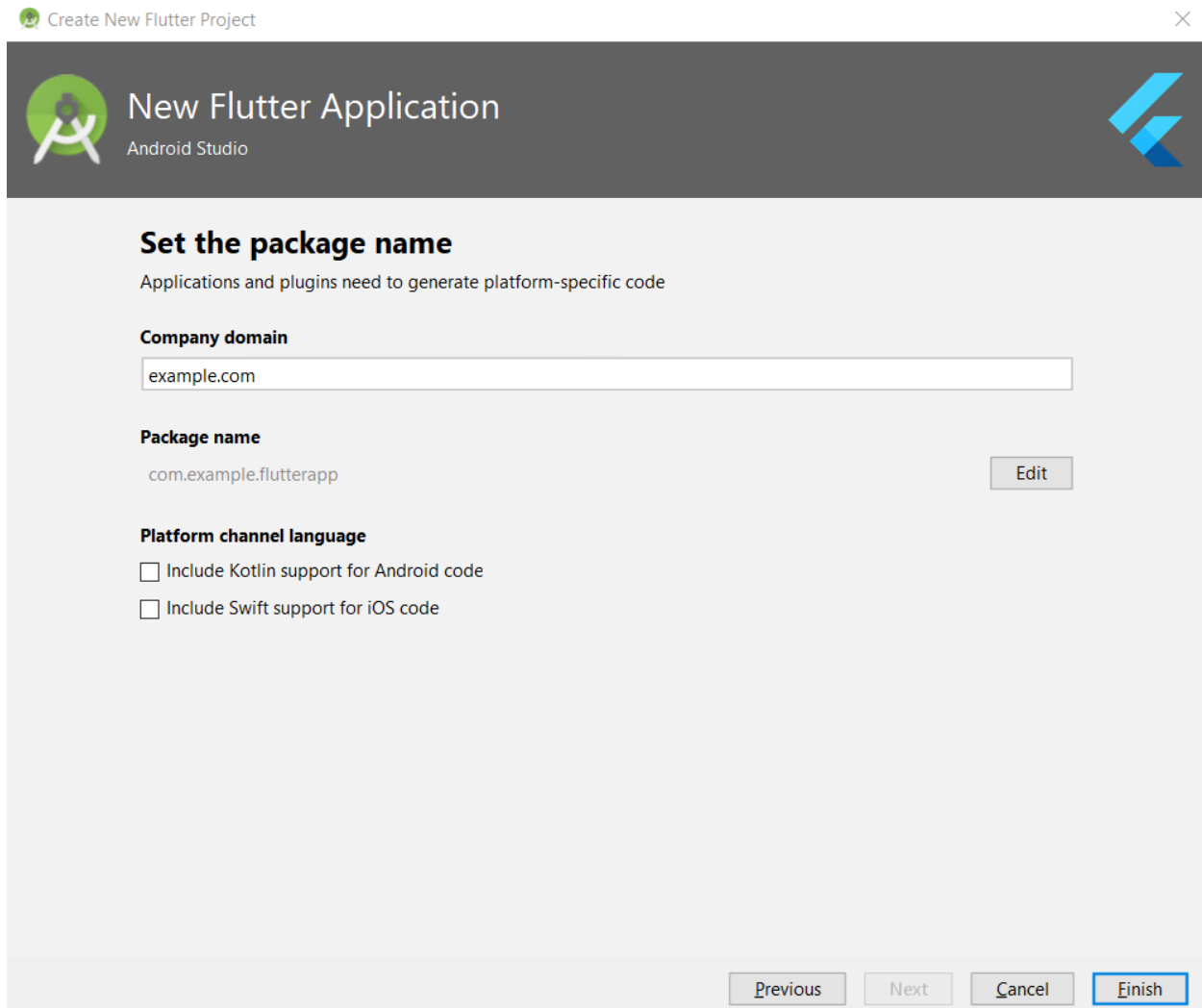


Figure 1-g: Create new Flutter project option (step 2)

Make sure the **Flutter SDK path** text field specifies the correct folder location of the SDK, as previously explained. With those options entered, click **Next**.

In the final step of the app creation process, we are asked to enter the **Company domain** and include (if applicable) **Kotlin support for Android code** and **Swift support for iOS code**—in our case, there's no need to include these options.

The following figure shows the final step of the application creation screen.



*Figure 1-h: Create new Flutter project option (step 3)*

To finalize the creation of the demo application, click **Finish**. With the demo application created, make sure you have a [virtual device created and ready](#) so we can quickly test the app.

## Creating a virtual device

Let's quickly go over the steps required to create a virtual device. With Android Studio opened, go to the **Tools** menu and click on the **AVD Manager** option, which will display the following screen.

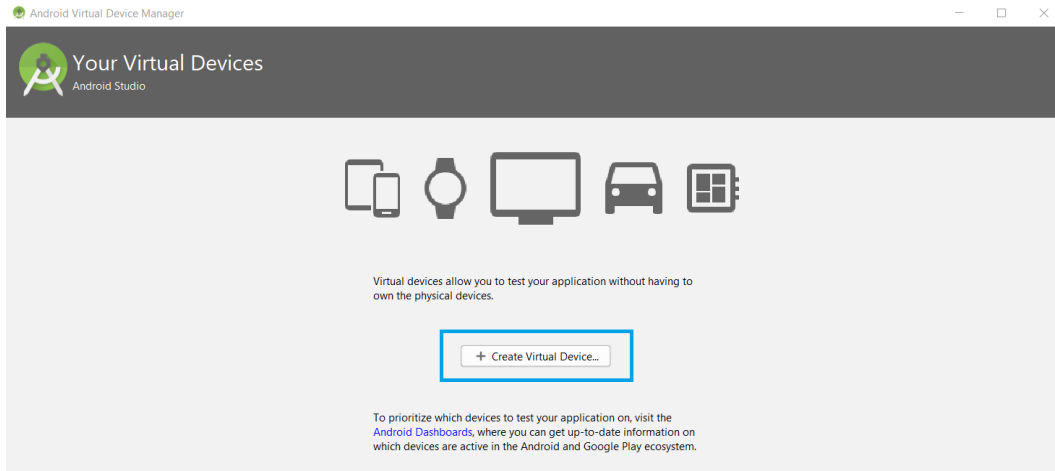


Figure 1-i: Creating a virtual device (step 1)

Then, click **Create Virtual Device**, which will display the following window with all the available virtual devices that can be created for different categories, such as: phones, TV, tablets, and wearable devices.

I'm going to select the **Nexus 6** model from the **Phone** category, but feel free to choose any other.

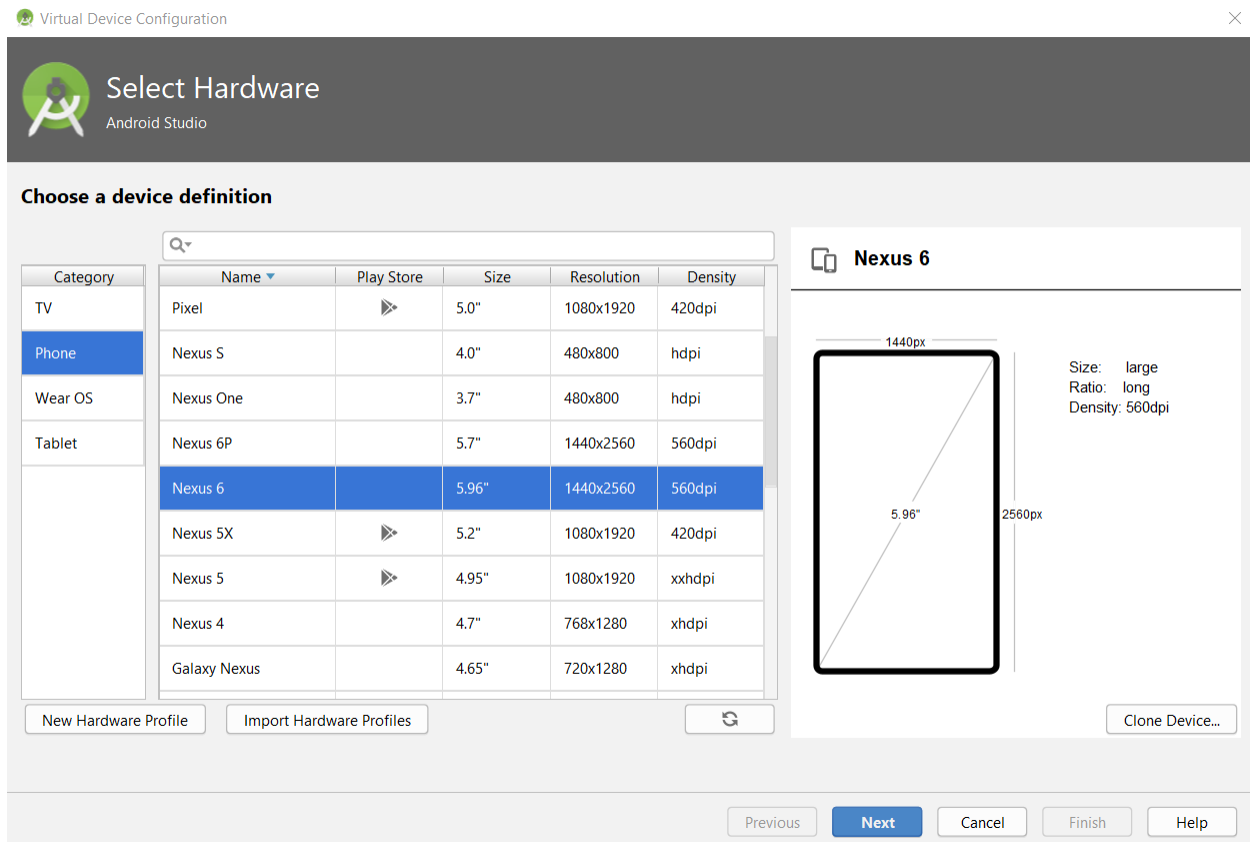


Figure 1-j: Creating a virtual device (step 2)

Once you have your model selected, click **Next**. You will be prompted to select one of the available device images.

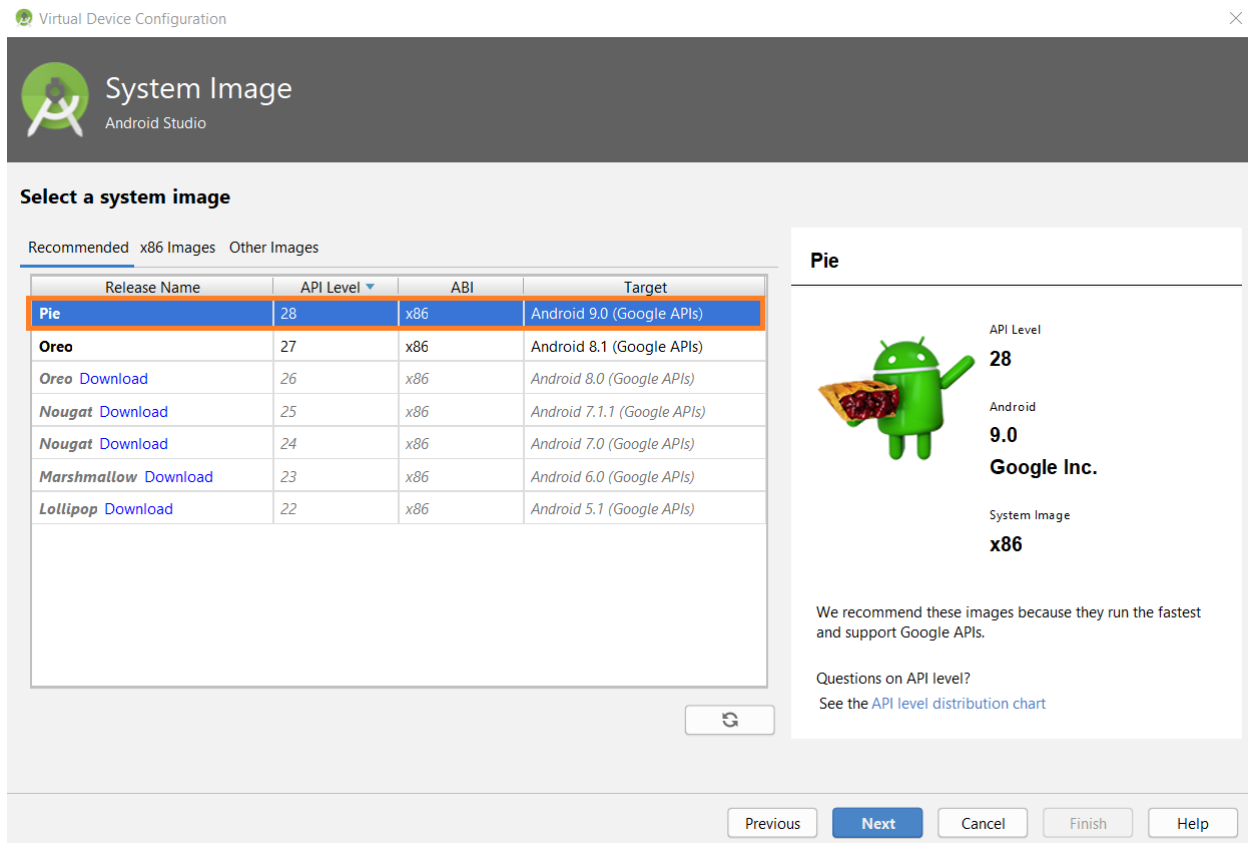
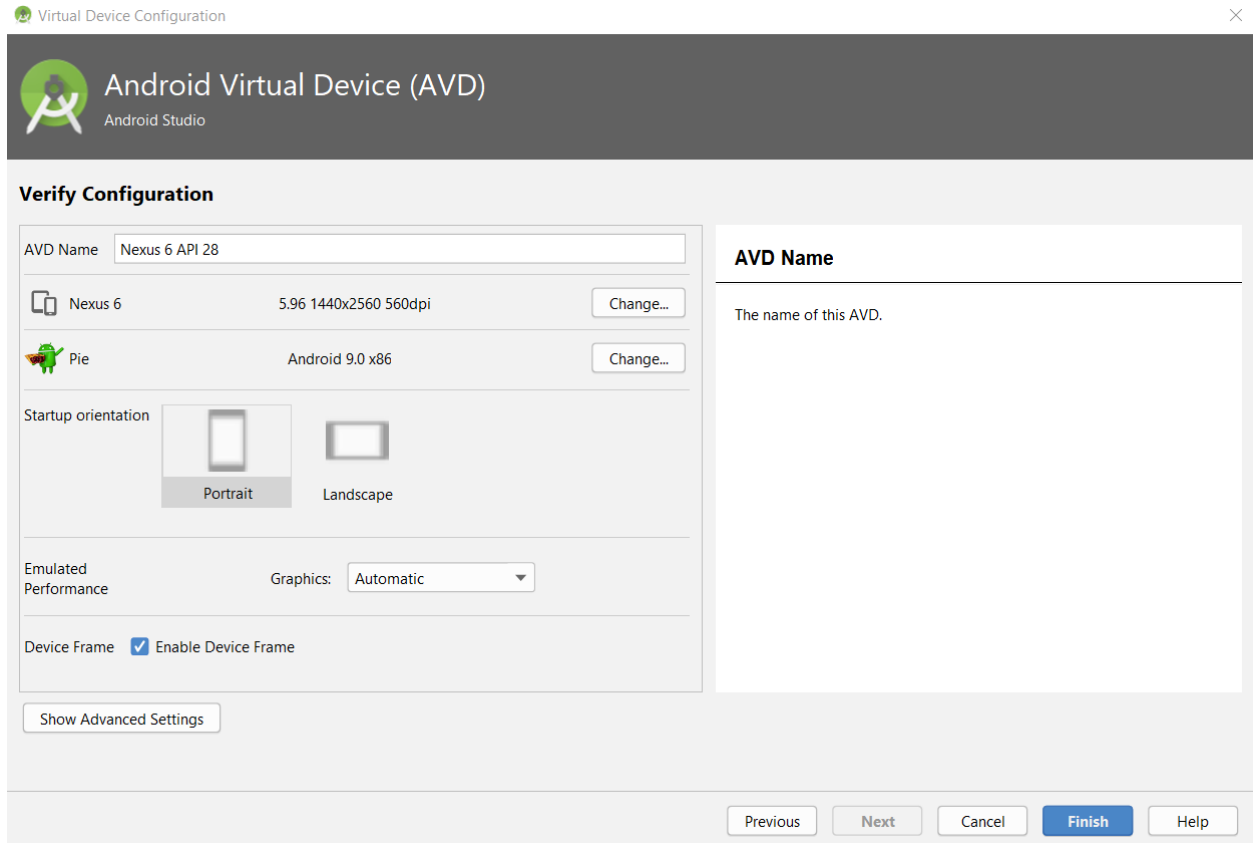


Figure 1-k: Creating a virtual device (step 3)

I'm going with the first recommended option from the available list; however, you can choose any other. It's important to choose an image that plays well with your computer's host operating system. In essence, for emulator performance reasons, it's not recommended to choose an [ARM](#)-based image if your computer's host operating system is based on a [x86](#) architecture.

If you've chosen a different image than the one highlighted in Figure 1-k you might have to download the image, using the **Download** link next to the image Release Name field.

Once the image has been selected (and downloaded, if applicable), click **Next** to continue to the last step.



*Figure 1-1: Creating a virtual device (step 4)*

The last step contains the configuration details for the virtual device image, which you can normally leave to the default options, and then simply click **Finish**.

Awesome—you now have created a virtual device. You can create more than one if you wish, as it might help you test your application with multiple devices. In my case, I’ve also created another virtual device for a Pixel 2 XL phone API 28, which looks as follows.

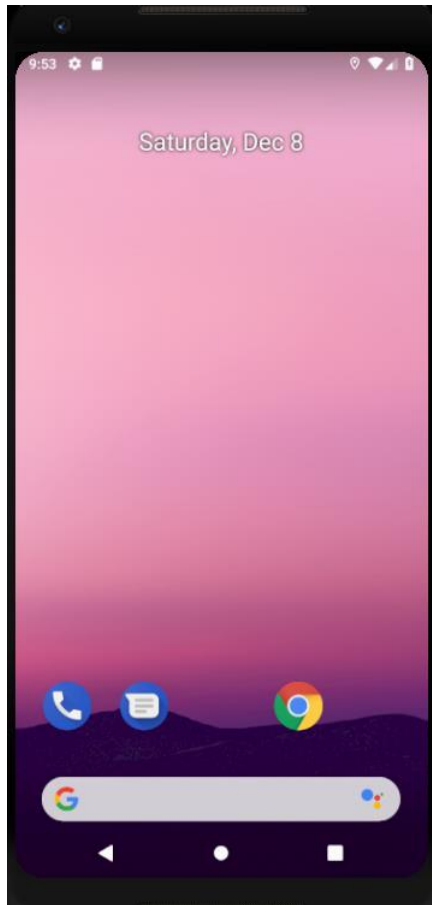


Figure 1-m: Virtual device—Android emulator

## Testing our setup

With our virtual device in place, it's now time to run the application we have created and see what it does.

To do that, select the **Open Android Emulator** option from the **Android SDK built for x86** drop-down list, which is next to the run button. Once the Android emulator is opened, you'll be able to execute the application when you click run.

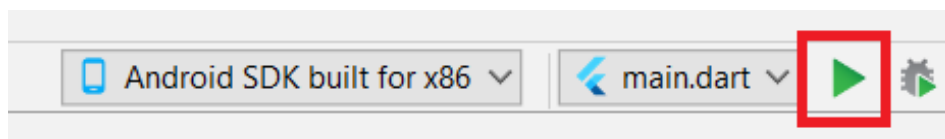


Figure 1-n: The emulator drop-down and run button

Try to run the application to see what happens—in my case, I get the following Android Studio console output.

Code Listing 1-b: Console output when running the application

```
Launching lib\main.dart on Android SDK built for x86 in debug mode...
Initializing gradle...
Resolving dependencies...

* Error running Gradle:
ProcessException: Process
"C:\Projects\test\flutter_app\android\gradlew.bat" exited abnormally:

> Configure project :app
Checking the license for package Android SDK Build-Tools 28.0.3 in
C:\Users\EdFreitas\AppData\Local\Android\sdk\licenses
Warning: License for package Android SDK Build-Tools 28.0.3 not accepted.

FAILURE: Build failed with an exception.

* Where:
Build file 'C:\Projects\test\flutter_app\android\build.gradle' line: 24

* What went wrong:
A problem occurred evaluating root project 'android'.
> A problem occurred configuring project ':app'.
    > Failed to install the following Android SDK packages as some
    licences have not been accepted.
        build-tools;28.0.3 Android SDK Build-Tools 28.0.3
    To build this project, accept the SDK license agreements and install
    the missing components using the Android Studio SDK Manager.
    Alternatively, to transfer the license agreements from one
    workstation to another, see http://d.android.com/r/studio-ui/export-licenses.html

    Using Android SDK: C:\Users\EdFreitas\AppData\Local\Android\sdk

* Try:
```



Run with `--stacktrace` option to get the stack trace. Run with `--info` or `-debug` option to get more log output. Run with `--scan` to get full insights.

\* Get more help at <https://help.gradle.org>

**BUILD FAILED in 1s**

Command: `C:\Projects\test\flutter_app\android\gradlew.bat`  
app:properties

**Finished with error: Please review your Gradle project setup in the android/ folder.**

If you didn't get this console output message after running your application, awesome—you may skip the rest of this section and go directly to the “Hot reloading” section.

If you did, then by carefully reviewing this output information, we find a reference to this <http://d.android.com/r/studio-ui/export-licenses.html> URL that redirects to [here](#). This article explains how [Gradle](#) can automatically download packages that might be missing, and that are required when running an application.

We can also see that the last line of the message indicates to review the Gradle project setup in the Android project folder—which refers to the `Build.gradle` file found within the Android folder of our application. We can see this in the following screenshot.

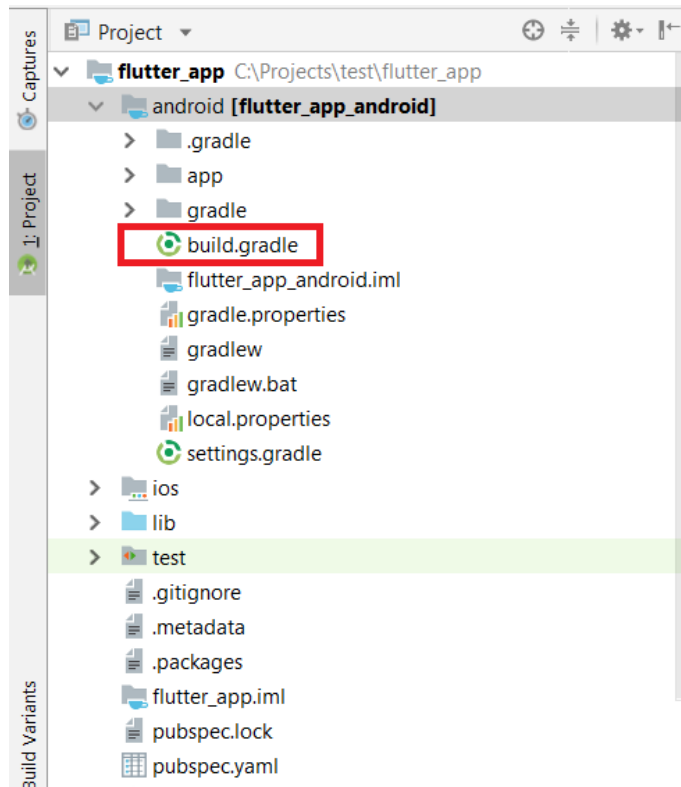


Figure 1-o: The project structure

Let's open the Build.gradle file and inspect its content. Notice in my case how it depends on **com.android.tools.build:gradle:3.2.1**—we can see this in the screenshot that follows.

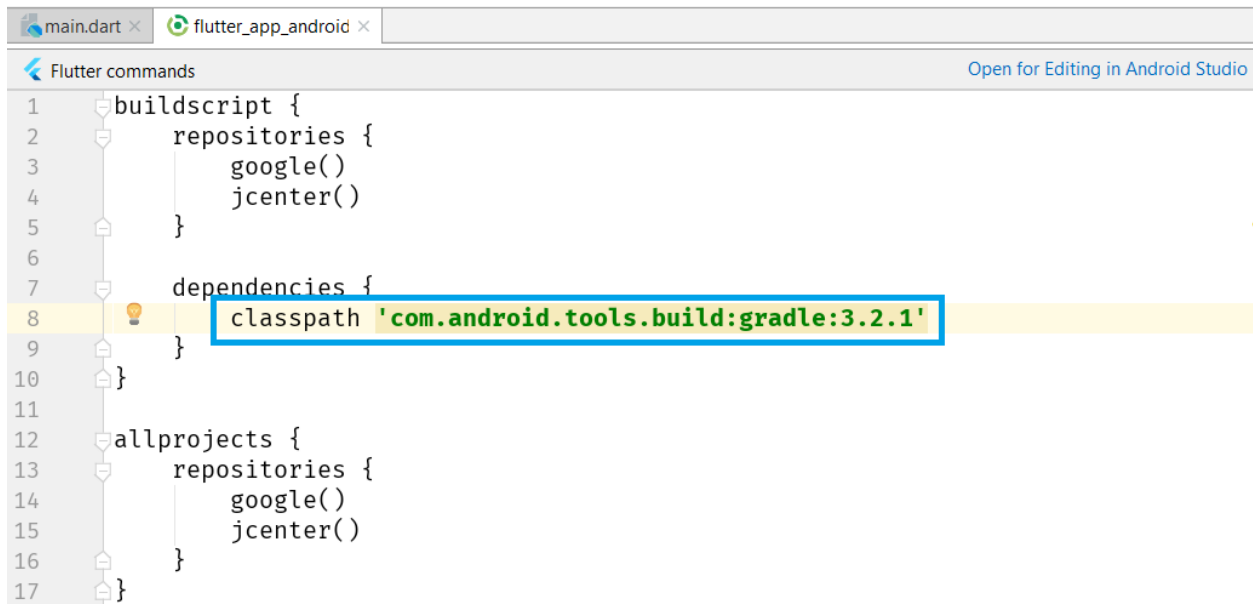


Figure 1-p: The Build.gradle file contents

The previous console output gives us a hint of what the problem might be: **License for package Android SDK Build-Tools 28.0.3 not accepted.**

What this is telling us is that it wasn't able to run the application with this **com.android.tools.build:gradle:3.2.1** dependency, because I have no license for it.

In other words, that specific **com.android.tools.build:gradle** version probably didn't get installed when I went through the Android Studio setup process.

In that case, the solution is to use a version of the **com.android.tools.build:gradle** dependency that was installed during the Android Studio setup process—which can be one version lower than the one mentioned on the Build.gradle file.

To resolve the problem, all I need to do is change that line on the Build.gradle file from **com.android.tools.build:gradle:3.2.1** to **com.android.tools.build:gradle:3.2.0**.

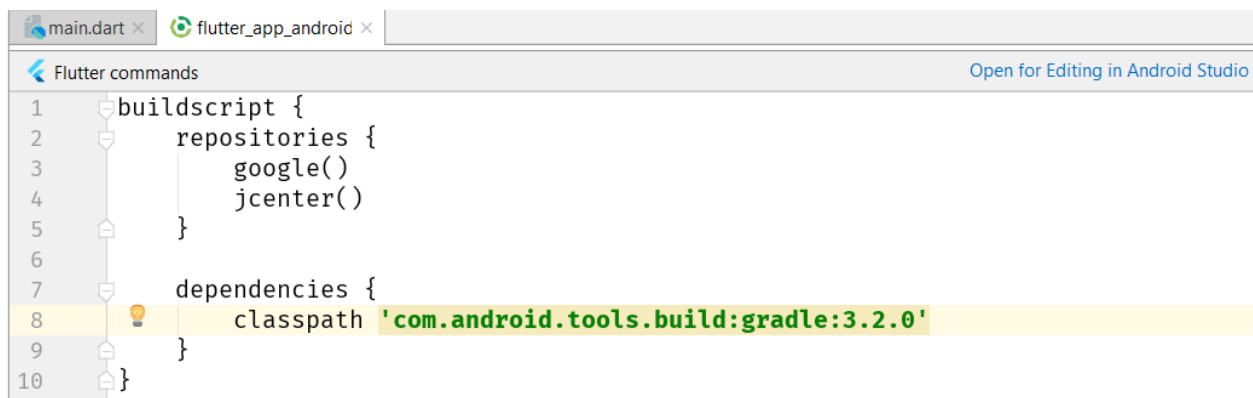


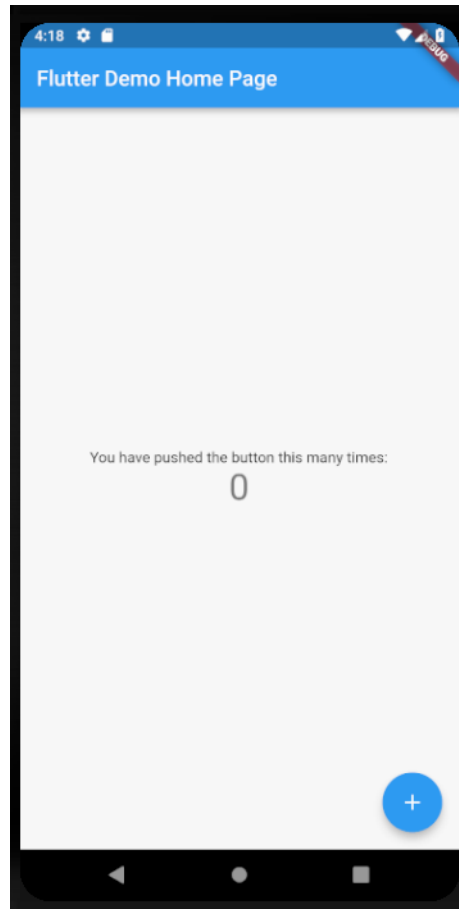
Figure 1-q: The Build.gradle file contents edited

After saving the change to the Build.gradle file, if I now click **Run**, I'll get the following build console output within Android Studio.

Code Listing 1-c: Console output when running the application (after updating Build.gradle)

```
Launching lib\main.dart on Android SDK built for x86 in debug mode...
Initializing gradle...
Resolving dependencies...
Gradle task 'assembleDebug'...
Built build\app\outputs\apk\debug\app-debug.apk.
```

Awesome—that's so much better! The application has been built, and it is running. We can see this on the Android emulator as follows.



*Figure 1-r: The demo app running*

With the building issues sorted, let's now explore how Flutter's "hot reload" mechanism works, and what it does.

## Hot reloading

Hot reloading is one of the coolest features of Flutter, and basically means that if a change to the code is made while the application is running, that change is almost immediately reflected within the running application.

Let's give hot reloading a try. With the application running, let's go to the `main.dart` file under the `lib` folder of our demo application, and locate the following code.

*Code Listing 1-d: Snippet of code of `main.dart`*

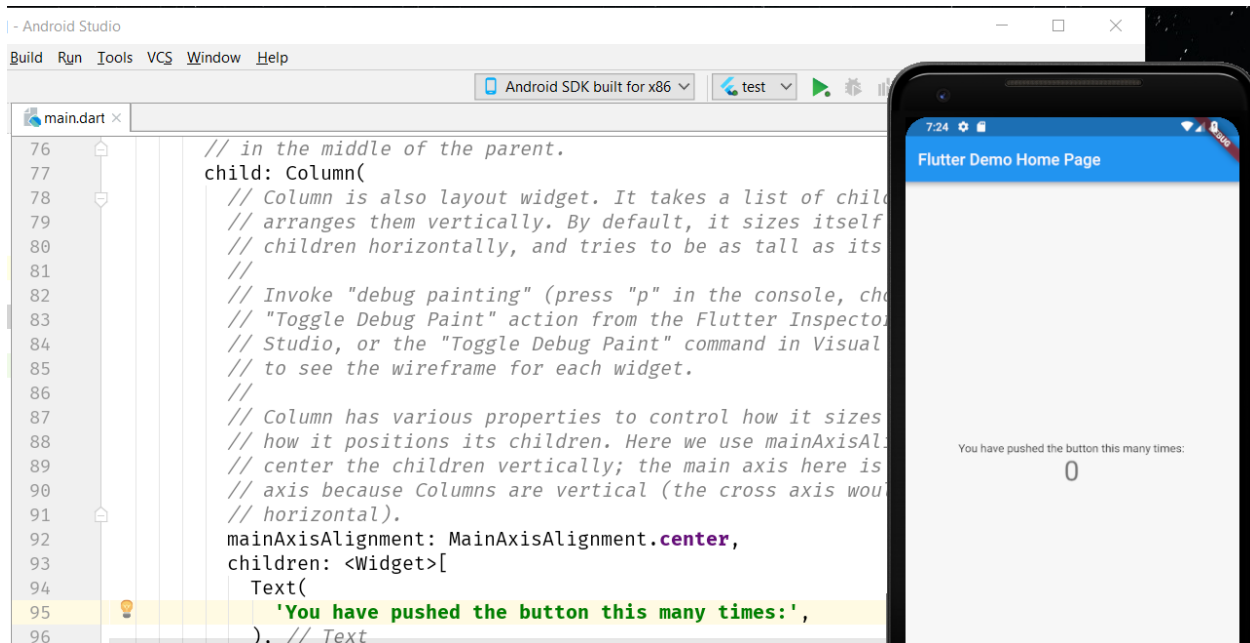
```
Text(  
  'You have pushed the button this many times:',  
)
```

Let's replace the word **pushed** with the word **clicked**. The code should now look as follows.

*Code Listing 1-e: Snippet of code of main.dart*

```
Text(  
  'You have clicked the button this many times:',  
)
```

Figure 1-s shows the source code and the application running before the change.



*Figure 1-s: App running (before the change)*

Figure 1-t shows the source code and the application running after the change.

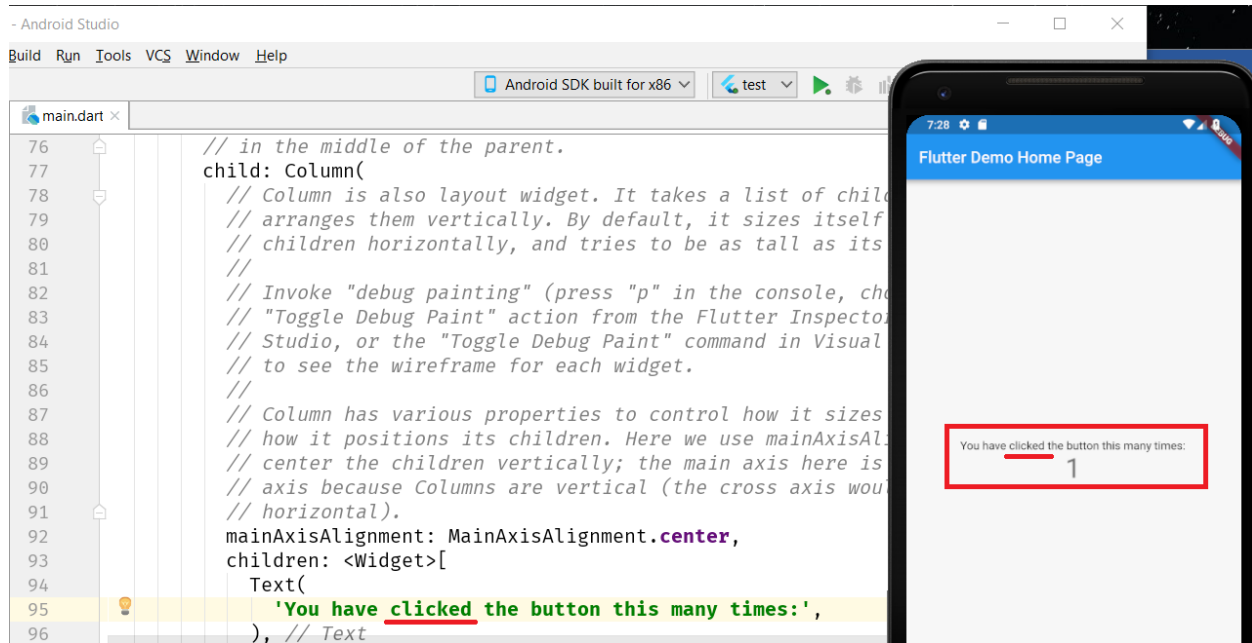


Figure 1-t: App running (after the change)

As you can clearly see, hot reloading worked. Something to notice about hot reloading is that the changes take a few seconds to propagate and become effective, as the application is basically redeployed to the emulator or device when changes take place.

Web developers will notice that hot reloading in Flutter is slower than when developing web applications. This is because during web development, hot reloading only applies to the HTML, CSS, or JavaScript being modified, whereas with Flutter, the actual application runtime needs to be synced to the device.

Nevertheless, Flutter's hot-reloading mechanism is impressive and very useful, as it helps us avoid having to stop the app and restart it.

## Summary

The goal of this chapter was to set up Flutter and get started—that's exactly what we managed to achieve.

Next, we'll dive straight into the code and start writing the fundamental pillars of our app. It's going to be a lot of fun, as we'll look at how to design our app's UI and implement its essential logic.