



江西理工大学 信息工程学院

JIANGXI UNIVERSITY OF SCIENCE AND TECHNOLOGY SCHOOL OF INFORMATION ENGINEERING



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Mobile application development

移动应用开发



Lecture 26:

Flutter_Section

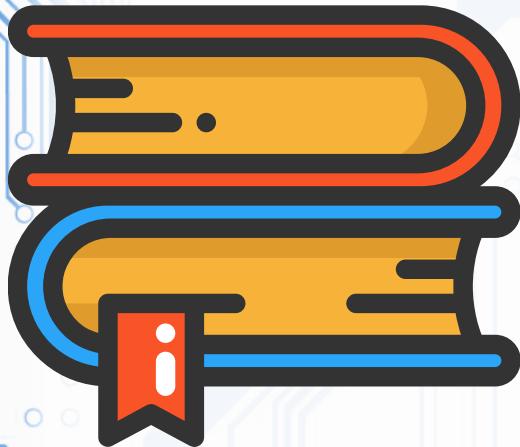
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LECTURE 26: Flutter short review and Project



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Flutter for Beginners

An introductory guide to building cross-platform mobile applications with Flutter and Dart 2



Flutter for Beginners

An introductory guide to building cross-platform mobile applications with Flutter and Dart 2

Alessandro Biessek



What is Flutter?



- Flutter is a free and open-source mobile UI framework created by Google and released in May 2017.
- *In a few words, it allows you to create a native mobile application with only one codebase.*
- *This means that you can use one programming language and one codebase to create two different apps (for iOS and Android).*
- *Flutter is Google's mobile app SDK for crafting high-quality native interfaces on iOS and Android in record time.*
- *Flutter works with existing code, is used by developers and organisations around the world, and is free and open source.*
- **Flutter** is used to develop cross platform applications for Android, iOS, Linux, Mac, Windows, Google Fuchsia, and the web from a single codebase.





Flutter History in breif



- **Initial release date:May 2017**

- Preview release: Release Preview 1(v0.6.0) / July 2018
- Developer(s):Google and community
- Original author(s):Google Platform
- Development: Windows, MacOS and Linux, Target:Android, iOS and Google Fuchsia

Written in: C, C++, Dart, Skia Graphics Engine <https://hackr.io/tutorials/learn-flutter>



History



- The first version of Flutter was known by the codename "Sky" and ran on the Android operating system. It was unveiled at the 2015 Dart developer summit with the stated intent of being able to render consistently at 120 frames per second.
- During the keynote of Google Developer Days in Shanghai in September 2018, Google announced Flutter Release Preview 2, which is the last big release before Flutter 1.0. On December 4th of that year, Flutter 1.0 was released at the Flutter Live event, denoting the first "stable" version of the Framework. On December 11, 2019, Flutter 1.12 was released at the Flutter Interactive event.
- On May 6, 2020, the Dart software development kit (SDK) in version 2.8 and the Flutter in version 1.17.0 were released, where support was added to the Metal API, improving performance on iOS devices (approximately 50%), new Material widgets, and new network tracking.





History



- **On March 3, 2021, Google released Flutter 2 during an online Flutter Engage event.** This major update brought official support for web-based applications with new CanvasKit renderer and web specific widgets, early-access desktop application support for Windows, macOS, and Linux and improved Add-to-App APIs.
- This release included sound null-safety, which caused many breaking changes and issues with many external packages, but the Flutter team included instructions to mitigate these changes as well.
- On September 8th, 2021, the Dart SDK in version 2.14 and Flutter version 2.5 were released by Google. The update brought improvements to the Android Full-Screen mode and the latest version of Google's Material Design called Material You. Dart received two new updates, the newest lint conditions have been standardized and preset as the default conditions as well Dart for Apple Silicon is now stable.





Framework architecture

The Flutter logo, which consists of three blue diagonal bars of increasing length forming a stylized 'F' shape.

- The major components of Flutter include:
 1. Dart platform
 2. Flutter engine
 3. Foundation library
 4. Design-specific widgets
 5. Flutter Development Tools (DevTools)



Framework architecture



Flutter

1. Dart platform

- Flutter apps are written in the Dart language and make use of many of the language's more advanced features.
- On Windows, macOS, and Linux Flutter runs in the Dart virtual machine, which features a just-in-time execution engine. While writing and debugging an app, Flutter uses Just In Time compilation, allowing for "hot reload", with which modifications to source files can be injected into a running application.
- Flutter extends this with support for stateful hot reload, where in most cases changes to source code are reflected immediately in the running app without requiring a restart or any loss of state.
- For better performance, release versions of Flutter apps targeting Android and iOS are compiled with ahead-of-time (AOT) compilation.



Framework architecture



Flutter

2. Flutter engine

- Flutter's engine, written primarily in C++, provides low-level rendering support using Google's Skia graphics library. Additionally, it interfaces with platform-specific SDKs such as those provided by Android and iOS.
- The Flutter Engine is a portable runtime for hosting Flutter applications. It implements Flutter's core libraries, including animation and graphics, file and network I/O, accessibility support, plugin architecture, and a Dart runtime and compile toolchain.
- Most developers interact with Flutter via the Flutter Framework, which provides a reactive framework and a set of platform, layout, and foundation widgets.



Framework architecture



Flutter

3. Foundation library

- The Foundation library, written in Dart, provides basic classes and functions that are used to construct applications using Flutter, such as APIs to communicate with the engine.



Framework architecture



Flutter

4. Design-specific widgets

- The Flutter framework contains two sets of widgets that conform to specific design languages:
- Material Design widgets implement Google's design language of the same name, and *Cupertino* widgets implement Apple's iOS Human interface guidelines.



Widgets



- Flutter uses a variety of widgets to deliver a fully functioning application.
- These widgets are Flutter's framework architecture.
- Flutter's Widget Catalog provides a full explanation and API on the framework.



Basics of Widgets in Flutter



Flutter

- Widgets are generally defined in three basic types: Stateful widgets, Stateless widgets, and Inherited widgets. Being the central class hierarchy in the Flutter framework the three basic types of widgets are used in the construction of every Flutter application.
- Although all the instances of a widget are immutable, the Stateful widget allows the interaction between user and application.
- By giving access to the method `setState`, the state can be maintained in separate state objects. Alternatively, the Stateless widget acts as a constant, and before anything displayed can be changed, the widget has to be recreated.
- The Inherited widget works by allowing another widget to subscribe to the Inherited widget's state allowing the state to be passed down to its children.



Flutter important parts:



Flutter consists of two important parts:

- An SDK (Software Development Kit):

A collection of tools that are going to help you develop your applications. This includes tools to compile your code into native machine code (code for iOS and Android).

- A Framework (UI Library based on widgets):

A collection of reusable UI elements (buttons, text inputs, sliders, and so on) that you can personalize for your own needs.





Flutter important parts:



Flutter

- To develop with Flutter, you will use a programming language called Dart. The language was created by Google in October 2011, but it has improved a lot over these past years.
- Dart focuses on front-end development, and you can use it to create mobile and web applications.
- *If you know a bit of programming, Dart is a typed object programming language. You can compare Dart's syntax to JavaScript.*



Why We Should Learn Flutter



Simple to learn and use

- Flutter is a modern framework, and you can feel it! It's way simpler to create mobile applications with it. If you have used Java, Swift, or React Native, you'll notice how Flutter is different.
- You can create a real native application without a bunch of code.
- Quick compilation: maximum productivity
- You can change your code and see the results in real-time. It's called Hot-Reload. It only takes a short amount of time after you save to update the application itself.
- Significant modifications force you to reload the app. But if you do work like design, for example, and change the size of an element, it's in real-time!





Why You Should Learn Flutter



A growing community

- **Flutter has a robust community, and it's only the beginning!**
 - 1. Flutter Awesome:** An awesome list that curates the best Flutter libraries and tools. This website publishes daily content with lots of examples, application templates, advice, and so on.
 - 2. Awesome Flutter:** A GitHub repository (linked to Flutter Awesome) with a list of articles, videos, components, utilities, and so on.
 - 3. It's all widgets!:** An open list of apps built with Flutter.
 - 4. Flutter Community:** A Medium publication where you can find articles, tutorials, and much more.



Top reasons to use it:



- **It's cheaper to develop** a mobile application with Flutter, because you don't need to create and maintain two mobile apps (one for iOS and one for Android).
- **It's performant** – you won't notice the difference between a native application and a Flutter app.
- **It's beautiful** – you can easily use widgets provided by Flutter and personalize it to create a valuable UI for your customers.





Top reasons to use it:



- Supported by Android Studio and VS Code Flutter is available on different IDEs.
- *The two main code editors for developing with this technology are Android Studio (IntelliJ) and VS Code.*
- **Android Studio is a complete software with everything already integrated. You have to download Flutter and Dart plugins to start.**
- **VS Code is a lightweight tool, and everything is configurable through plugins from the marketplace.**
- You are free to choose your preferred IDE!



The Essential Programming Features Of Dart



Why Learn Dart?

- Flutter has now become one of the best cross platform mobile app development kit.
- We can build powerful, high performant, beautiful and highly customizable native mobile apps with Flutter.
- Furthermore, it is now also moving towards reaching the web development community.
- So, one will also be able to build for the mobile, desktop and web with the same code base in the near future with the help of Flutter.



Dart





How Much Dart Should I Know To Learn Flutter?



- *The answer to this question is obviously, the more the better!*
- *But with that being said, do I have to be an expert on Dart to start out with Flutter?*
- *The answer for the second question is “No”.*

So, here's a bare minimum list of features you should be aware of when working with Dart and Flutter.

• Dart Keywords

• Dart Data Types

- Numbers, Strings, DateTime, Bool etc.
- Dart Collection Types: Lists, Sets And Maps

<https://stacksecrets.com/dart/for-loop-for-each-loop-and-map-in-dart>

• Control Statements

- If/Else
- List Iterations With For Each, Map And For Loops
- Switch Statements

• Object Oriented Programming in Dart

- Classes
- Functions
- Mixins

• Working With Futures, Streams and Async Operations In Dart

• Working With JSON Data



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Flutter_Installation



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Flutter_Installation



Using Flutter in China

If you'd like to install Flutter using an installation bundle (SDK), you can replace the domain of the original URL with a trusted mirror to speed it up.

For example:

1.Original URL:

https://storage.googleapis.com/flutter_infra_release/releases/stable/windows/flutter_windows_v1.0.0-stable.zip

1.Mirrored URL:

https://storage.flutter-io.cn/flutter_infra_release/releases/stable/windows/flutter_windows_v1.0.0-stable.zip



Step 1: Installation



Installing Flutter Step 1:

Navigate to <https://flutter.dev/docs/get-started/install> and select your operating system
After installation send to Documents folder

System requirements

To install and run Flutter, your development environment must meet these minimum requirements:

Operating Systems: Windows 7 SP1 or later (64-bit), x86-64 based.

Disk Space: 1.64 GB (does not include disk space for IDE/tools).

Tools: Flutter depends on these tools being available in your environment.

- **Windows PowerShell 5.0 or newer (this is pre-installed with Windows 10)**
- **Git for Windows 2.x, with the Use Git from the Windows Command Prompt option.**

If Git for Windows is already installed, make sure you can run git commands from the command prompt or PowerShell.





Step 2: Installation



Step 2:

Download the latest
stable build of the Flutter
SDK for your OS

Get the Flutter SDK

1. Download the following installation bundle to get the latest stable release of the Flutter SDK:

[flutter_windows_2.5.1-stable.zip](#)

For other release channels, and older builds, see the [SDK releases](#) page.

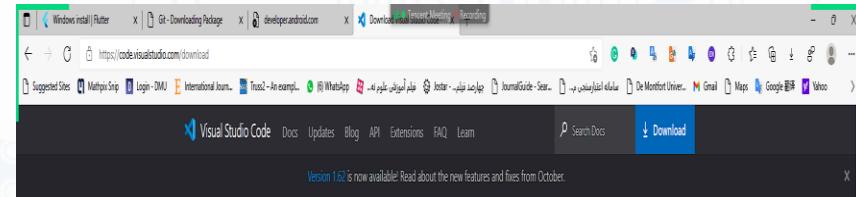


Step 3: Installation



code.visualstudio link:

<https://code.visualstudio.com/download>



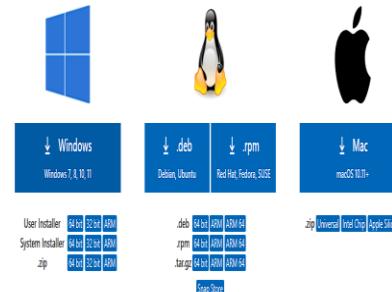
Install Visual Studio Code
by following this link

<https://code.visualstudio.com/>

or Use Android Studio as
your IDE

Download Visual Studio Code

Free and built on open source. Integrated Git, debugging and extensions.



By downloading and using Visual Studio Code, you agree to the [license terms](#) and [privacy statement](#).

Want new features sooner?

Get the [Insiders build](#) instead.



Step 3: Installation



Visual Studio Code Docs Updates Blog API Extensions FAQ Learn

Search Docs Download

Code editing. Redefined.

Free. Built on open source. Runs everywhere.

Download for Windows
Stable Build

	Stable	Insiders
macOS Universal	↓	↓
Windows x64 User Installer	↓	↓
Linux x64 .deb	↓	↓
Linux x64 .rpm	↓	↓

[Other downloads](#)

EXTENSIONS MARKETPLACE

- @sort:installs**
- Python** 2019.6.24221 45.9M ★4.5 Microsoft [Install](#)
- GitLens — Git sup...** 9.8.5 23.1M ★5 Eric Amadio [Install](#)
- C/C++** 0.24.0 23M ★3.5 Microsoft [Install](#)
- ESLint** 1.9.0 21.9M ★4.5 Integrates ESLint JavaScript into VS... Dirk Baeumer [Install](#)
- Debugger for Ch...** 1.11.6 20.6M ★4 Microsoft [Install](#)
- Language Supp...** 0.47.0 18.7M ★4.5 Java Linting, Intellisense, formatting,... Red Hat [Install](#)
- vscode-icons** 8.8.0 17.2M ★5 Icons for Visual Studio Code VSCode Icons Team [Install](#)
- Vetur** 0.21.1 17M ★4.5 Vue tooling for VS Code Pine Wu [Install](#)
- C#** 1.21.0 15.6M ★4 C# for Visual Studio Code (powered ... Microsoft [Install](#)

File Edit Selection View Go Debug Terminal Help serviceWorker.js - create-react-app - Visual Studio Code - In...

```
src > JS serviceWorker.js > register > window.addEventListener('load') callback
checkValidServiceWorker(swUrl, config);

// Add some additional logging to localhost, p...
// service worker/PWA documentation.

navigator.serviceWorker.ready.then(() => {

  product
  productSub
  removeSiteSpecificTrackingException
  removeWebWideTrackingException
  requestMediaKeySystemAccess
  sendBeacon

  serviceWorker (property) Navigator.serviceWorke...
  storage
  storeSiteSpecificTrackingException
  storeWebWideTrackingException
} userAgent
}

function registerValidSW(swUrl, config) {
  navigator.serviceWorker
    .register(swUrl)
    .then(registration => {
      Local: http://localhost:3000/
      On Your Network: http://10.211.55.3:3000/
    }
  )
}
```

TERMINAL 1: node

You can now view `create-react-app` in the browser.

Local: <http://localhost:3000/>
On Your Network: <http://10.211.55.3:3000/>





Step 4: Installation



- Step 4:
- Download Git from this link <https://git-scm.com/downloads>

The screenshot shows the 'ReleaseNotes.html' page for Git for Windows version 2.34.1. The page has a blue header with the title 'Git for Windows v2.34.1 Release Notes' and a subtitle 'Latest update: November 25th 2021'. Below the header is a large blue button labeled 'Introduction'. The main content area contains text about known issues, licenses, and changes. A sidebar on the left includes links to 'HOMEPAGE', 'FAQ', 'CONTRIBUTE', 'BUGS', and 'QUESTIONS'. At the bottom, there's a section titled 'Changes in v2.34.1 since v2.34.0 (November 15th 2021)'.

The screenshot shows the official Git website at https://git-scm.com/. The top navigation bar includes links for 'About', 'Documentation', 'Downloads', 'Community', and 'Logos'. The 'Downloads' section is highlighted. It features a large image of a computer monitor displaying the text 'Latest source Release 2.31.0' and a 'Download 2.31.0 for Windows' button. Below this, there are sections for 'macOS', 'Windows', and 'Linux/Unix'. A note states that older releases are available on GitHub. The 'GUI Clients' section lists tools like git-gui and gitk, with a 'View GUI Clients →' link. The 'Logos' section shows various Git logos in different formats. At the bottom, there's a 'Git via Git' section with instructions for cloning the repository and a note about browsing the web interface.





Step 4: Installation



GIT Installation

The screenshot shows the 'Information' step of the Git for Windows setup process. It displays the GNU General Public License text and a 'Next' button at the bottom right. The left and right sides of the window are blacked out.

Information

Please read the following important information before continuing.

When you are ready to continue with Setup, click Next.

GNU General Public License

Version 2, June 1991

Copyright (C) 1989, 1991 Free Software Foundation, Inc.
59 Temple Place - Suite 330, Boston, MA 02111-1307, USA

Everyone is permitted to copy and distribute verbatim copies
of this license document, but changing it is not allowed.

Preamble

The licenses for most software are designed to take away your
freedom to share and change it. By contrast, the GNU General Public
License is intended to guarantee your freedom to share and change

<https://gitforwindows.org/>

Only show new options [Next](#) [Cancel](#)



Step 4: Installation



Install Git in its default configuration

Name	Date modified	Type	Size
version	2021/09/29 13:01	File	1 KB
SECURITY.md	2021/07/02 00:28	MD File	4 KB
README.md	2021/07/02 00:28	MD File	5 KB
PATENT_GRANT	2021/07/02 00:28	File	2 KB
LICENSE	2021/07/02 00:28	File	2 KB
flutter_root.iml	2021/07/02 00:28	IML File	1 KB
flutter_console.bat	2021/07/02 00:28	Windows Batch File	2 KB
dartdoc_options.yaml	2021/07/02 00:28	YAML File	2 KB
CONTRIBUTING.md	2021/07/02 00:28	MD File	6 KB
CODEOWNERS	2021/07/02 00:28	File	1 KB
CODE_OF_CONDUCT.md	2021/07/02 00:28	MD File	3 KB
AUTHORS	2021/07/02 00:28	File	3 KB
analysis_options.yaml	2021/07/02 00:28	YAML File	11 KB
.gitignore	2021/07/02 00:28	txtfile	3 KB
.gitattributes	2021/07/02 00:28	txtfile	1 KB
.cirrus.yml	2021/07/02 00:28	YML File	10 KB
.ci.yaml	2021/07/02 00:28	YAML File	2 KB
packages	2021/07/02 00:28	File folder	
examples	2021/07/02 00:32	File folder	
dev	2021/07/02 00:28	File folder	
bin	2021/07/02 00:28	File folder	
.pub-cache	2021/07/02 00:29	File folder	
.idea	2021/07/02 00:32	File folder	
.github	2021/07/02 00:28	File folder	
.git	2021/09/29 09:41	File folder	





Step 5: Installation



Download Android Studio from this link:

https://developer.android.com/studio?gclid=CjwKCAjwndCKBhAkEiwAgSDKQVjz8zKywgnQbflC4DBAgCEfJAzmFOogXn4J8nASHuYZJs1iLCaaEBoCCWQQAvD_BwE&gclsrc=aw.ds#downloads



Android Studio provides the fastest tools for building apps on every type of Android device.

[Download Android Studio](#)

2020.3.1 for Windows 64-bit (912 MiB)

[Download options](#)

[Release notes](#)





Step 6: Installation



Step 6: Create the folder

C:\Users\<your-pc-name>\Documents\flutter and unzip the Flutter into this directory

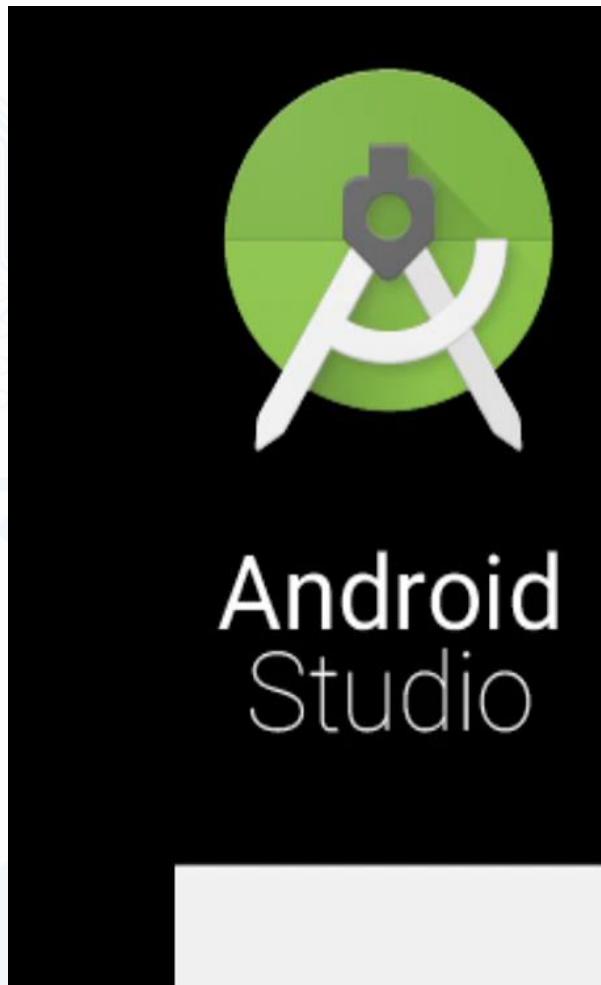




Step 6: Installation



Flutter





Step 7: Installation



Step7: Java installation

- <https://www.oracle.com/java/technologies/downloads/#jdk17-windows>

The screenshot shows the Oracle Java Downloads page for JDK 17. The page header includes the Oracle logo and navigation links for Products, Industries, Resources, Support, Events, Developer, and Partners. A search bar and account links are also present. The main content area displays three download options for Windows:

Product/file description	File size	Download
x64 Compressed Archive	170.66 MB	https://download.oracle.com/java/17/latest/jdk-17_windows-x64_bin.zip (sha256)
x64 Installer	152 MB	https://download.oracle.com/java/17/latest/jdk-17_windows-x64_bin.exe (sha256)
x64 MSI Installer	150.89 MB	https://download.oracle.com/java/17/latest/jdk-17_windows-x64_bin.msi (sha256)

Below the download links, there is a section titled "JDK 17 Script-friendly URLs" with a note: "The URLs listed above will remain the same for all JDK 17 updates to allow their use in scripts." It also provides a link to "Learn more about automating the downloads of JDK 17". At the bottom of the page, there are links for "Documentation Download" and "Release information" (Online Documentation, Installation Instructions, Release Notes, Documentation License, JDK 17 Licensing Information User Manual, Certified System Configurations). The page footer includes a search bar, a taskbar with various icons, and a small video player window in the bottom right corner.

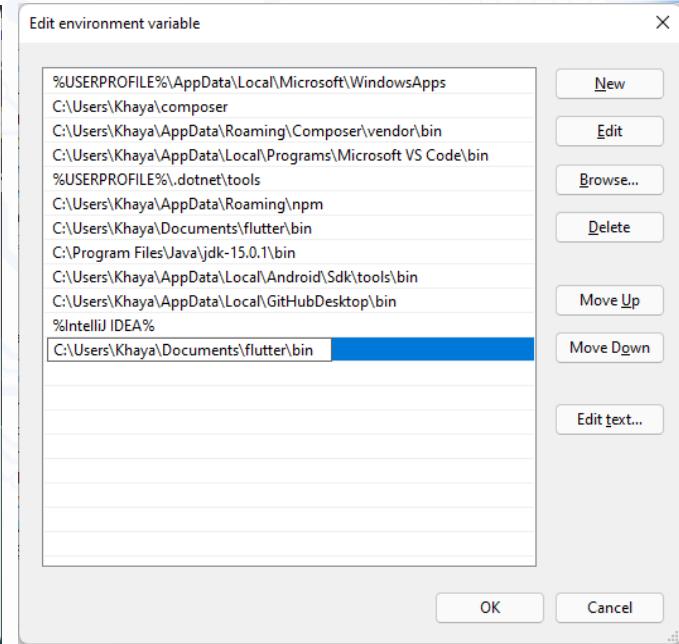
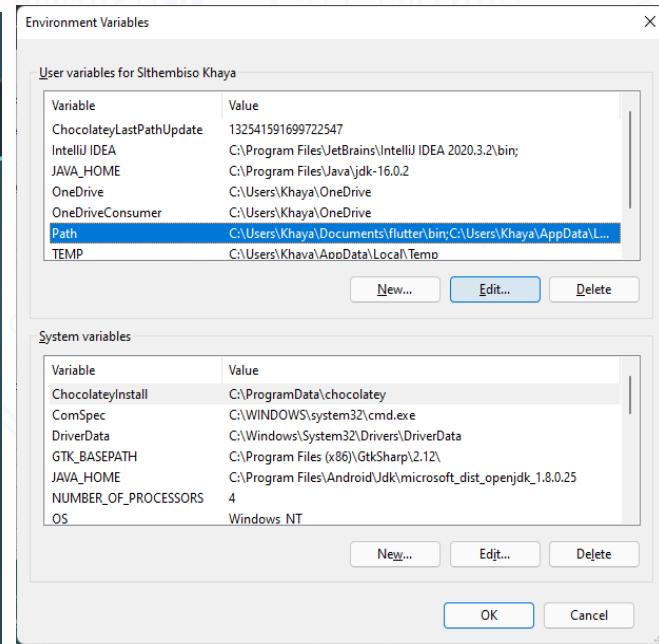
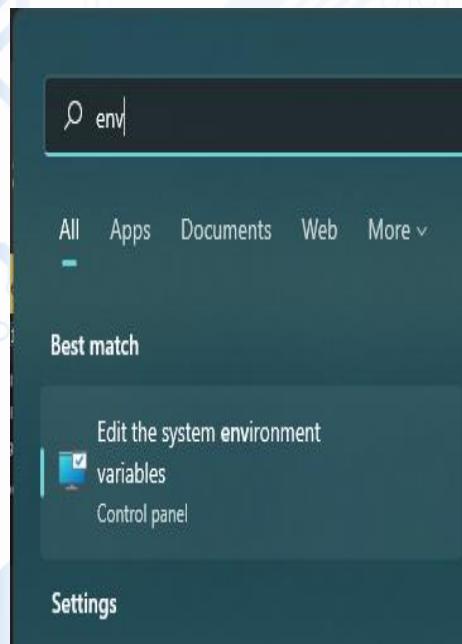


Step 8: Installation



Step 8: Copy the path

C:\Users<your-pc-name>\Documents\flutter\bin Save the Flutter path in the environment variables by navigating to search and typing env and select Edit System Environment Variables > Environment Variables > select the “Path” Variable and press the “Edit...” button > Press “New” button and add paste the path that you copied > press OK





On error in Installation



Flutter

enviro - All Control Panel Items

Control Panel > All Control Panel Items >

System
Edit environment variables for your account
Edit the system environment variables

Search Windows Help and Support for "enviro"

Environment Variables

User variables for AJM

Variable	Value
MOZ_PLUGIN_PATH	C:\Program Files\Foxit Software\Foxit PhantomPDF\plugins\
OneDrive	C:\Users\AJM\OneDrive
Path	C:\Users\AJM\Documents\flutter
PyCharm Community Edition	C:\Program Files\JetBrains\PyCharm Community Edition 2021.2.3\b...
TEMP	C:\Users\AJM\AppData\Local\Temp
TMP	C:\Users\AJM\AppData\Local\Temp

New... Edit... Delete

System variables

Variable	Value
ComSpec	C:\WINDOWS\system32\cmd.exe
DriverData	C:\Windows\System32\Drivers\DriverData
NUMBER_OF_PROCESSORS	6
OS	Windows_NT
Path	C:\WINDOWS\system32;C:\WINDOWS;C:\WINDOWS\System32\Wb...
PATHEXT	.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC
PROCESSOR_ARCHITECTURE	AMD64

New... Edit... Delete

New User Variable

Variable name: flutter

Variable value: C:\Users\AJM\Documents\flutter

Browse Directory... Browse File...

Environment Variables

User variables for AJM

Variable	Value
flutter	C:\Users\AJM\Documents\flutter
MOZ_PLUGIN_PATH	C:\Program Files (x86)\Foxit Software\Foxit PhantomPDF\plugins\
OneDrive	C:\Users\AJM\OneDrive
Path	C:\Users\AJM\AppData\Local\Microsoft\WindowsApps;C:\Users\A...
PyCharm Community Edition	C:\Program Files\JetBrains\PyCharm Community Edition 2021.2.3\b...
TEMP	C:\Users\AJM\AppData\Local\Temp
TMP	C:\Users\AJM\AppData\Local\Temp

New... Edit... Delete

System variables

Variable	Value
ComSpec	C:\WINDOWS\system32\cmd.exe
DriverData	C:\Windows\System32\Drivers\DriverData
NUMBER_OF_PROCESSORS	6
OS	Windows_NT
Path	C:\WINDOWS\system32;C:\WINDOWS;C:\WINDOWS\System32\Wb...
PATHEXT	.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC
PROCESSOR_ARCHITECTURE	AMD64

New... Edit... Delete

OK Cancel





On error in Installation



The screenshot shows a Windows desktop environment. In the foreground, a file explorer window titled 'Documents' is open, displaying a folder structure. It includes sections for 'Adobe Acrobat Document (4)' and 'File folder (29)'. Several PDF files are visible in the 'Adobe Acrobat Document' section. The taskbar at the bottom shows various application icons, including Microsoft Edge, File Explorer, and OBS Studio. The system tray indicates the date as 2021/09/29 and the time as 13:00.





Step 9: Installation



Step 9: Open your command prompt or Powershell and type

Flutter doctor --android-licences

Once typed in press enter and accept all the licenses by pressing “y”.

```
PS C:\Users\loki> flutter doctor
Running "flutter pub get" in flutter_tools...                                1,984ms
Doctor summary (to see all details, run flutter doctor -v):
[!] Flutter (Channel stable, 2.0.2, on Microsoft Windows [Version 10.0.19042.867], locale en-US)
[!] Android toolchain - develop for Android devices
    • Unable to locate Android SDK.
      Install Android Studio from: https://developer.android.com/studio/index.html
      On first launch it will assist you in installing the Android SDK components.
      (or visit https://flutter.dev/docs/get-started/install/windows/android-setup for detailed instructions).
      If the Android SDK has been installed to a custom location, please use
        'flutter config --android-sdk' to update to that location.

[!] Chrome - develop for the web
[!] Android Studio (not installed)
[!] Connected device (2 available)

! Doctor found issues in 2 categories.

PS C:\Users\loki> flutter doctor
Doctor summary (to see all details, run flutter doctor -v):
[!] Flutter (Channel stable, 2.0.2, on Microsoft Windows [Version 10.0.19042.867], locale en-US)
[!] Android toolchain - develop for Android devices (Android SDK version 30.0.3)
    • Android licenses not accepted. To resolve this, run: flutter doctor --android-licenses
[!] Chrome - develop for the web
[!] Android Studio (version 4.1.0)
[!] Connected device (2 available)

! Doctor found issues in 1 category.

PS C:\Users\loki>
```

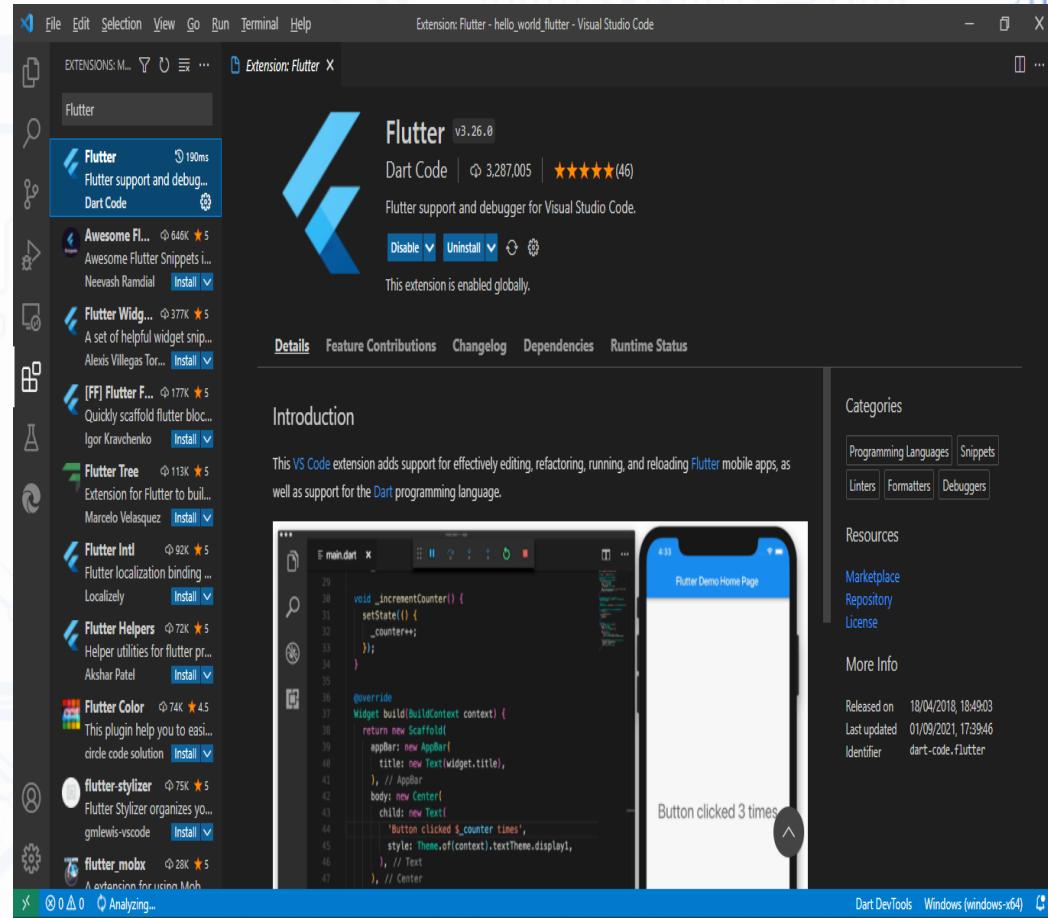


Step 10: Installation



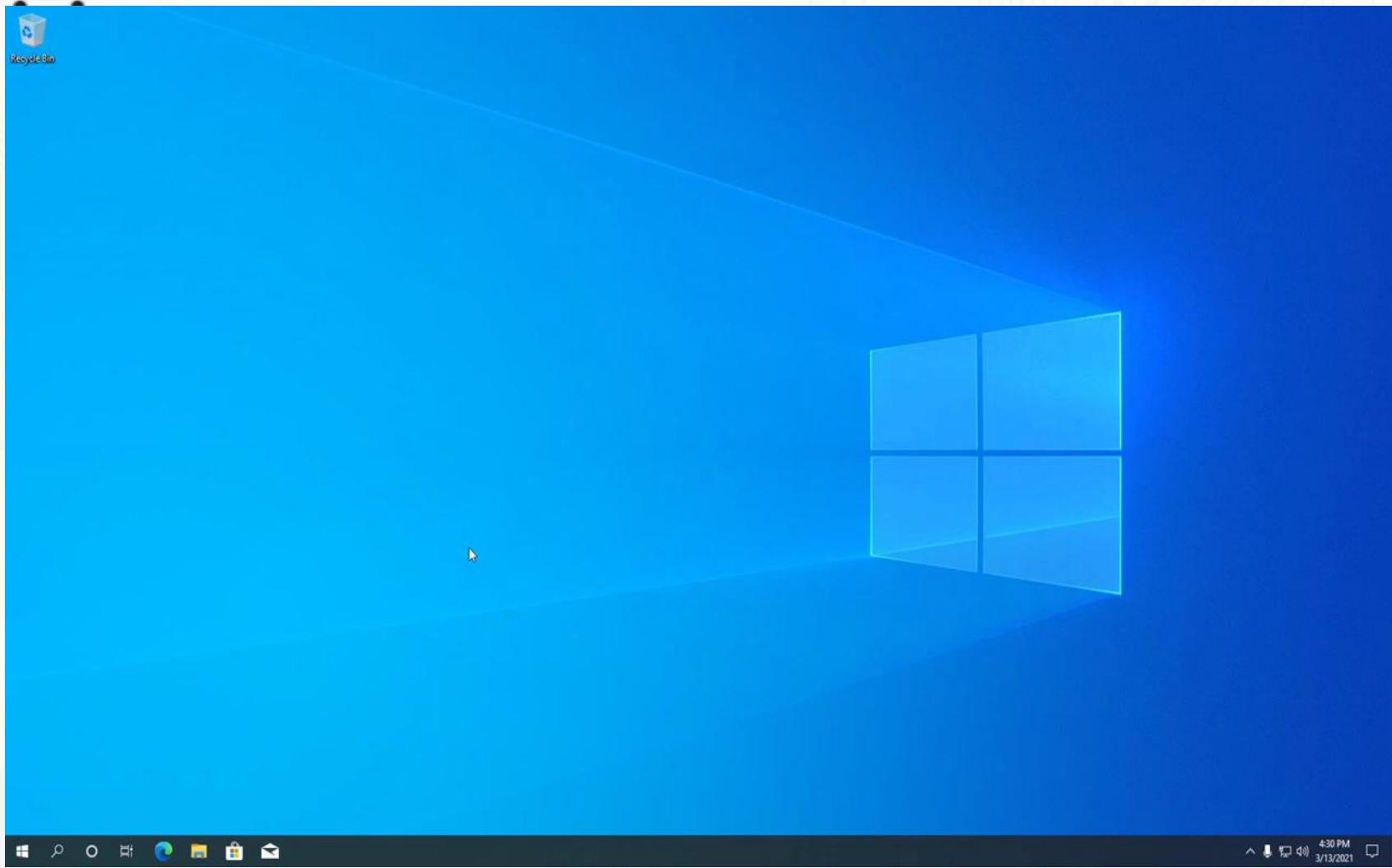
Step 10:

Install Flutter extension by navigating to the extensions tab and searching for Flutter this will install both Flutter and Dart programming Language





Let us see ALL installation process



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Step 12: Installation



Android Emulator

- Open your project on VSCode.
- If you would like to use your phone as a test device then connect it with your USB cable and enable USB Debugging in your developer settings.

Navigate to the bottom right corner the editor. Select the devices box



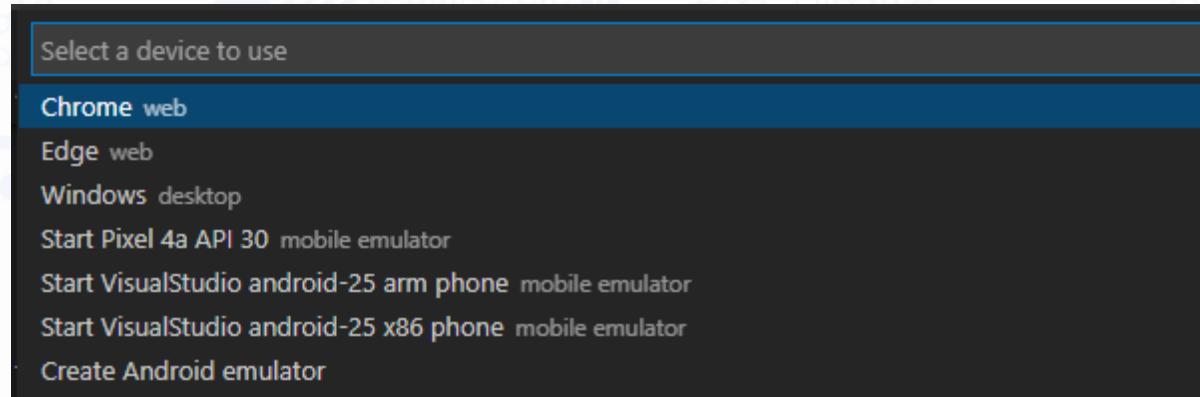


Step 12: Installation



Emulator.....

- Select your desired device or emulator.





Step 12: Installation



Emulator.....

- If an emulator is selected then it should pop up and start to load, loading should take less than 5 minutes, if not try to open it from Android Studio



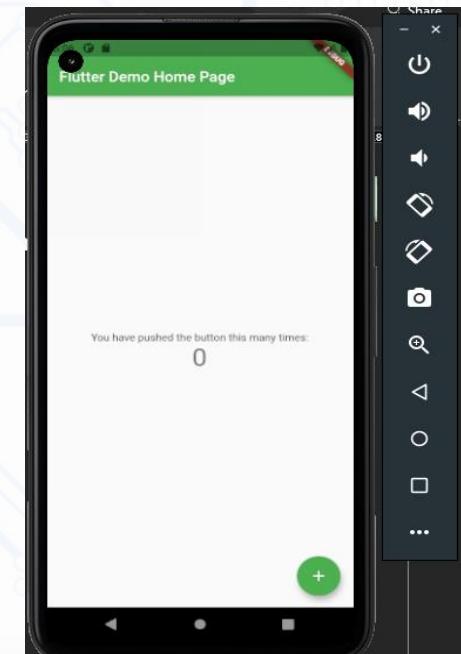
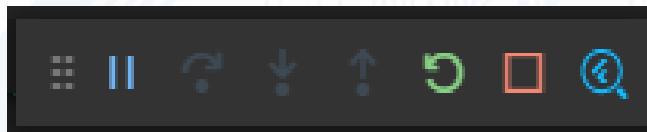


Step 12: Installation



Emulator.....

- To run your project onto the phone press ctrl + F5.
- This will then activate Hot Reload Settings which will be necessary for debugging and development





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Mobile application development

移动应用开发



LECTURE 01: **Flutter_DART**



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Dart Programming Language



- **Dart is the programming language used by Flutter.**
- The first hurdle for most would-be Flutter developers is being convinced to learn a new, sparsely used Language: Dart.
 - In order to write Flutter apps, it's important that you also learn Dart.
 - The fundamentals of Dart are similar to all higher-level languages.
 - You'll find familiarity in Dart syntax if you're coming from JavaScript, Java, or any other C-like language.
 - You'll feel comfortable with Dart's object-oriented design if you're coming from Ruby or Python.
 - Dart excels at being a "safe" language to learn. Google didn't set out to create anything innovative with Dart. Google wanted to make a language that was simple and productive and that could be compiled into JavaScript. What Google came up with, it turns out, works well for writing UIs.



Documentation and Dart Packages



- The documentation for Dart and Flutter are vast and clear.
- If you need a quick reference, or additional examples to compliment Flutter by Example, you can find Dart documentation at dart.dev and Flutter documentation at flutter.dev.



Dart's dependency management system



- **Pub** is Dart's dependency management system and library.
- If you're looking for an open-sourced library to solve a problem for any Dart (and Flutter) program, It can be accessed at pub.dev.



The main function



- All dart and Flutter programs start with the main function

```
void main() {  
  print('Hello, Dart');  
}
```

- This is the program which will tell Dart where the program starts and it's found in “main.dart” file.
- Only one main function can exist in a program,



Main Function in Flutter



```
void main() {  
  // any preprocessing can be done here, such  
  // as determining a device location //  
  // runApp is a Flutter function that runs  
  your Flutter app runApp(MyApp());  
}
```



Widgets



- *Widgets* are building blocks which you, the developer, will compose together to make a UI. When learning Flutter, you'll hear the phrase "everything is a widget" quite often.
- Every object in your Flutter application's UI is a widget.
- Structure is defined with widgets, styles are defined with widgets, even animations and routing is handled by widgets.
- Widgets are just Dart classes that know how to describe their view.
- The basic widgets are:
 - Text
 - Button
 - Column



Built-In Widgets



- Flutter comes with a set of built in widgets which combined can make a beautiful UI. These are:
- Layout
 - Row, Column, Scaffold, Stack
- Structures
 - Button, Toast, MenuDrawer
- Styles
 - TextStyle, Color
- Animations
 - FadeInPhoto, transformations
- Positioning and alignment
 - Center, Padding



Widget types: StatelessWidget



- A StatelessWidget is a widget that you (as the developer) are okay with being destroyed.
- Meant to display information and UI.
- Writing a StatelessWidget requires extending the correct class and including a build method.

```
class TitleText extends StatelessWidget {  
final String text;  
TitleText(this.text);  
@override  
Widget build(BuildContext context) {  
return Center(  
child: Text(text)  
);  
}  
}
```





StatefulWidget



- **A StatefulWidget is actually two classes: a State object and the widget itself.**
- The purpose of this class is to persist state when Flutter rebuilds widgets.
- The State object is special in that it has several methods that interact with Flutter in different ways. The most important of which is `setState`.
 - `setState` is used to tell Flutter that it needs to rebuild, usually because something has changed and the screen needs to reflect that. In actuality, after `setState` is called, Flutter knows that it needs to call the `build` method again.
 - The StatefulWidget class must implement the `createState` method.
 - The State object must implement the `build` method.
 - The StatefulWidget is immutable.
 - The State object is mutable.





```
class Counter extends StatefulWidget {  
  Counter({Key key, this.title})  
    : super(key: key); // Stateful Widgets don't have build methods.  
  // They have createState() methods.  
  // Create State returns a class that extends Flutters State class.  
  @override _MyHomePageState createState() => new _MyHomePageState(); //  
  Stateful Widgets are rarely more complicated than this.  
  } class _MyHomePageState extends State<MyHomePage> {  
  int counter = 0; void increaseCount() {  
    // setState is a special method that tells Flutter to repaint // the  
    // view because state has been updated!  
    setState(() { this.counter++; } ) // gotta have that build method!  
  Widget build(context)  
  { return new RaisedButton( onPressed: increaseCount, child:  
  new Text('Tap to Increase'), ); } }
```

Show this in real environment



Material App Widget



- A convenience widget that wraps a number of widgets that are commonly required for material design applications.
- It builds upon a WidgetsApp by adding material-design specific functionality, such as AnimatedTheme and GridPaper.
- The MaterialApp configures the top-level Navigator to search for routes in the following order:
 - *For the / route, the home property, if non-null, is used.*
 - *Otherwise, the routes table is used, if it has an entry for the route.*
 - *Otherwise, onGenerateRoute is called, if provided. It should return a non-null value for any valid route not handled by home and routes.*
 - *Finally if all else fails onUnknownRoute is called.*



```
MaterialApp(  
  home: Scaffold(  
    appBar: AppBar( title: const Text('Home')), ), ),  
  debugShowCheckedModeBanner: false, )
```

Home

Show this in real environment



Theme



- The theme of the app can be changed by changing the theme property on the Material App Widget.
- You can change the theme of the app to the way to see fit.
- You may need to restart the app in order to see changes

```
MaterialApp(  
    debugShowCheckedModeBanner: false,  
    theme: ThemeData(brightness: Brightness.dark, primaryColor: Colors.red),  
); // MaterialApp
```

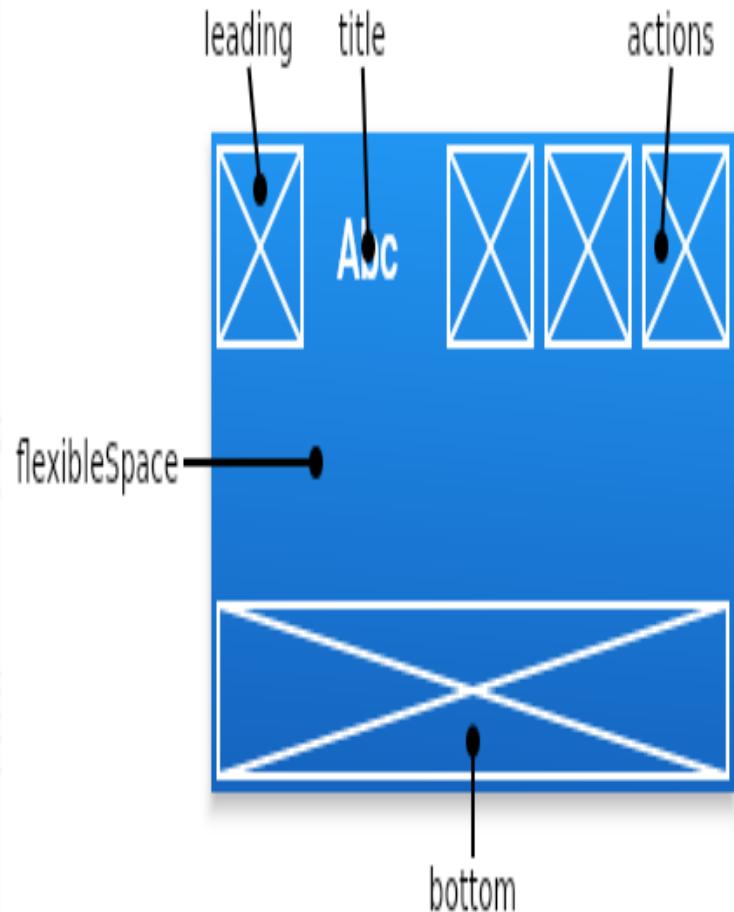




App Bar Widget



- The AppBar displays the toolbar widgets, leading, title, and actions, above the bottom (if any).
- The bottom is usually used for a TabBar.
- If a flexibleSpace widget is specified then it is stacked behind the toolbar and the bottom widget.
- The following diagram shows where each of these slots appears in the toolbar when the writing language is left-to-right (e.g. English):
- The AppBar insets its content based on the ambient MediaQuery's padding, to avoid system UI intrusions. It's taken care of by Scaffold when used in the Scaffold.appBar property.
- When animating an AppBar, unexpected MediaQuery changes (as is common in Hero animations) may cause the content to suddenly jump. Wrap the AppBar in a MediaQuery widget, and adjust its padding such that the animation is smooth.





```
import 'package:flutter/material.dart';

void main() => runApp(const MyApp());

/// This is the main application widget.
class MyApp extends StatelessWidget {
    const MyApp({Key? key}) : super(key: key);

    static const String _title = 'Flutter Code Sample';

    @override
    Widget build(BuildContext context) {
        return const MaterialApp(
            title: _title,
            home: MyStatelessWidget(),
        );
    }
}

/// This is the stateless widget that the main application instantiates.
class MyStatelessWidget extends StatelessWidget {
    const MyStatelessWidget({Key? key}) : super(key: key);

    @override
    Widget build(BuildContext context) {
        return Scaffold(
            appBar: AppBar(
                title: const Text('AppBar Demo'),
            ),
        );
    }
}
```



AppBar Demo

DEBUG

Show and test this in real environment



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Button Widget



- Flutter has a number of buttons which you can use. These include:
 - Text Button
 - Elevated Button
 - Outlined Button
 - Floating Button
 - Drop Down Button
 - Icon Button
 - PopupMenu Button

FlatButton

★ FlatButton.icon

★ FlatButton.icon

RaisedButton

★ RaisedButton.icon

★ Disabled RaisedButton.icon

OutlinedButton

★ OutlinedButton.icon

★ Disabled OutlinedButton.icon

TextButton

★ TextButton.icon

★ Disabled TextButton.icon

ElevatedButton

★ ElevatedButton.icon

★ Disabled ElevatedButton.icon

OutlinedButton

★ OutlinedButton.icon

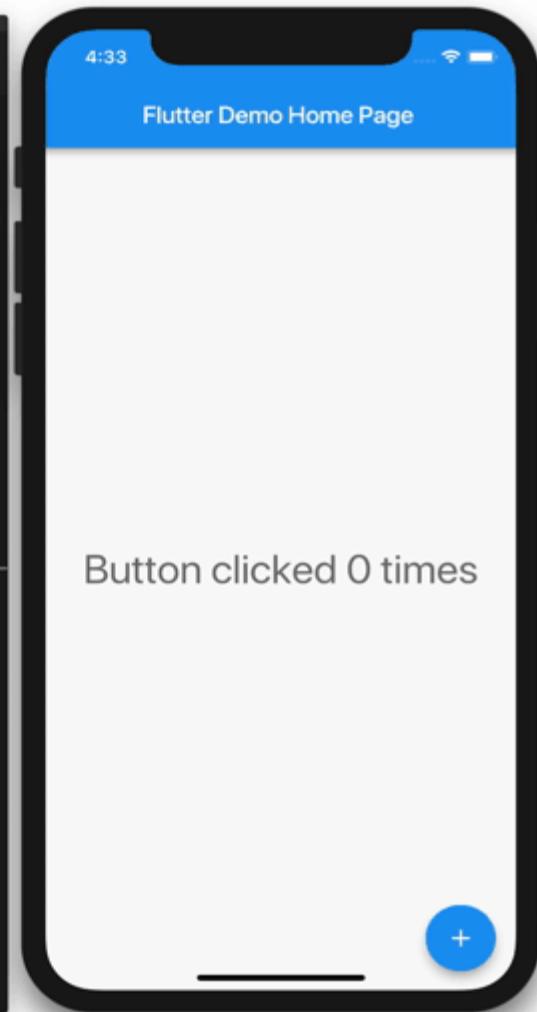
★ Disabled OutlinedButton.icon



Flutter

```
main.dart
```

```
29 void _incrementCounter() {
30     setState(() {
31         _counter++;
32     });
33 }
34
35
36 @override
37 Widget build(BuildContext context) {
38     return new Scaffold(
39         appBar: new AppBar(
40             title: new Text(widget.title),
41         ), // AppBar
42         body: new Center(
43             child: new Text(
44                 'Button clicked $_counter times',
45                 style: Theme.of(context).textTheme.display1,
46             ), // Text
47         ), // Center
48         floatingActionButton: new FloatingActionButton(
49             onPressed: _incrementCounter,
50             tooltip: 'Increment',
51             child: new Icon(Icons.add),
52         ), // FloatingActionButton
53     ); // Scaffold
54 }
55
56 }
```



Show and test this in real environment



Example: Buttons



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Navigation

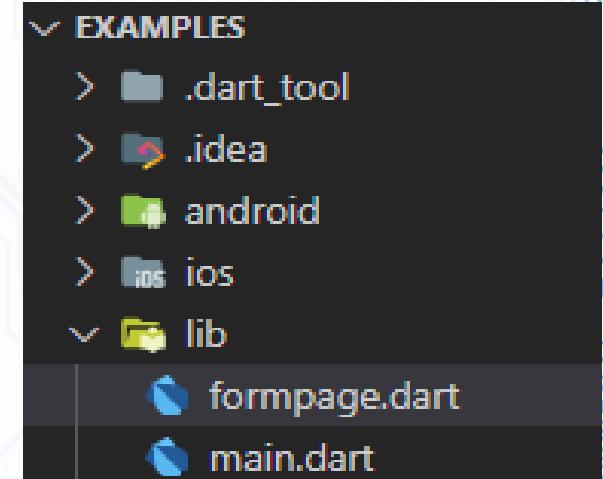


- Most apps contain several screens for displaying different types of information.
- For example, an app might have a screen that displays products. When the user taps the image of a product, a new screen displays details about the product.
- **In Flutter, screens and pages are called routes.**
- In our example we will navigate to a new page using a button.



Navigation

- Make a new flutter project and name it examples
- Create a new page called formpage.dart in the lib folder.
- Import the material package.
- Create a stateless widget called named FormPage.
- open main.dart and delete all the widgets.
- In runApp() add the following code:



```
runApp(MaterialApp(  
    debugShowCheckedModeBanner: false,  
    initialRoute: '/',  
    routes: {  
        '/': (context) => Home(),  
        '/form': (context) => Show and test this in real environment  
    })); // MaterialApp
```





Formpage



- In the form stateless widget add a scaffold and appbar.

```
class FormPage extends StatelessWidget {  
    const FormPage({Key? key}) : super(key: key);  
  
    @override  
    Widget build(BuildContext context) {  
        return Scaffold(  
            appBar: AppBar(  
                title: Text("Form"),  
            ), // AppBar  
        ); // Scaffold  
    }  
}
```

Show and test this in real environment



Floating Action Send Button



- To add a bit more flare to our Form, we will create a new Floating Action Button which will later be set to submit the form data
- All we need to do is add the following code to the Scaffold

```
floatingActionButton:  
FloatingActionButton(  
    onPressed: () {  
        Navigator.pop(context);  
    },  
    child: Icon(Icons.send),  
,
```





- In main.dart create a stateless widget named Home which returns a Scaffold Widget.
- In the scaffold widget add an appbar with the tile “Home”
- Add a body to the scaffold which will have a Center widget with the child of a column widget.
- The children of the column widget will be an elevated button with the child of a Text widget with the text “Form”.

```
class Home extends StatelessWidget {  
  const Home({Key? key}) : super(key: key);  
  
  @override  
  Widget build(BuildContext context) {  
    return Scaffold(  
      appBar: AppBar(  
        title: Text("Home"),  
      ), // AppBar  
      body: Center(  
        child: Column(  
          children: [ElevatedButton(onPressed: () {}, child: Text("Form"))],  
        ), // Column  
      ), // Center  
    ); // Scaffold  
  }  
}
```

Show and test this in real environment



OnPressed



- To execute a function when button is pressed, use onPressed() property of the button.
- We will configure the onPressed() {} function in our Elevated Button to open the FormPage().
- We do this by adding a Navigator with the context of current page and we'll push it to the route that we defined in the MaterialApp function.
- To test if it works we'll need to restart the app by pressing the green restart button on the hot reload panel.

```
child: Column(  
    children: [  
        ElevatedButton(  
            onPressed: () {  
                Navigator.pushNamed(context, '/form');  
            },  
            child: Text("Form")) // ElevatedButton  
    ],  
), // Column
```



Form



- Flutter provides a Form widget to create a form. The form widget acts as a container, which allows us to group and validate the multiple form fields.
- The Form widget acts as a container for grouping and validating multiple form fields.
- When creating the form, provide a GlobalKey. This uniquely identifies the Form, and allows validation of the form in a later step.



Form

Name

- Open the formpage.dart file and underneath the stateless widget create a new stateful widget named FormData.
- Once it's created add `final _formKey = GlobalKey<FormState>();` underneath class `_FormDataState extends State<FormData> {`

```
class _FormDataState extends State<FormData> {
    final _formKey = GlobalKey<FormState>();
```

- In the stateless widget add a body property to the scaffold and in the body property type the name of the widget you just created “FormData()”.
- Back in the FormData() widget delete the Container and replace it with the Form() widget and add a key property which will be `_formKey`.
- Inside the form widget’s child property there should be a Padding() widget with a padding property which has const EdgeInsets.all(10.0).
- Inside the Padding widget’s child property there should be a Column() widget.
- In the column widget’s children property add a TextFormField() widget.
- In the TextFormField type `(decoration: InputDecoration(labelText: 'Name')`

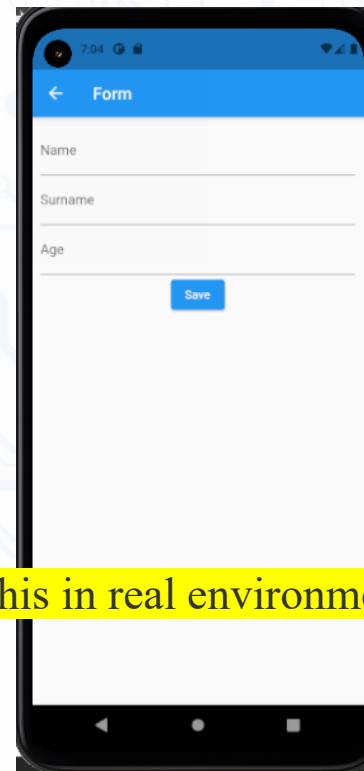




```
class FormData extends StatefulWidget {  
    const FormData({Key? key}) : super(key: key);  
  
    @override  
    _FormDataState createState() => _FormDataState();  
}  
  
class _FormDataState extends State<FormData> {  
    final _formKey = GlobalKey<FormState>();  
    @override  
    Widget build(BuildContext context) {  
        return Form(  
            key: _formKey,  
            child: Padding(  
                padding: const EdgeInsets.all(10.0),  
                child: Column(children: [  
                    TextFormField(decoration: InputDecoration(labelText: 'Name')),  
                    TextFormField(decoration: InputDecoration(labelText: 'Surname')),  
                    TextFormField(decoration: InputDecoration(labelText: 'Age')),  
                    ElevatedButton(  
                        child: Text('Save'),  
                        onPressed: () {},  
                    ), // ElevatedButton  
                ]), // Column  
            ), // Padding  
        ); // Form  
    }  
}
```



- Duplicate the Name Text form field to make more Fields.
- Add an Elevated Button with the child Text("Save").
- The code for the FormData Widget should look like this:



Show and test this in real environment





Form With Validation



- Apps often require users to enter information into a text field. For example, you might require users to log in with an email address and password combination.
- To make apps secure and easy to use, check whether the information the user has provided is valid. If the user has correctly filled out the form, process the information. If the user submits incorrect information, display a friendly error message letting them know what went wrong.





Validator Property



- The validator property is used to check validation for users.
- To add validation to your form start by adding the validator property to TextFormField() with the following code:

```
validator: (value) {  
  if (value != null && value.isEmpty) {  
    return 'Please type a name';  
  }  
  return null;  
},
```

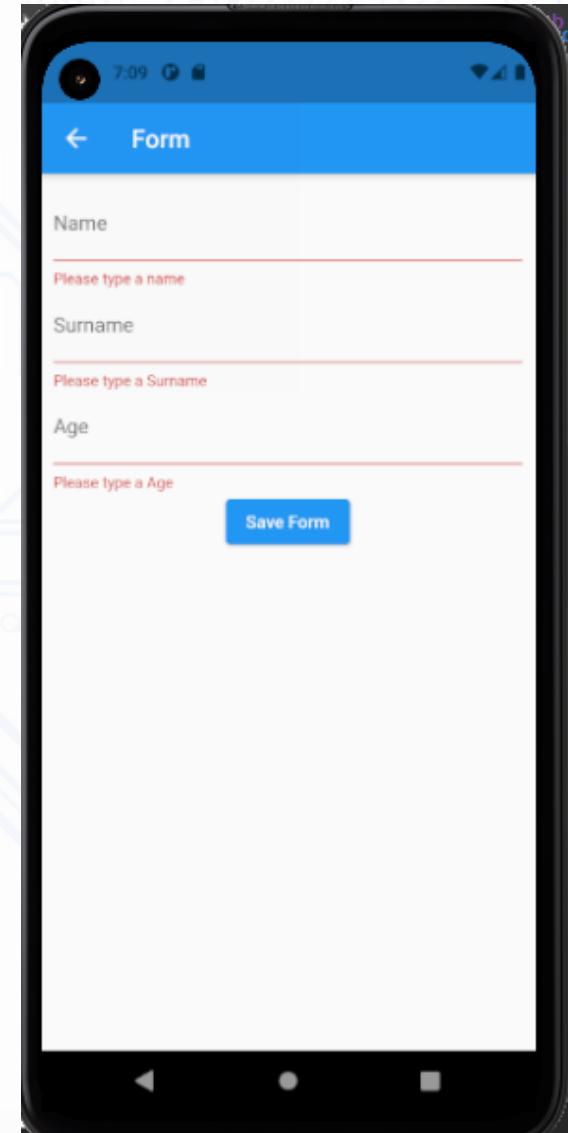
- Repeat for the other text fields



- In the ElevatedButton's onPressed property add the following code and your app should validate each time you press the Save button and if validated successfully a snackbar will pop up.

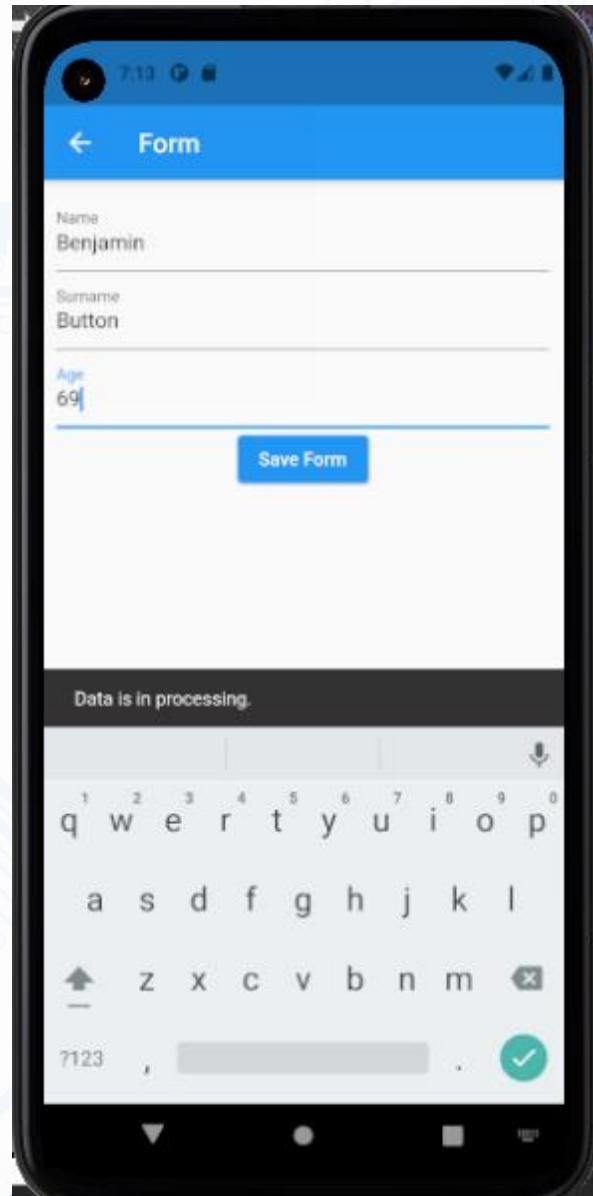
```
if (_formKey.currentState!.validate()) {  
    // If the form is  
    valid, display a Snackbar.
```

```
ScaffoldMessenger.of(context).showSnackBar(  
    SnackBar(content:  
    Text('Data is in processing.')));
```





Snackbar

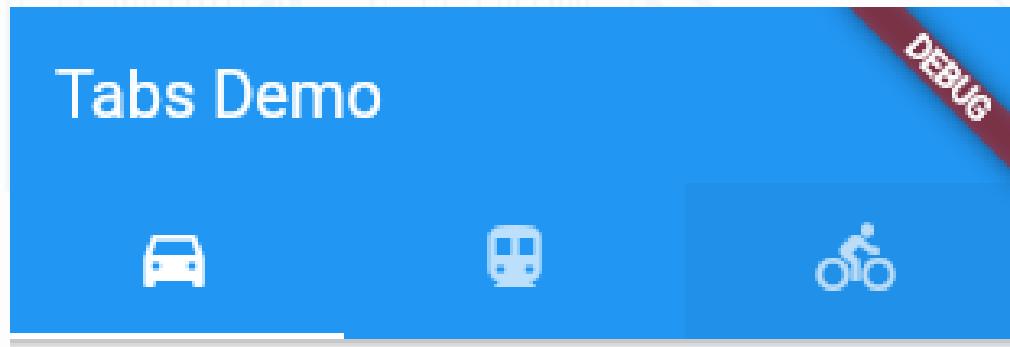




Appbar Tabs



- Working with tabs is a common pattern in apps that follow the Material Design guidelines. Flutter includes a convenient way to create tab layouts as part of the material library.





Let's make Tabs

- To make an App Bar tabs we'll need create a new file named tabpage.dart in the lib folder.
- Create a stateless widget named TabPage.
- To add a new button and route to our main.dart page. We do this by adding the following code to the routes list in Material App :
 - '/tab': (context) => TabPage(),
 - Then simply duplicate the code for the previous Elevated button:

```
ElevatedButton(  
  onPressed: () {  
    Navigator.pushNamed(context, '/tab');  
  },  
  child: Text("App Bar Tabs"))
```

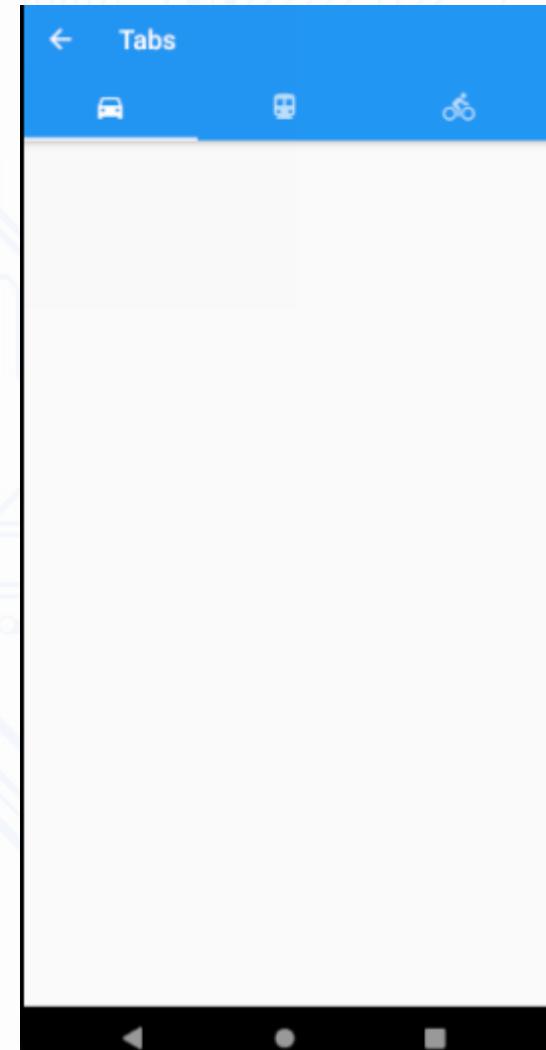




Tabpage

- Replace the Container widget with the following code:

```
return DefaultTabController(  
    length: 3,  
    child: Scaffold(  
        appBar: AppBar(  
            title: Text("Tabs"),  
            bottom: TabBar(  
                tabs: [  
                    Tab(icon:  
Icon(Icons.directions_car)),  
                    Tab(icon:  
Icon(Icons.directions_transit)),  
                    Tab(icon:  
Icon(Icons.directions_bike)),  
                ],  
            ),  
        ),  
    );
```





Content for each tab



- Content can be added for each tab using the TabView using the body property in Scaffold

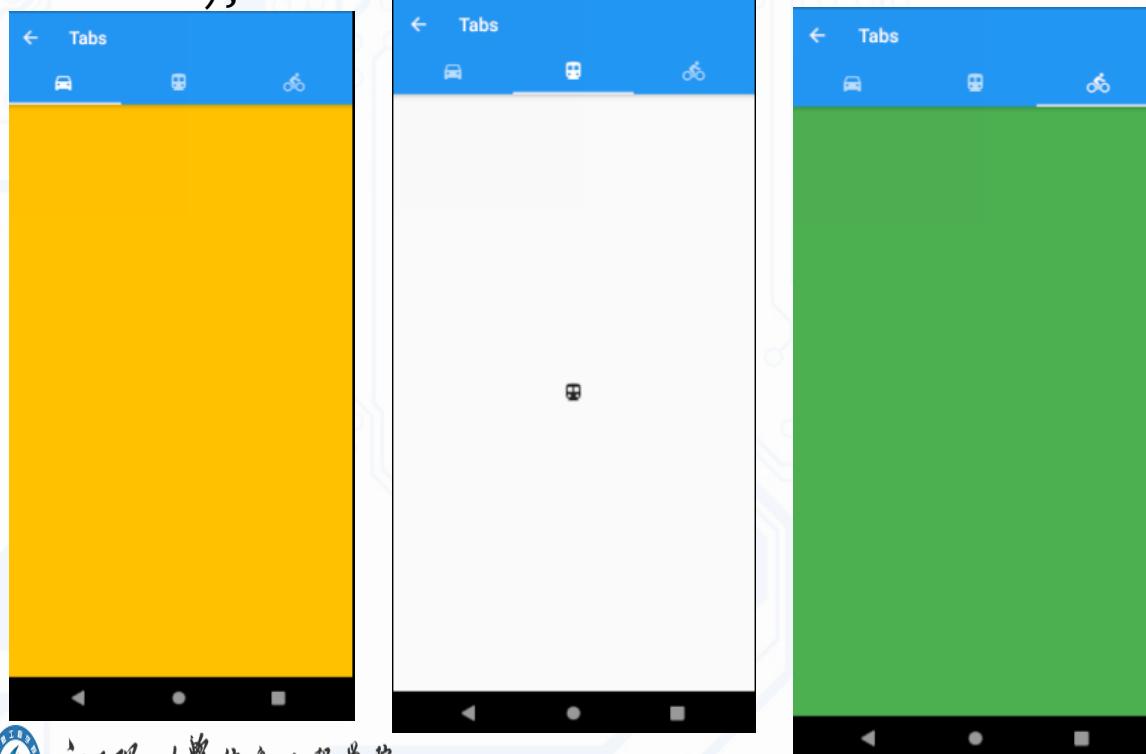
```
body: const TabBarView(  
            children: [  
  
Icon(Icons.directions_car),  
  
Icon(Icons.directions_transit)  
,  
  
Icon(Icons.directions_bike),  
        ],
```



Different content Tabs



```
TabBarView(  
    children: [  
        Container(color: Colors.amber),  
        Icon(Icons.directions_transit),  
        Container(color: Colors.green),  
    ],  
)
```

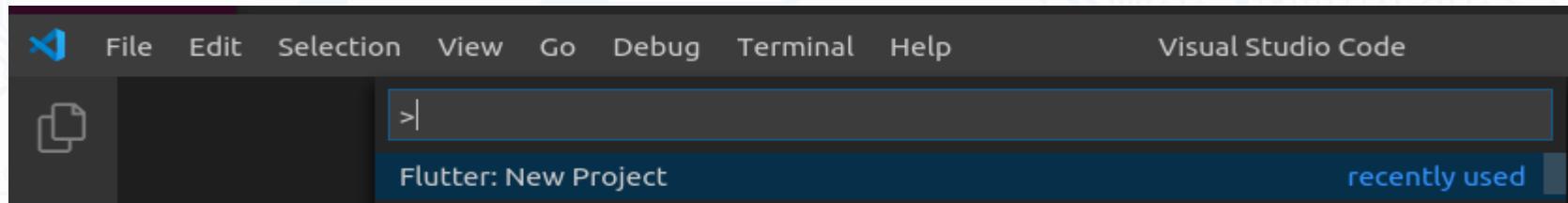




Creating a Flutter App



- You can create a new Flutter application in app:
- Open VSCode and invoke the command palette via View > Command Palette or ctrl + shift + p and type flutter to see the new project option



- Select a folder to save it in and name the project appropriately.
- Or by using the terminal
 - Type `Flutter create mynewapp`
 - Then open the new app folder in VSCode

```
\Desktop\Flutter_Projects\examples> flutter create newflutterapp
```

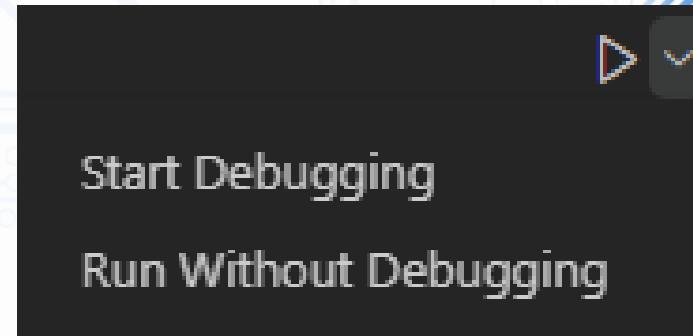


Running a Flutter App



- There are a couple of ways to start running a flutter app you could run it by:
- Using the terminal
 - Flutter start
- Using keyboard Shortcuts
 - Ctrl + F5
- Using UI
 - Pressing the play icon on the top left corner of Visual Studio Code.
 - To start without debugging press the drop down arrow.

```
\Desktop\Flutter_Projects\examples> flutter start
```





Debug Toolkit



- You can press the lightning icon to invoke Hot Reload manually or you could press `ctrl +s` to save your work and invoke hot reload.
- The green button is to restart the app.
- The red square is meant to stop the app.
- The blue arrow icons are meant for debugging and skipping over debug points.
- The debug toolkit pops up if the app is run by pressing `ctrl + F5` or by pressing the UI start button.



Properties



- Flutter widgets come with properties.
- These properties essentially define what a widget is able to do.
- For instance a container widget has alignment child, clipbehaviour and colour properties amongst others. These properties can be changed to edit the appearance or position of the container.
- Visual Studio gives more information about a widget and it's properties when you hover over it.

```
Container(  
  Key? key,  
  AlignmentGeometry? alignment,  
  EdgeInsetsGeometry? padding,  
  Color? color,  
  Decoration? decoration,  
  Decoration? foregroundDecoration,  
  double? width,  
  double? height,  
  BoxConstraints? constraints,  
  EdgeInsetsGeometry? margin,  
  Matrix4? transform,  
  AlignmentGeometry? transformAlignment,  
  Widget? child,  
  Clip clipBehavior = Clip.none  
)  
  
package:flutter/src/widgets/container.dart
```

Creates a widget that combines common painting, positioning, and sizing widgets.
The `height` and `width` values include the padding.



Snippets



- Snippets can be used to speed up entering typical code structures. They are built in but more can be downloaded in the extension library.
 - They are invoked by typing their prefix, and then selecting from the code completion window:

The screenshot shows an IDE interface with a code editor and a completion dropdown. The code editor has the following content:

```
15
16 | stful|
17 | ┌ Flutter stateful widget
18 | ┌ StatefulBuilder
19 | ┌ StatefulElement
20 | ┌ StatefulWidget
21 | ┌ StatefulWidgetBuilder(...)
22 | ┌ ScaffoldFeatureController
23 | Widget build(BuildContext context) {
24 |     return new AlertDialog(
25 |         title: const Text('Not Implemented'),
26 |         content: const Text('This feature'),
27 |         actions: <Widget>[
28 |             new FlatButton(
29 |                 child: const Text('OK'),
30 |             ),
31 |         ],
32 |     );
33 | }
```

The completion dropdown is open at the bottom of the code editor, showing suggestions for 'stful'. The top suggestion is 'Flutter stateful widget'. To the right of the dropdown, there is a preview window titled 'Insert a StatefulWidget' containing the following code:

```
class $1 extends StatefulWidget {
    @override
    _$1State createState() => new _$1State();
}

class _$1State extends State<$1> {
    @override
    Widget build(BuildContext context) {
        return new Container(
            $2
```



Pubspec File



- Every Flutter project includes a pubspec.yaml file, often referred to as the pubspec. A basic pubspec is generated when you create a new Flutter project. It's located at the top of the project tree and contains metadata about the project that the Dart and Flutter tooling needs to know. The pubspec is written in YAML, which is human readable, but be aware that white space (tabs v spaces) matters.
- The pubspec file specifies dependencies that the project requires, such as particular packages (and their versions), fonts, or image files. It also specifies other requirements, such as dependencies on developer packages (like testing or mocking packages), or particular constraints on the version of the Flutter SDK.
- Fields common to both Dart and Flutter projects are described in the pubspec file on dart.dev. This page lists Flutter-specific fields that are only valid for a Flutter project.



```
name: <project name>
description: A new Flutter project.
publish_to: 'none'

version: 1.0.0+1
environment:
  sdk: ">=2.7.0 <3.0.0"
dependencies:
  flutter:    # Required for every Flutter project
  sdk: flutter # Required for every Flutter project
  cupertino_icons: ^1.0.2 # Only required if you use Cupertino (iOS style) icons
dev_dependencies:
  flutter_test:
    sdk: flutter # Required for a Flutter project that includes tests

flutter:
  uses-material-design: true # Required if you use the Material icon font
  assets: # Lists assets, such as image files
    - images/a_dot_burr.jpeg
    - images/a_dot_ham.jpeg

  fonts:      # Required if your app uses custom fonts
    - family: Schyler
      fonts:
        - asset: fonts/Schyler-Regular.ttf
        - asset: fonts/Schyler-Italic.ttf
          style: italic
    - family: Trajan Pro
      fonts:
        - asset: fonts/TrajanPro.ttf
        - asset: fonts/TrajanPro_Bold.ttf
          weight: 700
```





Assets



- Common types of assets include static data (for example, JSON files), configuration files, icons, and images (JPEG, WebP, GIF, animated WebP/GIF, PNG, BMP, and WBMP).
- Before you can use an asset it should be listed in the pubspec.yaml file.
- Besides listing the images that are included in the app package, an image asset can also refer to one or more resolution-specific “variants”.



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5 concepts every Flutter dev should know



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5 concepts every Flutter dev should know



1. State management architecture

- This is one of the most important topics in the flutter community, it is quite important if you want to maintain a mid or large-size flutter project. It will help to create a project smoothly and add new features flawlessly.



1. State management architecture



- What do we need from architecture?
- 1. **Simplicity to understand:-** I prefer architecture that is quite simple to understand and has a very low learning curve, so any new dev can grasp it quickly and start doing what matters.
- 2. **Total separation of business logic:-** In flutter as we know, UI and business logic got mixed up very frequently and this can later cause problems and it becomes quite cumbersome to maintain this type of project.
- 3. **Effortless testing:-** Testing the codebase is as important as code, we need an architecture that lets us do straightforward testing.





2. Testing



- This is a single topic that I did not understand why it is important earlier in my career, but as I go ahead in my career and got experience with multiple projects and issues that came in a production environment.
- I have realized in a hard way, why this is as important.



3. IDE Shortcuts



- IDE shortcuts really? this is one of the most important thing that I need to learn, you must be thinking about it. Let me explain why, we're devs we spend most of our time writing code and debugging, which of course include a keyboard and we want to use it as efficiently as possible. Studies calculate that using **keyboard shortcuts** allows working 10 times faster than working with the mouse.
- **Benefits:-**
 - It saves you a ton of time.
 - It makes us productive and doesn't let us lose focus.
 - And of course, it makes you look cool (in movies have you noticed actors never use mouse)





4. Platform channel



- In mobile development even though we are using a cross-platform framework, we need to interact with multiple SDKs and libraries which are only available for the native platforms.
- Platform channel gives you the superpower to interact with native SDK. And I want you to have this superpower, if you are a beginner flutter dev almost in all interviews you will be asked if you've worked with native SDK using platform channel or not.





5. Maintaining a project



Flutter

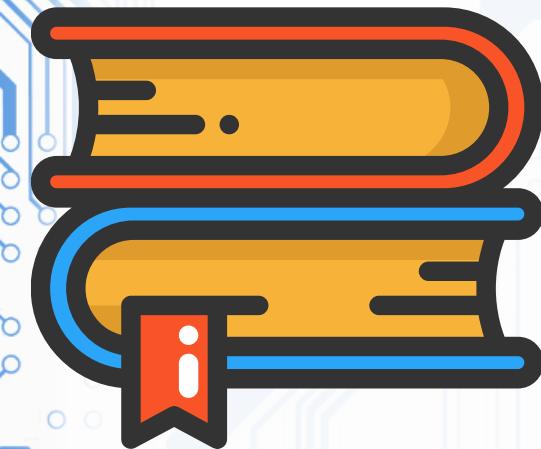
- You have worked hard and made a full-fledged application, You published it in-store and there you go, you start to get feedback and issues from users that need to be solved or a feature that needs to be in your app these are common things that will come upon daily basis while you're maintaining a project.
- **suggestions for better app maintenance:-**
 - Always write tests, it'll save you from issues and headaches in long run.
 - Focus on code coverage, with the coverage report you'll know which code your tests are specifically covering and which part is not covered and cause issues later on.
 - We reiterating here, choose a good architecture for your project and follow it.
 - Write strings, color codes, styles on separate files as constant and reuse them.
 - There are my top five suggestions for anyone who is into flutter development.





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Mobile application development

移动应用开发



LECTURE 01: Flutter Examples



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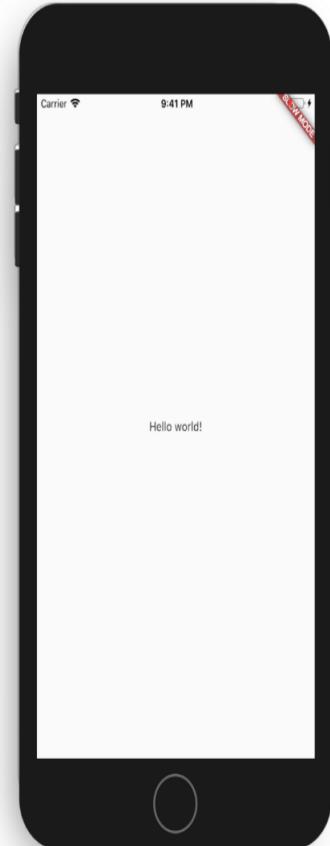


Example 1: Hello World



- Create a new folder named **Flutter_Projects**
- Open your preferred Terminal and navigate to **Flutter_Projects** and type the following command: **flutter create hello_world_flutter**

```
C:\Users\Khaya\Desktop\Flutter_Projects>flutter create hello_world_flutter  
Creating project hello_world_flutter...
```





Example 1: Hello World



- Open the project up in your IDE and navigate to lib\main.dart

The screenshot shows the Visual Studio Code interface with the following details:

- File Explorer:** Shows the project structure:
 - lib\main.dart (selected)
 - gradle
 - .gitignore
 - build.gradle
 - gradle.properties
 - gradlew
 - gradlew.bat
 - hello_world_flutter_androi...
 - local.properties
 - settings.gradle
 - ios
 - lib
 - main.dart
 - test
 - web
 - windows
 - .gitignore
 - .metadata
 - .packages
 - hello_world_flutter.iml
 - pubspec.lock
 - pubspec.yaml
 - README.md
- Code Editor:** Displays the content of main.dart:

```
1 import 'package:flutter/material.dart';
2
3 void main() {
4   runApp(MyApp());
5 }
6
7 class MyApp extends StatelessWidget {
8   // This widget is the root of your application.
9   @override
10  Widget build(BuildContext context) {
11    return MaterialApp(
12      title: 'Flutter Demo',
13      theme: ThemeData(
14        // This is the theme of your application.
15        //
16        // Try running your application with "flutter run". You'll see the
17        // application has a blue toolbar. Then, without quitting the app, try
18        // changing the primarySwatch below to Colors.green and then invoke
19        // "hot reload" (press "r" in the console where you ran "flutter run",
20        // or simply save your changes to "hot reload" in a Flutter IDE).
21        // Notice that the counter didn't reset back to zero; the application
22        // is not restarted.
23        primarySwatch: Colors.blue,
24      ),
25      home: MyHomePage(title: 'Flutter Demo Home Page'),
26    );
27  }
28}
29
30 class MyHomePage extends StatefulWidget {
31   MyHomePage({Key? key, required this.title}) : super(key: key);
```
- Bottom Status Bar:** ShowsLn 1, Col 1 | Spaces: 2 | CRLF | Dart | Dart DevTools | Flutter: 2.2.3 | Windows (windows-x64) | Analyzing...



Example 1: Hello World



Flutter

Delete the code in main.dart and enter this code.

```
import 'package:flutter/material.dart';

void main() => runApp(MyApp());

class MyApp extends StatelessWidget {
  @override
  Widget build(BuildContext context) {
    return MaterialApp(
      title: 'Welcome to Flutter',
      home: Scaffold(
        appBar: AppBar(
          title: const Text('Welcome to Flutter'),
        ),
        body: const Center(
          child: Text('Hello World'),
        ),
      );
  }
}
```



Example 1: Hello World



Flutter

Run the app by selecting your device and the pressing ctrl F5



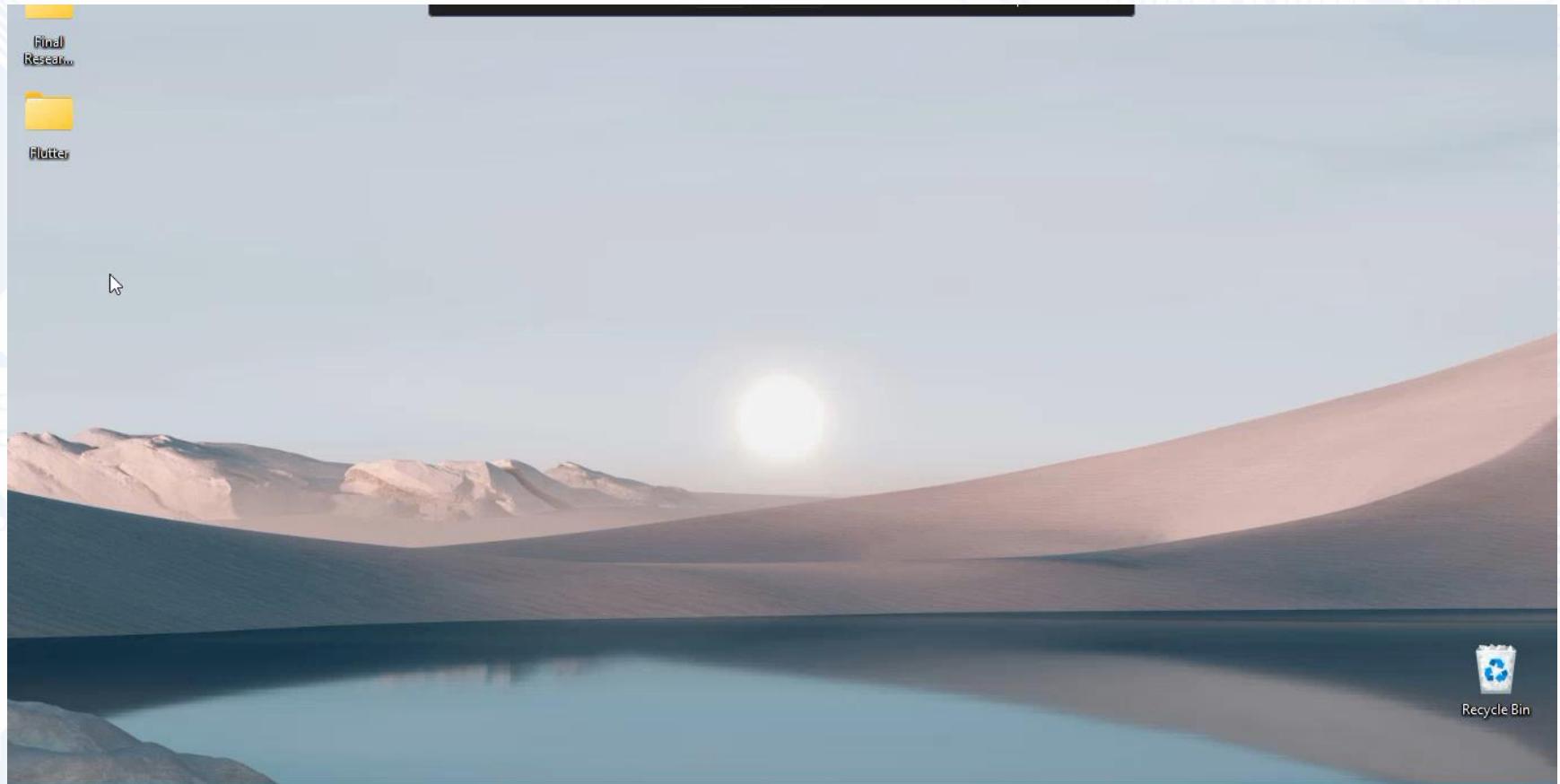
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Example 1: Hello World



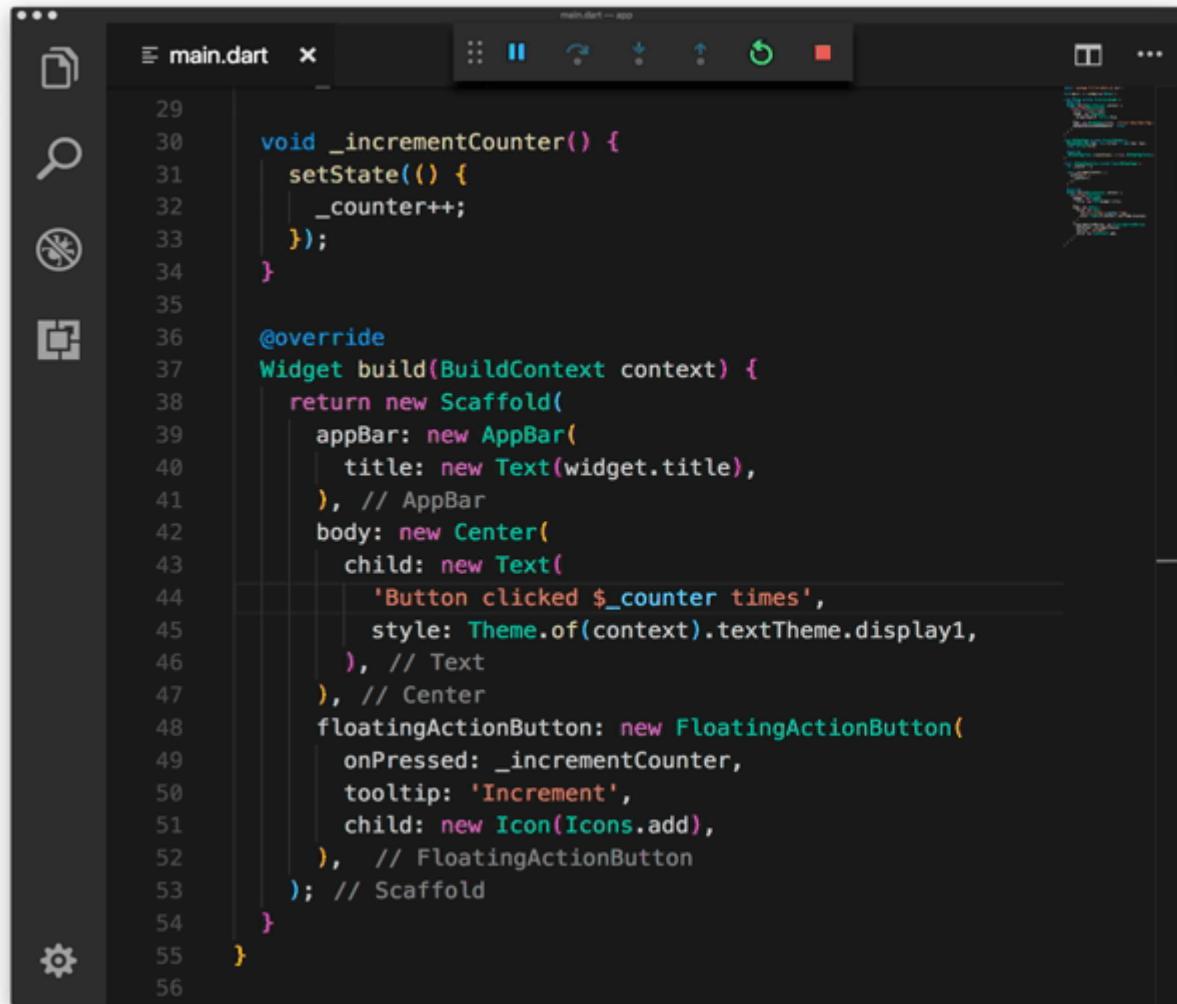
Flutter



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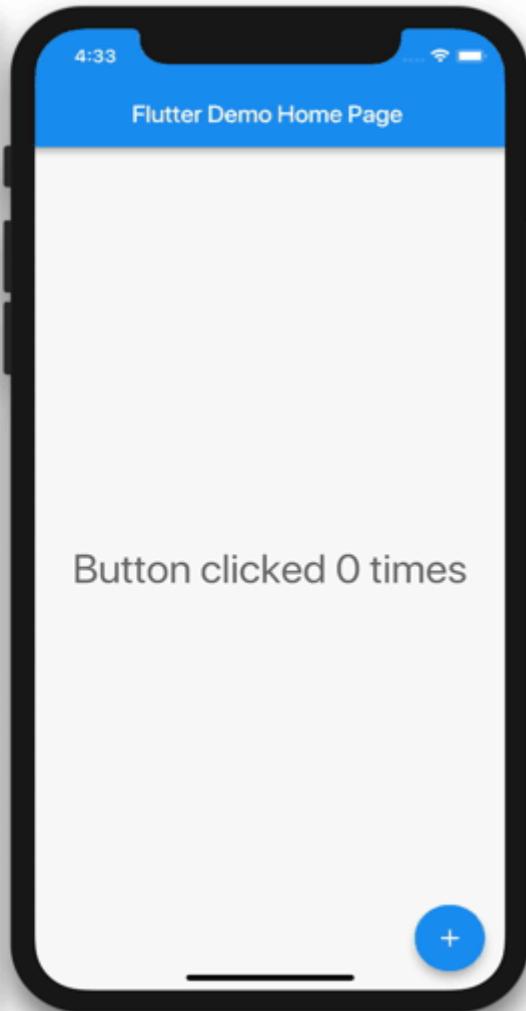


Example 2: Button



A screenshot of a code editor showing the `main.dart` file for a Flutter application. The code defines a counter and a floating action button.

```
29 void _incrementCounter() {
30     setState(() {
31         _counter++;
32     });
33 }
34
35
36 @override
37 Widget build(BuildContext context) {
38     return new Scaffold(
39         appBar: new AppBar(
40             title: new Text(widget.title),
41         ), // AppBar
42         body: new Center(
43             child: new Text(
44                 'Button clicked $_counter times',
45                 style: Theme.of(context).textTheme.display1,
46             ), // Text
47         ), // Center
48         floatingActionButton: new FloatingActionButton(
49             onPressed: _incrementCounter,
50             tooltip: 'Increment',
51             child: new Icon(Icons.add),
52         ), // FloatingActionButton
53     ); // Scaffold
54 }
55 }
56 }
```





Where to Start Learning Flutter?



1. <https://flutter.dev/>
2. learning Flutter? <https://hackr.io/tutorials/learn-flutter>
3. <https://hackr.io/tutorials/learn-flutter>
4. <https://flutter.dev/>
5. learning Flutter? <https://hackr.io/tutorials/learn-flutter>
6. Take a look at the following tutorials: <https://hackr.io/tutorials/learn-flutter>
7. **FragmentedCast**
8. Tutorial Links:
 9. <http://fragmentedpodcast.com/episodes/118/>
 10. <http://fragmentedpodcast.com/episodes/119/>
 11. <https://hackr.io/tutorials/learn-flutter>

12. **Flutter Docs**

13. Tutorial Links:
 1. •Flutter for Android devs
 2. •Flutter for iOS devs
 3. •Flutter for React Native devs
 4. •Flutter for Web devs <https://hackr.io/tutorials/learn-flutter>

14. **Googleodelabs:**

<https://hackr.io/tutorials/learn-flutter>

15. **Github repository:**

<https://hackr.io/tutorials/learn-flutter>

16. **Udacity Course :**

<https://hackr.io/tutorials/learn-flutter>

17. **MTechViral: YouTube :**

<https://hackr.io/tutorials/learn-flutter>



- **You just saw the top 8 Flutter Tutorials/Programming**

Community and courses but do you know which of the above ones is “the best”? No!

<https://hackr.io/tutorials/learn-flutter>

- **Hackr.io is the solution. Presenting you the best**

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- **Introduction of Flutter by Google**

<https://hackr.io/tutorials/learn-flutter>

- **You can also subscribe to Flutter Weekly**

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- **Here is Flutter (@r_FlutterDev) on Twitter**

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Student Task_Extra



- The student who repeat the example in this ppt have extra mark
- GOOD chance for student who didn't send the GTASK

- JUST MOOC
- Your file should have this format of name
<Task number><student name><Student ID>.ppt



Reference



- <https://flutterbyexample.com/lesson/about-dart>
- <https://medium.com/app-dev-community/flutter-button-types-with-examples-10ae487621a3>
- <https://www.javatpoint.com/flutter-forms>
- <https://www.quytech.com/blog/top-11-key-features-of-a-successful-mobile-app-development/>
- <http://www.appinventor.org/>
- Flutter Docs Tutorial Links:
 - Flutter for Android devs
 - Flutter for iOS devs
 - Flutter for React Native devs
 - Flutter for Web devs<https://hackr.io/tutorials/learn-flutter>
- Google Codelabs <https://hackr.io/tutorials/learn-flutter>
- Github repository <https://hackr.io/tutorials/learn-flutter>
- Udacity Course <https://hackr.io/tutorials/learn-flutter>
- [MTechViral: YouTube](https://www.youtube.com/watch?v=HJzXWVjwvIY) <https://hackr.io/tutorials/learn-flutter>
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- Introduction of Flutter by Google <https://hackr.io/tutorials/learn-flutter>
- You can also subscribe to Flutter Weekly <https://hackr.io/tutorials/learn-flutter>
- Here is Flutter (@r_FlutterDev) on Twitter <https://hackr.io/tutorials/learn-flutter>
- <https://flutter.dev/docs/development/tools/vs-code#:~:text=To%20perform%20a%20hot%20restart,Shift%20%2B%20F5%20on%20macOS.>
- <https://flutterbyexample.com/lesson/about-dart>
- <https://medium.com/app-dev-community/flutter-button-types-with-examples-10ae487621a3>
- <https://www.javatpoint.com/flutter-forms>



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“The beauty of research is that you never know where it's going to lead.”

RICHARD ROBERTS
Nobel Prize in Physiology or Medicine 1993



**“BE HUMBLE. BE HUNGRY.
AND ALWAYS BE THE
HARDEST WORKER
IN THE ROOM.”**

