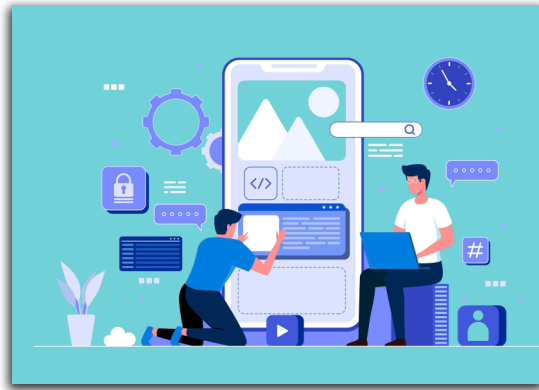


# Mobile Apps Development

1.0



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# Chapter 2 : Flutter overview

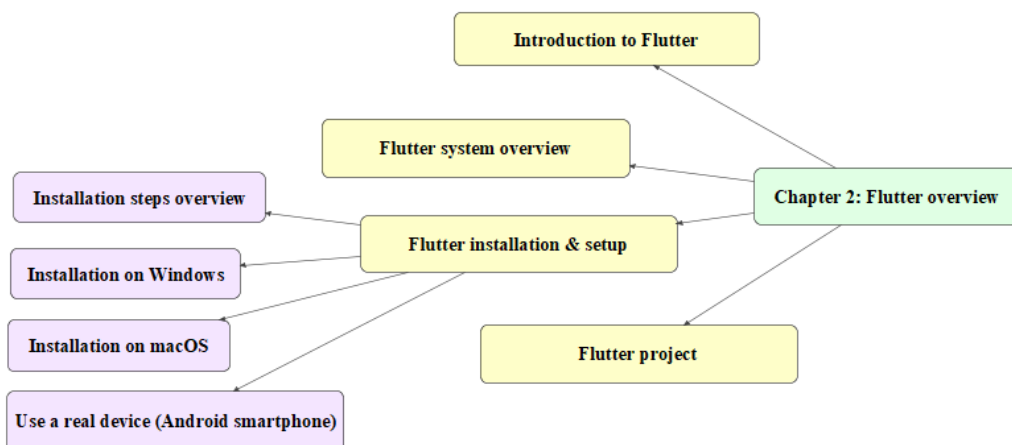


## Objectives :

- This chapter aims to:
- Define what Flutter is.
- Explain the benefits of using Flutter for mobile app development.
- Identify the key components of the Flutter system and explain their roles and interactions to describe how Flutter operates.
- List the prerequisites for installing Flutter and demonstrate the general steps to install it on a computer.
- Configure an Android smartphone to test a Flutter app.
- Identify the basic elements of a Flutter project and the role of its essential file and folder.

## Plan :

1. Introduction to Flutter.
2. Flutter system overview.
3. Flutter installation & setup.
  - Installation steps overview.
  - Installation on Windows.
  - Installation on macOS.
  - Use a real device (Android smartphone).
4. Flutter project.



# 1. Introduction to Flutter

## What is Flutter ?



*Définition*

An **open source** framework (software development kit SDK\*) created by Google.

## When was Flutter introduced ?



*Définition*

- Flutter was released in **May 2017** (the alpha version).
- Announcement to Mobile World Congress in **Feb 2018** (the beta version).
- It becomes popular in **December 2018** (the official stable version 1).
- Flutter version 2 in **March 2021**.

## Why is Flutter used ?



*Définition*

Creating and building **high performance** (natively-compiled) mobile, desktop and web applications across multiple platforms (Android and iOS as mobile OS and Windows, Linux and macOS as Desktop OS).

## What is Flutter good for ?



*Définition*

- A **flexible** technology to create a wide variety of apps both small for startups and large for enterprises.

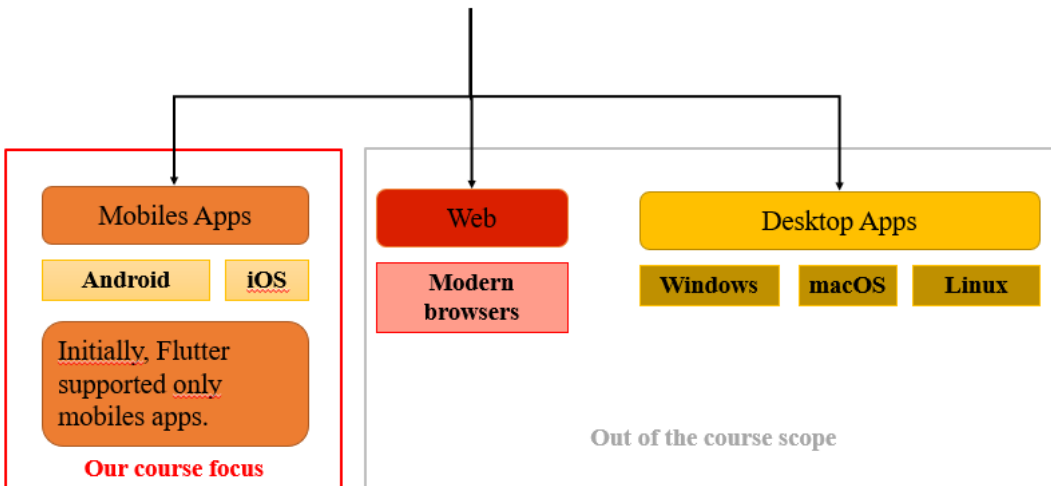
## Features of Flutter :

- Cross-platform development.
- Fast and low-cost development.
- Attractive and customizable UI.
- High performance (native) and awesome apps.
- Large community .
- Open-source and free.
- Hot reload (quick & ease app refresh).



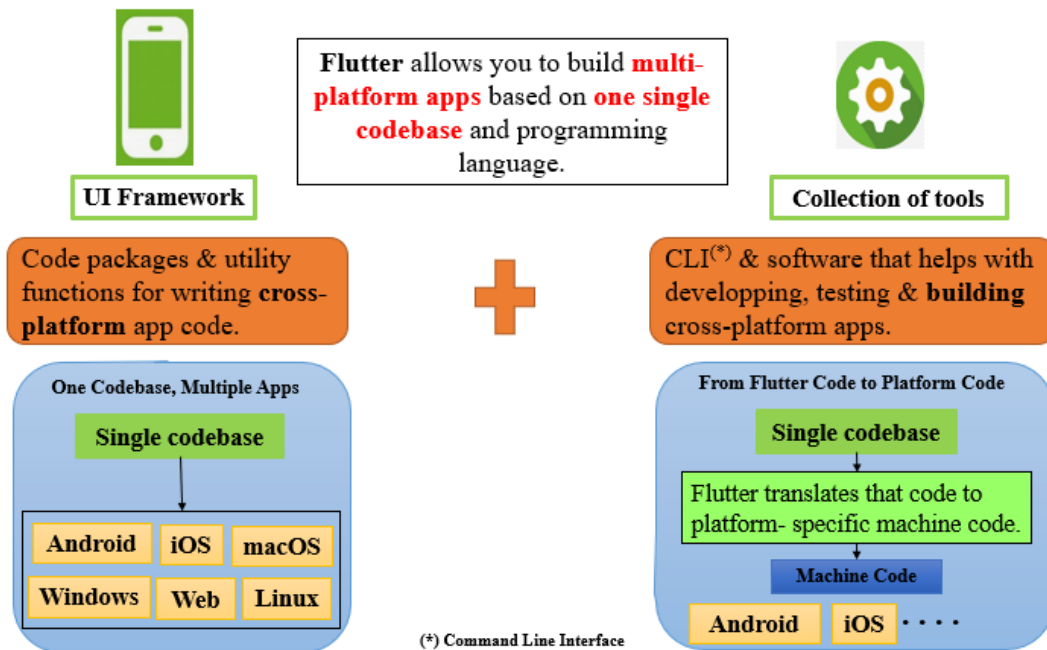
**See instantly the changes make to the code reflected in the UI**

Target platforms supported by Flutter :



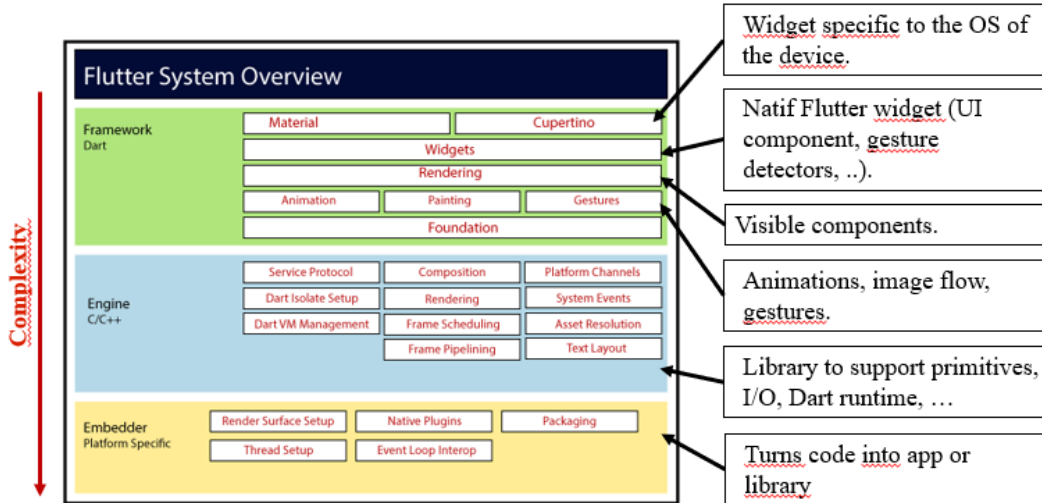
## 2. Flutter system overview

Concrelety, what is exactly Flutter ?

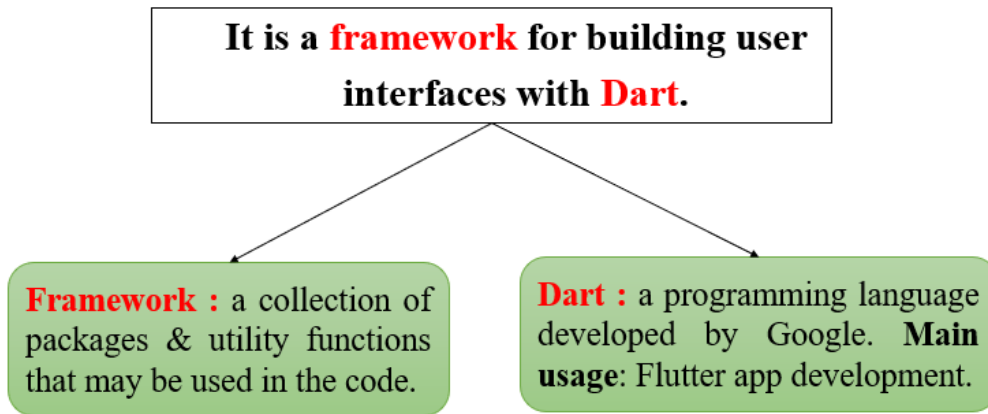


### Architecture (Layers) of Flutter:

Architecture of Flutter is categories with decreasing hierarchical level of complexity.



Flutter is NOT a programming language !



### 3. Flutter installation & setup

|                           | On Windows  | On macOS   | On Linux     |
|---------------------------|---|--|--------------|
| <b>Build iOS Apps</b>     | Not possible  | Download & install Xcode<br>Configure Xcode command-line tools<br>Create local iOS simulator | Not possible |
| <b>Build Android Apps</b> | Download & install Android Studio<br>Install SDK, command-line tools & build tools<br>Create local Android emulator |  |              |



- The code for all platforms can be written on the same machine, but can only tested and run **iOS & macOS apps on macOS machines, Windows apps on Windows machines** and **Linux apps on Linux machines**.
- Android and web apps can be built on all OS.

### 3.1. Flutter installation & setup

Installation steps overview

#### IDE for Flutter:

- Visual Studio Code (VS Code\*).
- Android Studio.
- IntelliJ IDEA.
- FlutLab.io (online IDE\* with limited free plan and premium paid plan) : <https://flutlab.io/pricing>.

#### Installation steps overview:

- *Step 0 : IDE \*+ extensions*

- a) **IDE** : for writing code.
- b) **Extensions** : add Flutter and Dart plugins to the IDE to simplify the development process.

- *Step 1 : Flutter SDK\**

- a) **Git** : version control software, used internally by Flutter SDK.
- a) **Flutter SDK (UI Framework + collection of tools)** : for managing Flutter projects.

- *Step 2 : Platform Tools*

- a) **Android Studio** : used by Flutter SDK and needed for Android app deployment.
- b) **Xcode**: used by Flutter SDK and needed for iOS app deployment.

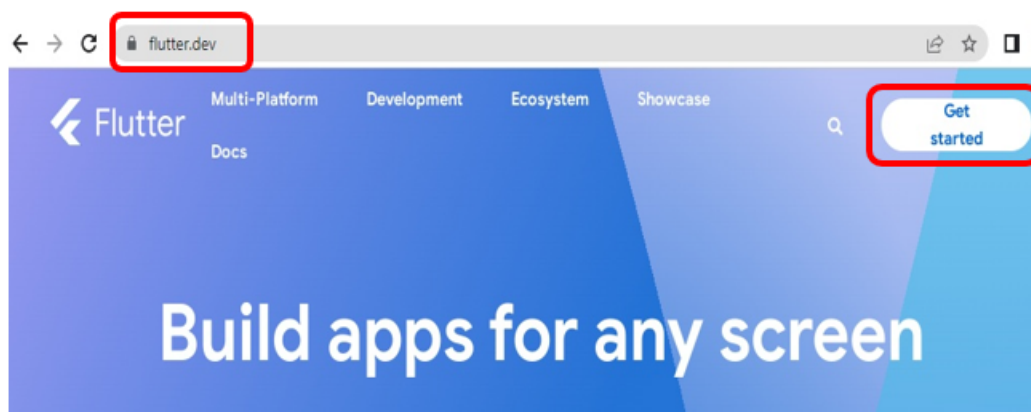
- *Step 3 : Virtual Devices*

- a) **Android** : preview Flutter apps on Android Virtual Devices.
- b) **iOS** : preview Flutter apps on virtual iOS devices.

### 3.2. Installing Flutter on Windows

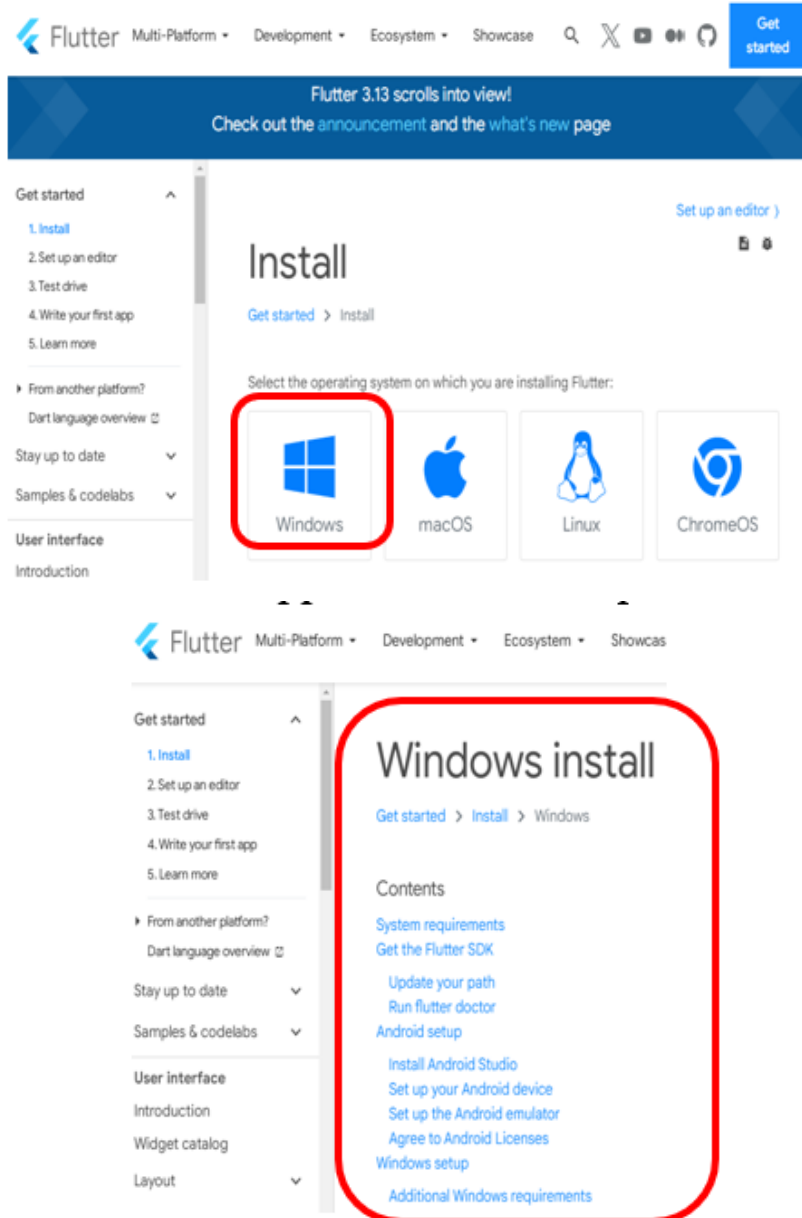
#### Step 1.a.1.

Visit the official Flutter website « *Flutter.dev* » then click on *Get started* button :



**Step 1.a.2.**

Picking **Windows** as an option of the platform on which mobile apps will be developed :



**Step 1.a.3.**

System requirements: installing Git with the option « **use Git from the Windows Command Prompt** » :

## System requirements

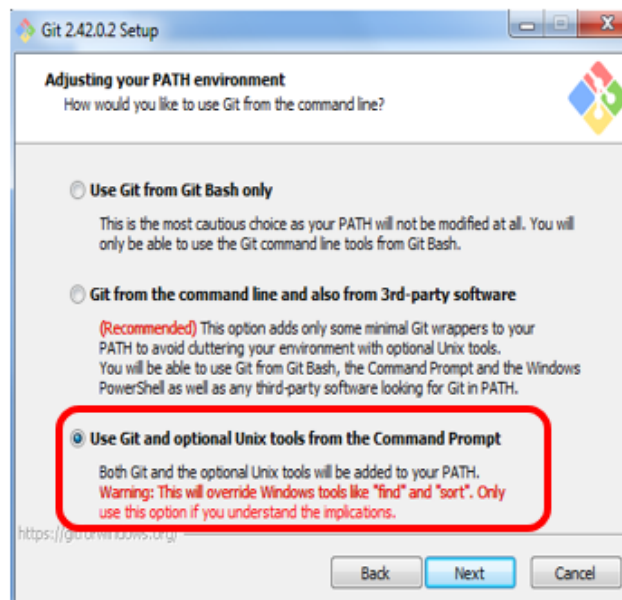
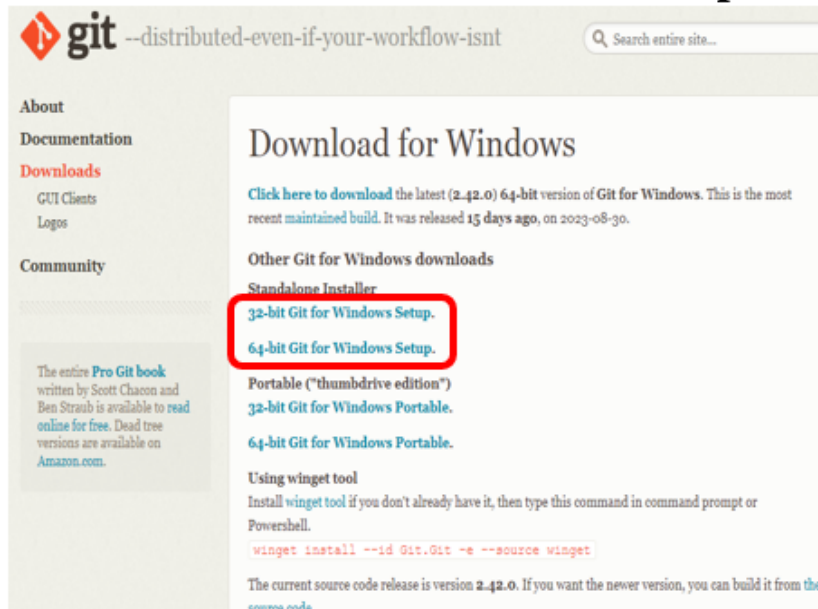
To install and run Flutter, your development environment must meet these minimum requirements:

- **Operating Systems:** Windows 10 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.

**Follow the link to install Git for Windows**

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





### Step 1.b.1.

Installing **Flutter** itself (from the Flutter website):

- Download the zip file and unzip it.
- Move the flutter file somewhere else: e.g. to **C:\src\flutter\** folder.

## Get the Flutter SDK

**Important:** If you're in China, read [Using Flutter in China](#).

[Help](#)

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

**flutter\_windows\_3.13.4-stable.zip**

For other release channels, and older builds, check out the [SDK archive](#).

### Step 1.b.2.

**Update the path** : set environment variable.

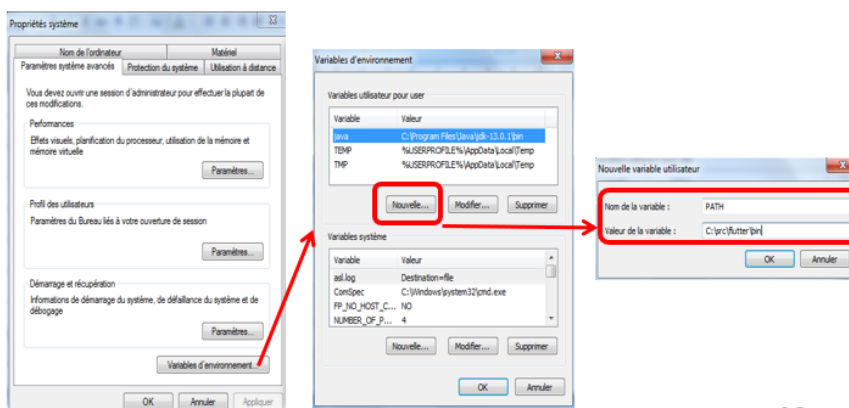
## Update your path



If you wish to run Flutter commands in the regular Windows console, take these steps to add Flutter to the **PATH** environment variable:

- From the Start search bar, enter 'env' and select **Edit environment variables for your account**.
- Under **User variables** check if there is an entry called **Path**:
  - If the entry exists, append the full path to **flutter\bin** using ; as a separator from existing values.
  - If the entry doesn't exist, create a new user variable named **Path** with the full path to **flutter\bin** as its value.

You have to close and reopen any existing console windows for these changes to take effect.



### Step 1.b.3.

Check platform dependencies to complete the setup : run « **flutter doctor** » command.

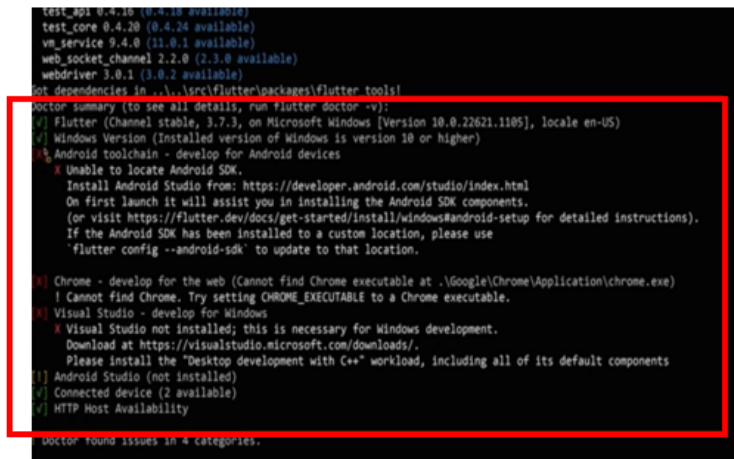
## Run flutter doctor



From a console window that has the Flutter directory in the path (see above), run the following command to see if there are any platform dependencies you need to complete the setup:

```
C:\src\flutter>flutter doctor
```

This command checks your environment and displays a report of the status of your Flutter installation. Check the output carefully for other software you might need to install or further tasks to perform (shown in bold text).



**Step 2.a.**

Prepare the system for Android app development :

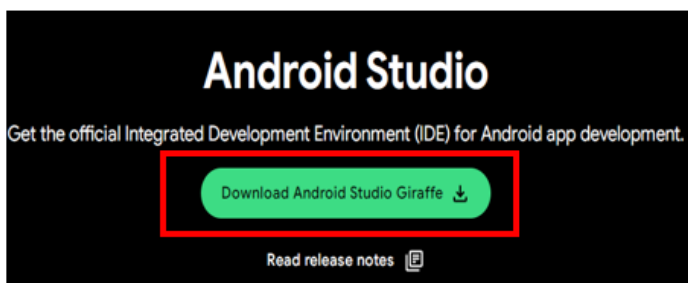
**Step 0.a.**

**Note:** Flutter relies on a full installation of Android Studio to supply its Android platform dependencies. However, you can write your Flutter apps in a number of editors; a later step discusses that.

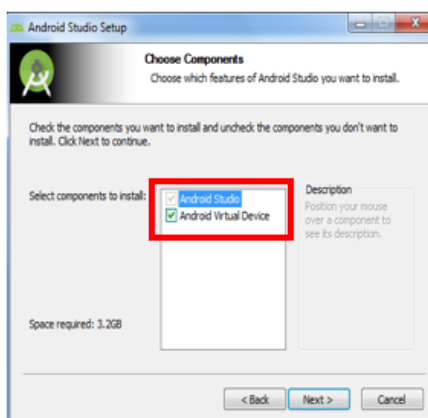
### Install Android Studio

1. Download and install [Android Studio](#).
2. Start Android Studio, and go through the 'Android Studio Setup Wizard'. This installs the latest Android SDK, Android SDK Command-line Tools, and Android SDK Build-Tools, which are required by Flutter when developing for Android.
3. Run `flutter doctor` to confirm that Flutter has located your installation of Android Studio. If Flutter cannot locate it, run `flutter config --android-studio-dir=<directory>` to set the directory that Android Studio is installed to.

**Step 2.a.1. Download Android Studio<sup>1</sup> :** (Step0.a.)

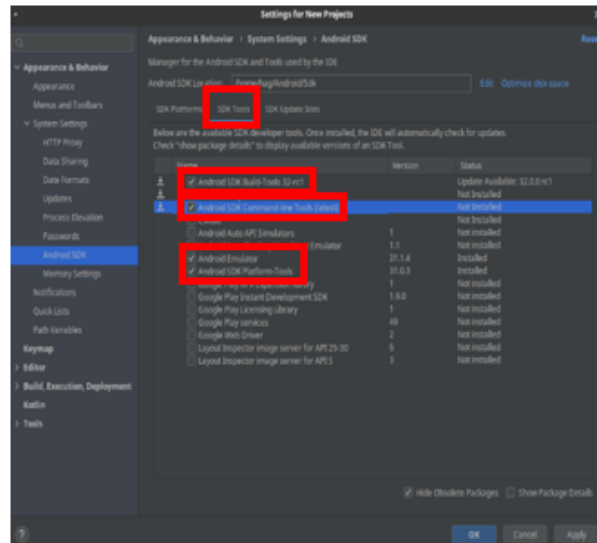
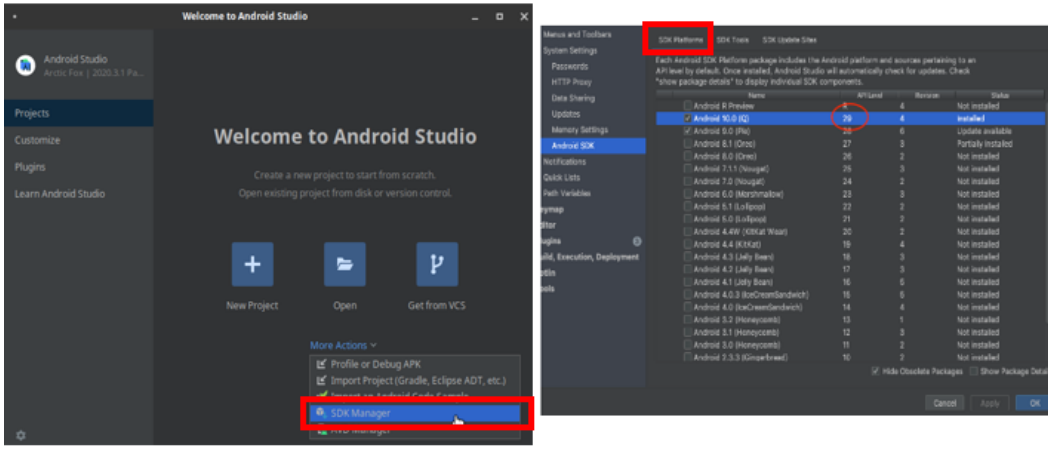


**Step 2.a.2. Install Android Studio :** (Step0.a.)



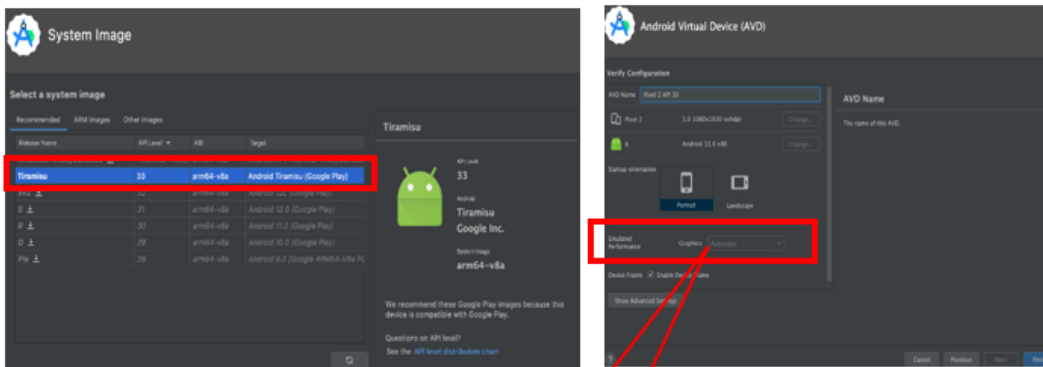
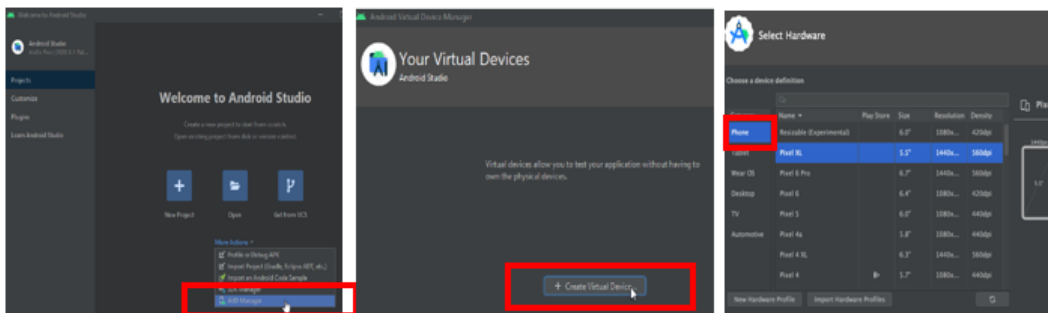
**Step 2.a.3. Start and setup Android Studio : SDK Manager**

<sup>1</sup> Google's official Android development environment.

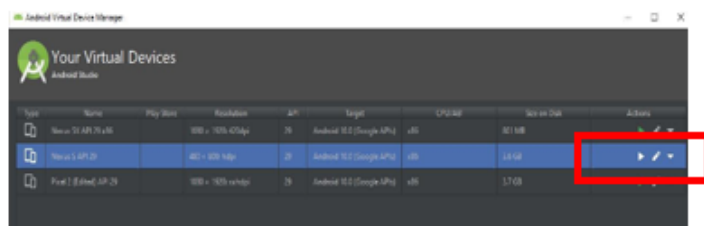


**Step 3.a.**

Setup the Virtual Device Manager to create an emulator.

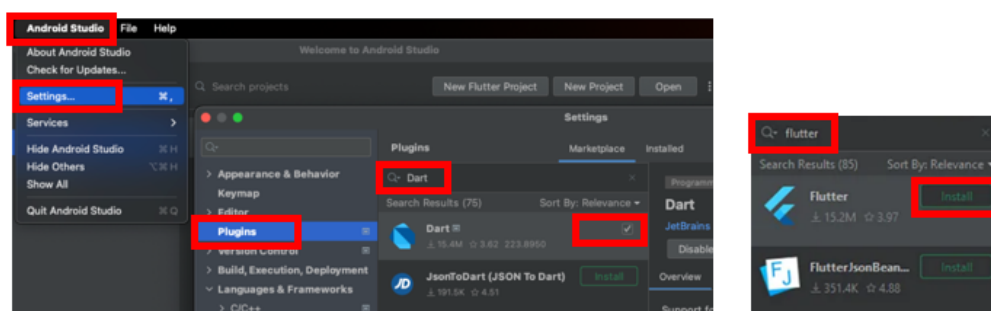
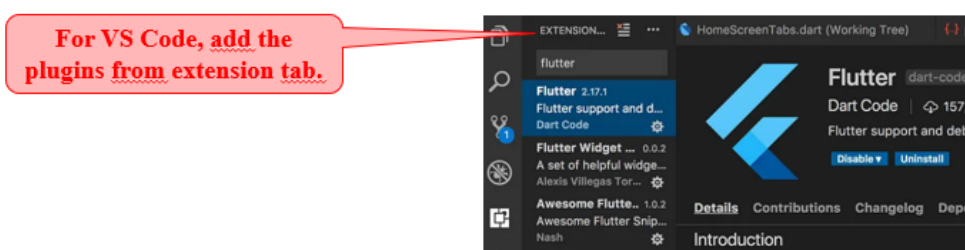


**Hardware**



### Step 0.b.

Add Flutter & Dart plugins (extensions).



### Installation videos :

- For more details on :
  - IDE installation of Android Studio and VS Code\* (including Flutter extension) and,
  - Running Flutter project on Android emulator (AVD)\*.
- Please get a look at the videos (cf. p.18) (cf. p.18) :\*
  - DemoFlutterInstallation.mp4.
  - DemoFlutterInstallation2.mp4.

### 3.3. Installing Flutter on macOS

For Flutter installation process on macOS system and running Flutter project on iOS simulator, please get a look at the video :

- DemoFlutterInstallation4macOS.mp4 (cf. p.18).\*

### 3.4. Running Flutter project on real device

#### Running on Android smartphone:

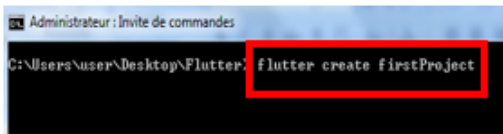
1. Activate developer options by clicking 7 times on the build number from « settings/About phone ... »
2. Activate USB debugging option on the phone from « settings/developer options ».
3. Connect physical device using USB cable.
4. Launch the app from the IDE\* (Android Studio, VS code\*).

## 4. Flutter project

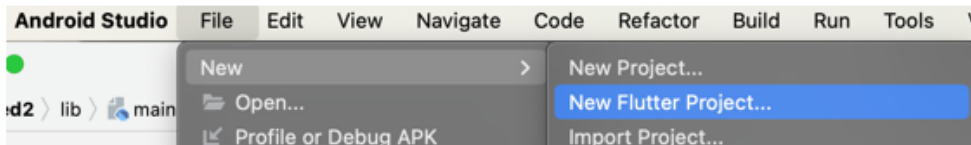
### 4.1. Flutter project creation

Four options exist for creating a new Flutter project.

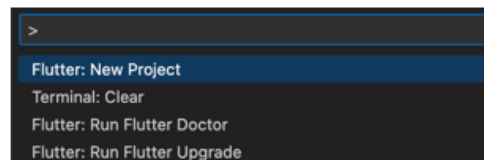
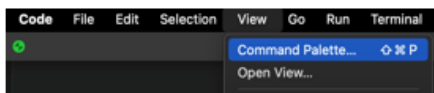
- From the windows prompt command :



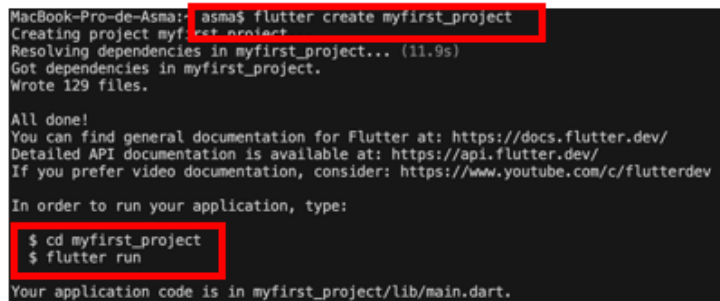
- From Android Studio :



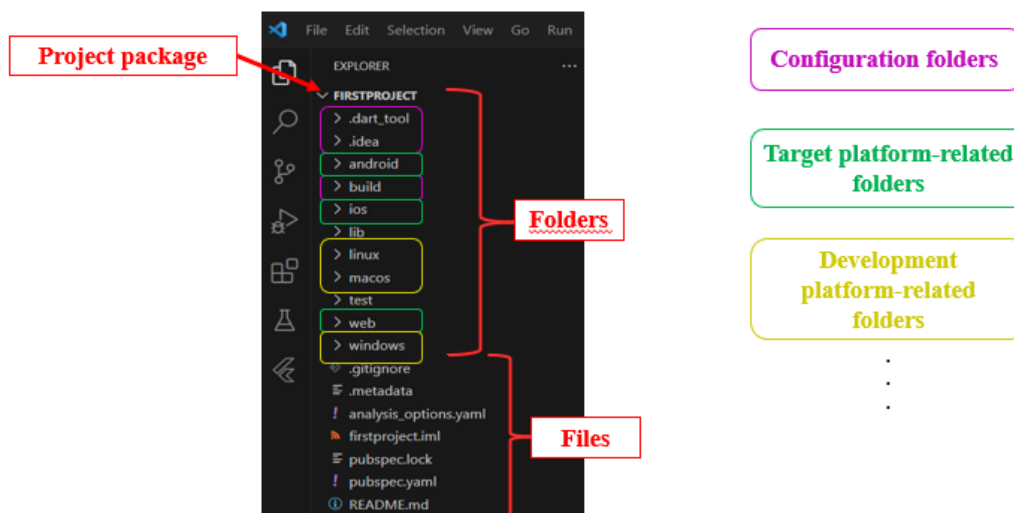
- From VS code\* command palette :



- From VS code\* Terminal :

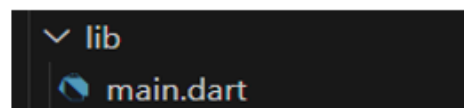


## 4.2. Flutter project structure



- **lib folder :**

- Contains Flutter app code (files end with .dart).
- Contains **main.dart** is the entry point of the Flutter app.



**Example:** basic Flutter app (Hello World!)

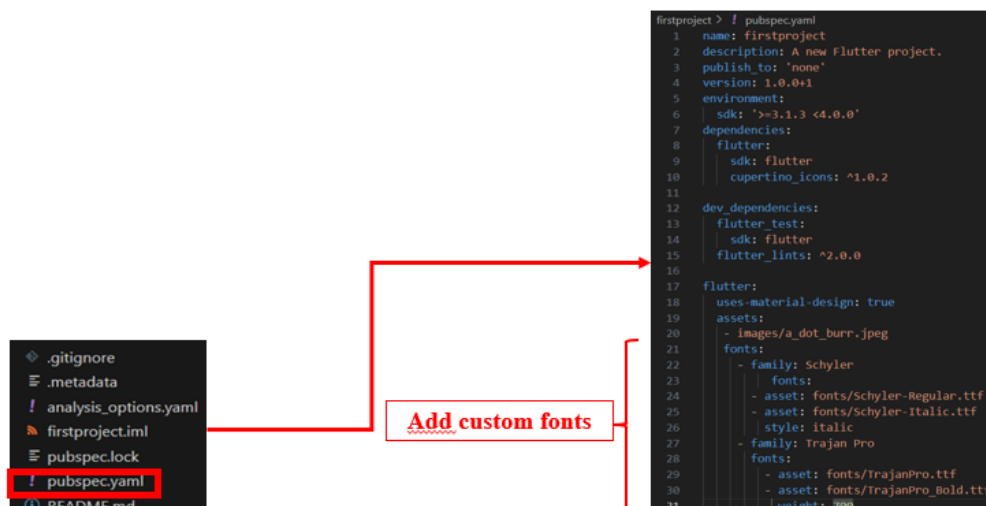
```

1 import 'package:flutter/widgets.dart'; // basic set of widgets
2
3 // When Dart is running the application, it calls to the main() function
4
5 main() => runApp( // The function runApp() starts the Flutter application
6
7 Text ( // this is a widget, it renders the given text
8   'Hello, World!!!', // the first argument is a text that needs to be rendered
9   textDirection: TextDirection.ltr, // here we set the direction "left to right"
10 ),
11 );
12

```

- **pubspec.yaml file :**

- Used to add third party packages to the project (e.g. include images into project).
- Specifies project descriptions, constraints, dependencies, version, assets, ...



## 5. References

- To learn more about Flutter and Flutter installation, please feel free to visit : \*,\* and \*.

## 6. Exercise

### Q1

---

What is the main advantage of using Flutter for app development?

- Uses multiple programming languages.
- Creates applications for iOS.
- Provides a native experience on different platforms with a single codebase. X
- Is free and open source.

### Q2

---

Which platforms are supported by Flutter ?

- Android
- iOS
- Web
- Desktop/Windows
- Desktop/Linux
- Symbian
- Desktop/MacOS
- BlackBerry

### Q3

---

Is it possible to develop iOS apps on a Windows machine ?

- Yes
- No

### Q4

---

Which methods can be used to create a new Flutter project?

- Using the flutter create command.
- Using Visual Studio's project creation wizard.
- Using the Android Studio New Flutter Project wizard. X
- Using the Xcode project creation wizard.



**Q5**

---

In a Flutter project, where are the ".dart" files placed?

- lib folder
- build folder
- mobile folder
- Pubspec folder.

## Ressources annexes

---



videoInstall1

[cf. videoInstall1]

videoInstall2

[cf. videoInstall2]

videoInstall3

[cf. videoInstall3]

# Glossaire

---



## **SDK (Software Development Kit)**

is a collection of building blocks (i.e. software tools, libraries, documentation, code samples, processes, and guides) used to develop efficiently software applications for specific platforms or frameworks.

# Abréviations

---



**AVD** : Android Virtual Device

**IDE** : Integrated Development Environment

**VSCode** : Visual Studio Code

# Références

---



*VLC*      Read videos with VLC media player.

# Bibliographie

---



Flutter Complete Reference, Alberto Miola, Packt Publishing, 2021 (<https://archive.org/details/flutter-complete-reference-alberto-miola/page/7/mode/2up>).

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# Webographie

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<https://docs.flutter.dev/get-started/install>

<https://medium.com/@logeshgcp/understanding-the-flutter-project-structure-84de4ec3ce5f>

<https://flutter.dev/>