Mobile Apps Development

1.0

Table des matières

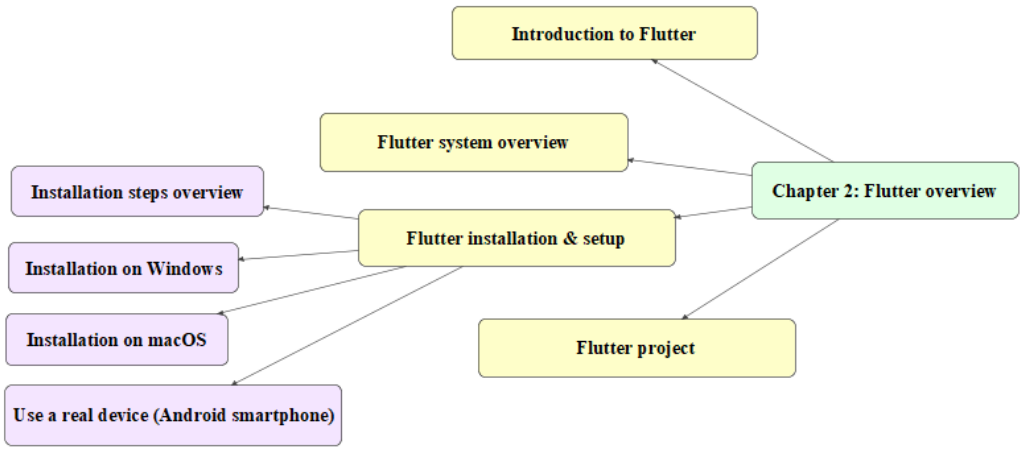
Chapter 2 : Flutter overview

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 Congrees 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).

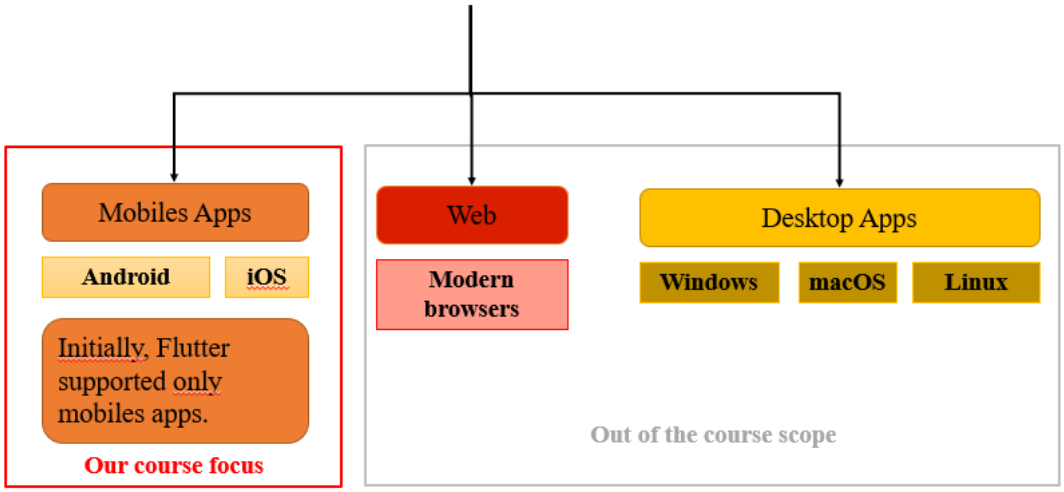
What is Flutter good for ? *Définition*

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

Features of Flutter :

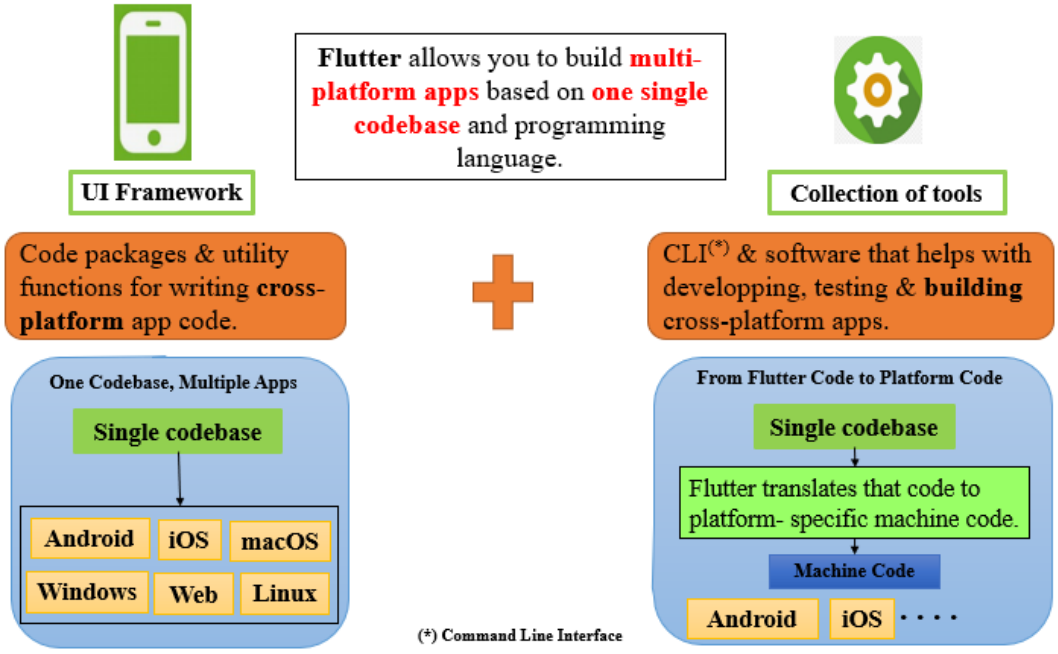
- Cross-platform development.
- Fast and low-cost development.
- Attractive and customizable UI.
- High performance (native) and awsome apps.
- Large community .
- Open-source and free.
- Hot reload (quick & ease app refresh).

Target platforms supported by Flutter :



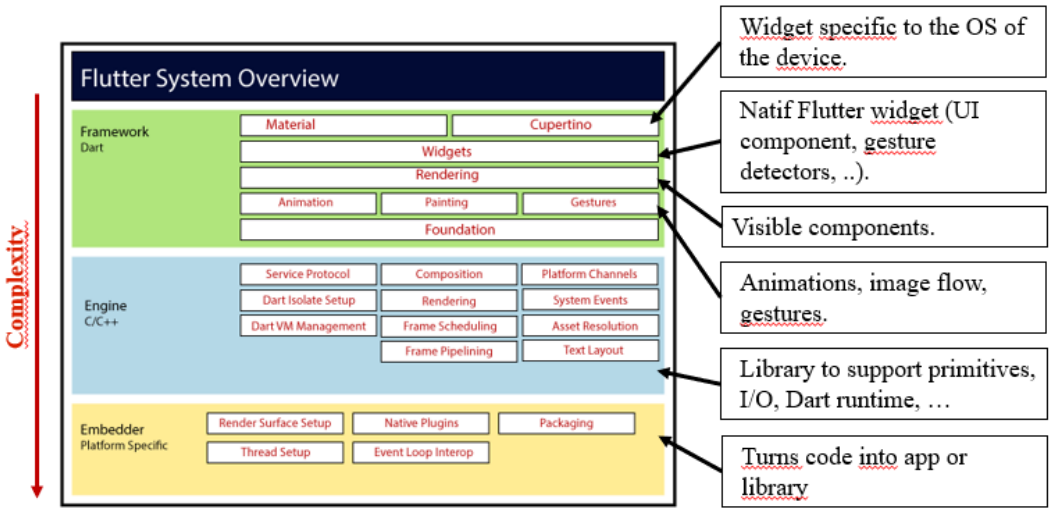
2. Flutter system overview

Concrelety, what is axactly Flutter ?

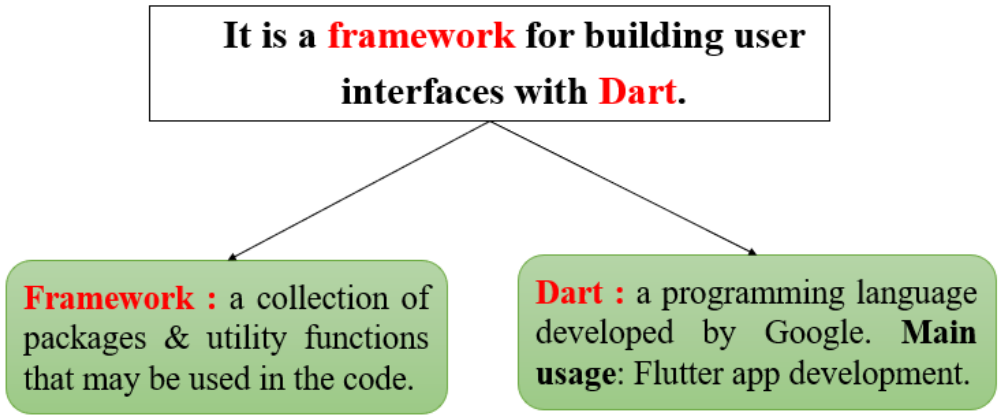


Architecture (Layers) of Flutter:

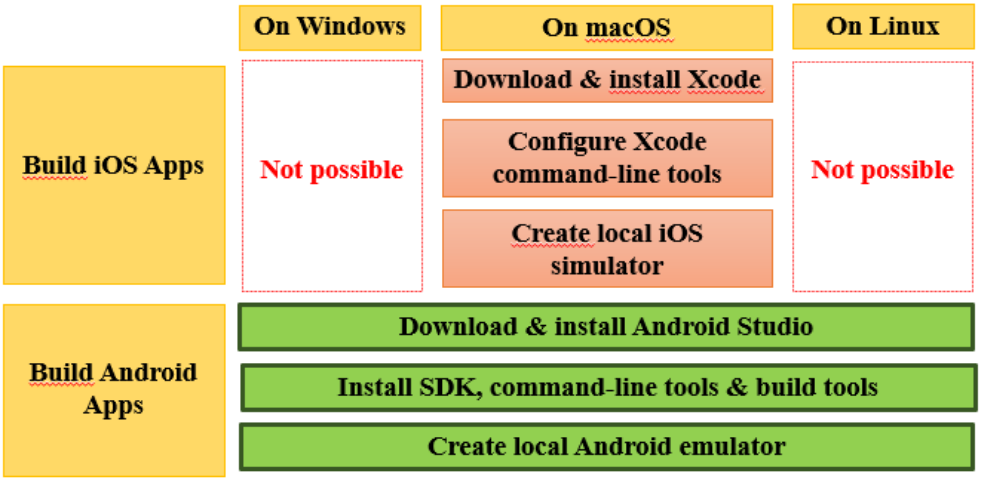
Architecture of Flutter is categories with decreasing hierarchical level of complexity.



Flutter is NOT a programming language !



3. Flutter installation & setup



- 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*

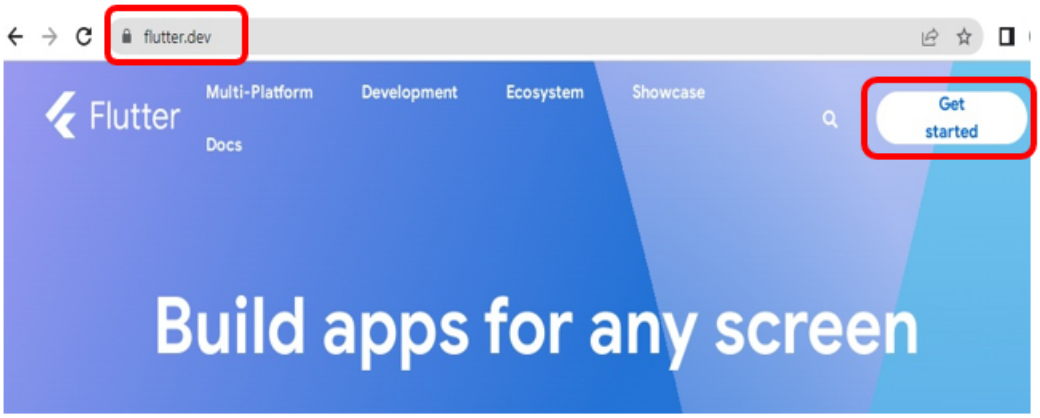
  a) **Android : preview Flutter apps on Android Virtual Devices.**

  b) **iOS : preview Flutter apps on virtual iOS devices.**

3.2. Installing Flutter on Windows

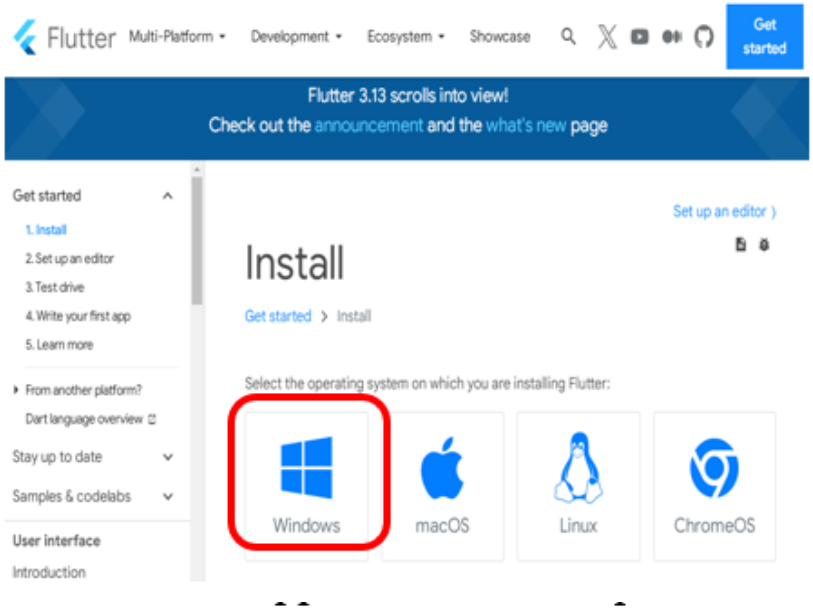
Step 1.a.1.

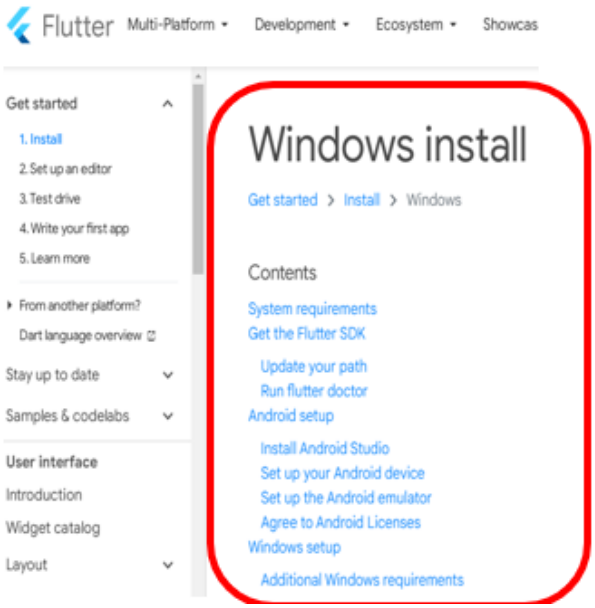
Visit the official Flutter website « ***Flutter.dev*** » then click on ***Get started*** button :



Step 1.a.2.

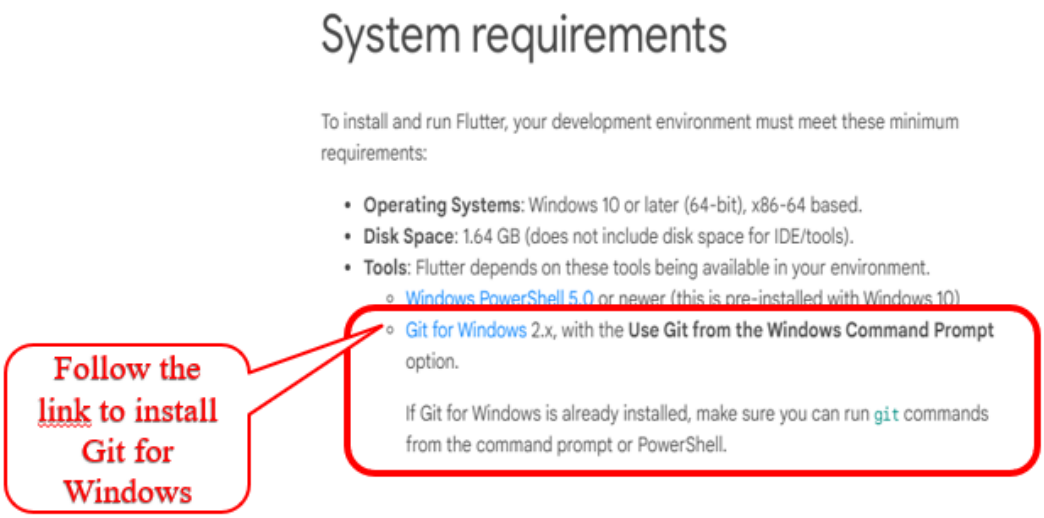
Picking ***Windows*** as an option of the platform on which mobile apps will be developed :

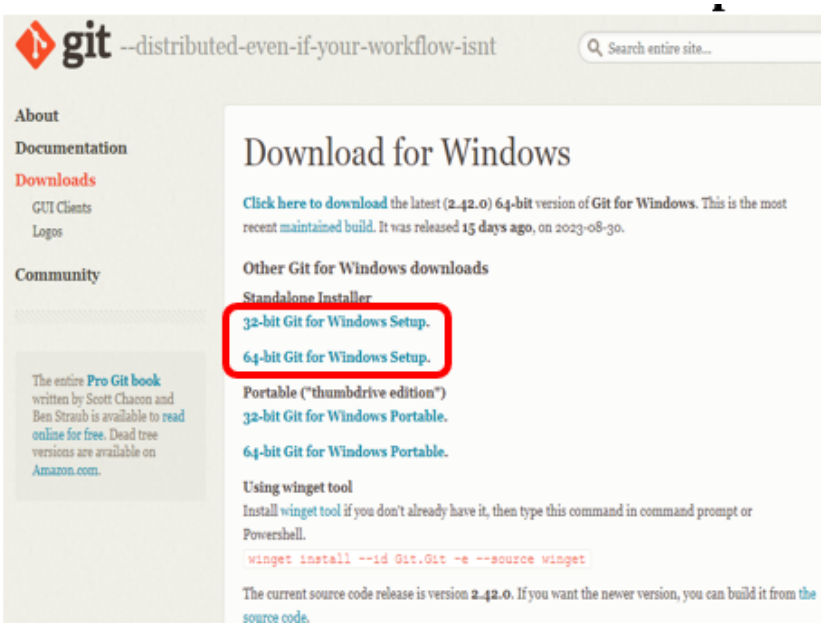


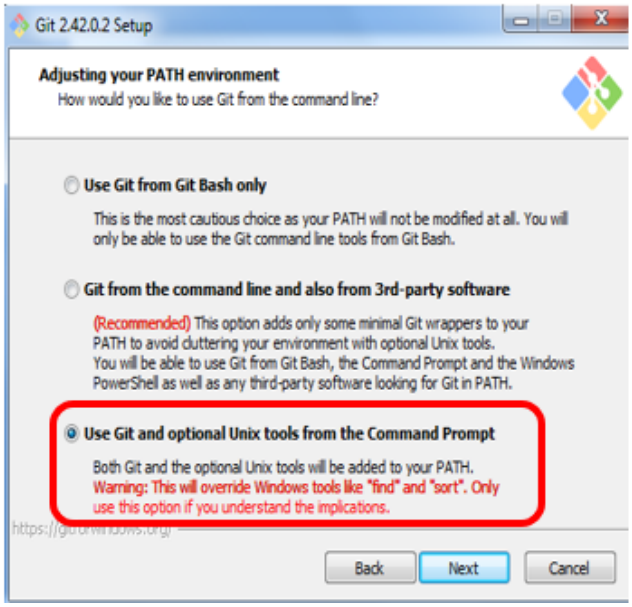


Step 1.a.3.

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



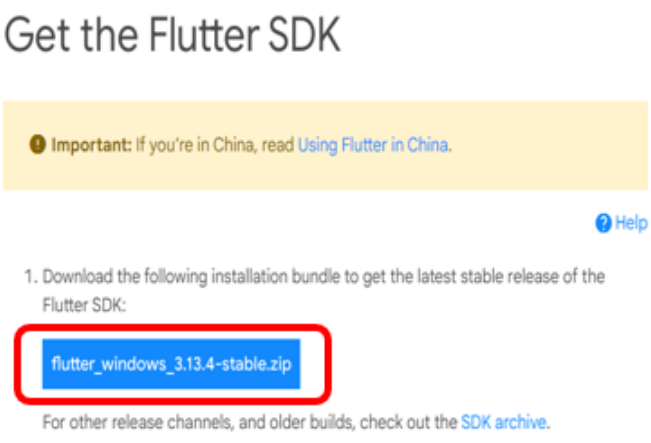




Step 1.b.1.

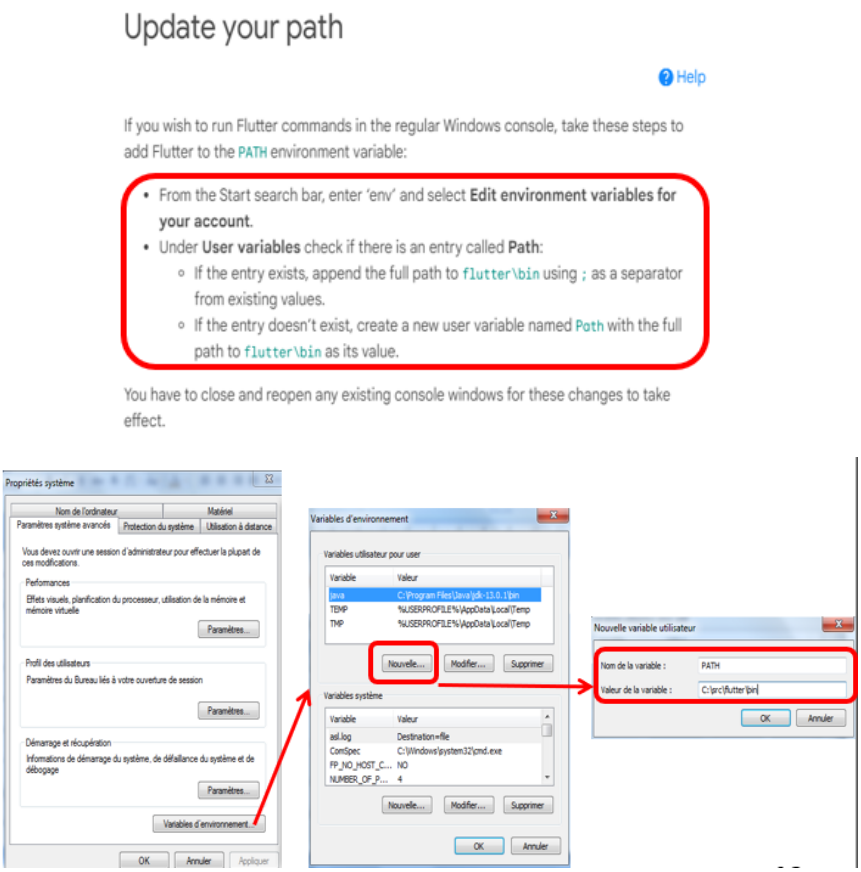
Installing **Flutter** itself (from the Flutter website):

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



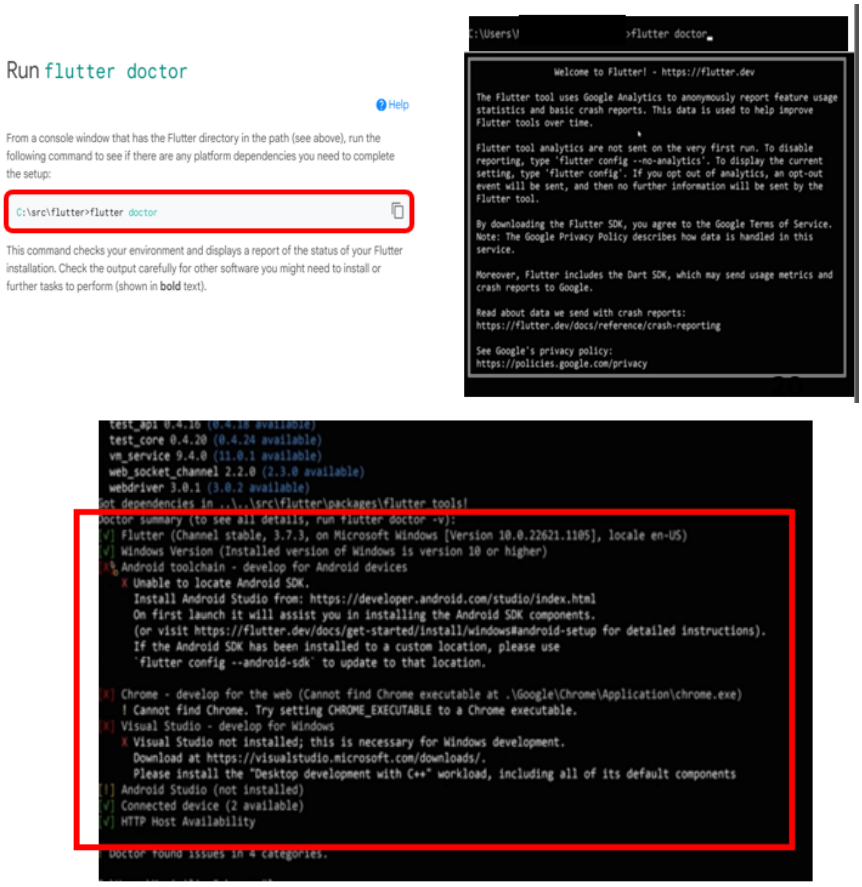
Step 1.b.2.

Update the path : set environment variable.



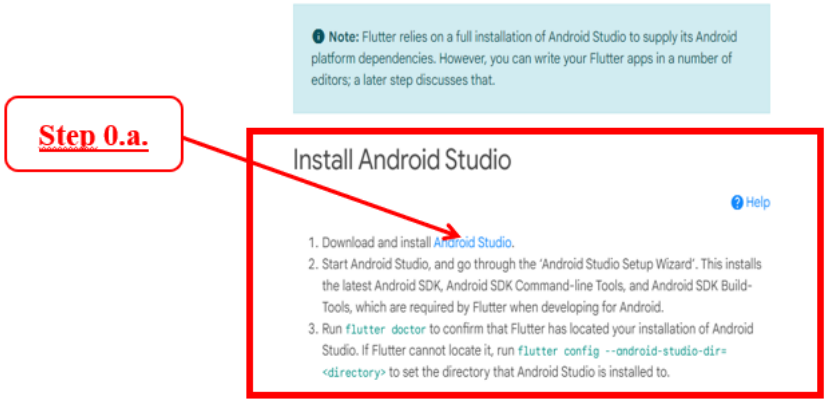
Step 1.b.3.

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

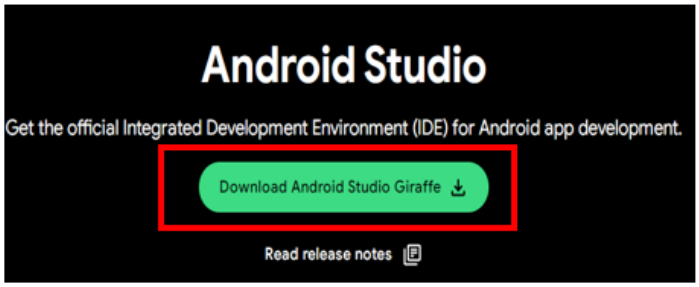


Step 2.a.

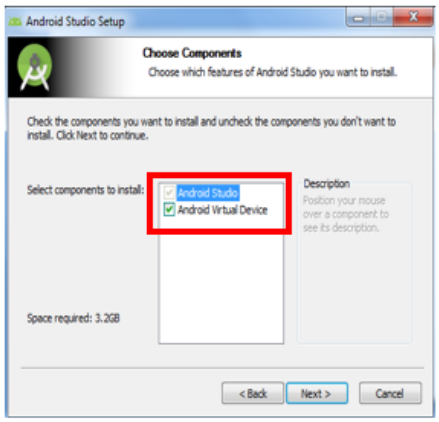
Prepare the system for Android app development :



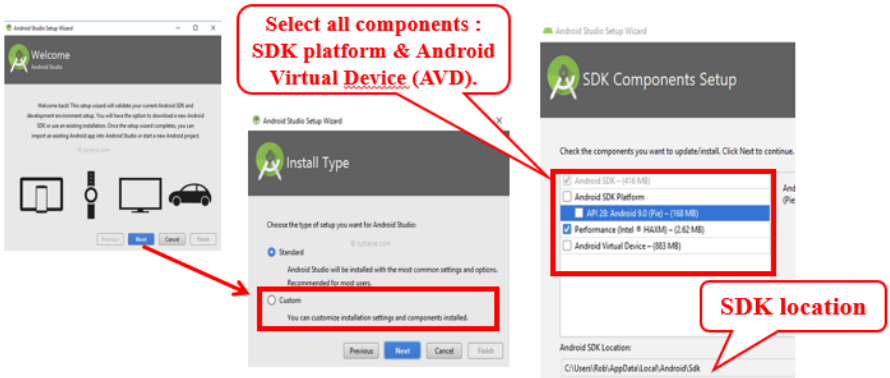
Step 2.a.1. **Download Android Studio[1] :** (Step0.a.)



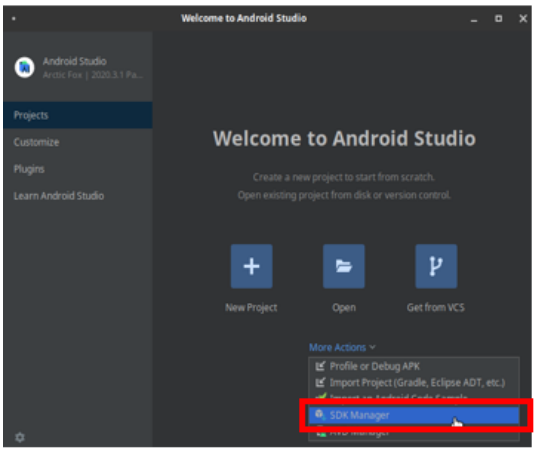
Step 2.a.2. **Install Android Studio :** (Step0.a.)

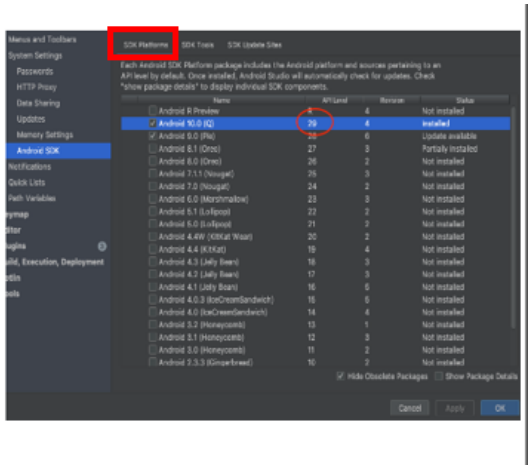


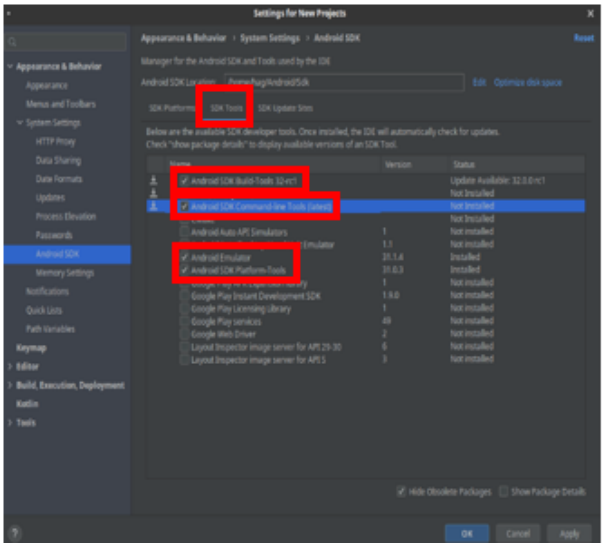
Step 2.a.3. **Start and setup Android Studio : SDK Manager**



[1] Google's official Android development environment.

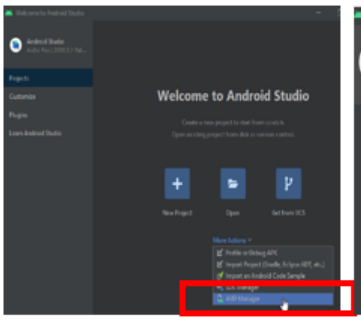


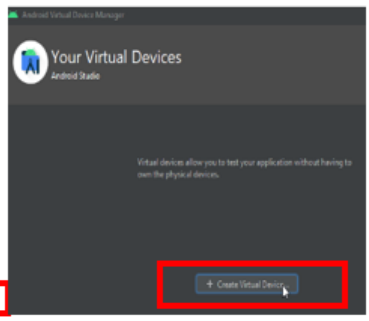


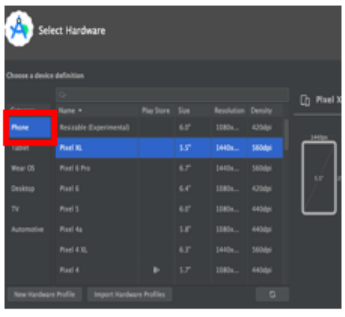


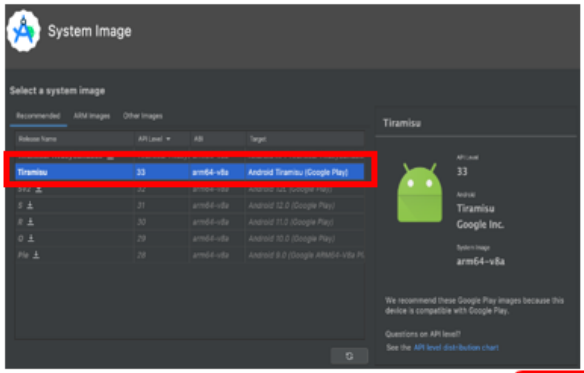
Step 3.a.

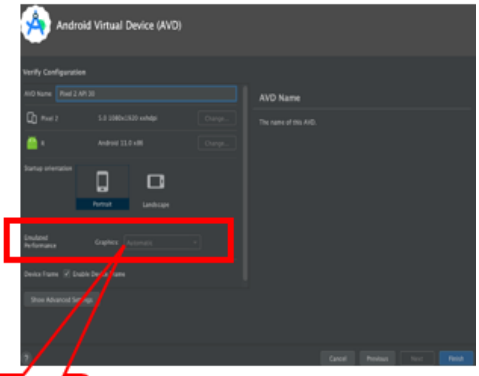
Setup the Virtual Device Manager to create an emulator.

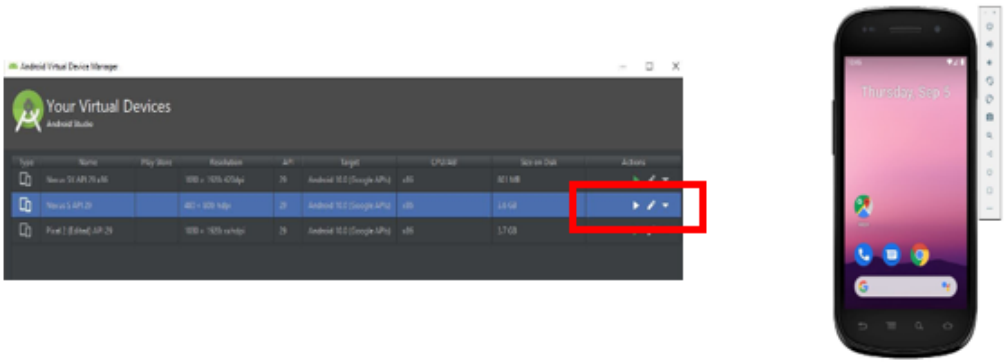






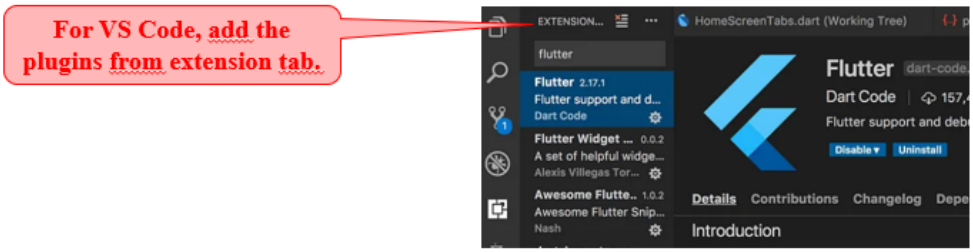


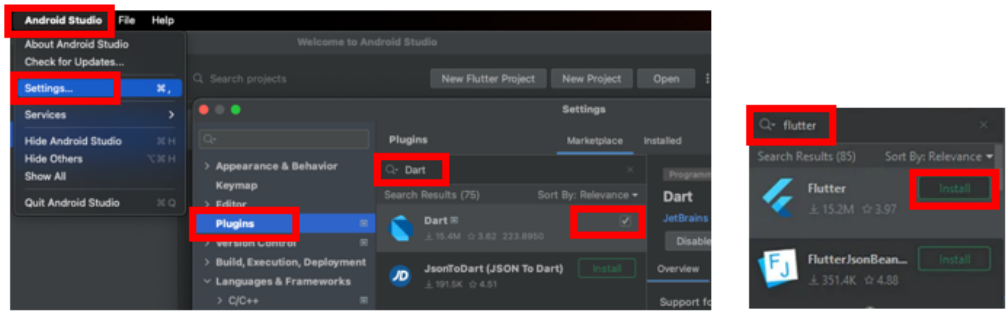




Step 0.b.

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*) .

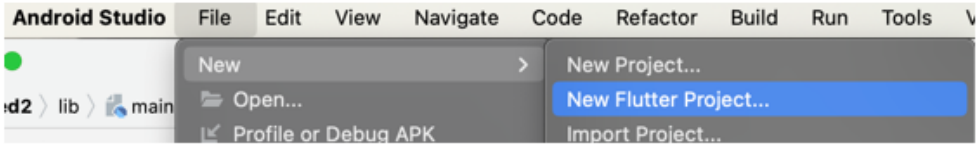
4. Flutter project

4.1. Flutter project creation

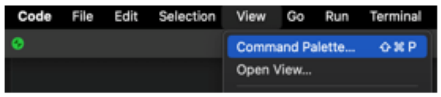
Four options exist for creating a new Flutter project.

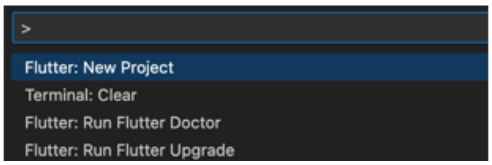
- From the windows prompt command :

- From Android Studio :

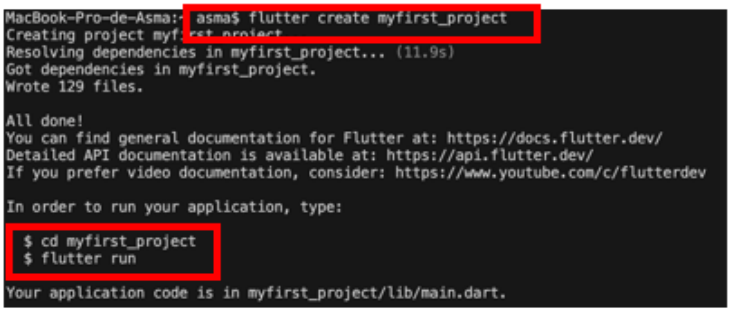


- From VS code* command palette :

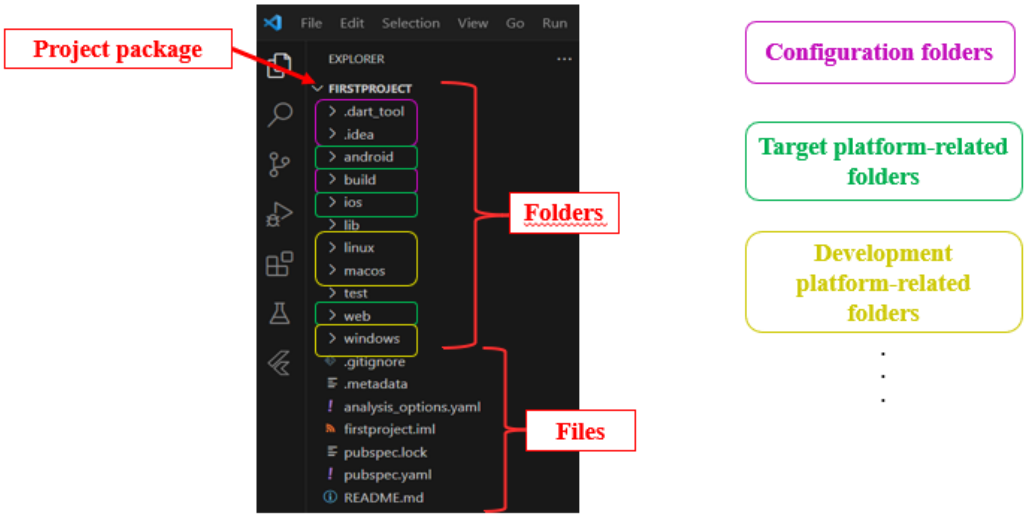




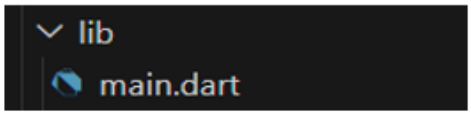
- From VS code* Terminal :



4.2. Flutter project structure



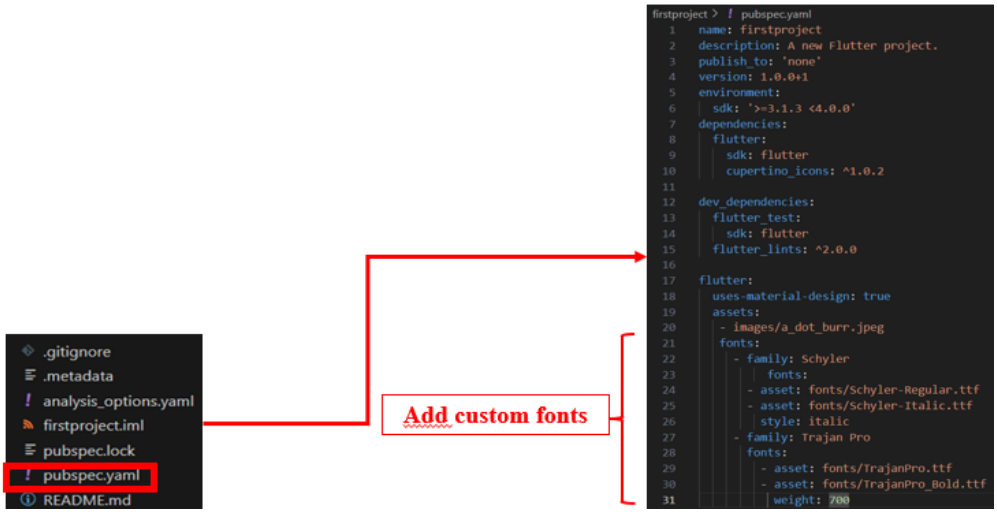
- **lib folder :**
  - Contains Flutter app code (files end with .dart).
  - Contains ***main.dart*** is the entry point of the Flutter app.



Example: basic Flutter app (Hello World!)

```dart
import 'package:flutter/widgets.dart'; // basic set of widgets

// When Dart is running the application, it calls to the main() function

 main() => runApp( // The function runApp() starts the Flutter application

Text ( // this is a widget, it renders the given text
    'Hello, World!!!', // the first argument is a text that needs to be rendered
    textDirection: TextDirection.ltr, // here we set the direction "left to right"
),
);

```

- **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. Exercice

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).

Mike Katz et al. Flutter Apprentice Learn to Build Cross-Platform Apps, 2nd Edition, 2021.

Thomas Bailey , Alessandro Biessek, et al. Flutter for Beginners: Cross-platform mobile development from Hello, World! to app release with Flutter 3.10+ and Dart 3.x, Kindle, 2023.

Sanjib Sinha. Beginning Flutter with Dart: A Beginner to Pro. Learn how to build Advanced Flutter Apps (Flutter, Dart and Algorithm Book 1), Kindle Edition, 2021.

Mark Clow. Learn Google Flutter Fast: 65 Example Apps, Paperback, 2019.

Dieter Meiller. Modern App Development with Dart and Flutter 2. 2021

Webographie

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

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

https://flutter.dev/