Name : Arjun Singh Silwal
Division : D15B
Roll no. : 55

EXPERIMENT - 1

Aim: Installation and Configuration of Flutter Environment.

Theory: What is Flutter?

Flutter is an open-source UI software development framework created by Google. It is used to build natively compiled applications for mobile (Android, iOS), web, desktop (Windows, macOS, Linux), and embedded devices from a single codebase.

Key Features of Flutter:

1. **Single Codebase** – Write once, run anywhere (iOS, Android, Web, Desktop).
2. **Dart Programming Language** – Uses **Dart**, a modern, object-oriented language optimized for UI.
3. **Hot Reload** – See changes instantly without restarting the app.
4. **Widget-Based UI** – Everything in Flutter is a widget, making UI development highly customizable.
5. **High Performance** – Uses Skia graphics engine to render UI at 60 or 120 FPS.
6. **Cross-Platform Development** – Same code works across multiple devices and OS.
7. **Flexible UI Components** – Pre-built **Material Design** (Android) & **Cupertino** (iOS) widgets.

Flutter Architecture:

Flutter is structured in three layers:

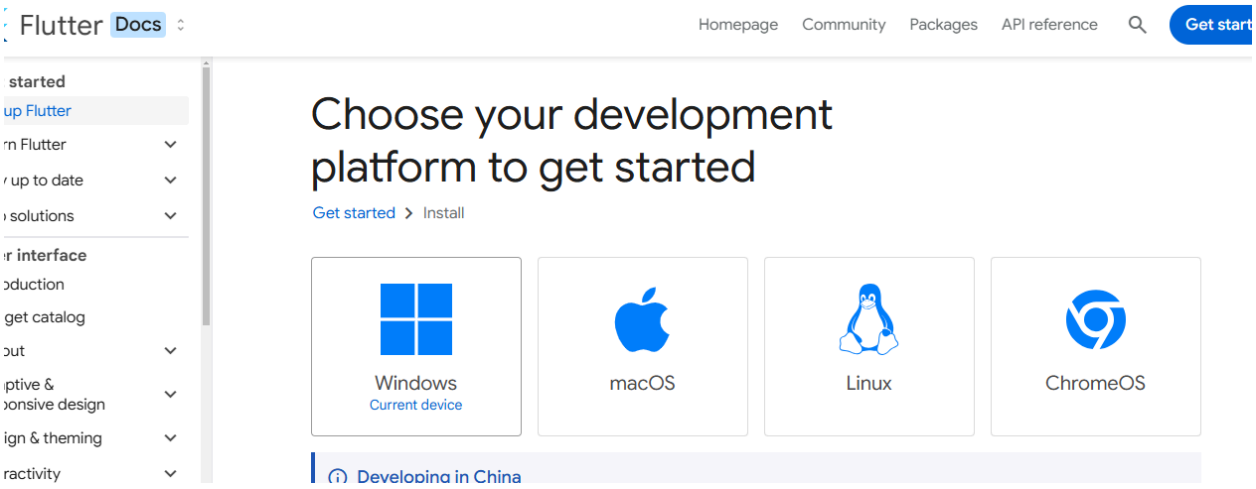
1. **Framework Layer** – Built using **Dart**, consists of UI components (Widgets, Animations, Gestures).
2. **Engine Layer** – Uses C++ and **Skia** for high-performance rendering.
3. **Embedder Layer** – Bridges Flutter with platform-specific APIs (iOS, Android, Web, etc.).

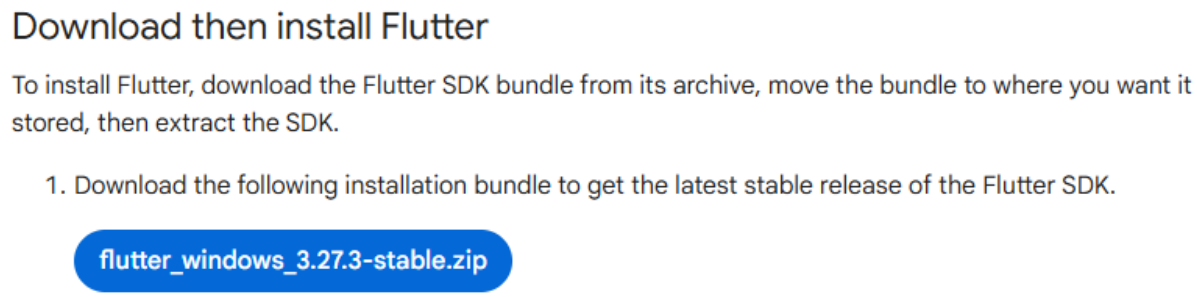
Why Use Flutter?

1) Fast development with Hot Reload.
2) Native-like performance (no JavaScript bridge).
3) Beautiful UI with rich animations.
4) Strong community & Google support.
5) Supports Web & Desktop apps.

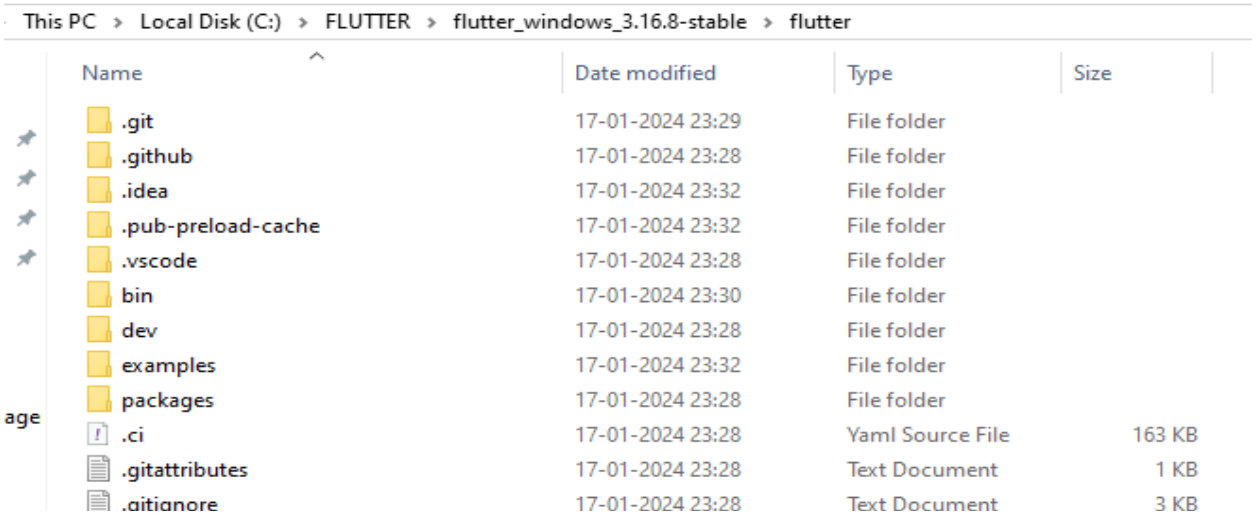
Install the Flutter SDK

Step 1: Download the installation bundle of the Flutter Software Development Kit for windows. To download Flutter SDK, Go to its official website https://docs.flutter.dev/get-started/install , you will get the following screen.

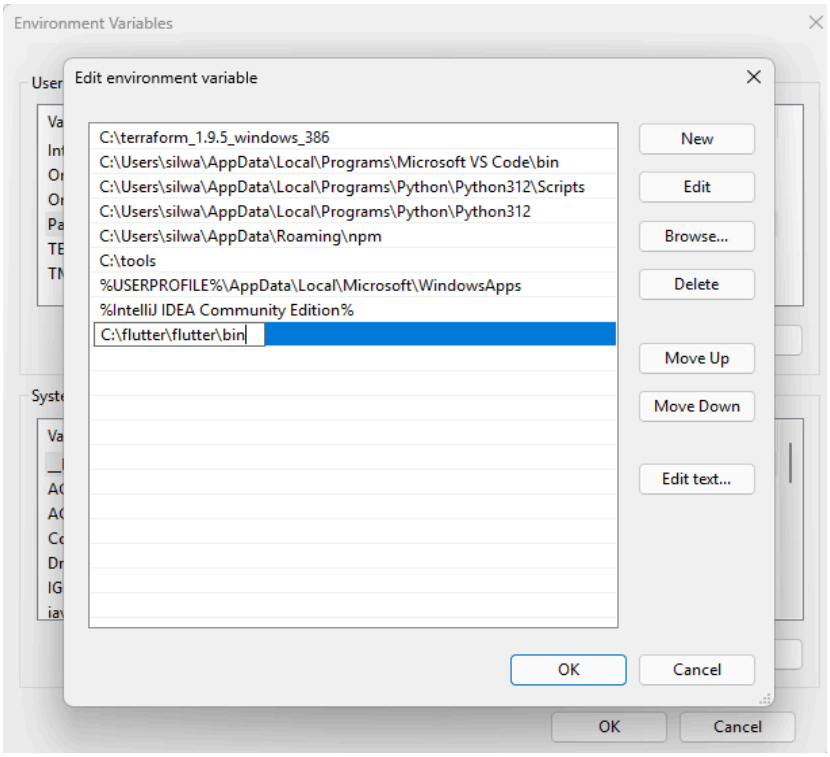




Step 2 : When your download is complete, extract the zip file and place it in the desired installation folder or location, for example, C: /Flutter.



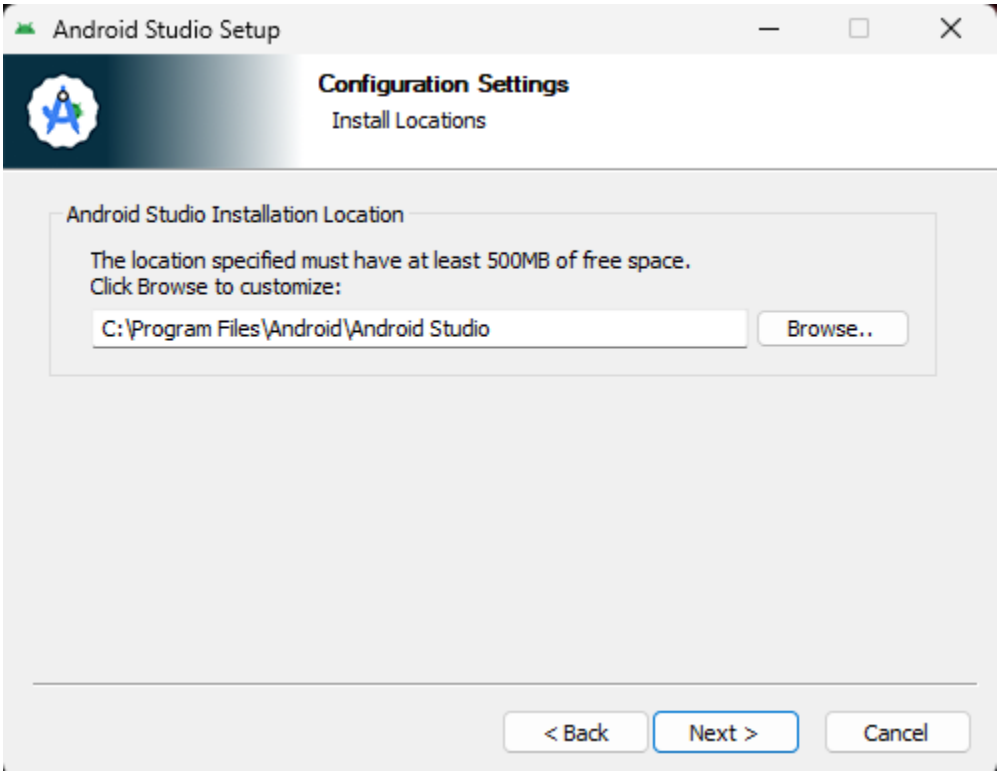
Step 3: To run the Flutter command in regular windows console, you need to update the system path to include the flutter bin directory.

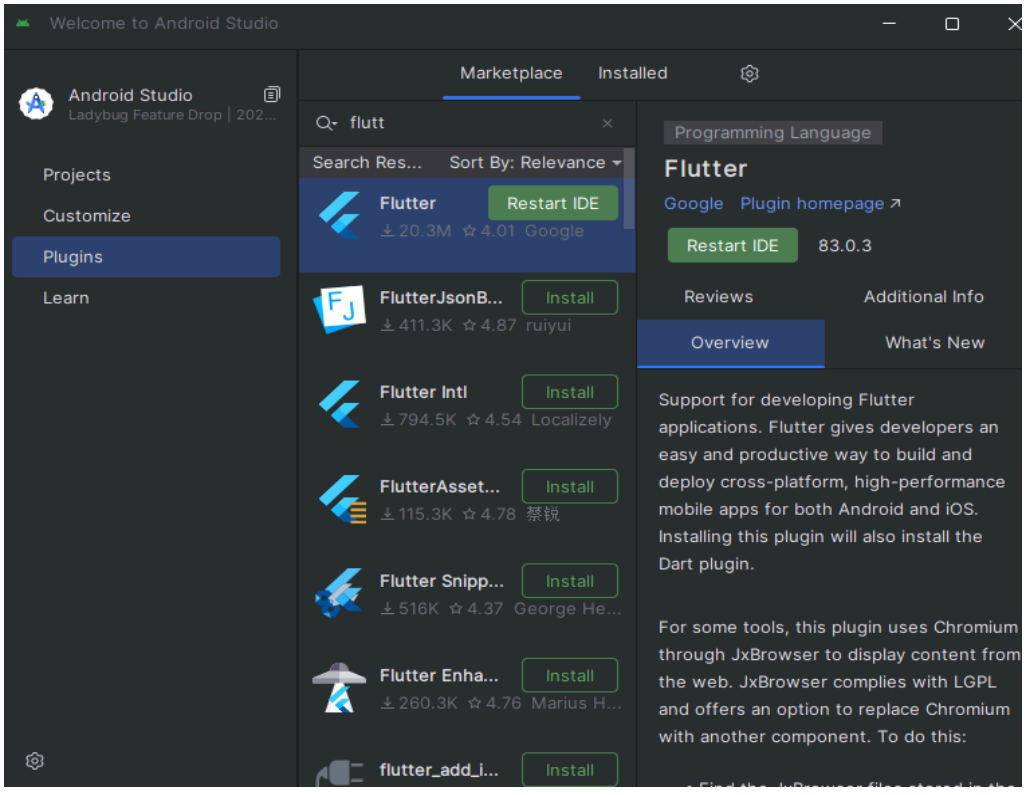


Step 4: Now, run the $ flutter command in the command prompt.

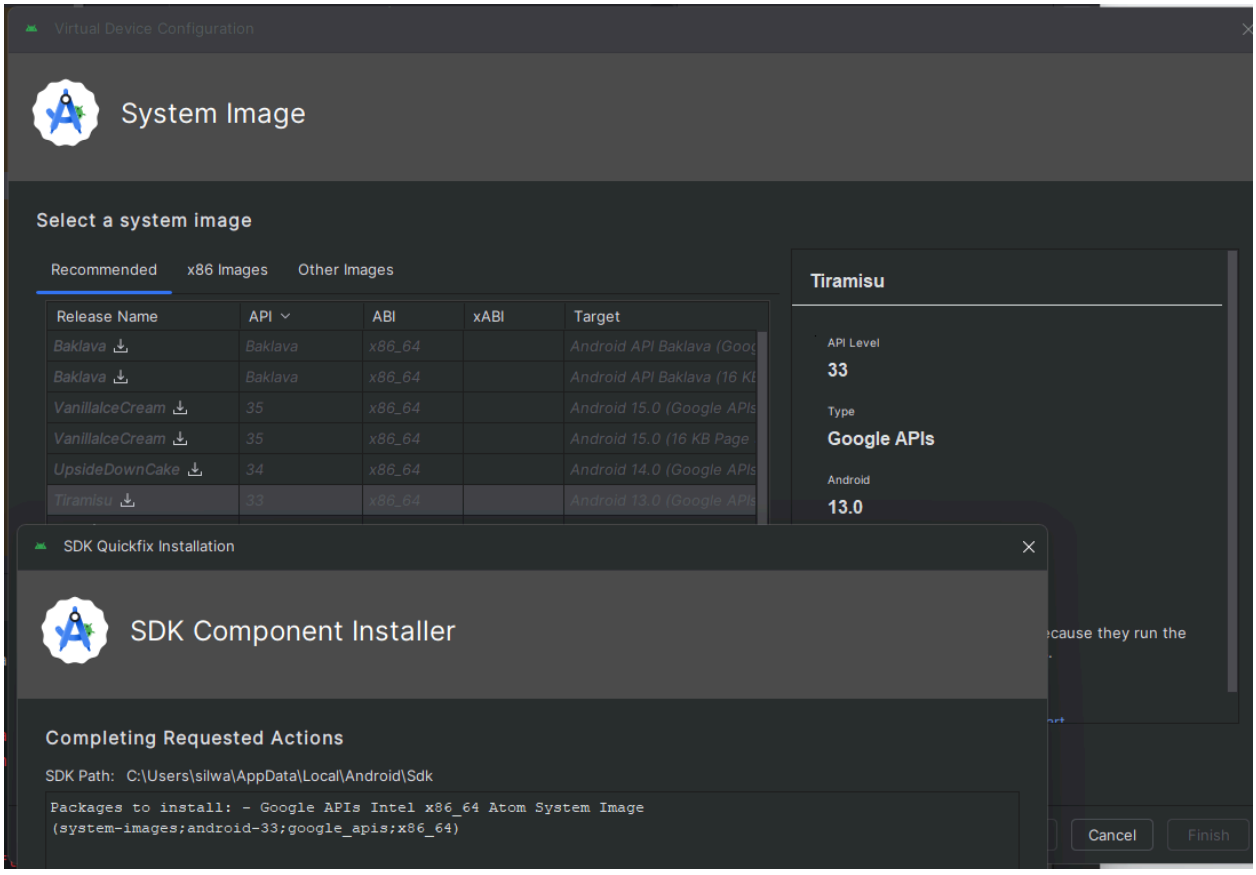
```
Microsoft Windows [Version 10.0.26100.2894]
(c) Microsoft Corporation. All rights reserved.

C:\Users\silwa>flutter
Manage your Flutter app development.

Common commands:

  flutter create <output directory>
    Create a new Flutter project in the specified directory.

  flutter run [options]
    Run your Flutter application on an attached device or in an emulator.

Usage: flutter <command> [arguments]

Global options:
-h, --help                  Print this usage information.
-v, --verbose               Noisy logging, including all shell commands executed.
                            If used with "--help", shows hidden options. If used with "flutter do
                            diagnostic information. (Use "-vv" to force verbose logging in those
-d, --device-id             Target device id or name (prefixes allowed).
    --version               Reports the version of this tool.
    --enable-analytics      Enable telemetry reporting each time a flutter or dart command runs.
    --disable-analytics     Disable telemetry reporting each time a flutter or dart command runs,
                            re-enabled.
    --suppress-analytics    Suppress analytics reporting for the current CLI invocation.

Available commands:
```

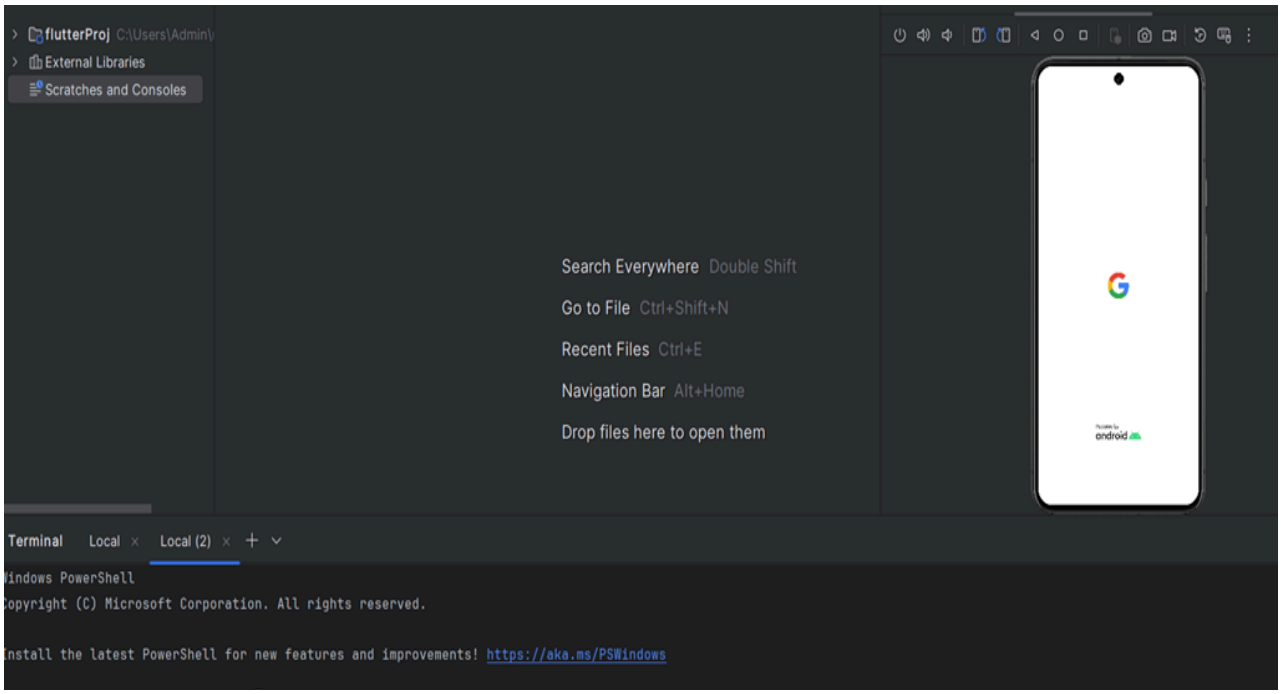
Step 5: Install the Android SDK. If the flutter doctor command does not find the Android SDK tool in your system, then you need first to install the Android Studio IDE.





Step 6: Next, you need to set up an Android emulator. It is responsible for running and testing the Flutter application.





Step 7 : Restart Android studio

Errors during installation :
Insufficient disk space
Incorrect bin folder path while editing environment variables

Conclusion: In this experiment, we set up the Flutter environment on a Windows system. We downloaded and configured the Flutter SDK, set the system path, and verified the installation with the flutter doctor command. Android Studio was installed, the Android SDK configured, and an emulator set up for testing. We also integrated the Flutter and Dart plugins into Android Studio. .