Experiment No.1
MAD & PWA LAB

- **Aim:** Installation and Configuration of Flutter Environment.

- **Theory:**

Flutter, an open-source framework backed by Google, has evolved since its 2018 launch to become a versatile tool utilized by frontend and full-stack developers. Its primary purpose is crafting the user interface (UI) of applications seamlessly across various platforms, encompassing iOS, Android, web, Windows, MacOS, and Linux, all within a singular codebase.

Originally centered on mobile app development, Flutter has expanded its support to cover the six aforementioned platforms. The framework streamlines the creation of cohesive and visually appealing UIs, fostering consistency throughout diverse devices. In comparing Flutter to native development, we can explore its distinct features that set it apart as a cross-platform development framework.

→ **Merits Of Using Flutter –**

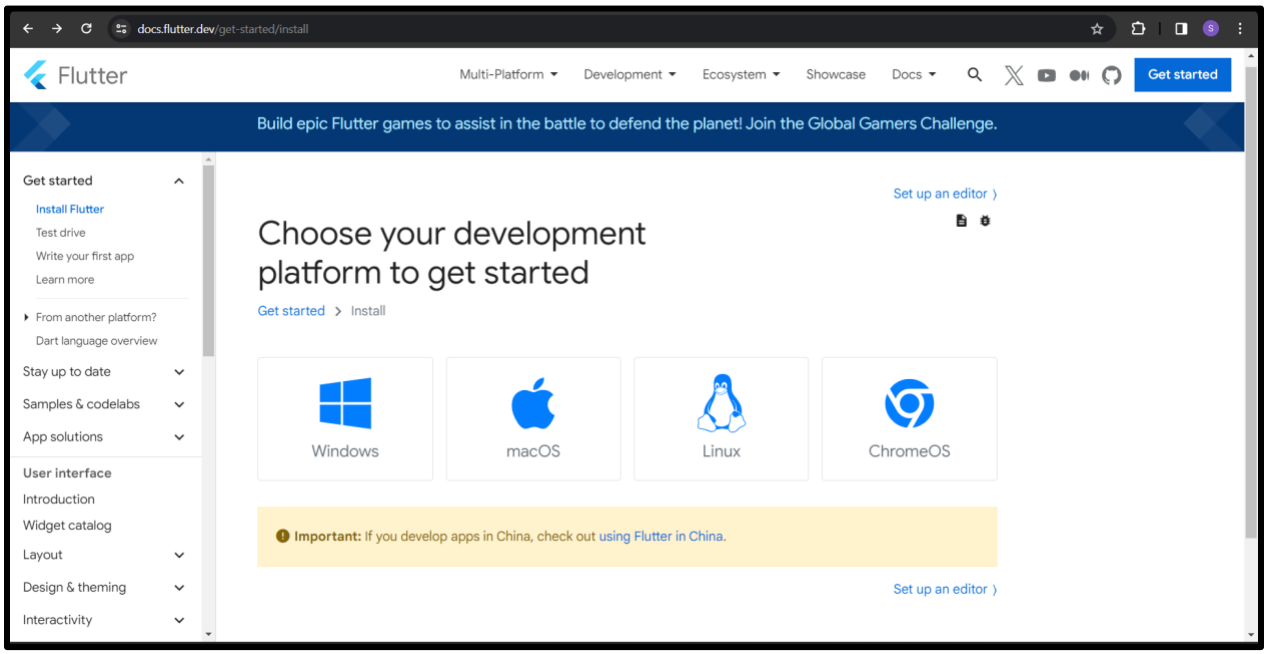
1. Efficient Development Process: Flutter streamlines development with a unified codebase, leveraging features like hot restart and hot reload for real-time updates, saving time and resources compared to alternatives like React Native and Xamarin.

2. Widgets and Compatibility: Flutter's widget-based structure, being platform-independent, minimizes compatibility issues across different platforms and OS versions, providing flexibility through customizable widgets.

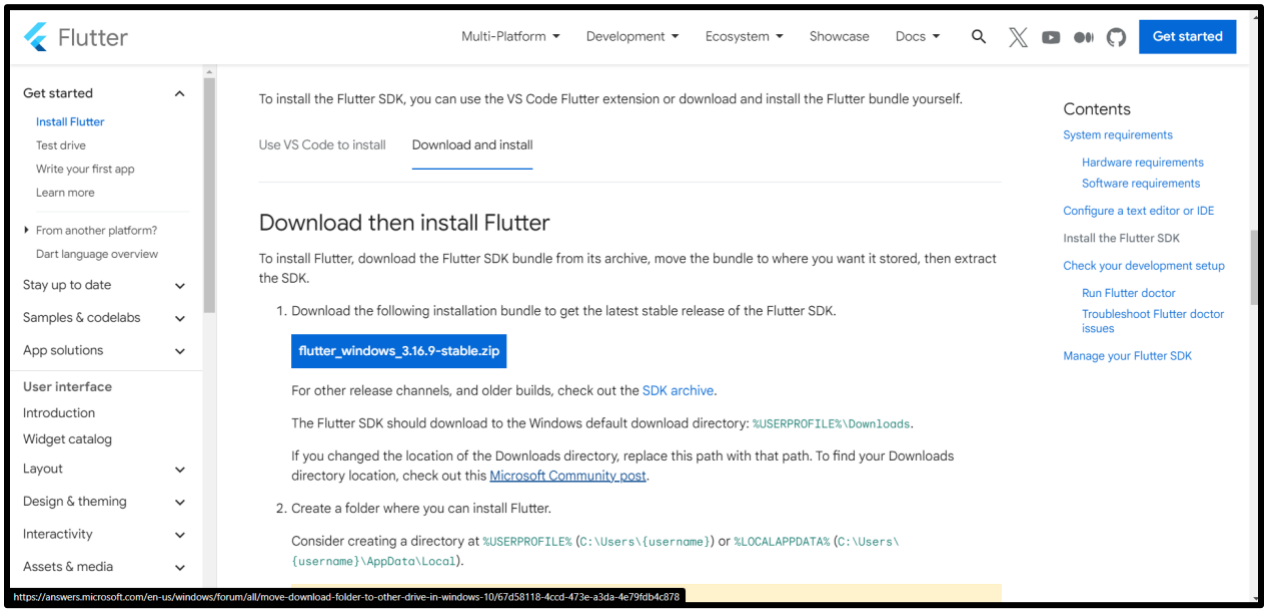
3. High Performance: Flutter's performance matches native mobile apps, avoiding the use of a bridge for communication, resulting in faster startups, smooth animations, and fewer performance problems compared to other cross-platform technologies.

- **Install the Flutter SDK:**

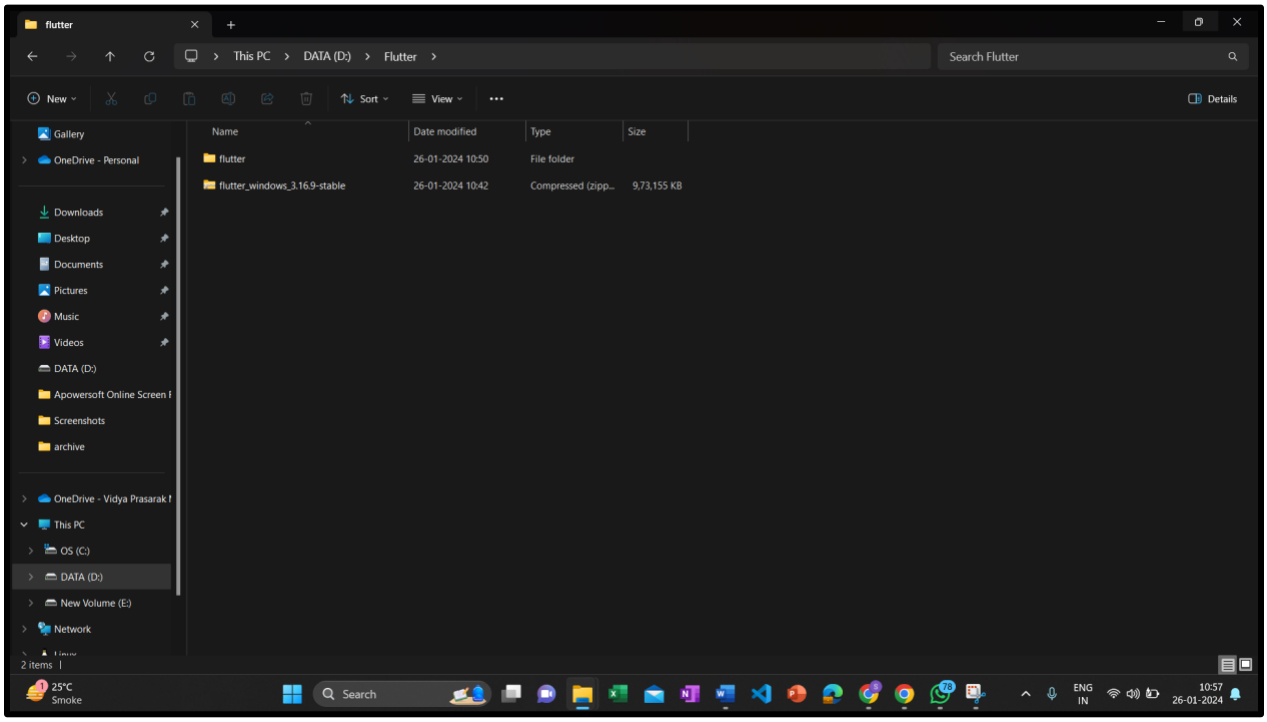
Step 1: Navigate to the official Flutter Software Development Kit website by visiting https://docs.flutter.dev/get-started/install to obtain the installation bundle tailored for Windows. Upon reaching the site, you will be greeted with the following interface.



Step 2: To acquire the latest Flutter SDK, click on the Windows icon to reveal the download link for the SDK on the website.

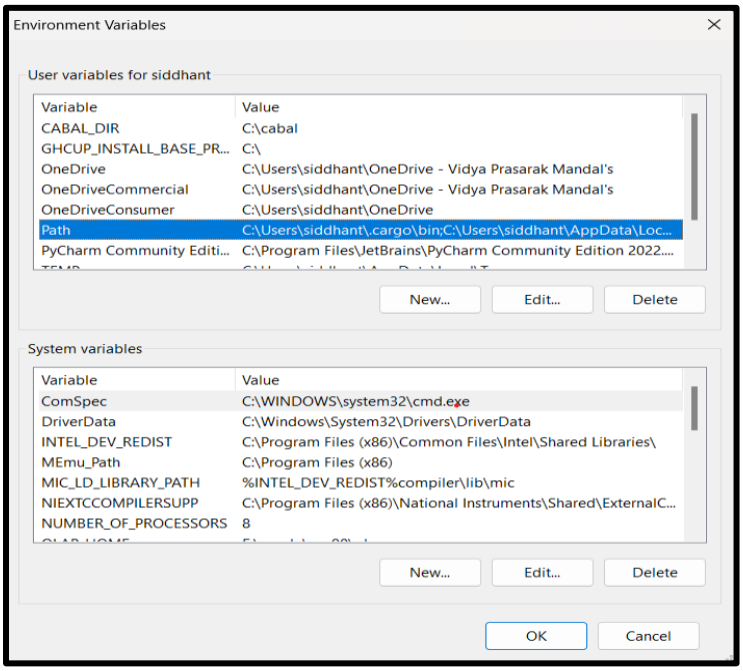


Step 3: Once downloaded, unzip the file and designate your desired installation folder or directory, for example, D:/Flutter.

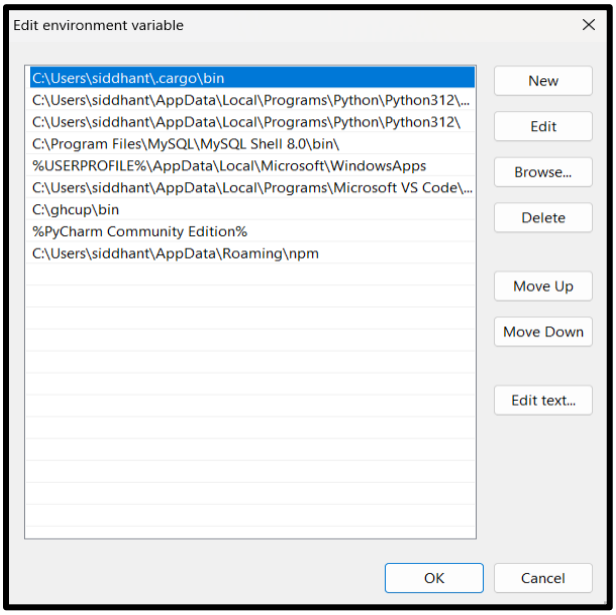


Step 4: To integrate the Flutter bin directory into the system path on a standard Windows console for executing Flutter commands regularly, adhere to the following steps:

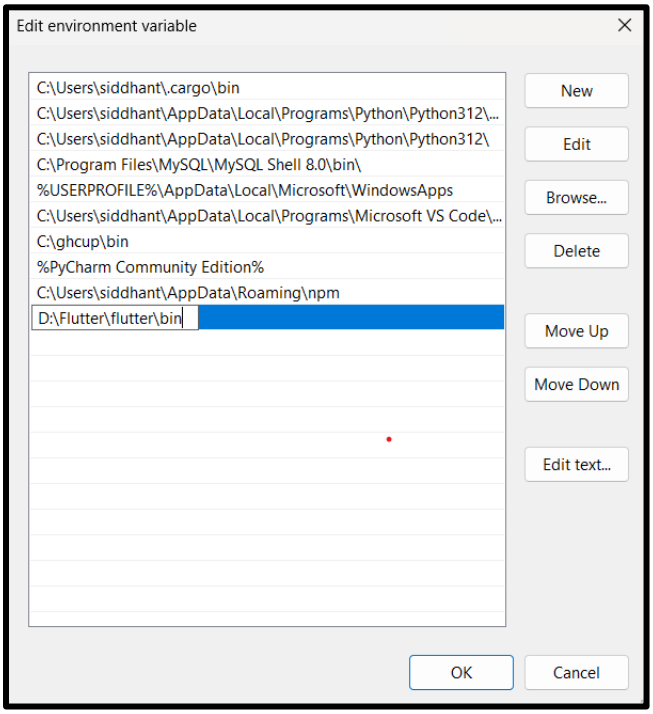
Step 4.1: Access the properties of My Computer, proceed to the advanced tab, and navigate to the environment variables. This will direct you to the relevant screen.



Step 4.2: Choose the "Edit" option after selecting the path, and you will be directed to the ensuing screen.

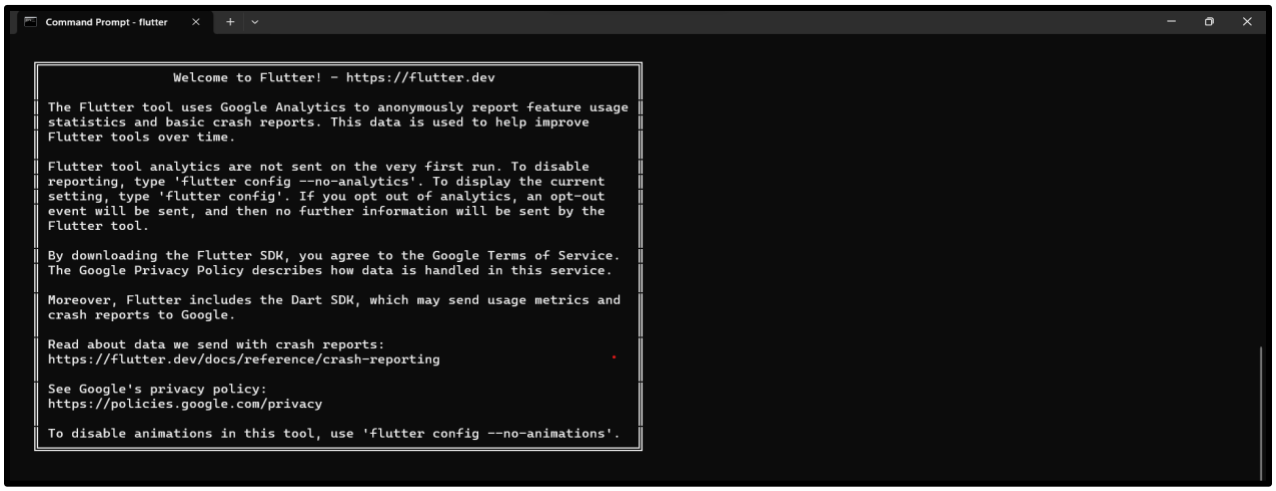


Step 4.3: Head to the New option within the current window, and input the path of the Flutter bin folder in the Variable Value field. Subsequently, click OK, and proceed through additional OK prompts until you exit the window.



Step 5: Execute the command $ flutter in the command prompt.

```
C:\Users\siddhant>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 doctor", shows additional                    diagnost
ic information. (Use "-vv" to force verbose logging in those cases.)
-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, until it is
                            re-enabled.
    --suppress-analytics    Suppress analytics reporting for the current CLI invocation.
```



Run the "flutter doctor" command to evaluate the status of your Flutter installation, ensuring it meets all the essential requirements for Flutter app development. This command generates a detailed report providing insights into the current configuration of your Flutter setup.

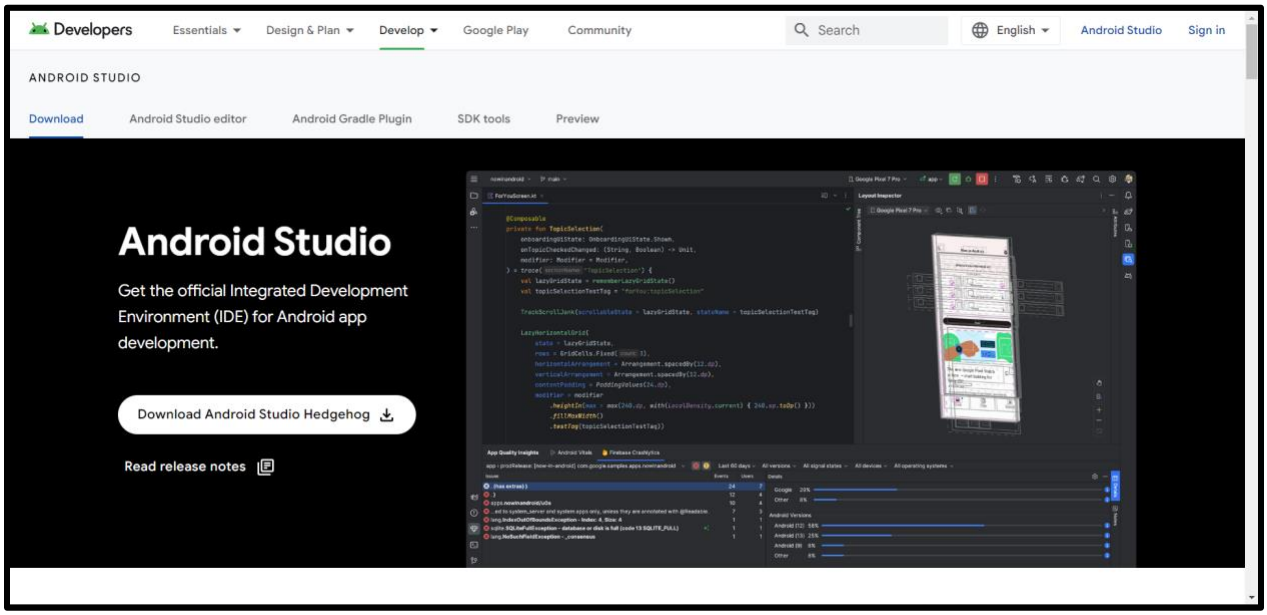
Step 6: Executing the provided command initiates a system analysis, yielding a detailed report. This report encompasses information about any missing tools vital for Flutter functionality, as well as insights into available development tools that may be unlinked to the device. Refer to the accompanying image for a visual representation.

```
C:\Users\siddhant>flutter doctor
Doctor summary (to see all details, run flutter doctor -v):
[✓] Flutter (Channel stable, 3.16.9, on Microsoft Windows [Version 10.0.22621.3007], locale en-IN)
[✓] Windows Version (Installed version of Windows is version 10 or higher)
[✓] Android toolchain - develop for Android devices (Android SDK version 34.0.0)
[✓] Chrome - develop for the web
[!] Visual Studio - develop Windows apps (Visual Studio Community 2022 17.8.5)
    X The current Visual Studio installation is incomplete.
      Please use Visual Studio Installer to complete the installation or reinstall Visual Studio.
[✓] Android Studio (version 2021.1)
[✓] Android Studio (version 2023.1)
[✓] VS Code (version 1.85.2)
[✓] Connected device (3 available)
[✓] Network resources

! Doctor found issues in 1 category.
```

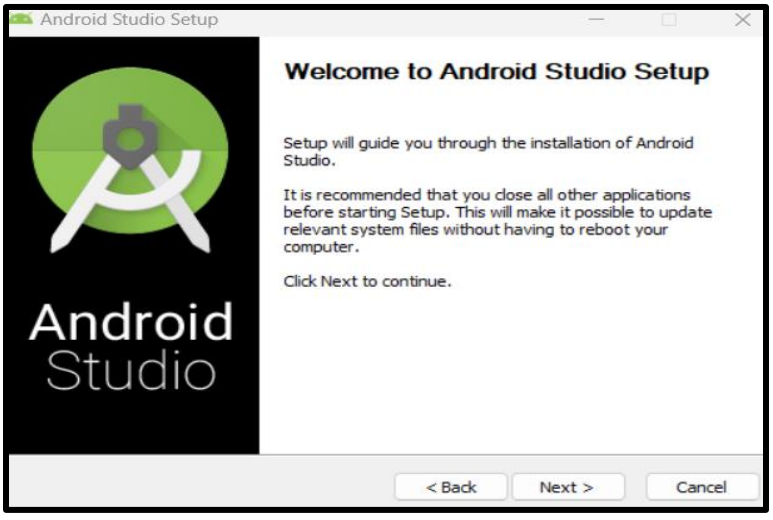
Step 7: In case the flutter doctor command cannot locate the Android SDK tool on your system, it is recommended to install the Android Studio IDE. If Android Studio IDE is already installed on your laptop, no error messages will be displayed. However, for users without prior installation, the following steps are provided:

[Note: Insert additional information or details about the steps to install Android Studio IDE for users who don't have it installed.]

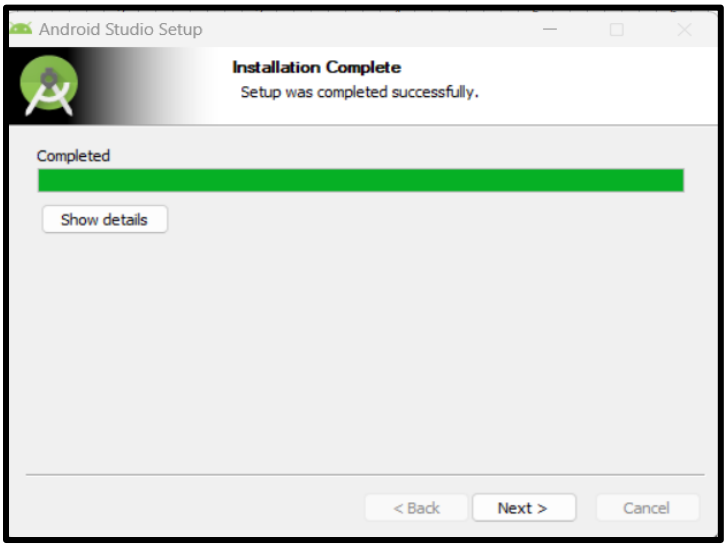
Step 7.1: Download the latest Android Studio executable or zip file directly from the official website to proceed with the installation.



Step 7.2: After finishing the download, open and run the .exe file. Subsequently, a dialog box will appear as depicted below.



Step 7.3: Proceed with the installation wizard by following its steps. Once the wizard concludes, you will be presented with the following screen.



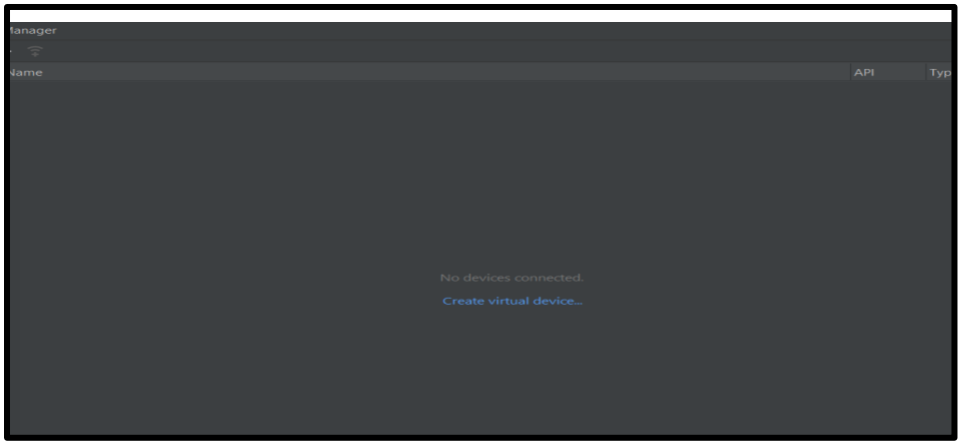
Step 7.4: Execute the command $ flutter doctor and then proceed to run $ flutter doctor --android-licenses.

```
C:\Users\siddhant>flutter doctor
Doctor summary (to see all details, run flutter doctor -v):
[√] Flutter (Channel stable, 3.16.9, on Microsoft Windows [Version 10.0.22621.3007], locale en-IN)
[√] Windows Version (Installed version of Windows is version 10 or higher)
[√] Android toolchain - develop for Android devices (Android SDK version 34.0.0)
[√] Chrome - develop for the web
[!] Visual Studio - develop Windows apps (Visual Studio Community 2022 17.8.5)
    X The current Visual Studio installation is incomplete.
      Please use Visual Studio Installer to complete the installation or reinstall Visual Studio.
[√] Android Studio (version 2021.1)
[√] Android Studio (version 2023.1)
[√] VS Code (version 1.85.2)
[√] Connected device (3 available)
[√] Network resources

! Doctor found issues in 1 category.
```

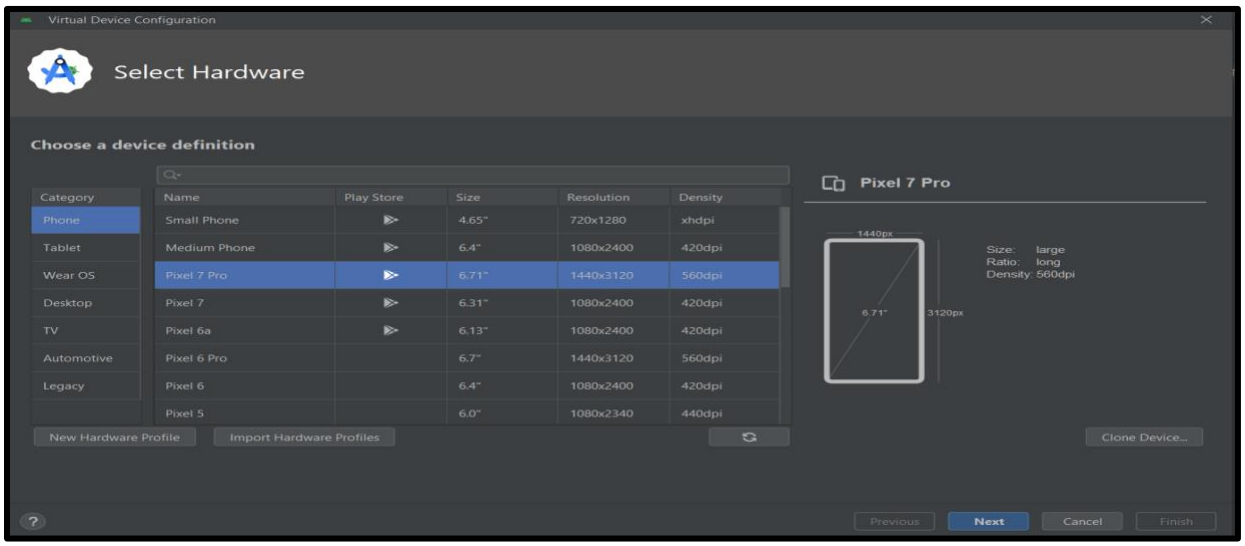
```
C:\Users\siddhant>flutter doctor --android-licenses
[======================================] 100% Computing updates...
All SDK package licenses accepted.
```

Step 8: Following that, you should configure an Android emulator, which is tasked with executing and testing the Flutter application.

Step 8.1: Establish a virtual Android emulator by navigating within Android Studio. Choose Tools > Android > AVD Manager. Alternatively, you can access it through Help -> Find Action, then type "Emulator" in the search box to bring up the corresponding screen.

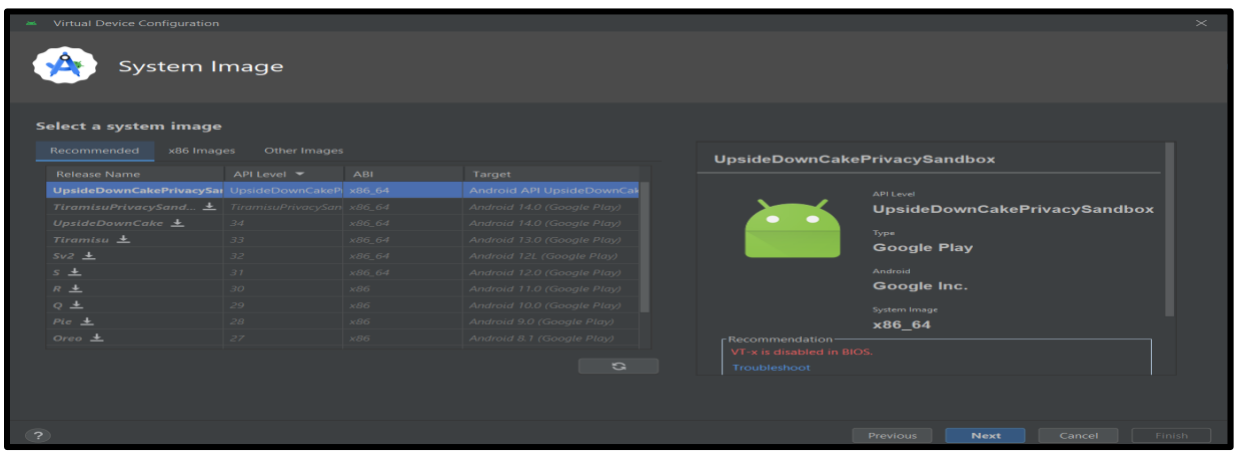


Step 8.2: Select the device definition and proceed by clicking on Next.

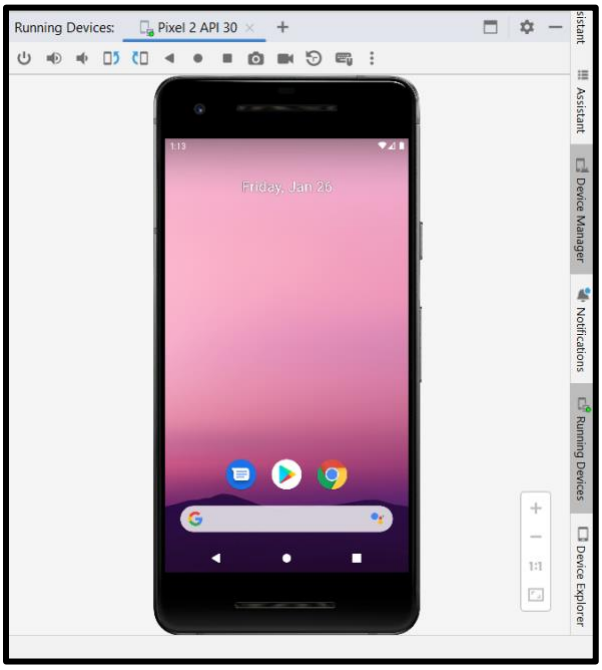


Step 8.3: Select the system image that corresponds to the latest Android version, then proceed by clicking on Next.

Step 8.4: Upon ensuring the AVD configuration is accurate, proceed to click on Finish. The subsequent screen will then be displayed.

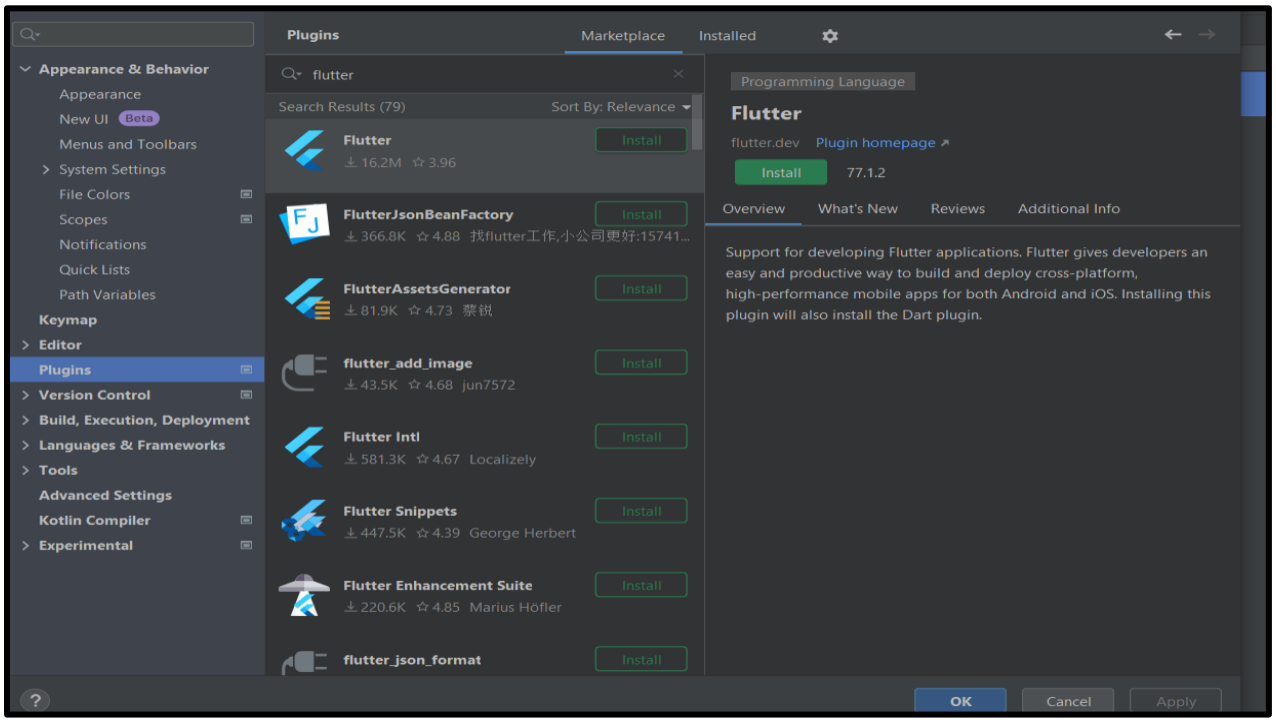


Step 8.5: After running the created virtual device, The Android emulator is displayed as below screen.

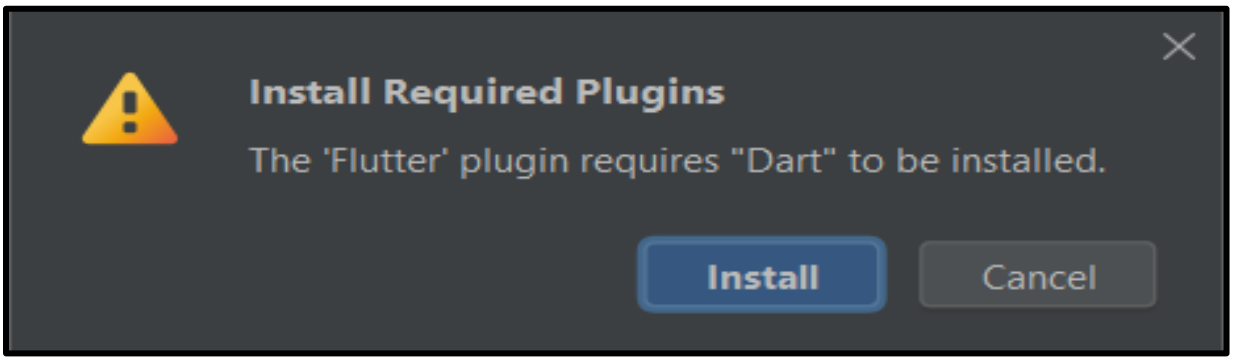


Step 9: To configure the Flutter and Dart plugins for Flutter application development in Android Studio, follow these steps. These plugins provide a template for creating Flutter applications and enable you to run and debug them directly within Android Studio.

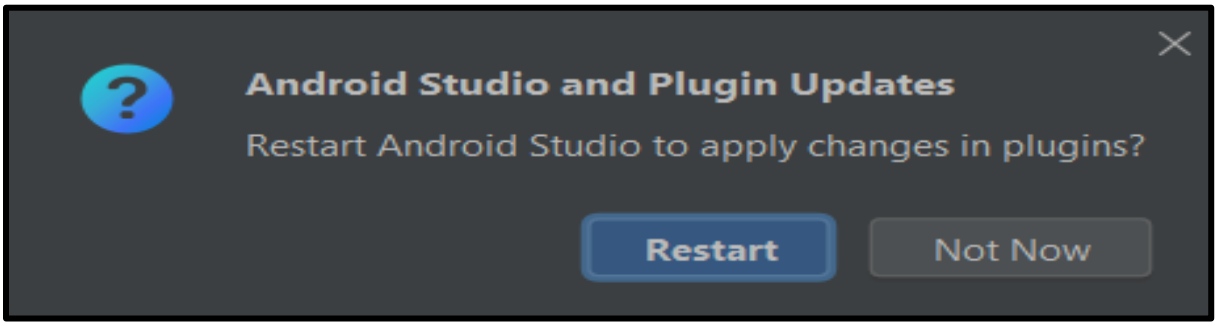
Step 9.1: Launch Android Studio, navigate to Settings by selecting File, then go to Plugins.



Step 9.2:.
Find the Flutter plugin and initiate the installation. Once started, a prompt will appear, asking you to install the Dart plugin. Confirm the installation by clicking on "install."



Step 9.3: To implement the modifications made to the plugins, please restart Android Studio.



- **Conclusion:**

Hence, we've navigated through the comprehensive process of installing and configuring the Flutter environment, encompassing the setup of the Flutter SDK, the integration of Android Studio, and the creation of a virtual device within the Android Studio ecosystem. Along the way, I encountered a challenge related to an outdated Android SDK version in my SDK manager, prompting me to update Android Studio for a seamless installation experience. This journey underscores the importance of maintaining up-to-date development tools for a smooth and efficient Flutter development environment.