

UNIT I: FUNDAMENTALS OF MOBILE PROGRAMMING

1.1 Introduction to Mobile Programming

1.2 Android: An Open Platform for Mobile Development

1.3 Overview of the Operating Systems used on different mobile devices

1.4 Android Operating System, Its Features and Versions

1.5 Android Development Tools

1.6 Introducing the Development Framework

1.7 Installing Android Studio

1.1 Introduction to Mobile Programming.

Mobile application development is the process to making software for smartphones and digital assistants, most commonly for Android and iOS.

The software can be preinstalled on the device, downloaded from a mobile app store or accessed through a mobile web browser.

The programming and markup languages used for this kind of software development include Java.

Mobile app development is rapidly growing.

From retail, telecommunications and e-commerce to insurance, healthcare and government, organizations across industries must meet user expectations for real-time, convenient ways to conduct transactions and access information.

Many independent application development teams choose to build their apps for Android first.

Why?

The vast majority—around 70 percent—of smartphones run Android,

The Google Play Store has fewer restrictions than the Apple App Store.

1.2 Android: An Open Platform for Mobile Development

Android is an Open Platform for Mobile Development made up of a hardware orientation design that describes the competencies required for mobile device.

Android is designed to support several variety of platforms including touch-screen phones and devices with no screen at all.

Android does not require licensing fees so the cost to manufacturers for providing compatible variations is significantly low.

The first Android mobile handset was released in the US in October 2008 and in the UK in November 2008, the T-Mobile G1 had a mobile framework based modern devices.

The Android system is used by 30 Open Handset Alliance members which including Samsung, LG and others.

A Linux operating system kernel that provides the low-level interface with the hardware.

Open source libraries for application development including SQLite, WebKit, OpenGL, and a media manager.

A run time used to execute and host Android applications, including the Dalvik virtual machine and the core libraries that provide Android specific functionality.

An application framework that agnostically exposes system services to the application layer, including the window manager, content providers, location manager, telephony, and peer-to-peer services.

1.3 Overview of the Operating Systems used on different mobile devices

1. A mobile operating system is an operating system that helps to run other application software on mobile devices.
2. It is the same kind of software as the famous computer operating systems like Linux and Windows, but now they are light and simple to some extent.
3. The operating systems found on smartphones include Symbian OS, iPhone OS, RIM's BlackBerry, Windows Mobile, Palm WebOS, Android, and Maemo. Android, WebOS, and Maemo are all derived from Linux.
4. The iPhone OS originated from BSD and NeXTSTEP, which are related to UNIX.
5. It combines the beauty of computer and hand use devices.
6. It typically contains a cellular built-in modem and SIM tray for telephony and internet connections.
7. Popular platforms of the Mobile OS are

1. Android OS: The Android operating system is the most popular operating system today.

It is a mobile OS based on the **Linux Kernel** and **open-source software**. The android operating system was developed by **Google**. The first Android device was launched in **2008**.

2. Bada (Samsung Electronics): Bada is a Samsung mobile operating system that was launched in 2010.

The Samsung wave was the first mobile to use the bada operating system.

The bada operating system offers many mobile features, such as 3-D graphics, application installation, and multipoint-touch.

3. BlackBerry OS: The BlackBerry operating system is a mobile operating system developed by **Research in Motion (RIM)**.

This operating system was designed specifically for BlackBerry handheld devices.

This operating system is beneficial for the corporate users.

4. iPhone OS / iOS: The iOS was developed by the Apple inc for the use on its device.

The iOS operating system is the most popular operating system today. It is a very secure operating system. The iOS operating system is not available for any other mobiles.

5. Symbian OS: Symbian operating system is a mobile operating system that provides a high-level of integration with communication.

The Symbian operating system is based on the java language.

It combines middleware of wireless communications and personal information management (PIM) functionality.

The Symbian operating system was developed by **Symbian Ltd** in **1998** for the use of mobile phones.

Nokia was the first company to release Symbian OS on its mobile phone at that time.

6. Windows Mobile OS: The window mobile OS is a mobile operating system that was developed by **Microsoft**. It was designed for the pocket PCs and smart mobiles.

7. Harmony OS: The harmony operating system is the latest mobile operating system that was developed by Huawei for the use of its devices. It is designed primarily for IoT devices.

1.4 Android Operating System, Its Features and Versions

Android is an open source and Linux-based **Operating System** for mobile devices such as smartphones and tablet computers.

Android was developed by the *Open Handset Alliance*, led by Google, and other companies.

Android offers a unified approach to application development for mobile devices which means developers need only develop for Android, and their applications should be able to run on different devices powered by Android.

Features of Android

Beautiful UI

Android OS basic screen provides a beautiful and intuitive user interface.

Connectivity

GSM/EDGE, IDEN, CDMA, EV-DO, UMTS, Bluetooth, Wi-Fi, LTE, NFC and WiMAX.

Storage

SQLite, a lightweight relational database, is used for data storage purposes.

Media support

H.263, H.264, MPEG-4 SP, AMR, AMR-WB, AAC, HE-AAC, AAC 5.1, MP3, MIDI, Ogg Vorbis, WAV, JPEG, PNG, GIF, and BMP.

Messaging

SMS and MMS

Web browser

Based on the open-source WebKit layout engine, coupled with Chrome's V8 JavaScript engine supporting HTML5 and CSS3.

Multi-touch

Android has native support for multi-touch which was initially made available in handsets such as the HTC Hero.

Multi-tasking

User can jump from one task to another and same time various application can run simultaneously.

Multi-Language

Supports single direction and bi-directional text.

Android versions, name

Cupcake	April 27, 2009
Donut	September 15, 2009
Eclair	October 26, 2009
Froyo	May 20, 2010
Gingerbread	December 6, 2010
Honeycomb	February 22, 2011
Ice Cream Sandwich	October 18, 2011
Jelly Bean	July 9, 2012
KitKat	October 31, 2013
Lollipop	November 12, 2014
Marshmallow	October 5, 2015
Nougat	August 22, 2016
Nougat	October 4, 2016
Oreo	August 21, 2017
Oreo	December 5, 2017
Pie	August 6, 2018
Android 10(Quince Tart)	September 3, 2019
Android 11(Red Velvet Cake)	September 8, 2020
Android 12(Snow Cone)	October 4, 2021
Android 13(Tiramisu)	August 15, 2022
Android 14(Upside Down Cake)	October 4, 2023
Android 15(Vanilla Ice Cream)	-

1.5 Android Development Tools

The android developer tools let you create interactive and powerful application for android platform. The tools can be generally categorized into two types.

- SDK tools
- Platform tools
- SDK tools
- SDK tools are generally platform independent and are required no matter which android platform you are working on. When you install the Android SDK into your system, these tools get automatically installed.

1	android This tool lets you manage AVDs, projects, and the installed components of the SDK
2	ddms This tool lets you debug Android applications
3	Draw 9-Patch This tool allows you to easily create a NinePatch graphic using a WYSIWYG editor
4	emulator This tools let you test your applications without using a physical device
5	mksdcard Helps you create a disk image (external sdcard storage) that you can use with the emulator
6	proguard Shrinks, optimizes, and obfuscates your code by removing unused code
7	sqlite3 Lets you access the SQLite data files created and used by Android applications
8	traceview Provides a graphical viewer for execution logs saved by your application
9	Adb

Android Debug Bridge (adb) is a versatile command line tool that lets you communicate with an emulator instance or connected Android-powered device.

Platform tools

The platform tools are customized to support the features of the latest android platform.

The platform tools are typically updated every time you install a new SDK platform. Each update of the platform tools is backward compatible with older platforms.

Some of the platform tools are listed below –

Android Debug bridge (ADB)

Android Interface definition language (AIDL)

aapt, dexdump , and dex e.t.c

1.6 Introducing the Development Framework

Mobile App Development Framework is a library that offers the required fundamental structure to create mobile applications for a specific environment.

Mobile application frameworks can be classified majorly into 3 categories: Native Apps, Web Apps & Hybrid Apps.

Native Apps: A Native App is an application specifically designed for a particular platform or device.

Web Apps: A Web App is concerned with an application that is designed to deliver web pages on different web platforms for any device.

Hybrid Apps: A Hybrid App is a combination of both native & web applications. It can be developed for any platform from a single code base.

1. React Native

React Native is one of the most recommended Mobile App Frameworks in the development industry. The framework, created by Facebook, is an open-source framework that offers you to develop mobile applications for Android & iOS platforms.

2. Flutter

Flutter, developed by Google, is a UI toolkit to build native applications for mobile apps, desktop & web platforms. Flutter is a cross-platform mobile app development framework that works on one code base to develop Android as well as iOS applications. The framework provides a large range of fully customizable widgets that helps to build native applications in a shorter span.

3. Ionic

Ionic, developed in 2013, is an open-source framework that allows you to build cross-platform for mobile apps using web technologies like HTML, CSS & JavaScript.

4. Xamarin

Xamarin is also one of the most popular open-source frameworks used to develop mobile applications. The framework, acquired by Microsoft, is based on .Net and allows you to build native applications for Android, iOS, and Windows platforms.

5. Mobile Angular UI

Mobile Angular UI is an open-source mobile application development

framework that merges the implementation of the Bootstrap and Angular frameworks. The framework offers various UI components such as overlays, switches, sidebars, navbars, scrollable areas, etc.

6. Adobe PhoneGap

Indeed, PhoneGap is among the most popular mobile app development frameworks. PhoneGap, purchased by Adobe Systems in 2011, is an open-source framework that allows you to build cross-platform applications using languages such as HTML5, CSS3, and JavaScript. The framework allows you to create a single mobile application that can be installed as a native app over many devices.

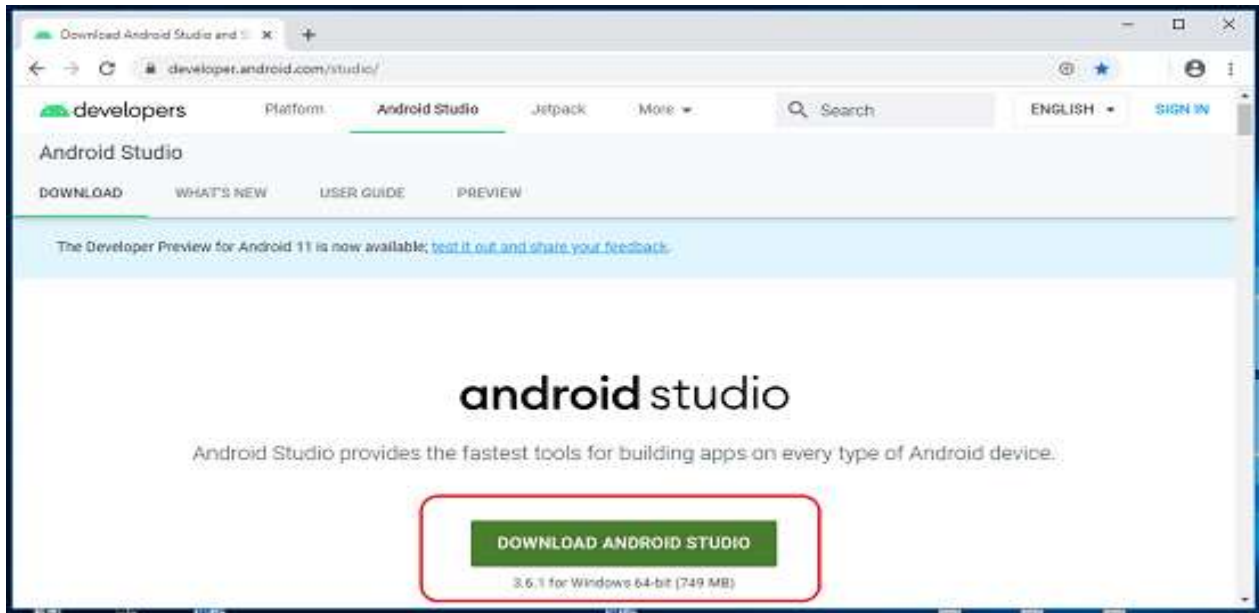
1.7 Installing Android Studio

Step 1

To download the Android Studio, visit the official Android Studio website in your web browser.

Step 2

Click on the "Download Android Studio" option.



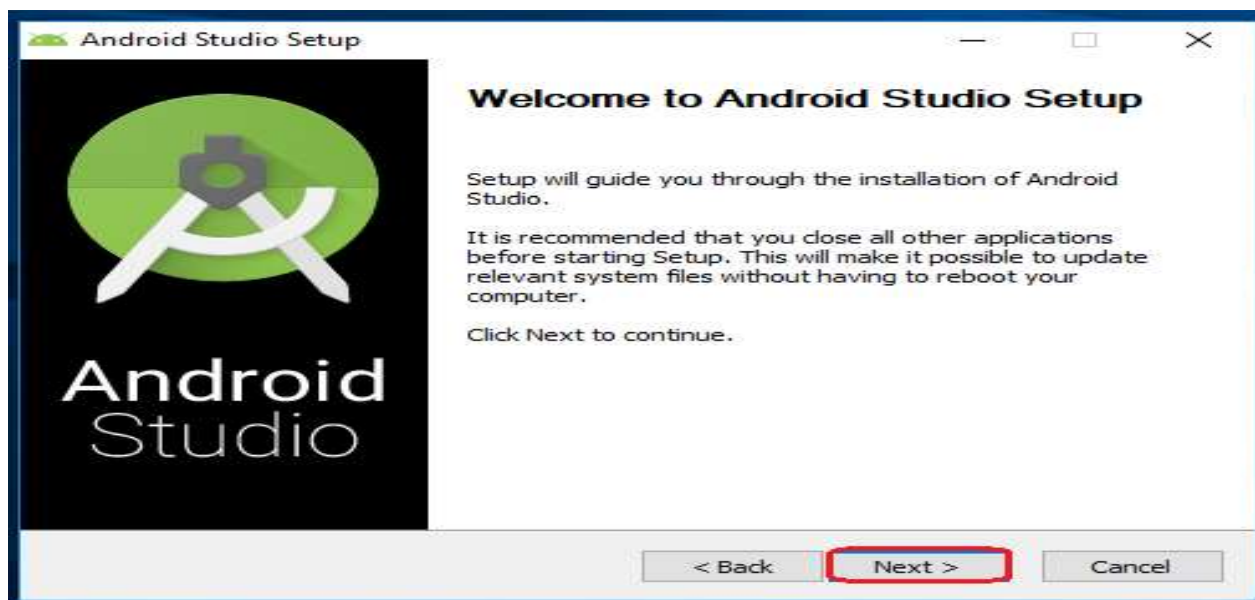
Step 3

Double click on the downloaded "Android Studio-ide.exe" file.



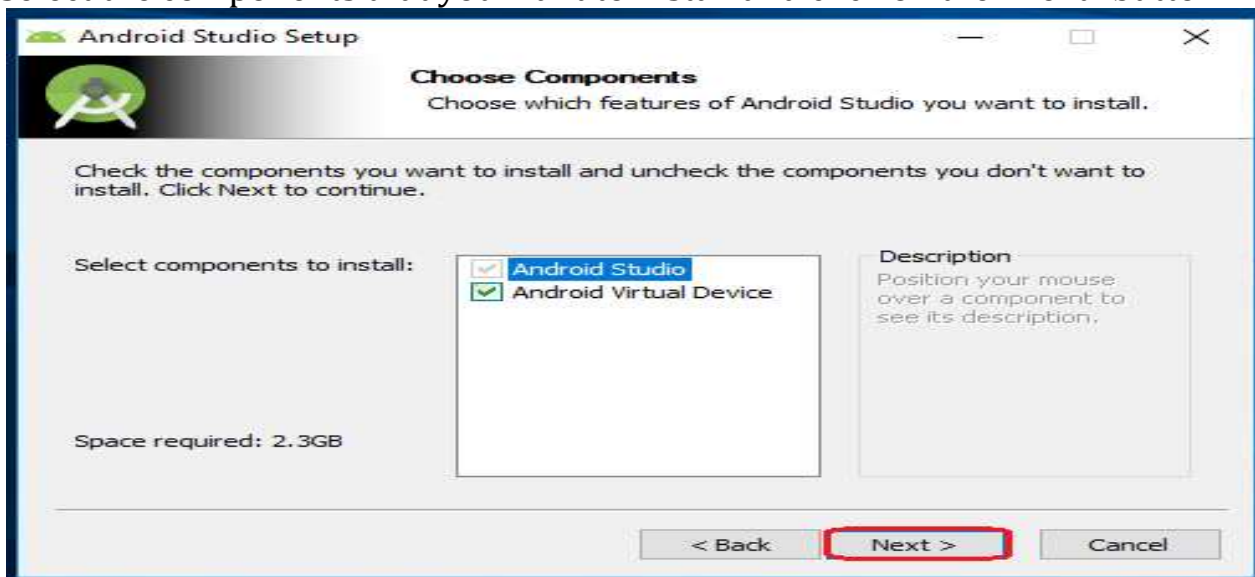
Step 4

"Android Studio Setup" will appear on the screen and click "Next" to proceed.



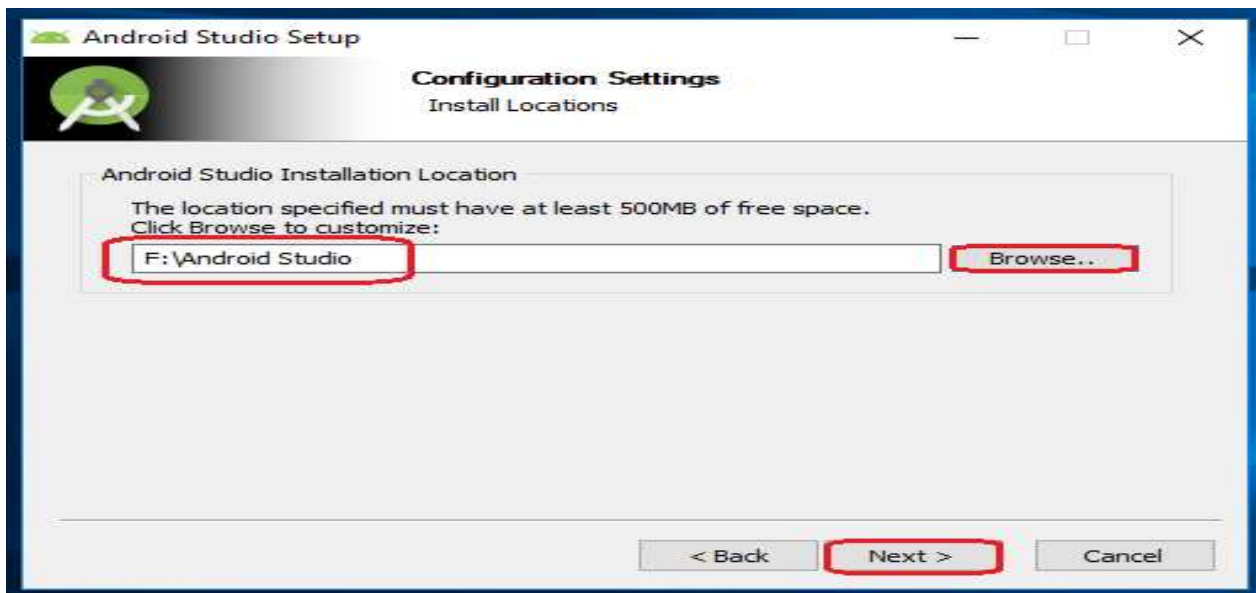
Step 5

Select the components that you want to install and click on the "Next" button.



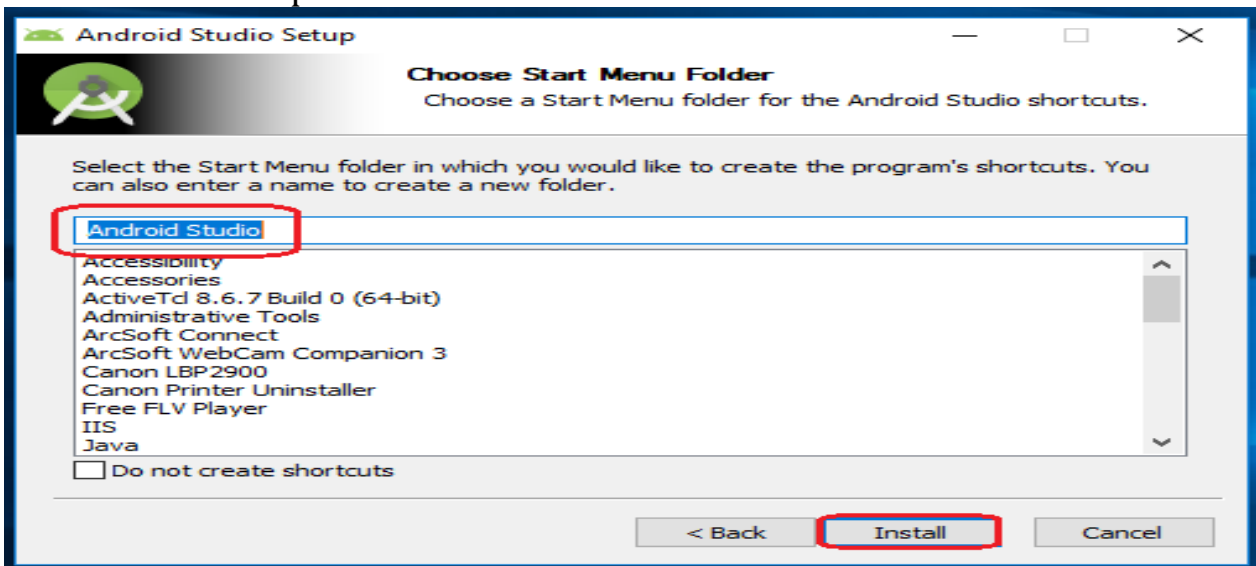
Step 6

Now, browse the location where you want to install the Android Studio and click "Next" to proceed.



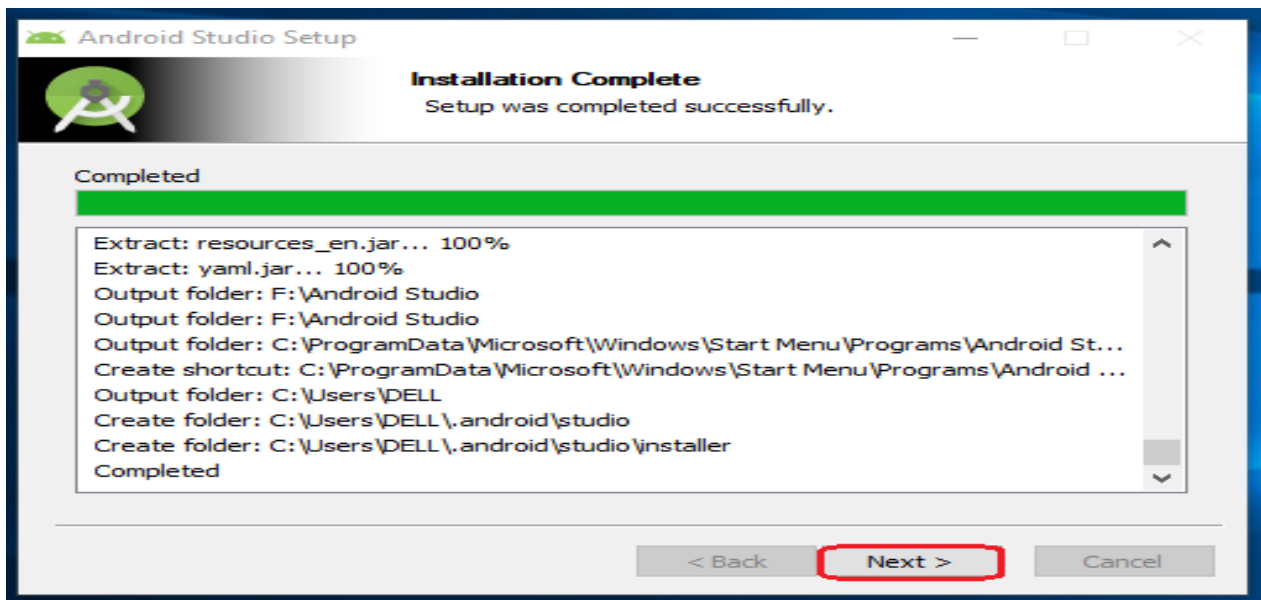
Step 7

Choose a start menu folder for the "Android Studio" shortcut and click the "Install" button to proceed.



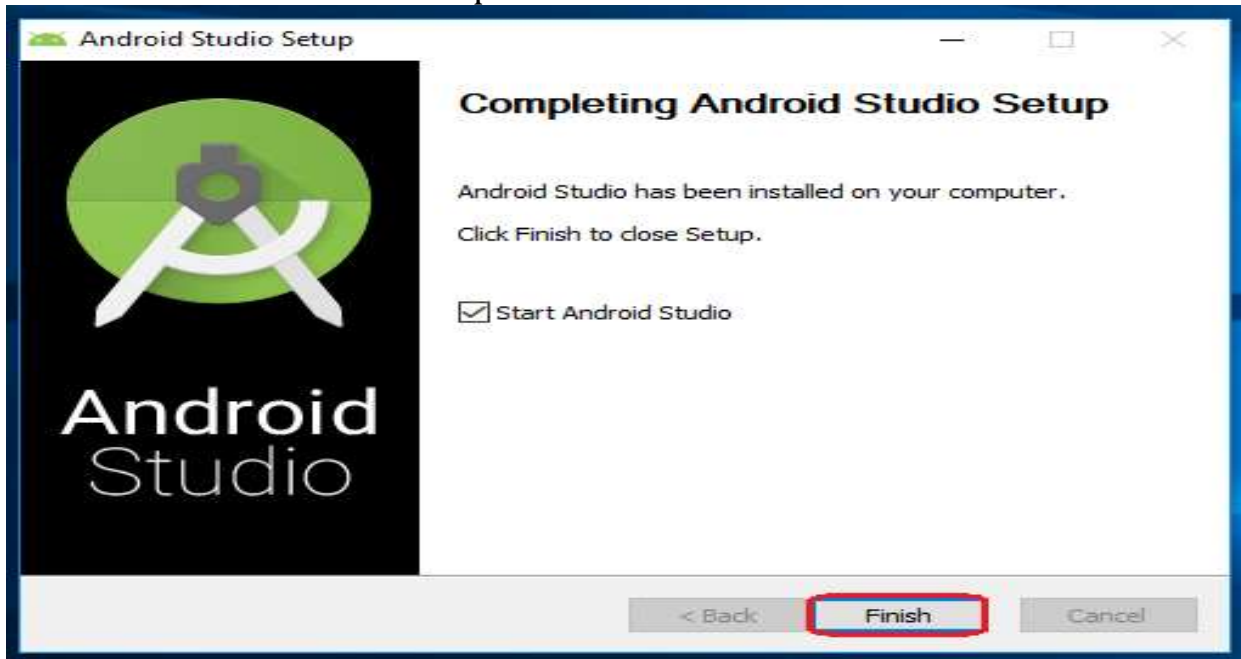
Step 8

After the successful completion of the installation, click on the "Next" button.



Step 9

Click on the "Finish" button to proceed.

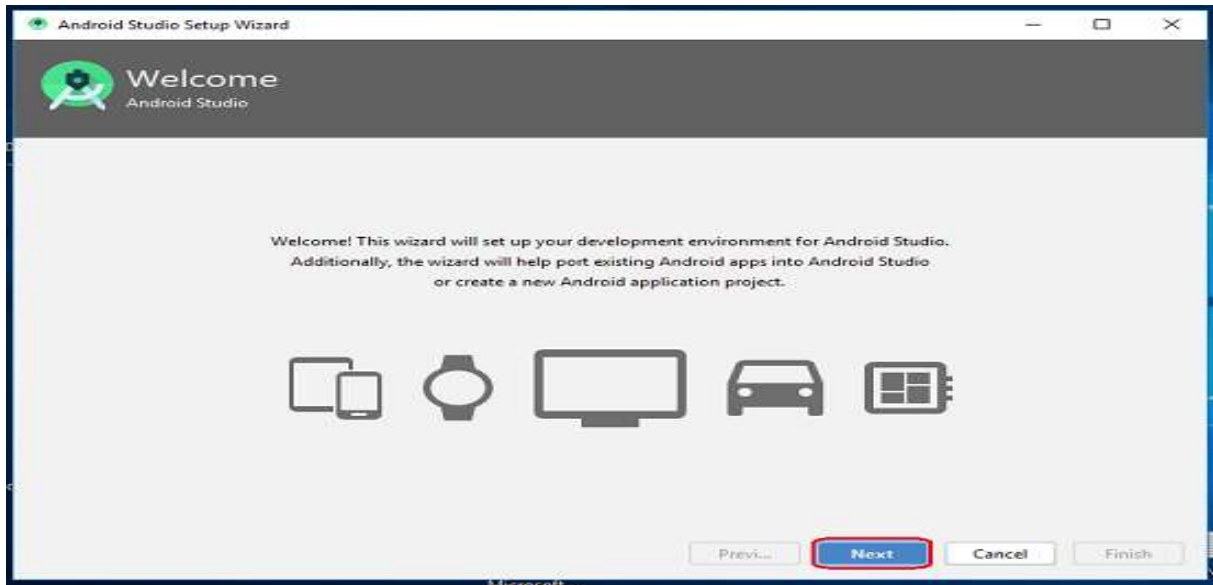


Now, your Android studio welcome screen will appear on the screen.



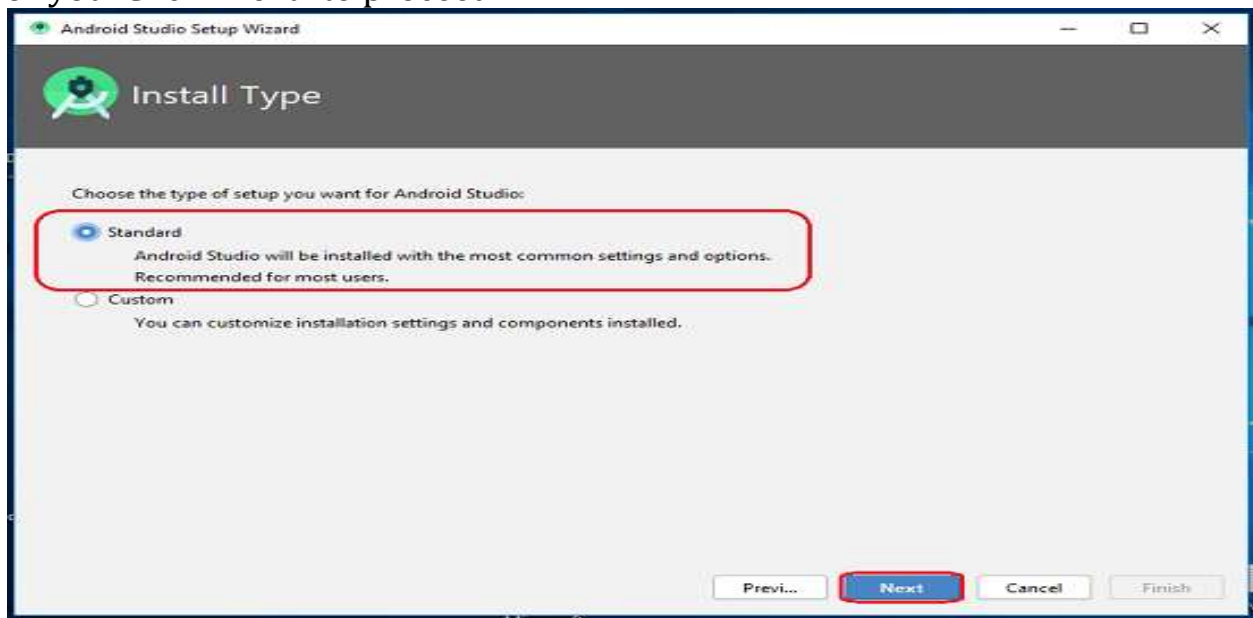
Step 10

"Android Studio Setup Wizard" will appear on the screen with the welcome wizard. Click on the "Next" button.



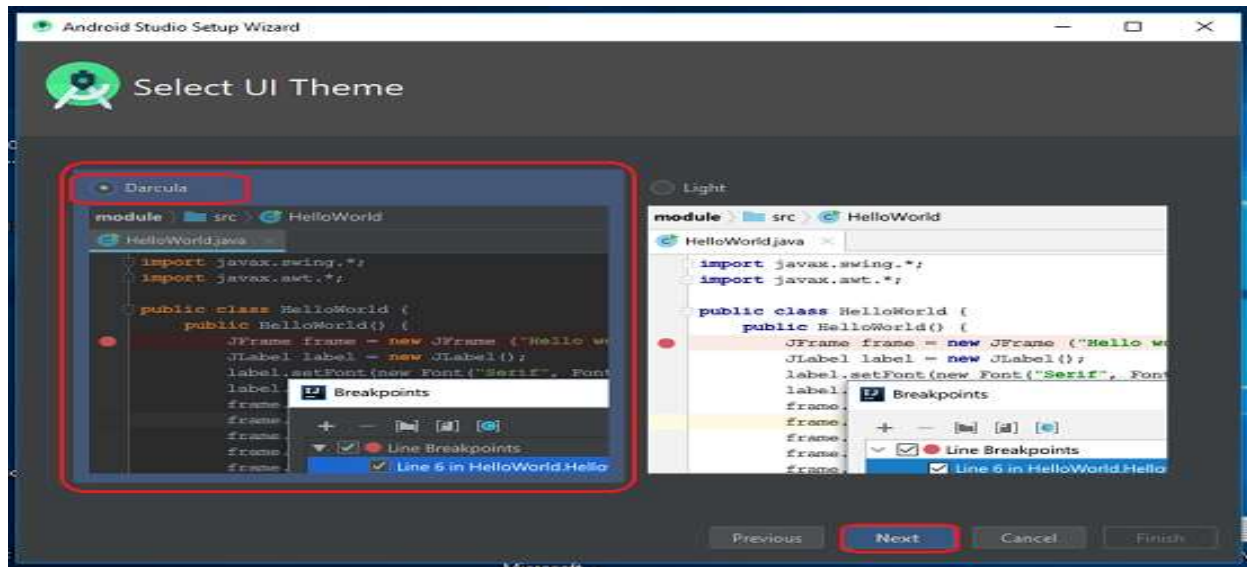
Step 11

Select (check) the "Standard" option if you are a beginner and do not have any idea about Android Studio. It will install the most common settings and options for you. Click "Next" to proceed.



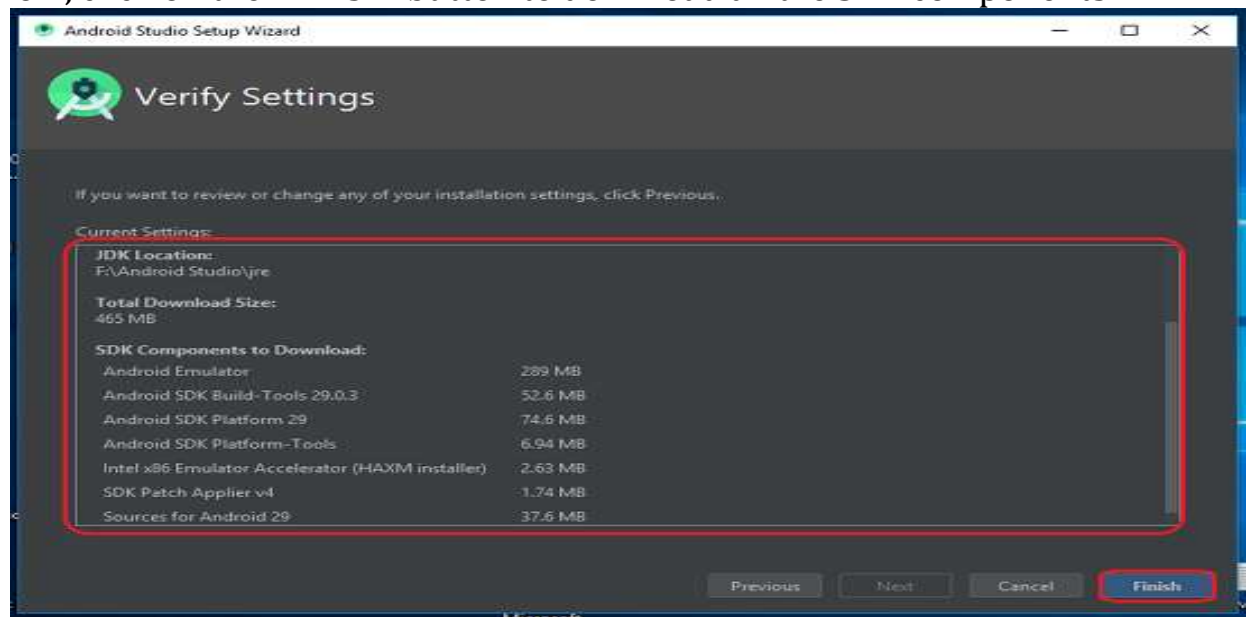
Step 12

Now, select the user interface theme as you want. (I prefer Dark theme (Dracula) that is most liked by the coders). Then, click on the "Next" button.

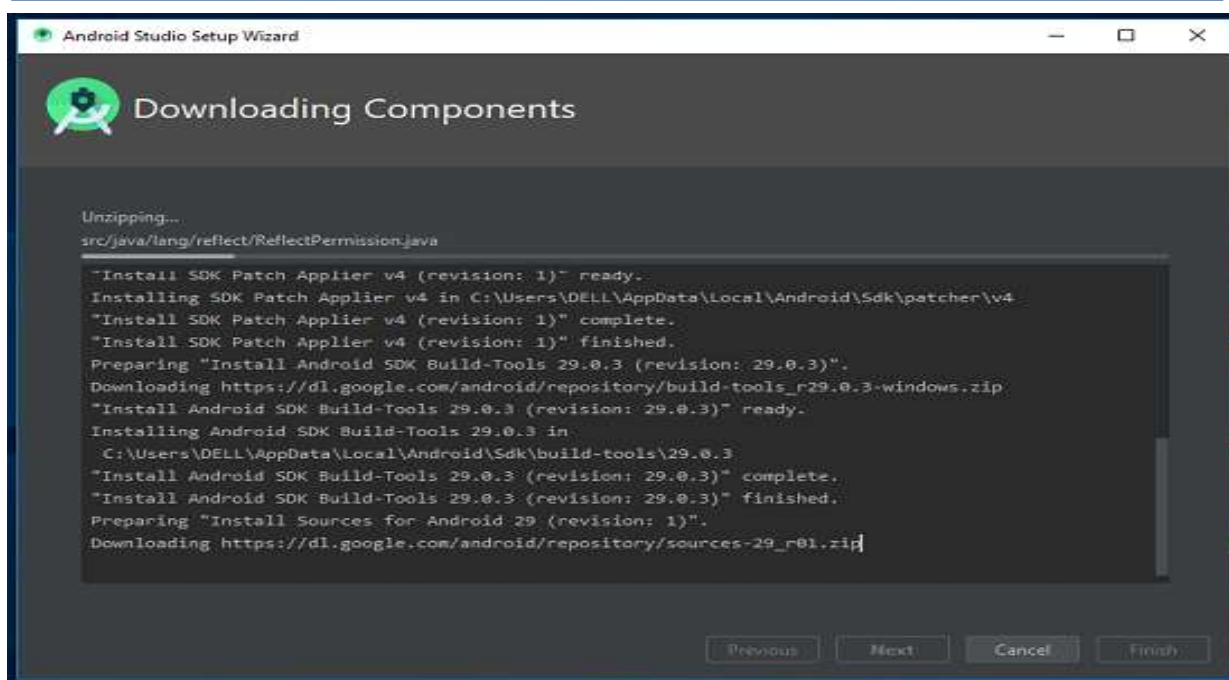


Step 13

Now, click on the "Finish" button to download all the SDK components.

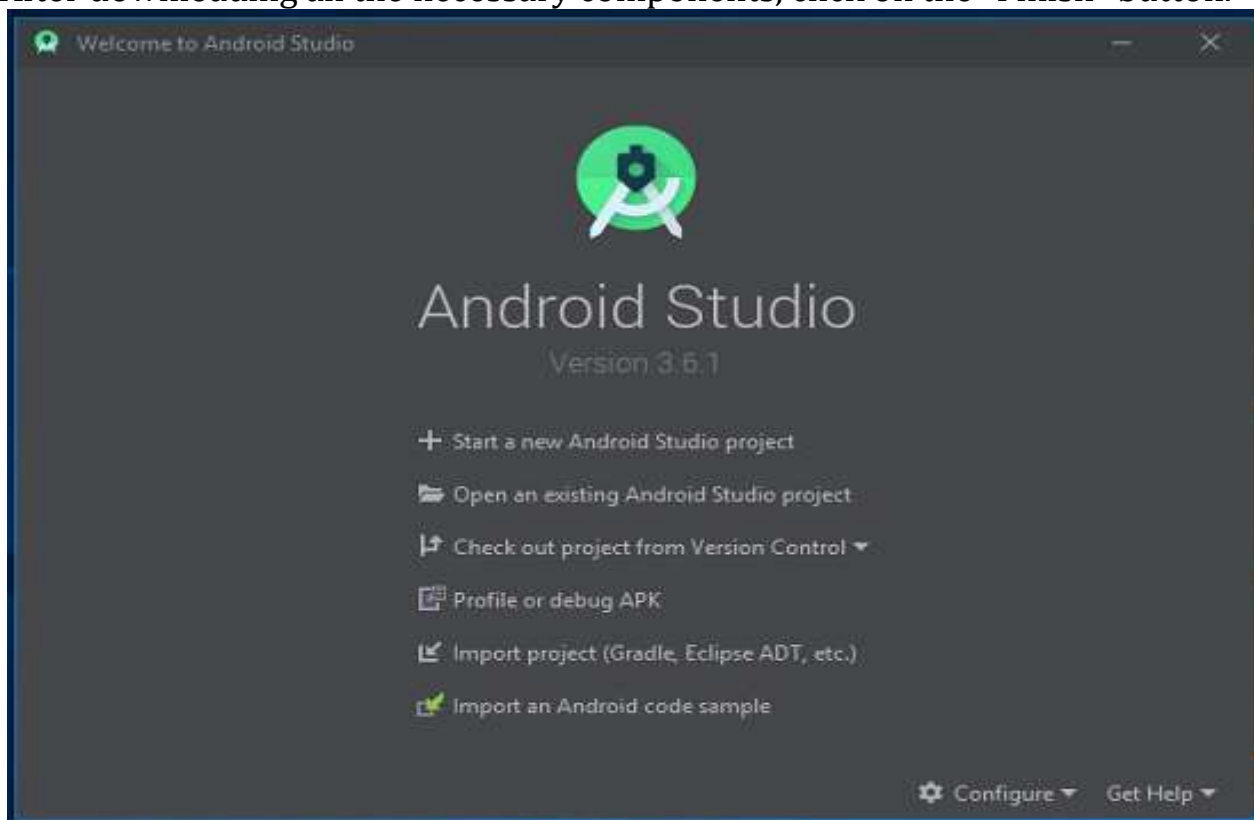


And, the downloading and installation process of components gets started.



Step 14

After downloading all the necessary components, click on the "Finish" button.



The End