विशाल जाधव सरांचे

VJTech Academy

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UNIT-II Installation and configuration of Android

Operating System, Java JDK, Android SDK.

Operating System

- A mobile OS is an operating system for smartphones, tablets, PDAs, or other mobile devices.
- Mobile OSs combine features of a personal computer OS with other features useful for mobile or handheld use.
- Usually most of the following considered essential in modern mobile systems.
- Touchscreen, cellular, Bluetooth, Wi-Fi, GPS mobile navigation, camera, video camera, speech recognition, voice recorder, music player, etc.

Java JDK

- The Java Development Kit (JDK) is a software development environment used for developing Java applications and applets.
- It includes the Java Runtime Environment (JRE), an interpreter/loader (java), a compiler (javac), an archiver (jar), a documentation generator (javadoc) and other tools needed in Java development.
- **JVM (Java Virtual Machine):** JVM is an abstract machine. It is a specification that provides runtime environment in which java bytecode can be executed. JVMs are available for many hardware and software platforms. JVM is a part of Java Run Environment (JRE). The JVM performs following operation:
    - Loads code
    - Verifies code
    - Executes code
    - Provides runtime environment
- **JRE:** The Java Runtime Environment (JRE) is a set of software tools for development of Java applications. It combines the Java Virtual Machine (JVM), platform core classes and supporting libraries.

Android SDK

- Android development starts with the Android SDK (Software Development Kit).
- It is a software development kit that enables developers to create applications for the Android platform.
- The Android SDK is a set of development tools used to develop applications for Android platform.

- The Android SDK includes the following:
    - Required libraries
    - Debugger
    - An emulator
    - Relevant documentation for the Android application program interfaces (APIs)
    - Sample source code
    - Tutorials for the Android OS

Android Development Tools (ADT):

1. Android Studio:

- Android Studio developed by Google.
- Android Studio is an all-rounder integrated development environment that allows the Android developers to get what they desire without an Integrated Development Environment or IDE.
- Android has Gradle-base support that has features like visual layout editor, intelligent code editor, real-time profilers and APK analyzer.
- It acts just like any other Java IDE in terms of error investigating and file hierarchy.

2. Visual Studio- Xamarin

- Xamarin was launched in 2011 which is the best free IDE for delivering an enterprise quality, cross-platform approach.
- Xamarin supplies add-ins to Microsoft Visual Studio that allows developers to build Android, iOS, and Windows apps within the IDE

3. IntelliJ IDEA

- The framework-based assistance, productivity boosters, unobtrusive intelligence, duplicates, and inspections are provided with the IDE.
- Using this IDE, you can do in-depth coding, quick navigation, and error analysis.
- It supports mobile app development with the help of Java, Scala, Kotlin, Groovy.

4. Eclipse IDE

- It is one of the most popular IDES of Android apps.
- The open-source software is free to use. Released under the Eclipse Public License, it holds a large community having plenty of plugins and configurations.

- Highly customizable offers full support for Java programming language and XML.

Android Virtual Devices (AVDs):

- An Android Virtual Device (AVD) is a configuration that defines the characteristics of an Android phone, tablet, Wear OS, Android TV, or Automotive OS device that you want to simulate in the Android Emulator.
- The AVD Manager is an interface you can launch from Android Studio that helps you create and manage AVDs.
- AVD is an emulator configuration that allows developers to test the application by simulating the real device capabilities.
- AVD may configure the variety of hardware features including options such as screen size, memory capacity, camera, GPS navigation support, etc.
- Android Virtual Devices (AVDs) are configurations of emulator options that let you better model an actual device.
- Each AVD is made up of:
    - **A hardware profile.** You can set options to define the hardware features of the virtual device. For example, you can define whether the device has a camera, whether it uses a physical QWERTY keyboard or a dialling pad, how much memory it has, and so on.
    - **A mapping to a system image.** You can define what version of the Android platform will run on the virtual device. You can choose a version of the standard Android platform or the system image packaged with an SDK add-on.
    - **Other options.** You can specify the emulator skin you want to use with the AVD, which lets you control the screen dimensions, appearance, and so on.
    - **A dedicated storage area** on your development machine, in which is stored the device's user data (installed applications, settings, and so on) and emulated SD card.
- You can create as many AVDs as you need, based on the types of devices you want to model and the Android platforms and external libraries you want to run your application on.

Emulators:

- The Android Emulator simulates Android devices on your computer so that you can test your application on a variety of devices and Android API levels without needing to have each physical device.
- The **Android emulator** is an **Android Virtual Device (AVD),** which represents a specific Android device.
- We can use the Android emulator as a target device to execute and test our Android application on our PC.
- The Android emulator provides almost all the functionality of a real device.
- We can get the incoming phone calls and text messages.
- It also gives the location of the device and simulates different network speeds.
- Android emulator simulates rotation and other hardware sensors. It accesses the Google Play store, and much more
- Testing Android applications on emulator are sometimes faster and easier than doing on a real device.
- For example, we can transfer data faster to the emulator than to a real device connected through USB.
- The Android emulator comes with predefined configurations for several Android phones, Wear OS, tablet, Android TV devices.

Dalvik Virtual Machine (DVM):

- The Dalvik Virtual Machine (DVM) is an android virtual machine optimized for mobile devices. It optimizes the virtual machine for memory, battery life and performance.
- Dalvik is a name of a town in Iceland.
- The Dalvik VM was written by Dan Bornstein.
- The Dex compiler converts the class files into the .dex file that run on the Dalvik VM.
- Multiple class files are converted into one dex file.

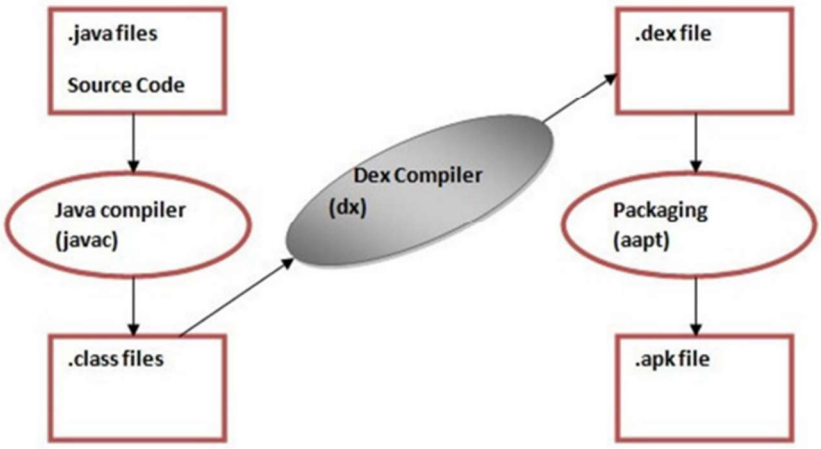


Fig: Compiling and packaging process from the source file.

- The javac tool compiles the java source file into the class file.
- The dx tool takes all the class files of your application and generates a single .dex file. It is a platform-specific tool.
- The Android Assets Packaging Tool (aapt) handles the packaging process and it creates .apk file.

Difference between JVM and DVM:

DVM	JVM
DVM stands for Dalvik Virtual Machine	JVM stands for Java Virtual Machine
It is Register based which is designed to run on low memory.	It is Stack based.
DVM uses its own byte code and runs ". Dex" file	JVM uses java byte code and runs ".class" file
DVM has been designed so that a device can run multiple instances of the VM efficiently	Single instance of JVM is shared with multiple applications.
DVM supports Android operating system only.	JVM supports multiple operating systems.
For DVM very few re-tools are available	For JVM many re-tools are available.
There is constant pool for every application.	It has constant pool for every class.
Here the executable is APK.	Here the executable is JAR.

Steps to install and configure Android Studio and SDK:

Follow steps below for complete installation and configuration of Android Studio.

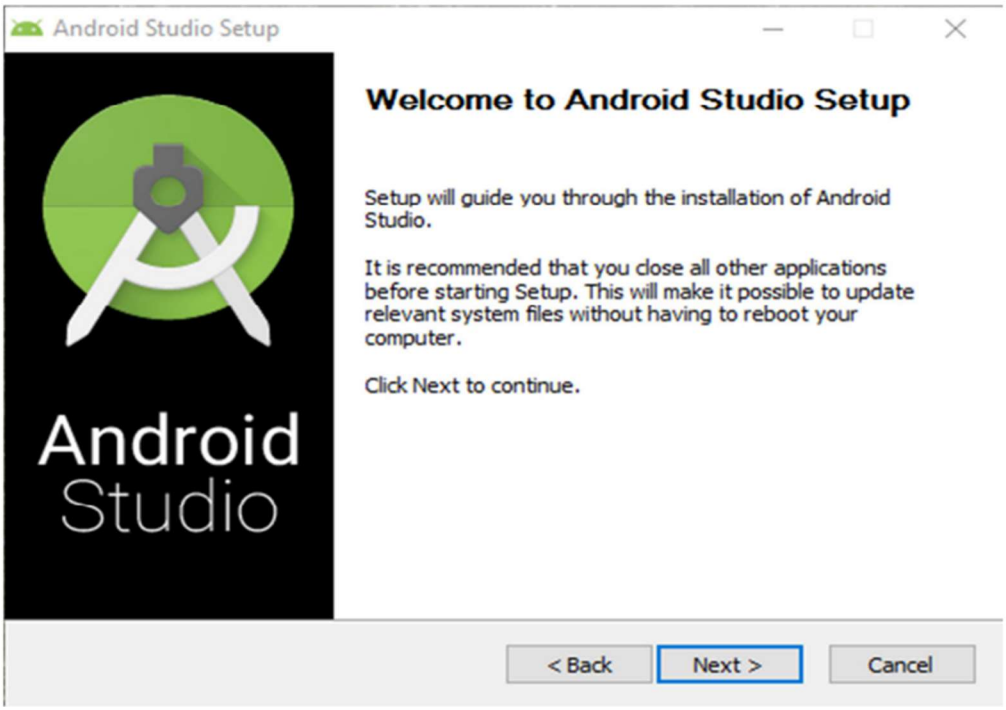
STEP-1: Download Android Studio

- You can download Android Studio from https://developer.android.com/ site. Following are the pre requirements for windows operating system.
- Pre-requirements
  - Microsoft windows 7/8/10 (32 or 64 bits)
  - Minimum 3GB RAM (recommended 8GB)
  - 2GB disk space
  - 1280 x 800 minimum screen resolution size
  - Intel processor for accelerated emulator
  - Android SDK

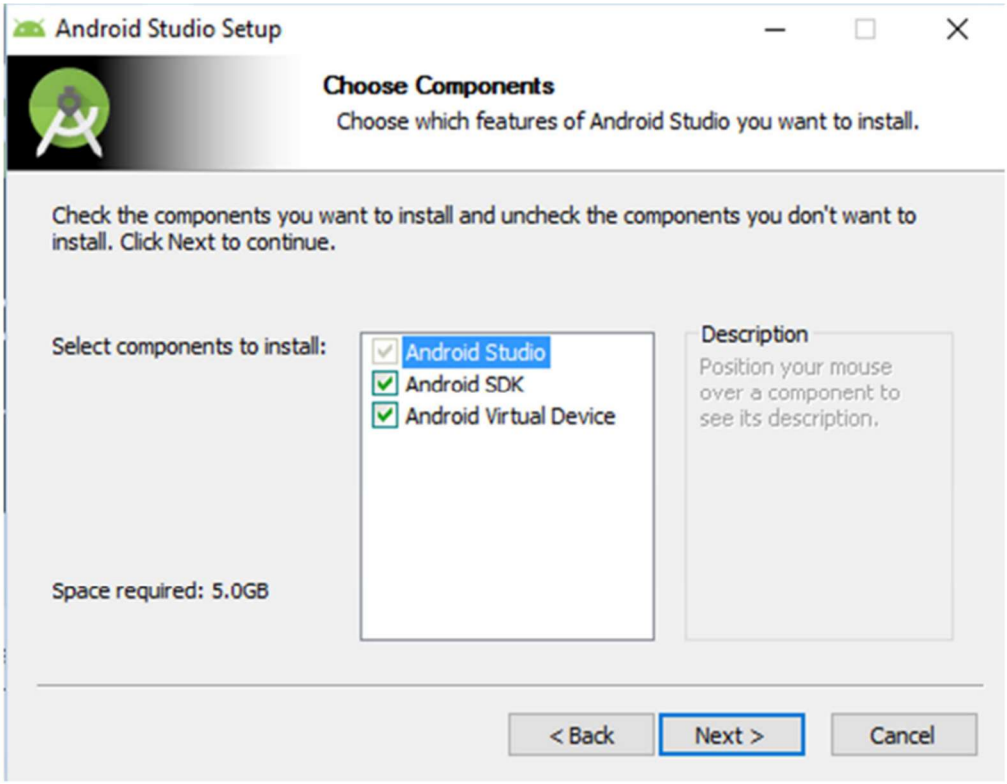
  Note: If you don't have Android SDK, you can download with Android studio. Go to the end of download's page and find android-studio-bundle-162.4069837-windows.exe it includes SDK also.

STEP-2: Run .exe file

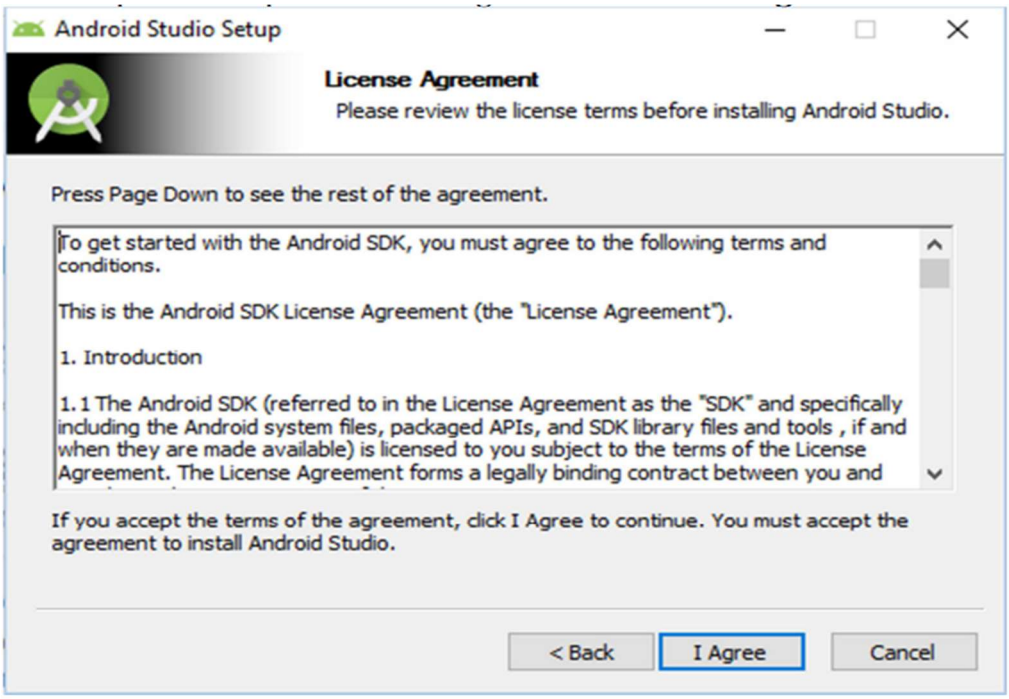
- Now the next step is to launch .exe file you just download. Following screen will appear



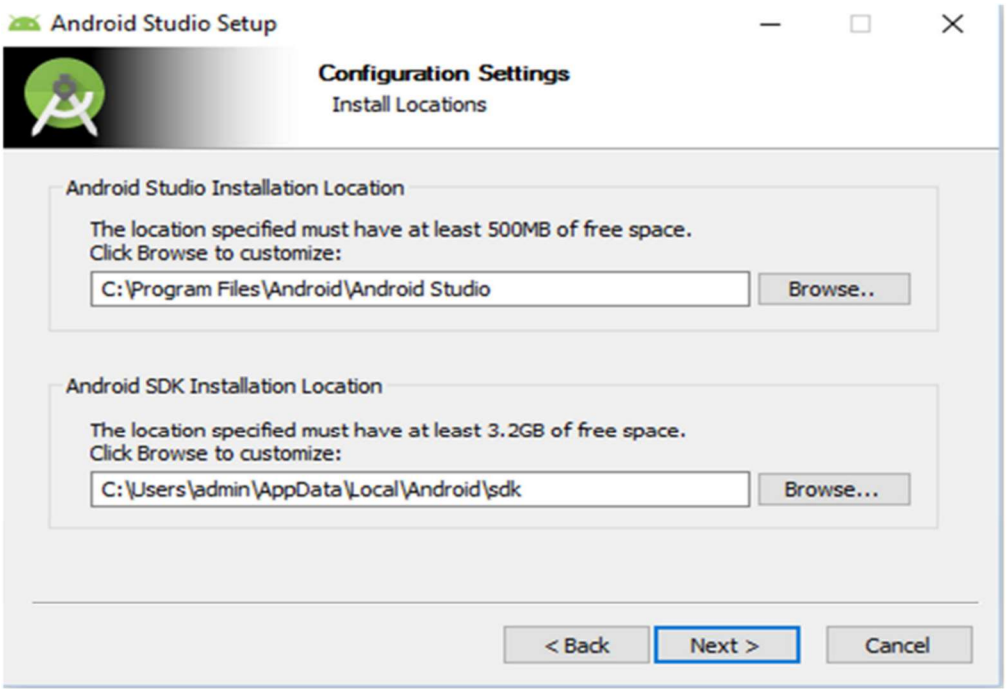
- Click next and select Android SDK checked if you don't have it already. Better is to leave the default settings. Make sure Android virtual device is also checked.



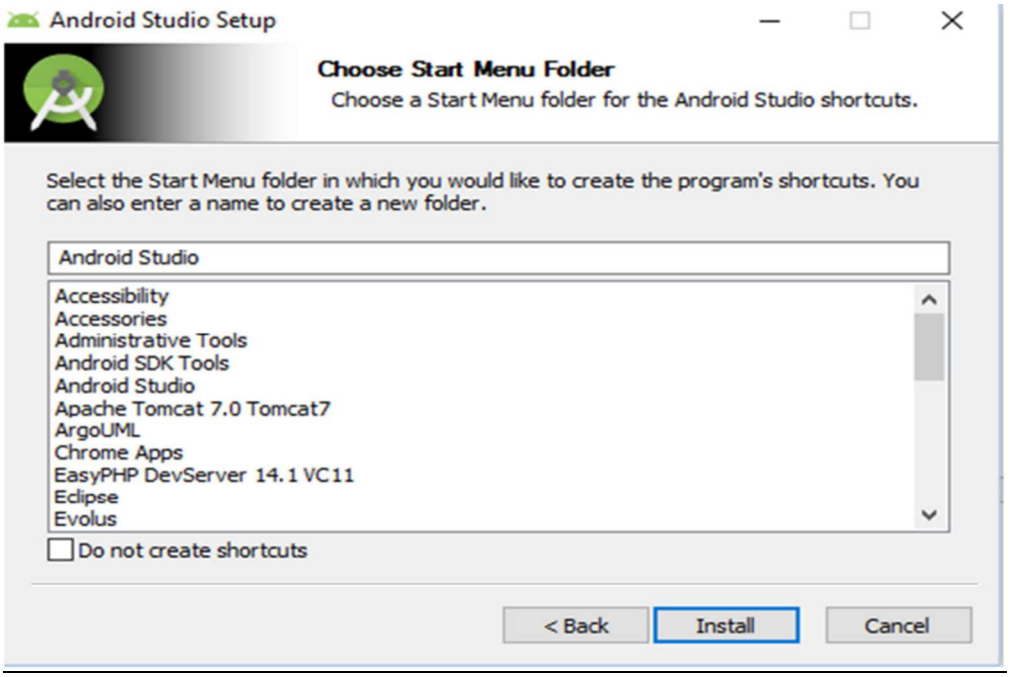
- Next step is to accept license and agreement. Click on I Agree



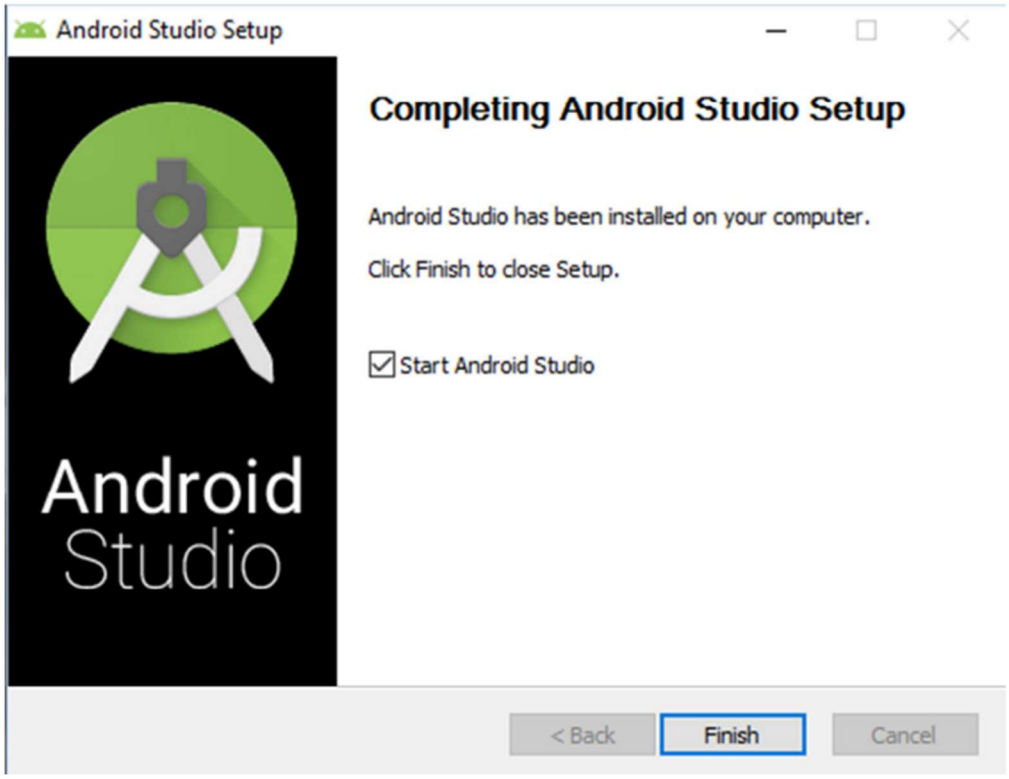
- Next step is to set location of installation. Please make sure your disk has minimum required space before clicking on Next.
- For Android Studio installation location must have at least 500MB free space.
- For Android SDK installation, selected location must have at least 3.25GB free space.



- Next step is to choose the start menu folder, where you want to create shortcut. If you don't want to create a shortcut just mark Do not create shortcut.



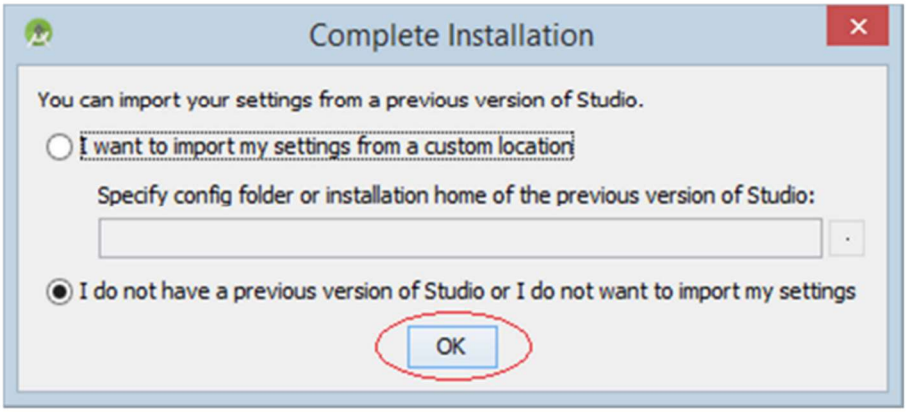
- And hit Install button. It will start installation. Once it's done following window will appear.



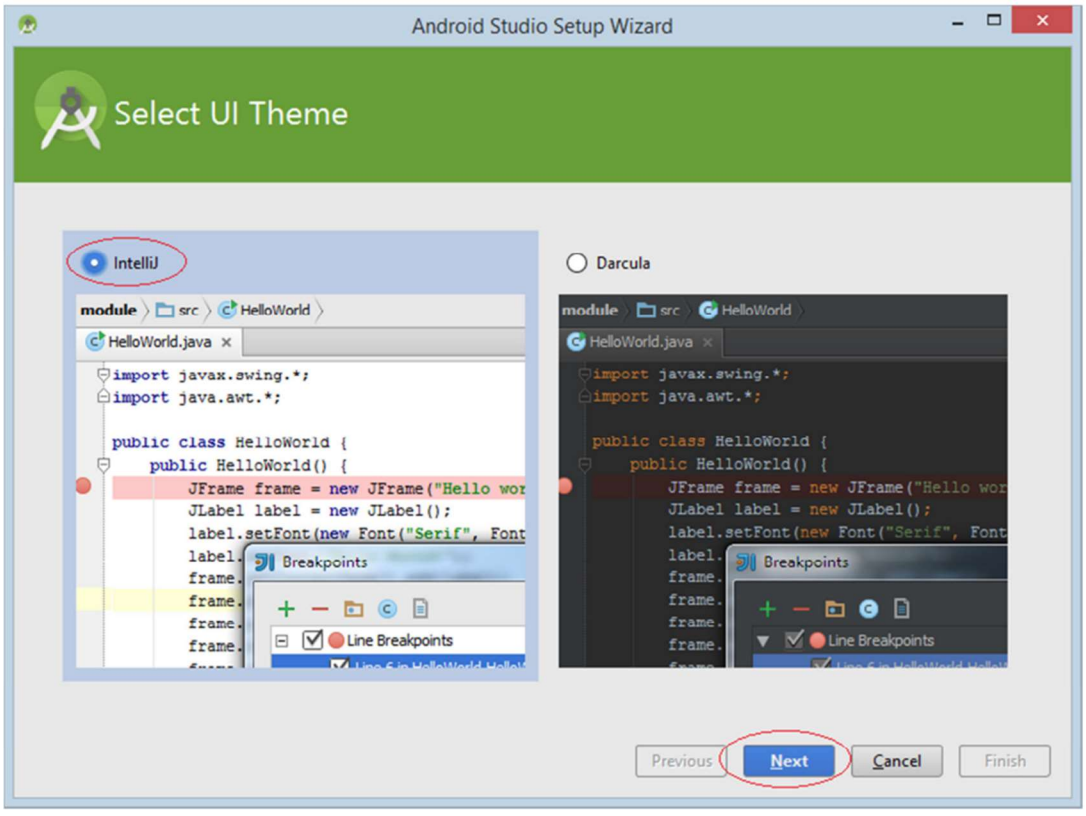
- This informs you installation has completed. Click Finish. Make sure Start Android Studio is checked. Following splash screen of Android Studio will appear.

STEP-3: Configure Android Studio

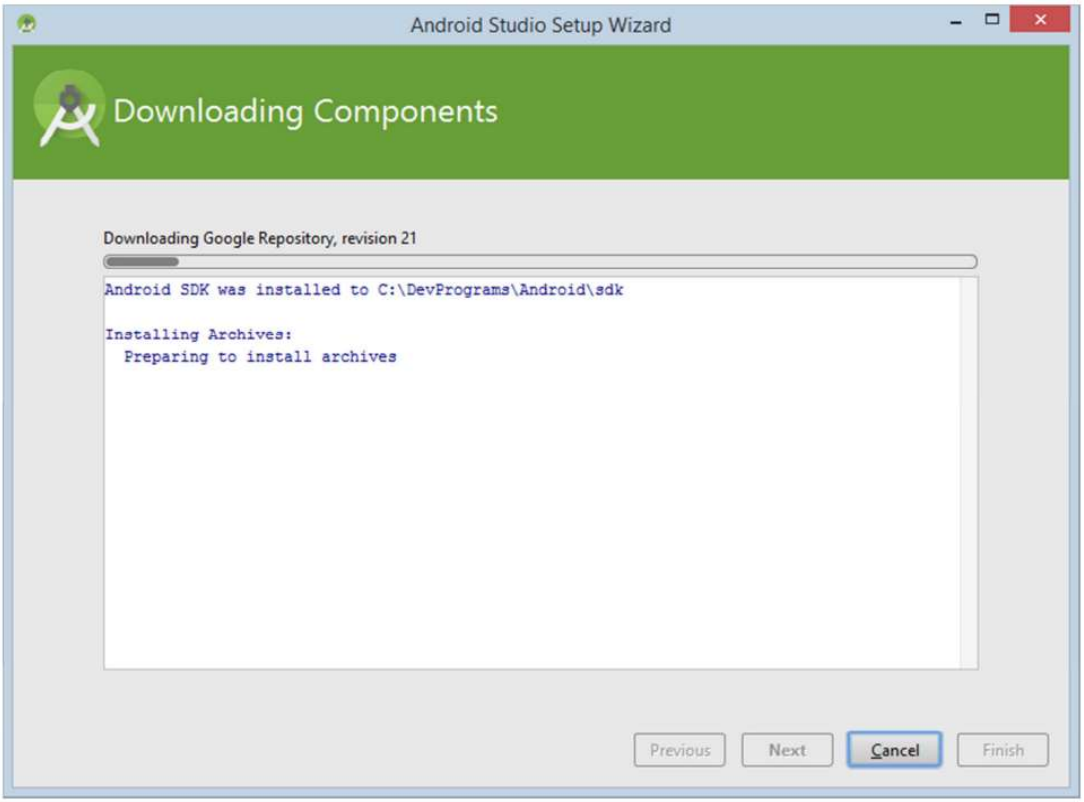
- When you run it for the first time it will ask for Android Studio settings.



- If you don't have any previous settings click on the second option (I don't have a previous version of Studio or I don't want to import my settings).
- Select a theme and click next.



- At the very first run it needs to download some necessary components, wait till it completes.



- And it's all done. Click on Finish and start building your Android apps.