Appium Intro & Architecture

BY MITHILESH SINGH

APPIUM??

- Appium is mobile web, native and hybrid software application test automation tool developed and supported by sauce labs.

PREREQUISITE TO USE APPIUM (WINDOW)

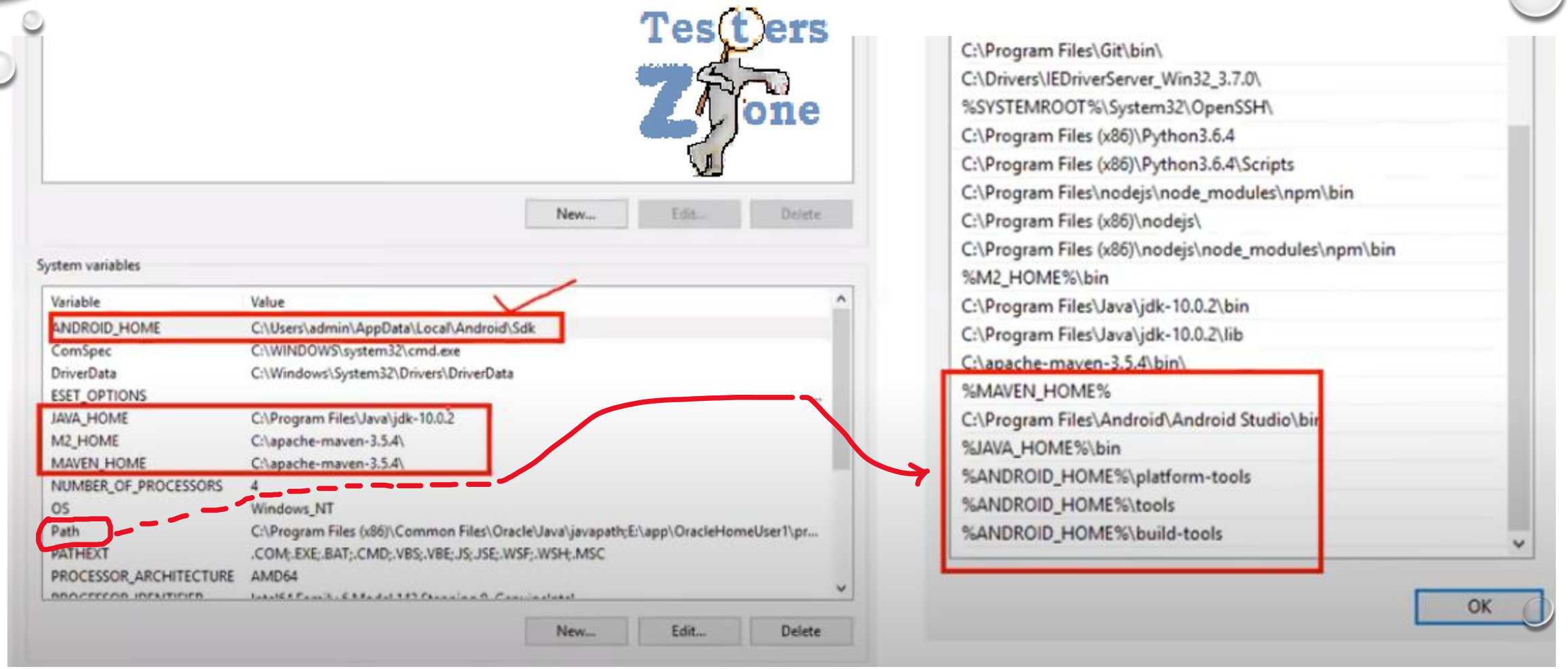
INSTALL JAVA.
ECLIPSE/INTELLIJ.
MAVEN PLUGIN FOR IDE.
TESTNG PLUGIN FOR IDE.
SELENIUM STANDALONE SERVER.
ANDROID STUDIO.
APPIUM SERVER/ APPIUM DESKTOP.

NOTE: FOR JAVA AND IDE INSTALLATION YOU CAN PREFER MY RESPECTIVE DOCS, HERE WE WILL BE DEALING WITH ANDROID STUDIO AND APPIUM INSTALLATION.

APPIUM INSTALLATION ON WINDOW

- **Steps by step guideline to install Appium in the Window System.**

- Download java and set Java_Home in environment variables.
- Download Android STUDIO from below link
- Https://developer.android.com/studio/index.html
- Check Android installation path in Machine
- Set Android_Home Environment variables path to SDK location and include bin folder paths in PATH variable
- Open Android Studio and configure Virtual device/Emulator
- Open Emulator and check if it is working
- Download Node.js
- https://nodejs.org/en/download/
- Set Node_Home Environment variables path
- Set npm Environment variables path
- Download Appium Server from Node – command is available in the next slide
- Download Appium Java Client library--(https://appium.io/downloads.html)
- Install IDE(Eclipse or Intellij)—> Create project and configure Appium libraries
- Start Appium server


Testers Zone
New...
Edit...
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System variables
Variable
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ANDROID_HOME
C:\Users\admin\AppData\Local\Android\Sdk
ComSpec
C:\WINDOWS\system32\cmd.exe
DriverData
C:\Windows\System32\Drivers\DriverData
ESET_OPTIONS
JAVA_HOME
C:\Program Files\Java\jdk-10.0.2
M2_HOME
C:\apache-maven-3.5.4\
MAVEN_HOME
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OS
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C:\Drivers\IEDriverServer_Win32_3.7.0\
%SYSTEMROOT%\System32\OpenSSH\
C:\Program Files (x86)\Python3.6.4
C:\Program Files (x86)\Python3.6.4\Scripts
C:\Program Files\nodejs\node_modules\npm\bin
C:\Program Files (x86)\nodejs\
C:\Program Files (x86)\nodejs\node_modules\npm\bin
%M2_HOME%\bin
C:\Program Files\Java\jdk-10.0.2\bin
C:\Program Files\Java\jdk-10.0.2\lib
C:\apache-maven-3.5.4\bin\
%MAVEN_HOME%
C:\Program Files\Android\Android Studio\bi
%JAVA_HOME%\bin
%ANDROID_HOME%\platform-tools
%ANDROID_HOME%\tools
%ANDROID_HOME%\build-tools
OK

Points to be remembered:

1. Appium is a node module which can be installed using npm (command line installor). Npm comes with node.js so once we install node.js we will get npm folder inside node.js folder structure. We have to set the node.js path in the environment variable also. Then we can use npm(**Node** Package Manager) to install the appium.

command: **npm install –g appium**

-g(global) indicates appium can be launched in your system without navigating to appium insttaled location. Open the CMD and type appium and press enter appium will be launched.

Note: if we want to install specific appium version, we can use this command:

npm install –g appium@<version>

Key notes

- 1. Android studio consists of android IDE. IDE helps to write and update the code and SDK helps to develop and test the mobile application, and android virtual device(avd)-->(emulator) to execute the automated test scenarios.
Note:: sdk folder path in window: path: **c:\users\admin\appdata\local\android\sdk**
- 2. Android studio will be present at location: **c:\programe files\android\android studio**
- 3. Android studio consists 2 parts: 1. SDK and 2. Android virtual device. But SDK does not present at the location where android studio folder exist. Both path is mentioned above.
- 4. Tools folder will not be available under SDK folder, to get it first we need to launch the android studio--> go to the **SDK tools** present next to the SDK platforms option --> check for the option "**android SDK tools**" from the list--> uncheck the "**hide obsolete packages**" option present bottom right corner--> click on apply and ok.
Note: **observe the next slide to get the more clarity.**

- Menus and Toolbars
- System Settings
  - Passwords
  - HTTP Proxy
  - Data Sharing
  - Updates
  - Memory Settings
  - Android SDK
- Notifications
- Quick Lists
- Path Variables
- **Keymap**
- **Editor**
- **Plugins** 1
- **Build, Execution, Deployment**
- **Kotlin**
- **Tools**

SDK Platforms | SDK Tools | SDK Update Sites

Below are the available SDK developer tools. Once installed, Android Studio will automatically check for updates.
Check "show package details" to display available versions of an SDK Tool.

Name	Version	Status
Android SDK Build-Tools 30-rc2		Update Available: 30.0.0 rc2
GPU Debugging tools		Not Installed
LLDB		Not Installed
NDK (Side by side)		Not Installed
Android SDK Command-line Tools (latest)		Not Installed
CMake		Not Installed
Android Auto API Simulators	1	Not installed
Android Auto Desktop Head Unit emulator	1.1	Not installed
Android Emulator	30.0.5	Installed
Android Emulator Hypervisor Driver for AMD Processors (installer)	1.4.0	Not installed
Android SDK Platform-Tools	29.0.6	Installed
Android SDK Tools (Obsolete)	26.1.1	Not installed
Documentation for Android SDK	1	Not installed
Google AdMob Ads SDK (Obsolete)	11	Not installed
Google Analytics App Tracking SDK (Obsolete)	3	Not installed
Google Cloud Messaging for Android Library (Obsolete)	3	Not installed
Google Play APK Expansion library	1	Not installed
Google Play Instant Development SDK	1.9.0	Not installed
Google Play Licensing Library	1	Not installed
Google Play services	49	Not installed
Google Play services for Froyo (Obsolete)	12	Not installed
Google USB Driver	12	Not installed
Google Web Driver	2	Not installed
Intel x86 Emulator Accelerator (HAXM installer)	7.5.6	Installed
NDK (Obsolete)	21.0.6113669	Not installed

Hide Obsolete Packages | Show Package Details

OK | Cancel | Apply | Help

DOWNLOAD APPIUM ON MAC

- **Install java JDK latest version, or older version as per your need.**
  Link: https://www.oracle.com/technetwork/java/javase/downloads/index.html
- **Install android studio from this link** https://developer.android.com/studio/#mac-bundle
- **Set java AND ANDROID home path using a terminal, type this command in the terminal:**
  Open -e .zshrc
  we have to install zsh first: use below command to do this:
  1. brew install zsh
  2. sh -c "$(curl -fssl https://raw.githubusercontent.com/robbyrussell/oh-my-zsh/ Master/tools/install.Sh)" --> (This will install oh-my-zsh, it is a framework which helps to maintain .zshrc configuration file)
  note: if people want to know about .Bash or .Zshrc file, visit this link: https://linuxhint.com/differences_between_bash_zsh/
- **It will open the .zshrc in edit mode. Now you can edit java_home, android _home**
- **Copy these commands and set your own username and JDK version:**
  export JAVA_HOME=/library/java/javavirtualmachines/jdk1.8.0_192.Jdk/contents/home
  export ANDROID_HOME=/users/<username>/library/android/sdk
  export PATH=$/library/java/javavirtualmachines/jdk1.8.0_192.Jdk/contents/home/
  bin:$path
  export PATH="/users/ <username> /library/android/sdk/platform-tools":$path
  note: now, java and android home environment variable has been set.
- **Download appium desktop and install it FROM BELOW link :** https://github.Com/appium/appium-desktop/releases

Types of mobile application

Web application:

- Web app is real application, it is actually websites that open in your smartphone with help of a web browser. Mobile websites have the broadest audience of all the primary types of applications.

Native application:

- A native app is developed specifically for one platform. It can be installed through an application store (such as google play store or apple app store)

Hybrid application:

- Hybrid apps are a way to expose content from existing websites in app format. It can well described as a mixture of web app and native app.

Various Mobile OS

Operating System	Developed by	Popularity (Low, Medium, High)
Android	Google Inc	High
iOS	Apple Inc	High
Blackberry	Blackberry Ltd	Low
Windows	Microsoft Inc	Medium

What is an APK file?

- **APK: android application package**
- This is similar to .exe files which use to install programs on windows. The only difference is that .apk files are designed to be used exclusively on android device and you may be required to download additional files before you run the application in the android.
  Note:
  there are various sites from where we can easily download the .apk files for testing(learning) purpose.
- - https://www.apk4fun.com/
- - https://apkpure.com/

- We are going to test mobile applications means once after the application is developed, in android it will be apk file only. So to automate that application we need apk files. generally in real time we can get this apk files from the developer and for generic application we can download from play store too.

Emulator And Simulator

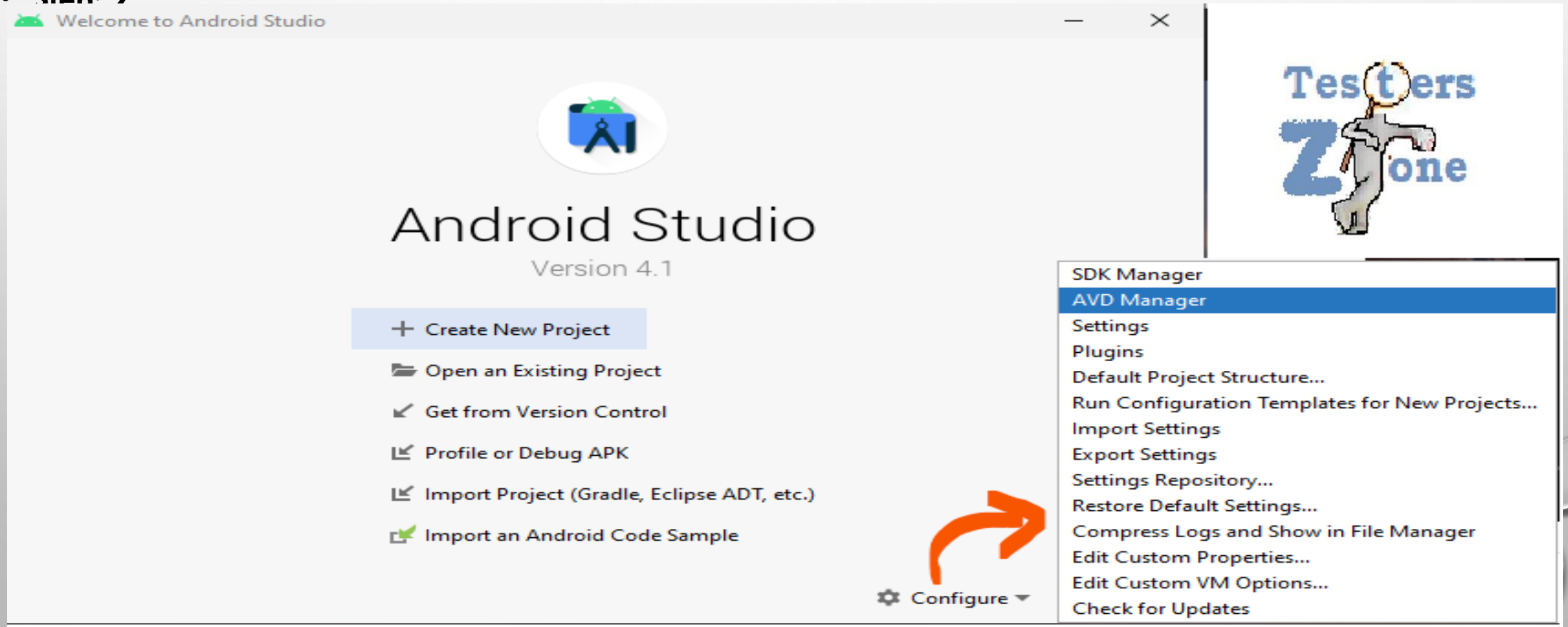
- **Emulator** and **simulator** are virtual devices. A virtual device is not real device but software which gives same functionality as the real phone(except few functionality like the camera).
- **Android virtual device. : emulator**
- **Ios virtual device. : simulator**

HOW TO CREATE VIRTUAL DEVICE(EMULATOR)

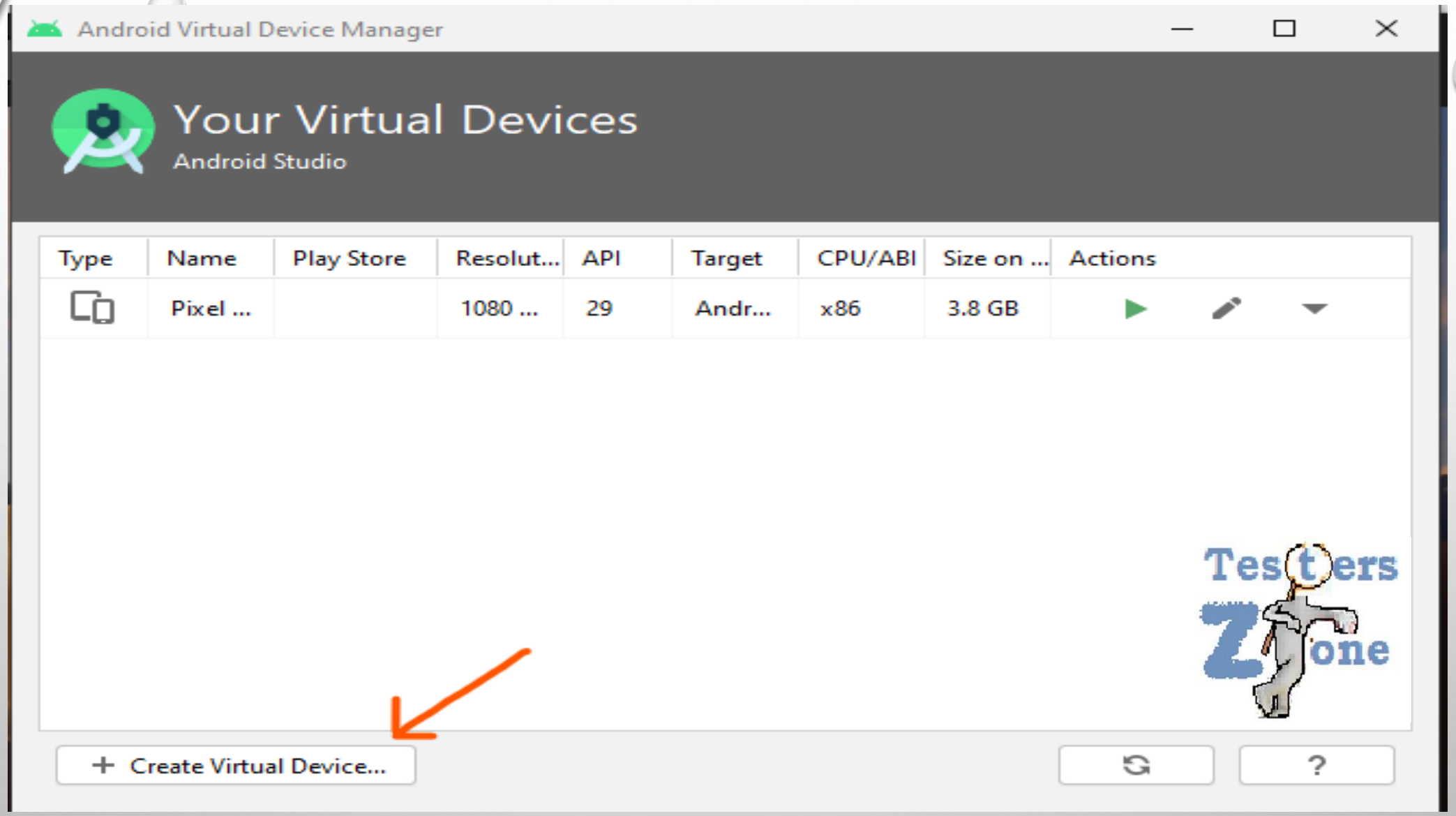
- **Step: 1**

  open android studio from desktop icon. If you don't get icon then navigate to this location. **C:\program files\android\android studio\bin** and double click on **studio64.** This will help you to launch android studio.

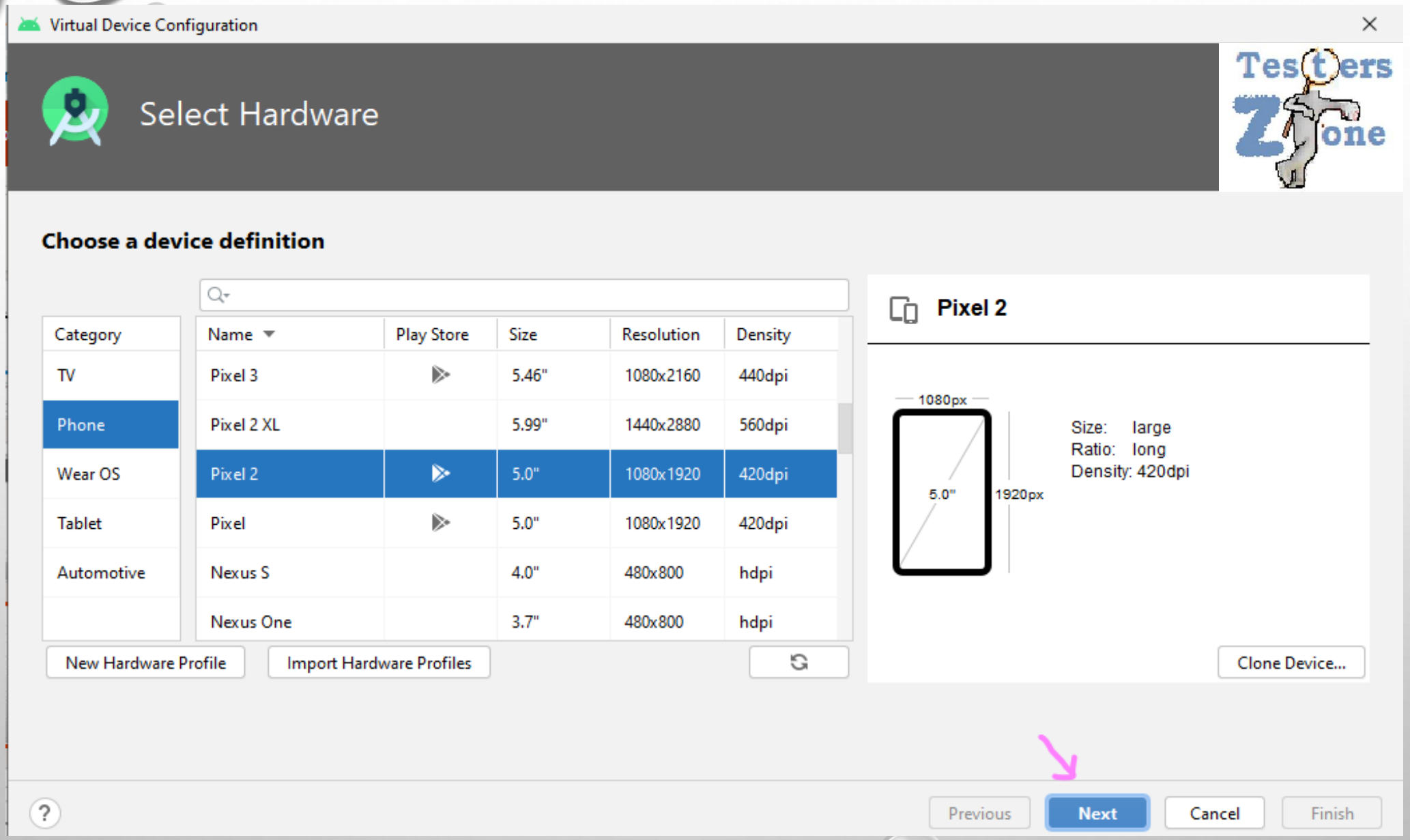
- **Step: 2**



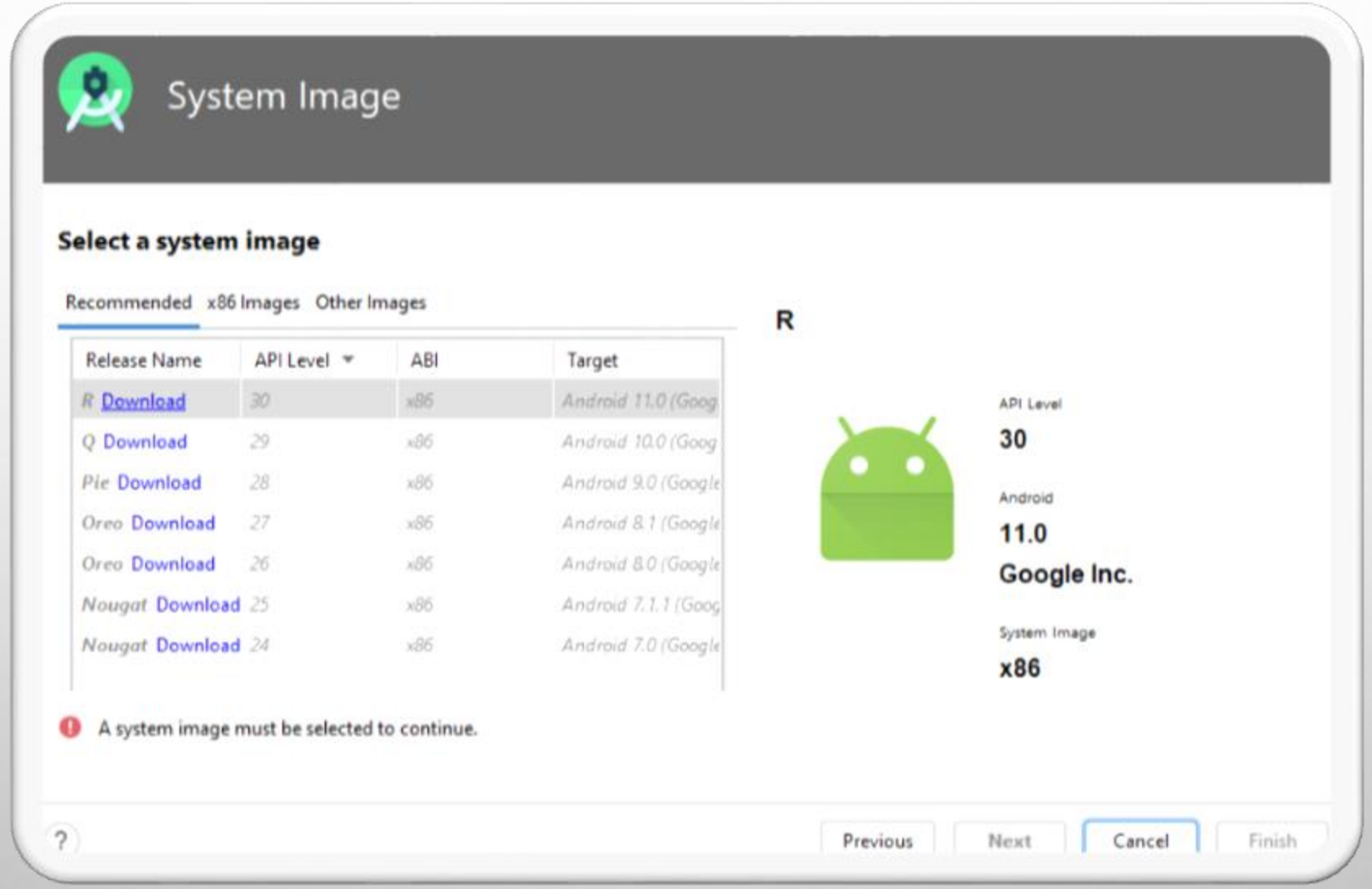
Step: 3


Android Virtual Device Manager
Your Virtual Devices
Android Studio
Type
Name
Play Store
Resolut...
API
Target
CPU/ABI
Size on ...
Actions
Pixel ...
1080 ...
29
Andr...
x86
3.8 GB
Testers Zone
Create Virtual Device...
?

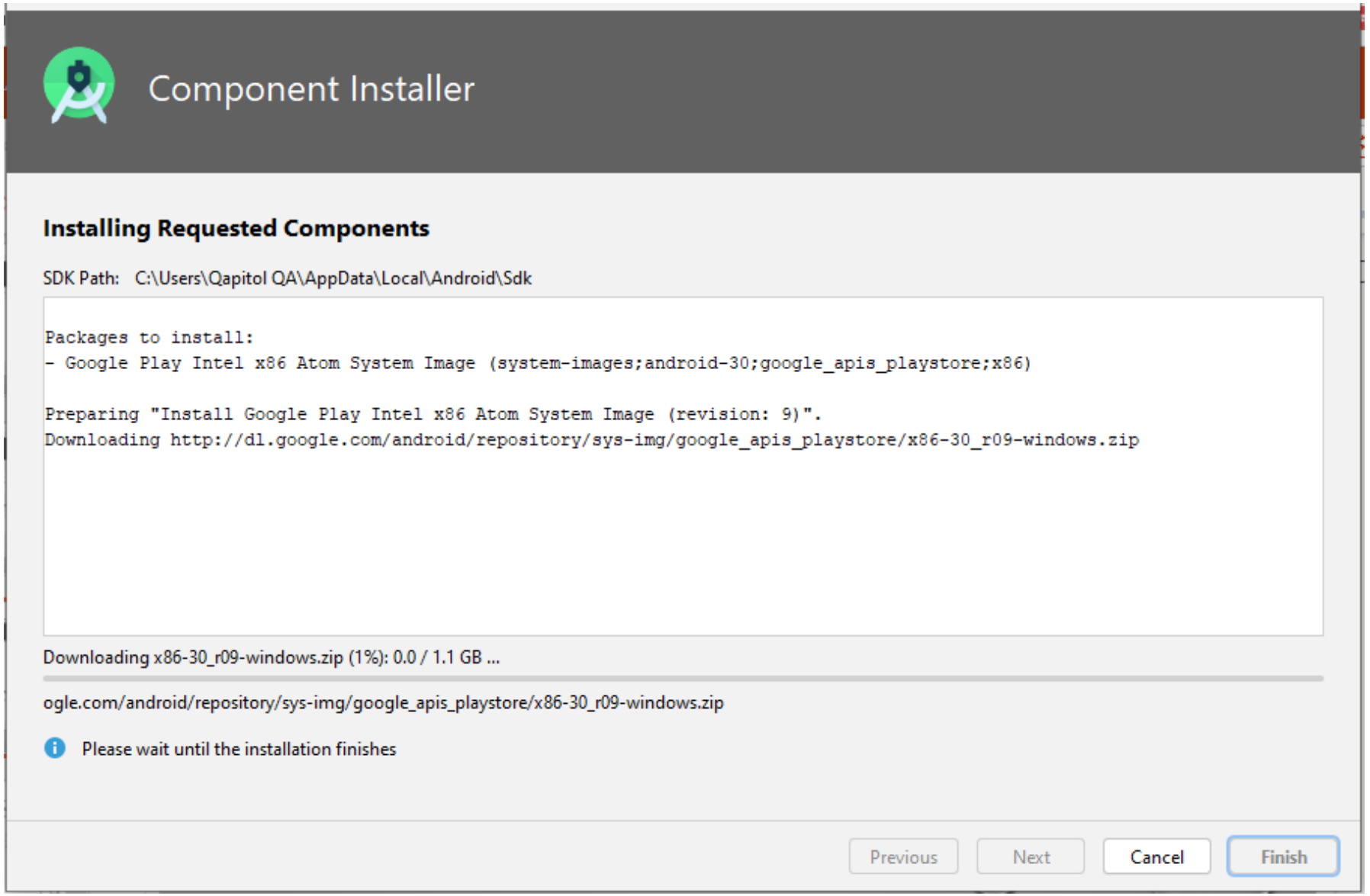
Select the device size and resolution and click on Next



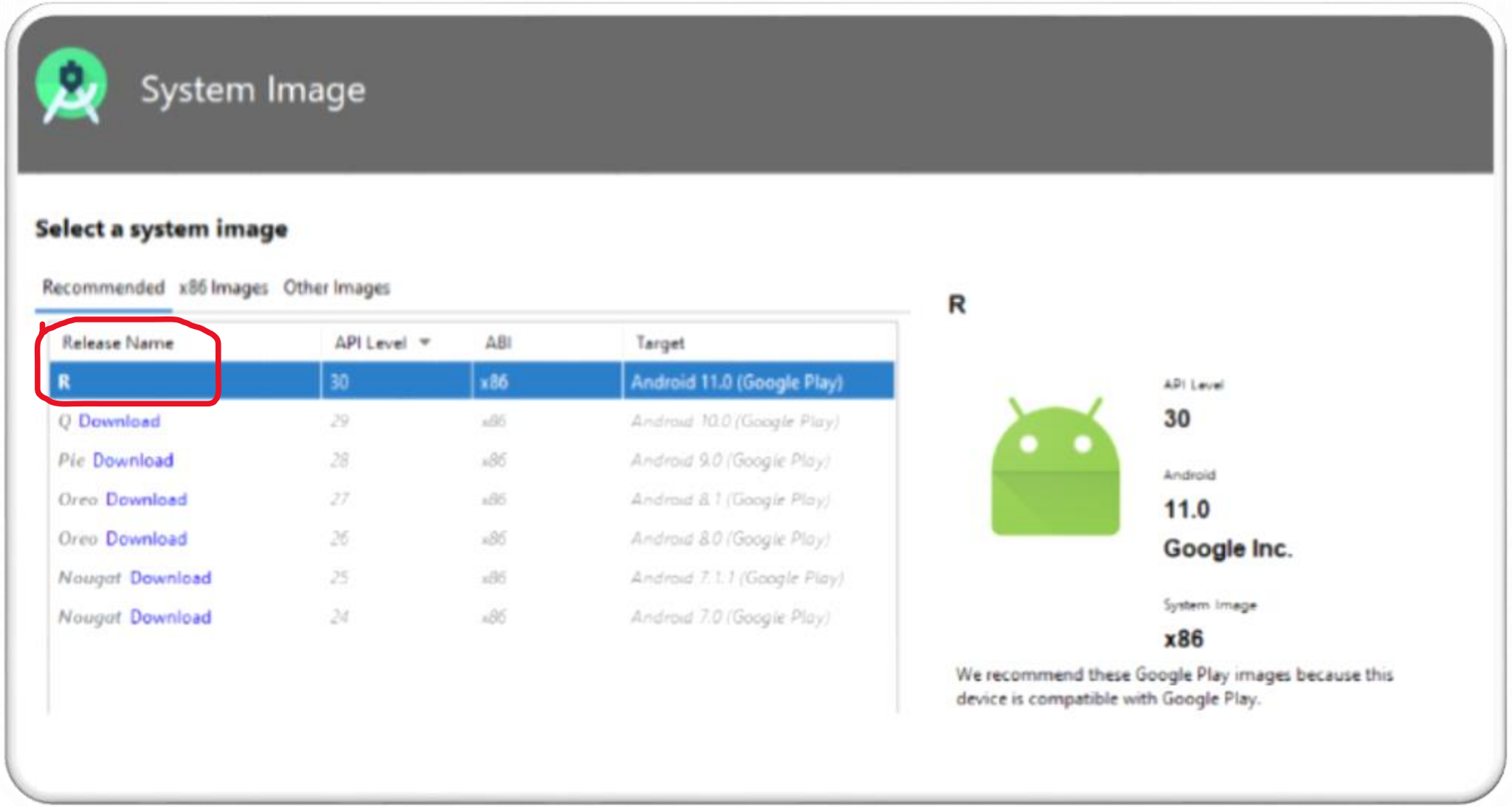
Select any android version and OS, and click on download option

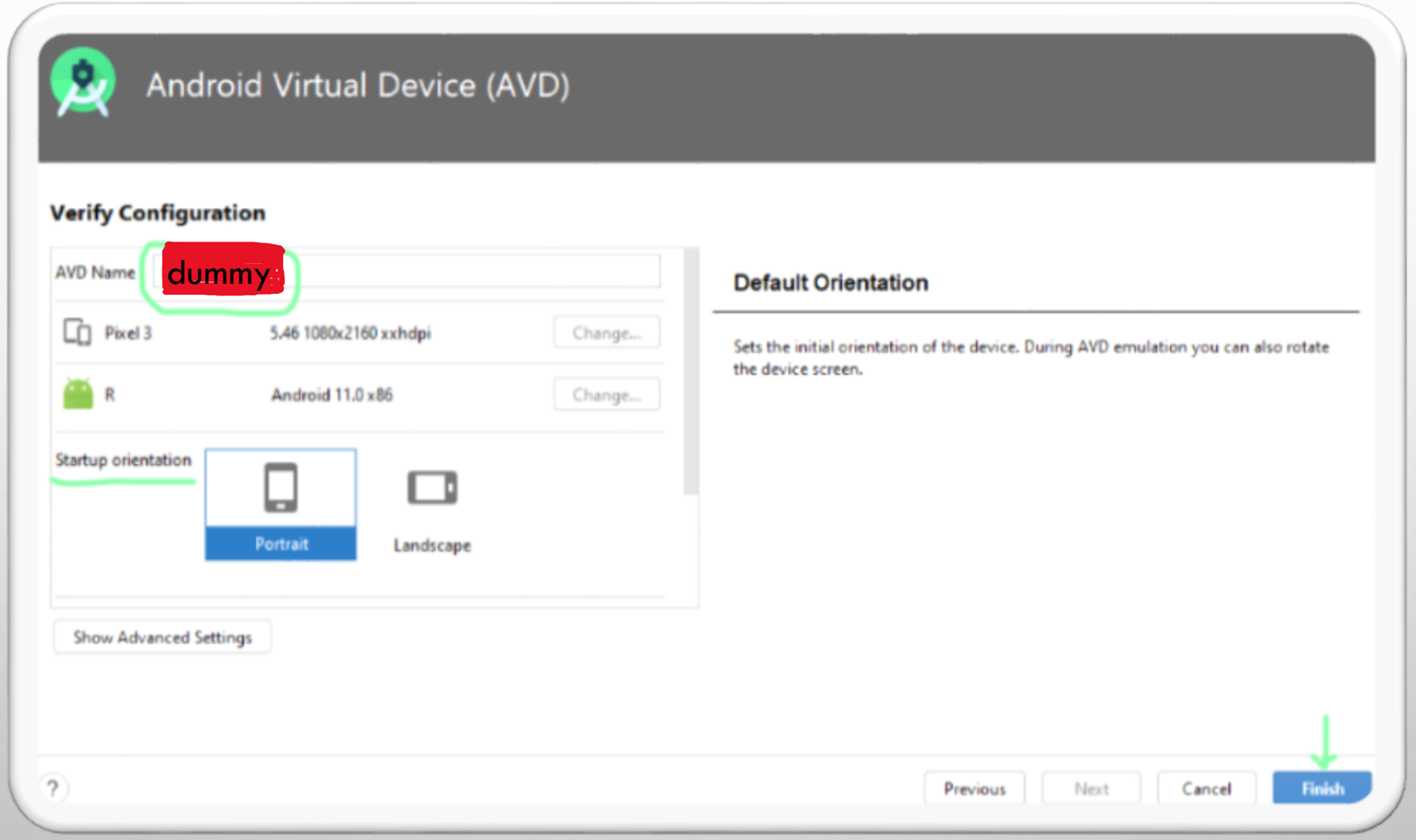


Once installation will start you will be getting this window. Let it be installed first and click **finish**



Selected version and OS have been downloaded. After downloading you will not be getting download option with release name. Click on next button

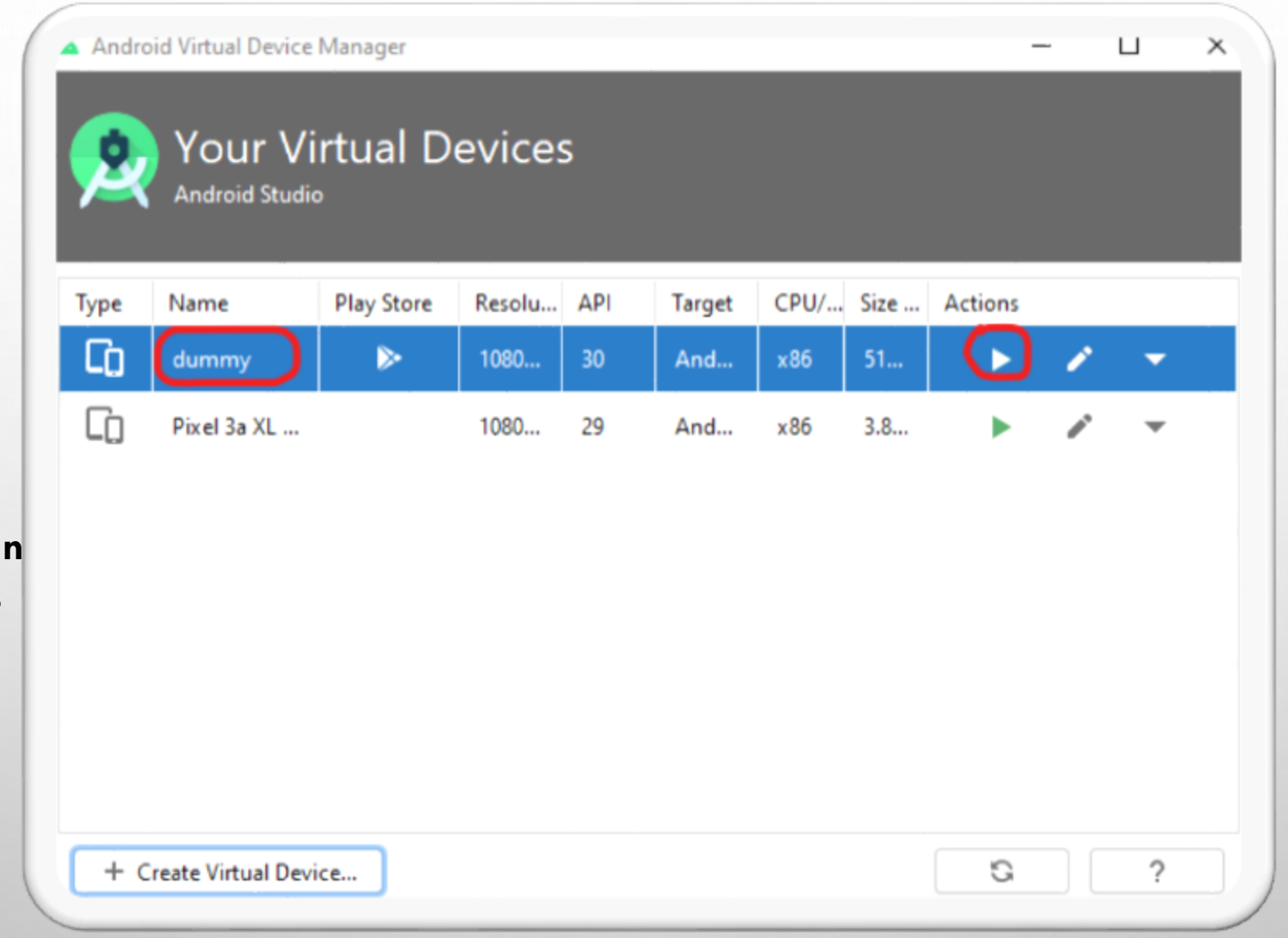




Enter the AVD name and select the orientation and click on finish button.

Note: I used AVD name = "dummy"

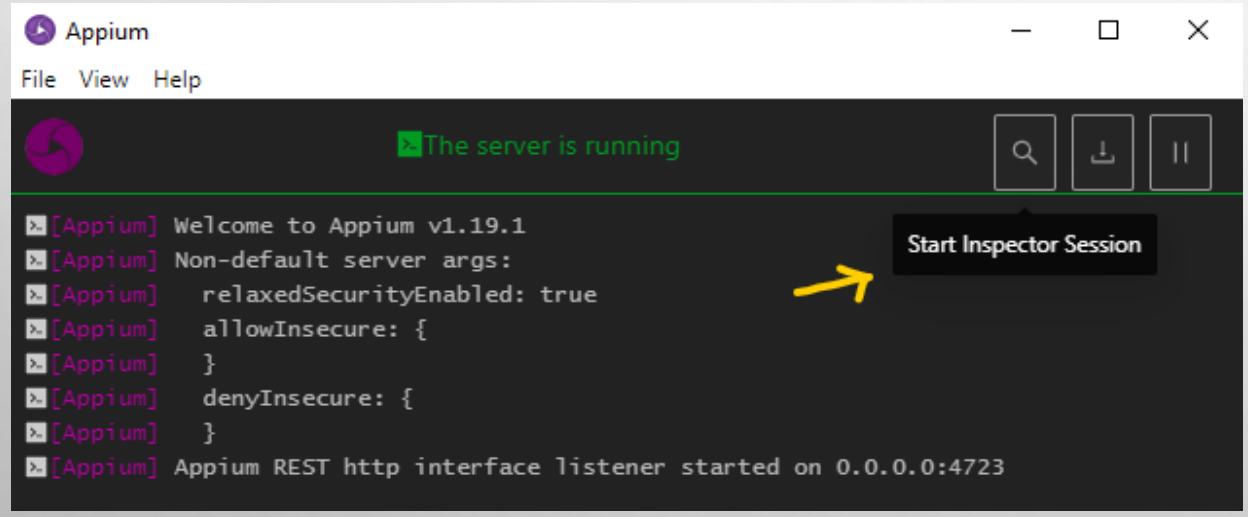
Virtual device has been created. We can verify with device name. It can be launch using play icon placed under the actions

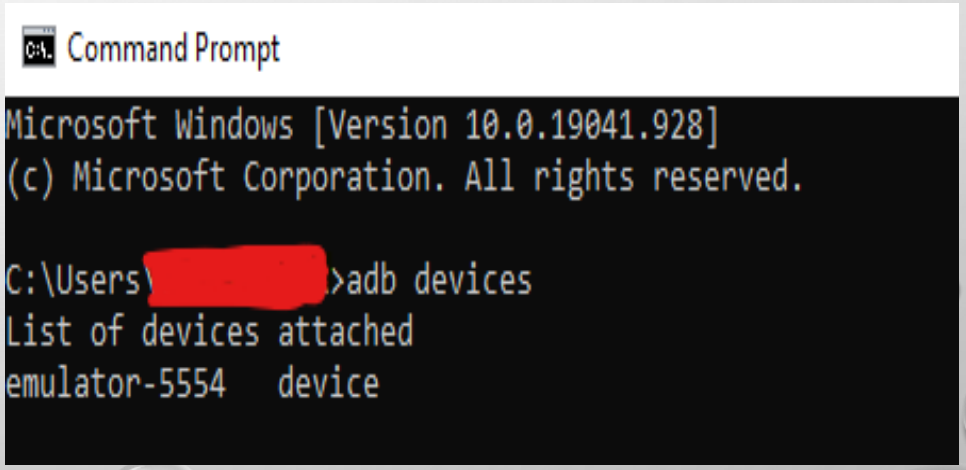


- Once you will click on the play button, the emulator/virtual device will be turned on and appear on the screen as shown in the image.

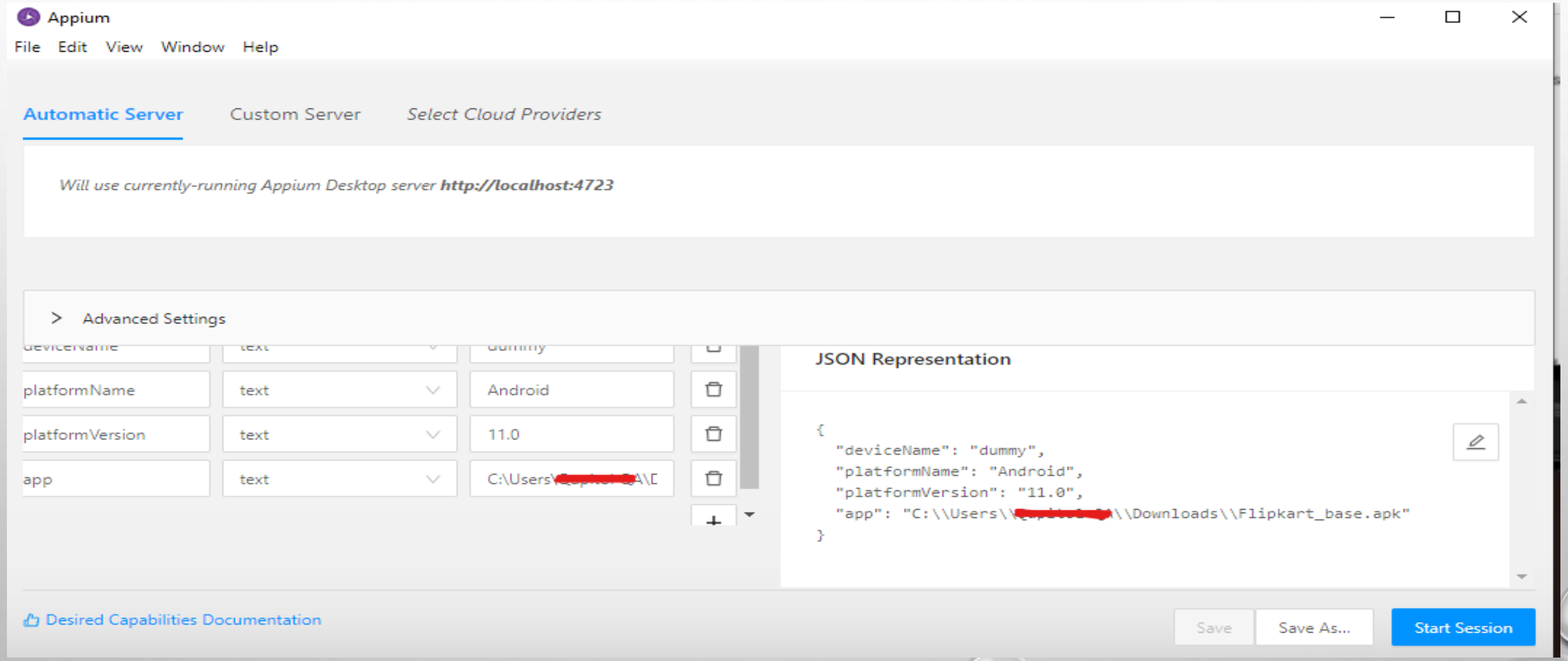
INSTALL APK FILE ON VIRTUAL DEVICE(EMULATOR) USING APPIUM SERVER DESKTOP

- **Step1**: launch the android studio click on configure--> AVD manager --> launch the emulator.
- **Step2**: launch the appium desktop and click on start inspector session(search icon).
- To check the device which are all connected with appium server just use adb command "adb devices" in cmd you will get device details



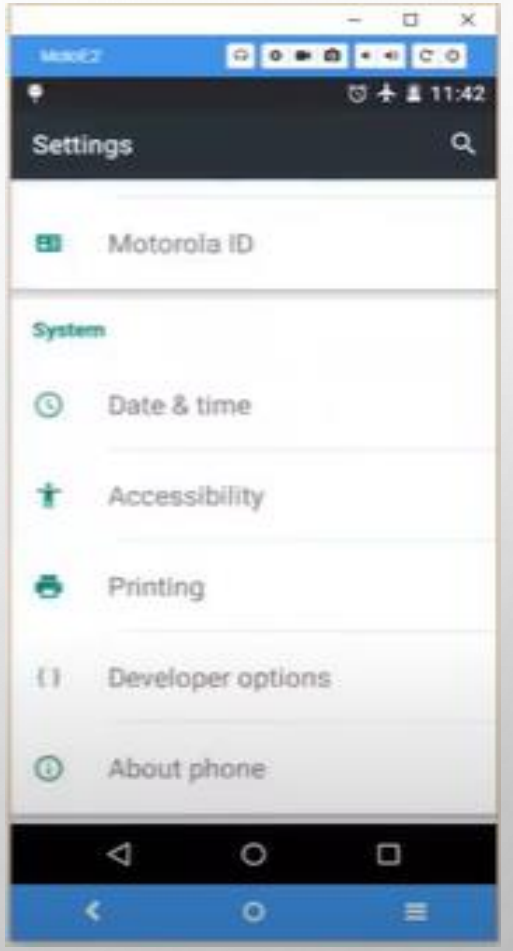


- To install the apk file in the emulator we need to add desire capabilities in the appium desktop specified below note: app is the key which takes apk file path as value and install the app in emulator.
  Click start session after saving the capabilities.



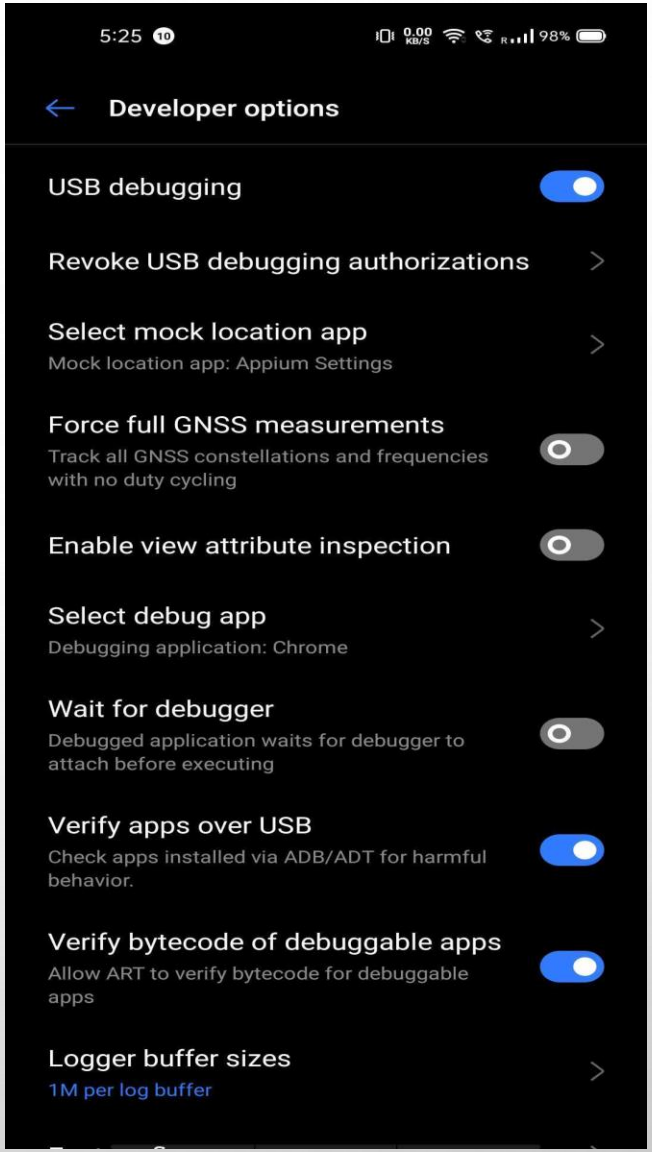
INSTALL APK FILE ON REAL DEVICE USING APPIUM SERVER DESKTOP

- Connect the device with your laptop and to see the mobile screen on the laptop screen use **vysor app.** It is available as a extension in the chrome browser.
- Go to **mobile setting –> about phone –> build number**. Tap on this build number 8-10 times then go back to the setting page and observe developer options will be available. It shows developer options is active now.



In the latest android mobile device we might not get build number option so in this case we can go to setting and search for developer options and turn on the usb debugging option shown in the screen

note: once developer option is on we can set the desire capabilities same as we did earlier. Only device name we need to change with real device name.



INSTALL APK(MOBILE APP) ON REAL DEVICE USING ADB commands

HERE IS THE FOLLOWING COMMANDS WHICH WE USE TO INSTALL apk

Kill the server : adb kill-server

Start the server : adb start-server

To check connected devices : adb.devices

Navigate to the folder where apk file is present and use this command: adb install <apk file name with .apk extension>

HOW MANY WAYS CAN INSPECT THE ELEMENT

- There are two ways to inspect the element in the appium

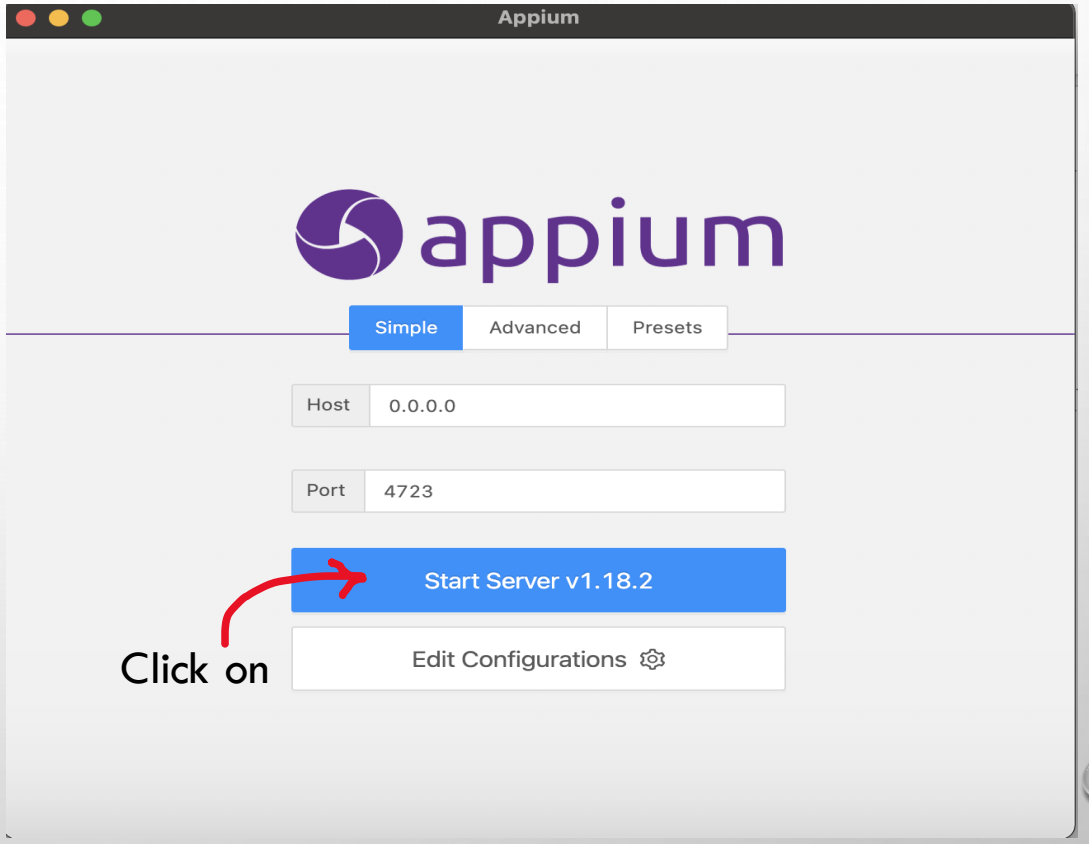
  1. Appium inspector

  2. Uiautomator

Steps to use "Appium Inspector"

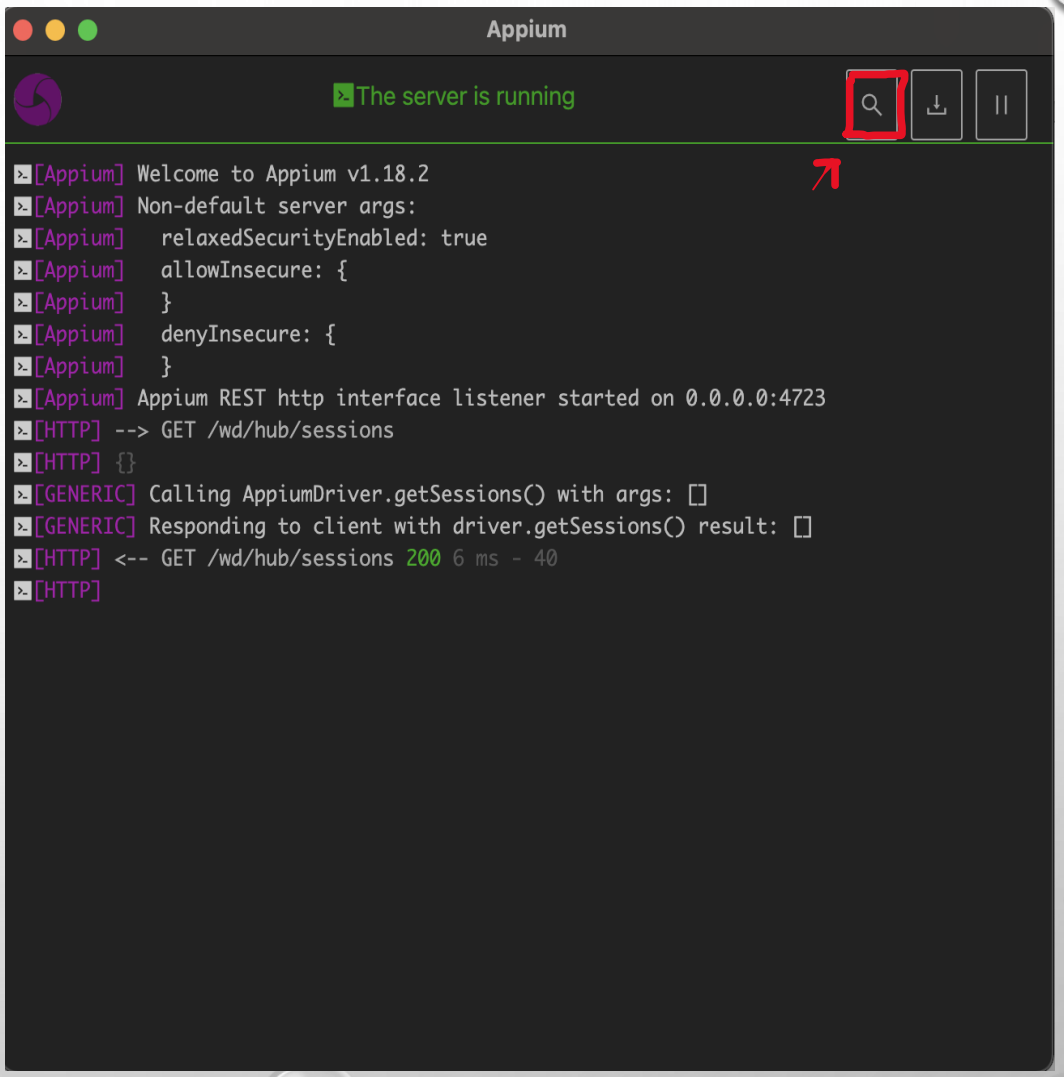
1. To Use appium inspector we need to launch appium server.

   Note: if appium is already installed we can launch it using command "appium in command line. Or we can open it using Appium Inspector shown in the screen.



Steps to use "Appium Inspector"

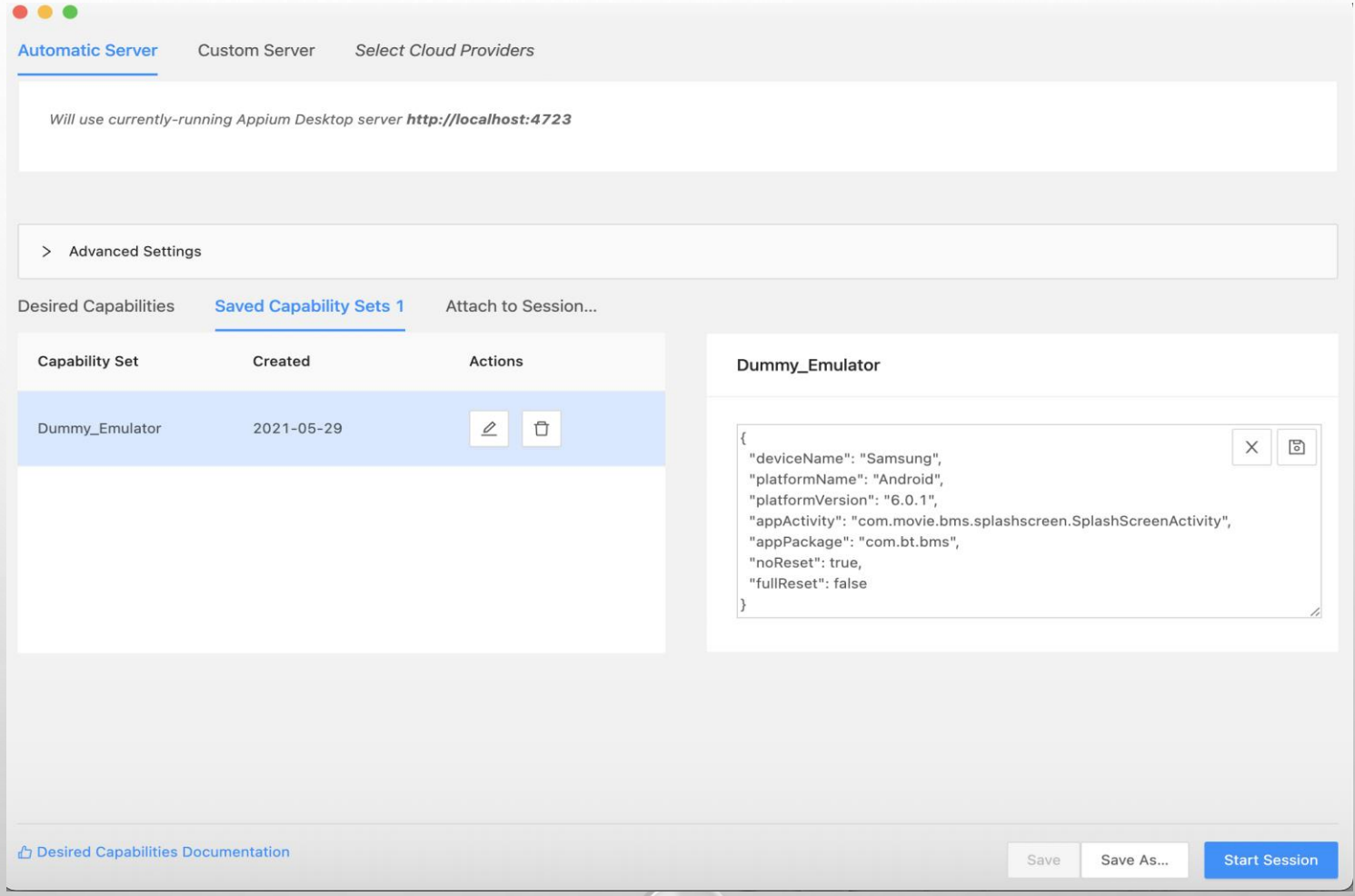
2. Click on search icon(present top right corner).



Steps to use "Appium Inspector"

3. One new window will appear where we need to fill device details as desire capabilities--> then click on Start Session. New screen will appear

4. Click on search icon present top middle place and mouse over on the mobile elements t o observe the locators.

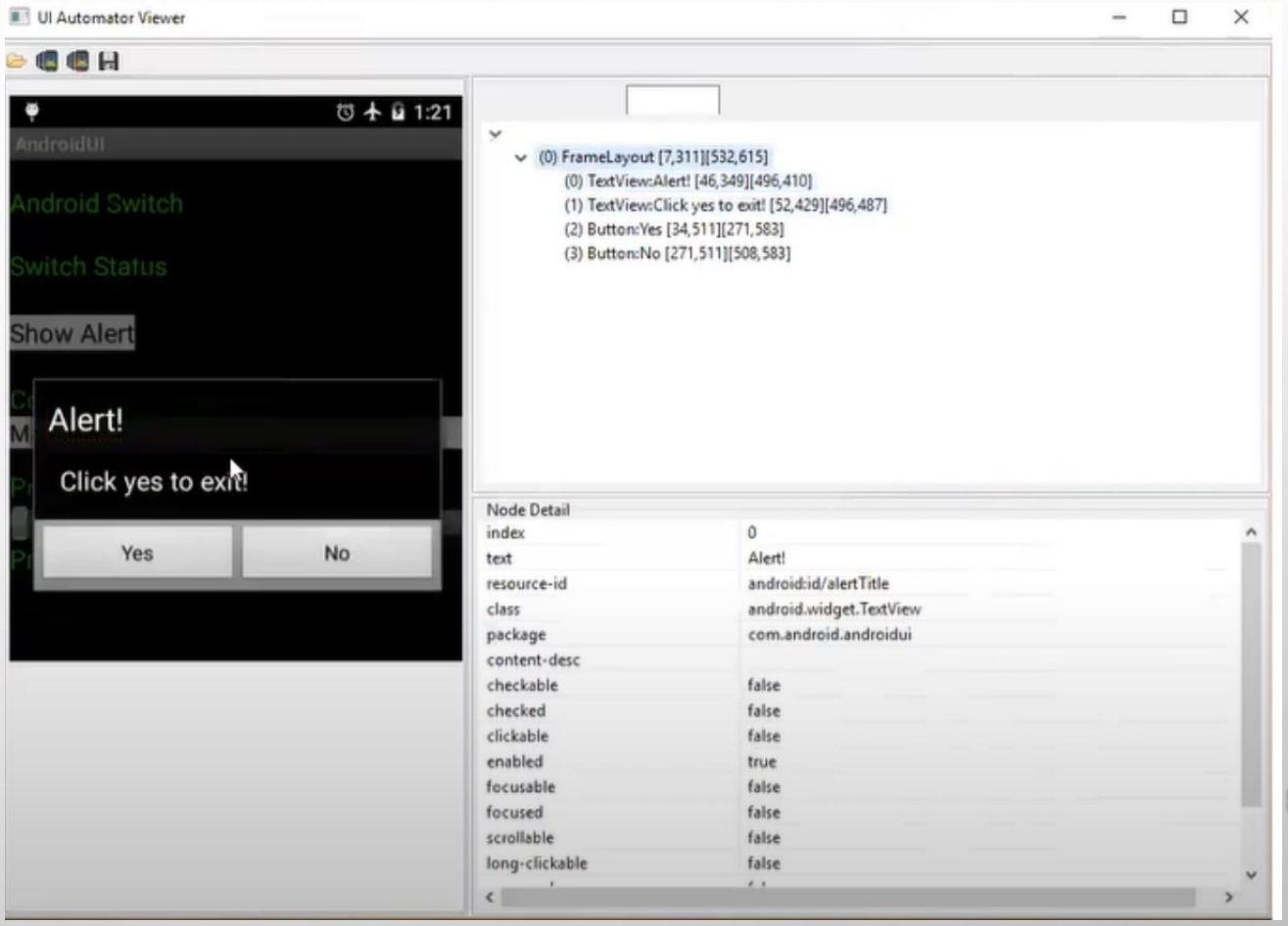


Steps to use "UI Automator"

- Launch uiautomator batch file from the location: c:\users\<xyz>\appdata\local\android\sdk\tools\bin

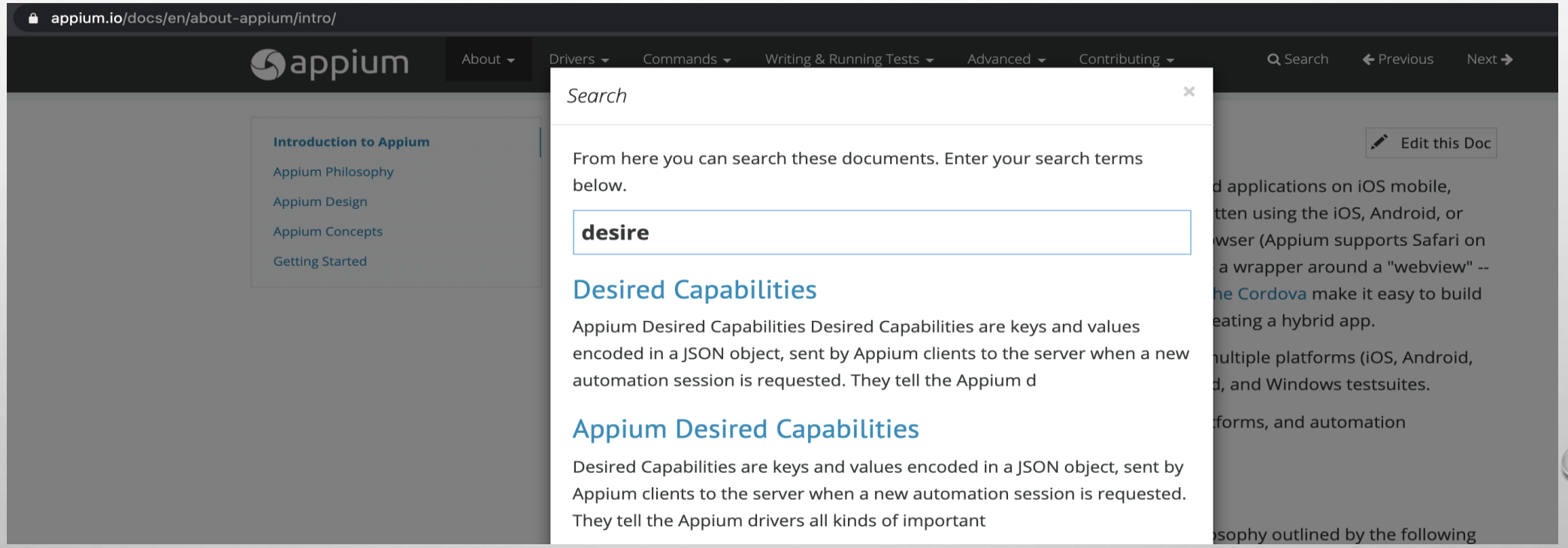
  Note: Click on Device screenshot option present top left corner on the screen. It will capture the screen of added mobile device on the UI Automator viewer screen. Now we can select locators from this screen

  Note: you will not be getting xpath on the screen, other locators can be used.



Desired capabilities

- We can get detail explanation on desired capabilities for appium under appium official website: **appium.io/docs/en/about/intro/**



Desire capabilities

- **For android:**

```
{
  "deviceName": "Samsung",
  "platformName": "Android",
  "platformVersion": "6.0.1",
  "appActivity": "com.movie.abc.splashscreen.SplashScreenActivity",
  "appPackage": "com.bt.abc",
  "noReset": true,
  "fullReset": false
}
```

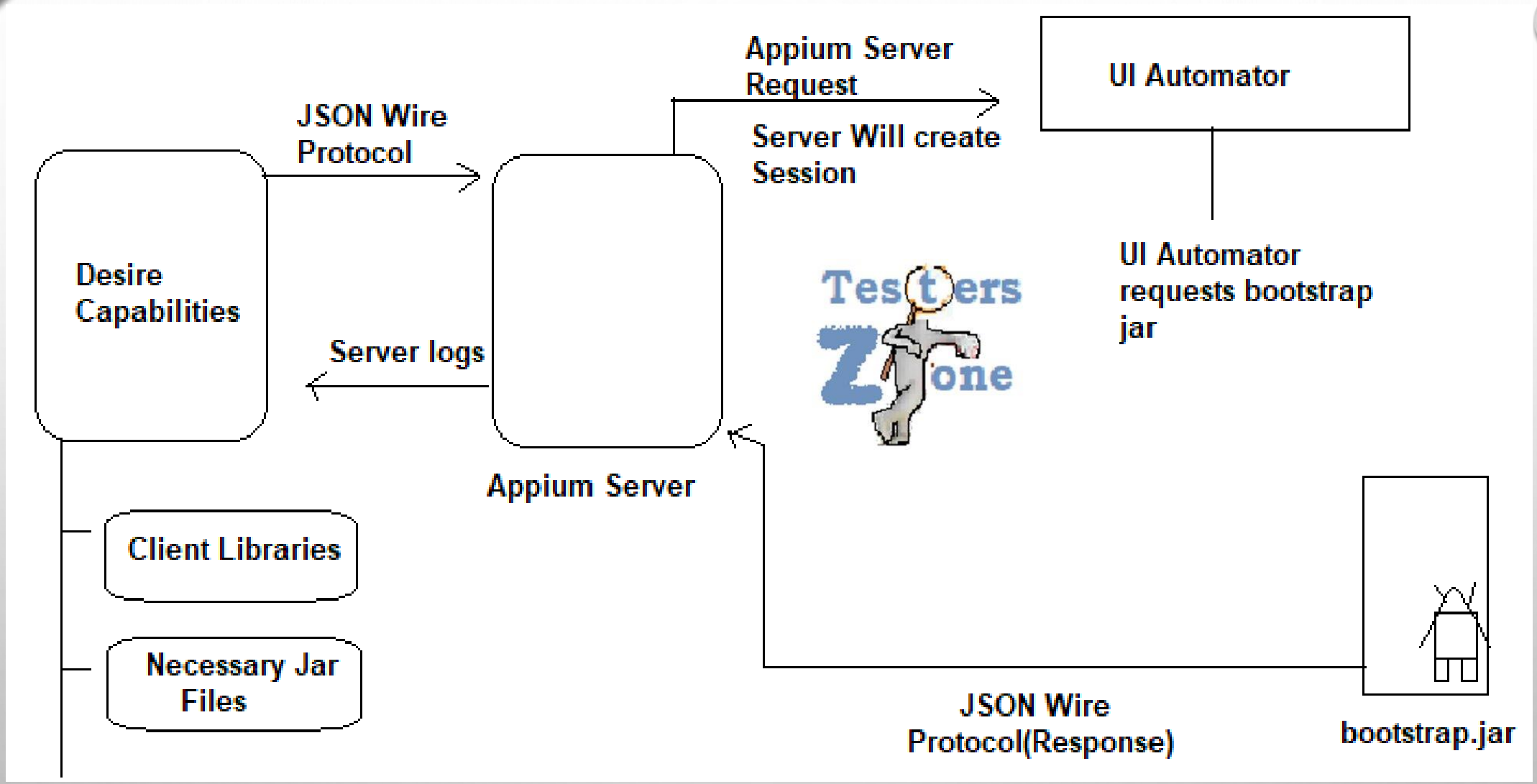
- **For IOS:**

```
{
  "platformName": "iOS",
  "udid": "00008030-0018255C3A92402E",
  "automationName": "XCUITest",
  "platformVersion": "14.4",
  "autoAcceptAlerts": false,
  "bundleId": "com.testerszone.testersZoneApp",
  "deviceName": "TestersZone iPhone",
  "app": /Users/mithilesh/Downloads/testerszone.ipa",
  "noReset": true
}
```

Here is example of iOS and android desired capabilities. To get more information about deviceName,PlateformName keys you can visit appium official website. Link mentioned in last slide.

There are so many other keys which we can explore based on needs.

APPIUM ARCHITECTURE


Appium Server Request
UI Automator
JSON Wire Protocol
Server Will create Session
Desire Capabilities
UI Automator requests bootstrap jar
Server logs
Testers Zone
Appium Server
Client Libraries
Necessary Jar Files
JSON Wire Protocol(Response)
bootstrap.jar

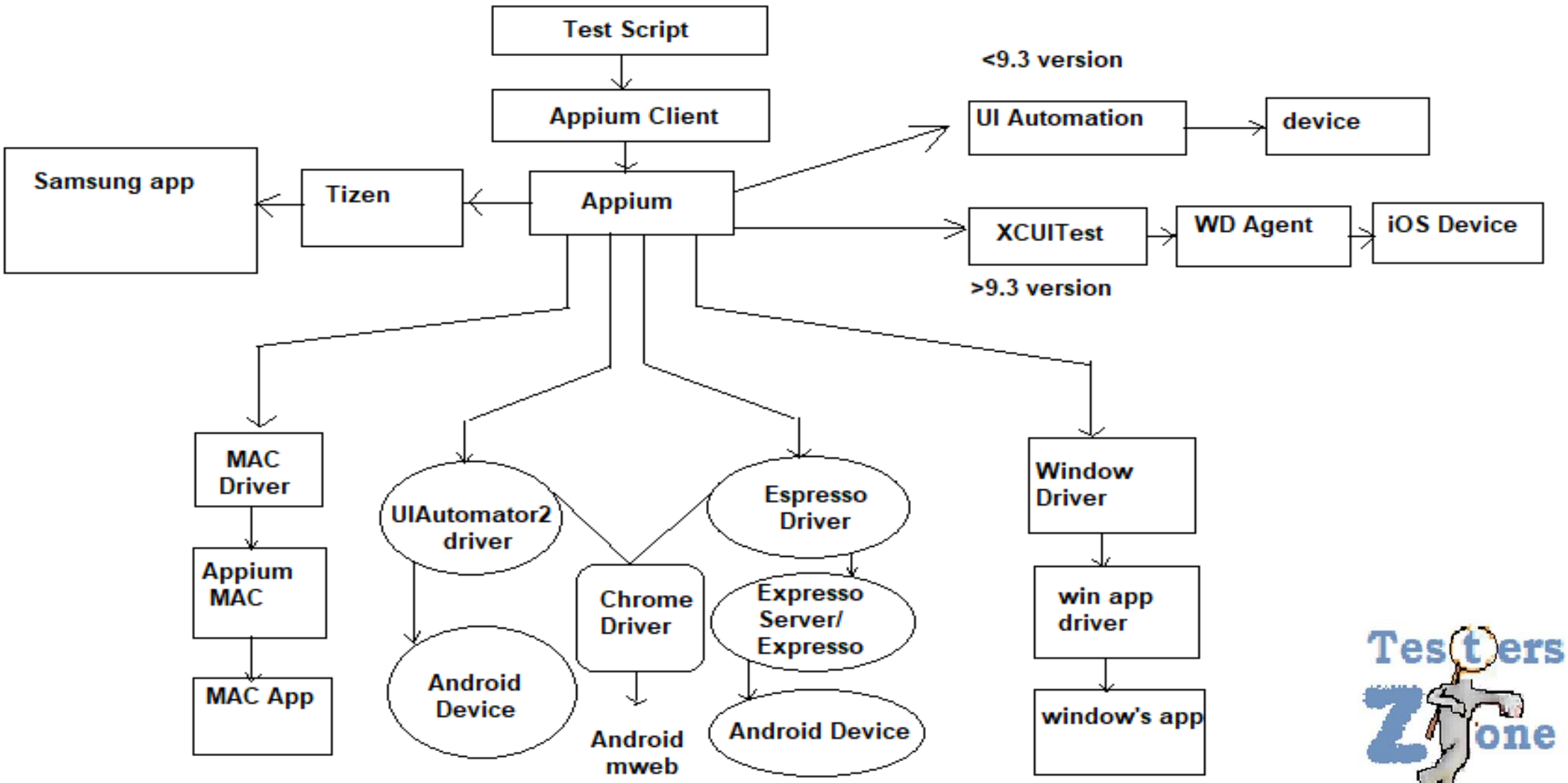
Appium Server Architecture for Android:

1. As per diag. We use any programming language as a client library to write the script(automation script) in IDE(Eclipse or Intellij). We also use desire capabilities code under the IDE to make the server(Appium) understand which device, app version, and framework we are going to use.
2. these capabilities along with code request to the appium server using JSON protocol, Appium server takes request and create server session and request one API called UIAutomator(Android) or XCUITest(iOS),
3. This module(frameworks) selection happens based on desire capabilities passed as a client request.

Now UIAutomator uses bootstrap.jar to perform the action on the apps.
iOS XCUITest uses bootstrap.js to perform action on the application.

Note: UIAutomator is a framework developed by android developer which works for android greater than the 4.2 version. Below this version, we need selendroid in place of UIAutomator2.
Note: XCUITest framework is developed by Apple which works for iOS version > 9 below this we have one more framework called UIAutomation

Different drivers based on different plateforms



Advantages of Appium

- It is free and open source.
- It supports both android and ios.
- Automation tests for ios and android can be written using same API.
- Appium tests can be written using any language.
- No need to install any extra software on mobile device to support appium.

Limitations of Appium

- Configuration and time needed to setup appium for ios and android is complex.
- Automation support for android 4.1 or lower is not present.
- Appium inspector cannot be run on windows.

By Mithilesh Singh