

# A Script-Based Approach for Teaching and Assessing Android Application Development

## Getting Started Manual

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PDF: <https://www.dais.unive.it/~modesti/docs/toce2021.pdf>

Tools and sample apps available at: <https://paolo.science/android>

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This document describes:

- the installation and configuration of Android SDK and Android Studio to run the scripts described in the paper. While it mentions a specific version of the tools, it could be easily adapted to other versions.
- The configuration and basic usage of the user's scripts. More information and more usage examples are available in the `readme.txt` file.

For the admin's scripts refer to the `readme_admin.txt` file.

The performance of the environment may depend on the system configuration and workload. Double check the antivirus settings is performance is too slow.

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# Android SDK and Android Studio installation and configuration

## Installing Android Studio for Windows

Android Studio 2.3.3 can be downloaded from this link:

<https://redirector.gvt1.com/edgedl/android/studio/install/2.3.3.0/android-studio-bundle-162.4069837-windows.exe>

Different versions of Android Studio are available at this page.

<https://developer.android.com/studio/archive.html>

Gradle 4.1 can be downloaded from

<https://services.gradle.org/distributions/gradle-4.1-bin.zip>

The file needs to be extracted to C:\Program Files\Android\Android Studio\gradle\gradle-4.1

## SDK/AVD version

We are using Android Studio 2.3.3 and Android SDK API level 23

GRADLE\_VER=4.1

BUILD\_TOOLS=26.0.1

AVD=Nexus\_5\_API\_23

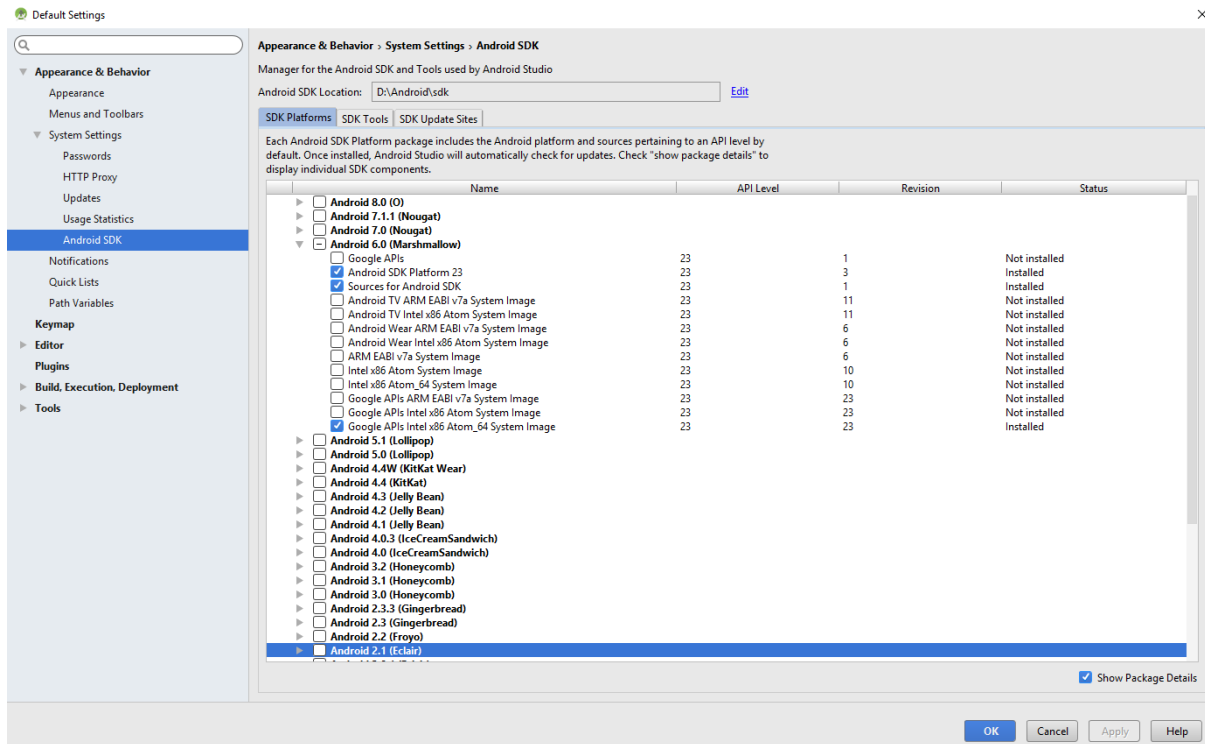
*The following steps will help you to check the configuration of Android Studio*

## SDK Configuration: Tools -> Android -> SDK Manager

The screenshot shows the 'Android SDK Manager' window in Android Studio. The 'SDK Tools' tab is selected, displaying a list of tools with their names, versions, and installation status. The 'Support Repository' section is expanded, showing 'ConstraintLayout for Android', 'Solver for ConstraintLayout', 'Android Support Repository, rev 47', and 'Google Repository'.

Name	Version	Status
<input checked="" type="checkbox"/> Android SDK Build-Tools		Installed
<input type="checkbox"/> GPU Debugging tools		Not installed
<input type="checkbox"/> CMake		Not installed
<input type="checkbox"/> LLDB		Not installed
<input type="checkbox"/> Android Auto API Simulators	1	Not installed
<input type="checkbox"/> Android Auto Desktop Head Unit emulator	1.1	Not installed
<input checked="" type="checkbox"/> Android Emulator	26.1.4	Installed
<input checked="" type="checkbox"/> Android SDK Platform-Tools	26.0.0	Installed
<input checked="" type="checkbox"/> Android SDK Tools	26.0.2	Installed
<input checked="" type="checkbox"/> Documentation for Android SDK	1	Installed
<input type="checkbox"/> Google Play APK Expansion library	1	Not installed
<input type="checkbox"/> Google Play Billing Library	5	Not installed
<input type="checkbox"/> Google Play Licensing Library	1	Not installed
<input checked="" type="checkbox"/> Google Play services	44	Installed
<input checked="" type="checkbox"/> Google USB Driver, rev 11	11.0.0	Installed
<input type="checkbox"/> Google Web Driver	2	Not installed
<input type="checkbox"/> Instant Apps Development SDK	1.0.0	Not installed
<input checked="" type="checkbox"/> Intel x86 Emulator Accelerator (HAXM installer)	6.2.0	Installed
<input type="checkbox"/> NDK	15.2.4203891	Not installed
<input checked="" type="checkbox"/> Support Repository		
<input checked="" type="checkbox"/> ConstraintLayout for Android		Installed
<input checked="" type="checkbox"/> Solver for ConstraintLayout		Installed
<input checked="" type="checkbox"/> Android Support Repository, rev 47	47.0.0	Installed
<input checked="" type="checkbox"/> Google Repository	58	Installed

## SDK Configuration (Packages): Tools -> Android -> SDK Manager (SDK Tools)



## AVD Configuration: Tools -> Android -> AVD Manager

Right click -> View details to view the VD configuration in a textual way (you may use it to build your on virtual device)

N.B.: you need to create the virtual device. In order to run it, virtualization need to be enabled on your system BIOS.



## Scripts configuration and usage (Windows OS)

The provided file contains all the scripts (developer + admin), and some sample applications. Therefore, it is sufficient to unzip all the files in the target folder (e.g.

C:\AndroidStudioProjects)

- Scripts.zip
- Admin.zip
- Apps.zip

There is a `readme.txt` file with documentation of the developer's scripts and their usage, and `readme_admin.txt` for the admin's scripts.

### Set Environment Variables

Environment variables "help" Android Studio to find some important folders in your system. Check the documentation of your operating system to see how to set such variables.

The following variable should be set (Paths are provided as an example. Use the actual path on your system)

```
JAVA_HOME=C:\Program Files\Java\jdk1.8.0_192
```

The folder where the JDK8 is installed

```
GRADLE_HOME=C:\Program Files\Android\Android Studio\gradle\gradle-4.1
```

The folder where are located the Gradle files used to build the applications

```
ANDROID_HOME=D:\Android\sdk
```

The folder where the Android SDK is located

```
ANDROID_SDK_HOME=D:\Android
```

The folder above your `.android` folder, where Android Virtual Devices configuration files are located

On Windows, you may use the `setenvnSDK.cmd` script, which must be run as an Administrator. (*Parameters are set in the `config.cmd` file*). Alternatively, variables can be configured by hand.

Other parameters are set in the `config.cmd`. Therefore, it is advisable to familiarise with this file before running the scripts.

## Checking the configuration

The script `chkSDK.cmd` can be used to check the configuration. The output should look like this:

```
-----
Testing the configuration of Android SDK...
-----
1) System Variables
-----
JAVA_HOME found in "C:\Program Files\Java\jdk1.8.0_192"
ANDROID_HOME found in "D:\Android\sdk"
ANDROID_SDK_HOME found in "D:\Android"
GRADLE_HOME found in "C:\Program Files\Android\Android Studio\gradle\gradle-4.1"
-----
2) Other Variables
-----
GRADLE_VER=4.1
BUILD_TOOLS=26.0.1
AVD=Nexus_5_API_23
-----
GRADLE found in C:\Program Files\Android\Android Studio\gradle\gradle-
4.1\bin\gradle.bat
ADB found in D:\Android\sdk\platform-tools\adb.exe
AAPT found in D:\Android\sdk\build-tools\26.0.1\aapt.exe
EMULATOR found in D:\Android\sdk\tools\emulator.exe
AVDMANAGER found in D:\Android\sdk\tools\bin\avdmanager.bat
AVD found in D:\Android\.android\avd\Nexus_5_API_23.avd
-----
3) Android Studio Version
-----
Expected: AI-162.4069837
Found:    AI-162.4069837
-----
4) Available platforms
-----
android-23
-----
Available Android Virtual Devices:
  Name: Nexus_5_API_23
  Device: Nexus 5 (Google)
  Path: D:\Android\.android\avd\Nexus_5_API_23.avd
  Target: Google APIs (Google Inc.)
         Based on: Android 6.0 (Marshmallow) Tag/ABI: google_apis/x86_64
  Skin: nexus_5
  Sdcard: D:\Android\.android\avd\Nexus_5_API_23.avd\sdcard.img
-----
```

## Example of scripts usage

### Basic project tasks

We assume the working directory being C:\AndroidStudioProjects

You can use a demo application MyFirstApp

It is in the provided archive in the Apps folder

```
// clean the project  
> clean_single Apps\MyFirstApp  
  
// build (compile) the project  
> build_single Apps\MyFirstApp  
  
// test a project, start the emulator if necessary  
> test_single Apps\MyFirstApp  
  
// run the project, start the emulator if necessary  
> run_single Apps\MyFirstApp  
  
// clean and zip the project (ready for submission!)  
> zip_single Apps\MyFirstApp
```

### Multiple projects tasks

It is in the provided archive in the Apps folder

2 small sample projects

```
// clean all projects in the Apps folder  
> clean Apps  
  
// build (compile) all projects  
> build Apps  
  
// clean and zip all projects  
> zip Apps
```

## Updating the scripts to later version of development tools

If you want to update the scripts to more recent version, please consider the following:

- Upgrading Java from JDK 8 to more recent versions of the JDK will require to update Gradle.
  - For example, JDK 11 requires Gradle 5.5.

**Gradle 5.5** can be downloaded from

<https://services.gradle.org/distributions/gradle-5.5-bin.zip>

The file needs to be extracted to

C:\Program Files\Android\Android Studio\gradle\gradle-5.5

- Moreover, the Android SDK command line tools will need to be updated.
  - <https://developer.android.com/studio/command-line>  
The “*lastest*” version are usually the best option. They can be downloaded from Android Studio or from here <https://developer.android.com/studio> (Command line tools only)
  - The path to *advmanager.bat* would need to be updated in *config.cmd* file.
- Other changes may be needed if you update Android Studio, built tools, etc. These changes can be addressed primarily by creating the *configXXX.cmd* files, but we cannot exclude further changes may be needed due to modification of tools that can break compatibility.
- If you update the scripts to newer version of the tools, please get in touch. They could be integrated in the main release. Thank you.