가천대학교
Gachon University

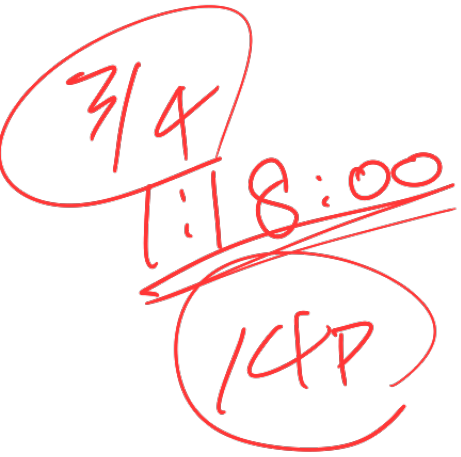
# 학생 여러분 반갑습니다.

# 다른 친구들이 입장할 때까지 조금 기다려 주십시오.

**곧 모바일 프로그래밍 수업을 시작합니다.**

음소거( )가 되었는지 확인 바랍니다.

모바일 프로그래밍
화목(1,2교시)/ 화목(3,4교시)
정윤현 (AI/소프트웨어학부)



# Mobile Programming

## Android Programming

### Chap 2. Android & Making First App

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Gachon University

# Innovation of Smartphone by Apple

- i-phone
  - Smartphone innovation since 2007.01
  - That is innovation of usability

We gonna use a stylus?
No! Who wants a stylus?
You have to get them and put them away, you loose them - yuckes!
Nobody wants a stylus. So let's not use a stylus.
We are gonna use the best pointing device in the world,
We are gonna use the pointing device that we're all born with
We're born with ten of them, we gonna use our fingers

# Popularizing Smartphone by Google

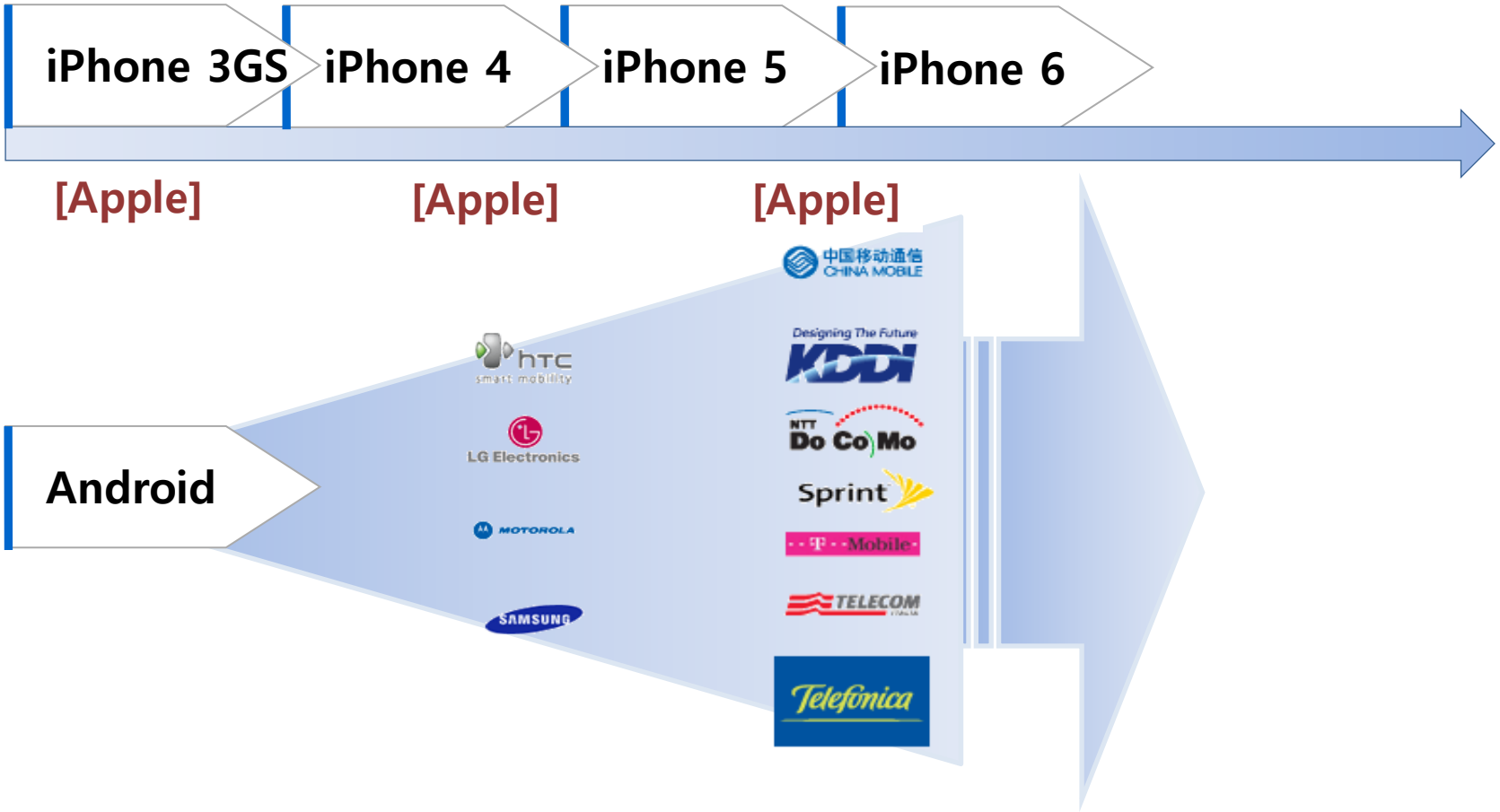
- Google provides Open Platform

iPhone → Apple → Innovation ?

Android → Google → Open ?

Fast Follower + Open

# Popularizing Smartphone by Google



# What is Google Android?

- Android is a mobile operating system (OS) based on the Linux kernel

- A software stack for mobile devices:
  - OS kernel, system libraries, application frameworks, & key apps
- Android Software Development Kit (SDK) for creating apps
  - Libraries & development tools
  - Lots of documentation

- See: http://developer.android.com/training

# What is Google Android?

- Android provides core system services
  - Security
  - Memory & process management
  - File & network I/O
  - Device drivers

OS가 하는 역할

- Android is open source and freely available to manufacturers for customization
  - There are no fixed H/W and S/W configurations

↳ 다양한 제품 O

# Brief History

- 2005
  - Google acquires startup Android Inc. (as well as its development team) to start Android platform
  - Work on Dalvik VM
- 2007
  - Open Handset Alliance (48 companies joined) announced
  - Early look at SDK
- 2008
  - Google sponsors 1st Android Developer Challenge
  - T-Mobile G1 announced
  - SDK 1.0 released
  - Android released open source (Apache License)

# Versions

P Q R
9 10 11

2017, 정재곤, "Do it! 안드로이드 앱 프로그래밍(개정4판)", 이지스퍼블리싱(주)

# Features of Android

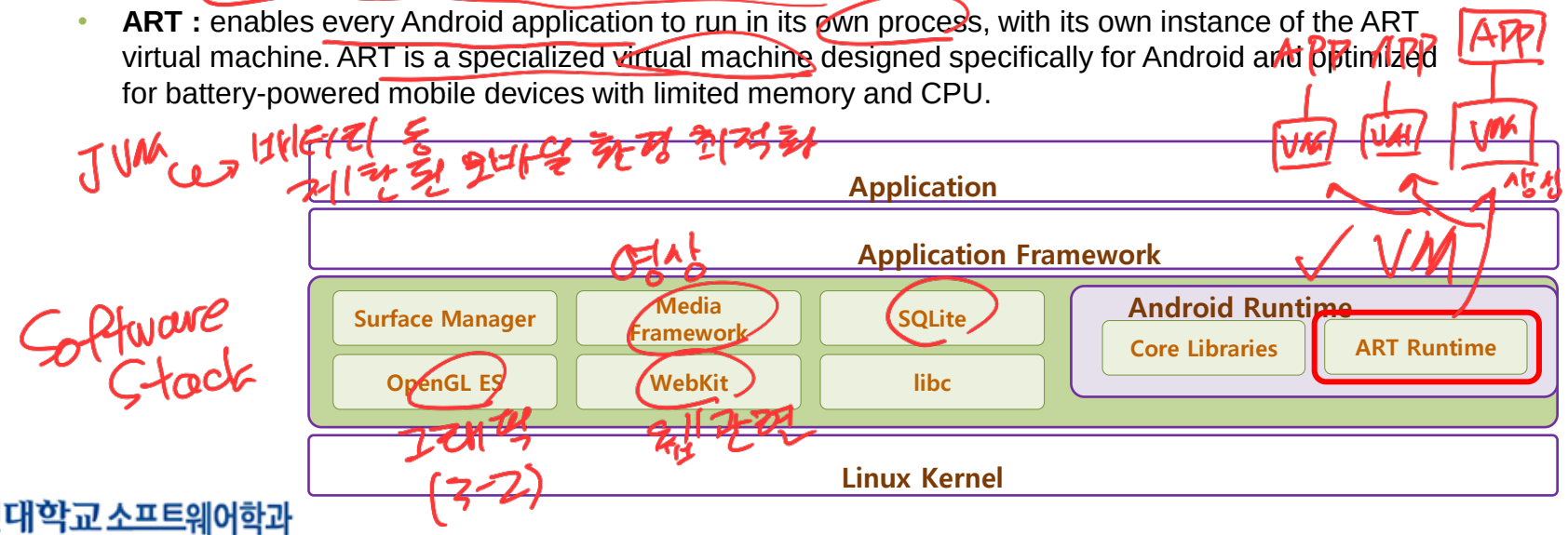
- Hardware support
  - Accelerometer Sensor, Camera, Digital Compass, Proximity Sensor, and GPS

API를 사용해서 센서를 사용할 수 있다용

- Multi-touch
  - Supports multi-touch screens
- Multi-tasking
  - Supports multi-tasking applications
- Flash support
  - Android 2.3 supports Flash 10.1.
- Tethering
  - Supports sharing of Internet connections as a wired/wireless hotspot

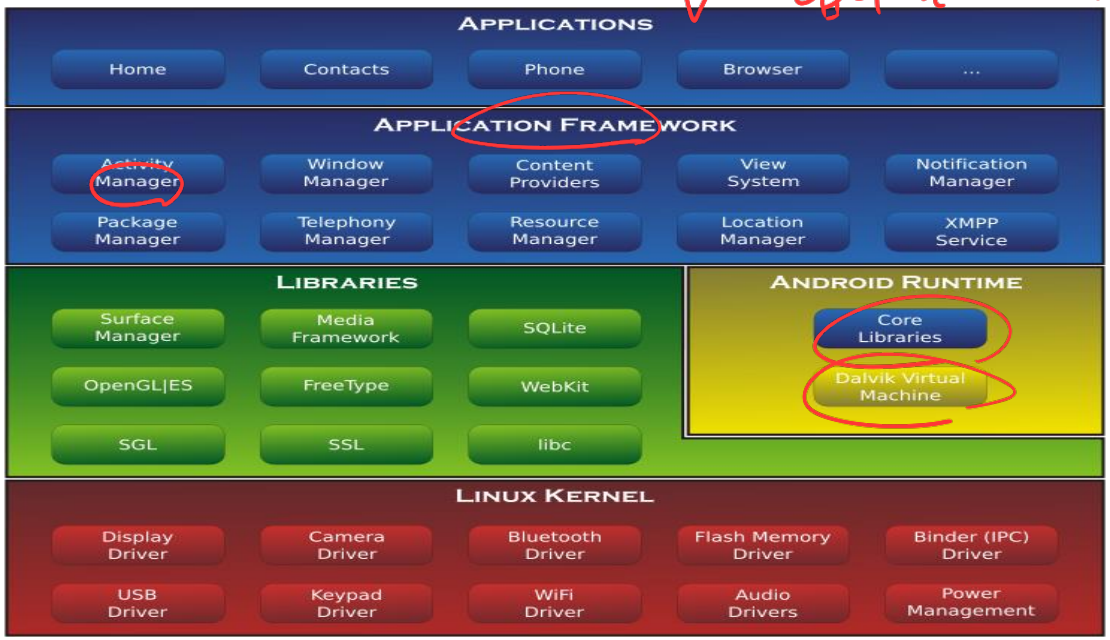
# Android Architecture

- Linux kernel
  - This layer contains all the low level device drivers for the various hardware components of an Android device.
- Libraries
  - These contain all the code that provides the main features of an Android OS.
  - E.g., SQLite (for DB support), WebKit library (for web browsing), …
- Android runtime (@ same layer as the libraries)
  - provides a set of core libraries that enable developers to write Android apps using the Java programming language.
  - includes the **Android Runtime (ART) virtual machine**
    - **ART :** enables every Android application to run in its own process, with its own instance of the ART virtual machine. ART is a specialized virtual machine designed specifically for Android and optimized for battery-powered mobile devices with limited memory and CPU.



# Cont.

- Application framework
  - Exposes the various capabilities of the Android OS to application developers so that they can make use of them in their applications.
- Applications
  - Contain all applications (basic applications as well as applications that you download and install from the Android Market)




For further study : https://www.youtube.com/watch?v=QBGfUs9mQYY

# Google Play (Android Market)

- The success of a smartphone platform strongly depends on "APPLICATIONs"
  - Also, it is extremely important to make these APPs accessible to the general user

- Google Play (Android Market) → 개발자는 판매수익의 ~~70%~~ 최근 바뀜
  - Online application store for Android devices (Oct. 2008)
  - Users can simply download third-party applications directly
  - Both paid and free applications are available
  - **More than 600,000 apps and games** (Mar. 2013)
  - **millions of songs and books, and thousands of movies**

# Your First Android Application

http://developer.android.com/training/basics/firstapp/index.html

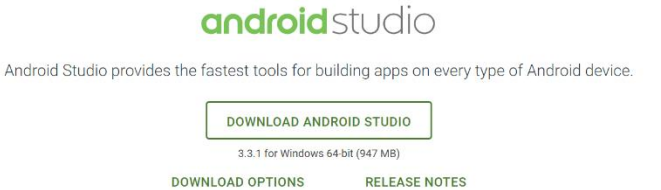
# Run on a Real Device

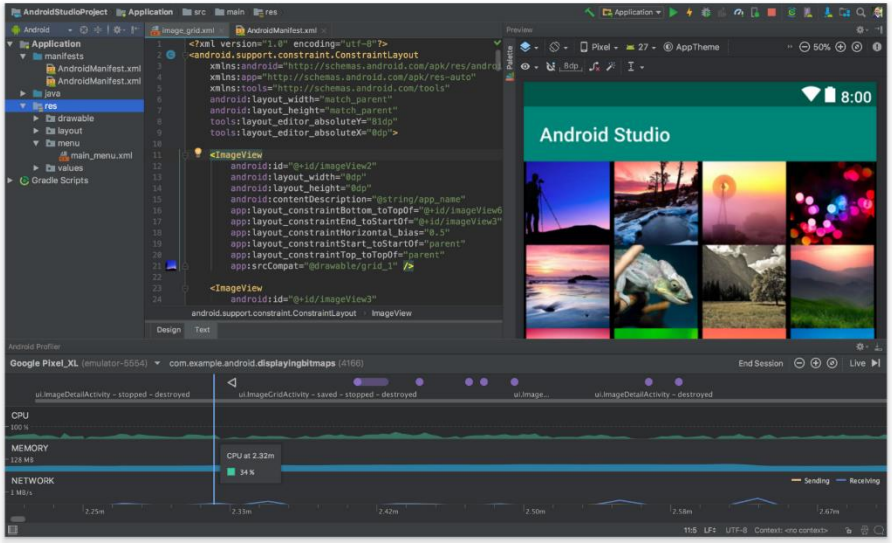
- Plug in your device to your development machine with a USB cable.
  - **you might need to install the appropriate USB driver for your device.**
    - E.g., samsung galaxy series: http://local.sec.samsung.com/comLocal/support/down/kies_main.do?kind=usb

- Enable USB debugging on your device.
  - On most devices running Android 3.2 or older, you can find the option under Settings > Applications > Development.
    On Android 4.0 and newer, it's in Settings > **Developer options.**
    - On Android 4.2 and newer, Developer options is hidden by default. To make it available, go to Settings > About phone and tap Build number seven times.

# TODO

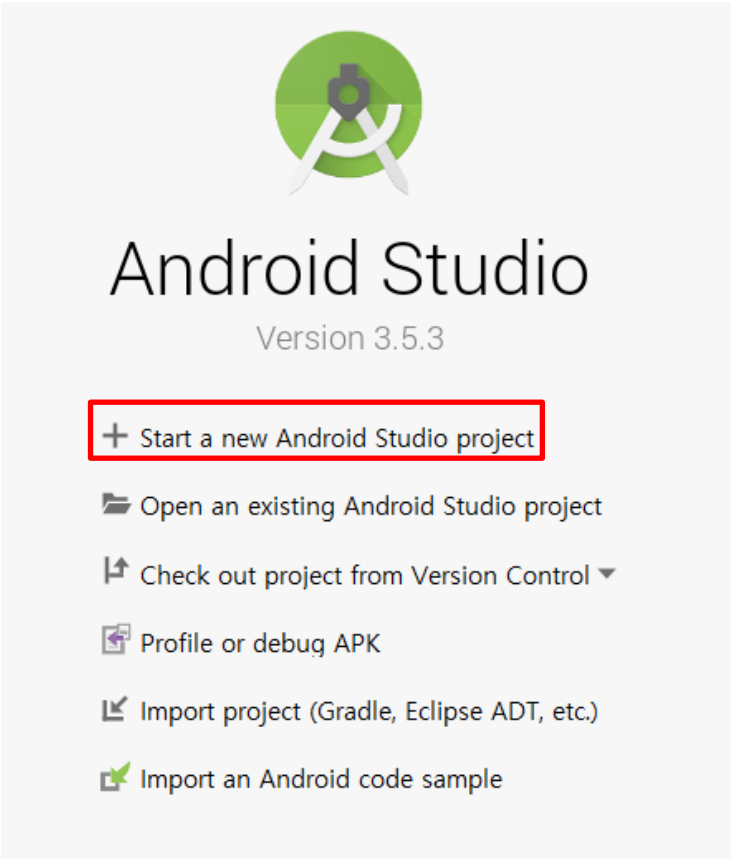
- Setup your development environment for this class
- [https://developer.android.com/studio](https://developer.android.com/studio)



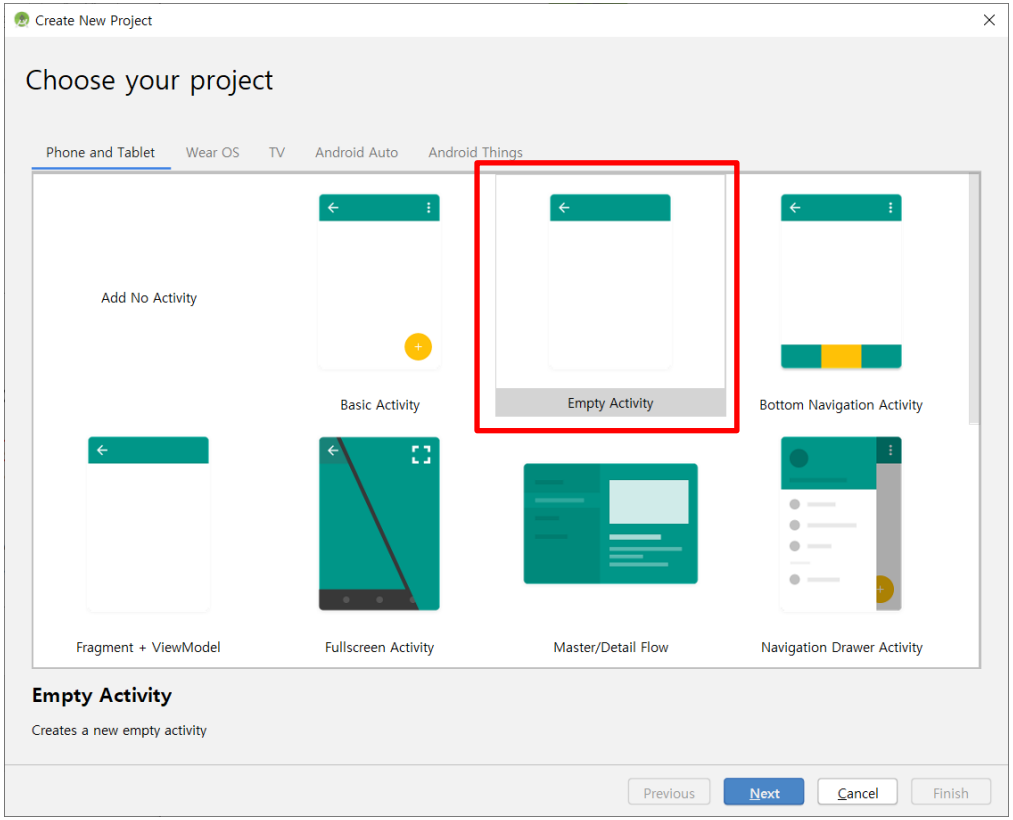



# 1. Create Project

- Click ‘Start a new Android Studio project’



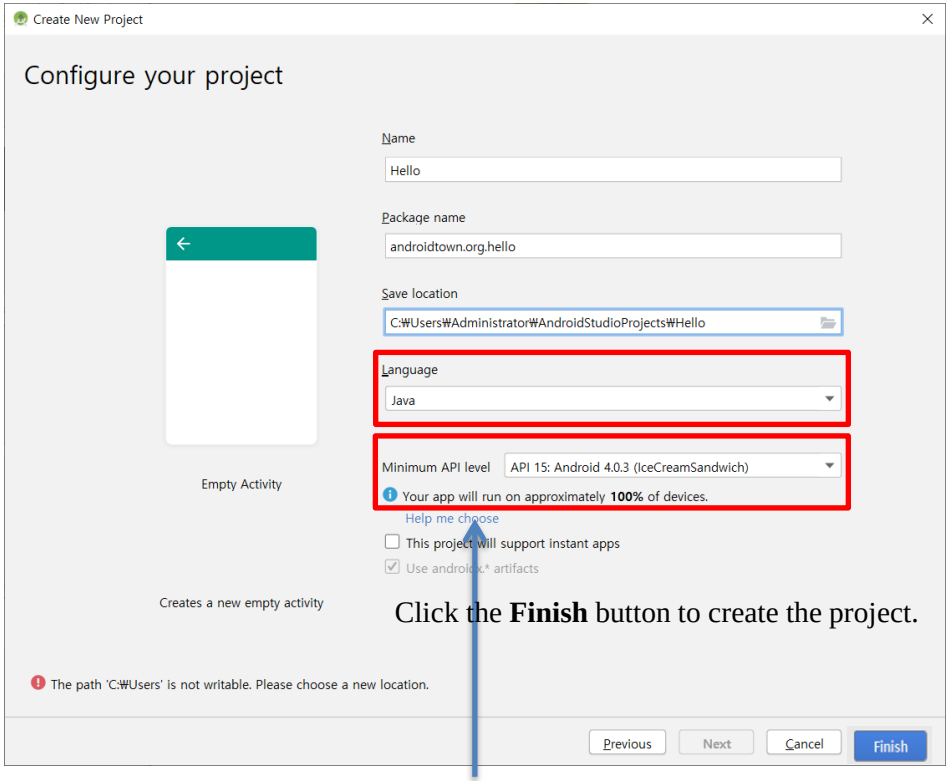
# Activity Template




- Select an activity template from which to begin building your app
  - For this project select Empty Activity and click Next.

# (cont.)

- Fill out the project details:
  - **Application name / Project name:**
    - Hello
  - **Company domain**
    - provides a qualifier that will be appended to the package name.
    - E.g., androidtown.org → **org.androidtown.hello** (pkg name)
  - **Package name**
    - the fully qualified name for the




Click the **Finish** button to create the project.

our package name must be unique across all packages installed on the Android system. For this reason, it's generally best if you use a name that begins with the reverse domain name of your organization or publisher entity.

E.g., com.naver.app1, net.daum.app1, ...
swdm2016.gachon.app2

The Minimum Required SDK is the earliest version of Android that your app supports.
To support as many devices as possible, you should set this to the lowest version available. If you just consider newer devices, it is not critical.

# (cont.)

- Fill out the project details:
  - **Application name / Project name:**
    - Hello
  - **Company domain**
    - provides a qualifier that will be appended to the package name.
    - E.g., androidtown.org → **org.androidtown.hello** (pkg name)
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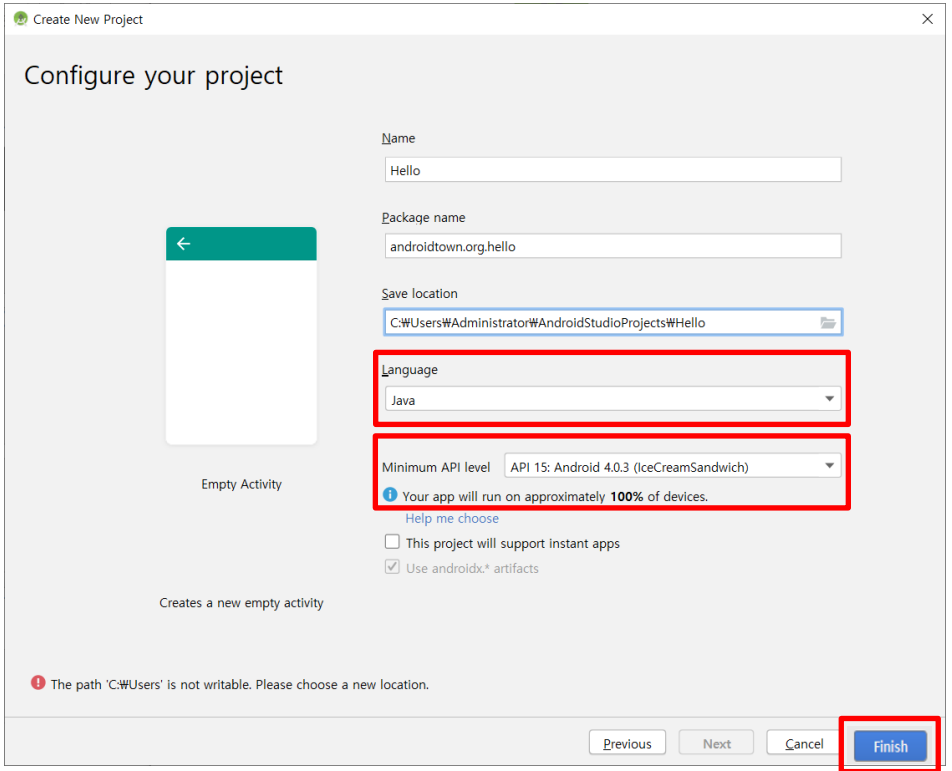


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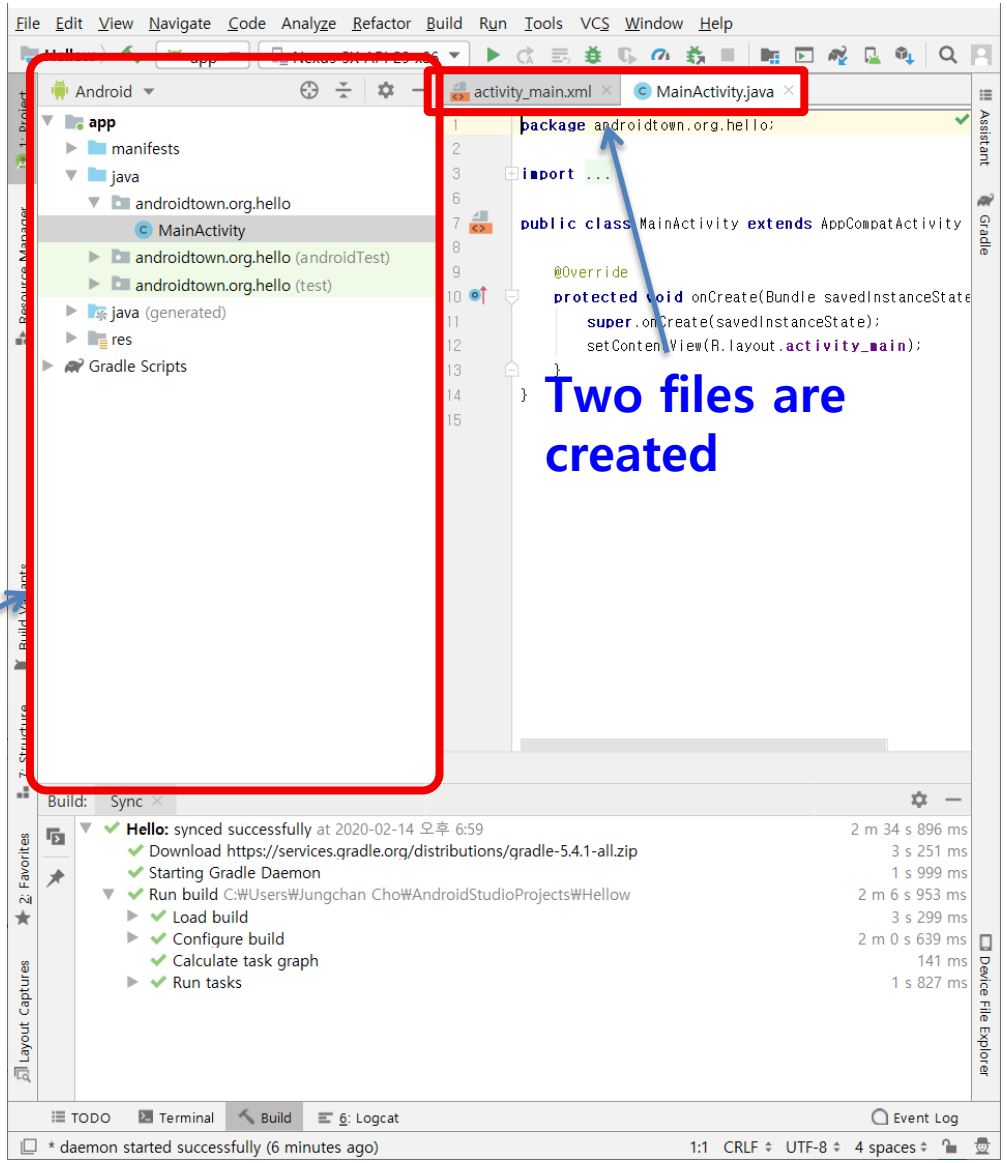
E.g., com.naver.app1, net.daum.app1, ...
swdm2016.gachon.app2

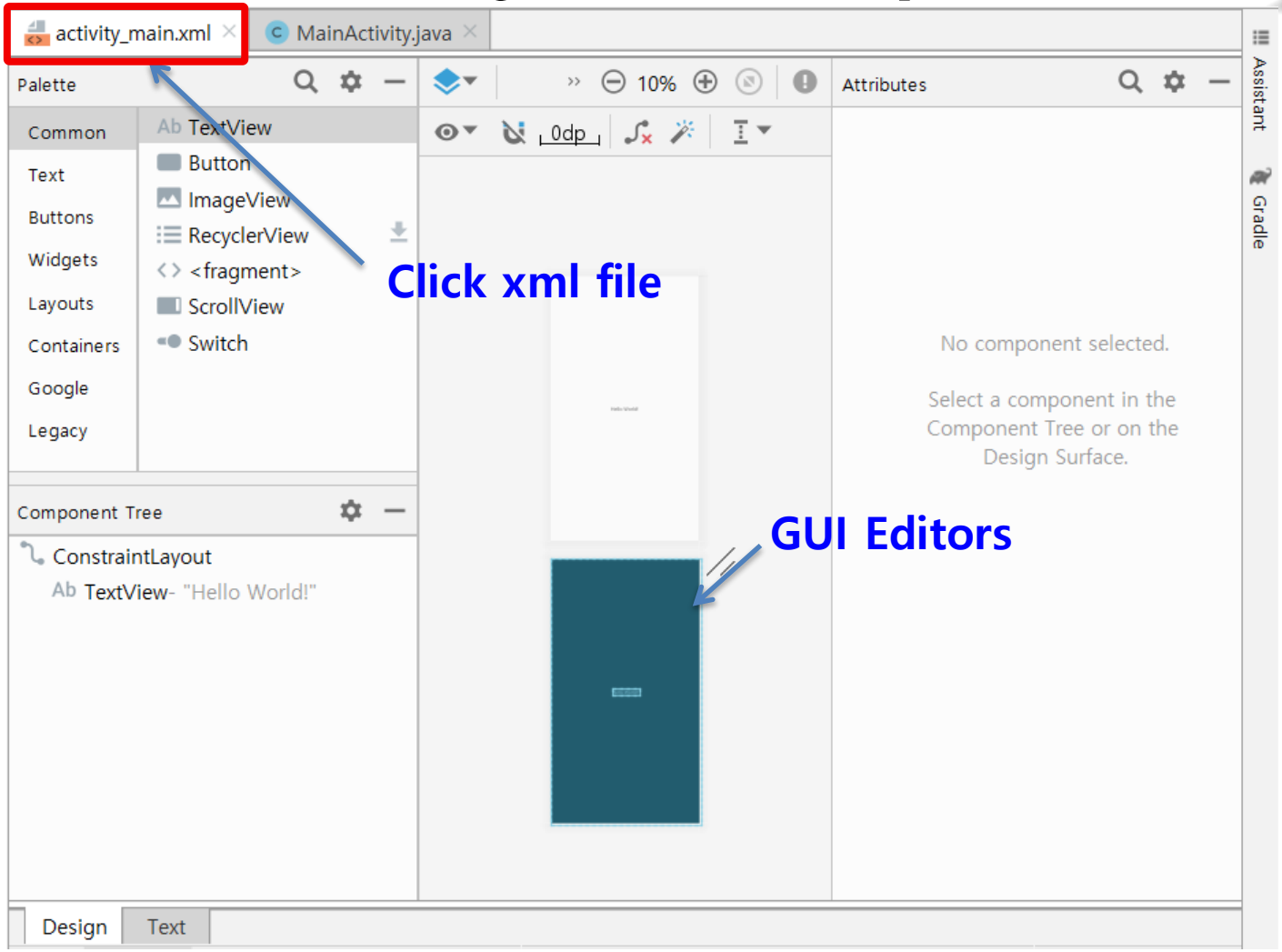
# Android Project Workspaces

XML → 디자인
Java → 코드

Project View

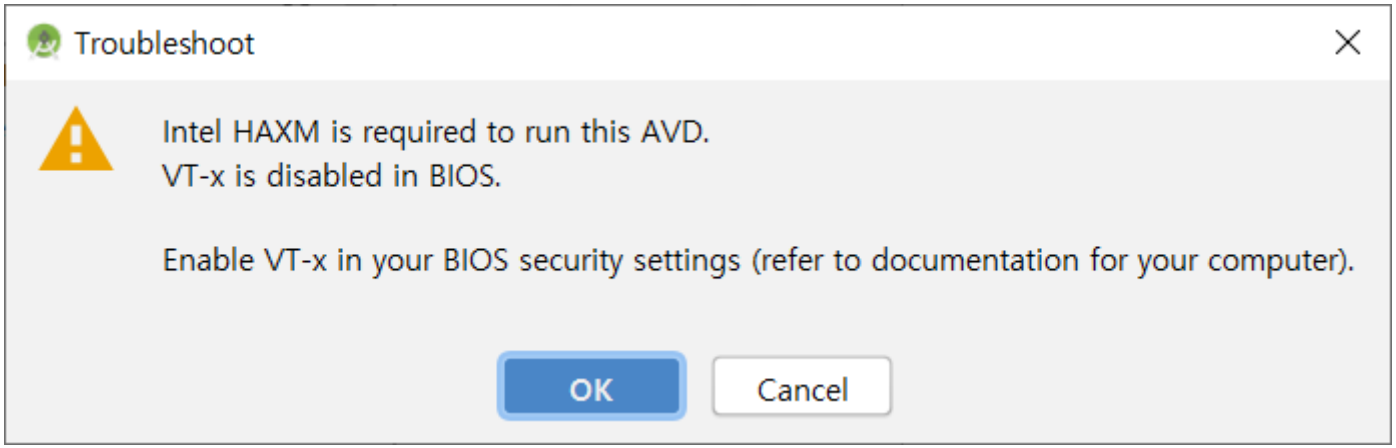


# Android Project Workspaces



# Troubleshoot

https://ehdtjq0411.tistory.com/4



Hello [C:₩Users₩Jungchan Cho₩AndroidStudioProjects₩Hello] - ...₩app₩src₩main₩java₩androidtown₩org...

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

Hello app Nexus 5X API 29 x86

Tools menu: AVD Manager, SDK Manager, Layout Inspector, Connection Assistant, Firebase, App Links Assistant, Tasks & Contexts, Generate JavaDoc..., IDE Scripting Console, JShell Console..., Groovy Console..., Kotlin

Android

app
manifests
java
androidtown.org.hello
MainActivity
androidtown.org.hello (andro
androidtown.org.hello (test)
java (generated)
res
res (generated)
Gradle Scripts

activity_main.xml

```
1  package an
2
3  import ...
6
7  public cla                    AppCompatActivity {
8
9      @Overri
10     protec                    savedInstanceState) {
11         sup                   State);
12         set                   vity_main);
13     }
14 }
15
```

Build: Build Output Sync

Build: completed successfully at 2020-02-14 오후 7:15 — 19 s 716 ms
Run build C:₩Users₩Jungchan Cho₩AndroidStudioProjects₩Hello — 18 s 868 ms
Load build — 4 ms
Configure build — 162 ms
Calculate task graph — 125 ms
Run tasks — 18 s 427 ms

TODO Terminal Build 6: Logcat 4: Run Event Log

Your anti-virus program might be impacting your build performance.... (4 minutes ago) 15:1 CRLF UTF-8 4 spaces

1: Project Resource Manager Build Variants 7: Structure 2: Favorites Layout Captures Gradle Device File Explorer

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Settings for New Projects

Appearance & Behavior
- Appearance
- Menus and Toolbars
- System Settings
  - Passwords
  - HTTP Proxy
  - Data Sharing
  - Updates
  - Memory Settings
  - Android SDK
- Notifications
- Quick Lists
- Path Variables

Keymap

Editor

Plugins

Build, Execution, Deployment

Kotlin

Tools

**Appearance & Behavior › System Settings › Android SDK**

Manager for the Android SDK and Tools used by Android Studio

Android SDK Location: C:₩Users₩Jungchan Cho₩AppData₩Local₩Android₩Sdk Edit

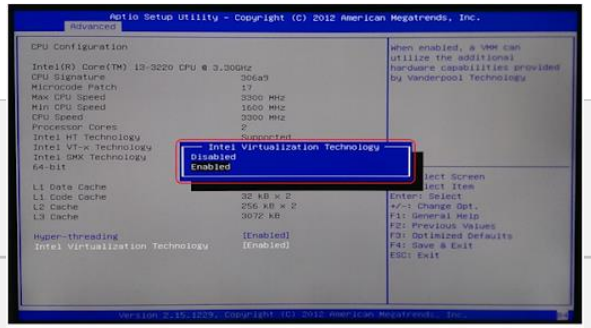
⚠ Android SDK location should not contain whitespace, as this can cause problems with the NDK tools.

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 | | Installed |
| ☐ GPU Debugging tools | | Not Installed |
| ☐ LLDB | | Not Installed |
| ☐ NDK (Side by side) | | Not Installed |
| ☐ CMake | | Not Installed |
| ☐ Android Auto API Simulators | 1 | Not installed |
| ☐ Android Auto Desktop Head Unit emulator | 1.1 | Not installed |
| ☑ Android Emulator | 29.3.4 | Installed |
| ☐ Android Emulator Hypervisor Driver for AMD Processors (installer) | 1.3.0 | Not installed |
| ☑ Android SDK Platform-Tools | 29.0.5 | Installed |
| ☑ Android SDK Tools | 26.1.1 | Installed |
| ☐ Documentation for Android SDK | 1 | 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 | Installed |
| ☐ Google USB Driver | 12 | Not installed |
| ☐ Google Web Driver | 2 | Not installed |
| ☑ Intel x86 Emulator Accelerator (HAXM installer) | 7.5.4 | Installed |

BIOS기능 -> Intel 가상화 기술 -> 허용

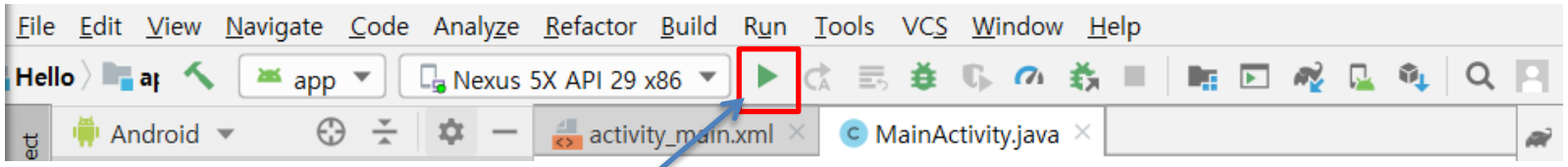



☑ Hide Obsolete Packages ☐ Show Package Details

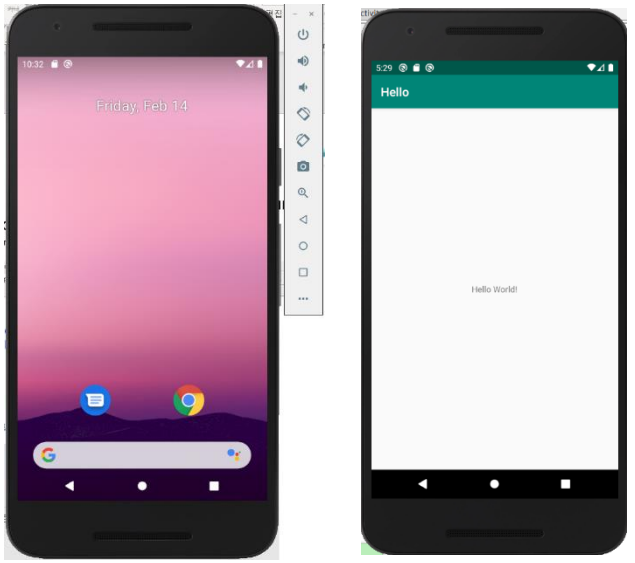
OK | Cancel | Apply | Help

# Run your first App

- Before running app, you need to create your virtual device or connect to real device
  - AVD Manager →Create Virtual Device




**Click Run 'app button (shift+F10)**



# Understanding first app

- Change text in Activity_main.xml

activity_main.xml | MainActivity.java

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmln
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Hello World!"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

</androidx.constraintlayout.widget.ConstraintLayout>
```

androidx.constraintlayout.widget.ConstraintLayout

Design | Text

Preview

Palette

# Understanding first app

- Change “TextView” as “Button”

**[Hello>/res/layout/activity_main.xml]**

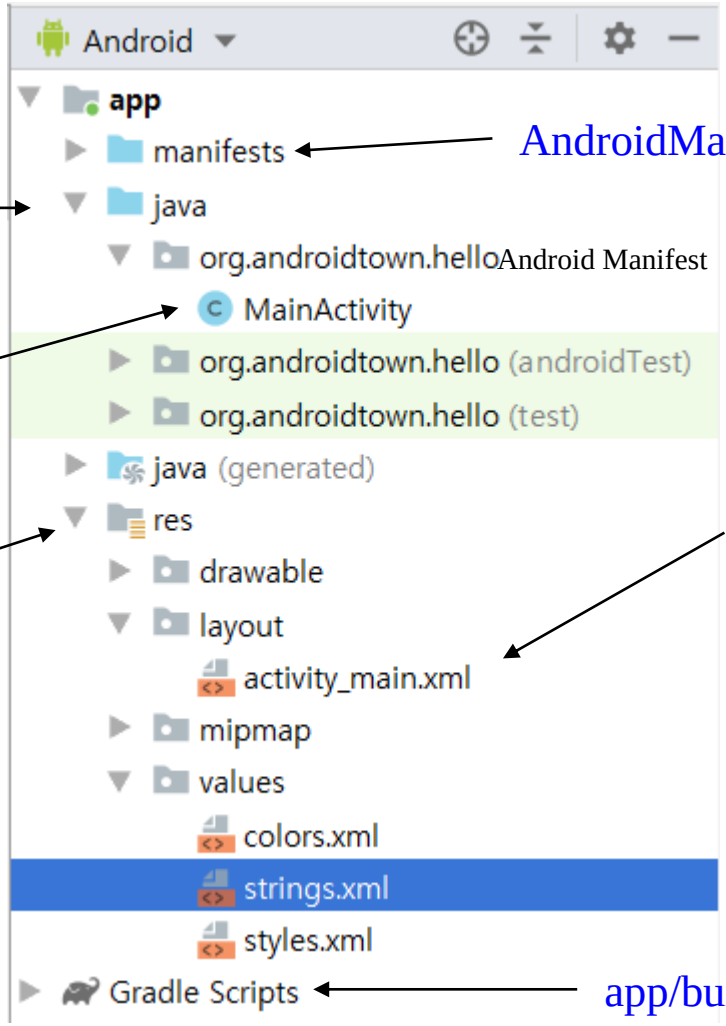
```
<Button
  android:layout_width="wrap_content"
  android:layout_height="wrap_content"
  android:text="안녕 안드로이드!"

  …

  />
```

# Structure of An Android Application

# Android Studio




**src/main/java/**

All source code here

AndroidManifest.xml

Android Manifest

MainActivity.java

Java code for our activity

**src/main/res/**

all the resources used by your application, such as HTML, text files, databases, etc

**layout/**

Directory for files that define your app's user interface (activities)

layout /activity_main.xml

Layout of the activity

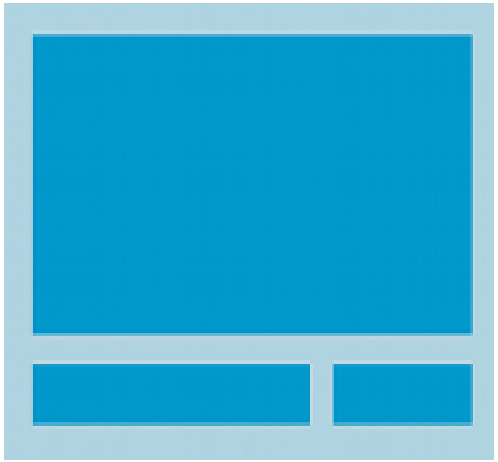
app/build.gradle

File to compile & build

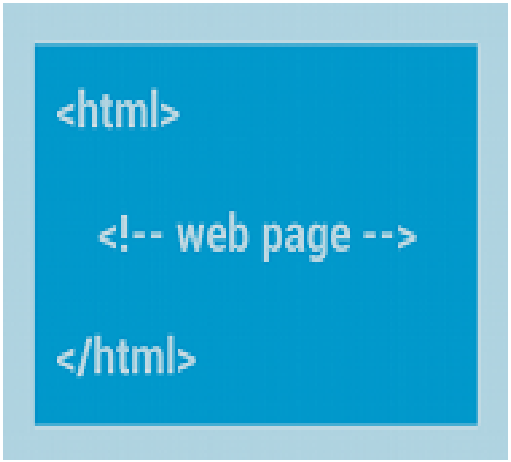
# Various Layouts

Linear Layout

Relative Layout

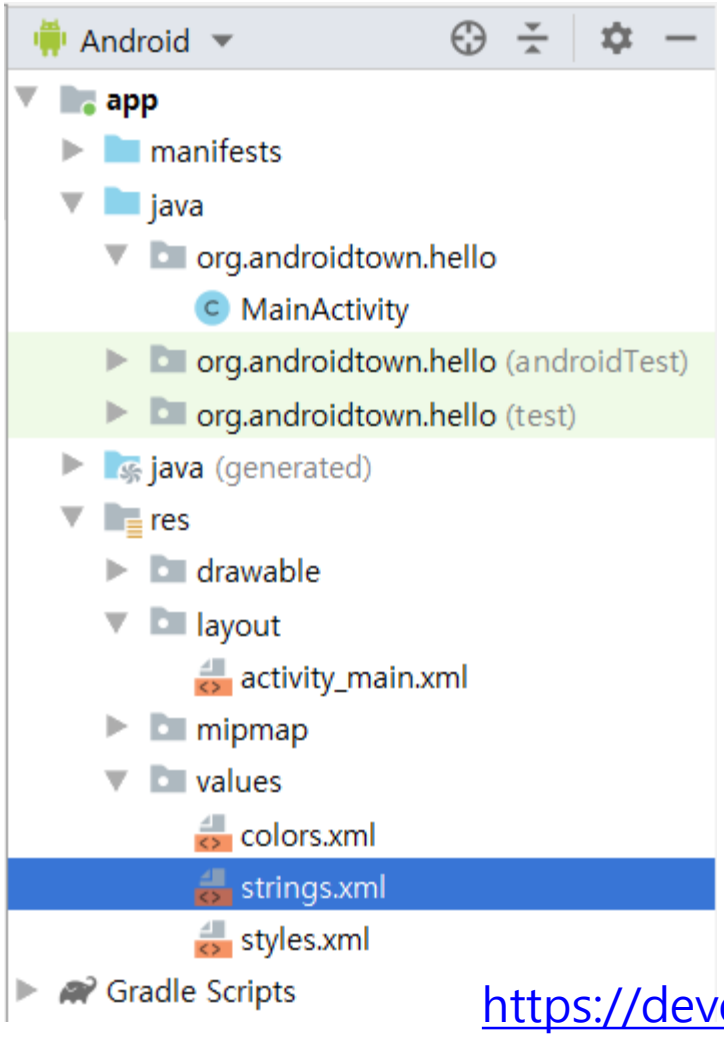


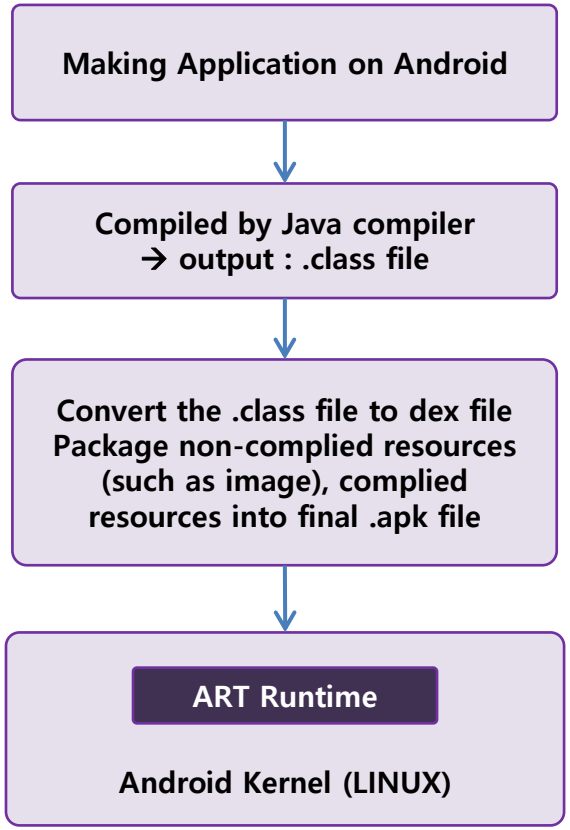
Web View




http://developer.android.com/resources/tutorials/views/index.html

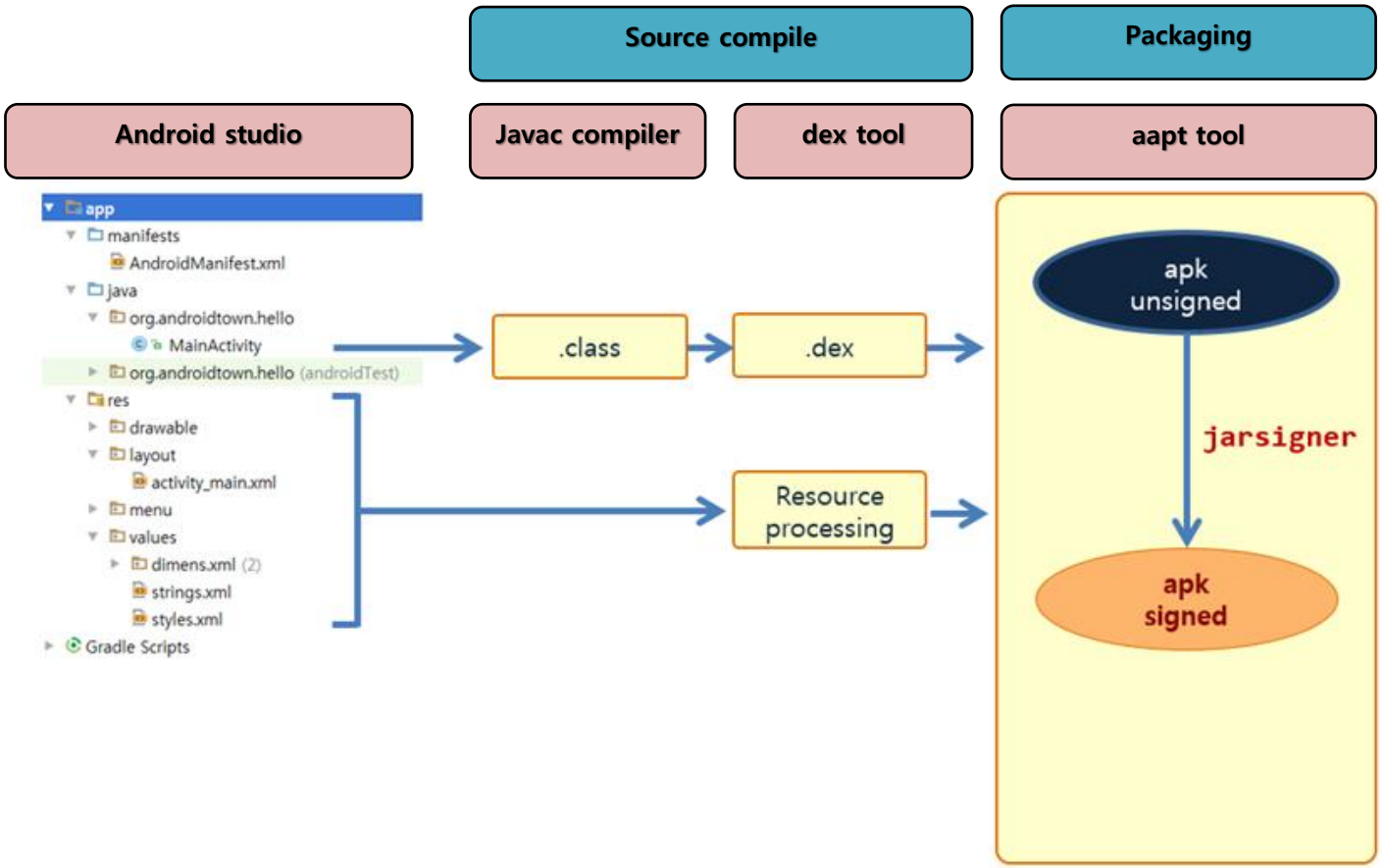
# Build Process



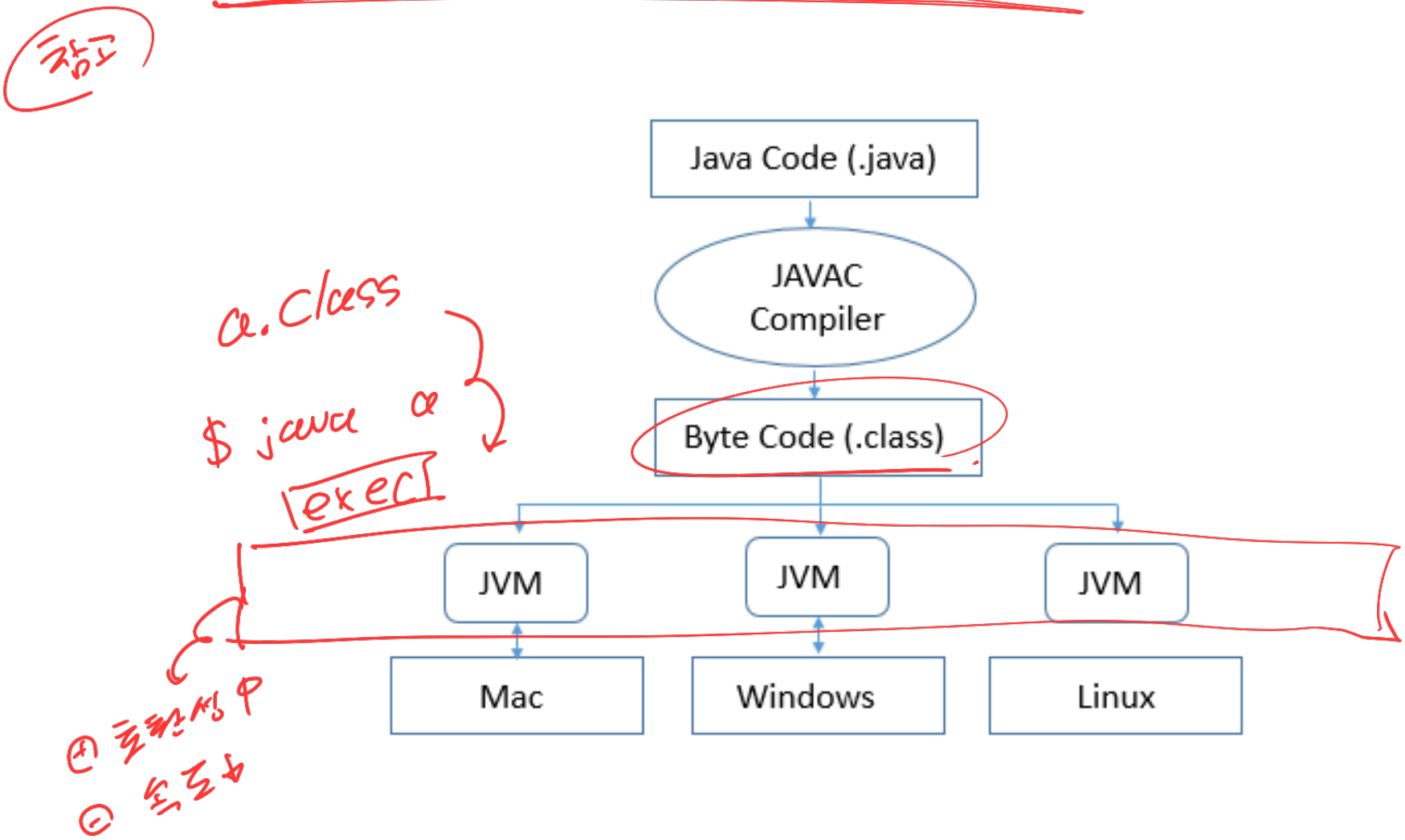

https://developer.android.com/studio/build

# (cont.)



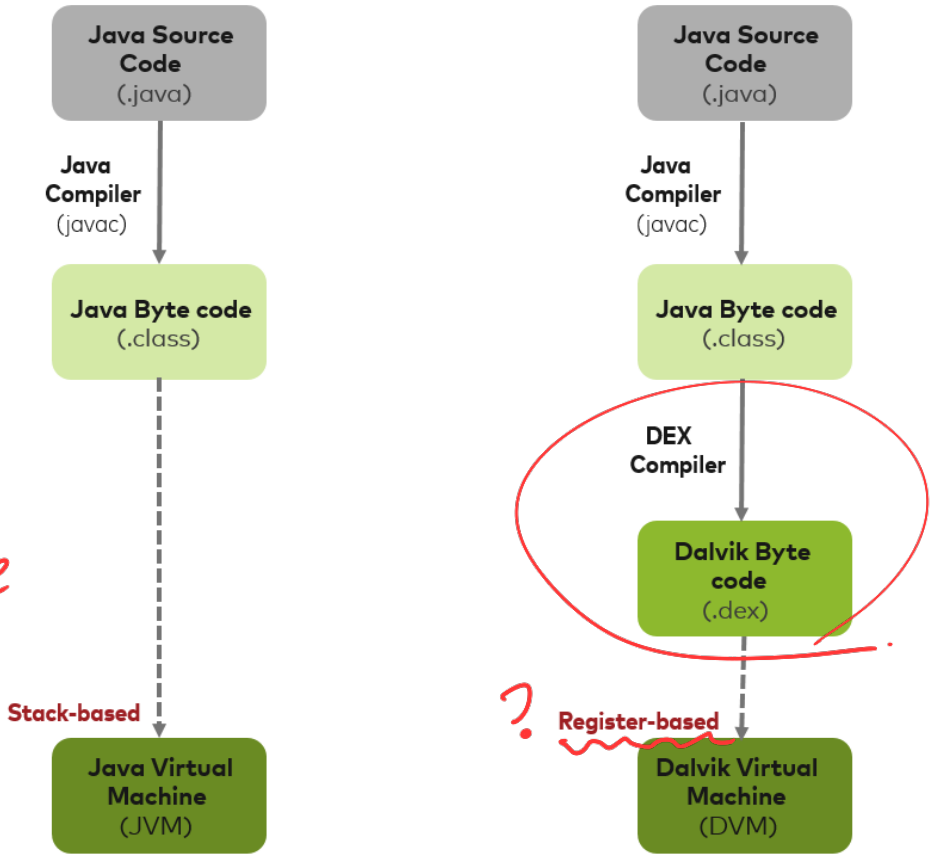

*aapt: Android Asset Packaging Tool

# Java virtual machine (참고)



# Java virtual machine vs Dalvik Virtual Machine

참고




independance of OS.

런타임 더 컴파일 진행

안드로이드에서만 돌아감 (dependant)

모든 안드로이드에서 돌아감

↳ 속도 등 최적화?

JVM vs DVM

https://android.jlelse.eu/closer-look-at-android-runtime-dvm-vs-art-1dc5240c3924

# References

- Textbook : Beginning Android Application 4 Development
- Android Introduction by Marko Gargenta, http://www.lecturemaker.com/2009/10/android-software-platform/
- Android Dev Guide http://developer.android.com/guide/topics/fundamentals.html
- http://developer.android.com/tools
- http://developer.android.com/tools/devices/index.html
- *Pro Android* by Hashimi & Komatineni (2009)
- Android Introduction by Marko Gargenta

# The Android Developer Community

- Official Android Developer Site:
  - http://developer.android.com

- **Google Android Training** (http://developer.android.com/training/index.html)
  - the Android Training site that contains a number of useful classes grou ped by topics
  - Visit TODAY and all the time during this semester!!

- **Stack Overflow** (http://www.stackoverflow.com)
  - a collaboratively edited question and answer site for developers
  - Ask your questions and get the answer!