P82 Mobile Application Development - Android

Introduction – Concepts

Android Presentation

- **Open Source OS: open and very flexible system**
  - Linux Kurnel
  - Dalvik Virtual Machine (DVM) (!!ART)
    - https://source.android.com/devices/tech/dalvik/
    - http://developer.android.com/guide/practices/verifying-apps-art.html
  - Applications and libraries
- **Scope**
  - touch devices: smartphones, tablets, smartwatch
  - televisions, radio alarms, car radios ... cars
- **Development Environment**
  - Java language
  - SDK Android (Software Development Kit)
  - Emulator
  - Android studio

Architecture in 5 layers / blocks

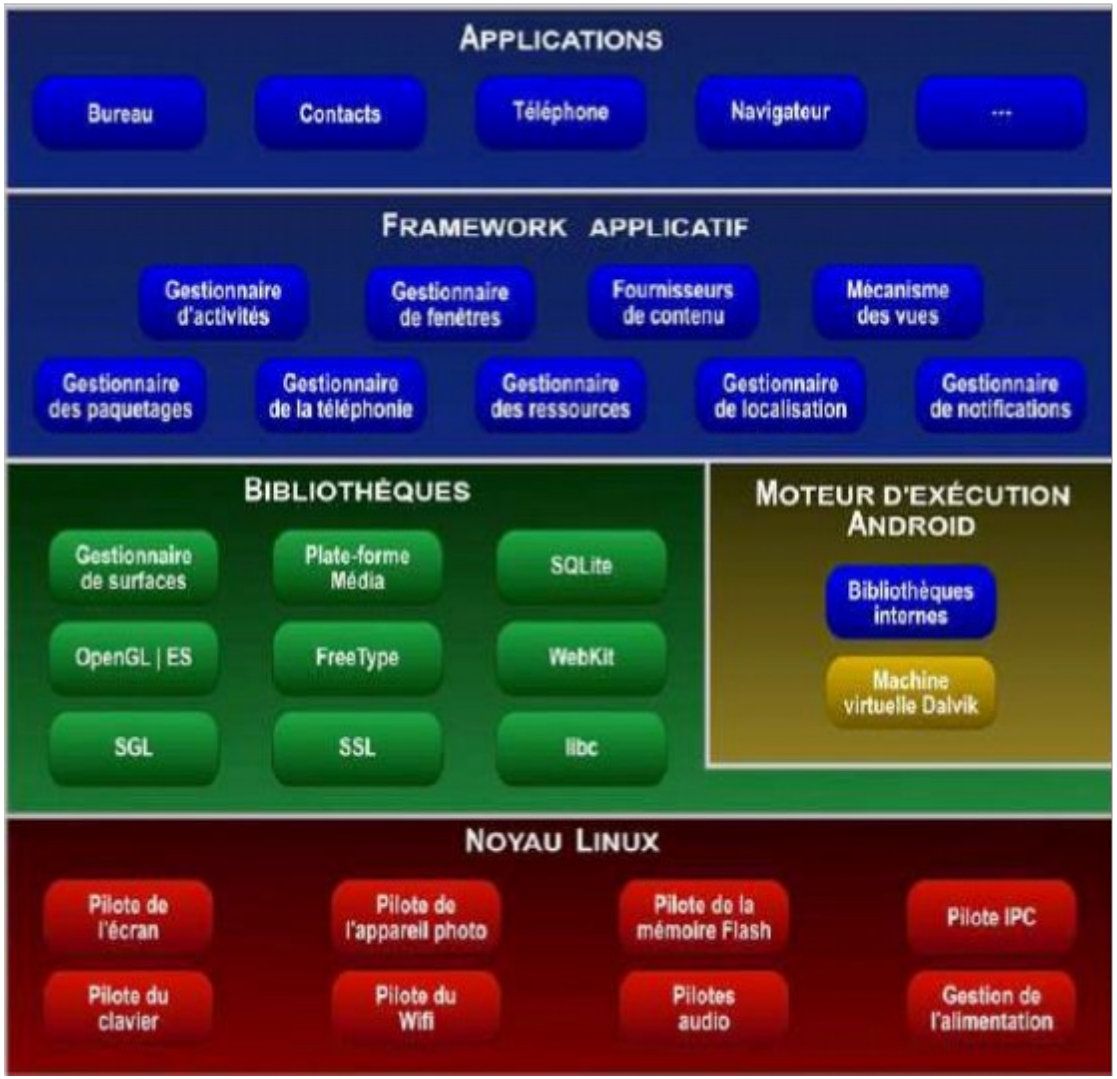
Linux kernel: (Drivers, Wifi, Power, ...): the OS on which is Android based

Execution engine: Android runtime (Dalvik VM): environment running Android apps.
Change for ART since version 4.1

Libraries: Low-level APIs interfacing with the linux kernel (written in C / C + +, adapted for android and linux based devices)

Framework Application: APIs made for developers (services underlying applications)

Applications: pre-existing base app + yours



History

- Google is not the creator of Android !!
- Android's origin is Android Incorporated acquired by Google in 2005
- In 2007 at the Open Handset Alliance

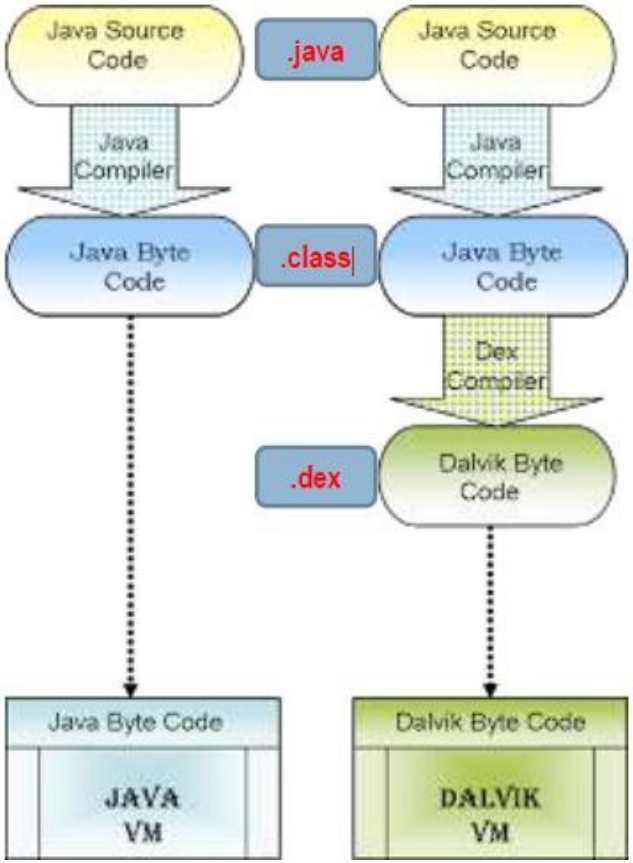
  35 companies in the mobile world with an OpenSource OS

The Dalvik Virtual Machine (DVM)

♦**Dalvik: virtual machine (will evolve towards ART**)
is not compatible with a JVM:
access library completely redesigned by Google

♦DVM executes its **own byte-code (.dex)**
- .class files make room for a .dex file (optimized space)
- There is one VM per process and therefore per application

♦Distribution of an Android application: as an **.apk file: code compiled** for Dalvik in a **class.dex** file + all the **resources used by** the application + **AndroidManifest.xml**



In summary

♦ Google is not android, exists the Open Handset Alliance (OHA) (about 84 companies currently)

♦ The philosophy of the system lies in 6 points:
open source,
Free (Almost),
easy to develop,
easy to sell,
flexible
Ingenious.

♦ Attention smartphones (for now) less powerful and less memory than your computers!

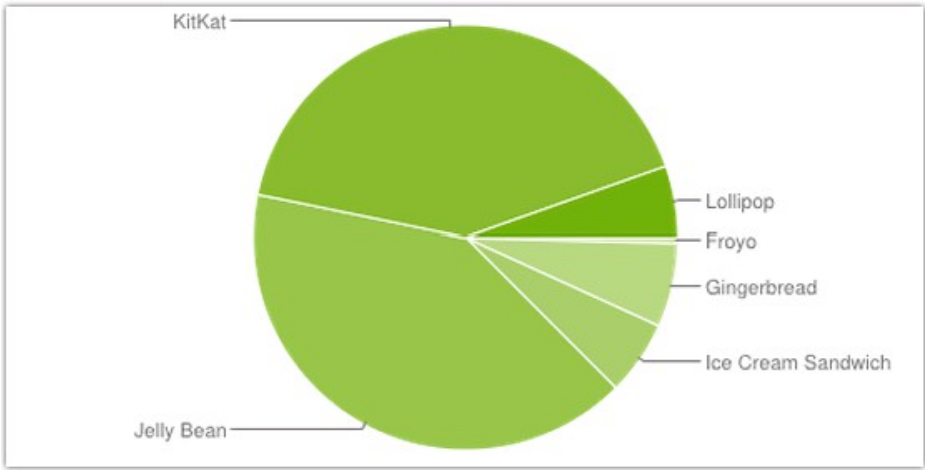
♦ A very good understanding of the Java language is necessary to develop on Android.

Android versions

- Currently version 23

Platform Version	API Level	VERSION_CODE	Notes
Android 6.0	23	M	Platform Highlights
Android 5.1	22	LOLLIPOP_MR1	Platform Highlights
Android 5.0	21	LOLLIPOP	
Android 4.4W	20	KITKAT_WATCH	KitKat for Wearables Only
Android 4.4	19	KITKAT	Platform Highlights
Android 4.3	18	JELLY_BEAN_MR2	Platform Highlights
Android 4.2, 4.2.2	17	JELLY_BEAN_MR1	Platform Highlights
Android 4.1, 4.1.1	16	JELLY_BEAN	Platform Highlights
Android 4.0.3, 4.0.4	15	ICE_CREAM_SANDWICH_MR1	Platform Highlights
Android 4.0, 4.0.1, 4.0.2	14	ICE_CREAM_SANDWICH	
Android 3.2	13	HONEYCOMB_MR2	
Android 3.1.x	12	HONEYCOMB_MR1	Platform Highlights
Android 3.0.x	11	HONEYCOMB	Platform Highlights
Android 2.3.4 Android 2.3.3	10	GINGERBREAD_MR1	Platform Highlights
Android 2.3.2 Android 2.3.1 Android 2.3	9	GINGERBREAD	
Android 2.2.x	8	FROYO	Platform Highlights
Android 2.1.x	7	ECLAIR_MR1	Platform Highlights
Android 2.0.1	6	ECLAIR_0_1	
Android 2.0	5	ECLAIR	
Android 1.6	4	DONUT	Platform Highlights
Android 1.5	3	CUPCAKE	Platform Highlights
Android 1.1	2	BASE_1_1	
Android 1.0	1	BASE	

Which versions to choose?



Must choose two versions for our Android Application:

-API minimum
-API maximum
Goal: Touch as many devices as possible

Version	Codename	API	
2.2	Froyo	8	0.4%
2.3.3 -2.3.7	Gingerbread	10	6.4%
4.0.3 -4.0.4	Ice Cream Sandwich	15	5.7%
4.1.x	Jelly Bean	16	16.5%
4.2.x		17	18.6%
4.3		18	5.6%
4.4	KitKat	19	41.4%
5.0	Lollipop	21	5.0%
5.1		22	0.4%

Percentage of sales

Worldwide Smartphone Sales to End Users by Operating System in 2Q15 (Thousands of Units)

Operating System	2Q15 Units	2Q15 Market Share (%)	2Q14 Units	2Q14 Market Share (%)
Android	271,010	82.2	243,484	83.8
iOS	48,086	14.6	35,345	12.2
Windows	8,198	2.5	8,095	2.8
BlackBerry	1,153	0.3	2,044	0.7
Others	1,229.0	0.4	1,416.8	0.5
Total	**329,676.4**	**100.0**	**290,384.4**	**100.0**

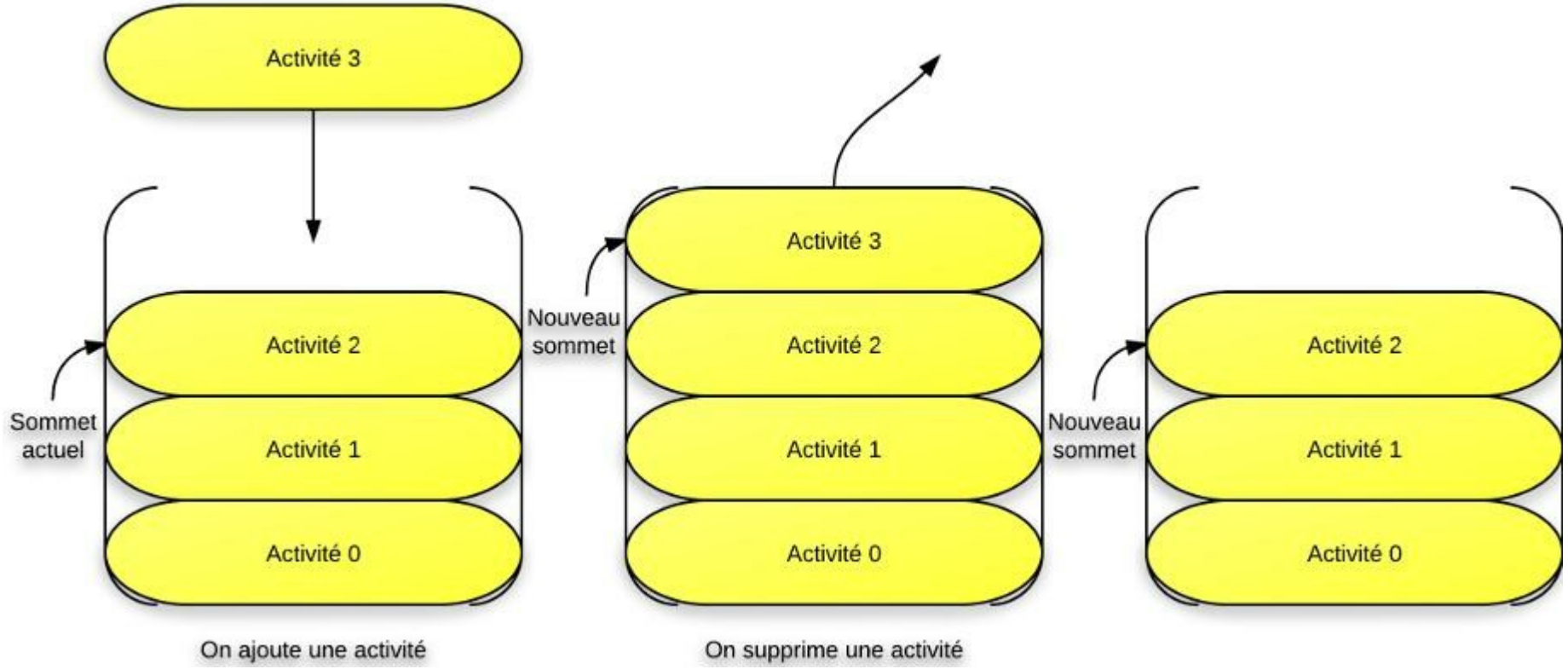
Source: Gartner (August 2015)

http://www.theverge.com/2015/8/20/9181269/gartner-q2-2015-smartphone-sales

Application Composition

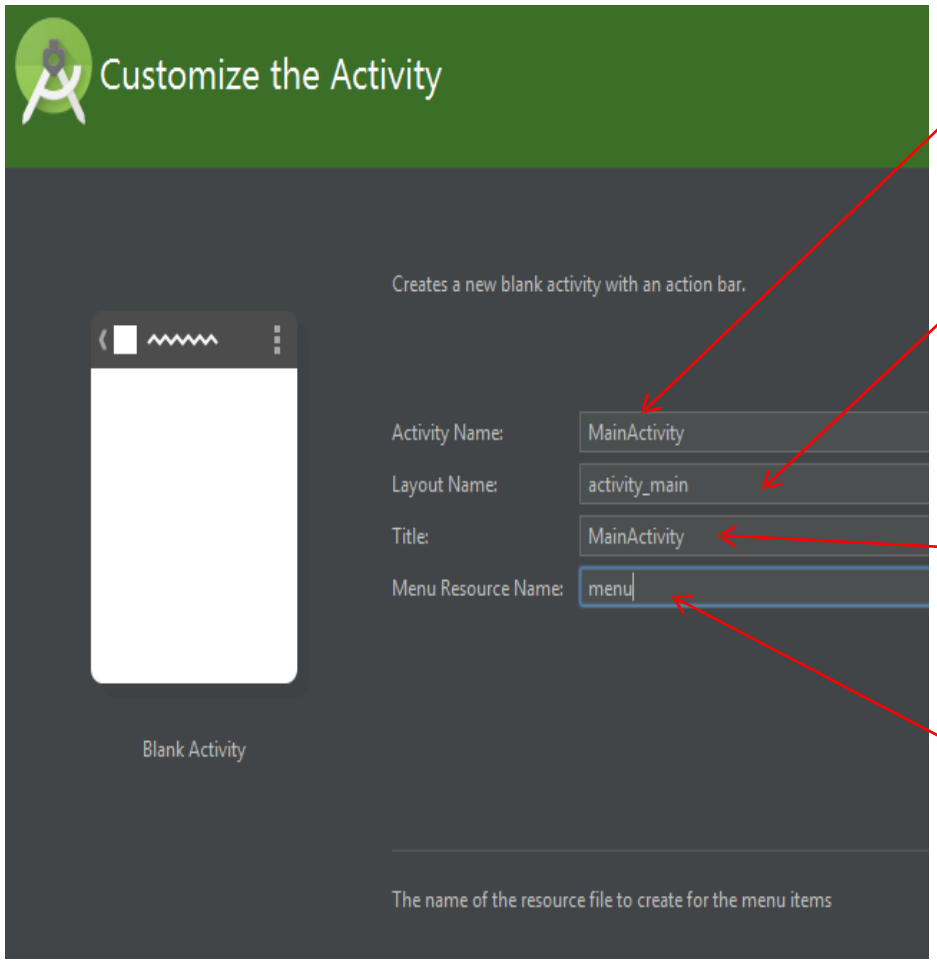
- There are 4 possible types of components in an Android application:
  - **The Activities** *:
    Represents a screen (like a web page), and the UI (User Interface) of your application.
  - **The Services** *:
    Represents a process that will run in the background. A service does not necessarily require UI.
  - **The Contents Providers**:
    Manage data, persistence of data: SQLite database, system file
  - **The broadcast receivers** *:
    Component that responds to system alerts. Low battery, downloaded data, corresponds to notifications
- To transmit the information or trigger these components we use the Intent object (* uses the Intent)

System Operations



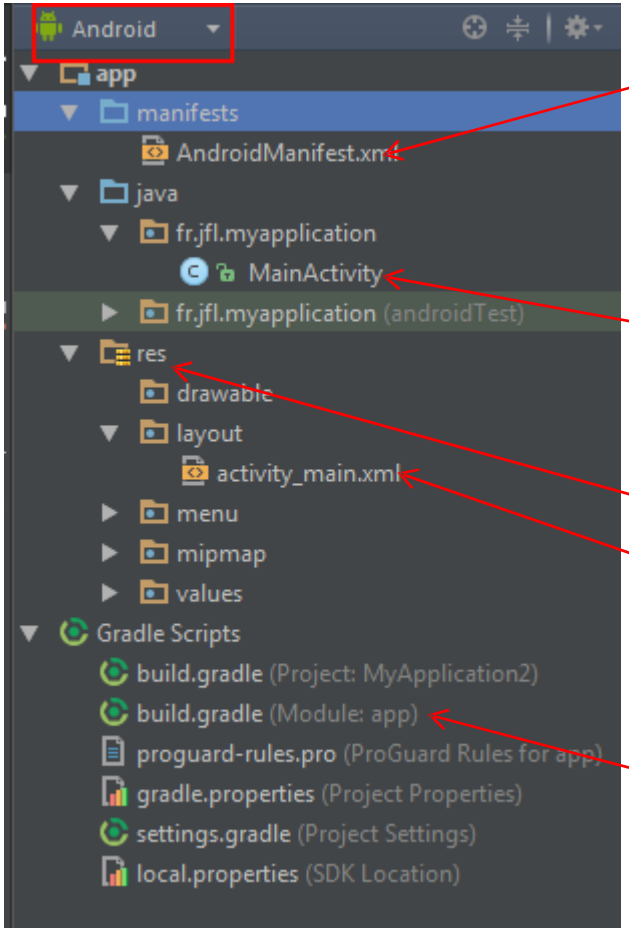
Never forget: your application is not alone
There are priorities: phone calls has priority (Normal for a phone)

First Application



- Java Class
- XML layout file
- Project title
- The name of the xml file

Project Architecture



- Configuration file project
- Java Class
- Resources
  - XML Layout
- Build configuration file