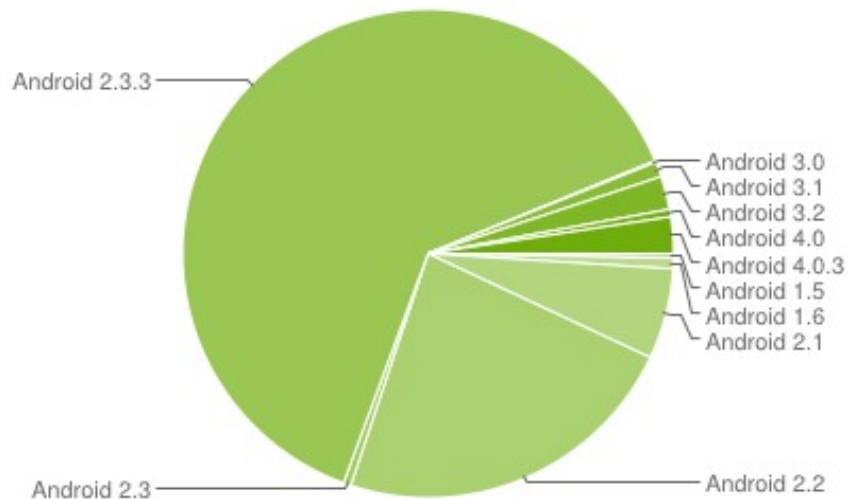# Android
what this thing is?

Born @ Android Inc.,
acquired by Google Inc. in 2005

Software stack, from kernel to the user

Open Source project (GPL 2 & Apache 2.0)
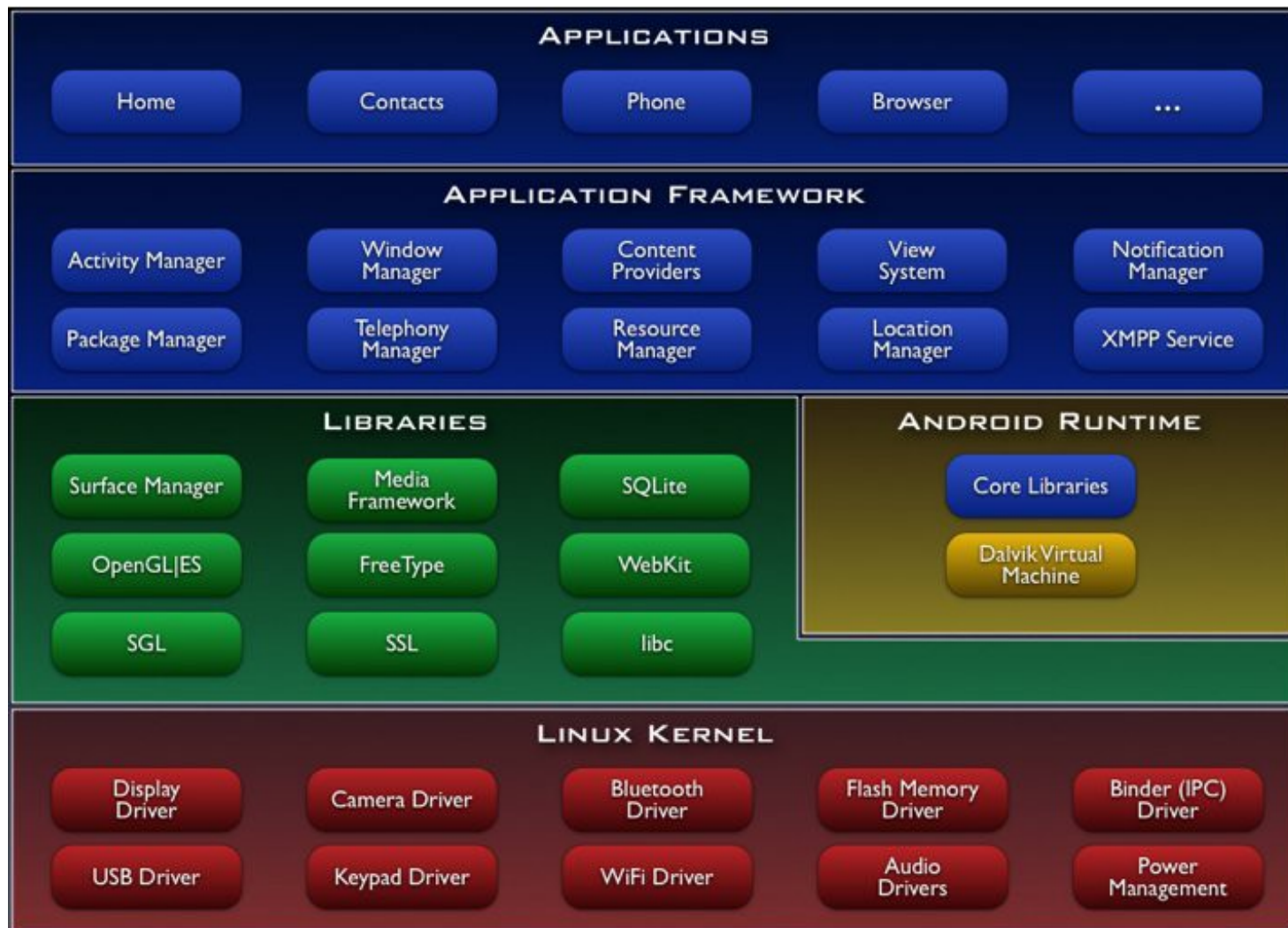(false for Honeycomb version, Android 3.x)

Android
which version is used more?

Platform	Codename	API Level	Distribution
Android 1.5	Cupcake	3	0.3%
Android 1.6	Donut	4	0.7%
Android 2.1	Eclair	7	6.0%
Android 2.2	Froyo	8	23.1%
Android 2.3 -Android 2.3.2	Gingerbread	9	0.5%
Android 2.3.3 -Android 2.3.7		10	63.2%
Android 3.0	Honeycomb	11	0.1%
Android 3.1		12	1.0%
Android 3.2		13	2.2%
Android 4.0 -Android 4.0.2	Ice Cream Sandwich	14	0.5%
Android 4.0.3		15	2.4%

Android
what there is in the box?

Android
a little memorandum, you know, the age

- Core: Linux 2.6
  - aggiunti driver di terze parti per hardware proprietari
  - aggiunte delle caratteristiche specifiche per Dalvik
- Dalvik Virtual Machine
  - interpreta il codice delle App sviluppate
  - non è una re-implementazione della Java Virtual Machine
    - ottimizzata per device dalle risorse limitate
    - esegue file .dex contenuti in file .apk, come i .class e i .jar
  - è parte della sandbox, ma non basta
- Librerie
  - Surface Manager, SQLite, OpenGL, FreeType, WebKit, SSL...
- Framework applicativo
  - sopra di esso si implementano le App
  - presenti le librerie standard Java
  - presenti nuove librerie per le App
- Applicazioni di default
  - si possono "integrare" nella propria App

Android
how Android protects itself?

- Every App has an instance of the DVM

- Every App has its own process

- To every process are given a specific UID and GID

  - files and folders of an App are inaccessible by another App

  - UID and GID are not known to the App

- Resources needed by the App are declared to the system and notified to the user during installation

  - the user allows or denies access to resources

  - Internet access, SMS receipt, SD card content modification, ...

- To the App is given some predefined space

  - SharedPreferences & a SQLite database

Android
which is the structure of an App?

- There are four type of **components**

  - Activity

  - Service

  - Content Provider

  - Broadcast Receiver

- There is a start point

  - is in **manifest.xml**

  - here is declared the "**main**" activity, that responds to an **Intent**

Android
how can **YOU** interact with all this stuff?

- Android **S**oftware **D**evelopment **K**it

- It is a set of shell tool

  - management of virtual Android devices (adapted **Qemu** virtual machine)

  - management of the API level (Android platform) downloaded for development

  - **adb** command to see logging messages from the device

  - compilation and loading on a device

  - ...

- There is a plugin for Eclipse (unbelievable!)

- There is even the **NDK**, like the SDK but for C and C++ code

  - in any case it is produced an .apk

  - useful for optimized code

Android
little things about devices

- We can activate events on the emulated device

  - setting the level of the battery

  - starting a call

  - sending a SMS

  - ...

- Real devices needs manual configuration

  - enabling USB debugging

  - allowing installation from untrusted sources