



E0-245: ASP

Lecture 2: Android Internals

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# Module 0: Basic Setup

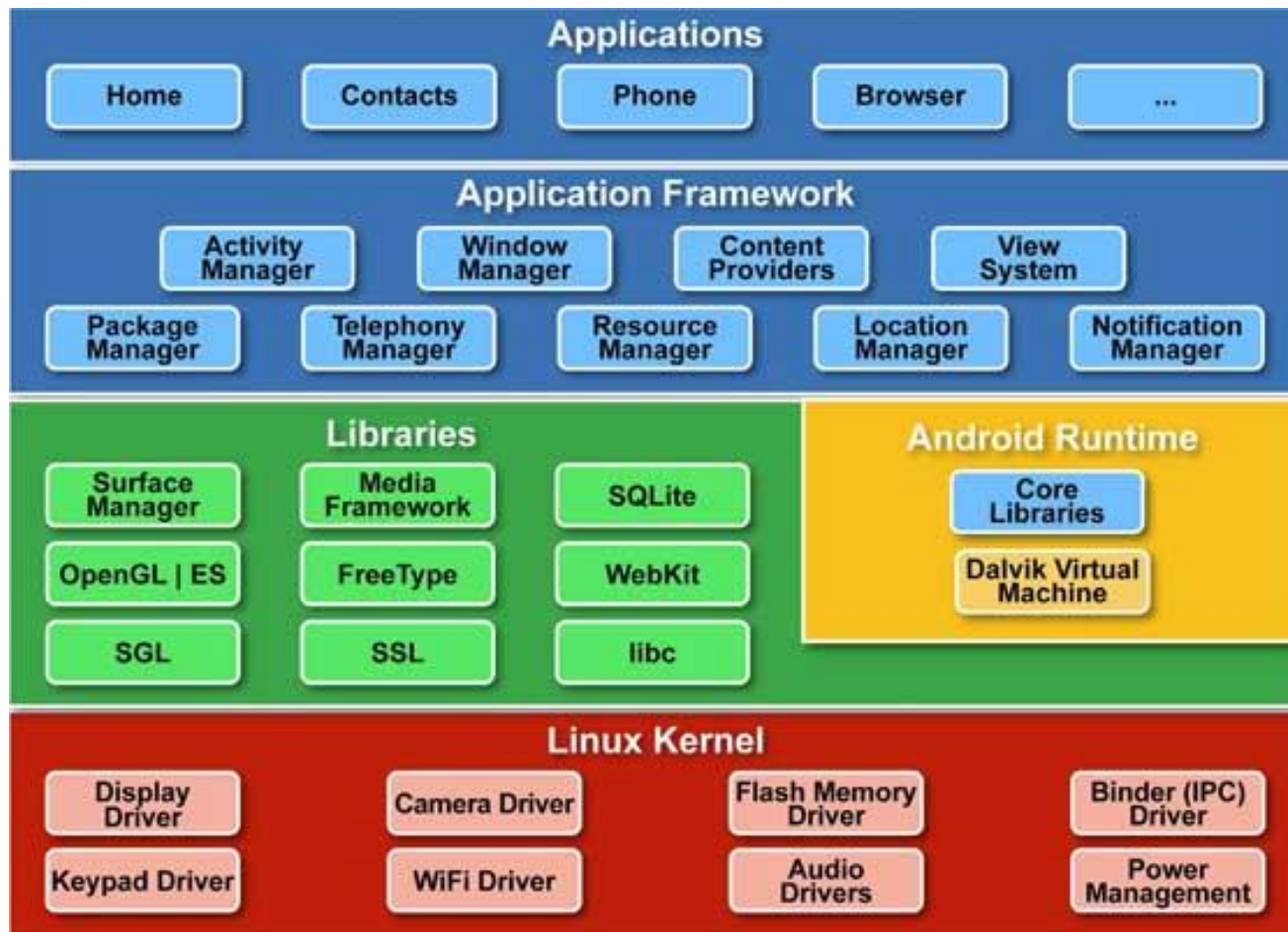
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- Mobile apps vs. desktop software
- Statistics of smart-phone usage
- History of Android
- Examples of popular Android applications
- Android architecture and building blocks
- Android setup on laptop

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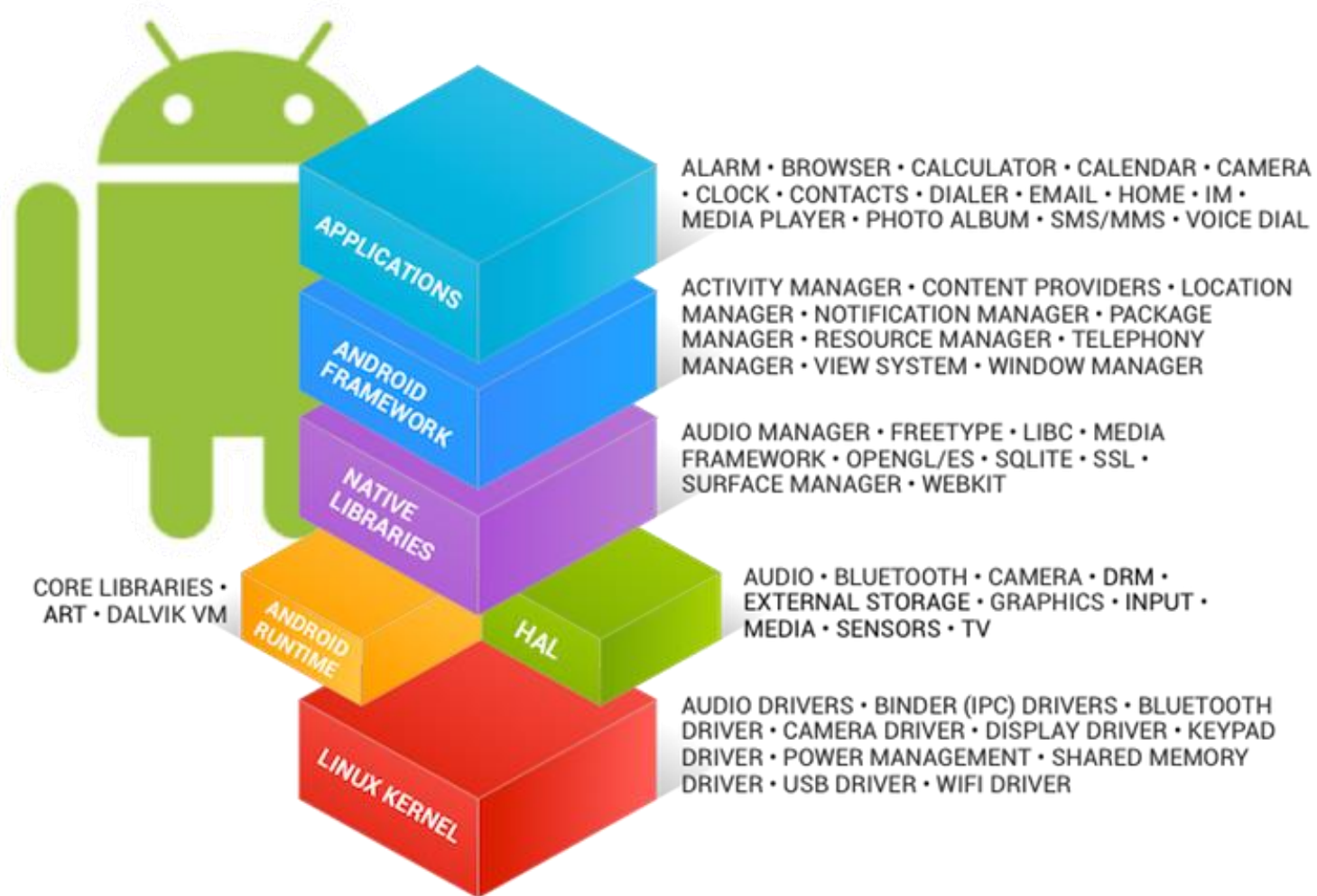
# Android Stack

# Android Stack



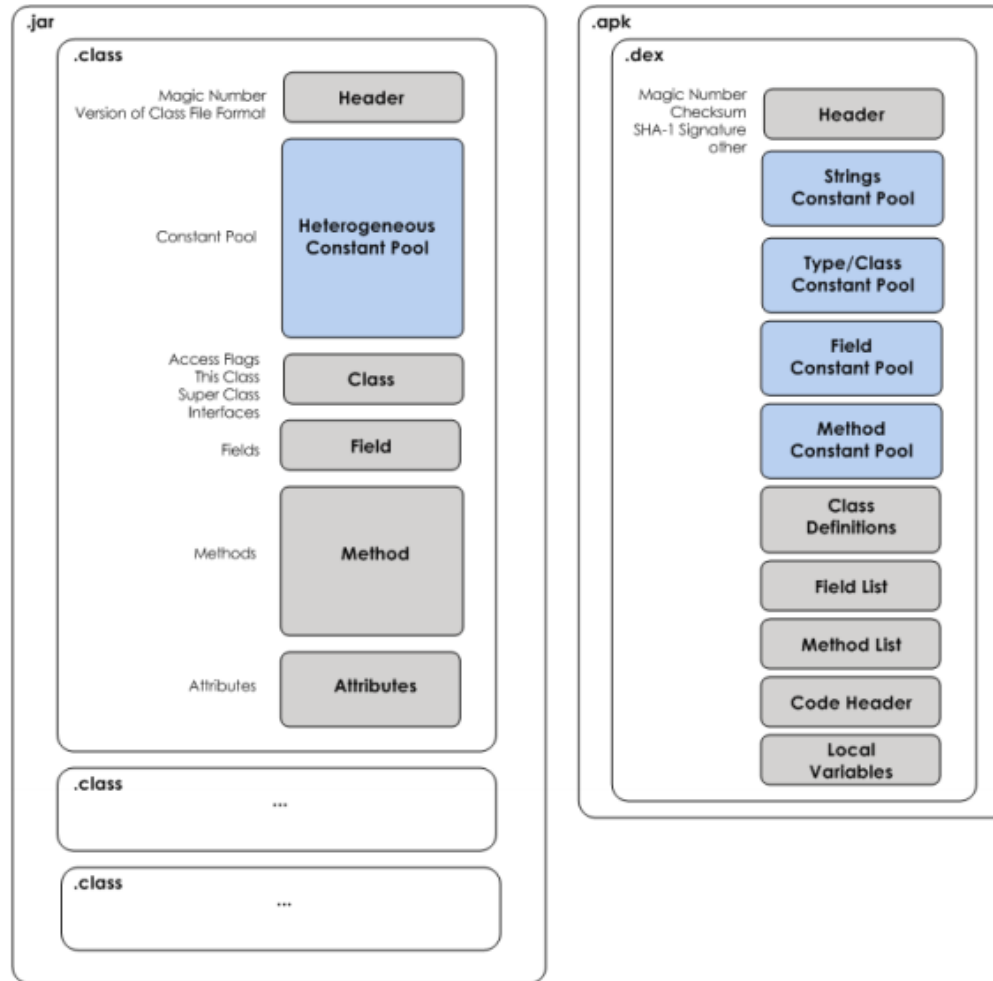
Ref: [http://www.tutorialspoint.com/android/android\\_architecture.htm](http://www.tutorialspoint.com/android/android_architecture.htm)

# Android Stack



<https://source.android.com/source/index.html>

# Dalvik Virtual Machine



[http://davidehringer.com/software/android/The\\_Dalvik\\_Virtual\\_Machine.pdf](http://davidehringer.com/software/android/The_Dalvik_Virtual_Machine.pdf)

# Dalvik Virtual Machine

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Code	Uncompressed JAR File (bytes)	Compressed JAR File (bytes)	Uncompressed dex File (bytes)
Common System Libraries	21,445,320 (100%)	10,662,048 (50%)	10,311,972 (48%)
Web Browser App	470,312 (100%)	232,065 (49%)	209,248 (44%)
Alarm Clock App	119,200 (100%)	61,658 (52%)	53,020 (44%)

[http://davidehringer.com/software/android/The\\_Dalvik\\_Virtual\\_Machine.pdf](http://davidehringer.com/software/android/The_Dalvik_Virtual_Machine.pdf)

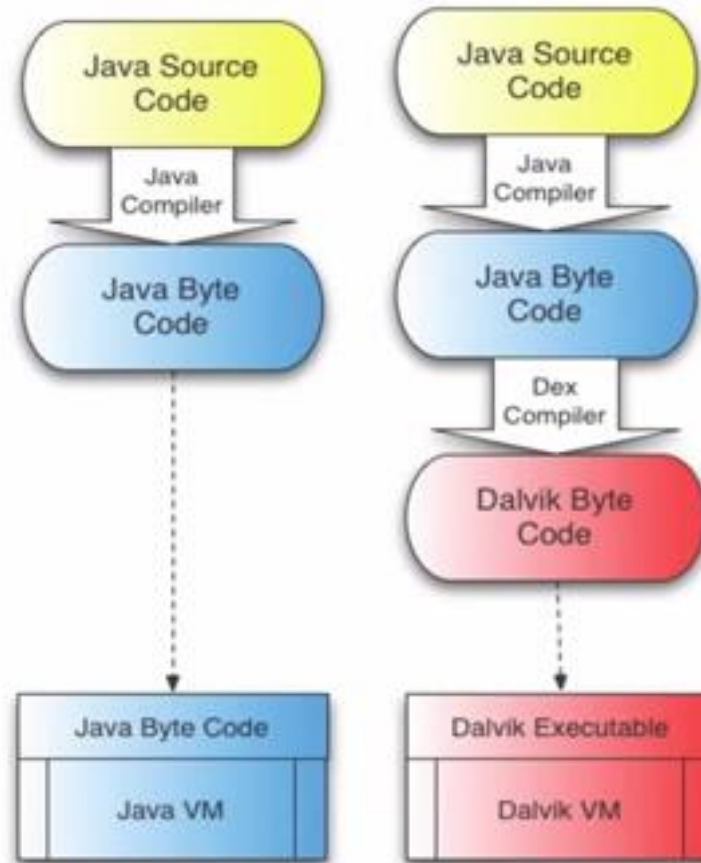
# Dalvik vs. JVM

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- Licensing model
- JVM: same size fits all
- Dalvik: Compressed package for mobile
- Register vs. stack-based VM



# Dalvik vs. JVM



<https://www.youtube.com/watch?v=byFTAhXVF7k>

San Francisco Android User Group held an event on February 23rd, 2010 with Marko Gargenta who presented on Android Internals and NDK



# Android Zygote

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- VM at boot time
- Fork new VMs on request
- Sharing of libraries across VMs
- Quick start-up time for app VMs

# Android APK

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- Full form: Android Application Package
- Package file format for distribution
- Self-sustained collection of:
  - manifest
  - certificates
  - lib
  - res
  - dex files

# Android APK

The image shows two overlapping Windows Explorer windows. The top window displays the directory structure of an Android project. The path is `areas_of_interest > HealthyMe > Android > my_codes > Accel`. The `Accel` folder is highlighted with a red box, and a red arrow points from it to the text "Project Directory". The `bin` folder is also highlighted with a red box, and a red arrow points from it to the bottom window.

The bottom window shows the contents of the `bin` folder. The path is `areas_of_interest > HealthyMe > Android > my_codes > Accel > bin`. The `Accel.apk` file is highlighted with a red box.

Name	Date modified	Type	Size
classes	27-Nov-14 11:43 A...	File folder	
res	14-Oct-12 3:46 AM	File folder	
Accel.apk	14-Oct-12 4:32 AM	APK File	414 KB
AndroidManifest.xml	20-Nov-14 5:47 PM	XML Document	2 KB
classes.dex	14-Oct-12 4:32 AM	DEX File	805 KB
jarlist.cache	27-Nov-14 11:43 A...	CACHE File	1 KB
resources.ap_	14-Oct-12 4:03 AM	AP_File	40 KB

# App: *principle of least privilege*

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- Multi-user linux system, each app is a different user
- App is assigned a unique user-id
- Each app has its own VM
- All permissions granted at install time