

Android

(XKE – Mars 2009)



Erwan Alliaume
*ealliaume(*AT*)xebia(*DOT*)fr*

History

- **August 2005**
 - ▶ Google acquires Android
- **November 2007**
 - ▶ Open Handset Alliance announcement
 - ▶ Android SDK available
- **September 2008**
 - ▶ HTC and T-Mobile announce G1
- **October 2008**
 - ▶ Android SDK 1.0
 - ▶ Android Market goes live
 - ▶ G1 available in retail stores in USA
- **March 2009 (today!)**
 - ▶ Android G1 is available in France via Orange



← Iphone is out in US

← Nokia buy Symbian

← JavaFX goes mobile...

Android is Hot !



Android is
HOT!

Oh yeaahh
I want a G1

Andrea the Android



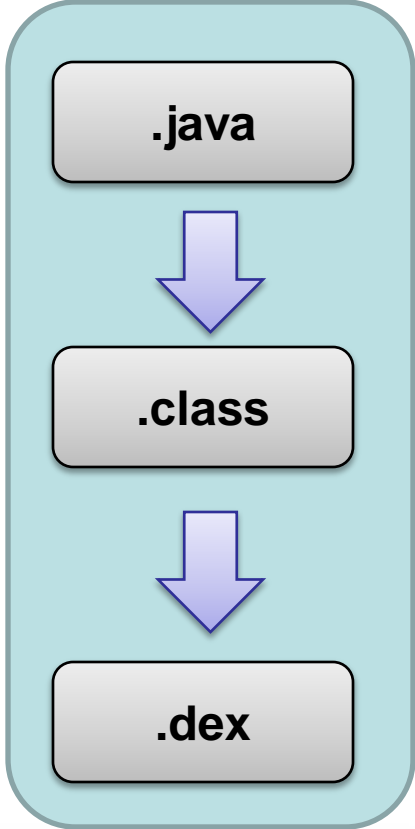
- **Google ... but not only ...**
 - ▶ Open handset alliance: 47 vendors
- **Open source**
 - ▶ Apache license
 - ▶ <http://git.android.com>
- **Solid foundation**
 - ▶ Based on Linux Kernel 2.6 - *Android is not Linux* 😊
- **Good framework based on Java**
- **Empower User**
 - ▶ Replace core apps / Personalize as you want
- **Google Stuffs**
- **Huge opportunity for vendors, developers, users**
- **Not just for phones**



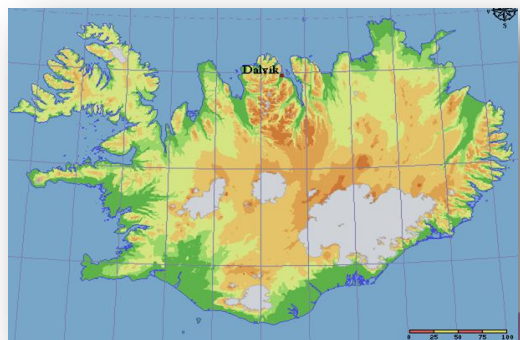


Dalvik Virtual Machine

- **No native windowing ! No glibc !**
- **Dalvik - Custom VM implementation**
 - ▶ Provides application **portability**
 - ▶ Run **optimized file** format (.dex)
 - ▶ Java .class / .jar converted to .dex at **build time**
 - ▶ Support **multi processes** per VM
 - ▶ Slimmed down to use **less space**
 - ▶ No Just-in-time compiler
 - ▶ Constant pool has been modified to use only 32-bit indexes
 - ▶ Uses its **own bytecode**, not Java bytecode.



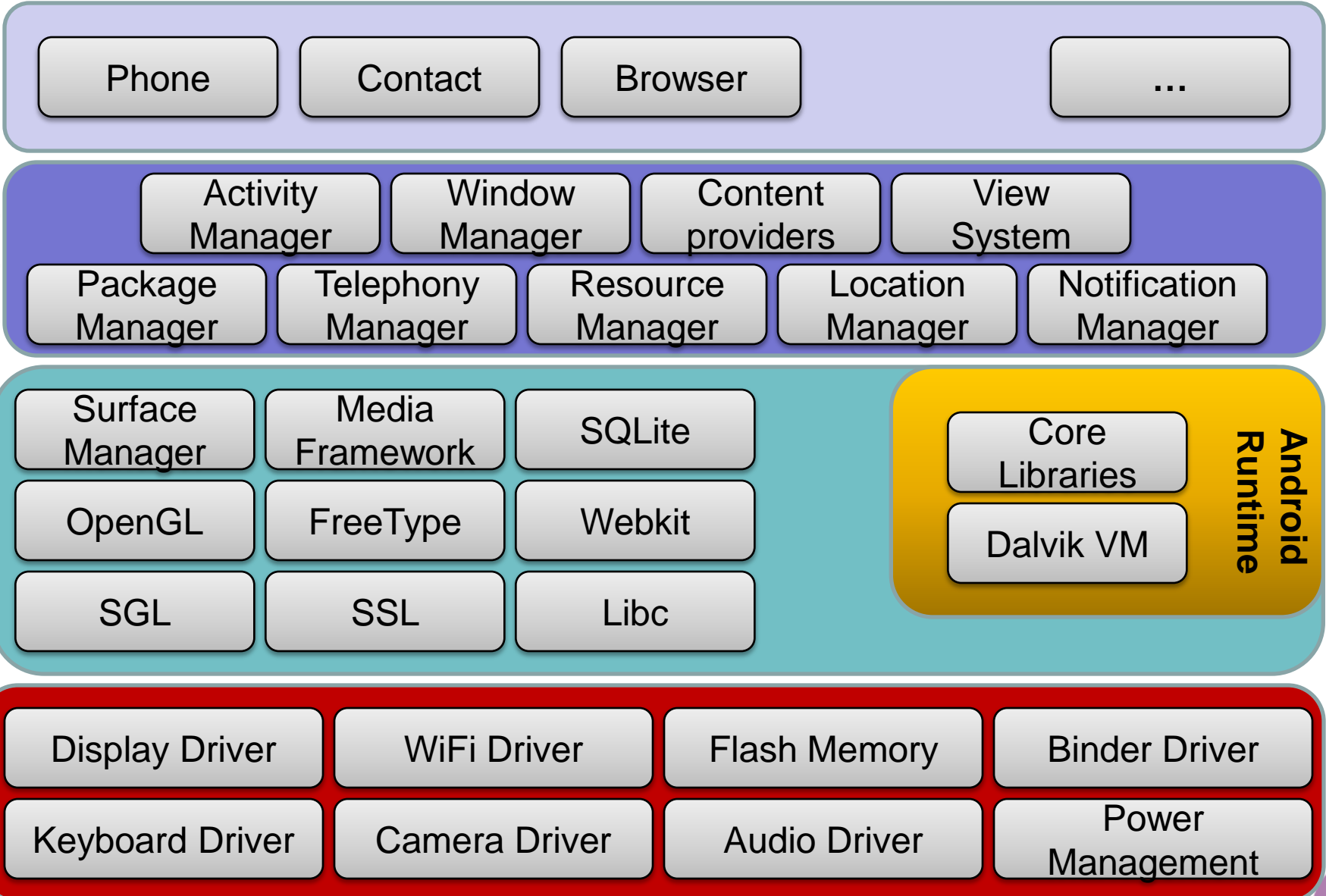
Dan Bornstein, has named it after going to the fishing village of Dalvík in Iceland, where some of his ancestors live.





What is Android?

Applications
Framework
Libraries
Linux Kernel



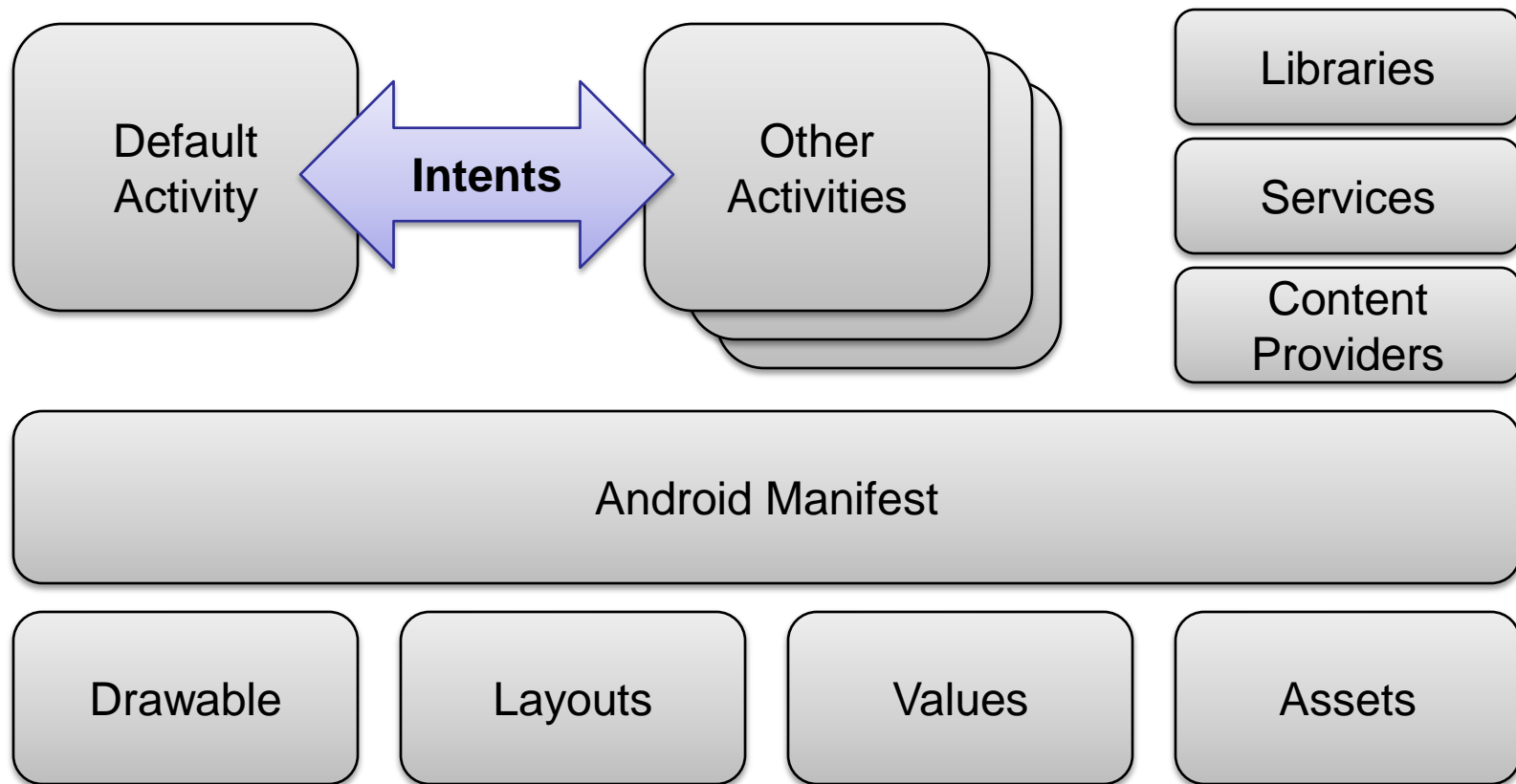


What is an application?

- **Application package file : myapp.apk**
- **Composed by one or more activities**
 - ▶ Usually a single screen in your application
 - ▶ Can be faceless
 - ▶ It is an entry point for your application
- **AndroidManifest.xml**
- **Activities**
 - ▶ Visible screens
- **Views**
 - ▶ Object who know how to draw itself on the screen
 - ▶ ListView, DatePicker, MapView
 - ▶ Equivalent to JavaSwing Components
- **Layouts**
 - ▶ Positions : use relative / absolute discouraged
- **Intents & IntentReceivers**
 - ▶ Declare to the OS that you want to do something
 - ▶ Predefined actions : VIEW (url / contact / pictures) PICK, EDIT, DIAL, ...
- **Permissions**
 - ▶ Low level access to features (GSM, SMS, GPS, Internet ...)
 - ▶ Declared by the developer at creation time
 - ▶ User prompt on the market at installation
- **Services**
 - ▶ Background services
- **Notifications**
 - ▶ Receive and react to broadcasted events
- **ContentProviders**
 - ▶ Shared data



What is an application?



- **All features of the Hardware are accessible to the developer**



- **Google G1**
 - ▶ Telephony
 - ▶ Location (GPS + phone)
 - ▶ Bluetooth / Wifi
 - ▶ USB
 - ▶ Sensors
 - » Compass
 - » Movement

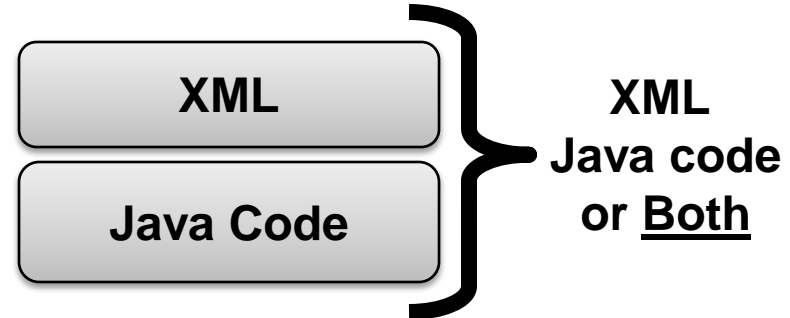




UI Development (1/2)

■ Two ways

- ▶ Declarative XML
- ▶ Full Java Code



■ Rich Java UI API

- ▶ Layouts & widgets : android.widgets* → about 80 widgets

■ Customization

- ▶ Inherit and override a base widget
- ▶ Combine existing widgets
- ▶ Fully draw yourself

■ OpenGL

■ May not beat iPhone, but foundation of for future

■ Edition Tools

- ▶ Official Eclipse Plugin sux (preview)
- ▶ 3rd party tool : UI Builder (editor) – <http://droiddraw.org>



■ 9-Patch Bitmaps

- ▶ Image stretching for widgets
- ▶ Embedded padding measurement

■ Animation

- ▶ In-built animation framework
- ▶ All view are animable - *View.startAnimation()*
- ▶ Tweened animation
 - » Scale, alpha, transition, rotation
- ▶ Frame-by-frame animation
 - » List image



■ Store data

- ▶ Sandbox file system
 - » Adb push, pull
- ▶ Sdcard for big files
- ▶ Preferences
 - » Out-of-the-box application preferences screen
- ▶ SQLite



■ Networking: apache HttpClient is available

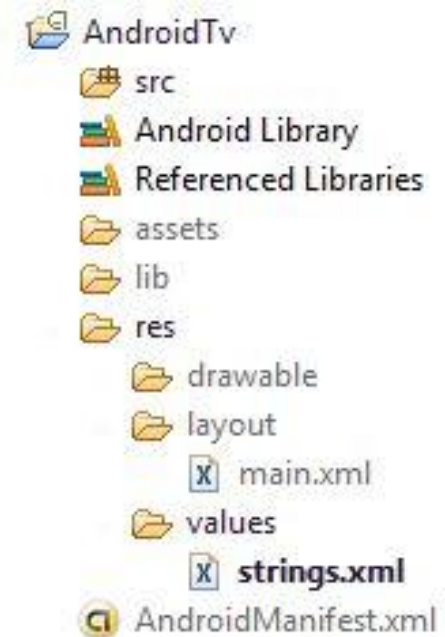
■ For XML calls

- ▶ 3 parsers included
 - » SAX
 - » DOM
 - » XmlPullParser
- ▶ Xstream works





- **Images, audio, video, strings, layouts, themes, ...**
- **Divided into logical directories**
- **Fetch from code**
 - ▶ Drawables : `Resources.getDrawable()`
 - ▶ XML : `Resources.getXML()`
 - ▶ Strings : `Resources.getString()`
 - ▶ Raw : `Resources.openRawResource()`
- **Intelligent resource matching**
 - ▶ Values-en/, values-fr/
 - ▶ Drawable-land/
 - ▶ Drawable-nokeys/
 - ▶ Drawable-en-finger/





- Zip file
- Java .class converted to .dex
- XML-files compressed into binary form
- Manifest for app permissions
- Signed with developer private key
- Developer public key included
- Assets packaged as is





Easiest way to code?

- **Java SDK**
- **Android SDK**
 - ▶ Android Emulator – *Windows, Mac & Linux*
 - ▶ Command Line Tools
 - » Aapt : Android asset packaging tool
 - » Adb : Android debug bridge
 - » Aidl : Android IDL compiler
 - » Emulator : Android emulator
 - ▶ Documentation
 - ▶ Example applications



- **Eclipse**
- **Eclipse Plugin**

with (or w/o) eclipse

Android 1.1 SDK r1 Eclipse IDE





■ Java

- ▶ java.util.*
- ▶ java.io.*
- ▶ java.lang.*

■ UI

- ▶ android.widgets.*
- ▶ android.views.*
- ▶ android.graphics.*

■ Telephony

- ▶ android.telephony.*

■ SMS

- ▶ android.telephony.gsm.SmsManager

■ Web

- ▶ android.webkit.WebView

■ Camera

- ▶ android.hardware.CameraDevice

■ Local database

- ▶ android.database.*

■ Maps

- ▶ Com.google.android.maps.MapView

■ Location

- ▶ Android.location.LocationManager

■ Multimedia

- ▶ android.media.MediaPlayer

■ HTTP

- org.apache.http.client*



- **Richard Miner, Android's Chief Developer : "No business model"**
- **From 1,18 billion potential users (web users) to 2.7 billion (mobile phone users)**
- **Emulator Mac, Windows & Linux !**
- **"A lot of things work, but some don't"**
 - ▶ Default libraries from apache harmony
 - ▶ Older DOM API can be an issue



- Objective-C vs. Java
- Multitouch controversy
- Open vs. not-so-much
- G1 isn't sexy

