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November 13, 2011

ANDROID APP DEVELOPMENT

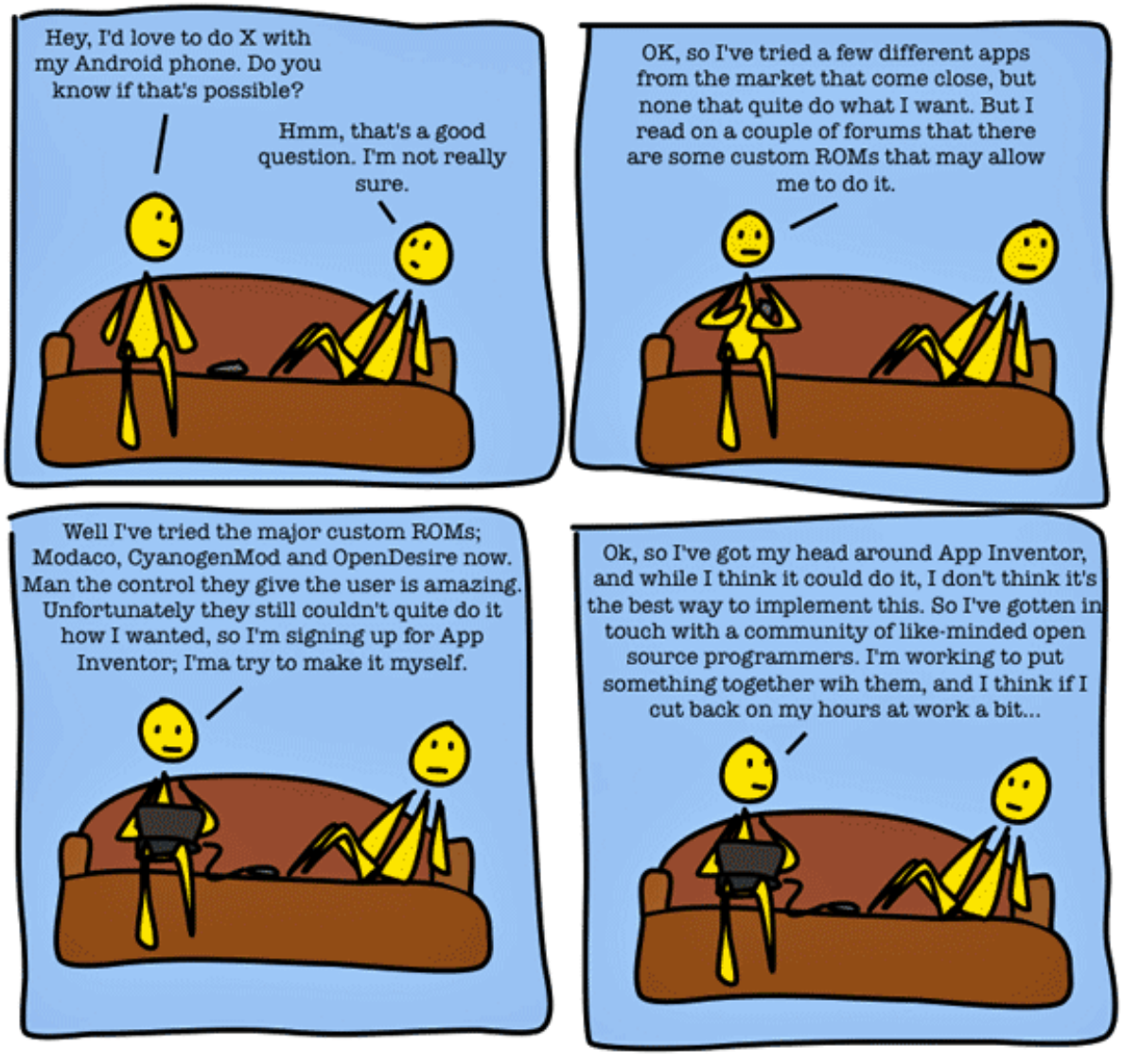
Agenda

- Why Android?
- Application framework
- Getting started
- UI and widgets
- Application distribution
- External libraries
- Demo

Why Android?

Two web comics illustrating the difference between iPhone and Android.

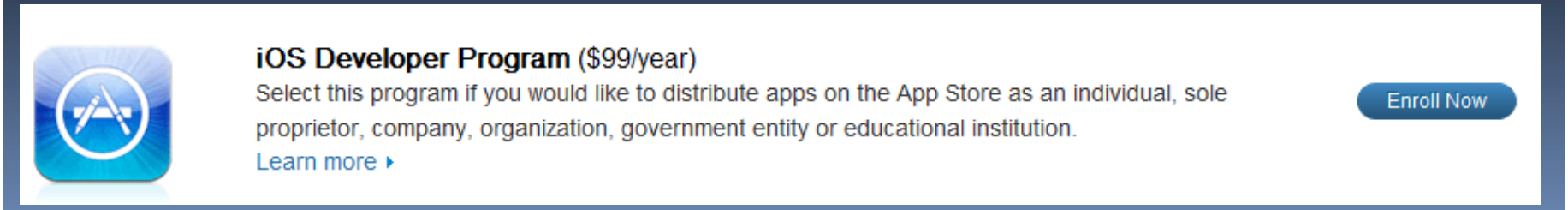
Android



iPhone
Hey, I'd love to do X with my iPhone. Do you know if that's possible?
Ohh.
Nahh, it's not possible.

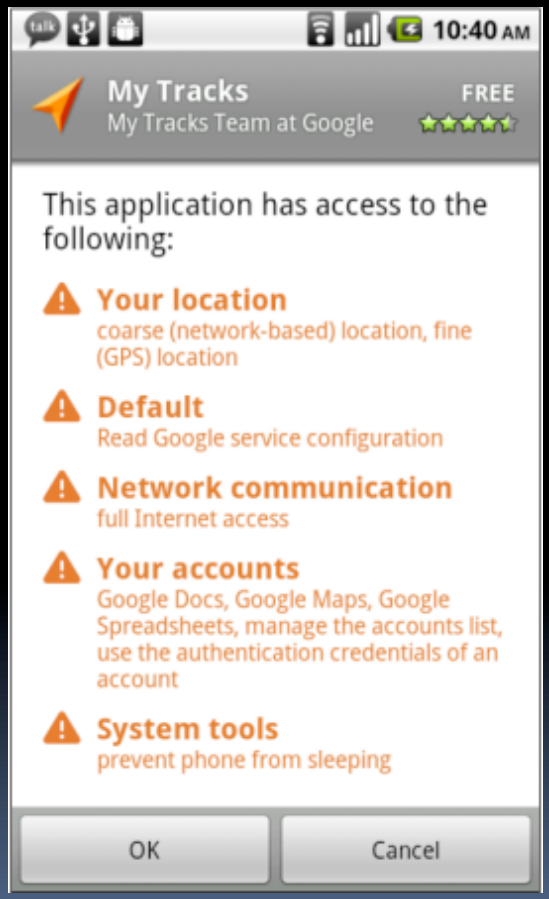
Why Android?

- Open-source
  - That means that it's free!
- Easy-to-use framework based on Java
- True customization
  - Replace stock apps
  - Personalize Home Screens with widgets
- Better notifications
- Easier to publish – no review process

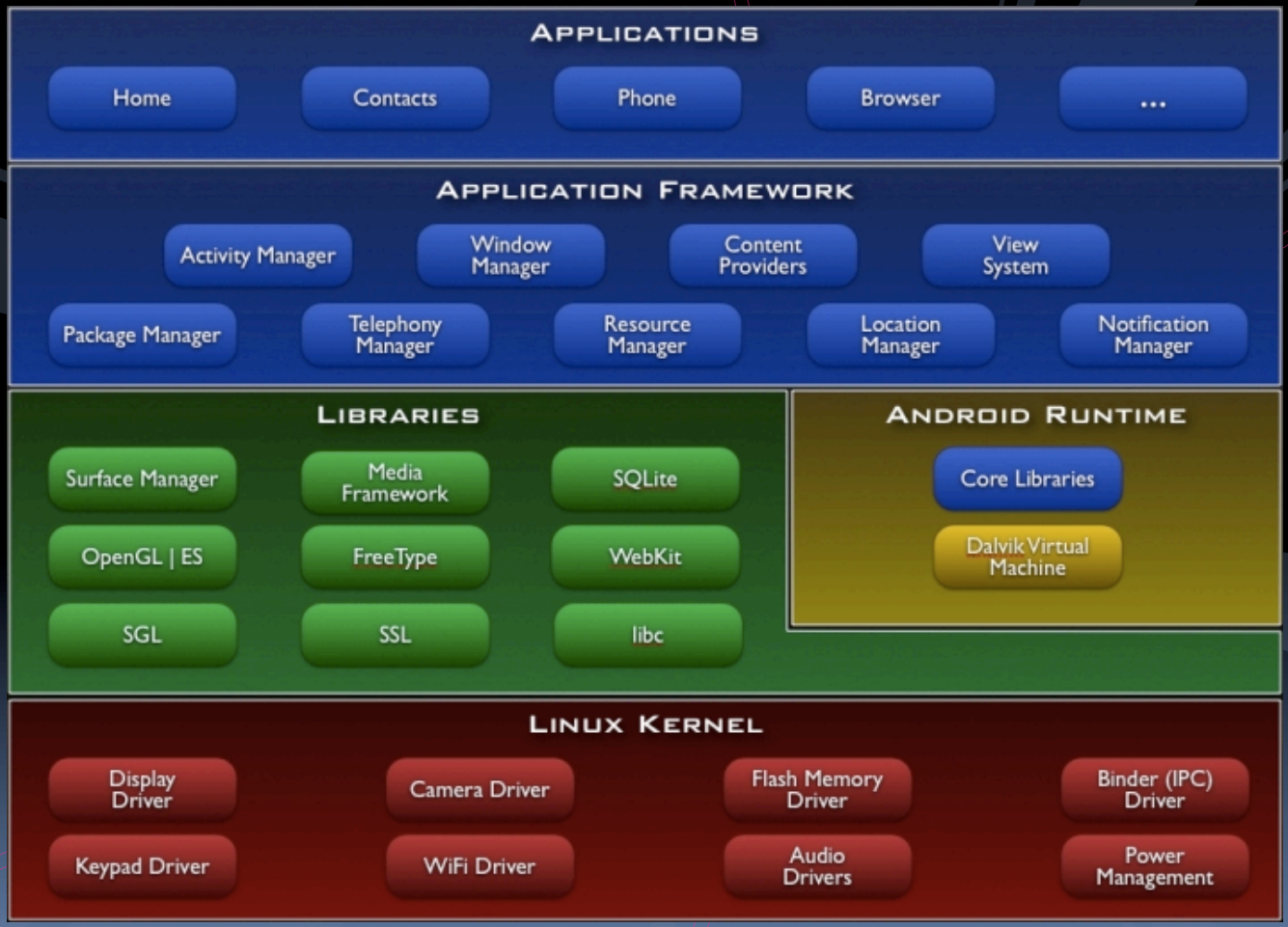


Why Android? - Security

- Reputation as less secure than iOS
  - True, but it is still very secure!
- Each application lives in its own security sandbox
  - System assigns each app a unique Linux user ID
- Each process has its own virtual machine, so an app's code runs in isolation from other applications
- Permissions are approved by the user during app installation.
- Apps are signed by a developer's private key

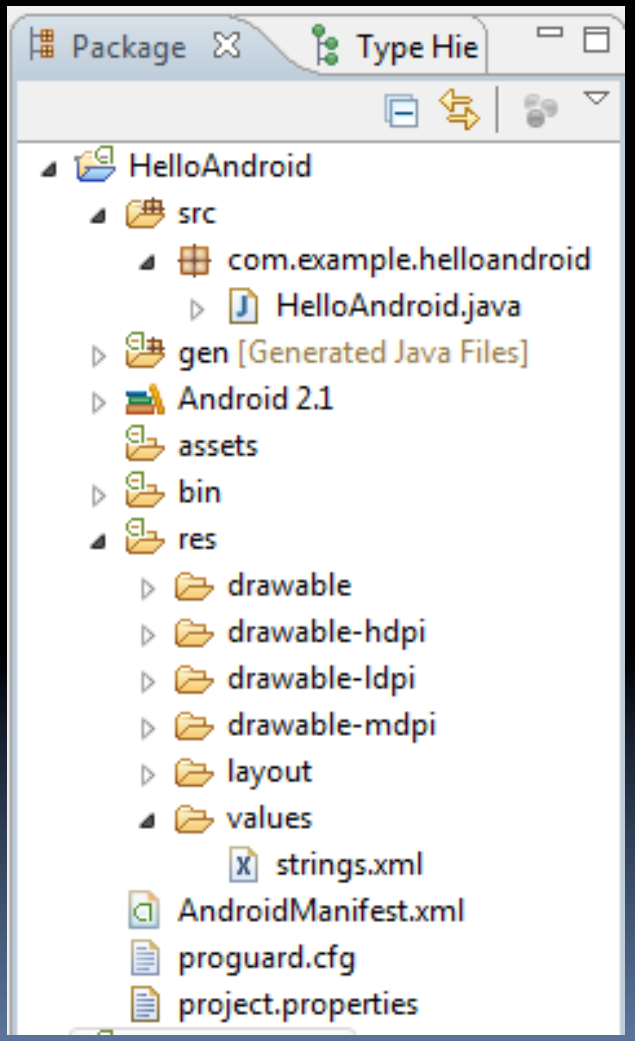


Application framework



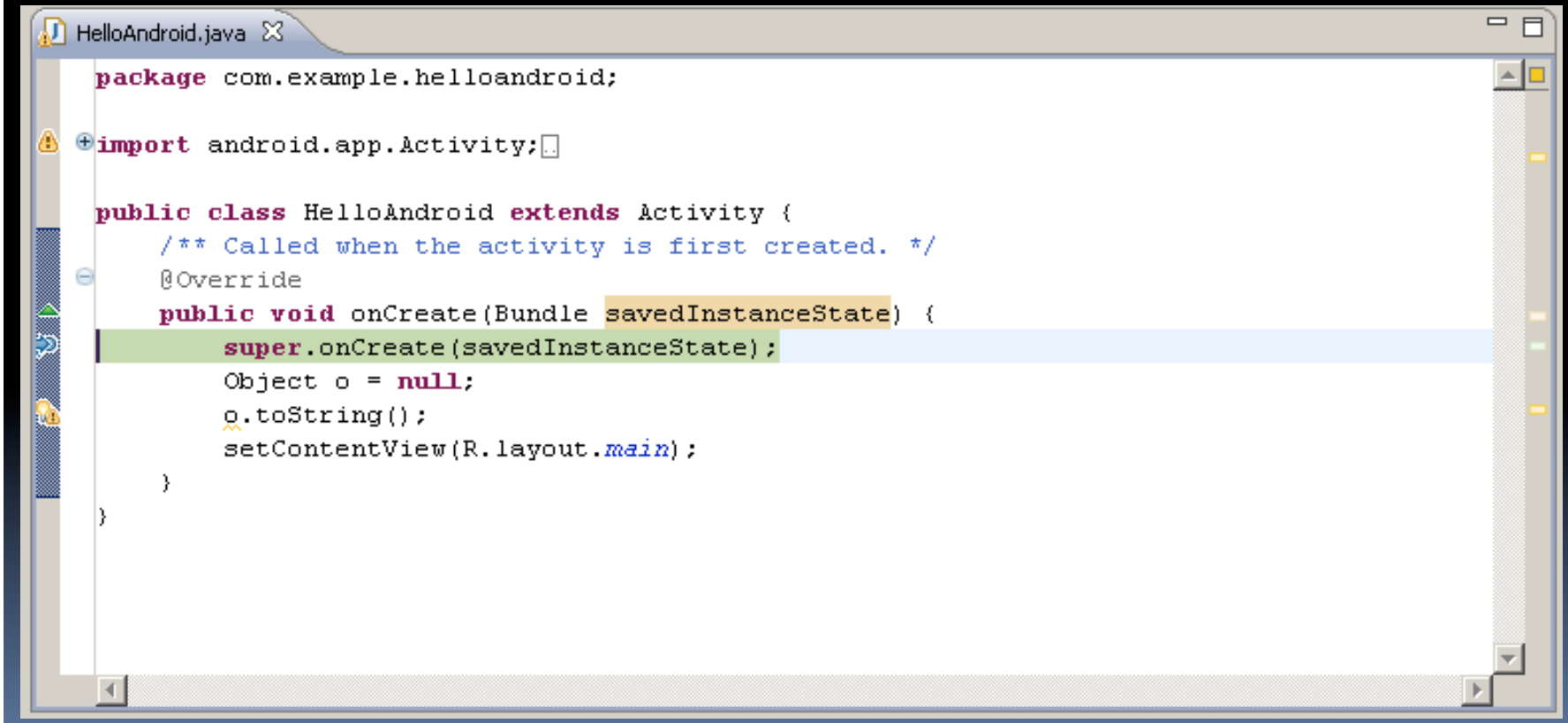
Application framework

- src - source files where the actual coding takes place
- res – collection of resources for screen layouts, images, sounds, text, animations and more.
- Manifest – represents essential information about the application to the Android system



Application framework

- src code example



Application framework

- res
  - res/drawable – logo and all images
    - Customizable for different pixel densities
  - res/raw – sounds and music
  - res/layout – the XML layout for each activity
    - Customizable for different screen sizes and orientations
  - res/values – saves all strings and object styles
- Not as stream-lined or standardized as iOS

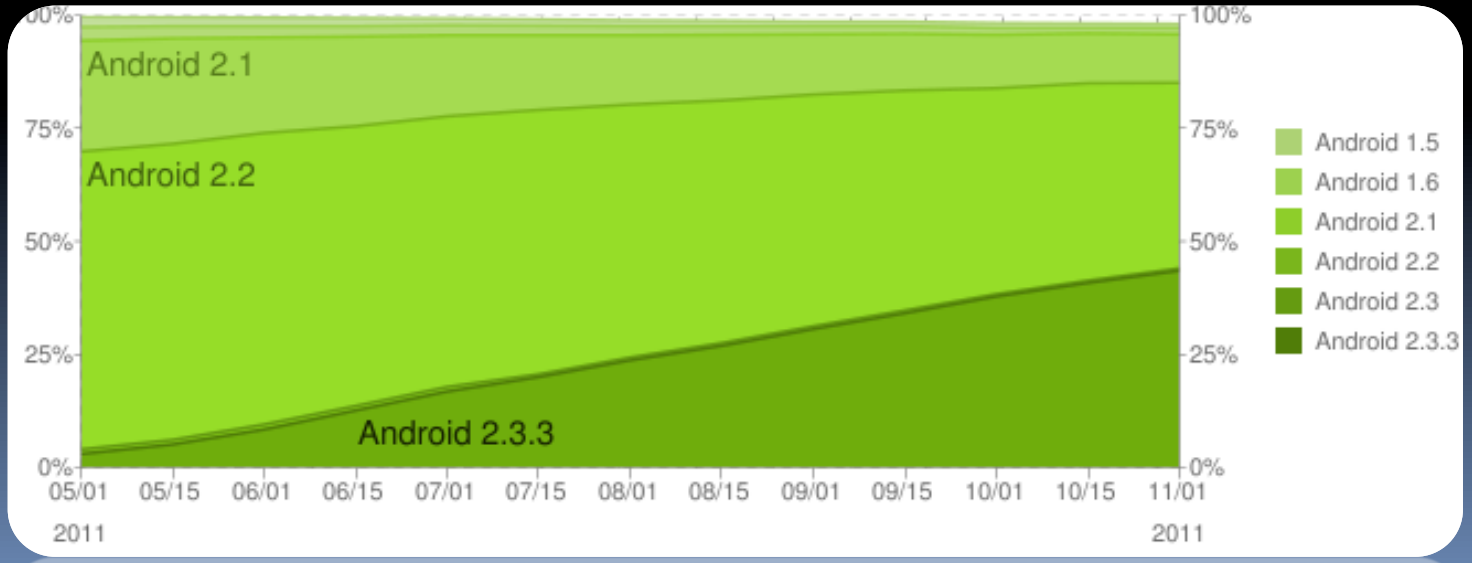
Application framework

- Layout example

```
1  <?xml version="1.0" encoding="utf-8"?>
2  <LinearLayout
3      xmlns:android="http://schemas.android.com/apk/res/android"
4      android:layout_width="fill_parent"
5      android:layout_height="fill_parent"
6      android:orientation="vertical">
7          <TextView
8              android:id="@+id/textview"
9              android:layout_width="fill_parent"
10             android:layout_height="fill_parent"
11             android:text="@string/hello"/>
12         <Button
13             android:id="@+id/button"
14             android:layout_width="wrap_content"
15             android:layout_height="wrap_content"
16             android:text="button"/>
17 </LinearLayout>
18
```

Application framework

- Manifest
  - Permissions
    - e.g. access internet, access SMS messages
  - Minimum API
  - Hardware and software features required
  - You must also declare every activity you create!

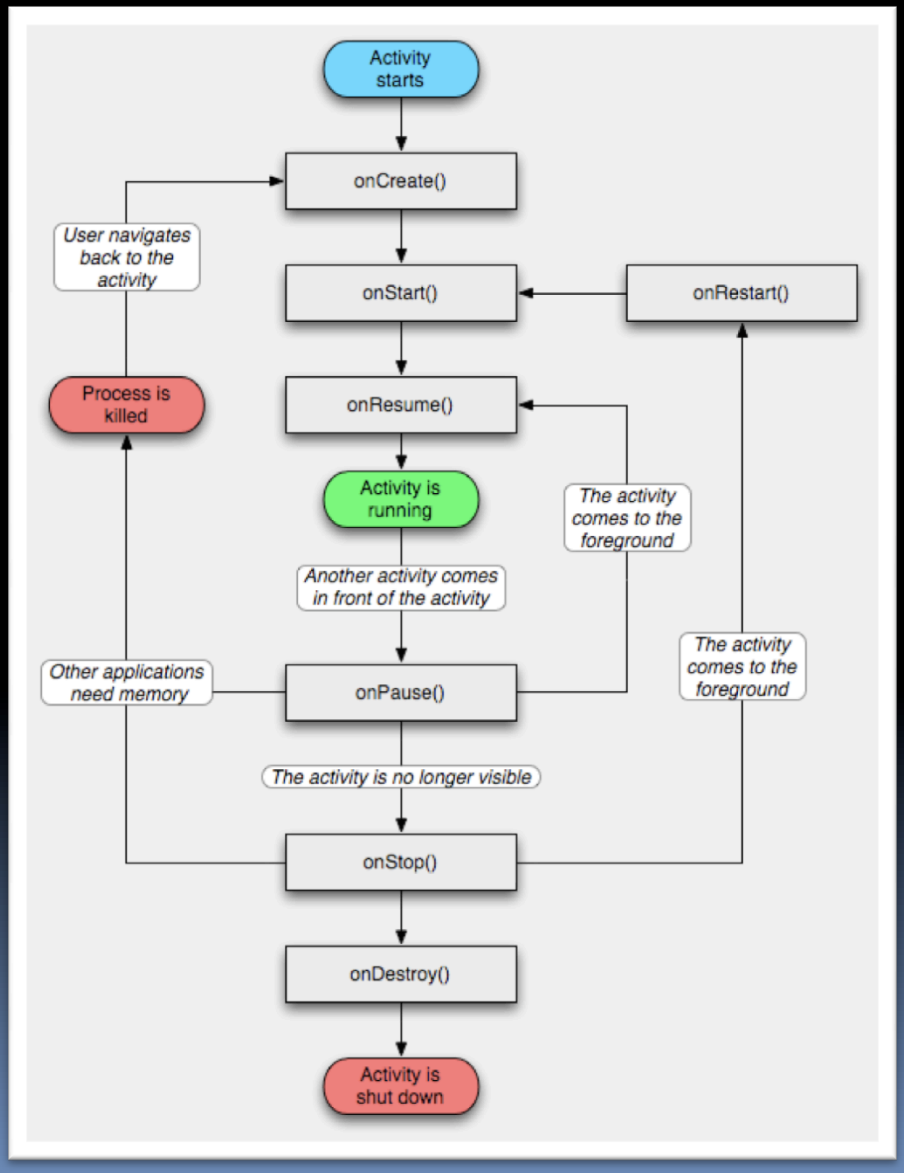


Application framework

- Manifest example

```
1  <?xml version="1.0" encoding="utf-8"?>
2  <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3        package="com.example.helloandroid"
4        android:versionCode="1"
5        android:versionName="1.0">
6      <uses-sdk android:minSdkVersion="7" />
7      <application android:icon="@drawable/icon" android:label="@string/app_name">
8          <activity android:name=".HelloAndroid"
9                    android:label="@string/app_name">
10             <intent-filter>
11                 <action android:name="android.intent.action.MAIN" />
12                 <category android:name="android.intent.category.LAUNCHER" />
13             </intent-filter>
14         </activity>
15     </application>
16     <uses-permission android:name="android.permission.INTERNET"/>
17     <uses-permission android:name="android.permission.ACCESS_NETWORK_STATE"/>
18 </manifest>
```

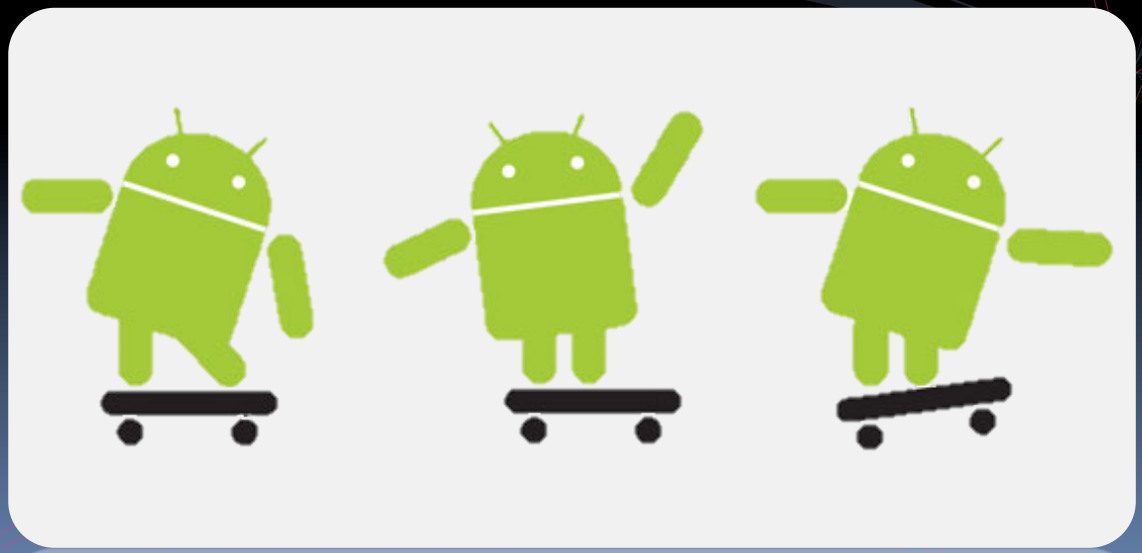
Application framework – Activity Lifecycle



Application Framework

- Activity
  - Visible screens
- Service
  - Background services
- Content provider
  - Shared data
- Broadcast receivers
  - Receive and react to broadcast events
- Intent
  - Launch new activities

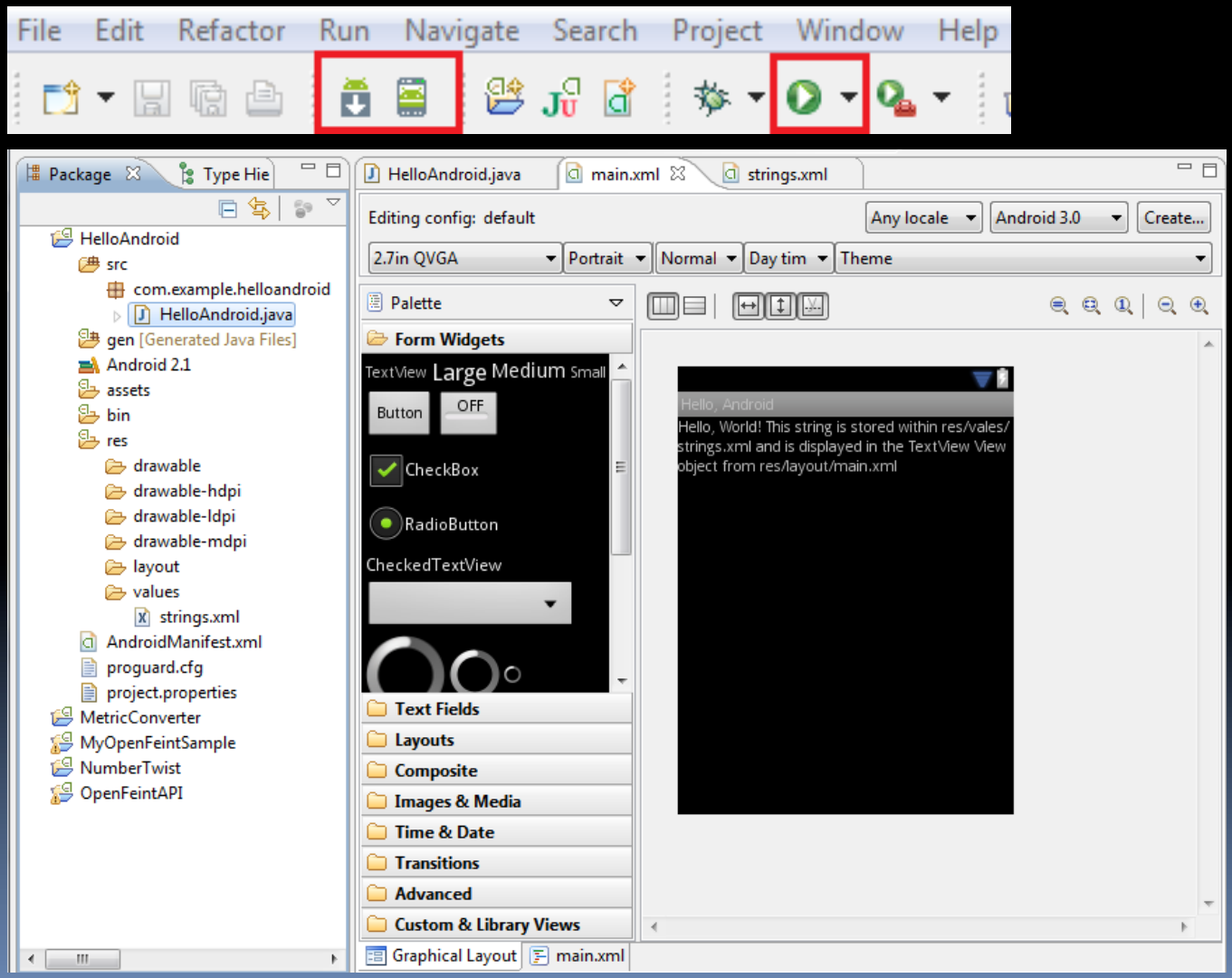
Getting started



Getting started - installation

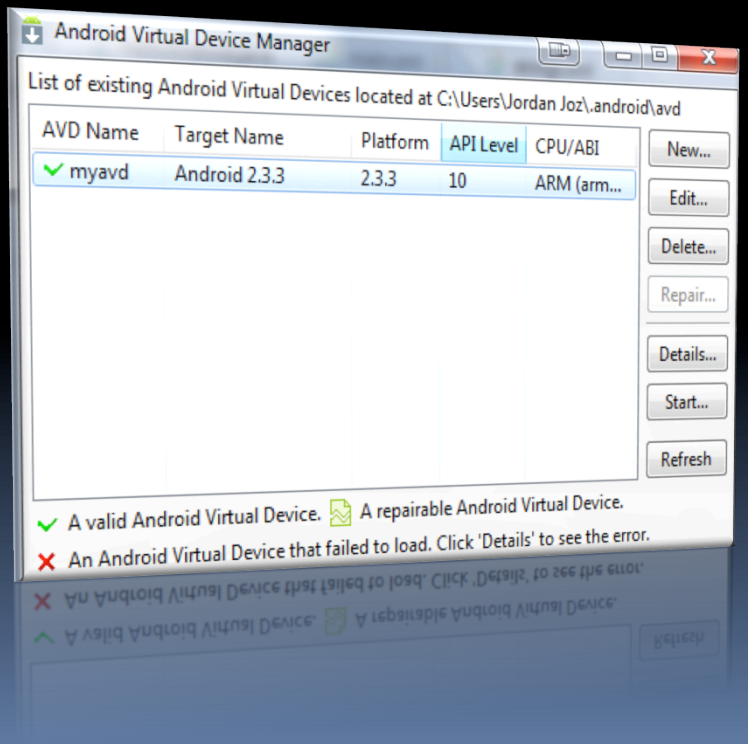
- Get the latest Java Development Kit (JDK)
- Get the latest version of Eclipse Classic (recommended)
- Install the Android Software Development Kit (SDK)
- Install the Android Development Tools (ADT) plugin for Eclipse
  - Makes your life easier: lets you quickly set up new Android projects, create an application UI, debug your apps, and export APKs for distribution!

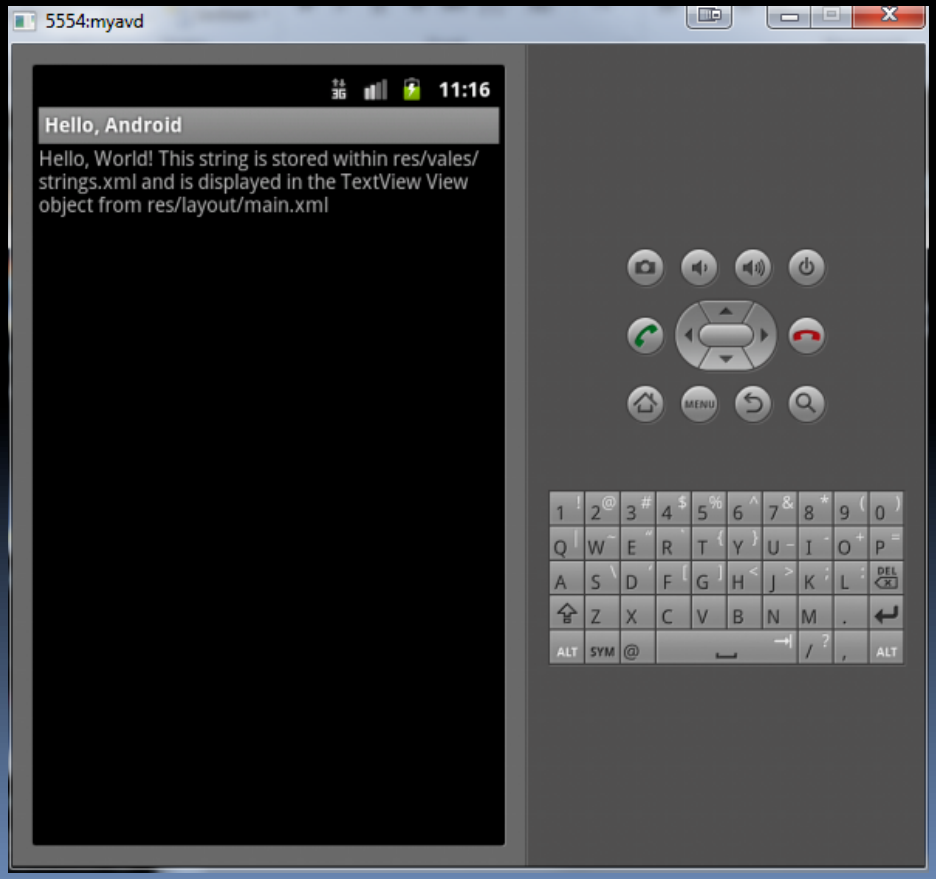
Getting started – Eclipse + ADT



Getting started - Emulator

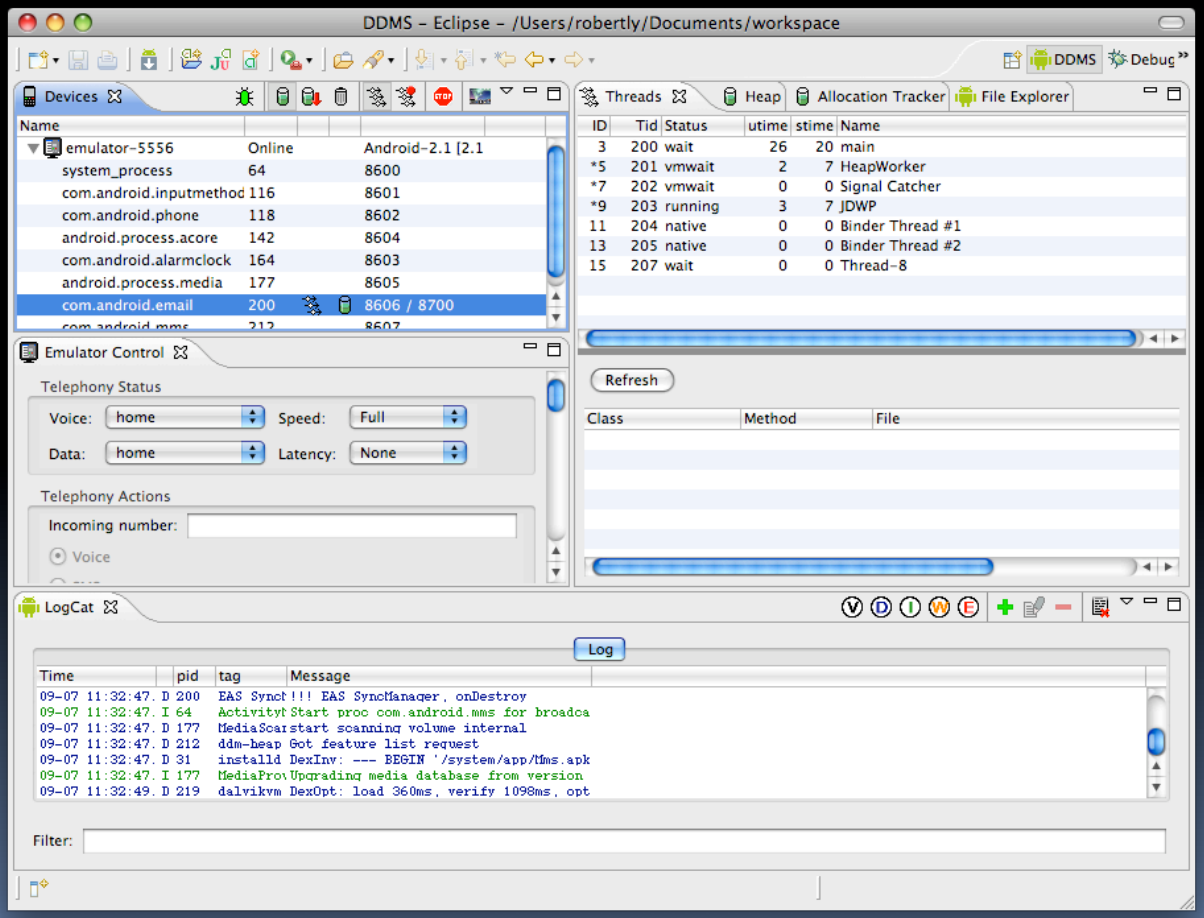
- Eclipse + ADT + Emulator = ☺



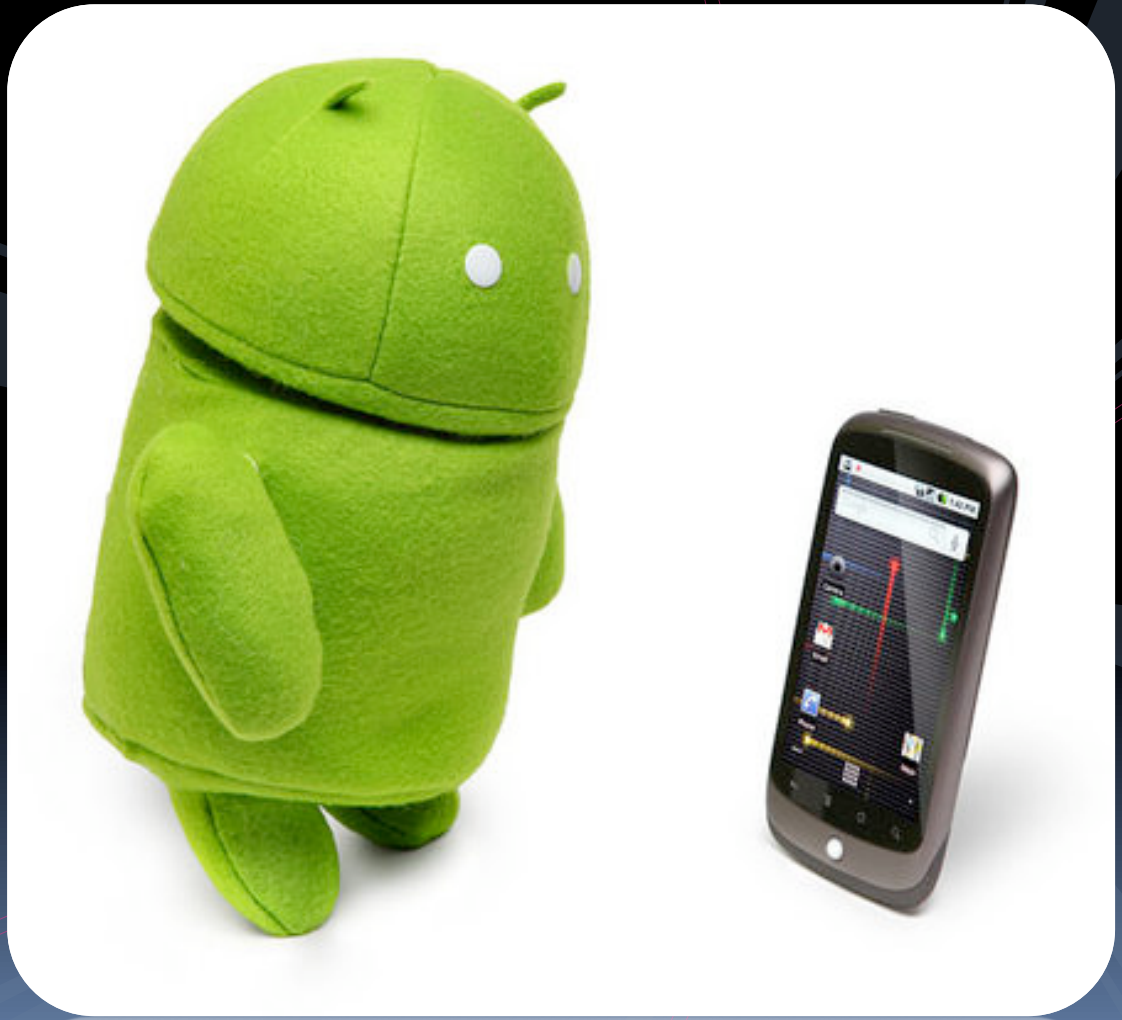


Getting started - debugging

- DDMS debugger - not fun, but you should do it.



UI and widgets

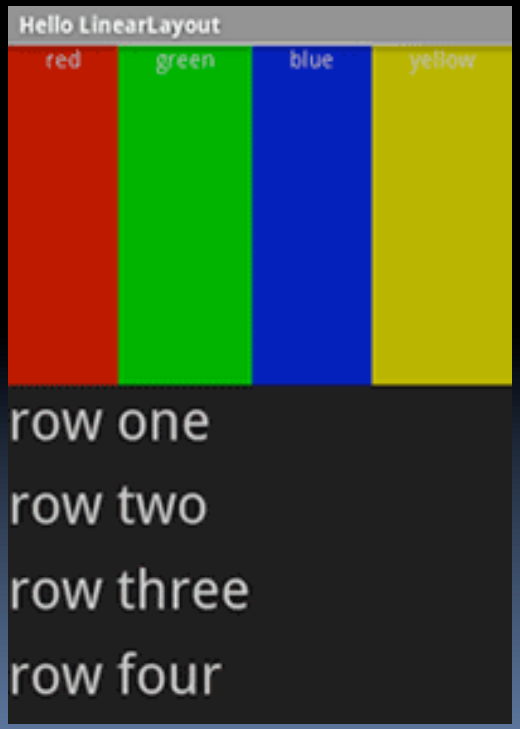


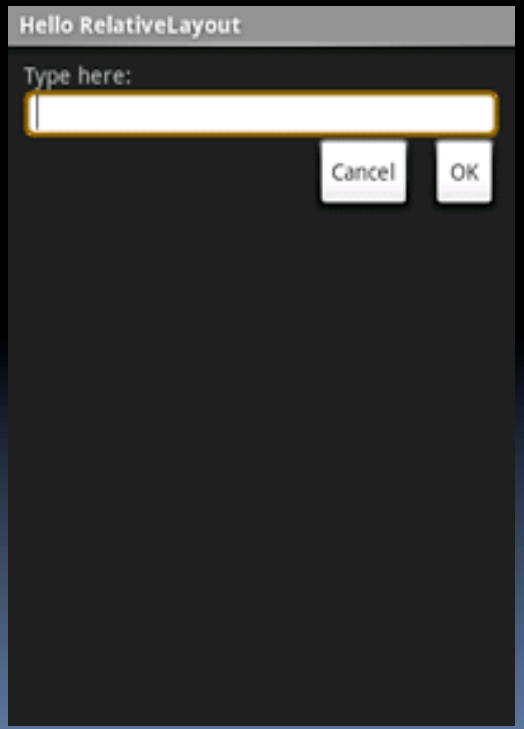
UI and widgets

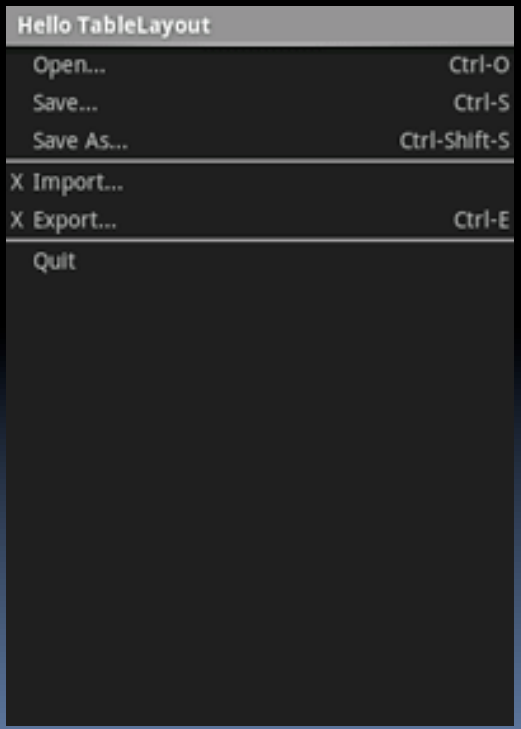
- Android user interface is composed of hierarchies of objects called Views
  - View: a drawable object such as a button, image, or text label
  - Widget: like form types in HTML, ways that the user can interact with the UI such as TextView, ListView, ScrollView, Spinner, TabWidget, Button
  - Layout: a container for widgets

UI and widgets

- Linear Layout, Relative Layout, and Table Layout







Application distribution

Application distribution

- Publish in the Android Market
  - Purchase a developer account for $25
  - Export APK from Eclipse with ADT
  - Upload APK, images, and description

External Libraries

External Libraries

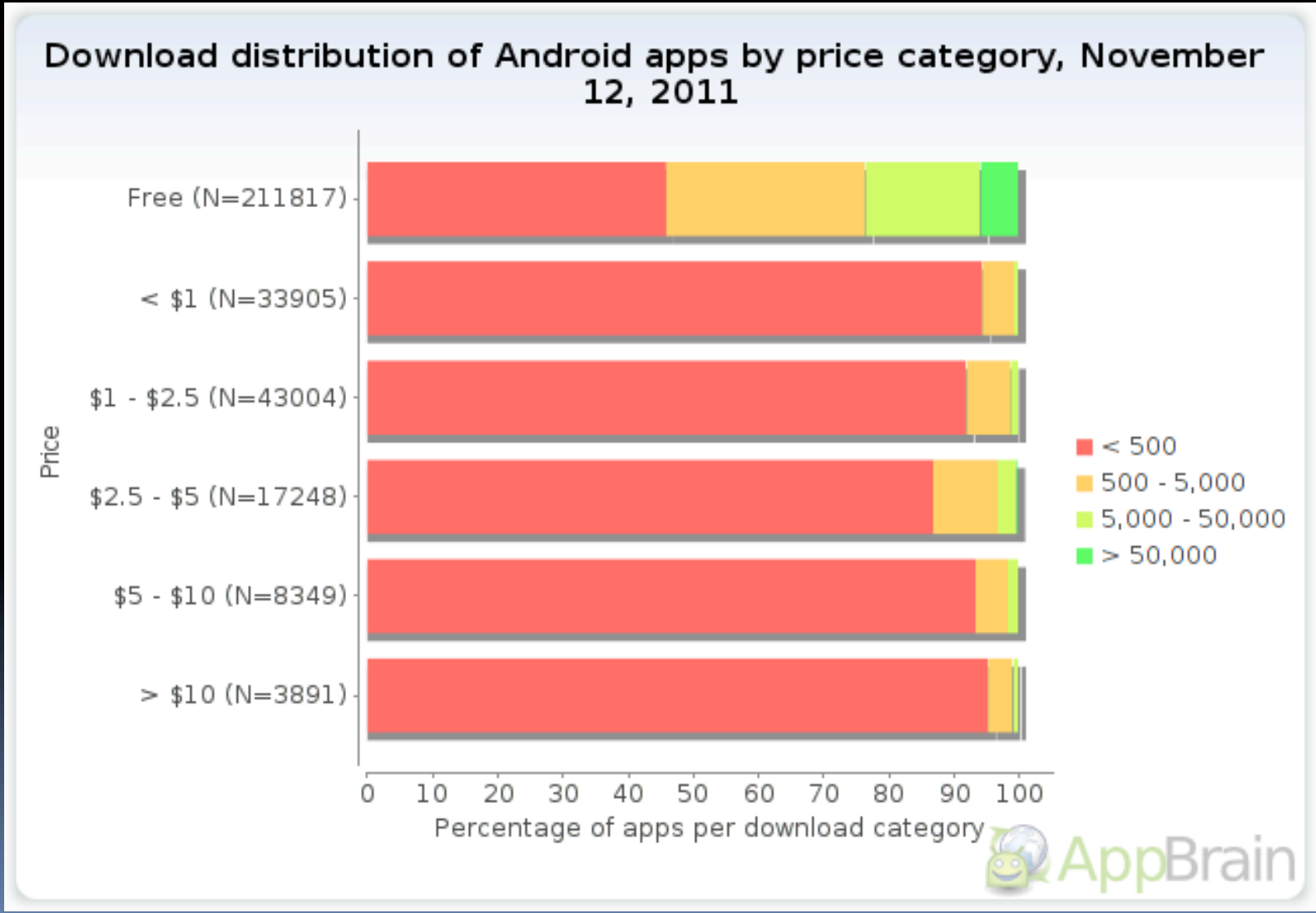
- Easily add external libraries by importing 3rd party JARs (.jar files)
  - Allows you to easily integrate cool features into your app
  - Make use of SDKs from big corporations
  - Selling point
  - Less coding

External Libraries - Analytics

- Google Analytics (recommended)

- Understand how users interact with your app
  - Number of visitors per day
  - Time on page (in activity)
  - Demographics and location
  - Track app version
  - App interaction (button presses, conversions, etc.)

External Libraries - Monetization



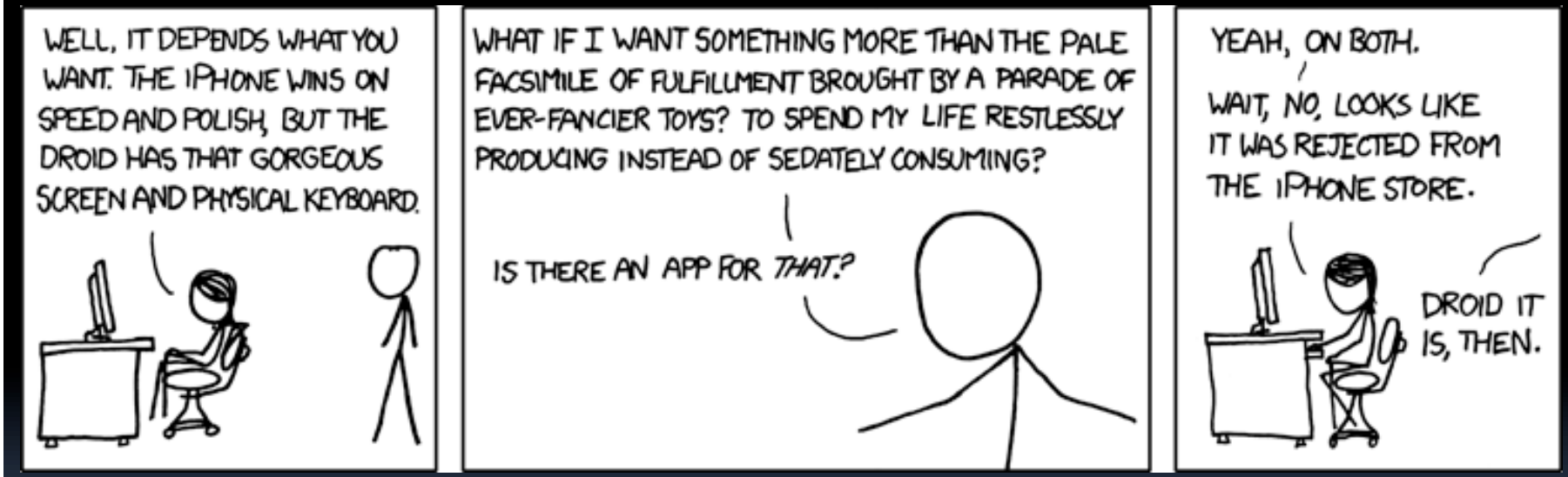
External Libraries - Monetization

- Open-source philosophy
  - People are less willing to pay for apps, so developers may money through advertisements
- AdMob (recommended)
  - Bought by Google in 2009 for $750 million
  - Paid by click, not by impression
  - Easily transfer funds to advertise your own app (20% bonus)

External Libraries - Others

- Many large companies have their own SDKs in the form of JARs
  - Facebook, Twitter, Dropbox, OpenFeint, etc.
  - Search online for JARs for other functions (advanced math operations, etc.)

Demo

- **Tutorial for Hello, world!**
  - **http://developer.android.com/resources/tutorials/hello-world.html**
- Tutorials for Views
  - http://developer.android.com/resources/tutorials/views/index.html
- Other tutorials
  - http://developer.android.com/resources/browser.html?tag=tutorial

Thanks for coming!