



(Very) Basic Android Programming

Chris - 07/16/2012

Outline

- Android Introduction
 - Background
 - Architecture
- Android programming basics
 - System structure
 - Basic components
- Example - Map'nTrackFriends
- Web app development
- Example - Antrip

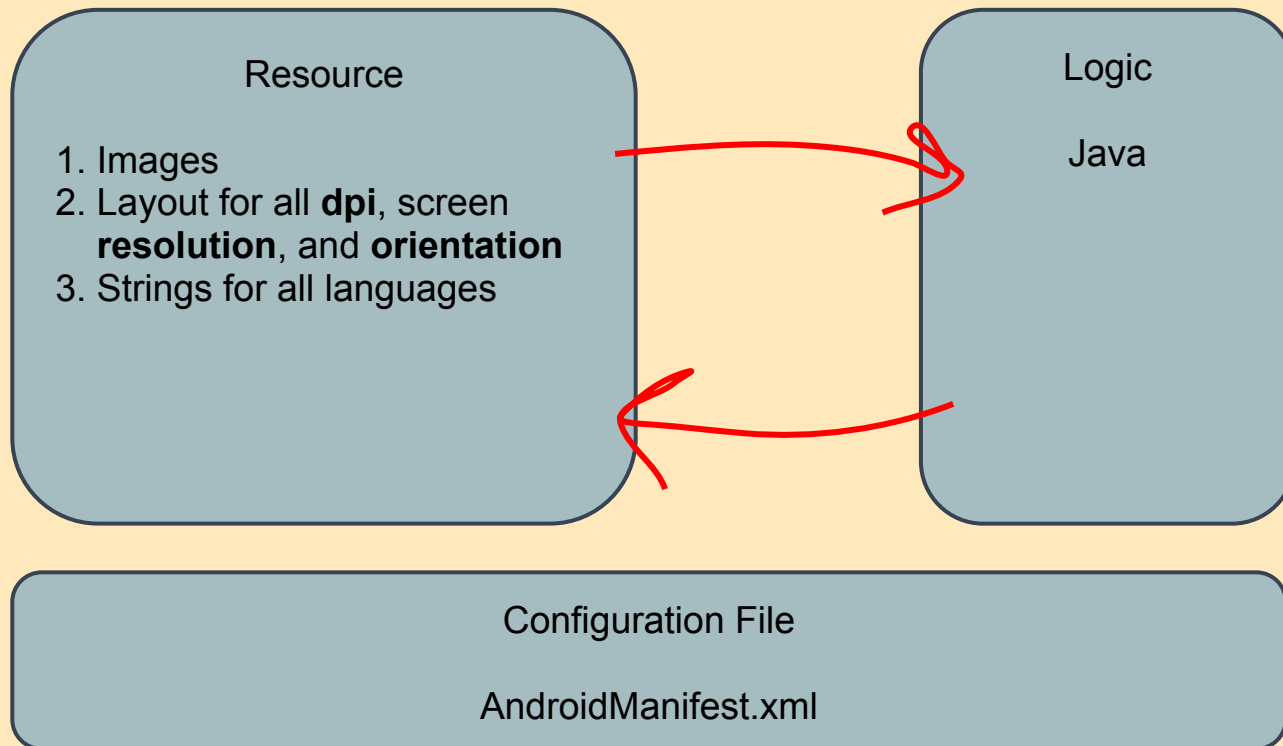
Android

- Linux-based mobile OS
- Open Handset Alliance
- Android Open Source Project(AOSP) is led by Google
- Linux kernel + APIs, libs + Java(Dalvik VM)
- Android version distribution

Android System Architecture



Android Application Structure



Logic

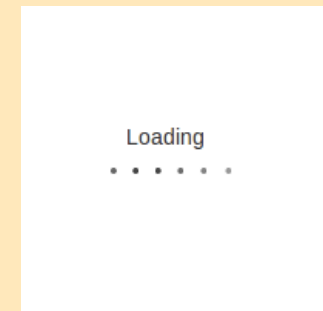
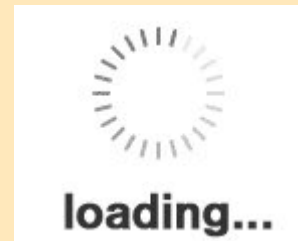
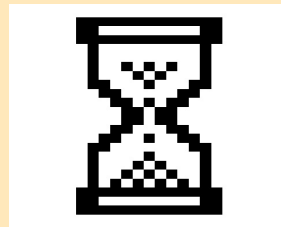
- Four fundamental components
 - a. **Activity**
provide UI for user
 - b. **Service**
background process, no UI
 - c. **Broadcast Receiver**
for inter-process communication
 - d. **Content Provider**
encapsulate data and provide them to apps
(vs. SQLite DB)

Activity

- An activity represents a single screen with a user interface
- Usually takes up the entire screen (except floating windows)
- Lifecycle
- Provide UI for users to interact with

ANR Error

- Application Not Responding (ANR)
 - any tasks take more than 5 seconds to respond will cause this error, usually caused by bad design
 - Create a new thread/AsyncTask for time consuming tasks
 - show a **loading animation** while a new thread fetches data



Activity

- Once the user left the activity, it stops
 - what if I need the activity to **continue running**?
e.g. music playing app
 - use **services!**

Service

- Background process, does not provide UI
- Time consuming tasks
- Lifecycle

Broadcast Receiver

- A component responds to system-wide broadcast announcements
 - e.g. screen is turned off, battery is low
- Inter-process communication

Broadcast Receiver

- To communicate between Activities and Services
 - Send a broadcast with intent, bundled with extra data

~~AIDL (Android's Interface Definition Language)~~

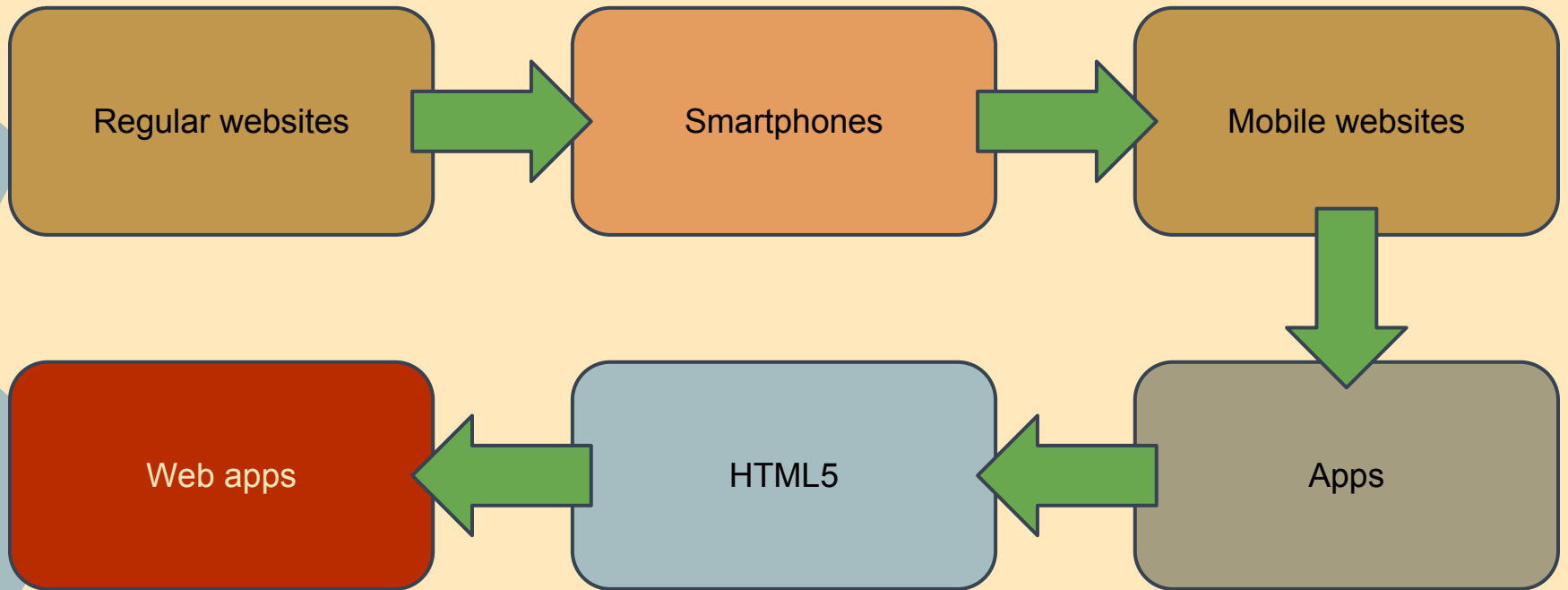
Content Provider

- Manages a shared set of application data
- Provides a public interface for accessing data
- Required methods
 - query
 - insert
 - update
 - delete
 - ...
- Calendar provider
- Contacts provider

Android Programming

LIVE DEMO

Web app



Web app and Web app

- Web apps vs Mobile sites
 - probably the same...
- Web apps vs Native apps
 - Mimic native app with a web page
- Web apps pros and cons
 - pros
 - Everyone knows HTML
 - Can be very fancy
 - cons
 - HTML can be very slow on phones
 - HTML have no control of phone's hardwares

Android Web App

- In the simplest form
 - The entire app is a single webview, acts like a browser
- Native code provides **JavaScriptInterface**
 - Allow function calls from webpage to native code
- Webpage provides **JavaScript functions**
 - Allow function calls from native code to webpage

Antrip

- For easy migration from MnTF to Antrip, we are only using html to replace XML layouts
- Some functions in native codes can be replaced by **javascripts** in webpages

Antrip

HTML

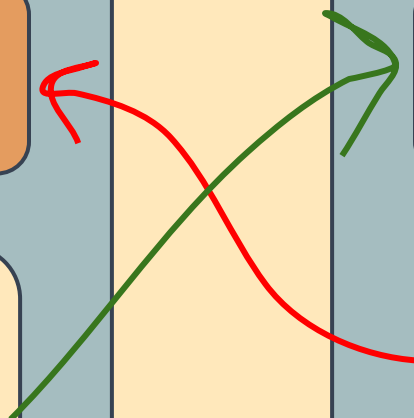
```
JavaScript Function{  
  hideButton()  
  showImage(image)  
}
```

```
contact =  
window.aaa.getContacts();  
window.aaa.takePicture();
```

JAVA

```
JavaScriptInterface aaa{  
  getContacts()  
  takePicture()  
}
```

```
javascript.hideButton();  
javascript.showImage(1.jpg);
```



Antrip

LIVE DEMO