EO-245: ASP

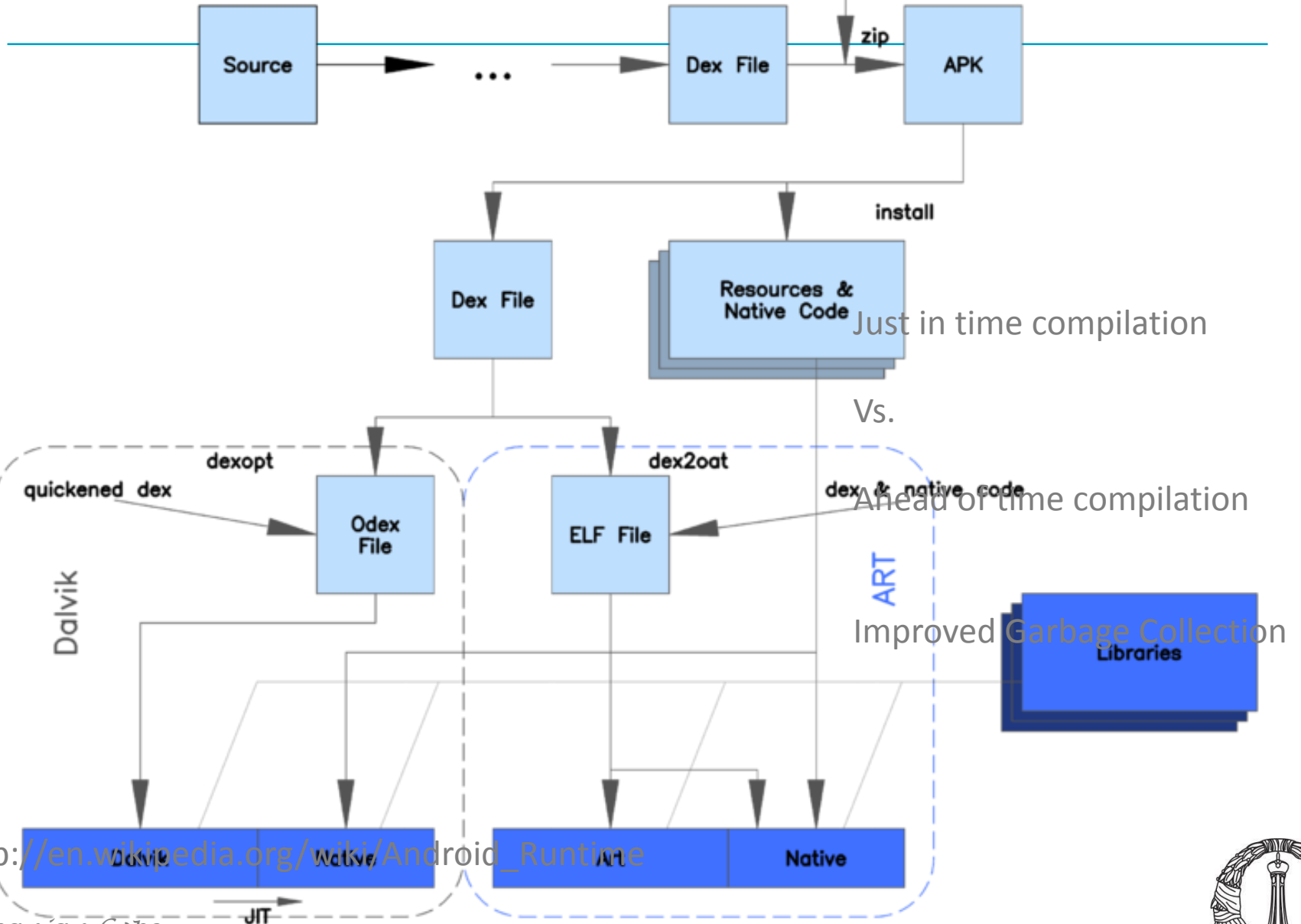## Lecture 3: Android components

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Questions from Lecture 2

- Why ART over Dalvik?

- Dalvik cache

- Is user-id fixed for app through lifetime?

- Permission across apps

- What defines an activity?

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Q1: ART over Dalvik

- Assembler

- Compiler

- Interpreter

- Just-in-time compiler

Q1: ART vs Dalvik

Just in time compilation

Vs.

Ahead of time compilation

Improved Garbage Collection

http://en.wikipedia.org/wiki/Android_Runtime

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Q3 + Q4: User-id and permissions

- Application has a fixed UID on a device

- SharedUID may be requested using manifest

- Manifest Permissions:
  http://developer.android.com/reference/android/Manifest.permission.html

- An app can access other apps with permissions

  - activity

  - services

  - content

  - broadcast

  - files

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Module 0: Basic Setup

- Mobile apps vs. desktop software

- Statistics of smart-phone usage

- History of Android

- Examples of popular Android applications

- Android architecture and building blocks
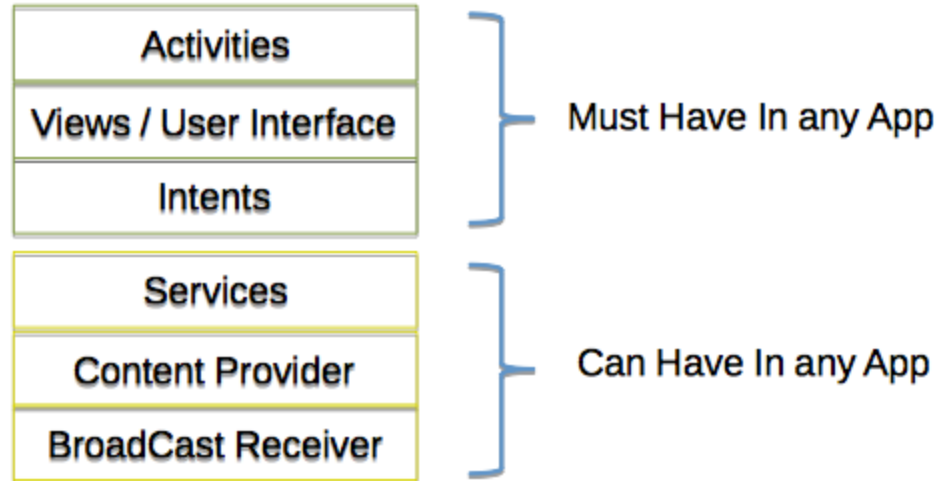
- Android setup on laptop

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Application Building Blocks

- Activity

- Views

- Intent

- Service

- ContentProvider

- BroadcastReceiver

http://www.javatpoint.com/android-core-building-blocks

Dipanjan Gope   https://www.youtube.com/watch?v=Mm6Ju0xhUW8

Application Building Blocks

Building Blocks of Android

http://www.codelearn.org/android-tutorial/android-introduction

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Building Block: Activity

- Extends activity class

- Loosely: Any screen inside an application

- An app has at least 1 activity

- Manifest.xml lists the activities

- 1 activity is the main activity

  (entry point to app)

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Building Block: Activity

AndroidManifest.xml

```xml
1 <manifest xmlns:android="http://schemas.android.com/apk/res/android"
2     package="com.app.HealthyMe"
3     android:versionCode="1"
4     android:versionName="1.0" >
5
6     <uses-sdk
7         android:minSdkVersion="14"
8         android:targetSdkVersion="17" />
9
10    <supports-screens
11        android:anyDensity="true"
12        android:largeScreens="true"
13        android:normalScreens="true"
14        android:resizeable="true"
15        android:smallScreens="true" />
16
17    <uses-feature android:name="android.hardware.sensor.accelerometer" />
18
19    <uses-permission android:name="android.permission.CAMERA" />
20
21    <uses-feature android:name="android.hardware.camera" />
22    <uses-feature android:name="android.hardware.camera.autofocus" />
23    <uses-feature android:name="android.hardware.camera.front" />
24
25    <uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE" />
26    <uses-permission android:name="android.permission.RECORD_AUDIO" />
27
28    <application
29        android:name="HMapplication"
30        android:allowBackup="true"
31        android:icon="@drawable/h_icon"
32        android:label="HealthyMe"
33        android:theme="@android:style/Theme.DeviceDefault" >
34        <activity
35            android:name=".MainActivity"
36            android:label="@string/title_activity_main" >
37            <intent-filter>
38                <action android:name="android.intent.action.MAIN" />
39
40                <category android:name="android.intent.category.LAUNCHER" />
41            </intent-filter>
42        </activity>
43        <activity
```
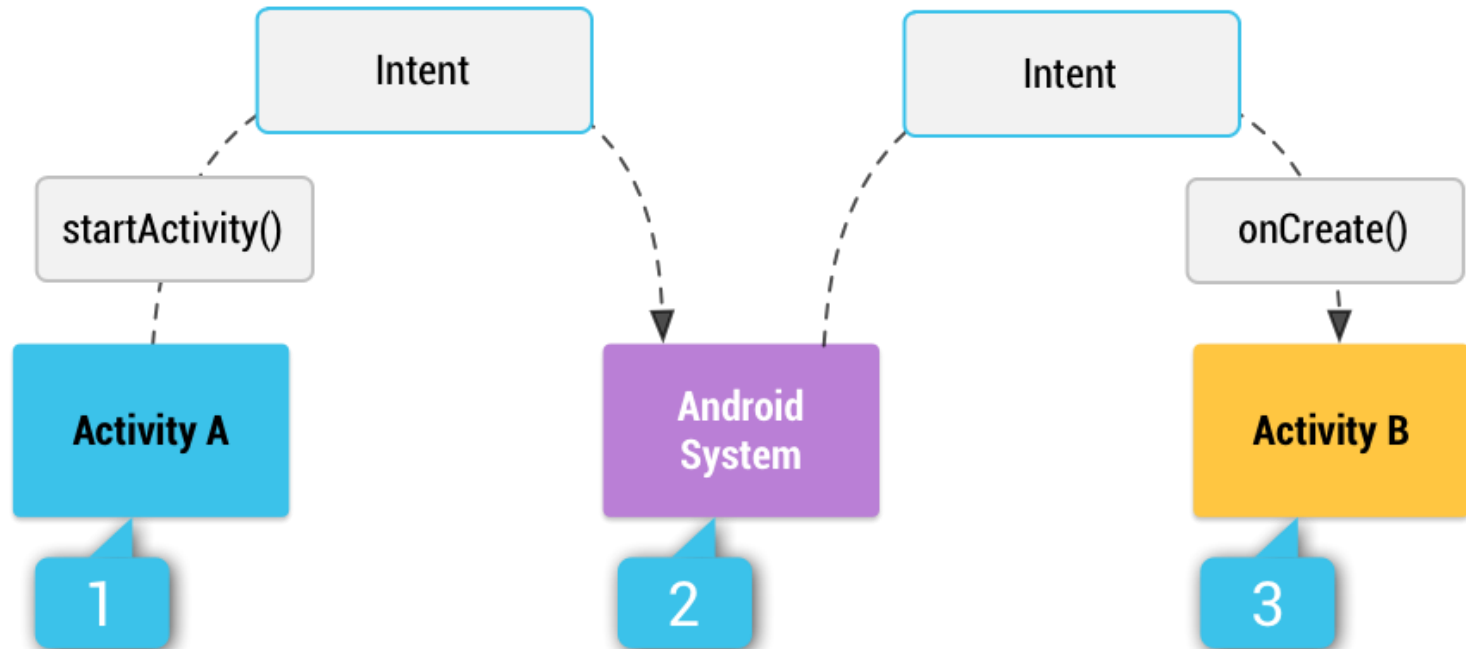
Building Blocks: Views

- Views and Layouts (viewgroups)

```xml
1  <?xml version="1.0" encoding="utf-8"?>
2  <RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
3      android:layout_width="match_parent"
4      android:layout_height="match_parent"
5      android:orientation="vertical" >
6
7      <Button
8          android:id="@+id/button1"
9          style="?android:attr/buttonStyleSmall"
10         android:layout_width="wrap_content"
11         android:layout_height="wrap_content"
12         android:layout_alignParentLeft="true"
13         android:layout_alignParentTop="true"
14         android:layout_marginLeft="10dp"
15         android:layout_marginTop="45dp"
16         android:text="Acceleration X" />
17
18     <Button
19         android:id="@+id/button2"
20         style="?android:attr/buttonStyleSmall"


97
98     <Button
99         android:id="@+id/button10"
100        android:layout_width="wrap_content"
101        android:layout_height="wrap_content"
102        android:layout_alignRight="@+id/button9"
103        android:layout_alignTop="@+id/button6"
104        android:text="0.0" />
105
106 </RelativeLayout>
```
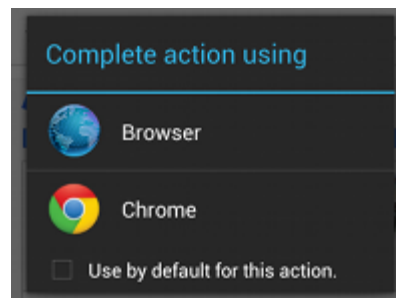
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Building Block: Intent

- Move from one screen (activity) to another
- Can also open other applications
- 3 main: start an activity/service/broadcast
- Asynchronous
- Bound at run-time
- Explicit or implicit

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Implicit Intent

http://developer.android.com/guide/components/intents-filters.html
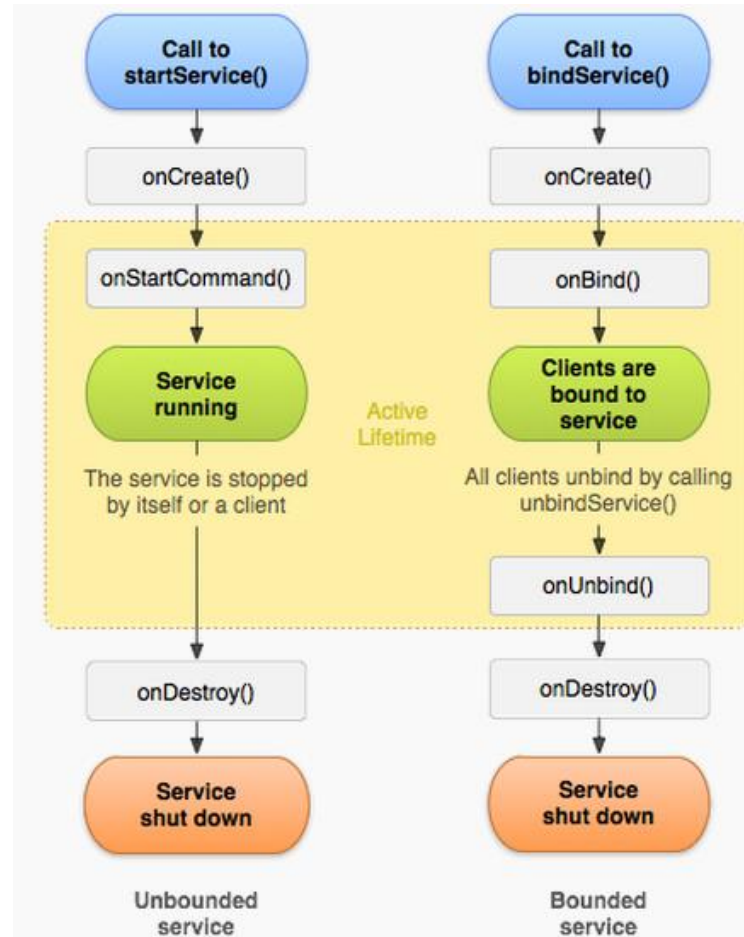

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Building Block: Service

- Extends Service class

- Long running processes in the background

- No user-interface

- onStartCommand()

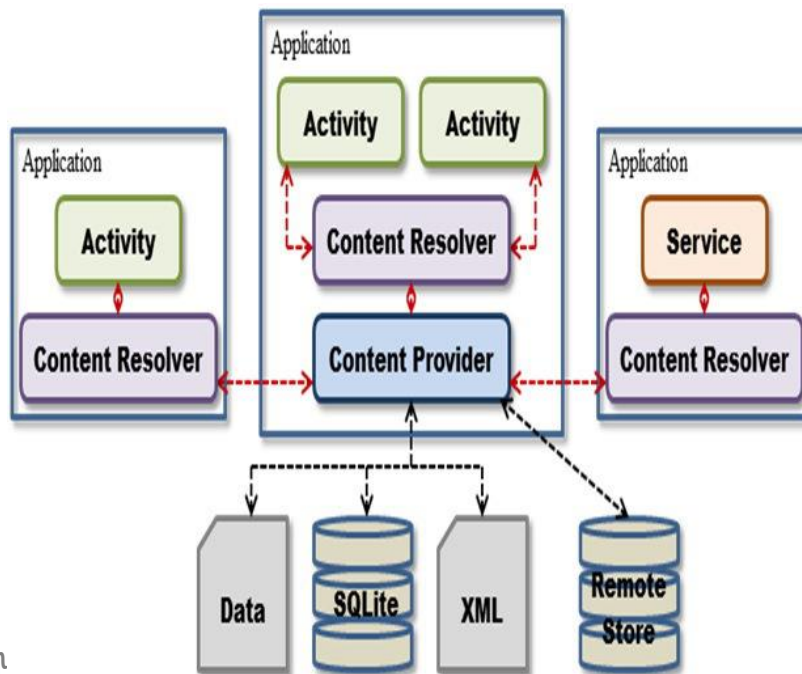 - e.g. download file

- onBind()

  - interactive

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Building Block: Service

http://developer.android.com/guide/components/services.html

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Building Block: **ContentProvider**

- Extends ContentProvider class
- Uniform single interface to content and data
- Data on 1 process; code on another
- Data communication between apps

https://bestandroidtraining.wordpress.com
/2013/03/30/android-project-structure/
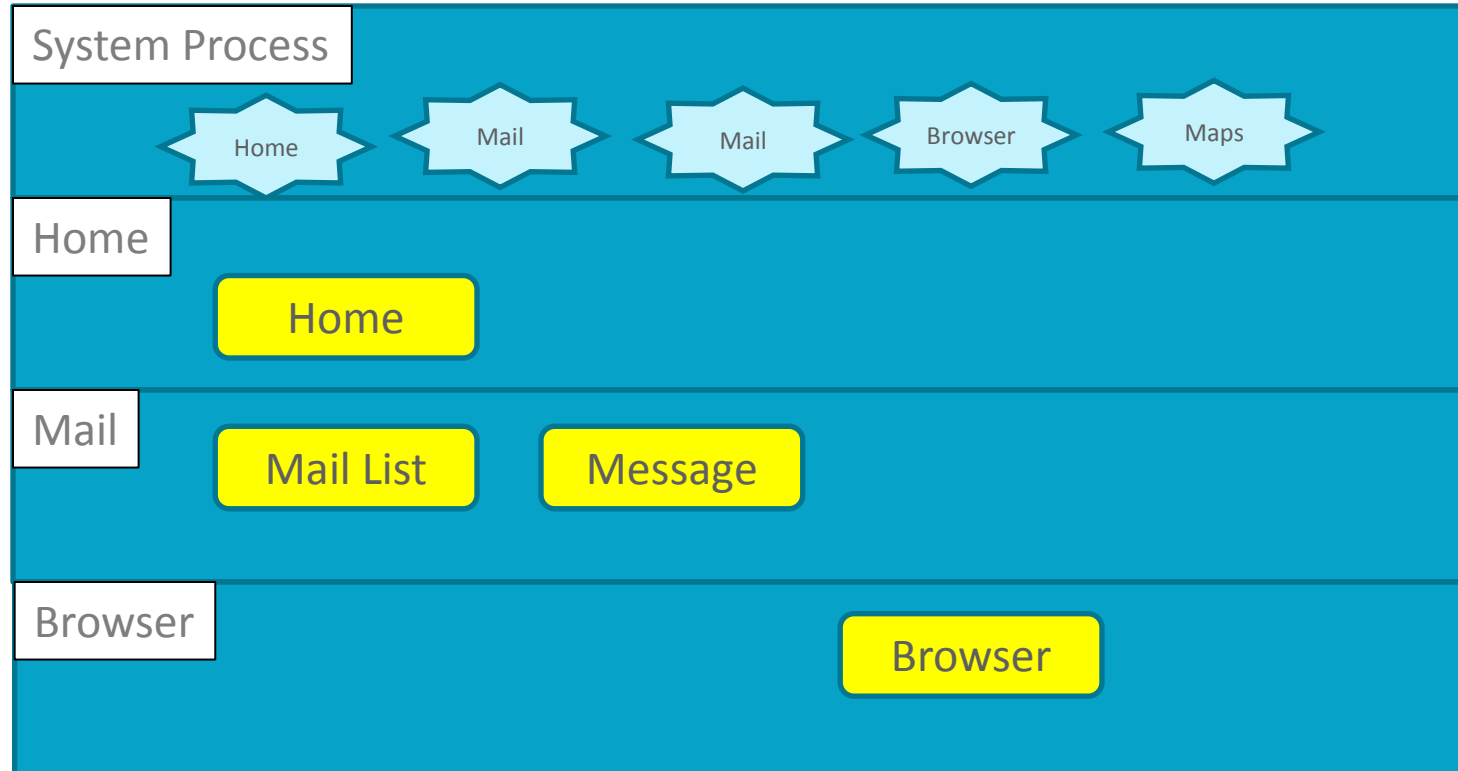
Building Block: BroadcastReceiver

- Register for system or app events

Table 1. System Events

Event	Description
Intent.ACTION_BOOT_COMPLETED	Boot completed. Requires the `android.permission.RECEIVE_BOOT_COMPLETED` permission.
Intent.ACTION_POWER_CONNECTED	Power got connected to the device.
Intent.ACTION_POWER_DISCONNECTED	Power got disconnected to the device.
Intent.ACTION_BATTERY_LOW	Triggered on low battery. Typically used to reduce activities in your app which consume power.
Intent.ACTION_BATTERY_OKAY	Battery status good again.

http://www.vogella.com/tutorials/AndroidBroadcastReceiver/article.html

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Activity Lifecycle

Application Lifecycle

System Process				
Home	Mail	Mail	Browser	Maps

Home

Home

Mail

Mail List   Message

Browser

Browser

https://www.youtube.com/watch?v=ITfRuRkf2TM
Androidology Part 2of 3

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Android APIs

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Android APIs

- Location Manager

- XMPP services

- Notification Manager

- Views

Android Development Platform Setup

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Eclipse and Android SDK

- http://developer.android.com/sdk/installing/installing-adt.html

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Android Studio

- http://developer.android.com/sdk/index.html

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