ITSMAP F13 Lesson 2

Applications (Apps)

Activity + Resources

Jesper Rosholm Tørresø

Subjects Lesson 2+3

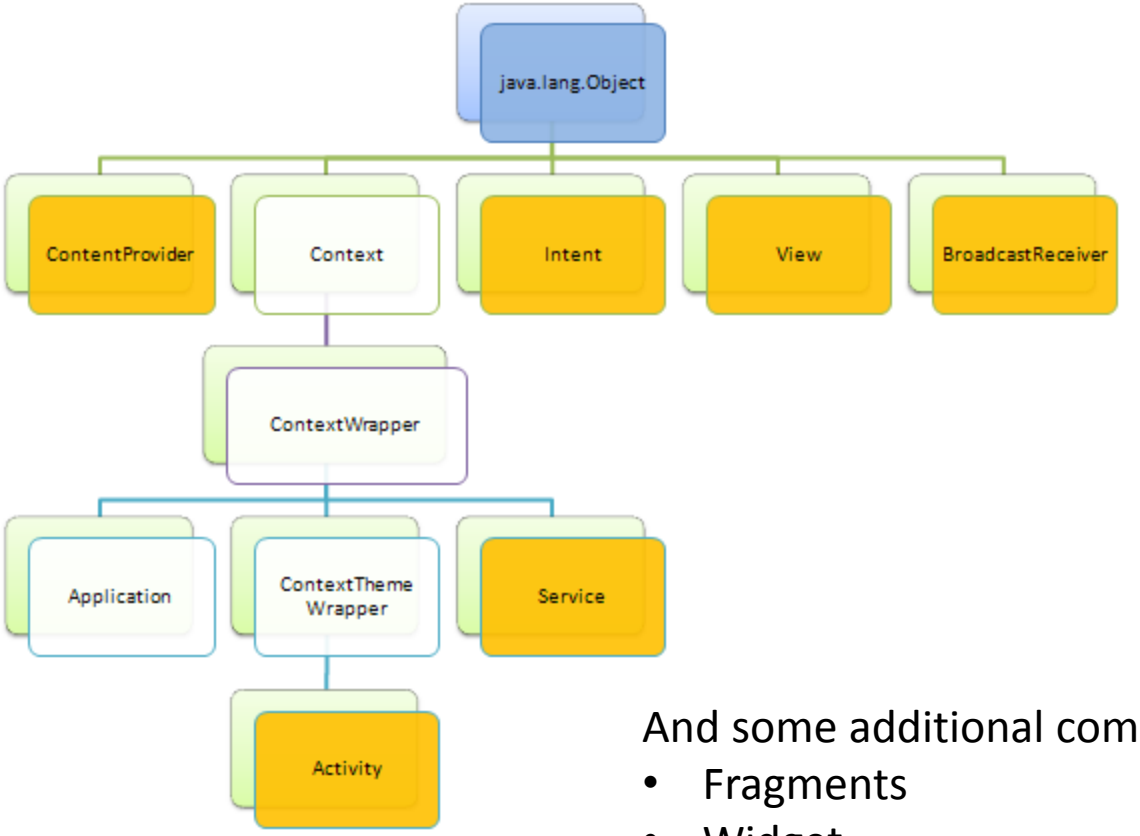
Tuesday L2

1. Android Application , the “App”
   - Principle of The Android Manifest
2. Activity Control and Life cycle, The Android App Lifercycle
   - Responding to activity changes

Thursday L3

1. Activities and resources (Externalization).
   - Using resources in layouts and manifest
   - Retrieving resources at runtime
2. Android Intents
3. Debugging and screencasts

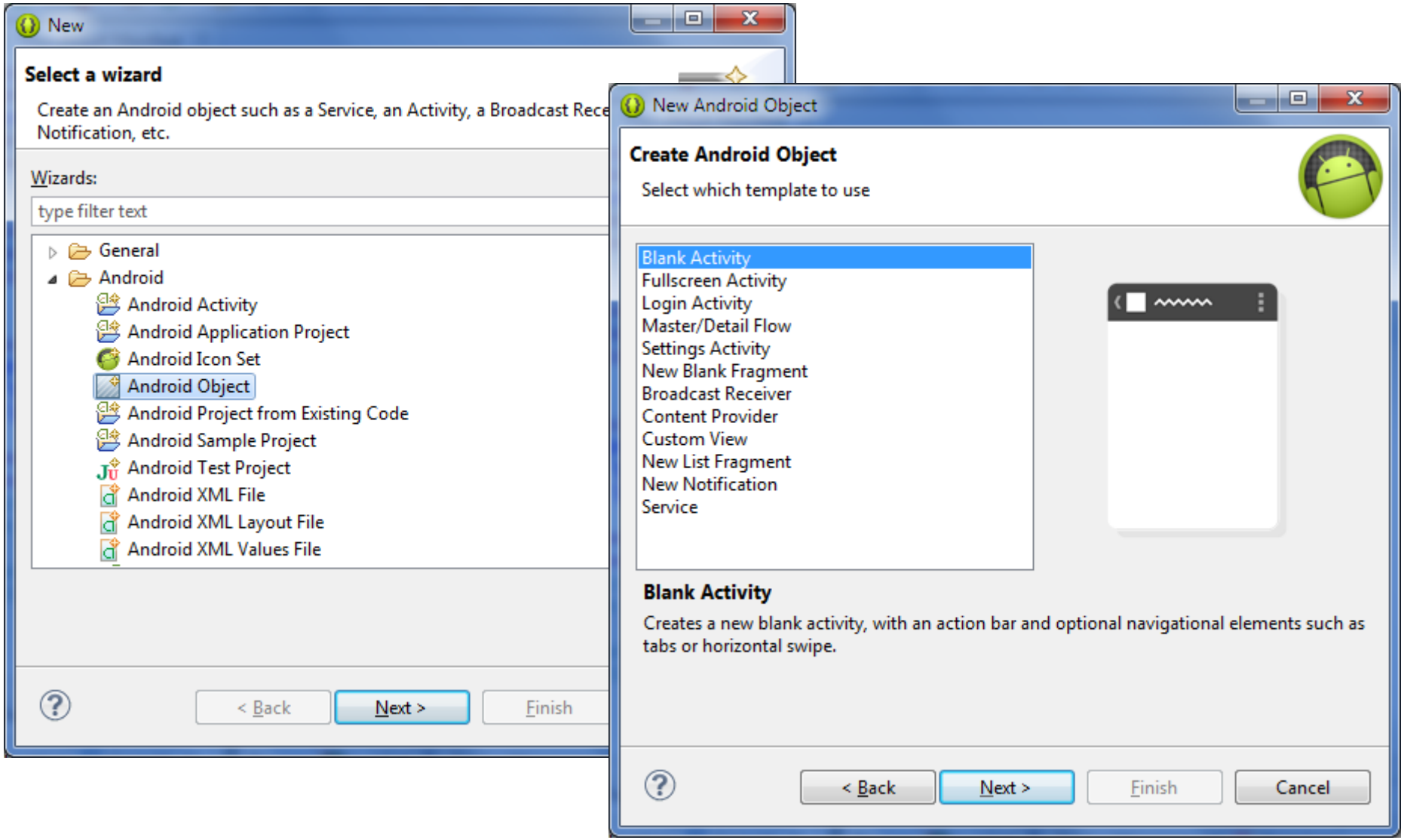
Android application architecture



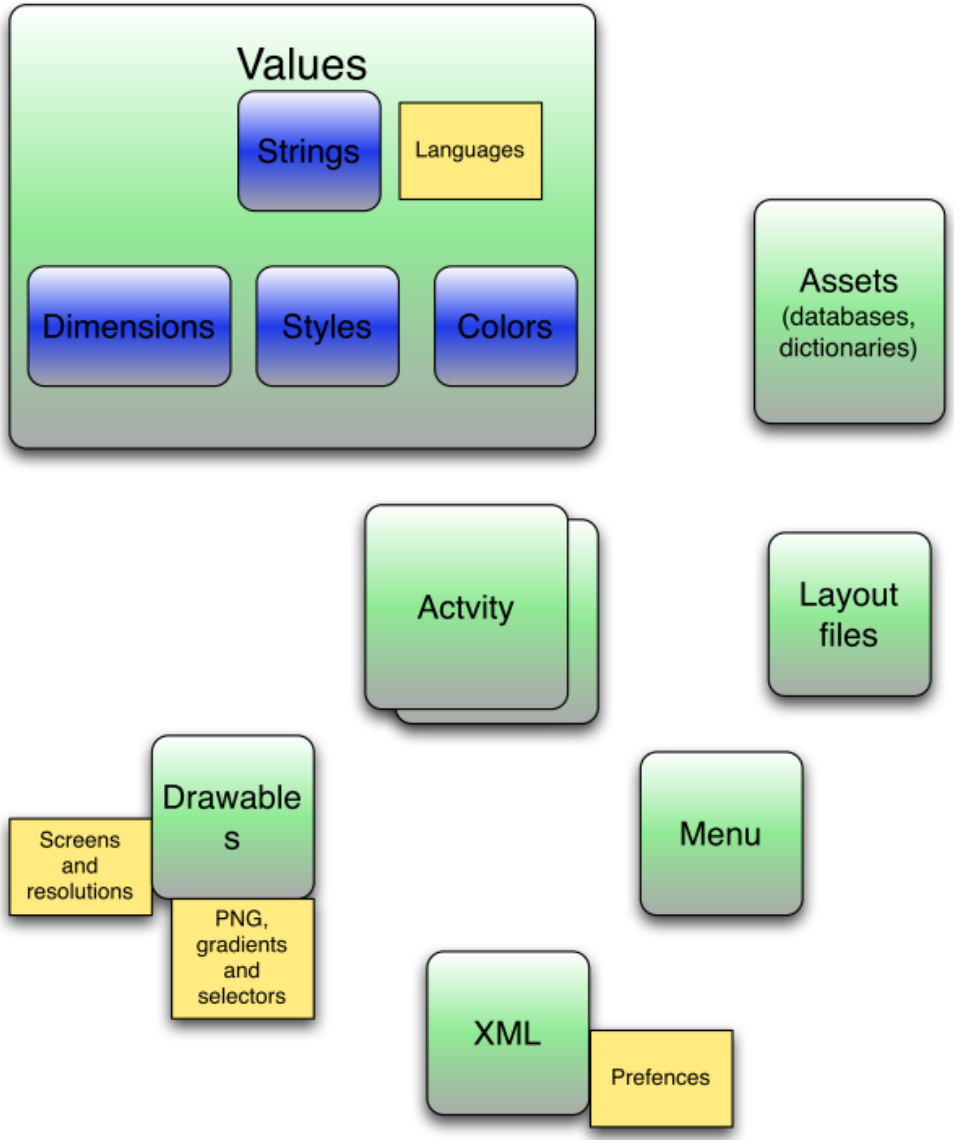
And some additional components

- Fragments
- Widget
- Notifications

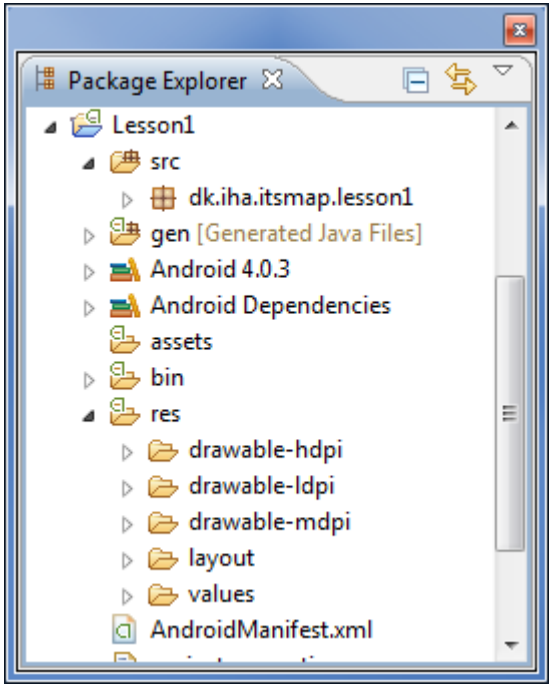
Templates in Eclipse ADT



Basic App Anatomy



Eclipse



The Android Manifest
An App' "ticket" to the Framework

- Defines the App' structure, metadata, components and requirements
- Done by an XML three in which the nodes are
  - The components (Activities, Service…)
  - Attributes/(Properties) to the App, like it' name
  - Version information
  - Intent filters and permissions
  - Requirements to platform like having a camera
  - …..
- Uses a Android namespace with system attributes

The XML file AndroidManifest.xml

```xml
<?xml version="1.0" encoding="UTF-8"?>
<manifest android:versionCode="1" android:versionName="1.0"
        package="dk.iha.itsmap.lesson1"
        xmlns:android="http://schemas.android.com/apk/res/android">
    <uses-sdk android:minSdkVersion="15"/>
    <application android:icon="@drawable/ic_launcher"
                 android:label="@string/app_name">
        <activity android:label="@string/app_name"
        android:name="MainActivity">
            <intent-filter>
                <action android:name="android.intent.action.MAIN"/>
                <category android:name="android.intent.category.LAUNCHER"/>
            </intent-filter>
        </activity>
        <service android:name=".Lesson1Service"/>
        <provider
        android:authorities="dk.iha.itsmap.lesson1.lesson1contentprovider"
        android:name=".Lesson1ContentProvider"/>
    </application>
</manifest>
```

Use the Android SDK documentation!

Nodes in the Manifest (just click the nodes)

<action>	<path-permission>
<action>	<permission>
<activity>	<permission-group>
<activity-alias>	<permission-tree>
<application>	<provider>
<category>	<receiver>
<compatible-screens>	<service>
<data>	<supports-gl-texture>
<grant-uri-permission>	<supports-screens>
<instrumentation>	<uses-configuration>
<intent-filter>	<uses-feature>
<manifest>	<uses-library>
<meta-data>	<uses-permission>
	<uses-sdk>

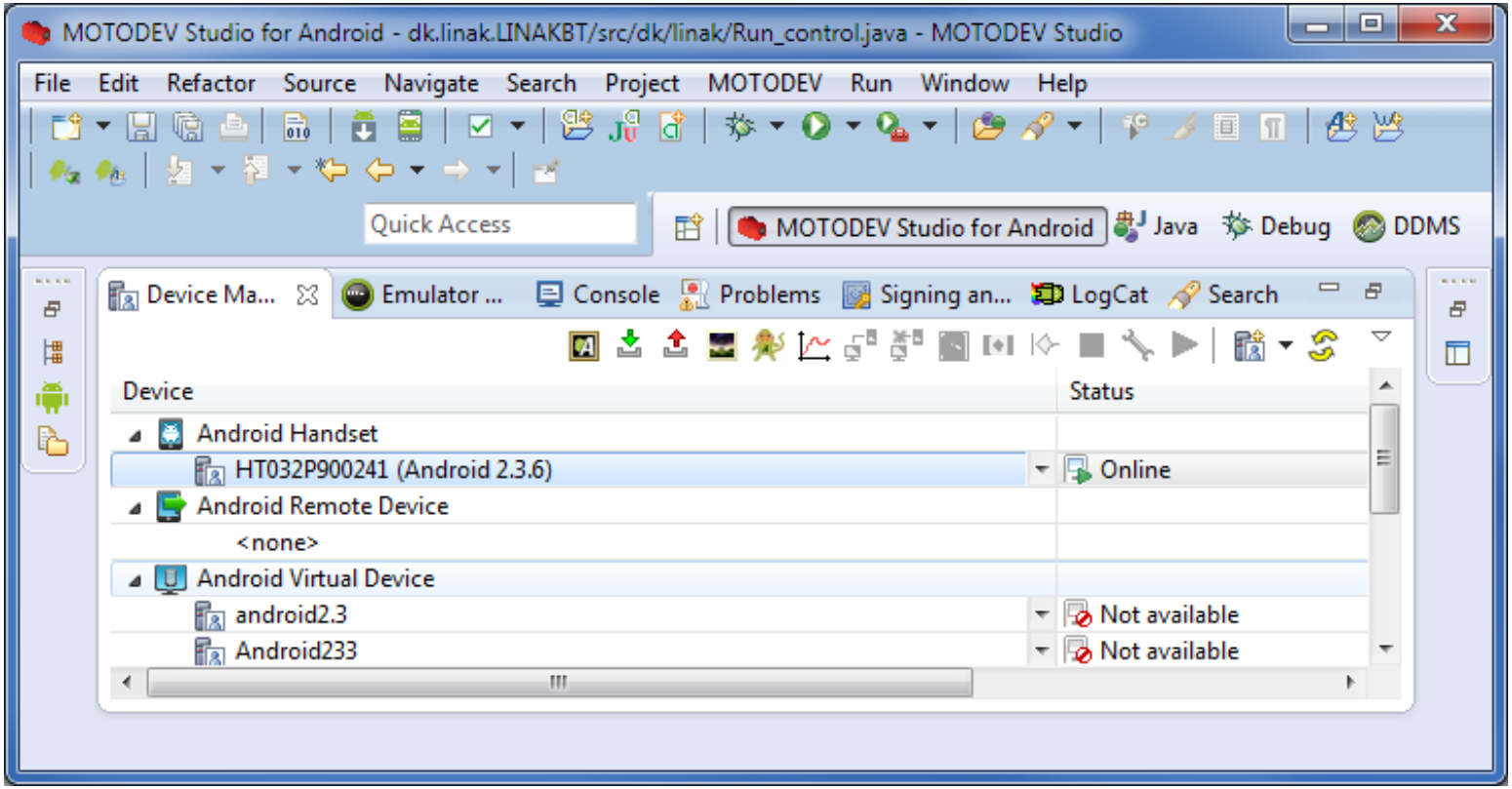
All the elements that can appear in the manifest file are listed in alphabetical order. These are the only legal elements; **you cannot add your own elements or attributes**.

http://developer.android.com/guide/topics/manifest/manifest-intro.html

Life cycle of an App/Activity

- The Android Frameworks way to control an Activity
- Life cycle control also goes for other component like Service.
- State changes calls a number of handles depending on current state and events for state change

An Android App is a Linux Process
Use the ADB Shell



An Android App is a Linux Process

ADB Shell

Administrator: Command Prompt - adb shell

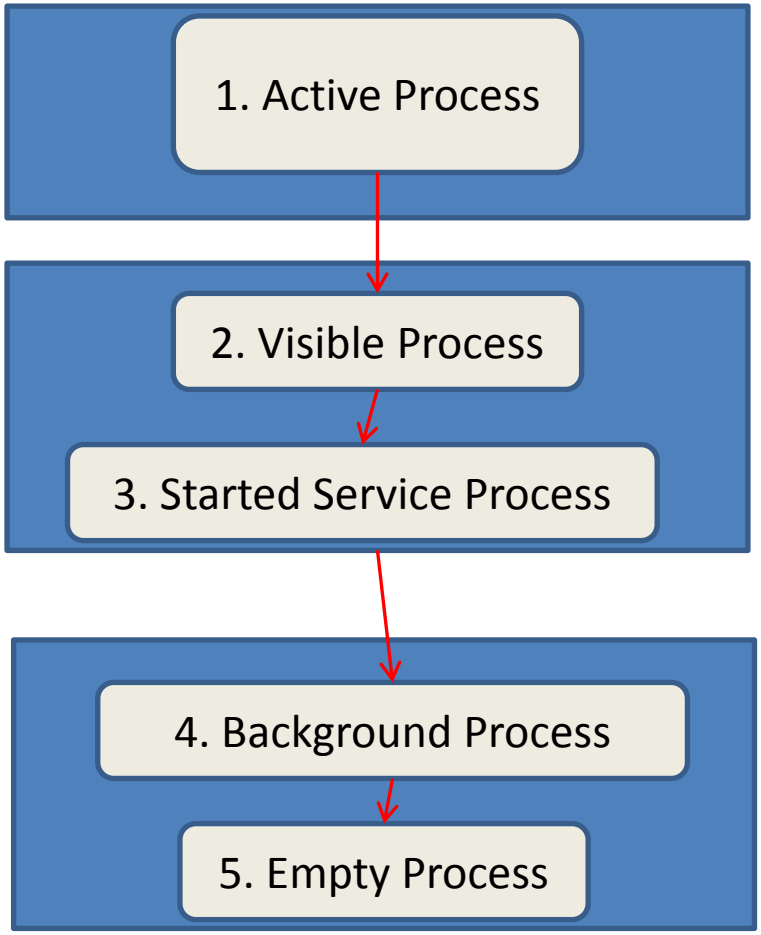
```
C:\Users\jrt-lok>adb devices
List of devices attached
emulator-5554   device


C:\Users\jrt-lok>adb shell
# ps
ps
USER     PID   PPID  VSIZE  RSS     WCHAN    PC         NAME
root     1     0     268    180     c009b74c 0000875c S /init
root     2     0     0      0       c004e72c 00000000 S kthreadd
root     3     2     0      0       c003fdc8 00000000 S ksoftirqd/0
root     4     2     0      0       c004b2c4 00000000 S events/0
root     5     2     0      0       c004b2c4 00000000 S khelper
root     6     2     0      0       c004b2c4 00000000 S suspend
root     7     2     0      0       c004b2c4 00000000 S kblockd/0
root     8     2     0      0       c004b2c4 00000000 S cqueue
root     9     2     0      0       c018179c 00000000 S kseriod
root     10    2     0      0       c004b2c4 00000000 S kmmcd
root     11    2     0      0       c006fc74 00000000 S pdflush
root     12    2     0      0       c006fc74 00000000 S pdflush
root     13    2     0      0       c00744e4 00000000 S kswapd0
root     14    2     0      0       c004b2c4 00000000 S aio/0
root     22    2     0      0       c017ef48 00000000 S mtdblockd
```

Select Administrator: Command Prompt - adb s

```
root      90    41    732    324
root      91    90    688    344
system    95    33    149924 38832
app_4     180   33    94604  22920 ffffffff afd0c51c S jp.co.omronsoft.openwnn
radio     187   33    107812 26004 ffffffff afd0c51c S com.android.phone
system    190   33    95136  26064 ffffffff afd0c51c S com.android.systemui
system    244   33    95160  21512 ffffffff afd0c51c S com.android.settings
app_6     250   33    102244 26516 ffffffff afd0c51c S android.process.acore
app_13    273   33    102824 31016 ffffffff afd0c51c S com.android.launcher
app_19    282   33    92816  21588 ffffffff afd0c51c S com.android.deskclock
app_0     307   33    95116  22852 ffffffff afd0c51c S android.process.media
app_2     324   33    92516  20984 ffffffff afd0c51c S com.android.quicksearchbo
x
app_24    337   33    91488  20076 ffffffff afd0c51c S com.android.protips
app_5     349   33    92036  20504 ffffffff afd0c51c S com.android.music
app_15    359   33    105156 22844 ffffffff afd0c51c S com.android.mms
app_28    381   33    94500  23112 ffffffff afd0c51c S com.android.email
root      535   41    732    332   c003da38 afd0c3ac S /system/bin/sh
app_33    564   33    94676  24904 ffffffff afd0c51c S com.example.android.apis
app_3     593   33    91412  20036 ffffffff afd0c51c S com.android.defcontainer
app_9     604   33    91400  19652 ffffffff afd0c51c S com.svox.pico
app_34    626   33    93832  22164 ffffffff afd0c51c S dk.iha.itsmap.f13.jrt.han
din1
root      639   535   888    324   00000000 afd0b45c R ps
# _
```

Android:process attribute

Process state and components



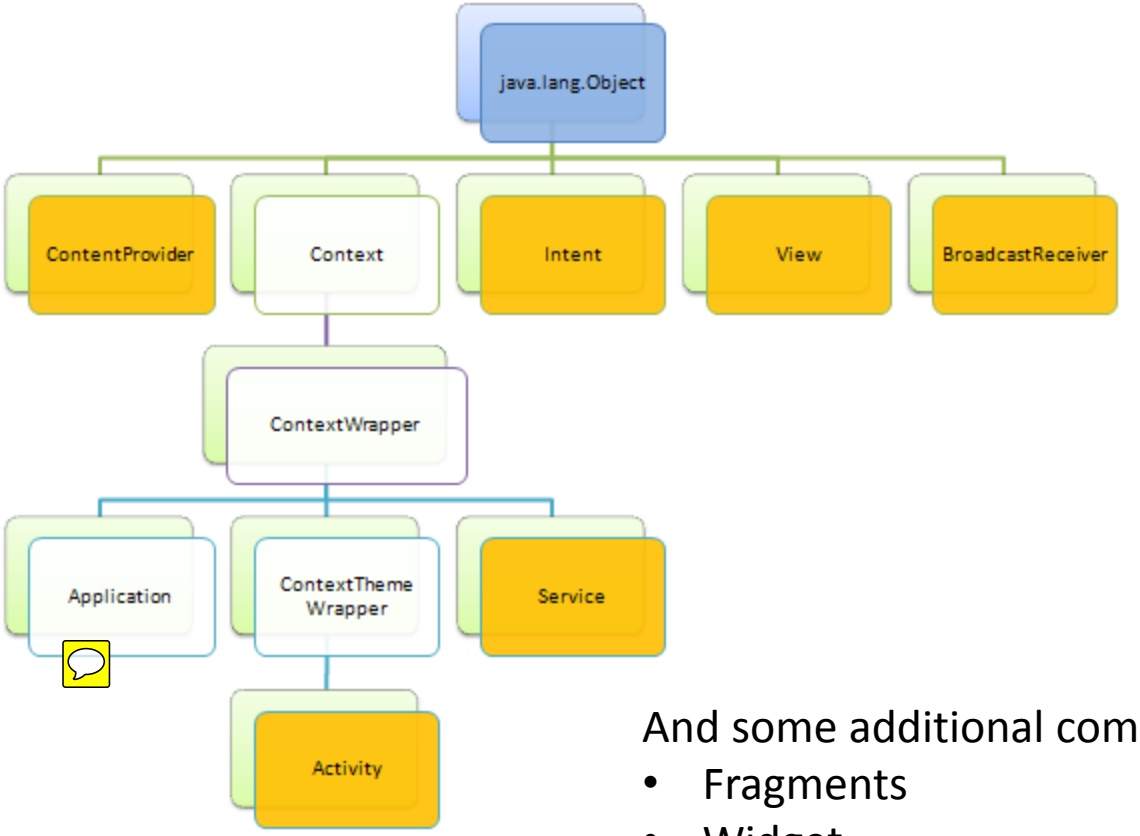
Critical Priority

High Priority

Low Priority

The app component running decides running/process state of your application

Android application architecture
The components



And some additional components

- Fragments
- Widget
- Notifications

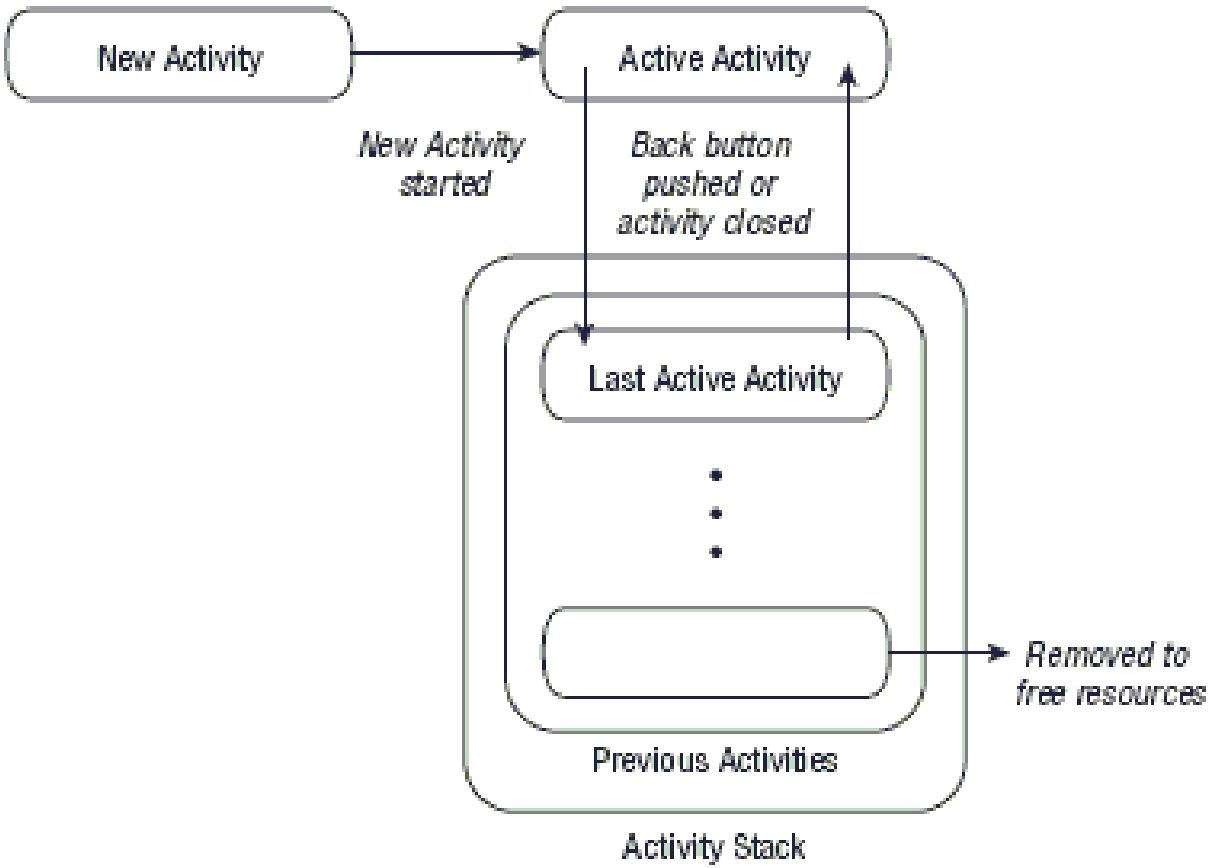
Android Application class "Android Singleton"

- The "logical top level" Android component that has lifecycle and thereby some impact at process state
  - Responds to application level events from Android Frame Work (run time low level memory)
  - Transfer object between application components
    - The only component guarantied to be instantiated through whole App lifetime
  - Manage and maintain resources for several App Components
  - Configured in the Android Manifest

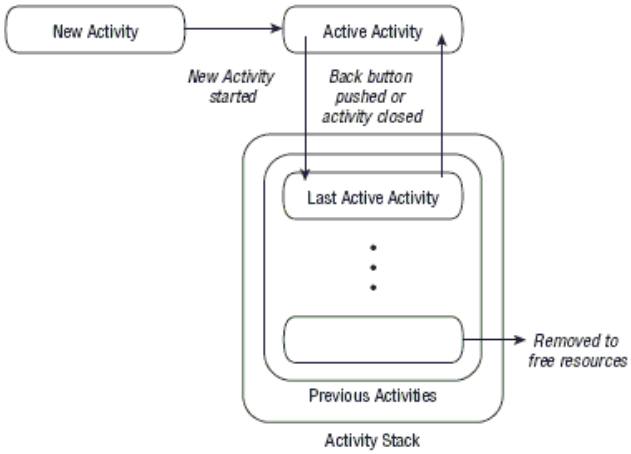
Android Activity

- An important component that that let the Android Framework decide state of the process running the App
- Android controls the Lifecycle of an Activity
- and all other Android components like Service.

Activity Stack



Activity Stack + Life cycle



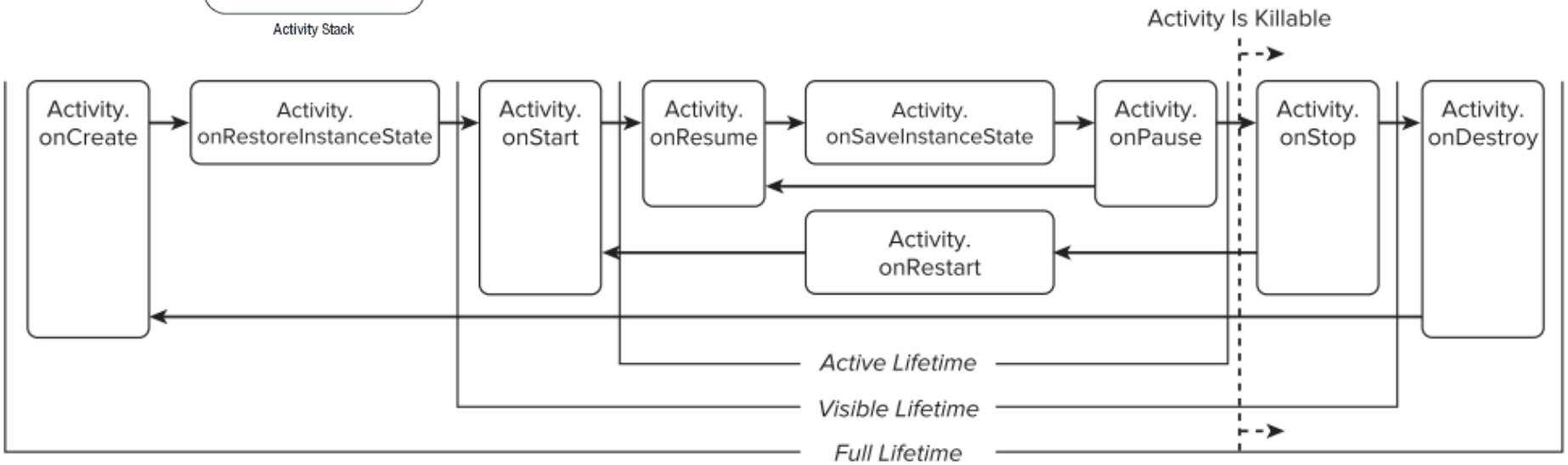
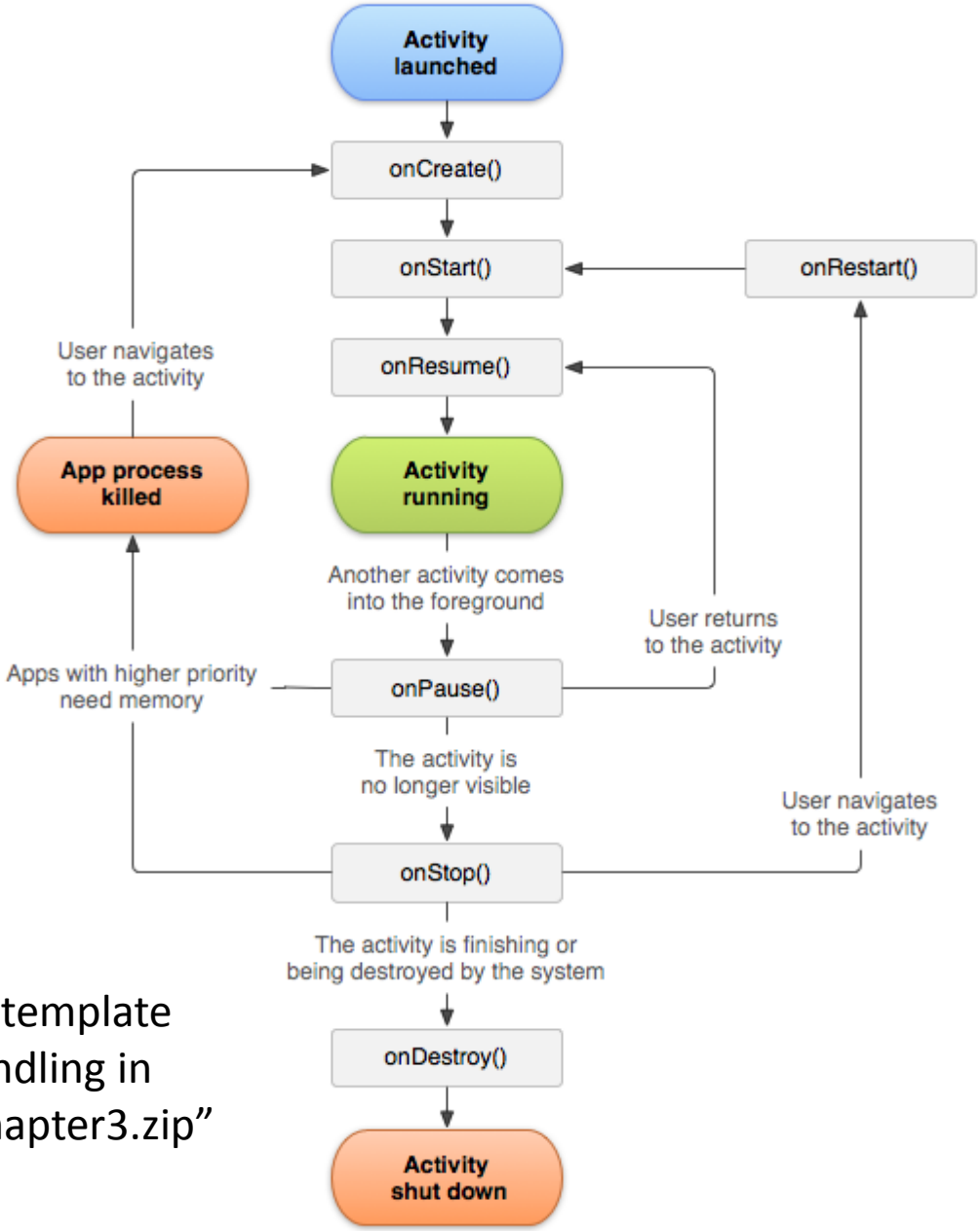


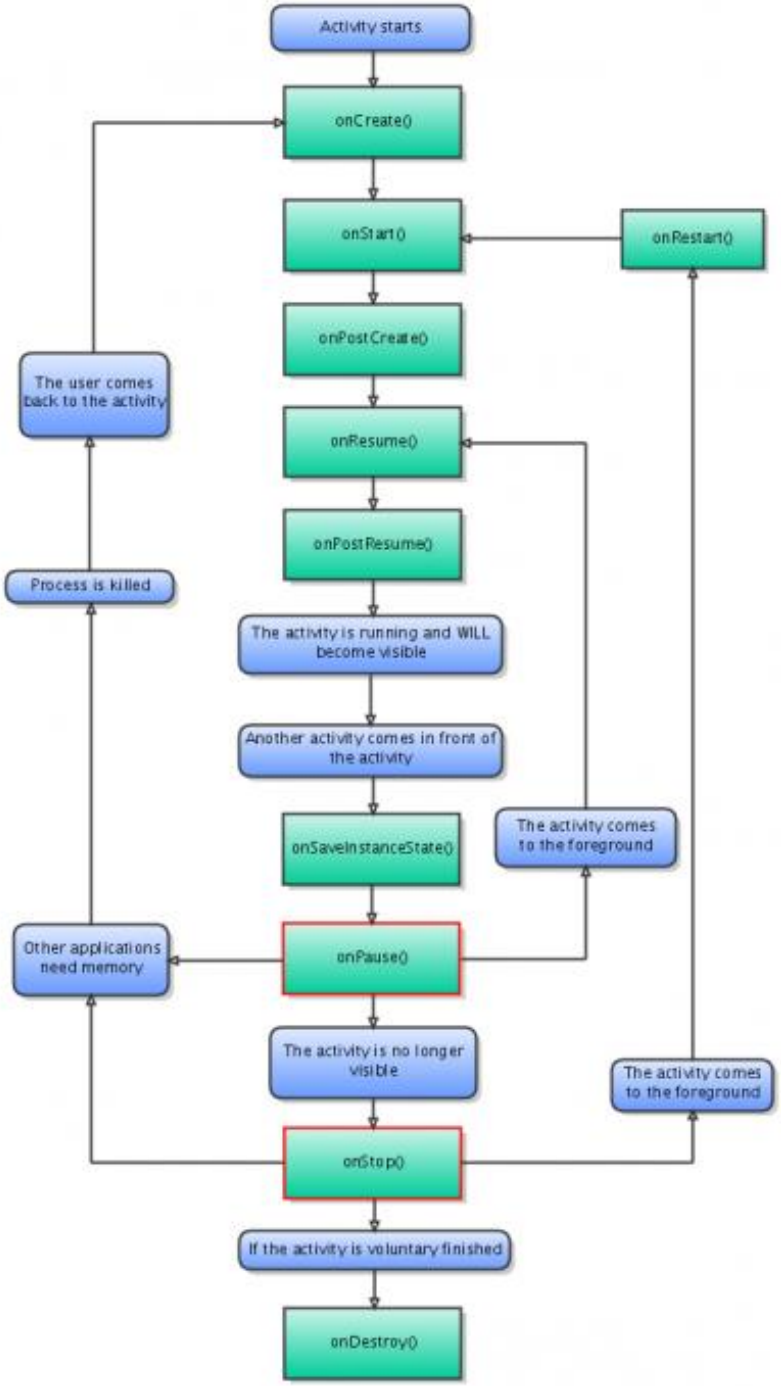
FIGURE 3-6



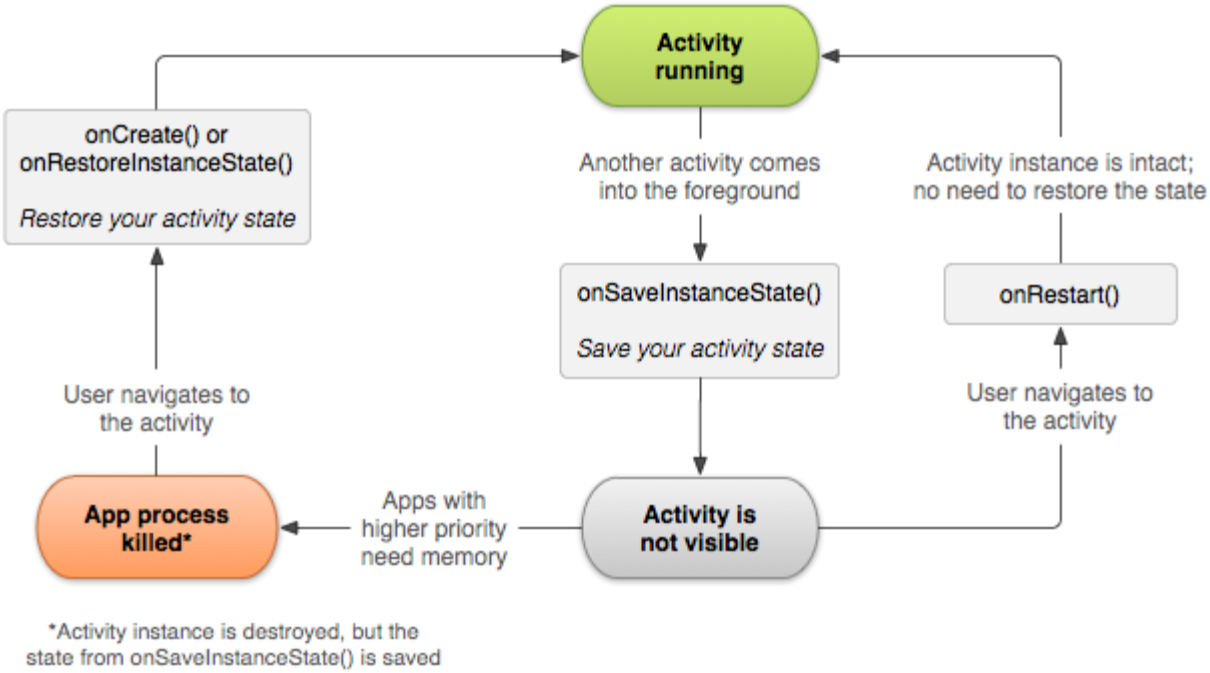
Find a Activity template with state handling in Lesson 2 files “chapter3.zip”

http://developer.android.com/guide/topics/fundamentals/activities.html

Android Activity Life Cycle with Instance Save/Restore:



Saving activity state



Detailed Instance Save/Restore Diagram