

Distributed and Mobile Programming Paradigms

Lab Sessions

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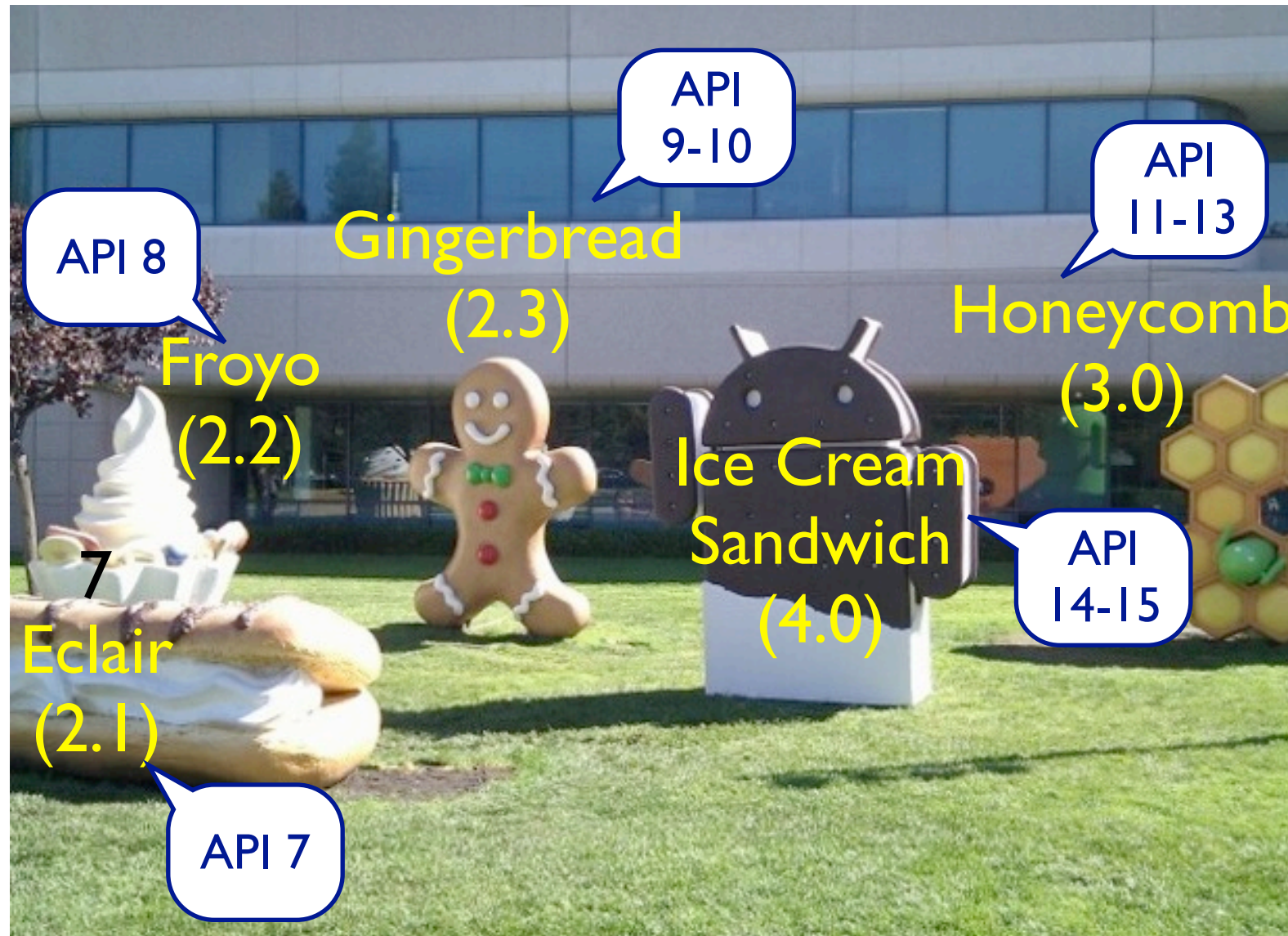


Android Platform

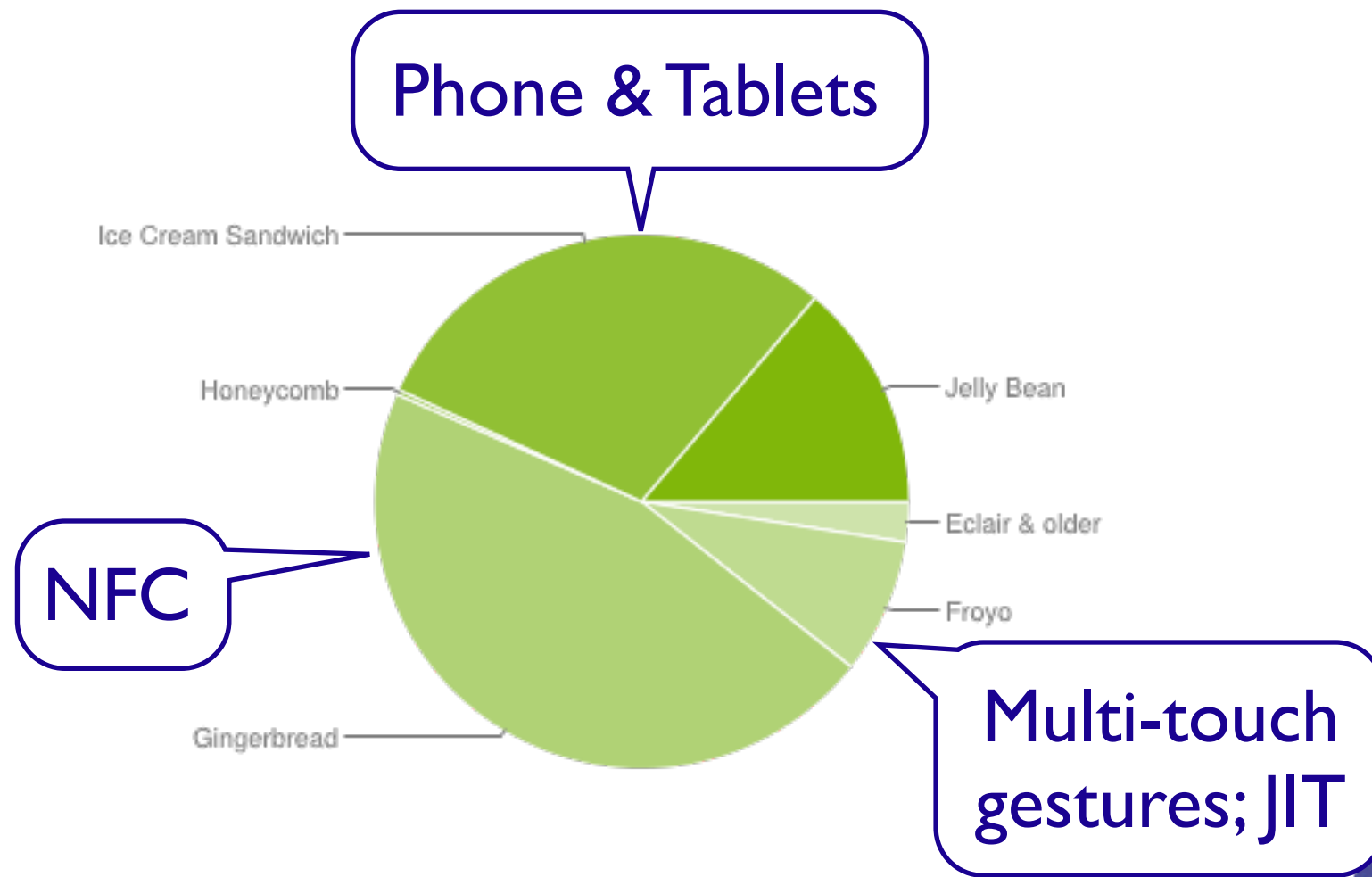
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Android Versions

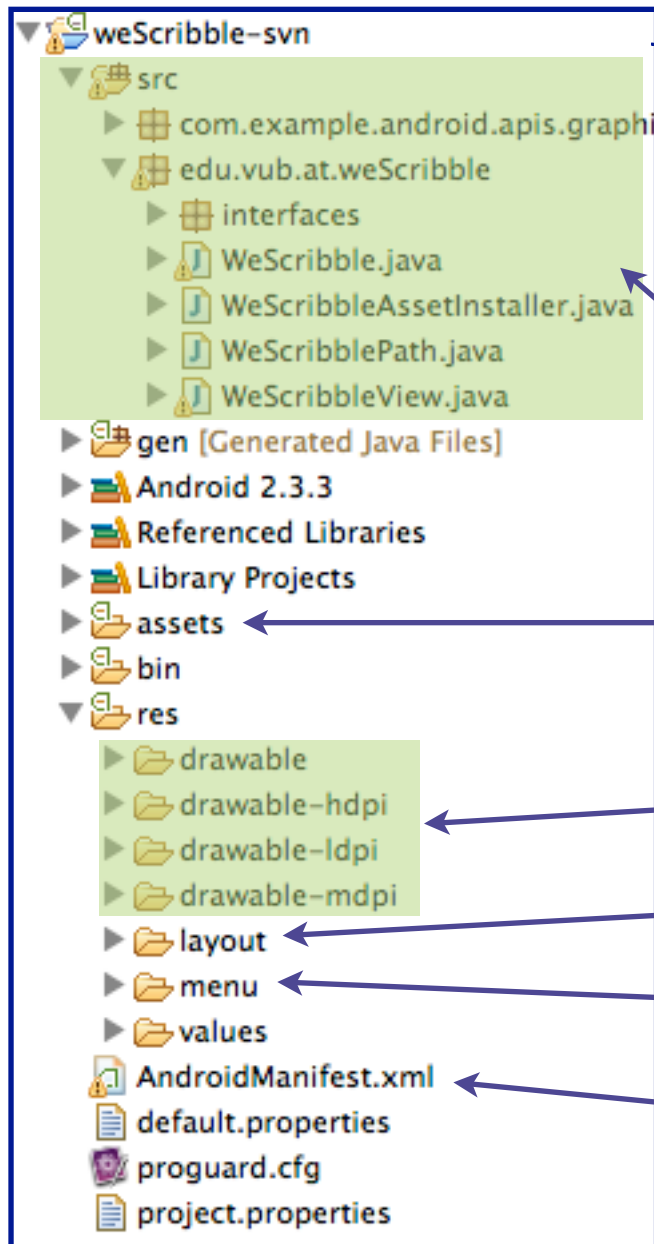


Android Version



<http://developer.android.com/resources/>

Android Project Layout



code +
data → .apk file

Source files

Assets (copied to device)

Icons

Screen layouts

Menu definitions

Manifest file

Android Manifest

AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="edu.vub.at.weScribble"
    android:versionCode="10012200" android:versionName="1.001+2.20.0">
```

```
<uses-sdk android:minSdkVersion="8" />
```

API level

```
<uses-permission android:name="android.permission.ACCESS_WIFI_STATE"></uses-permission>
<uses-permission android:name="android.permission.INTERNET"></uses-permission>
<uses-permission android:name="android.permission.CHANGE_WIFI_MULTICAST_STATE"></uses-permission>
<uses-permission android:name="android.permission.CHANGE_WIFI_STATE"></uses-permission>
<uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE"></uses-permission>
```

Permissions

```
<application android:icon="@drawable/icon" android:label="@string/app_name">
    <activity android:label="@string/app_name"
        android:name=".WeScribble"
        android:configChanges="keyboard|keyboardHidden|orientation"
        android:screenOrientation="portrait">
        <intent-filter>
            <action android:name="android.intent.action.MAIN" />
            <category android:name="android.intent.category.LAUNCHER" />
        </intent-filter>
    </activity>

    <activity android:name=".WeScribbleAssetInstaller"
        android:screenOrientation="portrait"
        android:configChanges="keyboard|keyboardHidden|orientation">
    </activity>
</application>
```

Activities

```
</manifest>
```

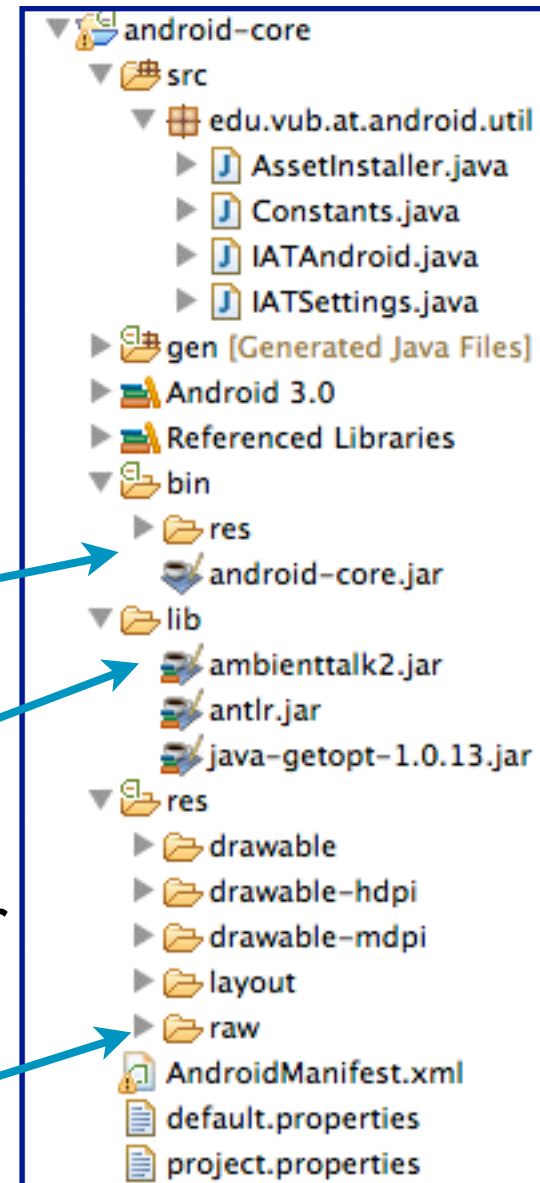
Android Library Project

- Shared code or resources are organized in a library project.
- Referenced from other Android project

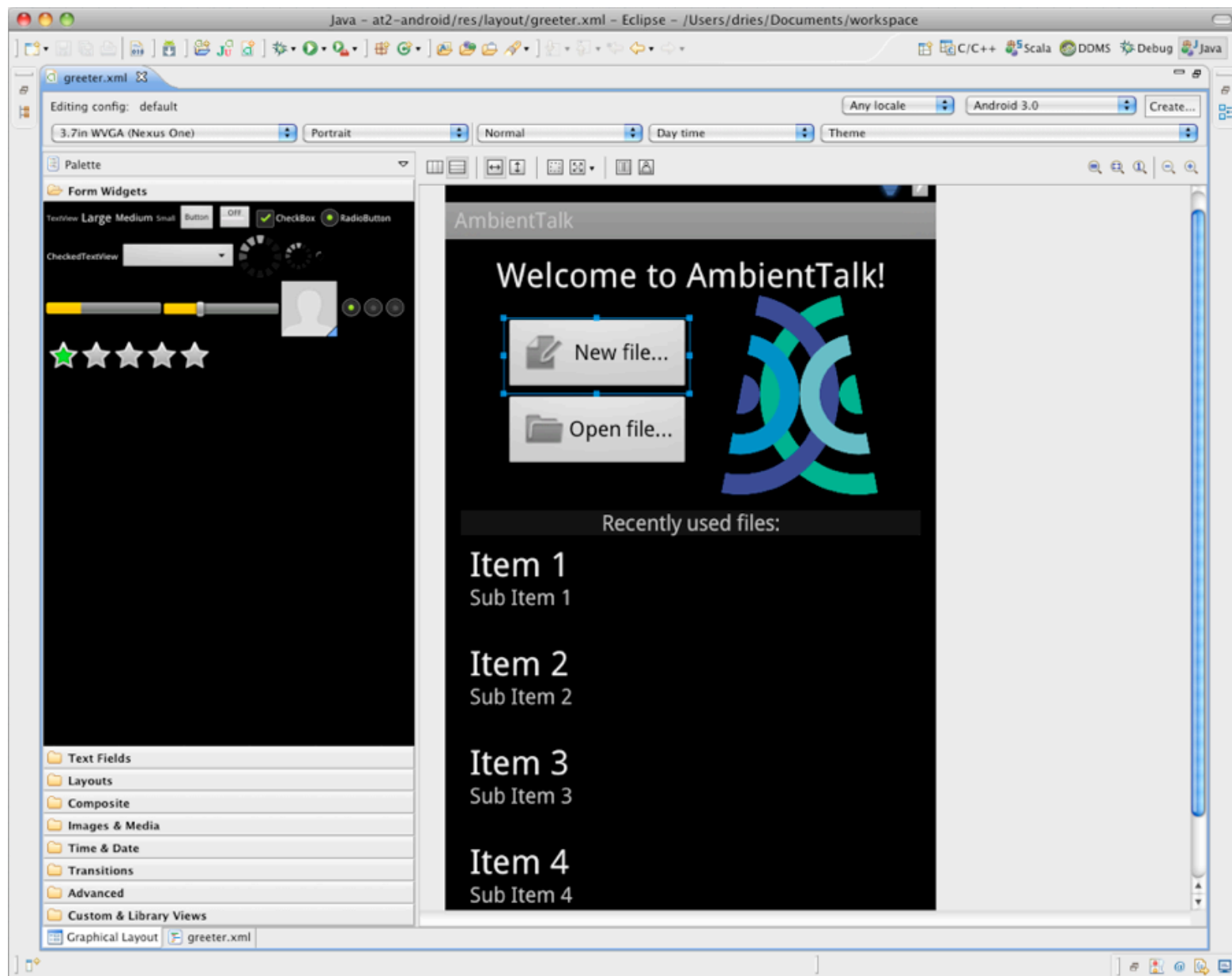
does not compile
as an .apk

can include jar file,
but it cannot be exported to a .jar

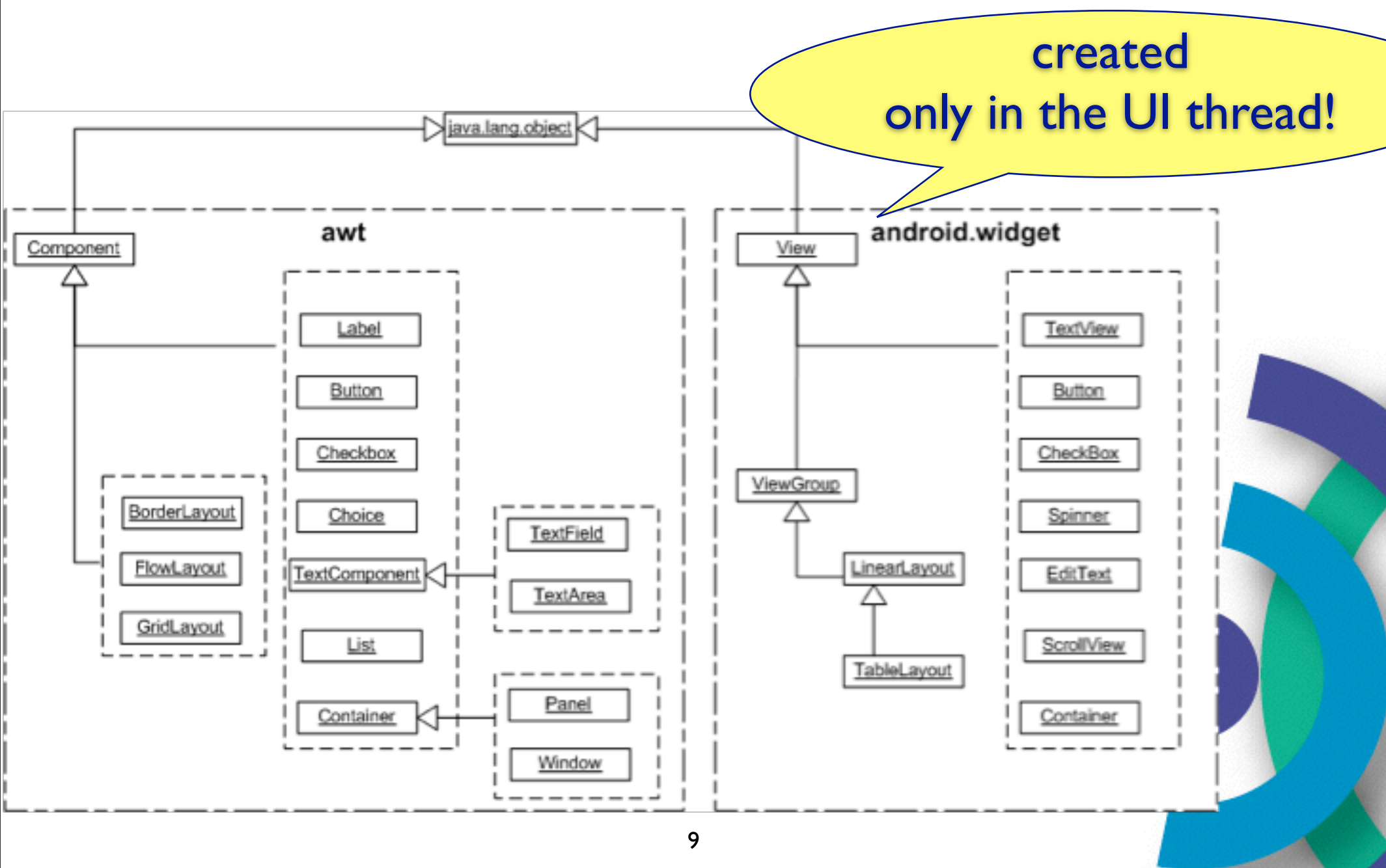
cannot include its
own raw assets



User Interface Design



User Interface Design



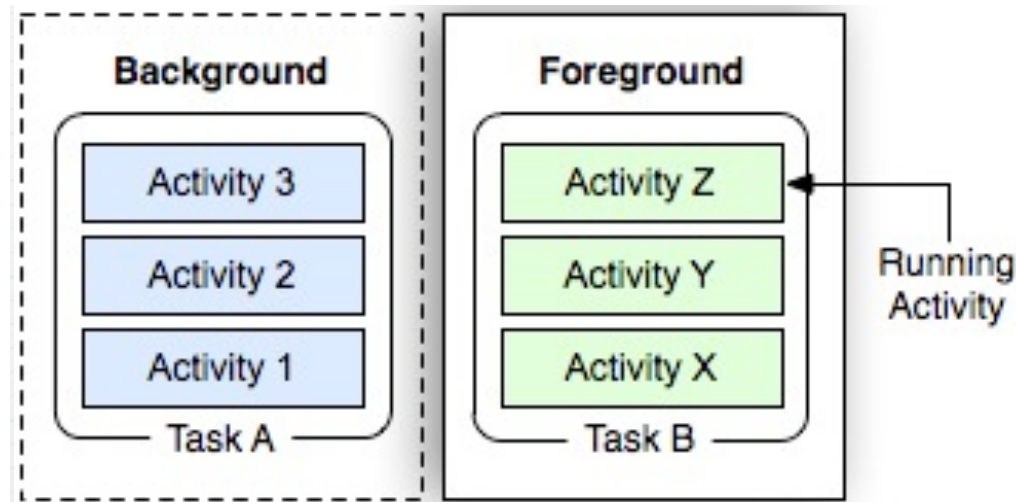
ListView

- ... is your friend
- Presents a list of items sequentially
- Adapter encapsulates items
- Adapter determines item presentation
- onItemClick / onItemClickLongClick
- Adapter.notifyDataSetChanged()



Application Fundamentals

- Android application = collection of tasks.



“An activity is a single screen with a user interface”

Intents

- 1 screen = 1 activity
- Can use other application's activities:

```
Intent dial =  
    new Intent(ACTION_DIAL, Uri.parse("tel:123"));  
startActivity(dial);
```



Intents

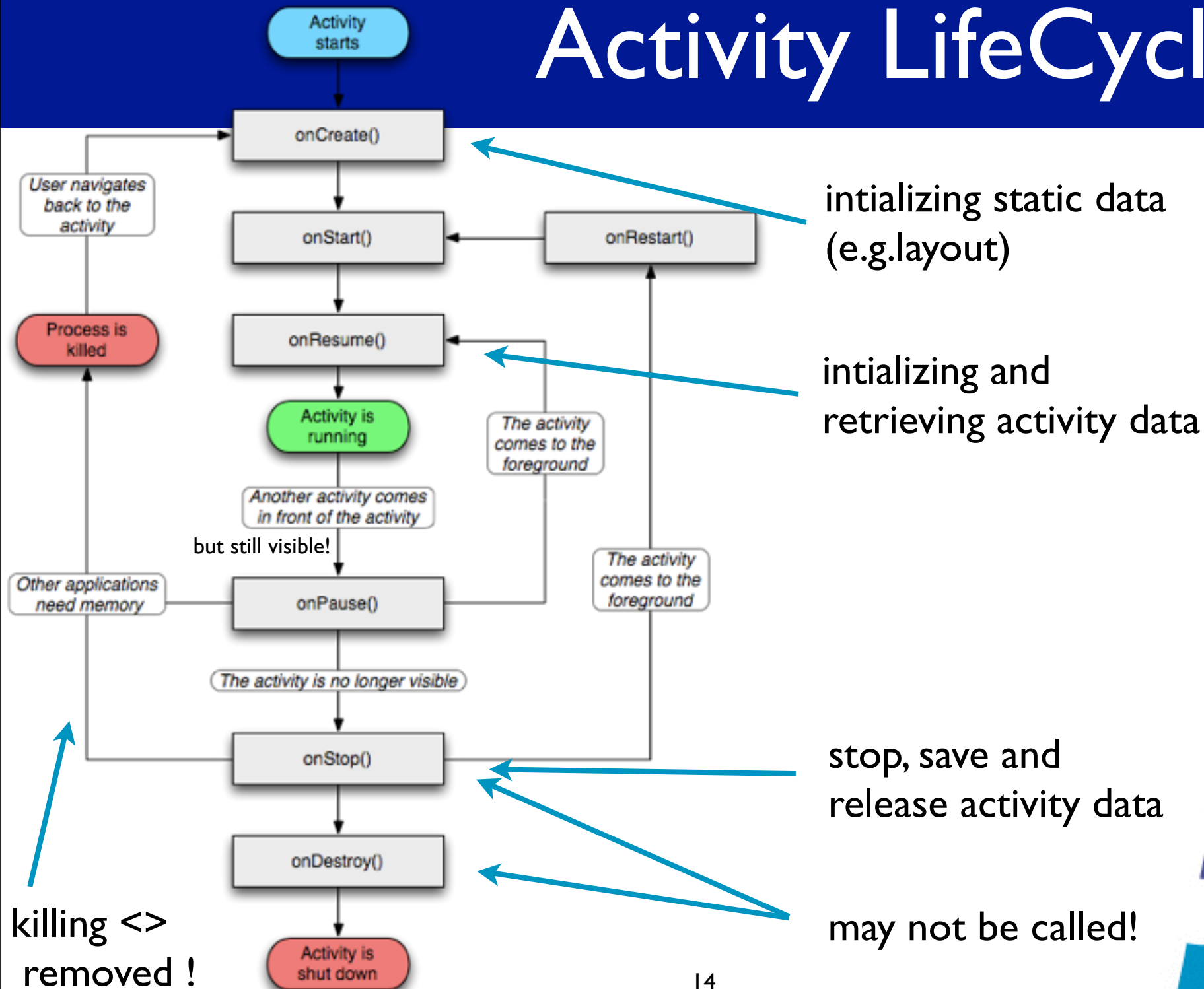
```
Intent i2 = new Intent(this,  
    BrowseFriends.class);  
i2.putExtra("context", "VUB");  
startActivityForResult(i2, REQUEST_CODE);
```

can
pass additional information to the
activity

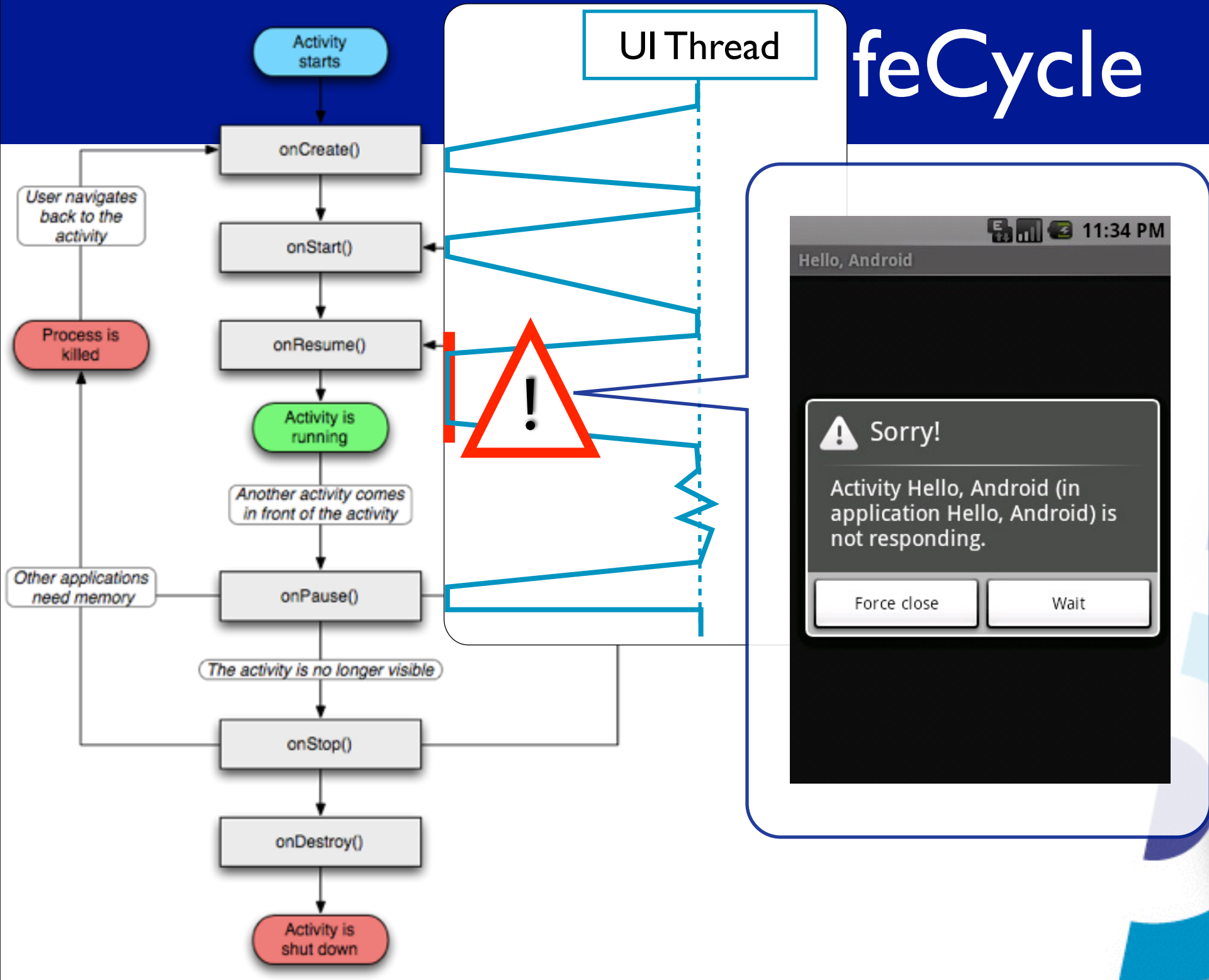
can
receive a result from the activity
you start

onActivityResult

Activity LifeCycle

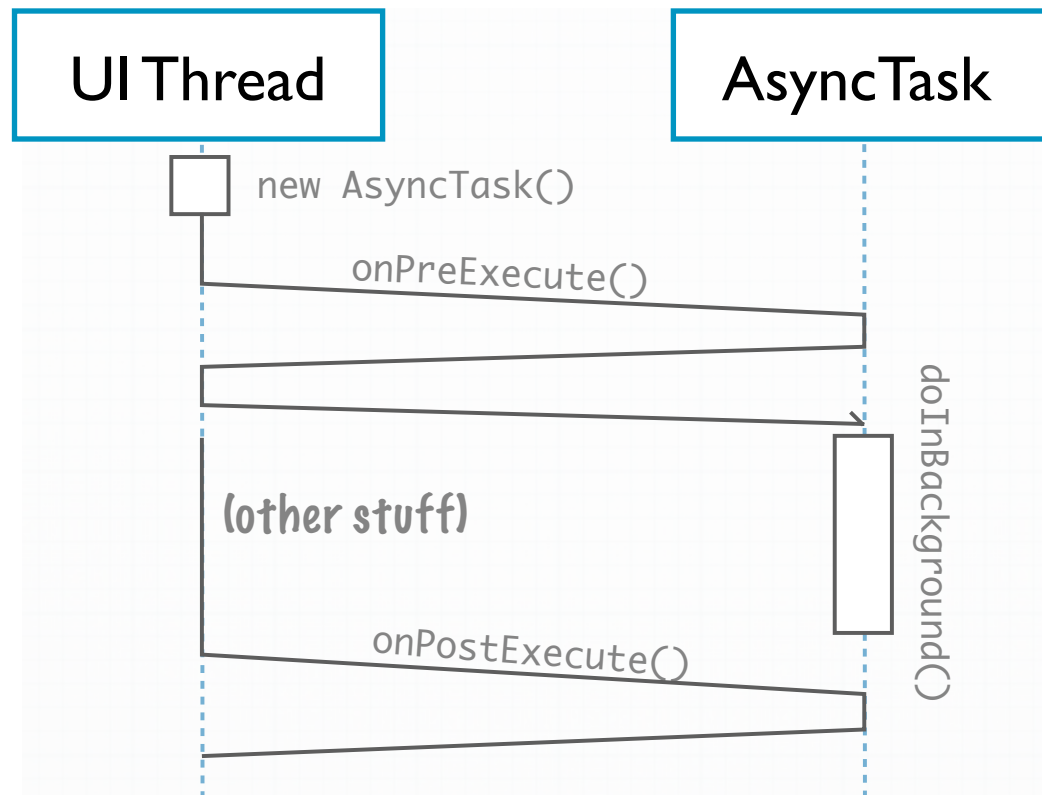


LifeCycle



Hiding work with AsyncTasks

```
new AsyncTask<Params,Progress,Result>().execute()
```



Useful Android tools

adb (android debug bridge)

- Low-level tool used to interact with the device.
- Specially useful:
 - Issue shell commands in the target device.
 - Commands can be directed to specific devices.
 - Logcat command



Useful Android tools

Debug & DDMS perspective in Eclipse

- Debugging on the target device!
 - Set “USB debugging” flag on the device.
 - Set “debuggable” flag in the `AndroidManifest.xml`.
- adb commands visualization: LogCat, Devices, etc.
- Adding your own messages to LogCat:

`Log.e(), Log.i(), Log.w(), Log.wtf(), etc.`
`Log.e(MY_TAG, “index out of bounds + i”);`



Debugging tools

DDMS (Dalvik Debug Monitor Service)

- Select Window -> Open Perspective -> DDMS
- Information about Threads, Heaps, Allocation, etc.
- Kill apps!
- Specially useful: LogCat.
- Direct access to the device (either real or virtual).



Lessons Learned

- TabActivities = bad idea
- Don't forget configuration changes (rotate device)
- Test the onStop -> onCreate path!
- Verify permissions!
- Clean your project (yes, it sometimes helps!)



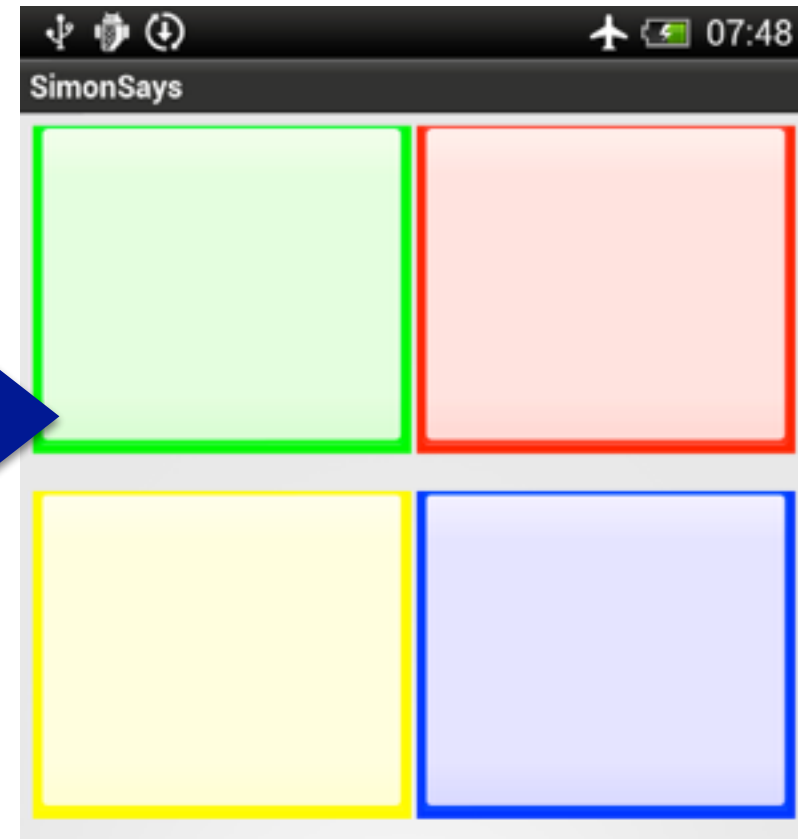
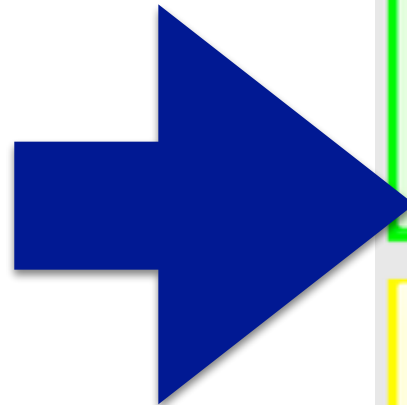
Resources

- <http://developer.android.com>
- <http://android-developers.blogspot.com>
- Android SDK Examples
- Stack Overflow ;)



Assignment: Simon Game

“back to the 80s”



<https://www.youtube.com/watch?v=qjdZHJmcAQ4>



<http://soft.vub.ac.be/amop>