

# Lifecycle Management

Android

Mobile and Ubiquitous Games

ICS 163

Donald J. Patterson

# The Manifest



# The Manifest

The screenshot shows an IDE window with the following details:

- Title Bar:** AndroidManifest.xml - [app] - GPSDrawApp - [~/Documents/ClassResources/2015\_03\_ICs163/codeWorkspace/GPSDrawApp]
- Toolbar:** Standard IDE navigation icons (back, forward, search, etc.) and a dropdown menu set to 'MainActivity'.
- Breadcrumbs:** GPSDrawApp > app > src > main > AndroidManifest.xml
- Project Structure (Left Panel):**
  - Android
  - app
    - manifests
      - AndroidManifest.xml
    - java
      - ics163.luci.ics.uci.edu.gpsdrawapp
        - MainActivity
      - ics163.luci.ics.uci.edu.gpsdrawapp (android)
    - res
      - drawable
      - layout
        - activity\_main.xml
      - menu
      - mipmap
      - values
    - Gradle Scripts

- Code Editor (Right Panel):**

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="ics163.luci.ics.uci.edu.gpsdrawapp" >

    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="GPSDrawApp"
        android:theme="@style/AppTheme" >
        <activity
            android:name=".MainActivity"
            android:label="GPSDrawApp" >
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

# Working with Location

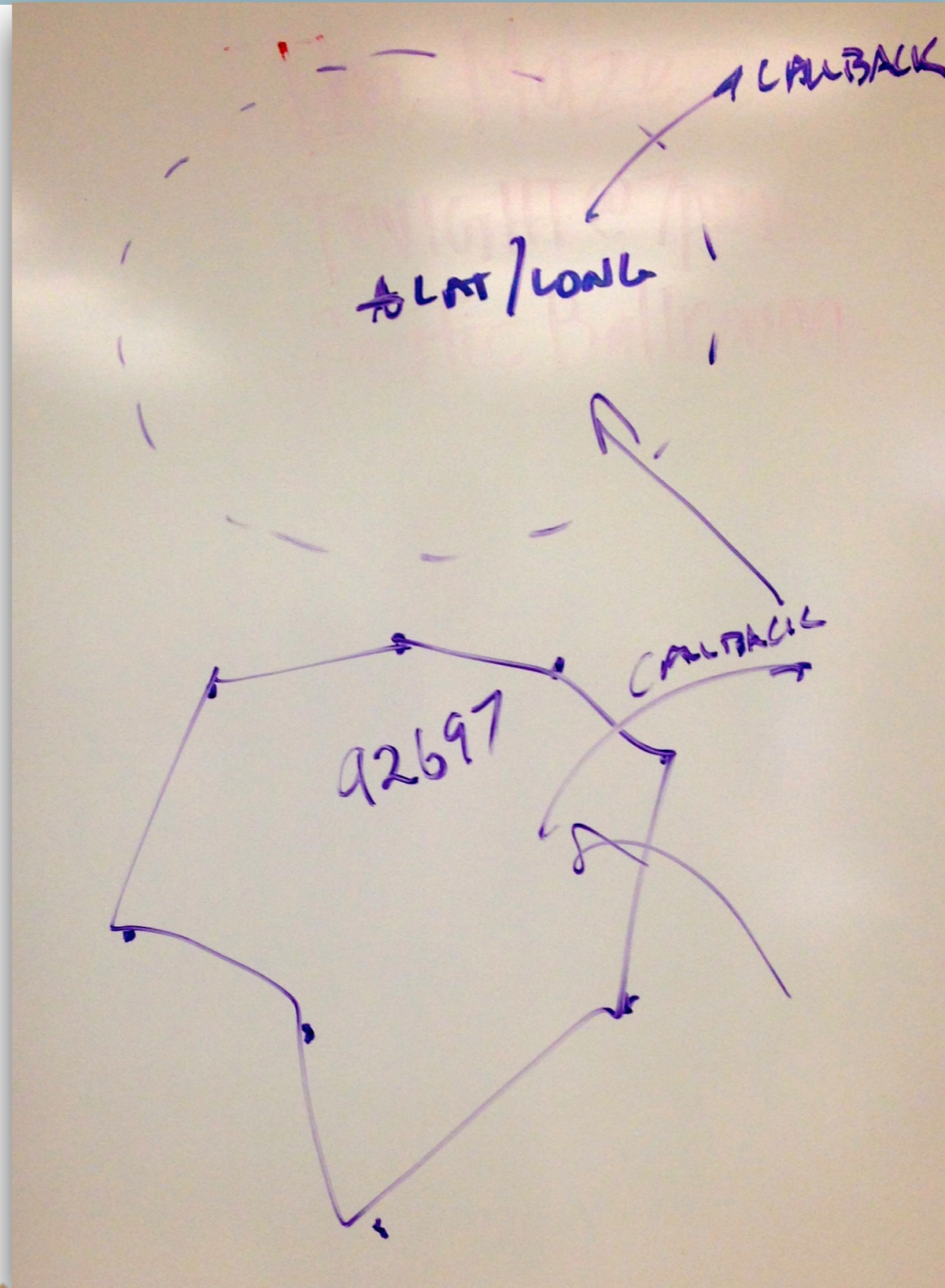


# What are some ways that location is used in mobile dev?

- Fused Location
  - Sensor fusion from a variety of different location sources
  - Asking for location based on high level concerns rather than technologies
- Geofencing
  - Setting up geographic triggers
- Activity Recognition



# Geofencing

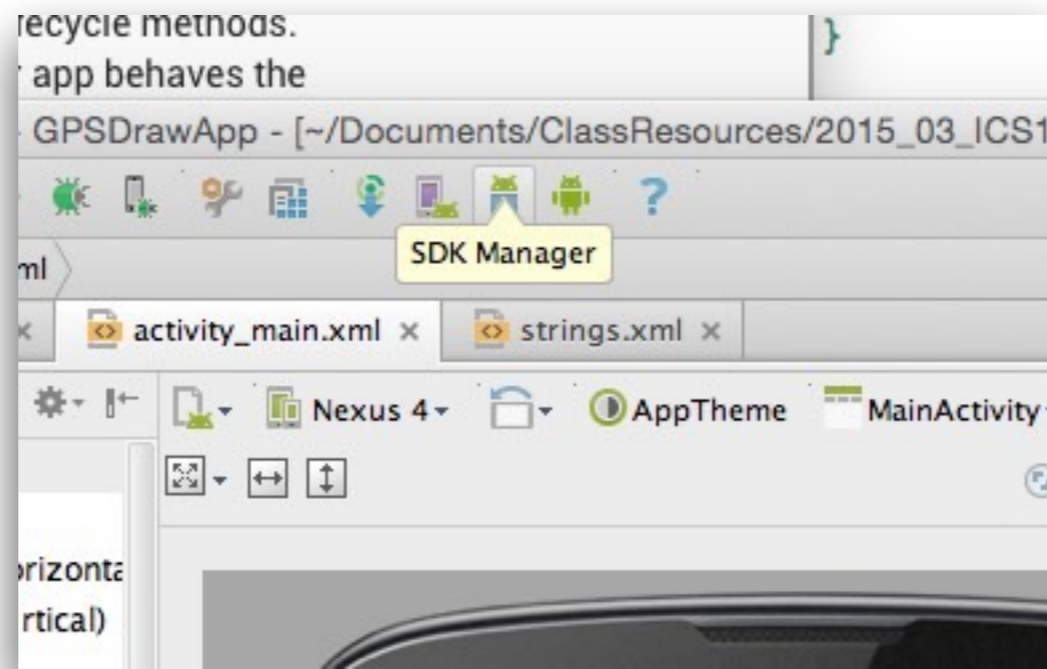


# Working with Location

- In order to work with location more set up must be done
- The Google Play SDK must be installed
  - This library links the phone, the user and the location data tools together
- Many location data tools are **personalized**
  - Frequently visited places
  - Recommended routes
  - Recommended destinations



# Working with Location





# Working with Location

Android SDK Manager

SDK Path: /Users/djp3/Development/Android/adt-bundle-mac-x86\_64-current/sdk

Packages

Name	API	Rev.	Status
▶ Tools			
▶ Android 5.1.1 (API 22)			
▶ Android 5.0.1 (API 21)			
▶ Android 4.4W.2 (API 20)			
▶ Android 4.4.2 (API 19)			
▶ Android 4.3.1 (API 18)			
▶ Android 4.2.2 (API 17)			
▶ Android 4.1.2 (API 16)			
▶ Android 4.0.3 (API 15)			
▶ Android 2.3.3 (API 10)			
▶ Android 2.2 (API 8)			
▼ Extras			
+ Android Support Repository	12		✓ Installed
+ Android Support Library	22		☐ Not installed
+ Google Play services	23		☐ Not installed
+ Google Repository	16		✓ Installed
+ Google Play APK Expansion Library	3		☐ Not installed
+ Google Play Billing Library	5		☐ Not installed
+ Google Play Licensing Library	2		☐ Not installed
+ Android Auto API Simulators	1		☐ Not installed
+ Google USB Driver	11		☒ Not compatible with Mac OS
+ Google Web Driver	2		☐ Not installed
+ Intel x86 Emulator Accelerator (HAXM installer)	5.3		✓ Installed

Show:  Updates/New  Installed [Select New or Updates](#)

Obsolete [Deselect All](#)

[Install 7 packages...](#)

[Delete packages...](#)

Done loading packages.

# Working with Location

- Android projects have to be **packaged**
- This creates an “.apk” file
- In that file are
  - a manifest
  - **resources** associated with your app
    - graphics, sounds, data files
    - compiled byte code
- “gradle” is the tool/language that describes how to package the “.apk”



## Working with Location

- Gradle must be told to package the Google Play SDK





Project Structure

- Android
  - app
    - manifests
    - java
      - ics163.luci.ics.uci.edu.gpsdrawapp
        - MainActivity
        - ics163.luci.ics.uci.edu.gpsdrawapp (android)
      - res

- Gradle Scripts
- build.gradle (Project: GPSDrawApp)
- build.gradle (Module: app)
- gradle-wrapper.properties (Gradle Version)
- proguard-rules.pro (ProGuard Rules for app)
- gradle.properties (Project Properties)
- settings.gradle (Project Settings)
- local.properties (SDK Location)

Gradle files have changed since last project sync. A project sync may be necessary for the IDE to work properly. [Sync Now](#)

```

apply plugin: 'com.android.application'

android {
    compileSdkVersion 22
    buildToolsVersion "21.1.2"

    defaultConfig {
        applicationId "ics163.luci.ics.uci.edu.gpsdrawapp"
        minSdkVersion 21
        targetSdkVersion 21
        versionCode 1
        versionName "1.0"
    }

    buildTypes {
        release {
            minifyEnabled false
            proguardFiles getDefaultProguardFile('proguard-android.txt'), 'proguard-rules.pro'
        }
    }
}

dependencies {
    compile fileTree(dir: 'libs', include: ['*.jar'])
    compile 'com.google.android.gms:play-services:7.0.0'
}
    
```

Android DDMS

Devices | logcat ADB logs →

Log level: **Verbose**

app: ics163.luci.ics.uci.edu.gpsdrawapp

Build Variants

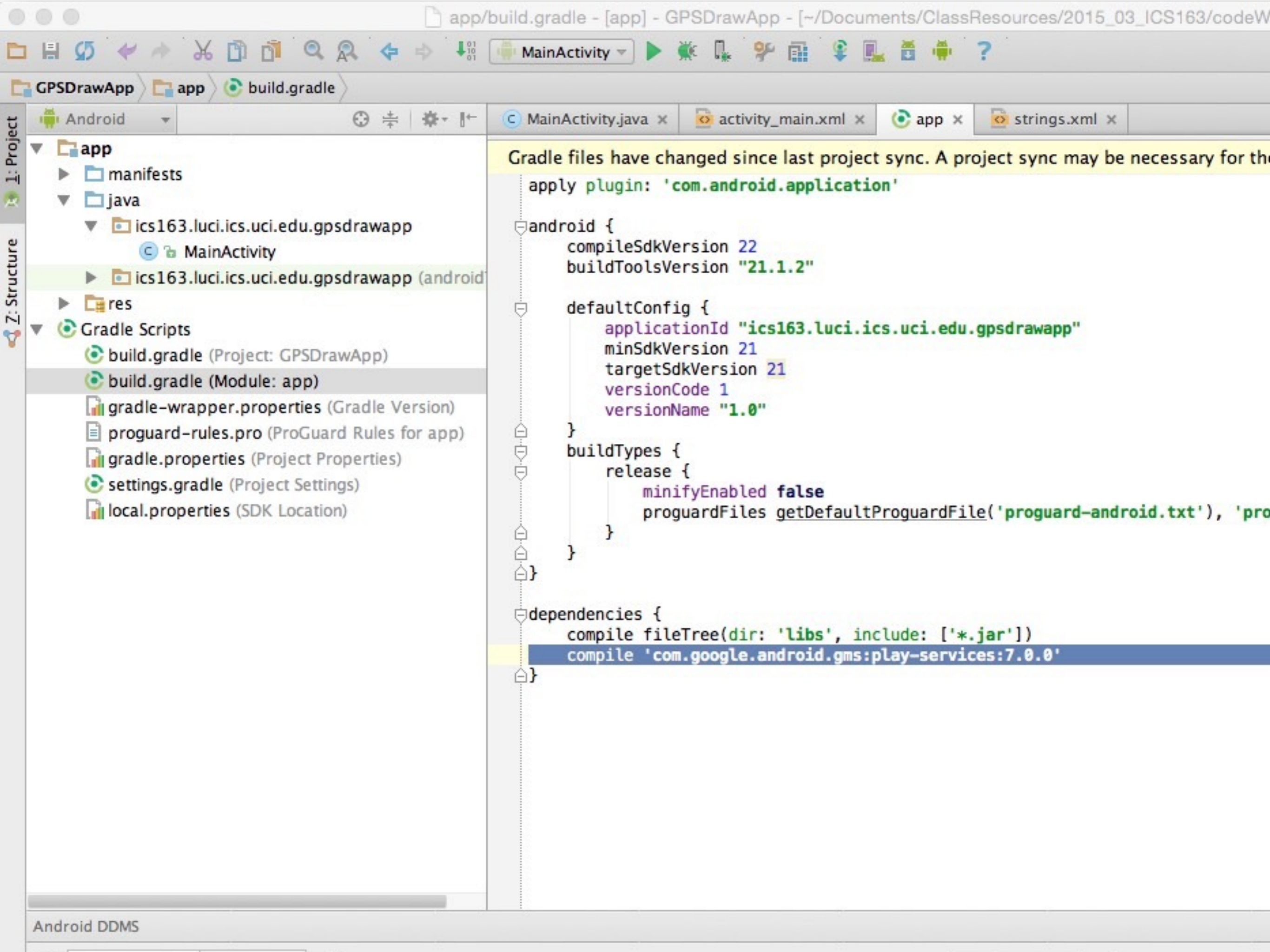
Devices

- LGE Nexus 5 Android 5.1 (API 2)
- ics163.luci.ics.uci.edu.gpsdrawapp (5747)

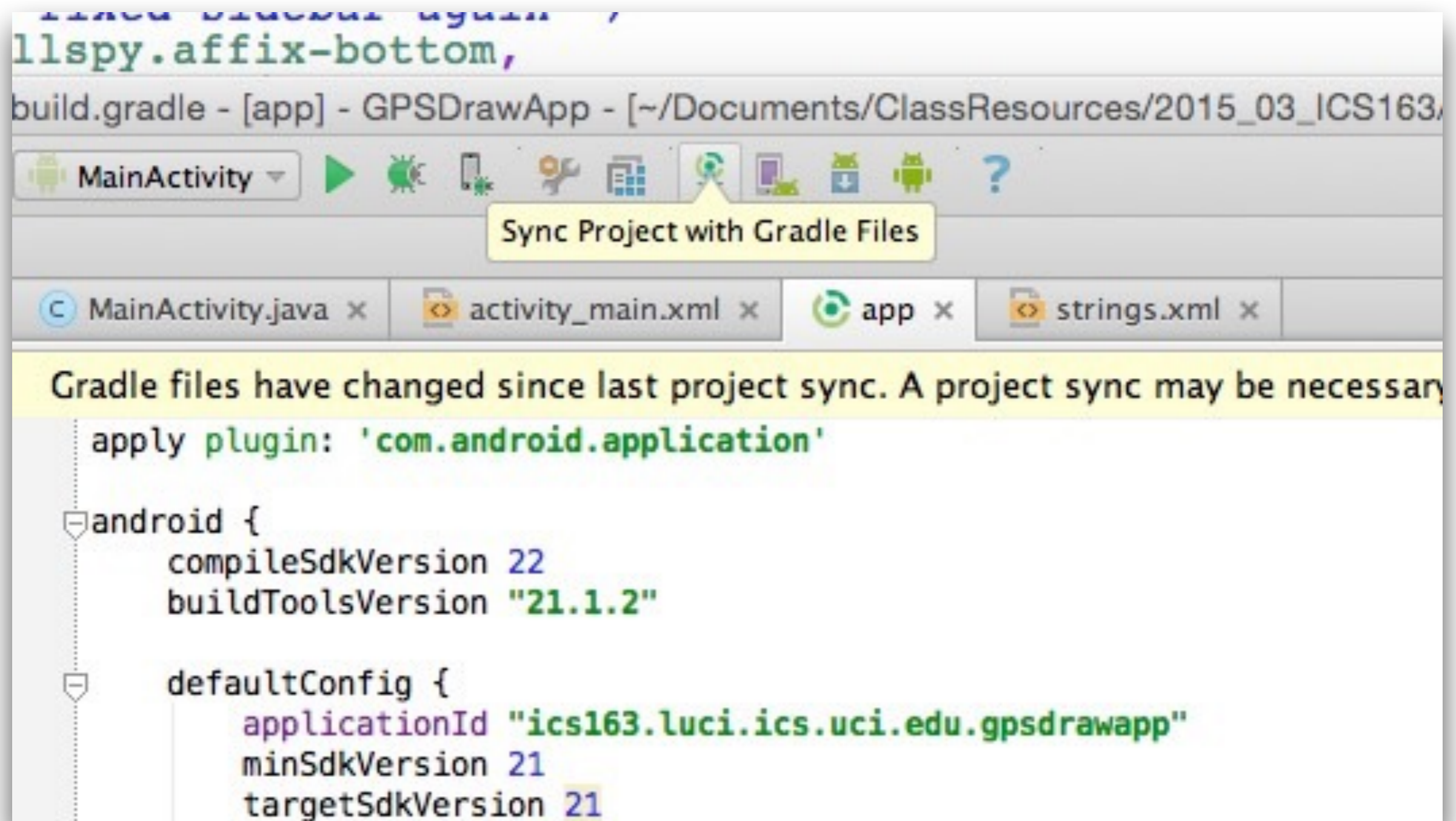
logcat

```

04-16 15:06:12.107 5747-5747/ics163.luci.ics.uci.edu.gpsdrawapp I/art: Late-enabling -Xcheck:jni
04-16 15:06:12.134 5747-5755/ics163.luci.ics.uci.edu.gpsdrawapp I/art: Debugger is no longer active
04-16 15:06:12.199 5747-5778/ics163.luci.ics.uci.edu.gpsdrawapp D/OpenGLRenderer: Use EGL_SWAP_BEHAVIOR_PRESERVED: true
04-16 15:06:12.205 5747-5747/ics163.luci.ics.uci.edu.gpsdrawapp D/Atlas: Validating map...
04-16 15:06:12.244 5747-5778/ics163.luci.ics.uci.edu.gpsdrawapp I/Adreno-EGL: <qeglDrvAPI_eglInitialize:379>: QUALCOMM Build: 01/14/15, ab00
04-16 15:06:12.245 5747-5778/ics163.luci.ics.uci.edu.gpsdrawapp I/OpenGLRenderer: Initialized EGL, version 1.4
04-16 15:06:12.257 5747-5778/ics163.luci.ics.uci.edu.gpsdrawapp D/OpenGLRenderer: Enabling debug mode 0
    
```



# Working with Location



The screenshot shows an IDE interface with a toolbar at the top. A tooltip for the 'Sync Project with Gradle Files' icon is visible. Below the toolbar, a notification bar states: "Gradle files have changed since last project sync. A project sync may be necessary". The main editor area displays a portion of a `build.gradle` file with the following content:

```
apply plugin: 'com.android.application'

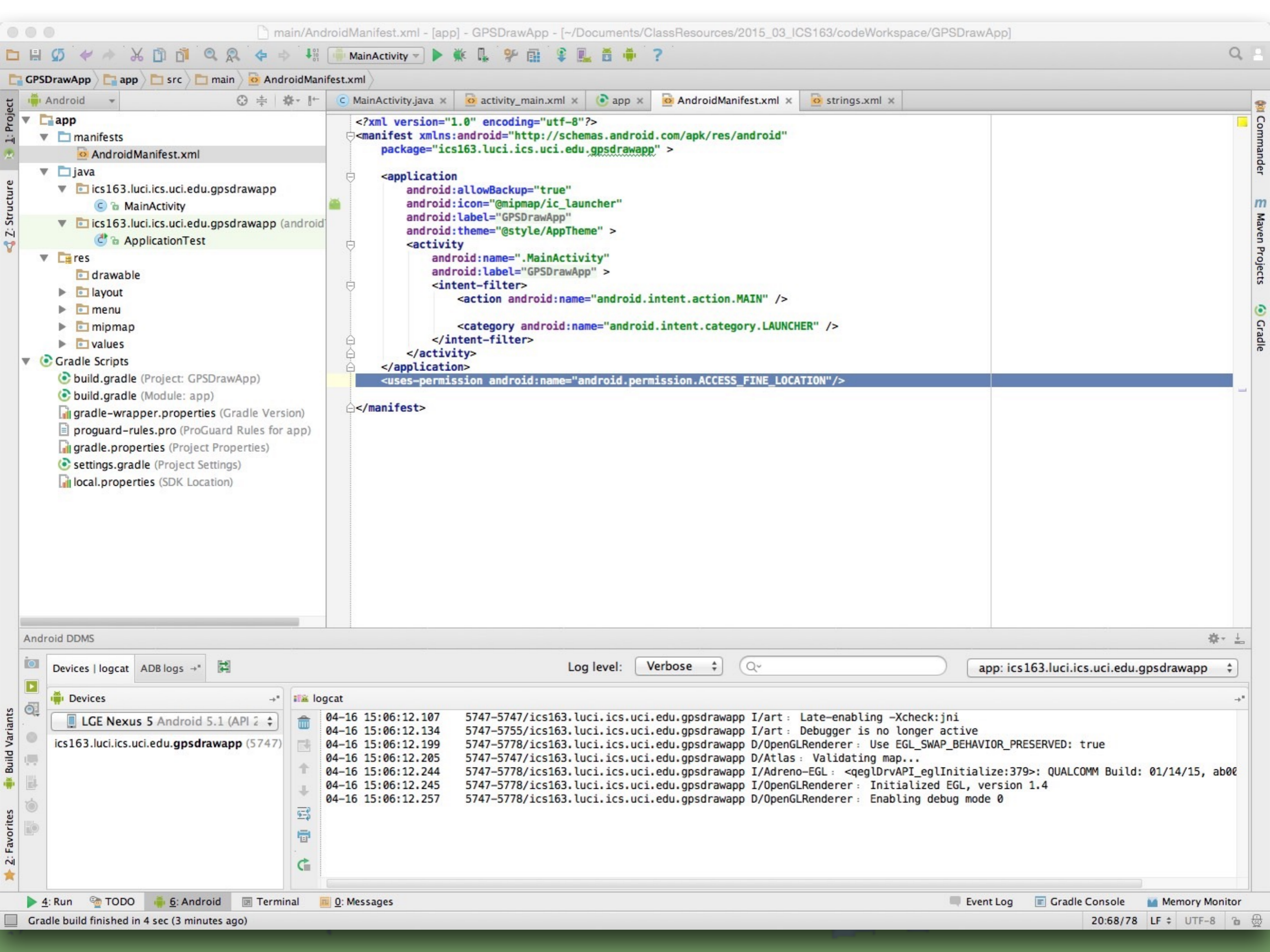
android {
    compileSdkVersion 22
    buildToolsVersion "21.1.2"

    defaultConfig {
        applicationId "ics163.luci.ics.uci.edu.gpsdrawapp"
        minSdkVersion 21
        targetSdkVersion 21
    }
}
```

## Working with Location

- The Manifest needs to be updated to tell Android that this application uses “location”
- There are about 100 sensitive permissions that apps might need to request:
  - See them all here:
    - <http://developer.android.com/reference/android/Manifest.permission.html>





Project Structure

- app
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    - AndroidManifest.xml
  - java
    - ics163.luci.ics.uci.edu.gpsdrawapp
      - MainActivity
    - ics163.luci.ics.uci.edu.gpsdrawapp (android)
      - ApplicationTest
  - res
    - drawable
    - layout
    - menu
    - mipmap
    - values
  - Gradle Scripts
    - build.gradle (Project: GPSDrawApp)
    - build.gradle (Module: app)
    - gradle-wrapper.properties (Gradle Version)
    - proguard-rules.pro (ProGuard Rules for app)
    - gradle.properties (Project Properties)
    - settings.gradle (Project Settings)
    - local.properties (SDK Location)

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="ics163.luci.ics.uci.edu.gpsdrawapp" >

    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="GPSDrawApp"
        android:theme="@style/AppTheme" >
        <activity
            android:name=".MainActivity"
            android:label="GPSDrawApp" >
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>
    <uses-permission android:name="android.permission.ACCESS_FINE_LOCATION"/>
</manifest>
```

Android DDMS

Devices | logcat ADB logs →

Log level: Verbose

app: ics163.luci.ics.uci.edu.gpsdrawapp

Devices

- LGE Nexus 5 Android 5.1 (API 2)
- ics163.luci.ics.uci.edu.gpsdrawapp (5747)

logcat

```
04-16 15:06:12.107 5747-5747/ics163.luci.ics.uci.edu.gpsdrawapp I/art: Late-enabling -Xcheck:jni
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04-16 15:06:12.199 5747-5778/ics163.luci.ics.uci.edu.gpsdrawapp D/OpenGLRenderer: Use EGL_SWAP_BEHAVIOR_PRESERVED: true
04-16 15:06:12.205 5747-5747/ics163.luci.ics.uci.edu.gpsdrawapp D/Atlas: Validating map...
04-16 15:06:12.244 5747-5778/ics163.luci.ics.uci.edu.gpsdrawapp I/Adreno-EGL: <qeglDrvAPI_eglInitialize:379>: QUALCOMM Build: 01/14/15, ab00
04-16 15:06:12.245 5747-5778/ics163.luci.ics.uci.edu.gpsdrawapp I/OpenGLRenderer: Initialized EGL, version 1.4
04-16 15:06:12.257 5747-5778/ics163.luci.ics.uci.edu.gpsdrawapp D/OpenGLRenderer: Enabling debug mode 0
```





```
android:allowBackup="true"  
android:icon="@mipmap/ic_launcher"  
android:label="GPSDrawApp"  
android:theme="@style/AppTheme" >
```

```
<activity  
    android:name=".MainActivity"  
    android:label="GPSDrawApp" >  
    <intent-filter>  
        <action android:name="android.intent.action.MAIN" />  
  
        <category android:name="android.intent.category.LAUNCHER" />  
    </intent-filter>  
</activity>
```

```
</application>
```

```
<uses-permission android:name="android.permission.ACCESS_FINE_LOCATION" />
```

```
</manifest>
```

# Connecting to Google Play Services



# Connecting to Google Play Services

- Lots of failure modes that must be handled
  - User hasn't logged in
  - Phone software is out of date
  - Network connection fails
  - Phone rotates while user is fixing a problem



# Connecting to Google Play Services

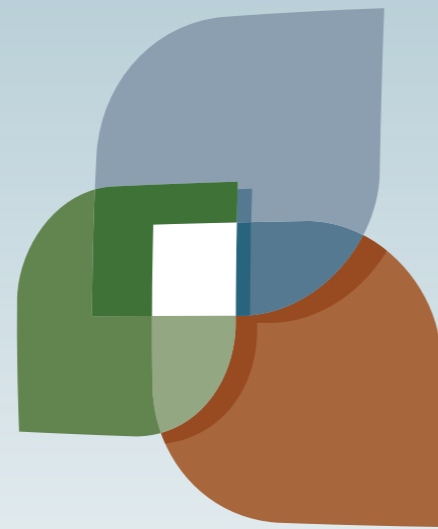
- Let's get an example of an application getting your last known location running



## Example

- Create a skeleton program
- Install/require Google Play SDK
- Give app permission to use location
- Create a Google Play Object
  - Handle error conditions
- Create a UI
- Get references to the UI elements
- Connect Google Play Object
  - On success, put our last known location into the UI





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