Programming with Android:
The Google Maps Library

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Outline

- **Google Maps**: History and General Information
- **Google Maps Library**: Installation and Registration
- **Google Maps Library**: *MapView* and *MapActivity*
- **Google Maps Library**: *MapController*
- **Google Maps Library**: *Overlay* Definition
- **Google Maps Library**: *GPS* Localization
- **Google Maps Library**: *Geocoding*

Android: Gmaps Important Dates …

- **2004** → Google Inc bought the australian company *Where 2 Technologies*, that developed a prototype WebMap system.
- **2005** (February) →Google Maps was announced
- **2006** → Google Maps updated to use the same satellite image database as Google Earth
- **2007** → Google Street View launched
- **2010** → On Christmas and New Years day, mobile usage of Google Maps surpassed desktop usage for the first time
- **NOW**: Google Maps, Google Sky, Google Moon, Google Mars, Google Transit, Google Aerial View, etc

Android: Gmaps Stats and Information

- Maps are based on a variant of *Mercator* projections.
- Frequency of updates for satellite images ~ 3 years

SERVICE **COVERAGE**

Map Tiles: 209 countries over 218 → **~96**%

Street View: 23 countries over 218 → **~10**%

Traffic View: 22 countries over 218 → **~10**%

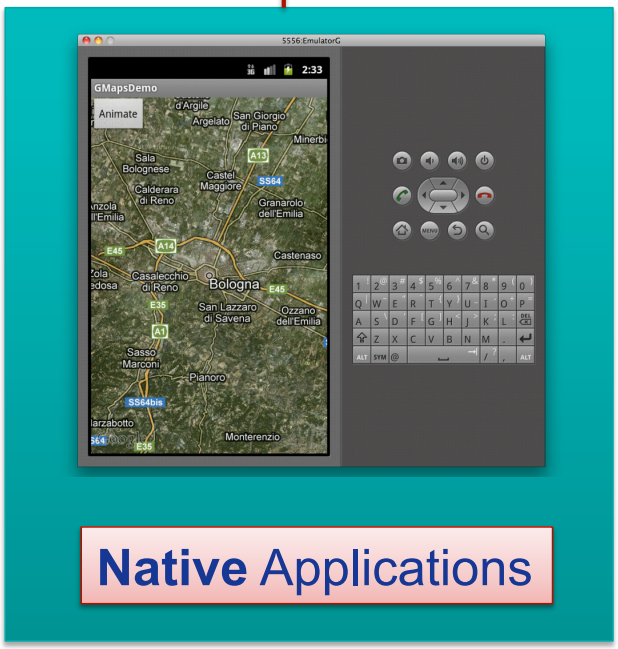
Business info: 37 countries over 218 → **~17**%

Android: Deploying Map-based Apps

Deploying **Map-based** Applications in Android

WebView +
Google Maps +
Web technologies

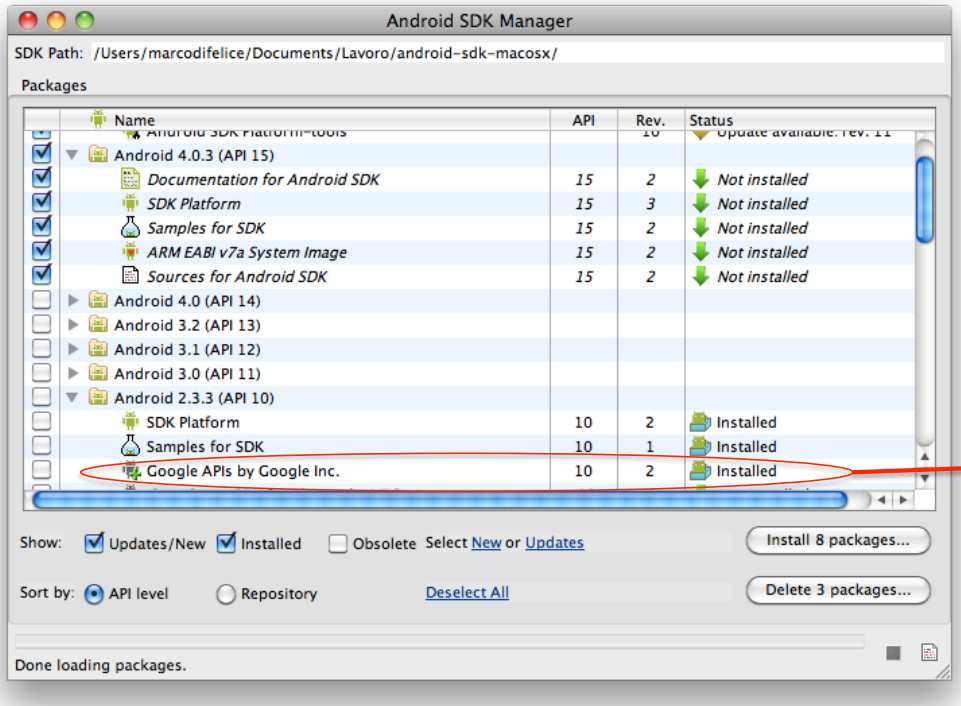
Hybrid Applications



Native Applications

Android: Installing Google APIs

STEP -1: Install **Google APIs** to use the Maps in a native application.



Window → Android SDK Manager →Installed packages

Check GoogleAPIs is **installed**, or **install** it otherwise

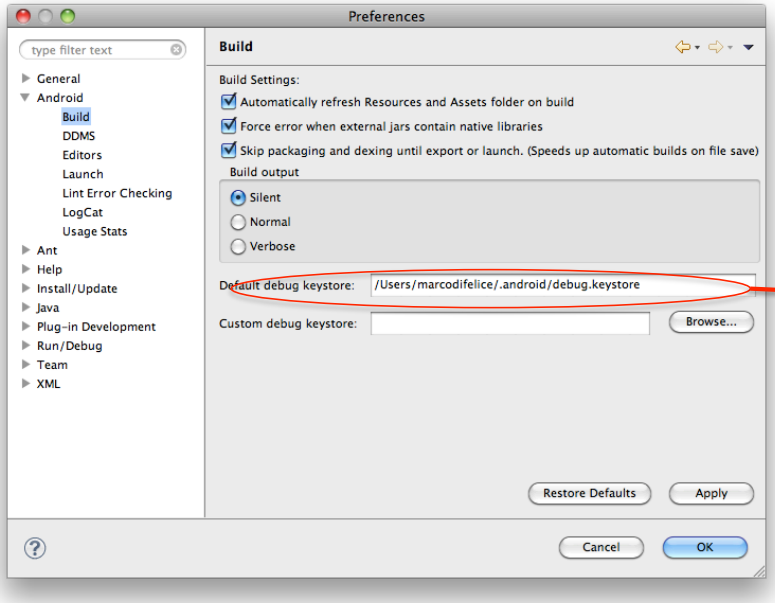
Android: Getting a Google Maps API Key

STEP 0: http://code.google.com/intl/it-IT/android/maps-api-signup.html

Android: Getting a Google Maps API Key

STEP 0: Get a valid **Maps API Key** to utilize the Google Maps library.

0.1: Retrieve the fingerprint MD5 of the certificate used to sign the apps.



Window → Preferences → Android → Build

Get the debug **keystore** path

Android: Getting a Google Maps API Key

STEP 0: Get a valid **Maps API Key** to utilize the Google Maps library.

0.1: Retrieve the fingerprint MD5 of the certificate used to sign the apps.

```
mylaptop:~ marco$ keytool -list -keystore /Users/
marcodifelice/.android/debug.keystore  -storepass
android -keypass android
…
androiddebugkey, Feb 1, 2011, PrivateKeyEntry,
Certificate fingerprint (MD5): A2:34:B1:A3:A5:BB:
11:21:21:B3:20:56:92:12:AB:DB
```

Android: Google MAPs library overview

What can I do with Google MAPs library in Android?

1. **Integrate** a Google Map into an Android application
2. **Control** the Map visualization **options**
3. **Customize** the Map
4. **Integrate** the Map with GPS data

Android: Google MAPs library overview

Instantiate these objects to integrate a Google Map

1. **MapView** (com.google.android.maps.MapView)
   - A **View** that displays a Map
2. **MapActivity**(com.google.android.maps.MapActivity)
   - Extension of the **Activity** class
   - Base class with code to manage the necessities of any Activity that displays a MapView …

Android: Google Maps library overview

Define a **MapView** in the layout file (main.xml)

```
<LinearLayout>
…
< com.google.android.maps.MapView
                    android:layout_width="fill_parent"
                    android:layout_height="fill_parent"
                    android:id="@+id/map
                    android:apiKey="**********"
/>
…
</LinearLayout>
```

Paste your **Google API Key** here

Android: Google Maps library overview

Define a **MapActivity** in the Java code ..

```
public class MapDemoActivity extends MapActivity {
… … … … … …
}
```

Implement the method **isRouteDisplayed()**:

```
protected boolean isRouteDisplayed() {
   return false;
}
```

Is my app giving routing information?

Android: Google Maps library overview

Set the permissions in the **AndroidManifest.xml**

```
 <uses-permission
android:name="android.permission.ACCESS_COARSE_LOCATION”/>
 <uses-permission
android:name="android.permission.INTERNET" />
```

Set the libraries in the **AndroidManifest.xml**

```
<application
        … … …
         <uses-library
   android:name="com.google.android.maps" />
```

Android: Google Maps library overview

Some **methods** of a MapView …

MapView options:

- public void **setSatellite**(boolean enable)
- public void **setTraffic**(boolean enable)
- public void **setStreetView**(boolean enable)

MapView interaction modes:

- public void **setClickable**(boolean enable)
- public void **setBuiltInZoomControls** (boolean enable)

Android: Google Maps library overview

- How to **control** the Google Map **visualization**?

… Through the **MapController** object!

  - **Center** the Map at a given location
  - **Zoom** in/out operations
  - **Enable** animations on the map

How to get a MapController from a MapView?

```
public MapController getController()
```

Android: Google Maps library overview

Some **methods** of a MapController …

Center the map at a given location:

- public void **setCenter(Geopoint p)**

A **GeoPoint** defines a location on the Map …

```
GeoPoint BOLOGNA=new GeoPoint(44494290,11346526);
```

<latitude, longitude> *in microgrades, i.e. grade*10^6*

Android: Google Maps library overview

Some **methods** of a MapController …

Control the **Zoom** IN/OUT operations

- public void **zoomIn()**
- public void **zoomOut**()

Enable animations on the map

- public void **animateTo(GeoPoint gp)**
- public void **animateTo**(Geopoint gp, Message msg)
- public void **animateTo**(Geopoint gp, Runnable runnable)

Android: Google Maps library overview

Overlays → Map customizations, markers with icon, title, snippet and associated events (e.g. touch, tap, etc).

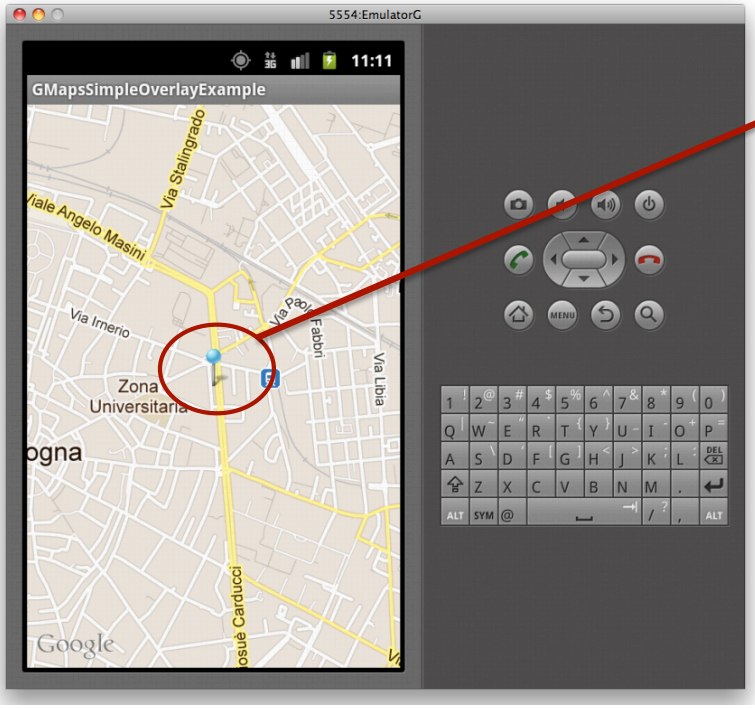
- **Overlay** (Base class representing an Overlay on the map)
- **ItemizedOverlay** (Extension of Overlay, List of **OverlayItems**)
- **MyLocationOverlay** (Extension of Overlay for drawing user's **current location** on the map, and/or a **compass-rose** inset)

ADDING an OVERLAY to a MAPVIEW

```
mapView.getOverlays().add(newOverlay);
```

Android: Google Maps library overview

Overlay → Basic class to add a Marker to the Map …



- **Extend** the Overlay class
- **Override** the method:

```
draw(Canvas c, MapView m,
boolean b)
```

- **Add** the Overlay to the Map:

```
mapView.getOverlay.add
(mySimpleOverlay)
```

Android: Google Maps library overview

```
class SimpleOverlay extends Overlay {
       private GeoPoint gp;
       private Bitmap marker;

       public SimpleOverlay(GeoPoint p, Bitmap d) {
          gp=p;
          marker=d;
       }

       public void draw(Canvas canvas, MapView mapView, boolean
shadow) {
          super.draw(canvas, mapView, shadow);
          Point point=new Point();
          mapView.getProjection().toPixels(gp, point);
          canvas.drawBitmap(marker, point.x-24, point.y-48, null);

       }
}
```

Android: Google Maps library overview

ItemizedOverlay → Overlay Extension, Collection of OverlayItem

OVERLAYITEM Constructor

```
OverlayItem(Geopoint gp, String title, String snippet)
```

ITEMIZEDITEM Constructor

```
ItemizedOverlay(Drawable defaultMarker)
```

Extend the ItemizedOverlay and **Override** the following methods:

- public int **size**()
- protectedOverlayItem **createItem**(int i)

Android: Google Maps library overview

ItemizedOverlay → Overlay Extension, Collection of OverlayItem

OVERLAYITEM Constructor

```
OverlayItem(Geopoint gp, String title, String snippet)
```

ITEMIZEDITEM Constructor

```
ItemizedOverlay(Drawable defaultMarker)
```

Other methods:

- protected void **populate**()
- protected boolean **onTap**(int index)

Android: Google Maps library overview

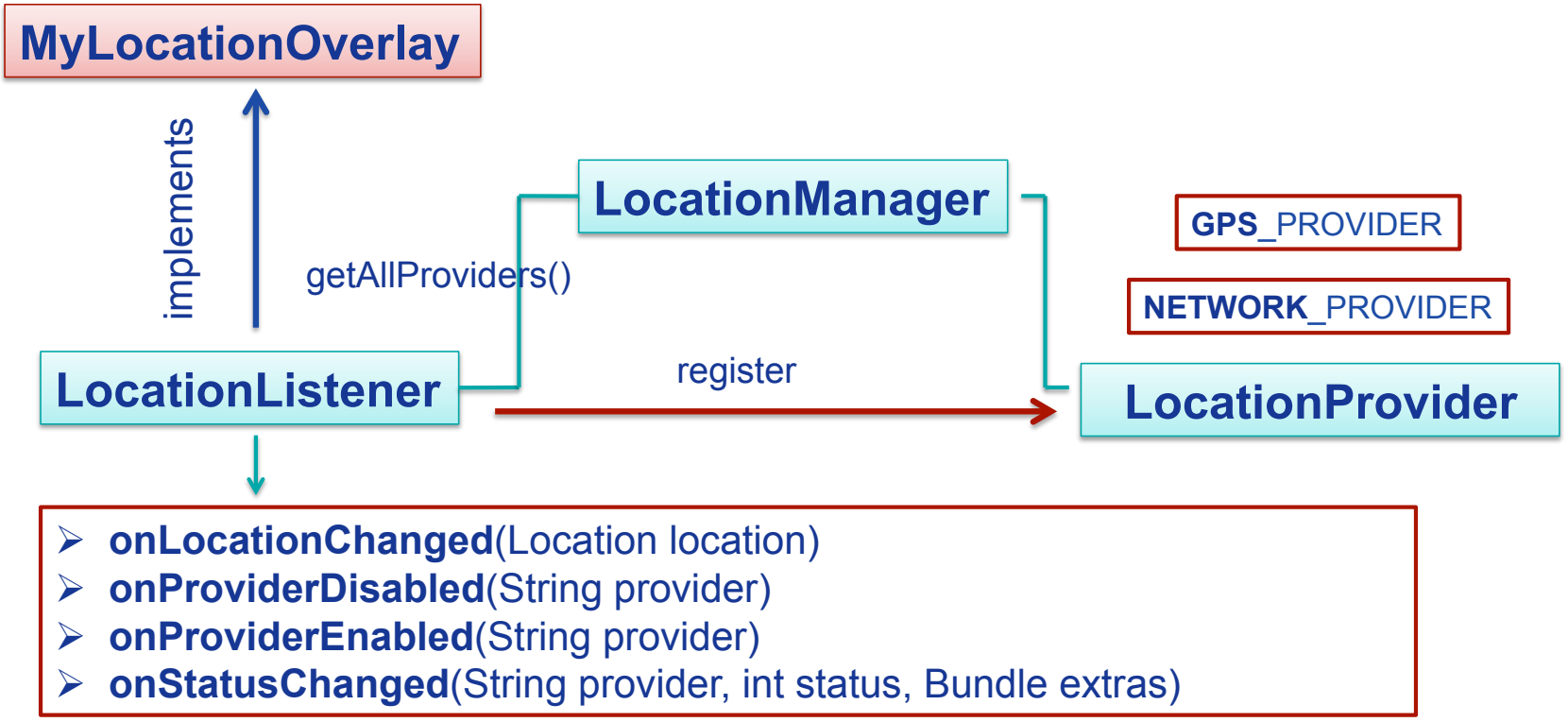
MyLocationOverlay → Overlay Extension, Draw user's position

MYLOCATIONOVERLAY Constructor

```
MyLocationOverlay(Context context, MapView mapview)
```

- public boolean **enableMyLocation**()
- public boolean **disableMyLocation**()
- public GeoPoint **getMyLocation**()
- public Location **getLastFix()**
- public boolean **runOnFirstFix(Runnable)**

Android: Google Maps library overview



Android: Google Maps library overview

GeoCoding → Technique to convert an Address into a GeoPoint, or viceversa …

Implemented by the Geocoder class

```
public Geocoder(Context contex)
```

Main methods:

- public **List<Address> getFromLocation**(double latitude, double longitude, int maxResults)
- public **List<Address> getFromLocationName**(String locationName, int maxResults)

Android: Google Maps library overview

WebView → A **View** that displays web pages, including simple browser methods (history, zoom in/out/ search, etc).

Implemented by the WebView class

```
public WebView(Context contex)
```

Main methods:

- public void **loadUrl**(String url) → load the HTML page at url
- public void **loadData**(String data, String mimeType, string encoding) → load the HTML page contained in data