# Mobile Application Development
# Google Maps Android API v2

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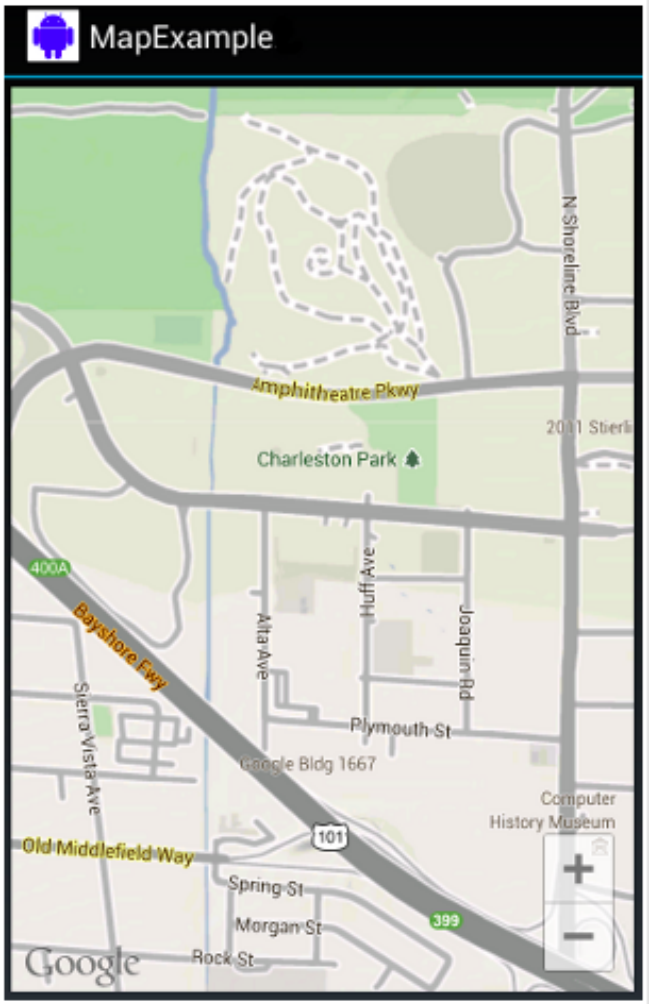
# Google Maps Android API v2

## API features

**Google Maps Android API**

- Embed & display map
- Access Google Map servers
- Download map data
- Add markers, polygons, overlays
- Change zoom level
- Determine geolocation
- Select map type (normal, hybrid . . . )

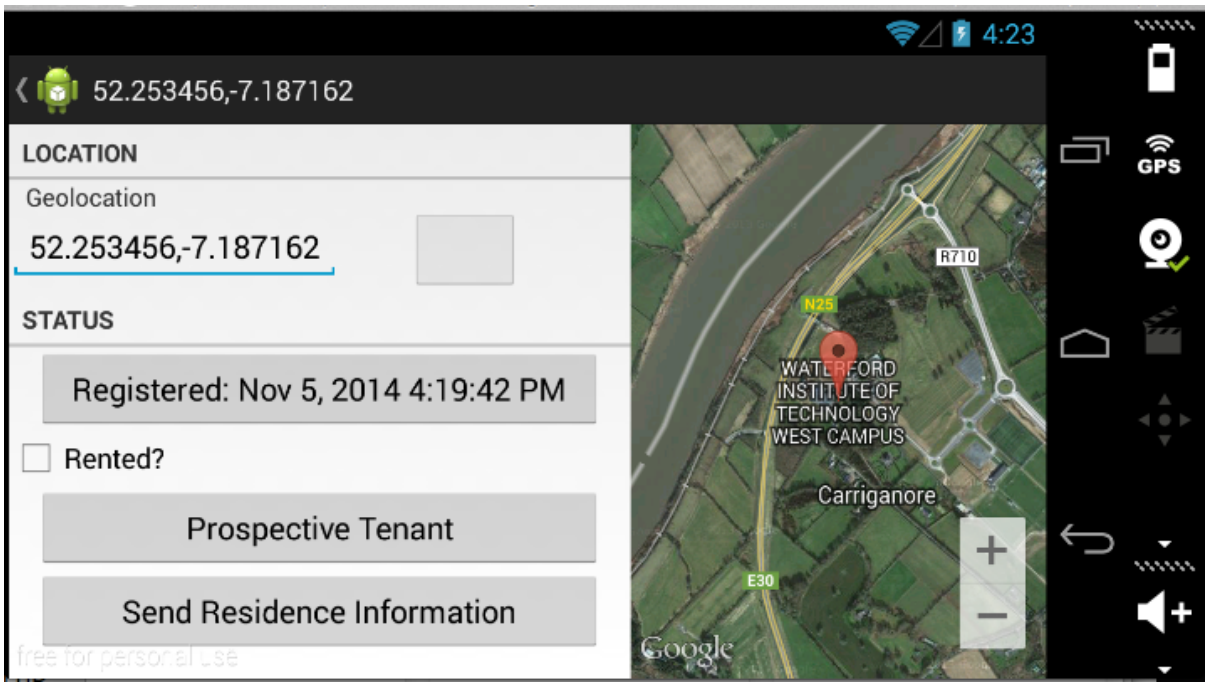


# Google Maps Android API v2

## Preparatory work

### Google Play Services

- Install via Android SDK Manager
- Import to MyRent workspace
- Reference in manifest file
- Reference in MyRent properties



# Google Maps Android API v2

## Maps API key

**Generating & using key**

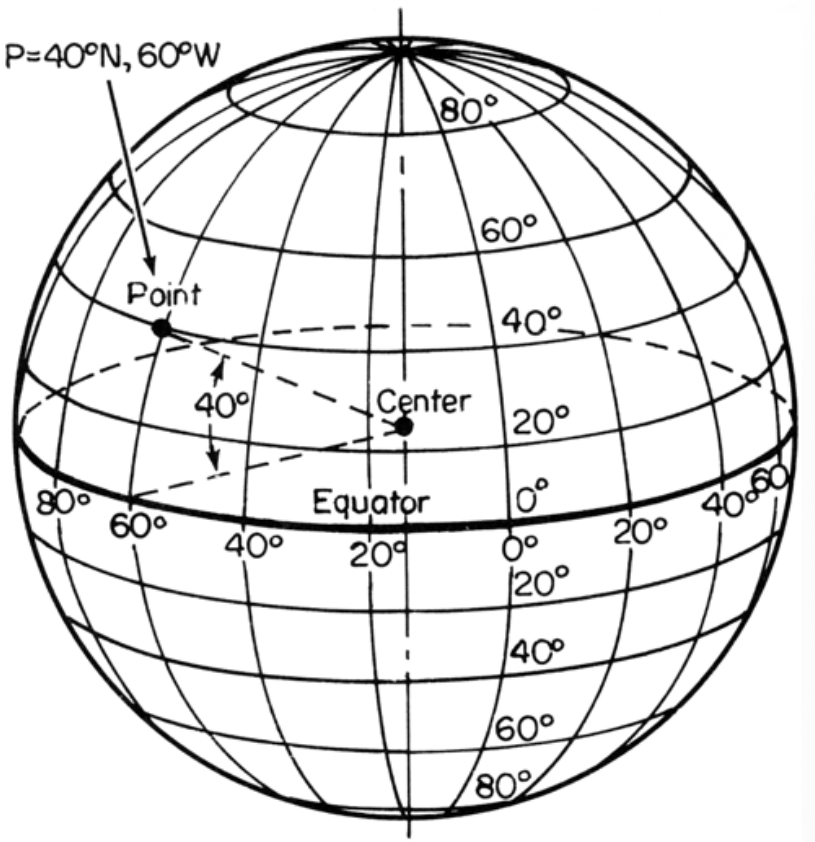
- Each app requires key
- Key obtainable at Google API console
- Must be registered user
- Generate key
- Add key to manifest
- Switch on API v2 in console

# Google Maps Android API v2

## Geolocation

### LatLng stores map data

- Units are degrees
- Ranges:
  - Longitude: 0 to +/- 180
  - Latitude: 0 to +/- 90
- One degree
  - latitude approx 111 km
  - longitude same at equator
  - zero at poles
- Accuracy decimal places:
  - Four: 11 m (Garmin 15 m)
  - Six: 11 cm
  - Seven: 11 mm



# Google Maps Android API v2

## Helpers

### Data input and manipulation

- Geolocation data input as String
- Necessary convert to & from Android **LatLng**

```
public static LatLng latLng(Context context, String geolocation)
{
  String[] g = geolocation.split(",");
  return new LatLng(Double.parseDouble(g[0]), Double.parseDouble(g[1]));
}
```

```
public static String latLng(LatLng geo)
{
  return String.format("%.6f", geo.latitude) + ", "
       + String.format("%.6f", % geo.longitude);
}
```

# Google Maps Android API v2

## Modify manifest file

- Add permissions

```
<uses-permission android:name="android.permission.INTERNET"/>
<uses-permission android:name="android.permission.ACCESS_NETWORK_STATE"/>
<uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE"/>
<!--  The following two permissions are not required to use
      Google Maps Android API v2, but are recommended. -->
<uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION"/>
<uses-permission android:name="android.permission.ACCESS_FINE_LOCATION"/>
```

- Add API key

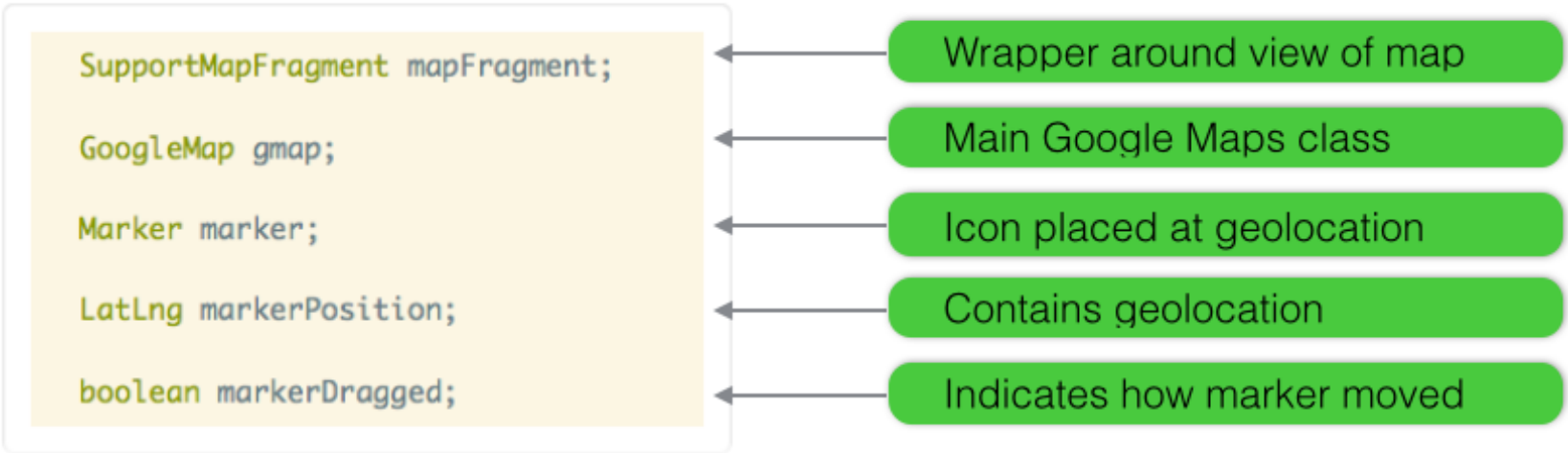
```
<meta-data
  android:name="com.google.android.maps.v2.API_KEY"
  android:value="TODO: Insert your API key here" />

<meta-data
  android:name="com.google.android.gms.version"
  android:value="@integer/google_play_services_version"/>
```

# Google Maps Android API v2

## ResidenceFragment

### Fields added to ResidenceFragment



# Google Maps Android API v2

## ResidenceFragment

Initialize map fragment in **onActivityCreated**

```
private void initializeMapFragment()
{
  FragmentManager fm = getChildFragmentManager();
  mapFragment = (SupportMapFragment) fm.findFragmentById(R.id.map);
  if (mapFragment == null)
  {
    mapFragment = SupportMapFragment.newInstance();
    fm.beginTransaction().replace(R.id.map, mapFragment).commit();
  }
}
```

# Google Maps Android API v2

## ResidenceFragment

### Implement interfaces

```
public class ResidenceFragment extends SupportMapFragment implements TextWatcher,
                                                                      OnCheckedChangeListener,
                                                                      OnClickListener,
                                                                      DatePickerDialog.OnDateSetListener,
                                                                      GoogleMap.OnMarkerDragListener,
                                                                      GoogleMap.OnCameraChangeListener
```

Listens for marker dragged

Listens for changes to map camera

# Google Maps Android API v2

## ResidenceFragment

### OnMarkerDragListener

- Three methods to implement
- Fully implement only **onMarkerDragEnd**

```
@Override
public void onMarkerDragEnd(Marker arg0)
{
  residence.geolocation = MapHelper.latLng(arg0.getPosition());
  getActivity().setTitle(residence.geolocation);
  gmap.animateCamera(CameraUpdateFactory.newLatLng(arg0.getPosition()));
  markerDragged = true;
}
```

# Google Maps Android API v2

## ResidenceFragment

### OnCameraChangeListener

- Triggered by pan, zoom . . .

```
@Override
public void onCameraChange(CameraPosition arg0)
{
  residence.zoom = arg0.zoom;
  markerPosition = MapHelper.latLng(getActivity(), residence.geolocation);
  if (marker != null)
  {
    marker.remove();
    marker = null;
  }
  MarkerOptions o = new MarkerOptions()
                    .position(markerPosition)
                    .draggable(true).title("Residence")
                    .alpha(0.7f)
                    .snippet("GPS : " + markerPosition.toString());
  marker = gmap.addMarker(o);
}
```

# Google Maps Android API v2

## ResidenceFragment

### Initialize Map when fragment starts

- Invoke in **onStart**
- Register marker & camera listeners
- Set map type (e.g. Hybrid, Terrain)
- Display map

```
private void initializeMap(LatLng markerPosition)
{
  if (mapFragment != null) {
    gmap = mapFragment.getMap();
    if (gmap != null) {
      gmap.animateCamera(CameraUpdateFactory.newLatLngZoom(markerPosition,
                         (float) residence.zoom));
      gmap.setMapType(GoogleMap.MAP_TYPE_HYBRID);
      gmap.setOnMarkerDragListener(this);
      gmap.setOnCameraChangeListener(this);
    }
  }
}
```

# Google Maps Android API v2

## ResidenceFragment

### Update Map

- When geolocation changed manually (**afterTextchanged**)
- Boolean flag used to distinguish manual geolocation changes and those caused by dragging marker.

```
private void updateMap(LatLng markerPosition)
{
  if (mapFragment != null)
  {
     gmap = mapFragment.getMap();
     if (gmap != null) {
        gmap.animateCamera(CameraUpdateFactory.newLatLngZoom(markerPosition,
                           (float) residence.zoom));
      }
    }
  }
```

# Google Maps Android API v2

## ResidenceFragment

**Geolodation data input**

- Validation introduced in MapHelper.latlng
- Disallows invalid geolocation
- try-catch block used