Android

-

mapy

Peter Borovanský
KAI, I-18
MS-Teams: 2sf3ph4, List, github
borovan 'at' ii.fmph.uniba.sk

Google Maps
- **API key, podpisovanie appky**
- ~~**V1,**~~ **V2**
- **FusedLocationAPI**
- **MarcelP – OSM, Mapbox**
- offline maps
- ploty a zábradlia (fences) ☺

Google Maps
(api key V1 & V2)

Na prácu s balíkom `com.google.android.maps.*` potrebujeme API kľúč pre Google Maps vygenerovaný pomocou SHA1 kľúča – čo je váš *finger-print*.

Google Maps verzia **V2** (pár rokov už jediná alternatíva Gmaps Verzia 2):
https://developers.google.com/maps/documentation/android/

Google Maps API-key sa generuje pomocou SHA1 kľúča, ktorý je vygenerovaný v súbore .keystore pri inštalácii Android Studio (po reinštale počítača idete s novým finger-printom!)

Dôsledok1 ☹
Ak si rebuildujete niektorý zo zverejnených kódov (mojich, či cudzích), nepôjde vám skôr:
- ako si aplikáciu nezaregistrujete v **Google Console** (vašim SHA1-kľúčom a package)
a
- vygenerovaným **API-key** z **Google Console** nepodpíšete váš build.

Dôsledok2 ☺
ak nerebuildujete project s vašim SHA1, tak .apk je ok, a pôjde vám nainštalovať aj spustiť

Získanie SHA1
viacero spôsobov

Potrebujeme získať náš SHA1 kľúč, v cmd spustíme keytool (v JRE java\bin):

keytool –v –list –alias androiddebugkey –keystore "c:\Users\\<user>\.android\debug.keystore" –storepass android –keypass android

Ten sa získa (pre účely ladenia) z (debug) .keystore file

- Windows: `c:\Users\<user>\.android\`**`debug.keystore`**

- Linux: /home/*user*/.android/

keytool –v –list –alias androiddebugkey –keystore "c:\Users\borovan\.android\debug.keystore" –storepass android –keypass android

```
C:\Users\borovan>keytool -v -list -alias androiddebugkey -keystore "c:\Users\borovan\.android\debug.keystore" -storepass andr
oid -keypass android
Alias name: androiddebugkey
Creation date: Dec 31, 2018
Entry type: PrivateKeyEntry
Certificate chain length: 1
Certificate[1]:
Owner: C=US, O=Android, CN=Android Debug
Issuer: C=US, O=Android, CN=Android Debug
Serial number: 1
Valid from: Mon Dec 31 13:47:15 CET 2018 until: Wed Dec 23 13:47:15 CET 2048
Certificate fingerprints:
     MD5:  78:CB:6A:11:66:A3:7E:2E:BE:80:DA:63:5E:53:6D:E7
     SHA1: 7A:94:75:11:DD:3D:57:                      :A0:B8:68:0F:67:F1
     SHA256: F1:FB:D3:08:6C:4C:AB:01:5D:8E:B6:FD:A4:7D:07:CE:41:90:98:86:85:BD:30:2D:40:25:91:11:C9:46:50:AB
Signature algorithm name: SHA1withRSA
```

Získanie SHA1
(v Android Studio)

Gradle

- ▼ RunTimePermissions
  - ▶ RunTimePermissions (root)
  - ▼ app
    - ▼ Tasks
      - ▼ android
        - ⚙ androidDependencies
        - ⚙ signingReport
        - ⚙ sourceSets
      - ▶ build
      - ▶ cleanup
      - ▶ help
      - ▶ install
      - ▶ other
      - ▶ verification
  - ▶ Run Configurations

1. Open Android Studio
2. Open your Project
3. Click on Gradle (From Right Side Panel, you will see Gradle Bar)
4. Click on Refresh (Click on Refresh from Gradle Bar, you will see List Gradle scripts of your Project)
5. Click on Your Project (Your Project Name form List (root))
6. Click on Tasks
7. Click on Android
8. Double Click on signingReport (You will get SHA1 and MD5 in Run Bar)
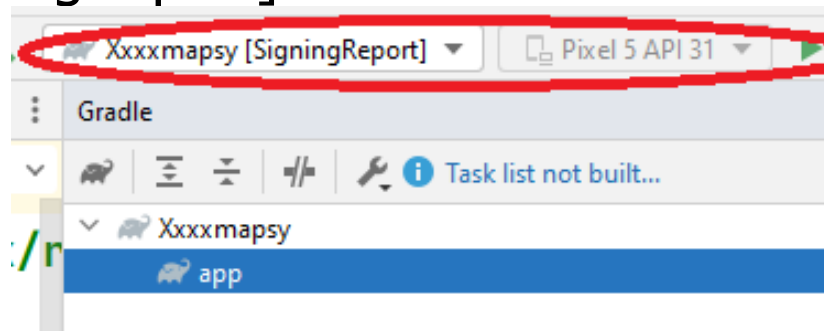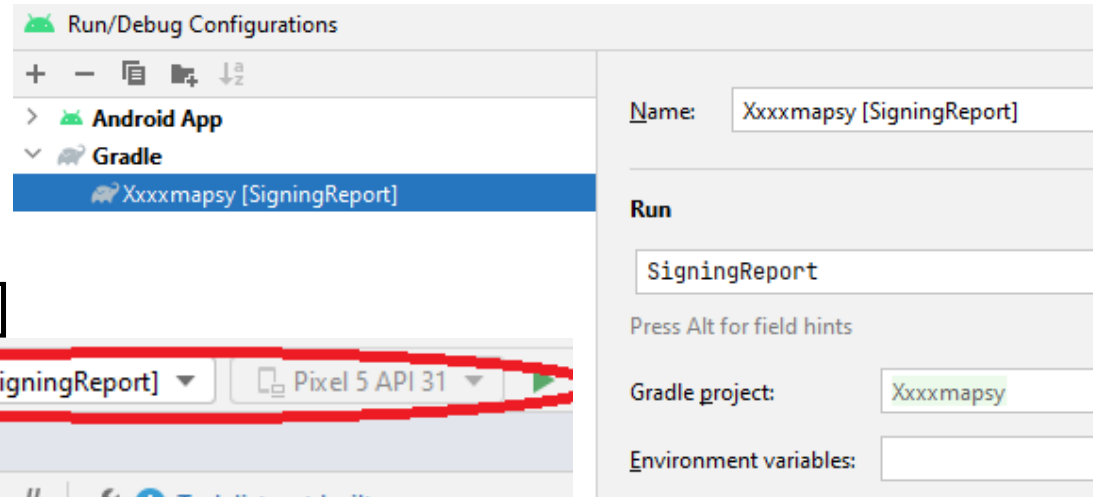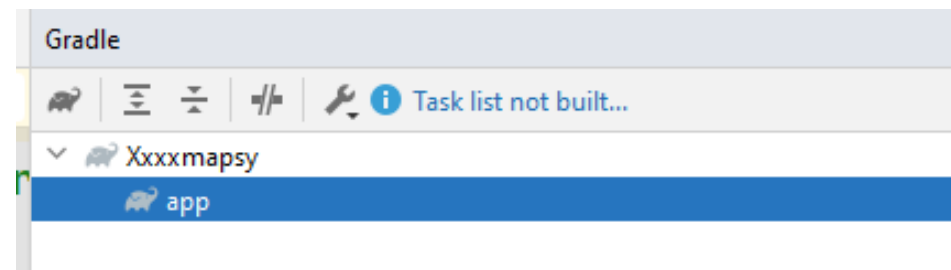9. Then click this button:
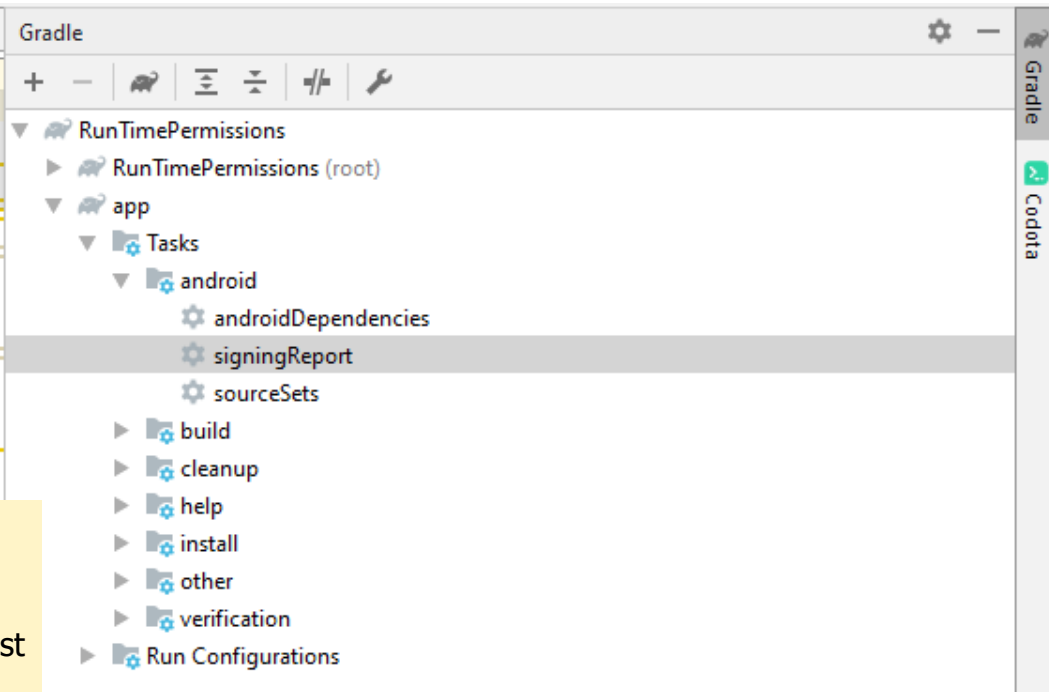
Run: RunTimePermissions:app [signingReport]

```
----------
Variant: debug
Config: debug
Store: C:\Users\borovan\.android\debug.keystore
Alias: AndroidDebugKey
MD5: 78:CB:6A:11:66:A3:7E:2E:BE:80:DA:63:5E:53:6D:E7
SHA1: 7A:94:75:11:DD:3D:57:          A0:B8:68:0F:67:F1
SHA-256: F1:FB:D3:08:6C:4C:AB:01:5D:8E:B6:FD:A4:7D:07:CE:41:90:98:86:85:BD:30:2D:40:25:91:11:C9:46:50:AB
Valid until: Wednesday, December 23, 2048
```

How to get the SHA-1 fingerprint certificate in Android Studio for debug mode?

Project:GMAPSos.zip

Signing Report
(čo ak ho nevidím)

- Edit Configuration/+/Gradle
  - Gradle Project: default
  - Run: SigningReport
  - Apply/Ok
- Run Project[SigningReport]

- už mám SHA-1 a čo s ním ? ...treba ho v Google Cloud Console

```
----------
Variant: debugAndroidTest
Config: debug
Store: C:\Users\borovan\.android\debug.keystore
Alias: AndroidDebugKey
MD5: 78:CB:6A:11:66:A3:7E:2E:BE:80:DA:63:5E:53:6D:E7
SHA1: 7A:94:75:11:DD:3D                                    F1
SHA-256: F1:FB:D3:08:6C:4C:AB:01:5D:8E:B6:FD:A4:7D:07:CE:41:90:98:86:85:BD:30:2D:40:25:91:11:C9:46:50:AB
```

Debug keystore
(manažment certifikátov)

- **debug.keystore** obsahuje jeden alebo viac privátnych kľúčov (certifikátov).
- **debug.keystore** nám automaticky vyrobí Android-Studio pri inštalácii
- Android Studio nám automaticky podpíše každú apku kľúčom debug.keystore
- vieme vygenerovať vlastný **keystore**/certifikát, pomocou `keytool`,resp.v AS
- v AS Build/Generate Signed APK https://developer.android.com/studio/publish/app-signing.html

Generovanie kľúča

- začnite v Build/Generate Signed APK
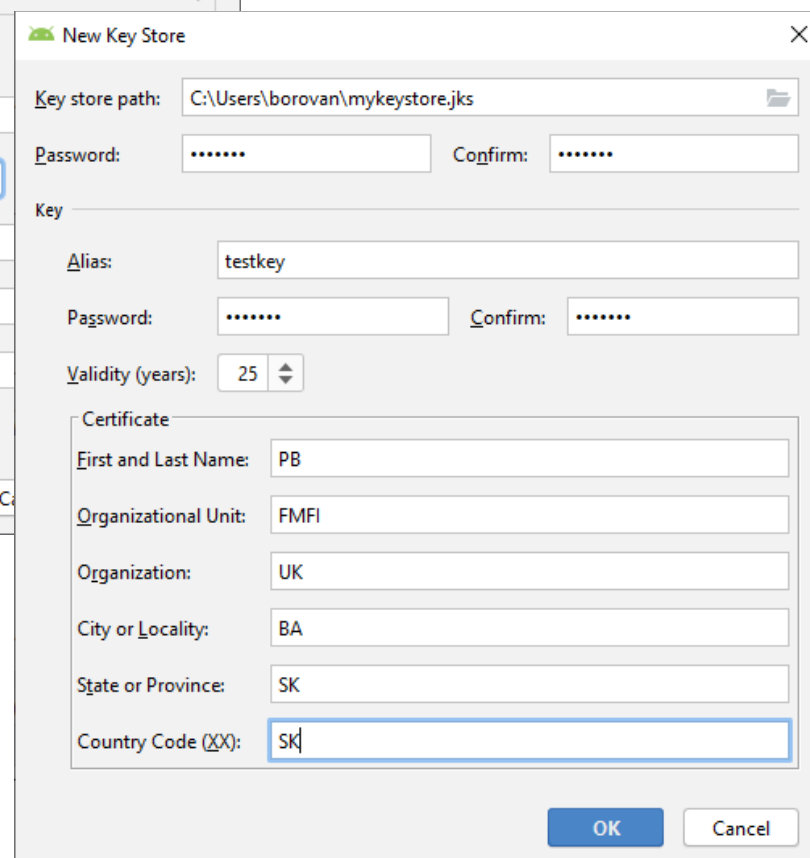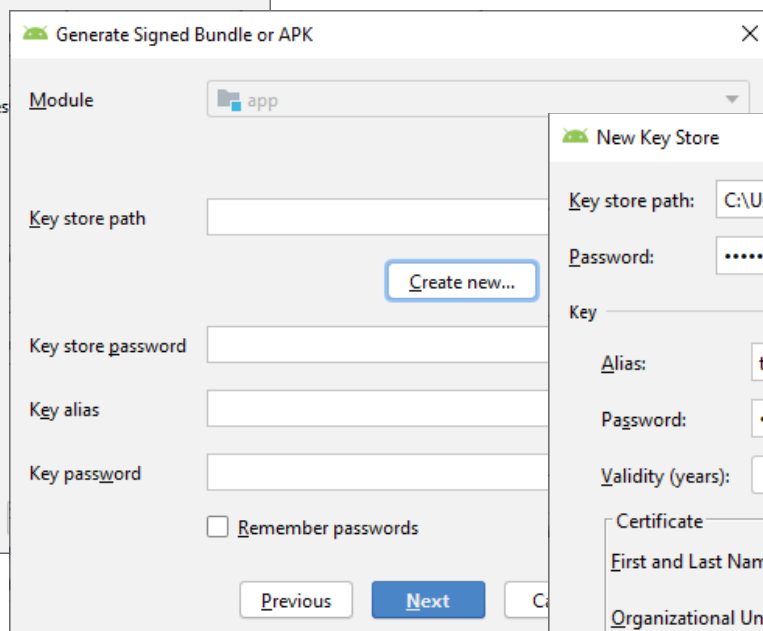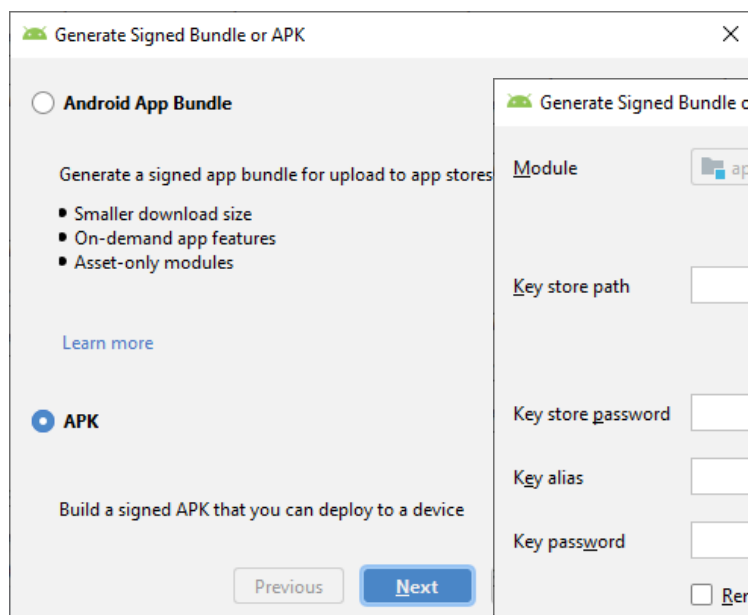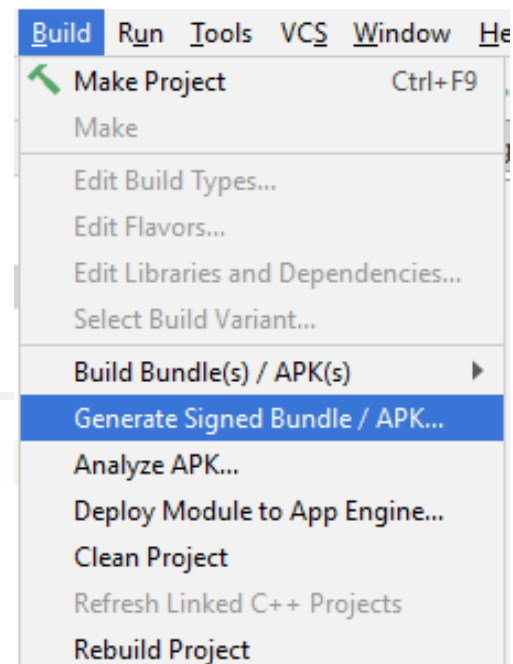
Podpisovanie aplikácie (debug)
(použitie certifikátov)

Vygenerovaný kľúč potom slúži na podpísanie .apk, napr. pomocou `jarsigner`
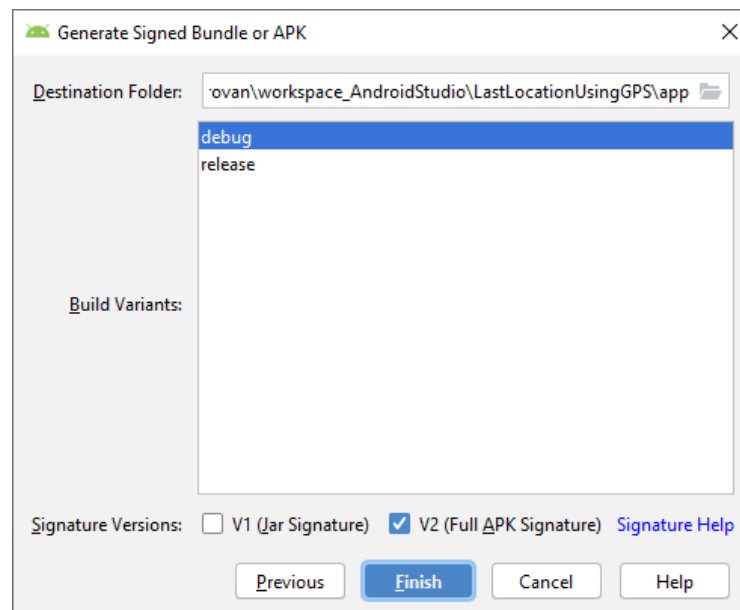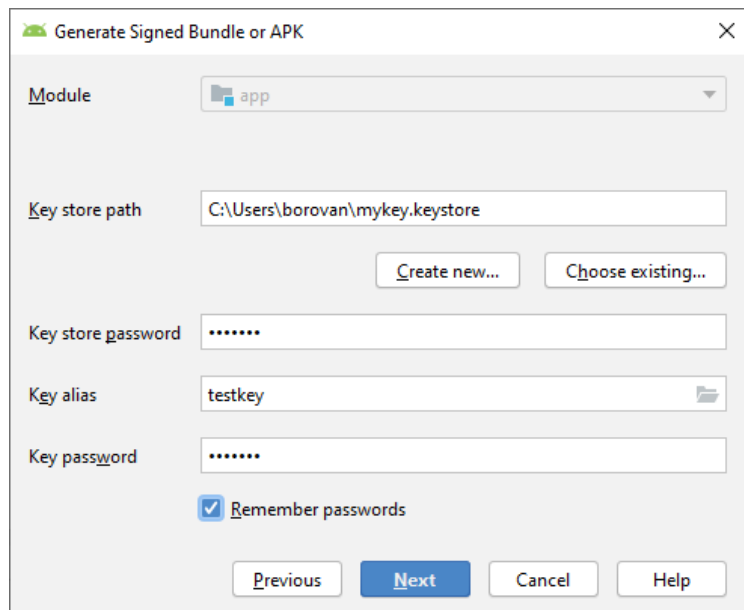
AS automaticky podpisuje .apk pri builde

Podpisovanie aplikácie (release)
(použitie certifikátov)

- Potrebujete release.keystore (návody):

https://developer.android.com/studio/publish/app-signing

https://medium.com/mindorks/upload-your-first-android-app-on-play-store-step-by-step-ee0de9123ac

- Potrebujete Google Play Account, Google Play Console:

https://play.google.com/apps/publish/signup/

Google (Play/Cloud) Console

- Nie je konzola ako konzola !!!

Google Cloud   Why Google   Solutions   Products   Pricing   Getting Started   Contact Us

https://console.cloud.google.com

https://play.google.com/console/u/0/signup

Google Play Console

(P) borovansky@gmail.com ⌄

Povedzte nám o sebe

Meno vývojára

Verejný názov vášho účtu vý
Play.

≡ Google Cloud Platform   :• My Project ▼

DASHBOARD   ACTIVITY   RECOMMENDATIONS

:• Project info

Project name
My Project

Project number
73305277898

Project ID
handy-theory-148710

ADD PEOPLE TO THIS PROJECT

→ Go to project settings

Google Maps API

Treba **dôsledne** (!!!) prejsť oficiálnym návodom:

- https://developers.google.com/maps/documentation/android-api/start

Set up the development environment

1. Android Studio Arctic Fox or later is required. If you haven't already done so, download and install it.
2. Ensure that you are using the Android Gradle plugin version 7.0 or later in Android Studio.

Create a Google Maps project in Android Studio
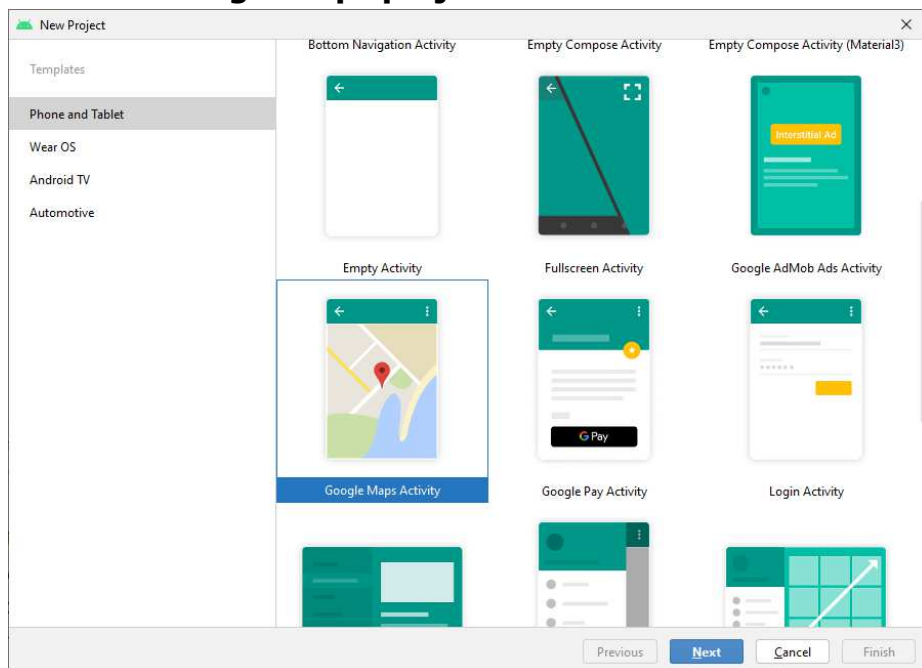
API_KEY

The AndroidManifest.xml file contains instructions on getting a Google Maps API key and then adding it to your local.properties file.
Do not add your API key to the AndroidManifest.xml file.
Doing so stores your API key less securely.
Instead, follow the instructions to create a **Cloud project** and configure an API key.

local.properties

```
sdk.dir=C:\\Users\\borovan\\AppData\\Local\\Android\\Sdk
MAPS_API_KEY=AIzaSyB31D.............XSqLKtK4SATo
```

AndroidManifest.xml

```xml
<!--
    TODO: Before you run your application, you need a Google Maps API key.

    To get one, follow the directions here:

       https://developers.google.com/maps/documentation/android-sdk/get-api-key

    Once you have your API key (it starts with "AIza"), define a new property in your
    project's local.properties file (e.g. MAPS_API_KEY=Aiza...), and replace the
    "YOUR_API_KEY" string in this file with "${MAPS_API_KEY}".
-->
<meta-data
    android:name="com.google.android.geo.API_KEY"
    android:value="${MAPS_API_KEY}" />
```

Cloud Console – Step 1

Step 1
Set up your project

Step 2
Enable APIs or SDKs

Step 3
Get an API Key

Console   Cloud SDK

1. In the Google Cloud Console, on the project selector page, click **Create Project** to begin creating a new Cloud project.

   [Go to the project selector page | ...]

2. Make sure that billing is enabled for your Cloud project. Confirm that billing is enabled for your project ☑.

   Google Cloud offers a $0.00 charge trial. The trial expires at either end of 90 days or after the account has accrued $300 worth of charges, whichever comes first. Cancel anytime. Google Maps Platform features a recurring $200 monthly credit. For more information, see Billing account credits and Billing.

How to create and attach a b...

Create & attach a billing account to a GCP pro

Google Maps Platform

G-Fa

Google™

Invoice

Invoice number: 4603377165

Google Cloud EMEA Limited
Velasco
Clanwilliam Place
Dublin 2
Ireland
VAT number: IE3668997OH

Bill to

Peter Borovansky

B

B

81105 Bratislava

Slovakia

Details

Invoice number 4603377165
Invoice date .... Oct 31, 2022
Billing ID 0195-6
Account ID .... 01C0F(

Google Cloud

Total in EUR   **€0.00**

Summary for Oct 1, 2022 - Oct 31, 2022

Subtotal in EUR	€0.00
VAT (20%)	€0.00
Total in EUR	€0.00

Poučenie z krízového vývoja

Nezadávajte číslo vašej karty skôr ako si neprečítate podmienky, resp. majte jednu „internetovú" platobnú kartu s obnosom, ktorého stratu viete poľahky prežiť

...stalo sa ...

Cloud Console – Step 2

project-level build.gradle

```
plugins {
    id 'com.google.android.libraries.mapsplatform.secrets-gradle-plugin' version '2.0.1'
apply false
}
```

// Top-level build file where you can add configuration options common to all sub-projects/modules.
```
plugins {
   id 'com.android.application' version '7.3.1' apply false
   id 'com.android.library' version '7.3.1' apply false
   id 'org.jetbrains.kotlin.android' version '1.7.20' apply false
   id 'com.google.android.libraries.mapsplatform.secrets-gradle-plugin' version '2.0.1' apply false
}
```

module-level build.gradle

```
id 'com.google.android.libraries.mapsplatform.secrets-gradle-plugin
```

```
plugins {
   id 'com.android.application'
   id 'org.jetbrains.kotlin.android'
   id 'com.google.android.libraries.mapsplatform.secrets-gradle-plugin'
}
```

local.properties

```
MAPS_API_KEY=AIzaSyB31D.............XSqLKtK4SATo
```

AndroidManifest.xml

```
<meta-data
   android:name="com.google.android.geo.API_KEY"
   android:value="${MAPS_API_KEY}" />
```

Project:GMAPApp.zip

Nepodpísana appka

E/Google Maps Android API: Authorization failure. Please see https://developers.google.com/maps/documentation/android-api/start for how to correctly set up the map.

E/Google Maps Android API: In the Google Developer Console (https://console.developers.google.com)

Ensure that the "Google Maps Android API v2" is enabled.

Ensure that the following Android Key exists:

API Key: YOUR_API_KEY

Android Application (<cert_fingerprint>;<package_name>):
7A:...........:67:F1;com.example.xxxxxgmap123

```
                         :horization failure.  Please see https://developers.google.com/maps/documentation/android-api/start for how to correctly
E/Google Maps Android API: In the Google Developer Console (https://console.developers.google.com)
    Ensure that the "Google Maps Android API v2" is enabled.
    Ensure that the following Android Key exists:
       API Key: YOUR_API_KEY
       Android Application (<cert_fingerprint>;<package_name>): 7A:94:75:11                                    :F1;com.example.xxxxxgmap123
```

Google Developer Console
(https://console.developers.google.com/)

Cloud Console – Step 3

1. Go to the Google Maps Platform/Credentials page, click Create credentials/API key.
   The API key created dialog displays your newly created API key.
2. Click Close.
3. The new API key is listed on the Credentials page under API keys.

API key created

Use this key in your application by passing it with the `key=API_KEY` parameter.

Your API key
AIza: 'OM

⚠ This key is unrestricted. To prevent unauthorized use, we recommend restricting where and for which APIs it can be used. Edit API key to add restrictions. Learn more

CLOSE

Restrict API Key

Name *
API key 18

API Key
AIzaSyAQHz1aQu_1VG2N1

Use this key in your applicatio

Creation date   N

Key restrictions
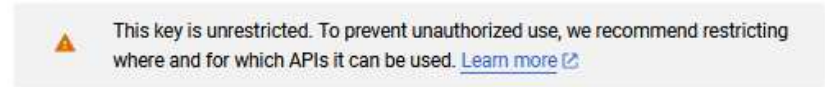
⚠️ This key is unrestricted. To prevent unauthorized use, we recommend restricting where and for which APIs it can be used. Learn more ⧉

How do I restrict my A

You can restrict an API key to
certificate fingerprint or a rele

Application restrictions

An application restriction controls which websites, IP addresses, or applications can use your API key. You can set one application restriction per key.

Debug certificate fingerpr
For Linux or macOS:

```
$ keytool -list -v -ke
    <
```

○ None
○ HTTP referrers (web sites)
○ IP addresses (web servers, cron jobs, etc.)
● Android apps
○ iOS apps

For Windows:

```
$ keytool -list -v -ke
    <
```

Restrict usage to your Android apps

Add your package name and SHA-1 signing-certificate fingerprint to restrict usage to your Android apps

Release certificate finger

```
$ keytool -list -v -ke
    <
```

,   ⌄

ADD AN ITEM

Replace your_keystore_name
including the .keystore extens
assigned to the certificate wh

API restrictions

API restrictions specify the enabled APIs that this key can call

● Don't restrict key
   This key can call any API
○ Restrict key

Restrict API Key

Application restrictions

An application restriction controls which websites, IP addresses, or applications can use your API key. You can set one application restriction per key.

- ○ None
- ○ HTTP referrers (web sites)
- ○ IP addresses (web servers, cron jobs, etc.)
- ● Android apps
- ○ iOS apps

Restrict usage to your Android apps

Add your package name and SHA-1 signing-certificate fingerprint to restrict usage to your Android apps

Edit item ⌃

Package name *
com.example.gmapapp

SHA-1 certificate fingerprint *
7A:94:75:11:DI   :F1

API Key

API key

This API key can be used in this project and with any API that supports it. To use this key in your application, pass it with the `key=API_KEY` parameter.

Creation date	Nov 6, 2016, 12:26:20 PM
Created by	borovansky@gmail.com (you)

API key

AIzaSyB6e5 [redacted] 8OEeC4QD1r8

Name

API key VMA 2016

Key restriction

Key restriction lets you specify which web sites, IP addresses, or apps can use this key. Learn more

- ( ) None
- ( ) HTTP referrers (web sites)
- ( ) IP addresses (web servers, cron jobs, etc.)
- (•) Android apps
- ( ) iOS apps

Restrict usage to your Android apps (Optional)

Add your package name and SHA-1 signing-certificate fingerprint to restrict usage to your Android apps

Get the package name from your AndroidManifest.xml file. Then use the following command to get the fingerprint:

```
$ keytool -list -v -keystore mystore.keystore
```

Package name	SHA-1 certificate fingerprint	
pokus.example.com.myapplicationx	05:0F:34:5E:FD:E [redacted] 6:8E:57:A2:80:1C:D1:91	✕
pokus.example.com.gmapv2	05:0F:34:5E:FD:E [redacted] 6:8E:57:A2:80:1C:D1:91	✕
com.example.mapdemo	05:0F:34:5E:FD:E [redacted] 6:8E:57:A2:80:1C:D1:91	✕

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☰ Google Cloud Platform ⠿ GMaps2018 ▾

API	APIs & Services	📌	>		Pro
				Dashboard	
👤	Support		>	Library	
👤	IAM & admin		>	Credentials	

Project info

Project name
GMaps2018

Project ID
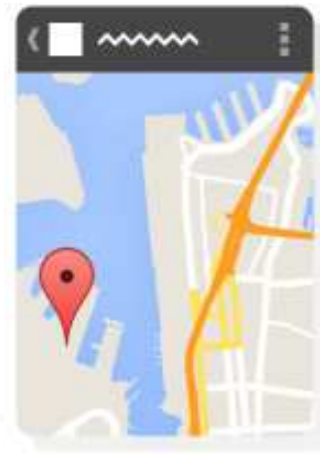gmaps2018-223015

Project number
294916644121

→ Go to project settings

API key pre Google Maps sa prideľuje
pre dvojicu, alebo niekoľko dvojíc,
(package name, SHA1-v prostredí, kde kompilujete)

Maps v Android Studio

... bolo v roku 2021 ...

Google Maps Activity

- inštalujte the <u>Google Play services SDK</u>

- vytvorte a Google Maps projekt

  File/New/New Project/**Google Maps Activity**

- získajte a Google Maps API key

  čítajte komentár a klinite na link v google_maps_api.xml

- vygenerujete link priamo do Google Developers Console

https://console.developers.google.com/flows/enableapi?apiid=maps_android_backend&key Type=CLIENT_SIDE_ANDROID&r=7A:94:75:11:DD:3D:57:█████████████████13:A0:B8:68:0F:67: F1%3Bcom.example.gmapfirstapp

- nakopírujte vygenerovaný Google Maps API key

  do súboru google_maps_api.xml

```
<resources>
    <string name="google_maps_key" translatable="false"
      templateMergeStrategy="preserve">
        YOUR_KEY_HERE            ← AIzaSyC-_5QmNIi0v7favcJCfVZBQxl9RgcZKVM
    </string>
</resources>
```

- skompilujte (čakajte............)/pustite projekt

Gradle build finished in 1m 48s 700ms
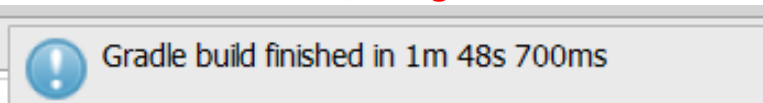
podľa builingtools buildToolsVersion v gradle

Najčastejšie chyby s GMapsAPI

(jemne serioznejší pohľad)

http://ddewaele.github.io/GoogleMapsV2WithActionBarSherlock/part6

Beware of Map API key caching

ak package name, zmenu aplikujte aj na Google Console

ak zmeníte API key/package name, radšej odinštalujte starú verziu m-appky,
nainštalujte opäť novú, API kľúč môže byť nacachovaný...

Ak u seba prekompilujete (napr. moju) m-appku, tak nepôjde...

musíte jej vygenerovať API key zodpovedajúci vášmu SHA1

Failing to provide the correct map permissions, API Key

najčastejšie sa vám nezobrazí mapa, okopírujte potrebné permissions napr. zo
súboru, resp. iného, čo funguje

https://github.com/ddewaele/GoogleMapsV2WithActionBarSherlock/blob/master/GoogleMapsV2WithActionBarSherlock/AndroidManifest.xml

```
E/Google Maps Android API: Authorization failure.  Please see
https://developers.google.com/maps/documentation/android-api/start for how to correctly set up the map.
E/Google Maps Android API: In the Google Developer Console (https://console.developers.google.com)
    Ensure that the "Google Maps Android API v2" is enabled.
    Ensure that the following Android Key exists:
```

Najčastejšie chyby s GMapsAPI
(jemne serioznejší pohľad)

http://ddewaele.github.io/GoogleMapsV2WithActionBarSherlock/part6

API key problem

váš package name-SHA1-GMAPS_API_Key musia súvisieť cez Google Console:

- Binary XML file line #2: Error inflating class fragment
- Caused by: java.lang.RuntimeException: API key not found. Check that
- Google Maps Android API(4040): Failed to contact Google servers.

Zlé SDK

java.lang.RuntimeException: Unable to start activity

ComponentInfo{com.ecs.google.maps.v2.actionbarsherlock/com.ecs.google.maps.v2.simple.SimpleMapActivity}:

android.view.InflateException: Binary XML file line #2: Error inflating class fragment at android.app.ActivityThread.performLaunchActivity(ActivityThread.java:1651)

A mnohé iné problémy

http://ddewaele.github.io/GoogleMapsV2WithActionBarSherlock/part6

Gmap a emulator 2022

android.system.ErrnoException: open failed: ENOENT (No such file or directory)

known issue

- https://issuetracker.google.com/issues/228091313

V úspešnom prípade
(v Android Studiu)

Ak sa všetko podarí, dostanete Layout s **SupportMapFragmentom**, a zobrazí sa mapa

```kotlin
class MapsActivity : AppCompatActivity(), OnMapReadyCallback {
    private lateinit var mMap: GoogleMap
    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        setContentView(R.layout.activity_maps) -- obsahuje Map fragment
        val mapFragment = supportFragmentManager
                .findFragmentById(R.id.map) as SupportMapFragment
        mapFragment.getMapAsync(this) -- otvorenie Gmaps chvíľku trvá
    } -- keď sa naložia, zavolá sa callback onMapReady v tejto triede

    override fun onMapReady(googleMap: GoogleMap) { -- tu začína život m-appky
        mMap = googleMap                -- referenciu na Gmapu si odložíme
        // Add a marker in Sydney and move the camera
        val sydney = LatLng(-34.0, 151.0)              -- Sydney
        mMap.addMarker(MarkerOptions()                 -- balónik
            .position(sydney)
            .title("Marker in Sydney"))
        mMap.moveCamera(CameraUpdateFactory.newLatLng(sydney))
}
```

Layout s MapFragmentom


```xml
<fragment
    xmlns:android=http://schemas.android.com/apk/res/android
    xmlns:map=http://schemas.android.com/apk/res-auto
    xmlns:tools=http://schemas.android.com/tools
    android:id="@+id/map"
    android:name="com.google.android.gms.maps.SupportMapFragment
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context="pokus.example.com....MapsActivity" />
```

typy mapových podkladov:

```
mMap.setMapType(
    GoogleMap.MAP_TYPE_SATELLITE)
    GoogleMap.MAP_TYPE_HYBRID)
    GoogleMap.MAP_TYPE_TERRAIN)
    GoogleMap.MAP_TYPE_NORMAL)
    -- pre offline mapy (zložitejšie)
    GooglemMap.MAP_TYPE_NONE)
```


Project:GMAPApp.zip

Permissions

- **AndroidManifest.xml**

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

- Žiadanie povolenia v runtime

```kotlin
val permission = ActivityCompat.checkSelfPermission(this,
                        Manifest.permission.ACCESS_FINE_LOCATION)
if (permission == PackageManager.PERMISSION_GRANTED) {
    mMap.isMyLocationEnabled = true
} else {
    requestPermissions(
        arrayOf(Manifest.permission.ACCESS_FINE_LOCATION),
        LOCATION_REQUEST_CODE)
}
```

- Callback

```kotlin
override fun onRequestPermissionsResult(requestCode: Int,
        permissions: Array<String>, grantResults: IntArray) {
    when (requestCode) {
        LOCATION_REQUEST_CODE -> { ....
```

Project:GMAPApp.zip

Elementy Gmap API

- **MapView : View**, ktorá vie zobraziť Gmaps

- **SupportMapFragment:Fragment** - môže byť umiestnený v rámci fragmentu

- **GoogleMap** – hlavná trieda sa vytvorí s vytvorením MapView, SupportMF

- **Marker** – ikona na mape definovaná polohou latitude+longitude

- **Shapes** – útvary, napr. Polyline (lomená čiara), Polygon (n-uholník)

- **UiSettings** – nastavenie užívateľského rozhrania, napr. zoom-level, ...

- **Overlays -** vrstvy

- My Location – ak je povolená, zobrazuje sa button MyLocation, ktorý vycentruje mapu podľa aktuálnej polohy

https://developers.google.com/maps/documentation/android-sdk/groundoverlay

Marker/MarkerOptions

```
                              // zobrazí moju polohu
mMap.isMyLocationEnabled = true        // button na mape
val mff = LatLng(48.151901, 17.068422) // cache z prémie
val MFF = mMap.addMarker(MarkerOptions()
    .position(mff)          // žiadne 1E6,ale slušná trieda LatLng
    .icon(BitmapDescriptorFactory  // ikona markera
            .fromResource(R.drawable.andro_cube))
    .draggable(true)        // vieme marker posúvať
    .alpha(0.5f)            // 0=transparent, 1=nontransparent
    .flat(true)             // marker sa nezoomuje s mapou
    .title("MFF")           // popis markera
    .anchor(0.0f, 1.0f)     // pozícia ikony relatívne k position
    .snippet("Kockáči")     // popis
    .rotation(90.0f)        // natočenie
)
```

Camera

```kotlin
mMap.isBuildingsEnabled = true

mMap.moveCamera(CameraUpdateFactory.newLatLngZoom(mff, 6))

mMap.animateCamera(CameraUpdateFactory.zoomIn()) //zoomOut

mMap.animateCamera(CameraUpdateFactory.zoomTo(13),2000,null)


val cameraPosition = CameraPosition.Builder()
    .target(mff)          // kamera nasmerovaná na cieľ
    .zoom(17)             // finálny zoom level
    .bearing(90)          // azimut kamery, 90=východ
    .tilt(30)             // horizontalne natočenie 30-90
    .build()
mMap.animateCamera(
    CameraUpdateFactory.newCameraPosition(cameraPosition))
```
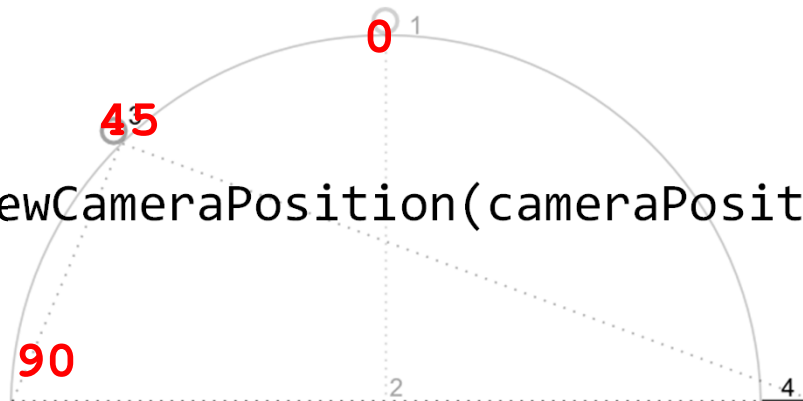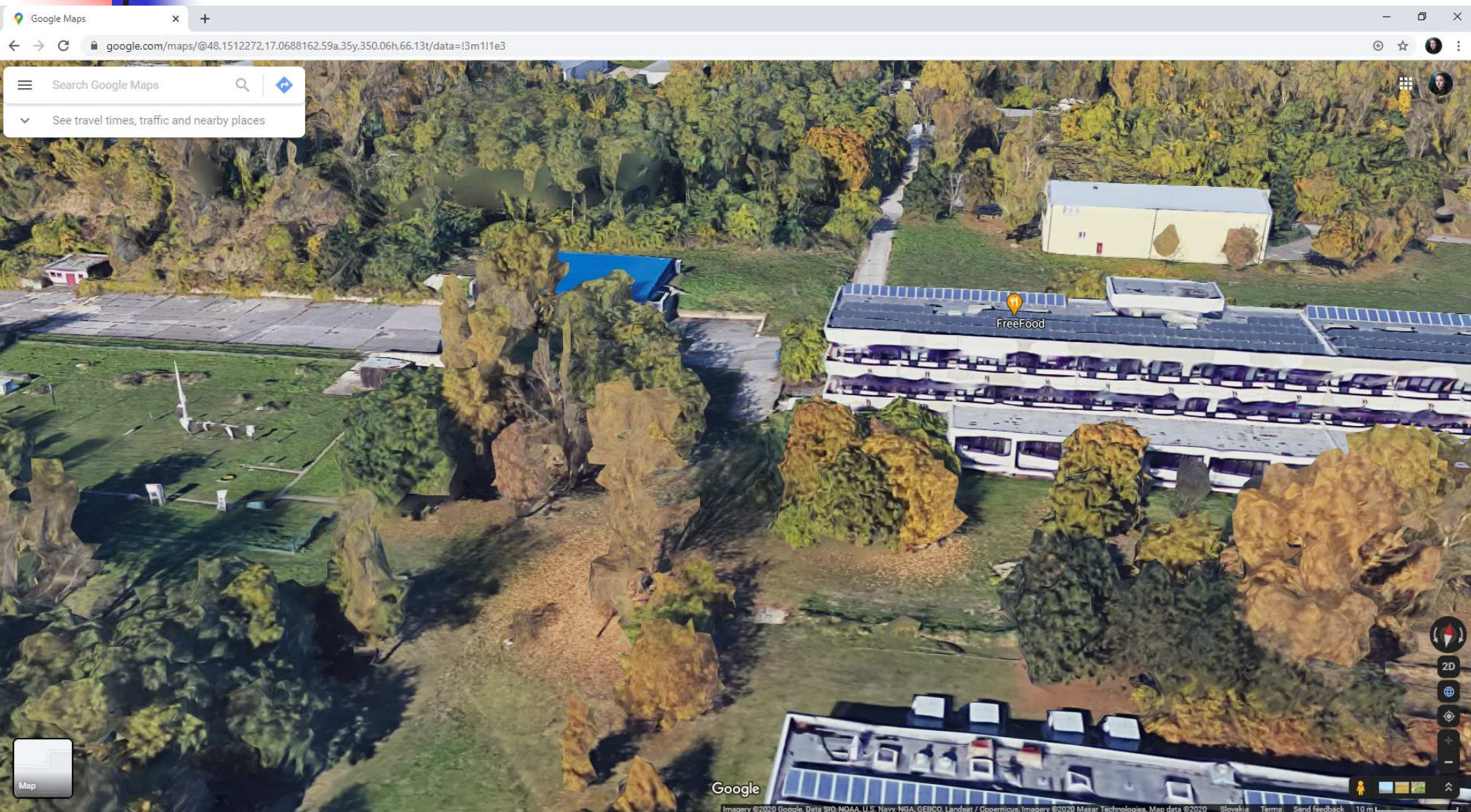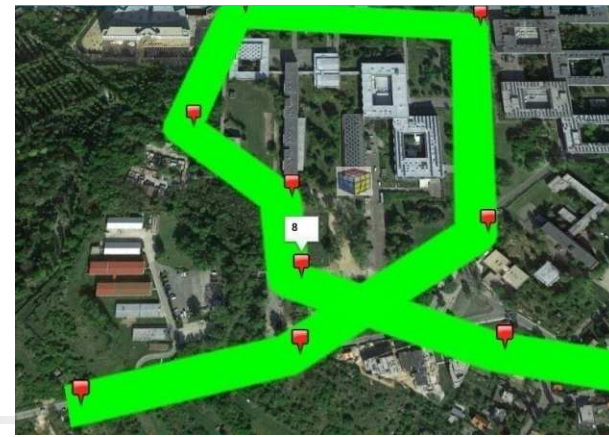
Porovnanie: ESB vs. FMFI

Keška MFF

onMapClick, PolyLine


```
clickedLine = mMap.addPolyline(PolylineOptions())
                              // ak chceme klikať do mapy

mMap.setOnMapClickListener {
    latlng ->   // onClickListener – nefunguje pri satelitných m.
        val clickedPoints = clickedLine.points
        clickedPoints.add(latlng)
        clickedLine.points = clickedPoints
        clickedLine.color = ...
        clickedLine.width = ...

        mMap.addMarker(MarkerOptions()
          .title("" + clickedPoints.size())
          .icon(BitmapDescriptorFactory
              .fromResource(R.drawable.marker))
          .position(latlng))
```
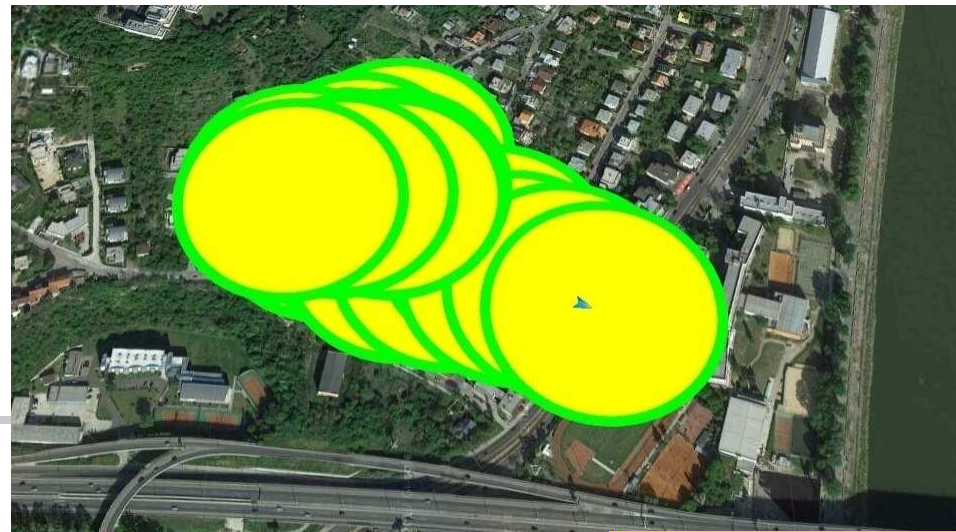

Project:GMapV2.zip

GPS Location

(prvá možnosť - GPS)

Použijeme `LocationManager`, ako v minulej prednáške, a `LocationListener`

```kotlin
override fun onLocationChanged(loc:Location) {
  val latlng = LatLng(loc.getLatitude(), loc.getLongitude())
  val circle = mMap.addCircle(CircleOptions(latlng)
        .center()
        .radius(15)            // polomer kruhu v metroch
        .strokeColor(Color.GREEN)
        .fillColor(Color.YELLOW))
  circle.setZIndex((float)System.currentTimeMillis()) }
```

```kotlin
val bounds =                    // ak si mimo...
      mMap.getProjection().getVisibleRegion().latLngBounds
if(!bounds.contains(latlng))   // preanimuj na novú polohu
  mMap.animateCamera(CameraUpdateFactory.newLatLng(latlng)
```

uiSettings

```
map.uiSettings
        .isMyLocationButtonEnabled
        .isCompassEnabled
        .isRotateGesturesEnabled
        .isScrollGesturesEnabled
        .isScrollGesturesEnabledDuringRotateOrZoom
        .isZoomGesturesEnabled
        .isTiltGesturesEnabled
        .isMapToolbarEnabled
```

LocationServices API
(Fused Location API)

Iná možnosť, ako získať poslednú polohu na vyššej úrovni ako od GPS senzora

- neriešite location providera (GPS/NETWORK/wifi),
- vysoká presnosť, nízka spotreba baterky,
- ale používajú Google Play Services, do build.gradle doplníte:

```
dependencies {
    implementation 'com.google.android.gms:play-services-location:18.0.0'
    implementation 'com.google.android.gms:play-services-maps:18.0.0'
}
```

- `import com.google.android.gms.*…`

- `fusedLocationProviderClient =`
  `LocationServices.getFusedLocationProviderClient(this@MapsActivity)`

- ```
  locationCallback = object : LocationCallback() {
      override fun onLocationResult(locationResult: LocationResult) {
          for (location in locationResult.locations) { // pri zmene polohy
              ...   location je aktuálna poloha
          }
      } }
  ```

Project:GMapSOS.zip

Fused Location API

(onResume, onPause)

```kotlin
override fun onResume() {
    super.onResume()
    val interval = (10 * 1000).toLong()        // 10 seconds, in milliseconds
    val fastestInterval = (1 * 1000).toLong()  // 1 second, in milliseconds
    val minDisplacement = 0f

    // Create the LocationRequest object
    val mLocationRequest = LocationRequest.create()       // criteria
        .setPriority(LocationRequest.PRIORITY_BALANCED_POWER_ACCURACY)
        .setInterval(interval)          -- ako často chceme update polohy
        .setFastestInterval(fastestInterval) -- ako často vieme spracovať update
                    polohy-pre prípad, že iná apka intenzívnejšie používa GPS
        .setSmallestDisplacement(minDisplacement)

    fusedLocationProviderClient.requestLocationUpdates(
        mLocationRequest,
        locationCallback,
        Looper.getMainLooper())
}
override fun onPause() {
    super.onPause()
    fusedLocationProviderClient.removeLocationUpdates(locationCallback)
}
```

> LocationRequest.*PRIORITY_HIGH_ACCURACY* ~GPS
> LocationRequest.PRIORITY_BALANCED_POWER_ACCURACY; ~100m,block
> LocationRequest.PRIORITY_LOW_POWER;   ~ 10km,mesto
> LocationRequest.PRIORITY_NO_POWER; berie polohu od iných klientov

Project:GMapSOS.zip

Fused Location API
(LocationCallback)

```kotlin
locationCallback = object : LocationCallback() {
                                // pri zmene polohy podľa LocationRequest
  override fun onLocationResult(locationResult: LocationResult) {
    for (location in locationResult.locations){
      Log.w(TAG, "onLocationResult= ${location?.latitude}, ${location?.longitude}")
      val savedLastLocation = LatLng(location.latitude, location.longitude)
      val options = MarkerOptions()
                          .position(savedLastLocation)
                          .title("I am here!")
    mMap.addMarker(options)
    mMap.animateCamera(CameraUpdateFactory.newLatLngZoom(savedLastLocation, 15f))
    }
  }
}

binding.sendSosBTN.setOnClickListener {
    val sendIntent = Intent(Intent.ACTION_VIEW)
    sendIntent.data = Uri.parse("sms:")
    sendIntent.putExtra("sms_body",
        "My location at \nLatitude: ${savedLastLocation.latitude} \n" +
                "Longitude: ${savedLastLocation.longitude}")
    startActivity(sendIntent)
}
```

Project:GMapSOS.zip

Poloha vs. poloha

Priority	Typical location update interval	Battery drain per hour (%)	Accuracy
HIGH_ACCURACY	5 seconds	7.25% **~1/14**	~10 meters
BALANCED_POWER	20 seconds	0.6%	~40 meters
NO_POWER	N/A	small	~1 mile

Demo pre inšpirácie
(kód je v jave)

https://github.com/googlesamples/android-play-location

GMapsAPI

Basic Map
Launches a map.

Camera
Demonstrates camera functions.

Camera Clamping
Demonstrates how to constrain the camera to specific boundaries and zoom levels.

Circles
Demonstrates how to add Circles to a map.

Events
Demonstrates event handling.

Ground Overlays
Demonstrates how to add a GroundOverlay to a map.

Indoor
Demonstrates how to use the Indoor API.

Layers
Demonstrates the different map layers.

Lite Mode
Demonstrates some features on a map in lite mode.

Lite Mode ListView
Demonstrates using maps in lite mode in a ListView.

Location Source Demo
Demonstrates how to use a custom location source.

Map In Pager
Demonstrates how to add a map to a ViewPager.

Markers

GMapsAPI

Demonstrates how to save the state of a MapFragment upon rotation of the device.

Snapshot
Demonstrates how to take a snapshot of the map.

Street View Panorama and Map
Demonstrates how to show a Street View panorama and map.

Street View Panorama
Standard Street View Panorama using a Fragment.

Street View Panorama events
Standard Street View Panorama with event handling.

Street View Panorama navigation
Street View Panorama with programmatic navigation.

Street View Panorama options
Street View Panorama with toggles for options.

Street View Panorama View
Standard Street View Panorama using a View.

Styled Map
Demonstrates how to style a map.

Tile Coordinate Overlay
Demonstrates how to add a tile overlay with tile coordinates to a map.

Tile Overlays
Demonstrates how to add a tile overlay to a map.

UI Settings
Demonstrates how to alter user interface settings.

Visible Regions
Demonstrates how to use Visible Regions.

Project:ApiDemos.zip

Break – Marcel Mapbox/OSM

GoogleSignIn

```kotlin
val gso = GoogleSignInOptions.Builder(GoogleSignInOptions.DEFAULT_SIGN_IN)
    .requestEmail()
    .build()

// Build a GoogleSignInClient with the options specified by gso.
val mGoogleSignInClient = GoogleSignIn.getClient(this, gso)
// Set the dimensions of the sign-in button.
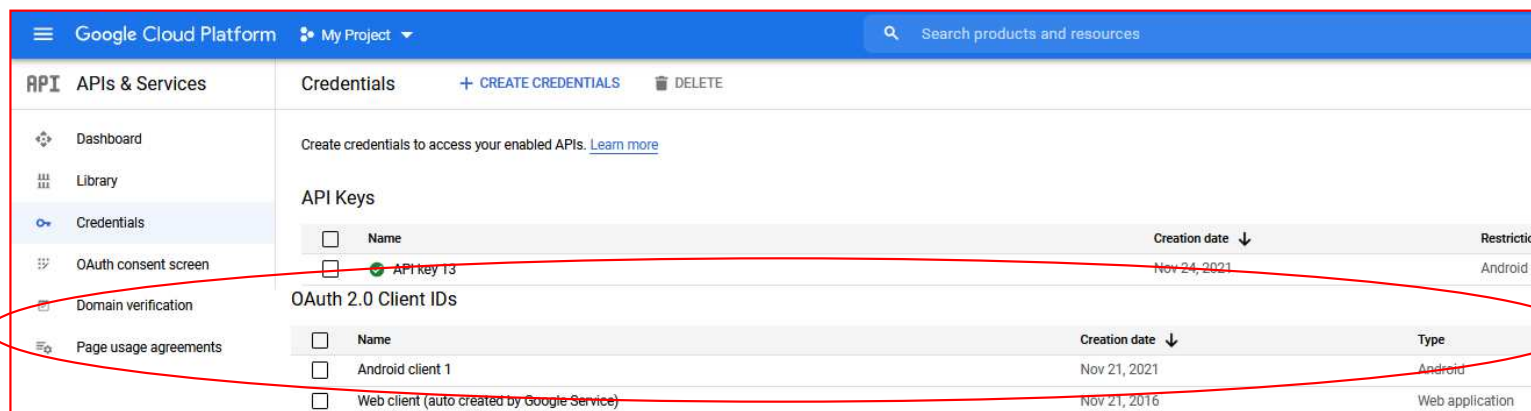sign_in_button.setSize(SignInButton.SIZE_STANDARD)
sign_in_button.setOnClickListener {
    val signInIntent = mGoogleSignInClient.signInIntent
    startActivityForResult(signInIntent, SIGN_IN_REQUESTCODE)
}
val mGoogleApiClient = mGoogleSignInClient.asGoogleApiClient()
```


GMapsSignIn.zip

GoogleSignIn

```kotlin
override fun onActivityResult(requestCode : Int, resultCode : Int, data : Intent?) {
    super.onActivityResult(requestCode, resultCode, data)

    if (requestCode == SIGN_IN_REQUESTCODE) {
        // The Task returned from this call is always completed, no need to attach
        // a listener.
        val task : Task<GoogleSignInAccount> =
                GoogleSignIn.getSignedInAccountFromIntent(data)
        handleSignInResult(task)
    }  }
private fun handleSignInResult(completedTask: Task<GoogleSignInAccount>) {
    try {
        val account = completedTask.getResult(ApiException::class.java)
        Log.w(TAG, "signInResult:success account= ${account.displayName}")
    } catch (e: ApiException) {
        Log.w(TAG, "signInResult:failed code=" + e.statusCode)
    }
}
```

GMapsSignIn.zip

Poloha vs. Poloha
(a máme dve polohy)

- android.location.LocationListener.onLocationChanged(Location)
- com.google.android.gms.location.LocationListener.onLocationChanged(...)

Dokumentácia hovorí:

> The Google Play services location APIs are preferred over the Android framework location APIs (android.location) as a way of adding location awareness to your app. If you are currently using the Android framework location APIs, you are strongly encouraged to switch to the Google Play services location APIs as soon as possible.

FusedLocationProvider „fúzuje"=integruje všetky druhy určenia polohy:
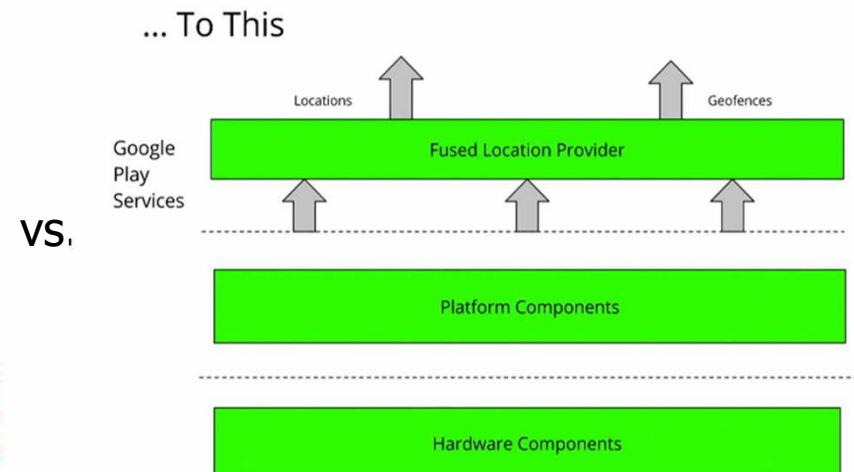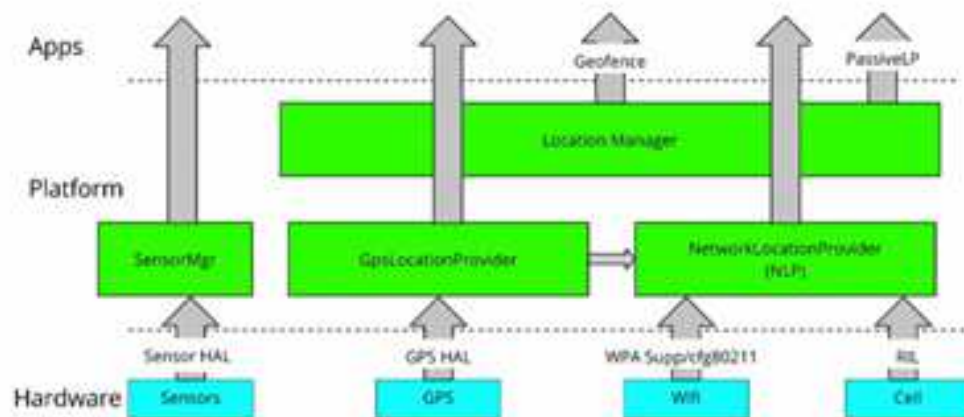
Poloha a mockovanie
(LocationClient)

FusedLocation a mocking

- android.location – bez problémov
- LocationClient – dalo sa
- com.google.android.gms.location - ??? asi nejde …

---

public class   Summary: Nested Classes | Constants | Ctors | Methods | Inherited Methods | [Expand All]

LocationClient

extends Object

implements GooglePlayServicesClient

java.lang.Object
 ↳com.google.android.gms.location.LocationClient

This class is deprecated.
Use `LocationServices`.

---

void	setMockLocation (Location mockLocation)
	Sets the mock location to be used for the location provider.
void	setMockMode (boolean isMockMode)
	Sets whether or not the location provider is in mock mode.

Geofencing
ploty a zábradlia

- detekuje vchod/východ/trvanie v oblasti, ktorá môže expirovať=zmiznúť
- AndroidManifest.xml:

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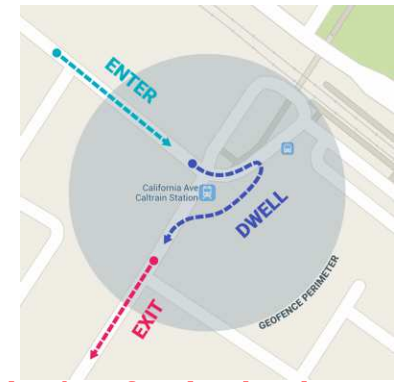<uses-permission android:name="android.permission.ACCESS_FINE_LOCATION"/>
<application
    <service android:name=".GeofenceTransitionsIntentService"/>
<application/>
```

Kruhová ohrada (zoznam ohraničený na 100 oblastí):

```
mGeofenceList.add(
    Geofence.Builder()
        .setRequestId(entry.getKey())
        .setCircularRegion(entry.getValue().latitude,
                           entry.getValue().longitude,
                Constants.GEOFENCE_RADIUS_IN_METERS)
        .setExpirationDuration(Constants.GEOFENCE_EXPIRATION_IN_MILLISECONDS)
        .setTransitionTypes(Geofence.GEOFENCE_TRANSITION_ENTER |
                    Geofence.GEOFENCE_TRANSITION_EXIT)
        .build())
```

Detekcia aktivity

(ActivityRecognition.API)

```
= GoogleApiClient.Builder(context)
        .addApi(ActivityRecognition.API)
        .addConnectionCallbacks(this)
        .addOnConnectionFailedListener(this)
        .build()
```

Metódy:

`.getType()-IN_VEHICLE/ON_BICYCLE/ON_FOOT/RUNNING/STILL/WALKING/…`

`.getConfidence()  0..100`

```
D/ActivityRecogition: onConnected
E/ActivityRecogition: onHandleIntent
E/ActivityRecogition:  Still: 100
E/ActivityRecogition: onHandleIntent
E/ActivityRecogition:  Still: 100
E/ActivityRecogition:  On Foot: 92
E/ActivityRecogition:  Running: 87
E/ActivityRecogition:  On Bicycle: 8
E/ActivityRecogition:  Walking: 5
```

Project:ActivityRecognition.zip

Detekcia aktivity
(ActivityRecognition.API)

```java
Intent intent =
    new Intent(this,ActivityRecognizedIntentService.class );
PendingIntent pendingIntent =
    PendingIntent.getService(this,0,intent,
    PendingIntent.FLAG_UPDATE_CURRENT );
ActivityRecognition.ActivityRecognitionApi
    .requestActivityUpdates( mApiClient, 1000, pendingIntent );

public class ActivityRecognizedIntentService extends IntentService {
    protected void onHandleIntent(Intent intent) {
    if(ActivityRecognitionResult.hasResult(intent)) {
      ActivityRecognitionResult result =
      ActivityRecognitionResult.extractResult(intent);
      String act = "";
      for(DetectedActivity activity:result.getProbableActivities()){
        switch( activity.getType() ) {
          case DetectedActivity.IN_VEHICLE: {
            act += " In Vehicle: " + activity.getConfidence();
            break;
```