

# Android - Firebase



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# Kam (inam) uložiť naše dáta

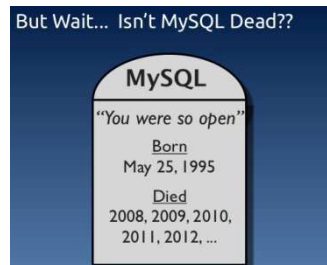
bolo:

- máme vlastný server – protokol najčastejšie http-https
  - najčastejšie (v bakalárkach) AMP – Apache-MySQL-PHP, prip. java-servlets
  - tak trochu doba minulá...

[LinuxDays 2017:](#)

[MySQL sežere Vaše data](#)

[David Karban](#)



W - Windows  
A - Apache  
M - MySQL  
P - PHP  
WAMP - Server

bude:

- cloudové úložiská a ich služby
  - Relačné - tabuľkovo orientované
    - [Parse.com](http://parseplatform.org/) -> <http://parseplatform.org/> (Facebook)
  - nosql – json
    - [firebase.com](https://firebase.com) (Google)





Parse + **facebook**

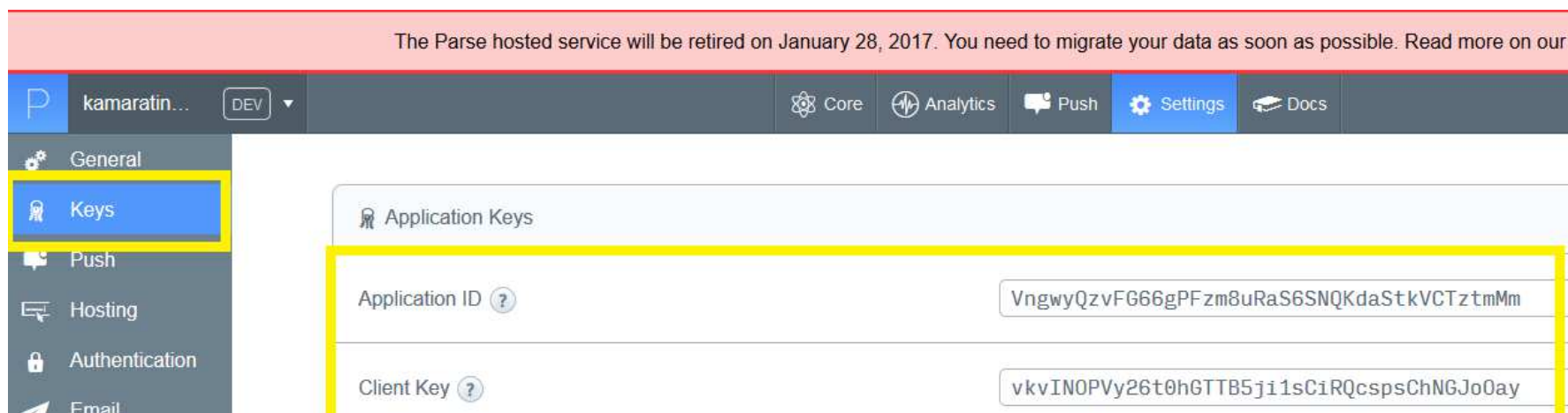
# Parse vs. Parse Server

- API pre komunikáciu mobilných/web aplikácií, ukladanie/zdieľanie dát
- podporoval PUSH notifikácie pomocou Google Cloud Messaging (GCM) vaša aplikácia dostane notifikáciu zo servera, ak iný užívateľ vyvolá event

Parse.com kúpený FB 2013 (free) končí v 2017 ☹

Ponúka migráciu na open-source Parse Server

- s veľmi podobným API 😊           
- na vlastnom serveri, s infraštruktúrou Node.js + MongoDB + Python



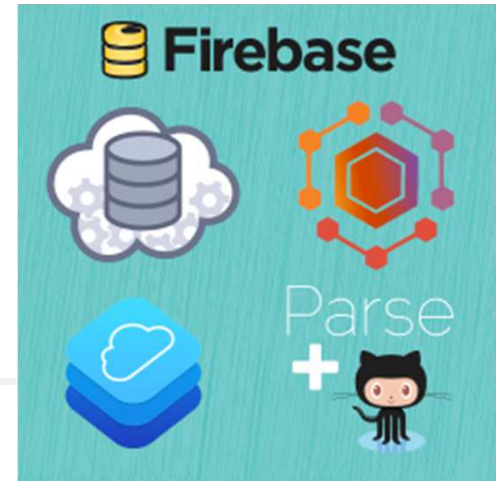
# Alternatívy

(k Parse Server)

Veci zadarmo sú (často) síce najlepšie, ale zase pomíjivé.

Treba pozrieť konkurenciu:








- Google datastore API – iOS, Android, JS, PHP, ...  
<https://cloud.google.com/solutions/mobile/>
- Amazon AWS – iOS, Android, Web, ReactNative, ...  
<https://aws.amazon.com/amplify/>
- MS Azure Mobile App SDK – iOS, Android, Xamarin, Cordova, ...  
<https://docs.microsoft.com/en-us/azure/app-service-mobile/app-service-mobile-android-how-to-use-client-library>
- Firebase – iOS, Android, Flutter, Web, ...
  - realtime JSON oriented DB,
  - PUSH notifikácie, analytics, REST
- <https://www.raywenderlich.com/126098/top-5-parse-alternatives>
  - Amazon Web Services Mobile Hub
  - CloudKit limited to iOS

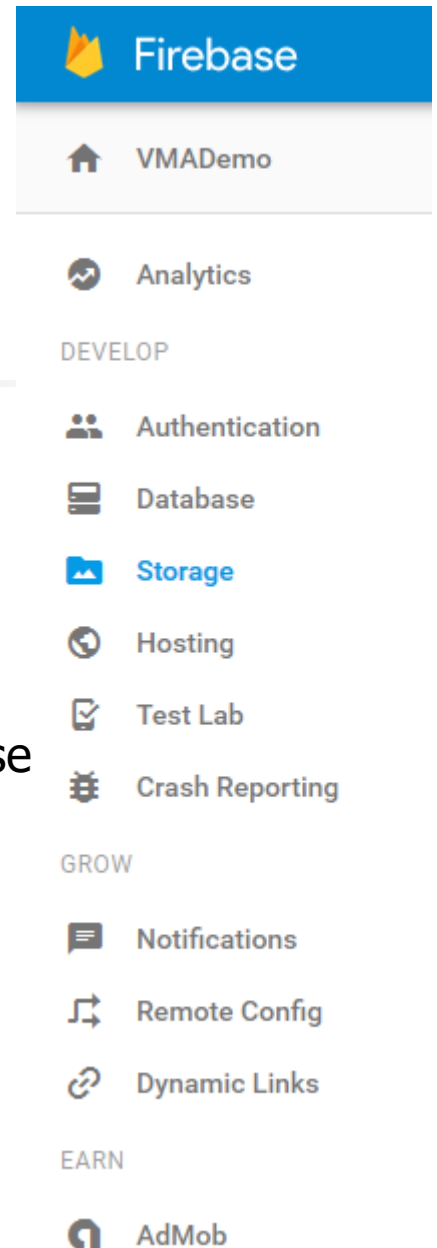




Startup Firebase(2011) kúpil Google(2014)

Ponúka služby/servisy:

- Authentication – FB/Git/Google/Twitter/FirebaseEmail
- Realtime database – non sql store & synchronize database
- Cloud Firestore       
- File storage – secure upload & download files
- Test lab for Android – rôzne virtuálne zariadenia
- Cloud messaging – push notifikácie pomocou  
Google Cloud Messaging/Firebase Cloud Messaging
- Crash reporting
- Analytics
- ...



# Firestore Console

kamaratinamape  
kamaratinamape

<https://console.firebase.google.com/project/kamaratinamape/database/data>

The screenshot shows the Firebase Authentication console for the project 'kamaratinamape'. The 'USERS' tab is selected. A modal dialog titled 'Add an Email/Password user' is open, showing input fields for 'Email' and 'Password'. The email 'vmaandroid@yahoo.com' and password 'androidVMA2016' are entered and highlighted with red boxes. The 'ADD USER' button is visible at the bottom right of the dialog.

Email	Providers	Created	Signed In	User UID ↑
-------	-----------	---------	-----------	------------

- ukážky sú robené pomocou tohoto účtu
- login a password vidíte v obrázku

# Autentifikácia

Sign-in metódy:

- vlastná autentifikácia cez email/password
  - môžete definovať viacero email-účov
- cez FB/Google/Twitter/GitHub API

SIGN-IN METHOD		EMAIL TEMPLATES
Sign-in providers		
Provider	Status	
Email/Password	Enabled	
Google	Enabled	
Facebook	Enabled	
Twitter	Enabled	
GitHub	Disabled	
Anonymous	Enabled	

## Authentication

Users Sign-in method Templates Usage

pre začiatok  
odporúčam skúsiť  
aplikácie z balíka

GIT: [quickstart-android-master](https://github.com/firebase/quickstart-android)

Search by email address, phone number, or user UID					Add user
Identifier	Providers	Created	Signed In	User UID ↑	
(anonymous)		Dec 1, 2016	Dec 1, 2016	1s70KNetLsYbmZ07ZE5qsHvah7q2	
vmaandroid@yahoo.com		Nov 22, 2016	Dec 13, 2018	4eWsnHhdRPVgUAtV200q7V1gN...	
		Dec 1, 2016	Dec 2, 2016	5UoBQBMAcXQ9rj2060MsG80IOJ...	
(anonymous)		Dec 2, 2018	Dec 2, 2018	7v4jPhXKQBVz5zq86oUuhIkAW1t1	
prostrediahm@gmail.com		Dec 7, 2019	Dec 7, 2019		

Project:auth.zip

<https://github.com/firebase/quickstart-android>













# Sign-in methods

<https://console.firebase.google.com/project/kamaratinamape/authentication/providers>

## Authentication

Users Sign-in method Templates Usage

### Sign-in providers

Provider	Status
 Email/Password	Enabled
 Phone	Disabled
 Google	Enabled
 Play Games	Disabled
 Game Center <span>Beta</span>	Disabled
 Facebook	Enabled
 Twitter	Enabled
 GitHub	Disabled
 Yahoo	Disabled
 Microsoft	Disabled
 Apple <span>Beta</span>	Disabled
 Anonymous	Enabled



# Project Setting

<https://console.firebase.google.com/u/0/project/kamaratinamape/settings/general/android:com.example.firebasedemo1>

- meno projektu (support email)
- rovnaké API pre všetky Android apps (package)
- SHA1-certificatite
- google-services.json

The screenshot shows the 'Your apps' section of the Firebase Project Settings. A list of apps is on the left, with 'com.google.firebase.quickstart.auth' selected. The right panel shows the details for this app, including the App ID, App nickname, Package name, and SHA certificate fingerprints.

**Your apps**

**Add app**

[google-services.json](#)

such as keys and identifiers, for the services you just enabled.

com.google.firebase.quickstart.an...	App ID ⓘ
com.google.firebase.quickstart.auth	1:539843735083:android:87fcb66cc6ca320a
FBAuth com.google.firebase.quickstart.auth.j...	App nickname Add a nickname
quickstart com.google.firebase.quickstart.datab...	Package name com.google.firebase.quickstart.auth
FBDatabase com.google.firebase.quickstart.datab...	SHA certificate fingerprints ⓘ
com.google.firebase.quickstart.fcm	7a:94:75:11:dd:3d:57:2a:36:ed:2a:f2:76:13:a0:b8:68:0f:67:f1
FBMessaging com.google.firebase.quickstart.fcm.ja...	Type ⓘ SHA-1

[Add fingerprint](#)

# google-services .json

```
{
  "project_info": {
    "project_number": "539843735083",
    "firebase_url": "https://kamaratinamape.firebaseio.com",
    "project_id": "kamaratinamape",
    "storage_bucket": "kamaratinamape.appspot.com"
  },
  "client": [
    {
      "client_info": {
        "mobilesdk_app_id": "1:539843735083:android:e4c17d2977753b25",
        "android_client_info": {
          "package_name": "sk.uniba.fmph.dai.borovan.fbdemo"
        }
      },
      "oauth_client": [
        {
          "client_id": "539843735083-e4n6dg61g1npk7uka8ebf2rhcmg4t7v1.apps.googleusercontent.com",
          "client_type": 3
        }
      ],
      "api_key": [ { "current_key": "AIzaSyCbfmtNkbnhjlqanA051uSfQl1_PTjPa8" } ],
      "services": {
        "analytics_service": { "status": 1 },
        "appinvite_service": { "status": 1, "other_platform_oauth_client": [] },
        "ads_service": { "status": 2 }
      }
    }
  ],
  "configuration_version": "1"
}
```

```
\quickstart-android-master\auth\app
.
..
.gitignore
app.iml
auth-app.iml
build
build.gradle
google-services.json
proguard-rules.pro
src
58 bytes
64 bytes free
```

Tento súbor potrebujete mať v projekte, stiahnite a do pod adresára \app

# Autentifikácia cez FB

<https://firebase.google.com/docs/auth/android/facebook-login>



Enable ☒

App ID

1286286781442318

App secret

663845afe79e444fafa94932a5d2cf7f

To complete set up, add this OAuth redirect URI to your Facebook app configuration. [Learn more](#)

[https://kamaratinamape.firebaseio.com/\\_/auth/handler](https://kamaratinamape.firebaseio.com/_/auth/handler)



## Autentifikácia cez FB/Twitter/GitHub API:

CANCEL

SAVE

- predpokladá, že registrujete aplikáciu na FB/Twitter/Git developerskej konzole napr. <https://developers.facebook.com/apps/1286286781442318/settings/basic/>
- kde dostanete nejakú analógiu APP ID/Secret key
- tie zapíšete do Firebase API vašej Firebase appky
- Firebase vám vygeneruje **google-services.json**, ktorý zakompilujete do .apk

Project:auth.zip

<https://github.com/firebase/quickstart-android>

# Facebook for developers

(dev konzola od FB)

facebook for developers

Docs

Tools

Support

My Apps

Search developers.fa

FirebaseAuthApp

APP ID: 1286286781442318

OFF Status: In D

Dashboard

Settings

Basic

Advanced

Roles

Alerts

App Review

PRODUCTS +

Facebook Login

App ID

1286286781442318

App Secret

663845afe79e444fafa94932a5d2cf7f

Reset

Display Name

FirebaseAuthApp

Namespace

App Domains

Contact Email

borovansky@gmail.com

Privacy Policy URL

https://kamaratinamape.firebaseio.com/\_\_/auth/handler


Terms of Service URL

Terms of Service for Login dialog and App Details

<https://developers.facebook.com/apps/1286286781442318/settings/basic/>

# Facebook Sign-in


- App ID a App Secret zapíšete do Firebase Console do
- Authentication/Sign-in methods/Facebook


 Facebook

☒ Enable

App ID

App secret

To complete set up, add this OAuth redirect URI to your Facebook app configuration. [Learn more](#) 

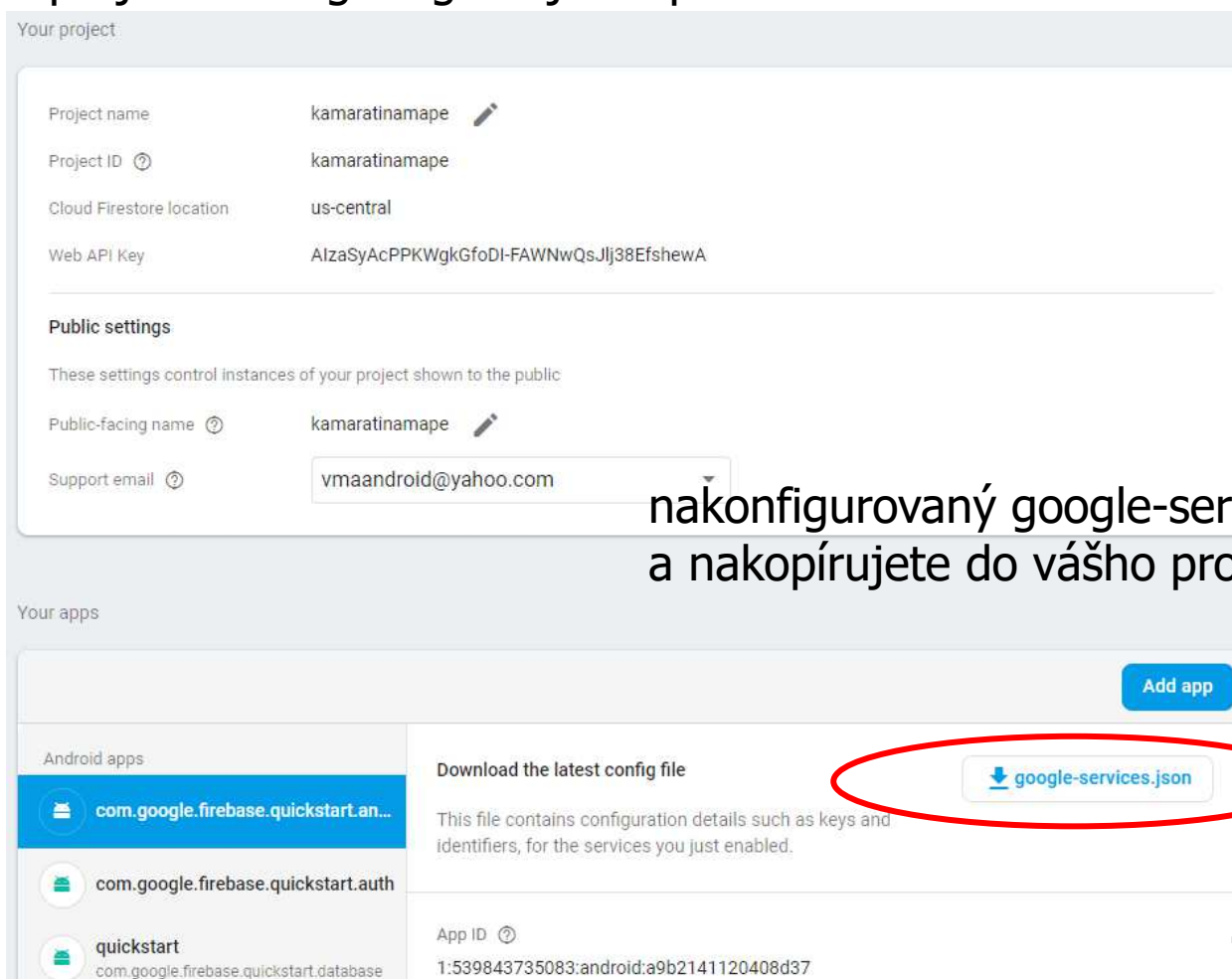
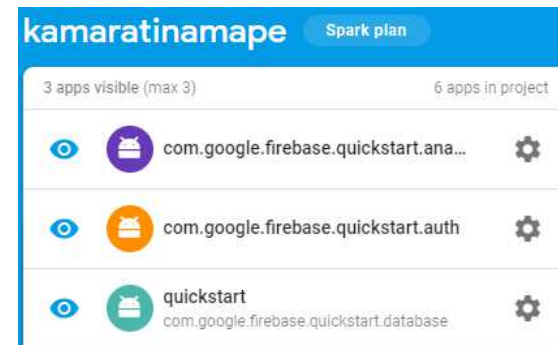


Cancel

Save

# Registrovanie appky

v project settings registrujete aplikáciu



nakonfigurovaný google-services.json stiahnete a nakopírujete do vášho projektu, do ...app/

... a skompilujete

# Autentifikácia cez Google

<https://developers.google.com/android/guides/client-auth>

Musíte do Firebase projektu/aplikácie vložiť svoj SHA1 kľúč (viac bolo minule)  
Google sign-in is automatically configured on your connected iOS and web apps. To set up Google sign-in for your Android apps, you need to add the [SHA1 fingerprint](#) for each app [Project Settings](#).

Android apps

- com.google.firebase.quickstart.an...
- com.google.firebase.quickstart.auth**
- FBAuth  
com.google.firebase.quickstart.auth.j...
- quickstart  
com.google.firebase.quickstart.datab...
- FBDatabase  
com.google.firebase.quickstart.datab...
- com.google.firebase.quickstart.fcm
- FBMessaging  
com.google.firebase.quickstart.fcm.ja...

Download the latest config file

[google-services.json](#)

This file contains configuration details such as keys and identifiers, for the services you just enabled.

App ID ⓘ  
1:539843735083:android:87fcb66cc6ca320a

App nickname  
Add a nickname ✎

Package name  
com.google.firebase.quickstart.auth

SHA certificate fingerprints ⓘ

	Type ⓘ
7a:94:75:11:dd:3d:57:2a:36:ed:2a:f2:76:13:a0:b8:68:0f:67:f1	SHA-1

# Autentifikácia cez Twitter

<https://firebase.google.com/docs/auth/android/twitter-login>

<https://developer.twitter.com/en/apps/13160641>

Na Twitter developerskej konzole musíte registrovať aplikáciu, a získaťe Consumer API keys a Access token, ten prezradíte Firebase Console


Apps > **FirebaseAuthorisationDemo**

---

**App details**    Keys and tokens    Permissions

---

**App details**  
Details and URLs

 **App icon**  
App icon is default, click edit to upload.

**App Name**  
FirebaseAuthorisationDemo

**Description**  
asdfsdfsdfsdfsdf

**Website URL**  
<http://dai.fmph.uniba.sk/courses/VMA/android/>

**Sign in with Twitter**  
Enabled

**Callback URL**  
[https://kamaratinamape.firebaseio.com/\\_/auth/handler](https://kamaratinamape.firebaseio.com/_/auth/handler)

Project:auth.zip

<https://github.com/firebase/quickstart-android>



# Autentifikácia cez Twitter

<https://developer.twitter.com/en/apps/13160641>

Apps > **FirebaseAuthorisationDemo**

App details

**Keys and tokens**

Permissions

## Important notice about your access token and access token secret

To make your API integration more secure, we will no longer show your access token and access token secret beyond the first 10 characters. You will be able to regenerate it at anytime here, which will invalidate your current access token and secret. Please save this info before you regenerate. API keys, which will still be shown here as they are below. To learn more, [visit the Forums](#).

## Keys and tokens

Keys, secret keys and access tokens management

### Consumer API keys

k7YuSJH9qjJLeZn51N3TzCV0c (API key)

Xpz88UjjjTVQU61IkQWHxIOyiQlfrJPU7qHAY0V83I1NCfCtu (API secret key)

Regenerate

### Access token & access token secret

492951543-CZmXbG2ad1LICjIU8H8RJo2ZmRIWLPWK4JLtzQW (Access token)

Sp8zOMrLSAw7mCarrLnpNwmshYFj5Eonwg9JsQG8DtSn9 (Access token secret)

Read-only (Access level)

Project:auth.zip

<https://github.com/firebase/quickstart-android>

# Autentifikácia cez Twitter

<https://developer.twitter.com/en/apps/13160641>

API KEY a SECRET treba vložiť do Firebase Console pre Twitter Authentication



☒ Enable

API key

k7YuSJH9qjJLeZn51N3TzCV0c

API secret

Xpz88UjjJTVQU61IkQWHxIOyiQIfkRJPU7qHAY0V83I1NCfCtu

To complete set up, add this callback URL to your Twitter app configuration. [Learn more](#)

[https://kamaratinamape.firebaseio.com/\\_\\_/auth/handler](https://kamaratinamape.firebaseio.com/__/auth/handler)



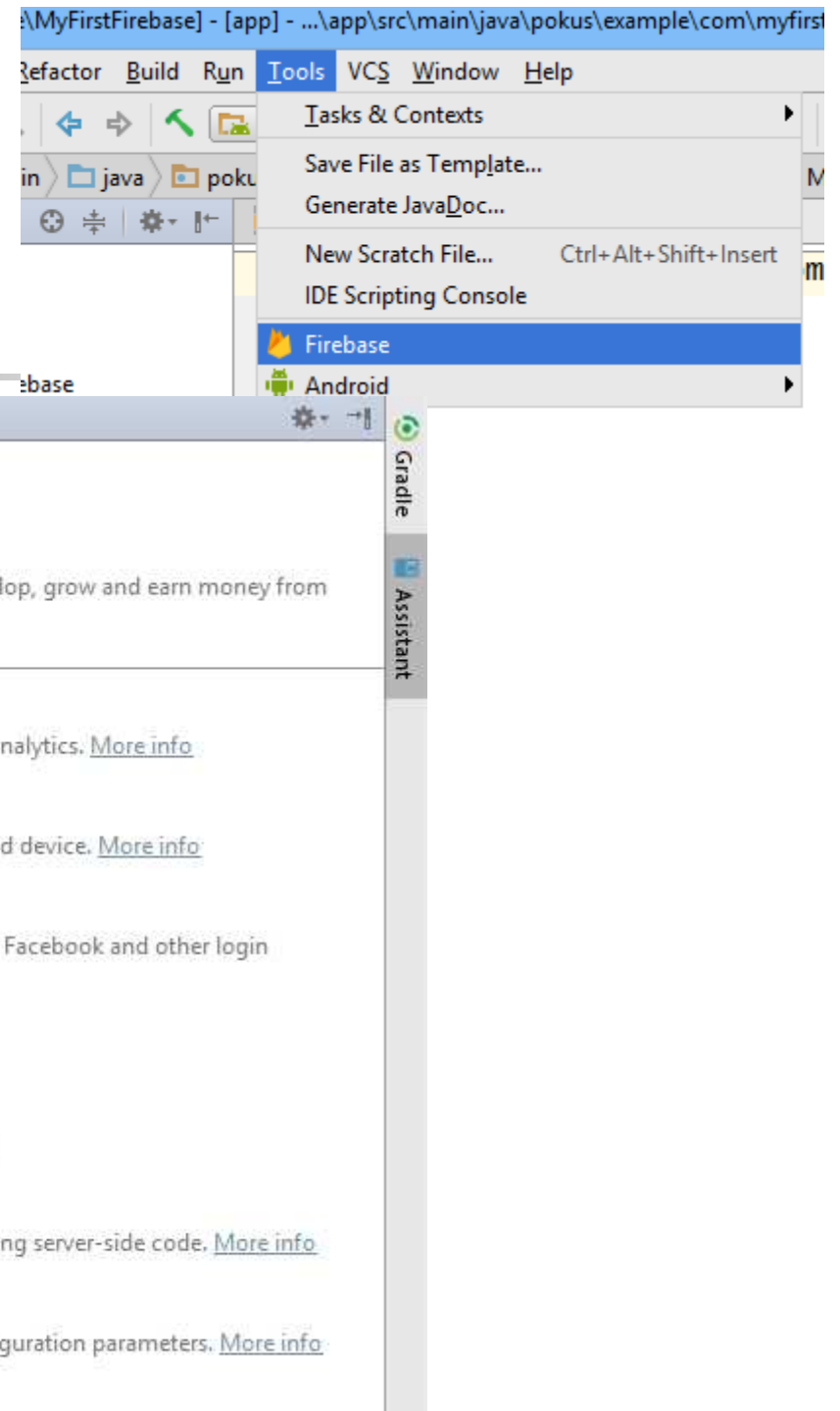
Cancel

Save

Project:auth.zip

<https://github.com/firebase/quickstart-android>

# Firestore v AS



# Autentifikačný kit v AS

Assistant

← Firebase > Authentication

## Email and password authentication

You can use Firebase Authentication to let your users sign in with their email addresses and passwords, and to manage your app's password-based accounts. This tutorial helps you set up an email and password system and then access information about the user.

[Launch in browser](#)

- 1 **Connect your app to Firebase**  
[Connect to Firebase](#)
- 2 **Add Firebase Authentication to your app**  
[Add Firebase Authentication to your app](#)  

To use an authentication provider, you need to enable it in the [Firebase console](#). Go to the Sign-in Method page in the Firebase Authentication section to enable Email/Password sign-in and any other identity providers you want for your app.
- 3 **Listen for auth state**  

Declare the `FirebaseAuth` and `AuthStateListener` objects.

```
private FirebaseAuth mAuth;
```

```
private FirebaseAuth.AuthStateListener mAuthListener;
```

In the `onCreate()` method, initialize the `FirebaseAuth` instance and the `AuthStateListener` method so you can track whenever the user signs in or out.

```
mAuth = FirebaseAuth.getInstance();
```

Ponúka vám to step-by-step návod na vytvorenie rôznych typov Firebase aplikácií

Add Firebase Authentication to your app

Performing this action will make the following changes to your project.

```
build.gradle (project-level)

Add Firebase Gradle buildsript dependency
classpath 'com.google.gms:google-services:4.0.1'
```

---

```
app/build.gradle

Add Firebase plugin for Gradle
apply plugin: 'com.google.gms.google-services'
```

build.gradle will include these new dependencies:

```
compile 'com.google.firebase:firebase-auth:16.0.1:15.0.0'
```

This will also enable the firebase-core library which includes Firebase Analytics. [Learn more](#)

[Accept Changes](#) [Cancel](#)

# 1) Connect your app to Firebase

Success!

You've signed in to Android Studio.

To continue, go back to Android Studio.




Explore Google services you can now use in your Android app:




Firebase



Google Cloud Platform

 Connect to Firebase ✕

 **Firebase**

☒ Create new Firebase project [What's this?](#) Signed in as vmaandroid@yahoo.com [Sign out](#)

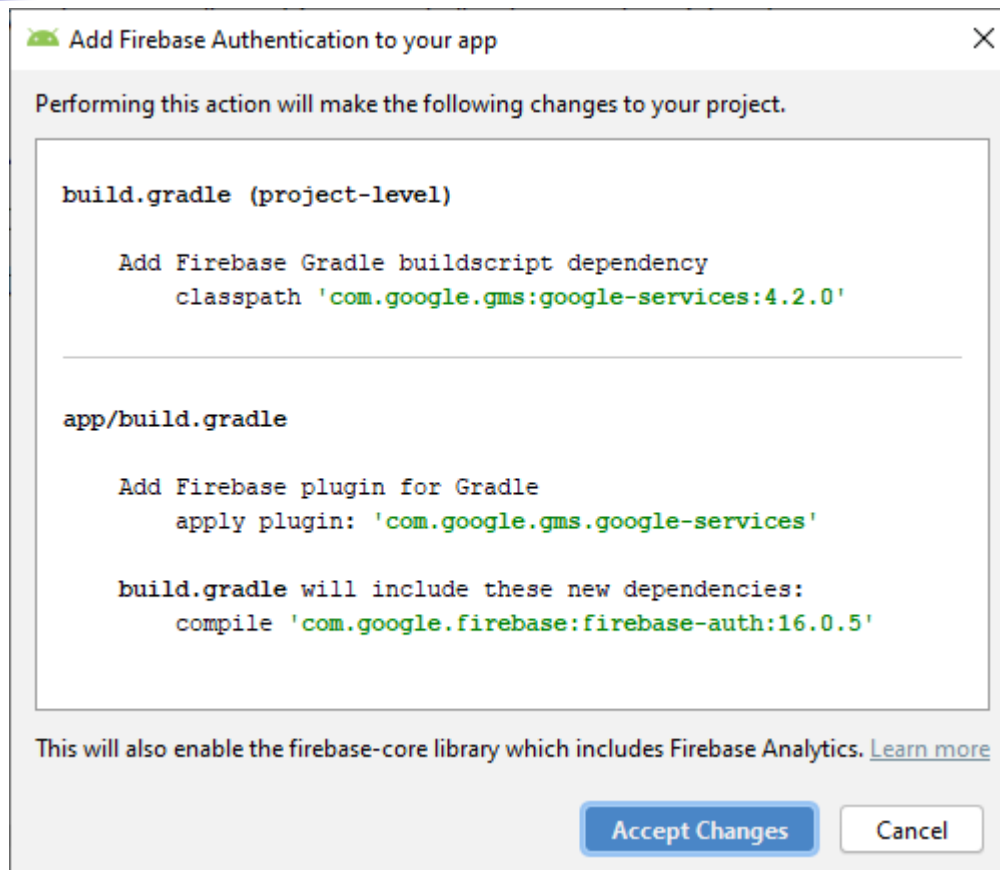
☐ Choose an existing Firebase or Google project

FBDemo	1 Android app(s) connected
kamaratinamape	11 Android app(s) connected

Country/region [What's this?](#)

By default, your Firebase Analytics data will enhance other Firebase features and Google products. You can control how your Firebase Analytics data is shared in your settings at anytime. [Learn more](#)

## 2) Add Firebase Auth to your app





# Firestore Email Authentication

## sign-up new user

---

```
mAuth.createUserWithEmailAndPassword(email, password)
    .addOnCompleteListener(this, object:
        OnCompleteListener<AuthResult> {
            override fun onComplete(task: Task<AuthResult>) {
                if (task.isSuccessful()) { // Sign in success, update
                    Log.d(TAG, "createUserWithEmail:success")
                    val user = mAuth.currentUser
                } else { // If sign in fails,
                    Log.w(TAG, "createUserWithEmail:failure",
                        task.getException())
                }
            }
        })
```



# Firestore Email Authentication

## sign-in an existing user

---

```
mAuth.signInWithEmailAndPassword(email, password)
    .addOnCompleteListener(this) { task ->
        if (task.isSuccessful) { // Sign in success
            Log.d(TAG, "signInWithEmail:success")
            val user = mAuth.currentUser
        } else { // If sign in fails
            Log.w(TAG, "signInWithEmail:failure", task.exception)
        }
    }
}
```



# Firestore Email Authentication

get user info

```
val user = FirebaseAuth.getInstance().currentUser
if (user != null) { // Name, email address, and profile photo Url
    val name = user.displayName
    val email = user.email
    val photoUrl: Uri? = user.photoUrl
    val emailVerified = user.isEmailVerified
    val uid = user.uid
    infoTV.setText("$name, $email, $uid")
}
```

FirestoreDemo1

miki@sme.sk

qqqqqqq

SIGN IN

INFO

SIGNUP

null, miki@sme.sk, CWlvuMztroOnSvRxJZqxZmKGKNb2

Project:FirestoreDemo1

# Iná autentifikácia

Pozrite si [Facebook](#), resp. [Google](#) Login API

Android Studio interface showing Firebase Authentication quickstart examples.

**Java**  
Run the Firebase Auth quickstart written in Java. [OPEN](#)

**Kotlin**  
Run the Firebase Auth quickstart written in Kotlin.

**Firebase Authentication**


- GoogleSignInActivity**  
Use a Google Sign In credential to authenticate with Firebase.
- FacebookLoginActivity**  
Use a Facebook Login credential to authenticate with Firebase.
- TwitterLoginActivity**  
Use a Twitter Login credential to authenticate with Firebase.
- EmailPasswordActivity**  
Use an email and password to authenticate with Firebase.
- PasswordlessActivity**  
Use only an email to authenticate with Firebase.
- PhoneAuthActivity**  
Use a phone number to authenticate with Firebase.
- AnonymousAuthActivity**  
Sign in anonymously and then later upgrade to a full Firebase Auth user.
- FirebaseUIActivity**  
Use FirebaseUI to authenticate with Firebase.

**Project:auth.zip**  
<https://github.com/firebase/quickstart-android>



# Firestore ako databáza

---

- noSQL databázy
- **Realtime Database** (efektívna pre mobilné app, synchronizácia)
  - ukladanie a synchronizácia v reálnom čase so všetkými pripojenými klientami
  - všetky dáta sú jeden veľký json dátový strom (JSON Tree)
  - existuje dávno, stabilná, **regionálne** má veľmi slušnú latenciu
-  ■ **Cloud Firestore** (novinka)
  - Realtime updates, powerful queries, automatic scaling
  - dáta sú v kolekciách, hierarchicky organizované, subkolekcie, ...
  - novinka, beta r.2018, skalabilita, prepojenie cez viaceré dátové centrá

Obe podporujú offline support pre mobilných klientov (Android, iOS, web)  
- zmeny počas off-line sa ukladajú do cache a synchronizujú, keď on-line

# Realtime Database

(nosql databáza)

## Rules

- Default, no access, only FB console

```
// These rules don't allow anyone read or write access to your database
{
  "rules": {
    ".read": false,
    ".write": false
  }
}
```

- Public, anyone can...

```
// These rules give anyone, even people who are not users of your app,
// read and write access to your database
{
  "rules": {
    ".read": true,
    ".write": true
  }
}
```

- FB/Google/Git Authenticated only

```
{
  "rules": {
    "users": {
      "$uid": {
        ".read": "$uid === auth.uid",
        ".write": "$uid === auth.uid"
      }
    }
  }
}
```

<https://kamaratinamape.firebaseio.com/>

★ Default security rules require users to be authenticated

kamaratinamape

- 4eWsnHhdRPVgUAtV200q7V1gNOI3: "treti :"
  - pikatchus
    - address: "treti status"
    - lati: 48
    - longi: 17
    - name: "treti"
    - time: 1480539003061
  - statuses
    - druhy: "druhy status"
    - prvy: "prvy status"
    - treti: "treti status"

### Realtime Database

DATA RULES USAGE BACKUPS

### Firestore Database

★ Default security rules require users to be authenticated

```
1 {
2   "rules": {
3     ".read": "auth != null",
4     ".write": "auth != null"
5   }
}
```

# Realtime Database

(zápis)

```
databaseReference = FirebaseDatabase  
    .getInstance()  
    .reference
```

→ **object** `databaseReference.child("pikatchus")`  
`.setValue(Pokemon(name, address, lati, longi))`

```
globalState == mutableMapOf<String,String>()  
globalState[name]=status
```

→ **kolekcia** `databaseReference.child("statuses").setValue(globalState)`

```
FirebaseUser user = firebaseAuth.getCurrentUser()
```

```
if (user != null) { // ak je user nalogovaný
```

→ **uid** `databaseReference.child(user.getUid()).setValue(status)`  
}

https://kamaratinamape.firebaseio.com/

★ Default security rules require users to be authenticated

```
kamaratinamape  
├── 4eWsnHhdRPVgUAtV200q7V1gNOI3 "treti status"  
└── pikatchus  
    ├── address: "treti status"  
    ├── lati: 48  
    ├── longi: 17  
    ├── name: "treti"  
    ├── time: 1480539003061  
    └── statuses  
        ├── druhy: "druhy status"  
        ├── prvy: "prvy status"  
        └── tretí: "tretí status"
```

# Realtime Database

(čítanie)

Pri akejkol'vek zmene sa zavola listener

→  
po zápise

```
databaseReference.addValueEventListener(  
    object: ValueEventListener() {  
        override fun onDataChange(dataSnapshot: DataSnapshot) {  
            for (child in dataSnapshot.children) { % toto sú zmeny  
                val o = child.value % (child.key, child.value)  
                val str = "changed " + child.key + " is: "  
                val o = child.value % zmenil sa (key,o=value)  
                if (o is Pokemon) % zmenil sa objekt  
                    statusMemo.append("Pokemon has ")  
                Log.d(TAG, child.key)  
                editTextMemo.append(  
                    "changed ${child.key} is: ${o.toString()}\n")  
            }  
        }  
    })
```

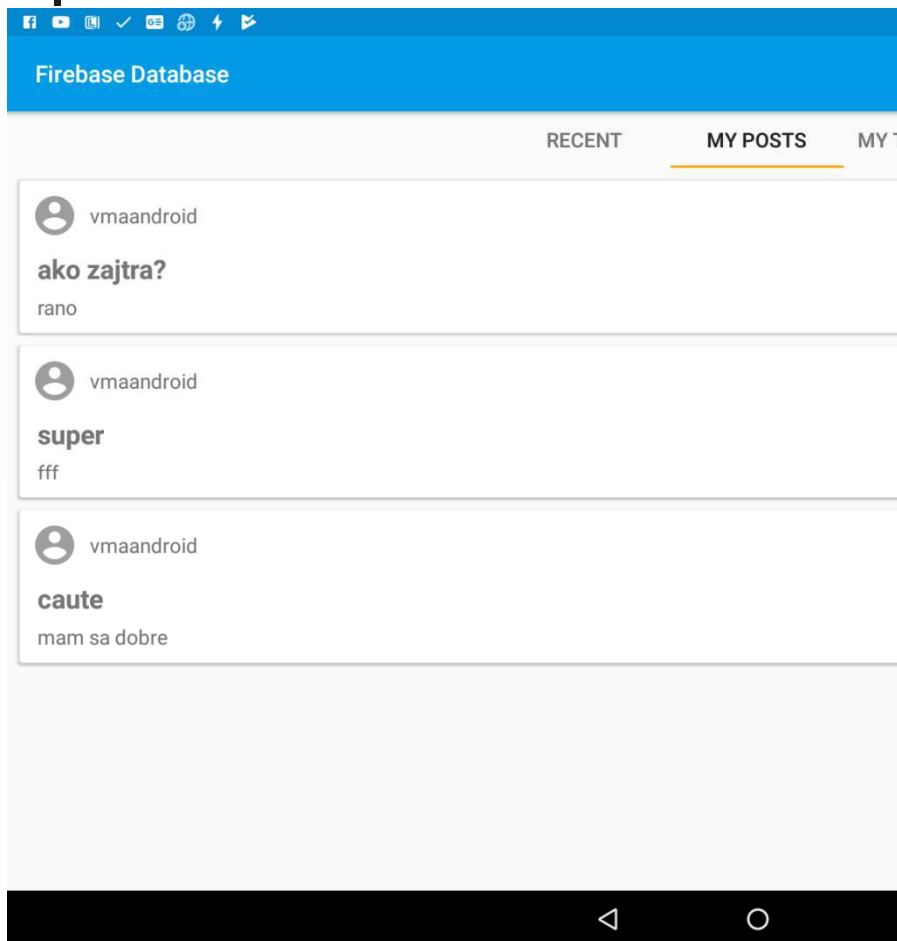
https://kamaratinamape.firebaseio.com/

★ Default security rules require users to be authenticated

```
kamaratinamape  
├── 4eWsnHhdRPVgUAtV200q7V1gNOI3: "treti status"  
├── pikachus  
│   ├── address: "treti status"  
│   ├── lati: 48  
│   ├── longi: 17  
│   ├── name: "treti"  
│   └── time: 1480539003061  
└── statuses  
    ├── druhy: "druhy status"  
    ├── prvy: "prvy status"  
    └── tretí: "treti status"
```

# Firestore Database

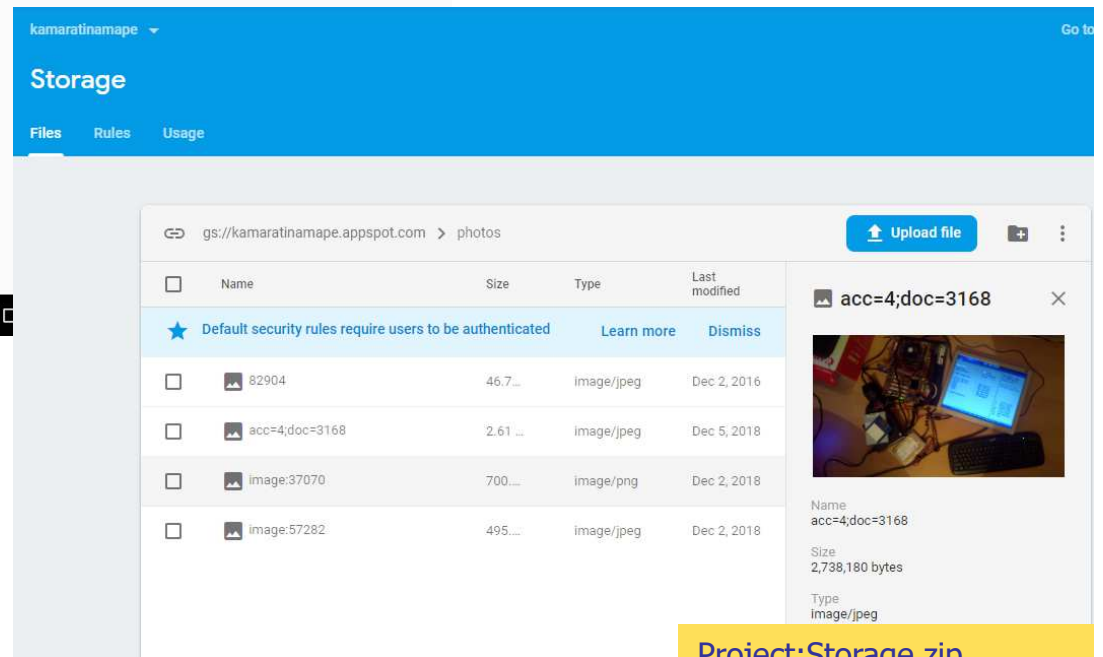
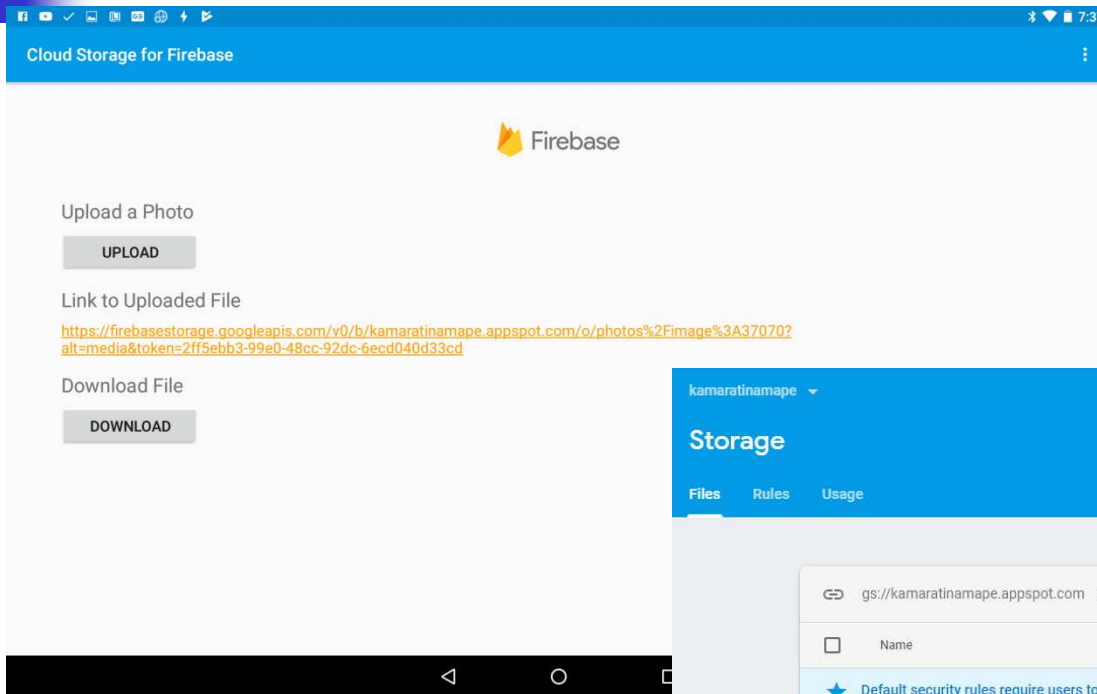
(vyskúšajte si)



Project:Database.zip

# Firestore Storage

(vyskúšajte si)



Project: Storage.zip





# Firebase Cloud Messaging

(vyskúšajte si)

- Firebase Messaging – push notifikácie
- cross-platform (iOS, Android, ...)
- payload of up to 4kB to client app.
- Notification messages – when app is in the **background**

```
{ "message": {  
  "token": "chLzRZ59Svk:APA91bGEy41ulMs3qQnThxYL6VWJAOu61pIHWkGTUEHQe4rWlyWL9yutLHxiwmgYdstis7T54I68yKhWZj95TnKXjUynd4rt2oLQ1gPAaIa249g2-h4MKSg7Xkgie8uCVPx8sbB_itLr",  
  "notification": {  
    "title": "Notification Test",  
    "body": "test"  
  }  
}}
```
- Data messages – key/value pairs received in a callback function.

```
{ "message": {  
  "token": "chLzRZ59Svk:APA91bGEy41ulMs3qQnThxYL6VWJAOu61pIHWkGTUEHQe4rWlyWL9yutLHxiwmgYdstis7T54I68yKhWZj95TnKXjUynd4rt2oLQ1gPAaIa249g2-h4MKSg7Xkgie8uCVPx8sbB_itLr",  
  "data": {  
    "Nick" : "Peter",  
    "body" : "teacher",  
    "Room" : "I-18"  
  }  
}}
```

# Firebase Cloud Messaging

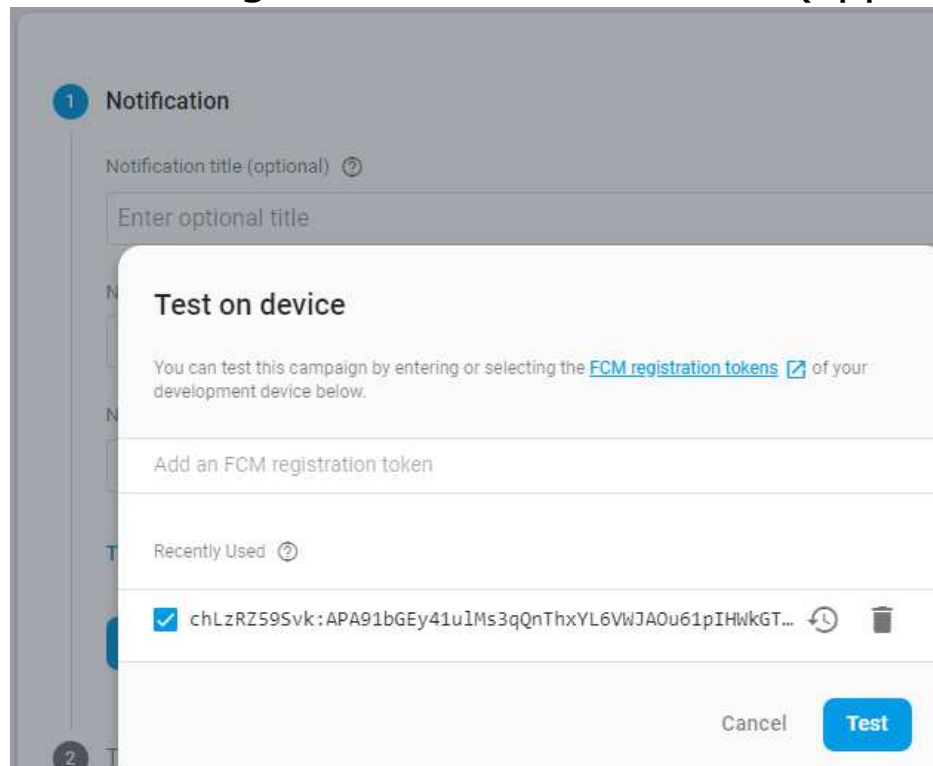
(vyskúšajte si)

Device Token

InstanceID Token:

chLzRZ59Svk:APA91bGEy41uIMs3qQnThxYL6VWJAOu61pIHWkGTUEHQe4rWlyWL9yutLHxiwmgYdstis7T54I68yKh  
wZj95TnKXjUynd4rt2oLQ1gPAaIa249g2-h4MKSg7Xkgie8uCVPx8sbB\_itLr

Sending a test message from Firebase Console (app is in background!)



Project: Messaging.zip