

Mobile Application Development

Produced
by

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Waterford Institute of Technology
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Android & Firebase

Part 4

Firebase Integration





Google Services Overview

- Overview of **Google Play Services** and Setup
- Detailed look at
 - Google Sign-in and Authentication (Part 1)
 - Location & Geocoding (Part 2)
 - Google Maps (Part 3)
- Firebase Integration (Part 4) (NEW)



Google Services Overview

- ❑ Detailed look at
 - **Firebase Integration (Part 4) (NEW)**



Agenda

- ❑ Firebase history
- ❑ The all new Firebase
- ❑ Real-time database
- ❑ Authentication
- ❑ Storage
- ❑ Remote config
- ❑ Hosting
- ❑ Crash reporting
- ❑ Test lab
- ❑ Firebase cloud messaging
- ❑ Dynamic links
- ❑ App indexing
- ❑ Analytics
- ❑ CoffeeMate Highlights & Demos along the way...

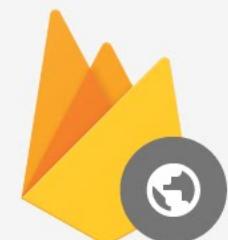


Agenda

- ❑ Crash reporting
 - ❑ Test lab
 - ❑ Firebase cloud messaging
 - ❑ Dynamic links
 - ❑ App indexing
 - ❑ Analytics
 - ❑ CoffeeMate Highlights & Demos along the way...

❑ Remote config

❑ Hosting



Hosting

The new VPS in town...



Firebase Hosting

- ❑ Firebase hosting provides a fast and secure static hosting for your web app.
- ❑ It is a production grade web content hosting.
- ❑ No need to look for any other VPS solution
- ❑ Hosting gives a subdomain of “firebaseapp.com”
- ❑ You can also get a custom domain.
- ❑ Install firebase CLI and deploy in a matter of seconds.
- ❑ Also suited for progressive web apps



Deploy Your Site In Seconds

- ❑ Install npm.
 - ❑ Install firebase CLI
 - `npm install -g firebase-tools`
 - ❑ Initialize your app
 - `firebase init`
 - ❑ Set root folder and put your static content there.
 - ❑ Deploy
 - `firebase deploy`



Firebase Hosting



Quick DEMO...



S W R E

console.firebaseio.google.com/project/coffeematefbi/hosting

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CoffeeMateFBI – Hosting – Firebase console

Firebase CoffeeMateFBI Overview Go to docs :

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DASHBOARD USAGE

HOSTING

Deploy web and mobile web apps in seconds using a secure global content delivery network

Learn more View the docs

GET STARTED

The screenshot shows the Firebase Hosting dashboard for the project "CoffeeMateFBI". The left sidebar has a red box around the "Hosting" item, which is currently selected. The main area features a globe icon and text about deploying web and mobile apps using a secure global content delivery network. A "GET STARTED" button is at the bottom right. The top navigation bar includes links for Overview, Analytics, Authentication, Database, Storage, Functions, Test Lab, Crash Reporting, Performance, Notifications, Remote Config, Dynamic Links, and an Upgrade link for the Spark plan (Free \$0/month).



S W R E

console.firebaseio.google.com/project/coffeematefbi/hosting

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CoffeeMateFBI – Hosting – Firebase console

Firebase CoffeeMateFBI ▾

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Set up hosting

1 Install 2 Deploy

To host your site, you need to install Firebase command line tools using npm ([Node.js](#)).

Install Firebase tools: `$ npm install -g firebase-tools`

Doesn't work? You may need to [change npm permissions](#).

If you've previously installed Firebase command line tools, run the install command again to make sure that you have the latest version.

CANCEL CONTINUE



S W R E

console.firebaseio.google.com/project/coffeematefbi/hosting

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CoffeeMateFBI – Hosting – Firebase console

Firebase CoffeeMateFBI Overview Hosting Analytics DASHBOARD USAGE ?

DEVELOP Authentication Database Storage Hosting Functions Test Lab Crash Reporting Performance GROW Notifications Remote Config Dynamic Links

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Set up hosting

1 Install 2 Deploy

Open a terminal window and navigate to or create a directory for your site

Sign in to Google: `$ firebase login`

Initiate your project: `$ firebase init`

Add your static files to your deploy directory (the default is public)

Deploy your website: `$ firebase deploy`

FINISH

A screenshot of the Firebase Hosting setup dialog box. It shows two steps: 'Install' and 'Deploy'. Step 1, 'Install', includes instructions to sign in to Google and run the command '\$ firebase login'. Step 2, 'Deploy', includes instructions to initiate the project with '\$ firebase init' and to add static files to the deploy directory. A 'Deploy your website:' section shows the command '\$ firebase deploy'. A large blue 'FINISH' button is at the bottom right.



S W R E

console.firebaseio.google.com/project/coffeematefbi/hosting/main

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CoffeeMateFBI – Hosting – Firebase console

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HOSTING

Domain

coffeematefbi.firebaseioapp.com Default CONNECT DOMAIN

Deployment history

Waiting for your first deploy INSTRUCTIONS

The screenshot shows the Firebase Hosting dashboard for the project "CoffeeMateFBI". On the left sidebar, under the "DEVELOP" section, the "Hosting" option is selected and highlighted in blue. In the main content area, there is a table titled "Domain" with one entry: "coffeematefbi.firebaseioapp.com" listed under "Type: Default". A red box highlights this domain entry. To the right of the table is a blue "CONNECT DOMAIN" button. Below the table is a section titled "Deployment history" with the message "Waiting for your first deploy" and a blue "INSTRUCTIONS" button.

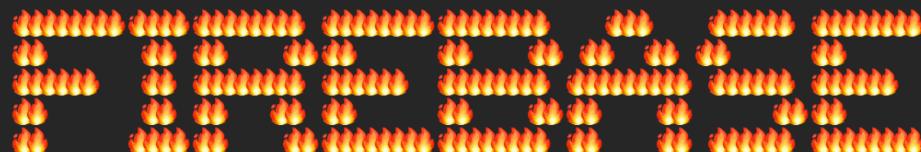


```
ict — node /usr/local/bin/firebase init — 180x40

contributors.txt credits topic01-overview-and-tools topic04-google-services
course.md public-site topic02-ui-design topic05-firebase
courseurl topic00-profile topic03-networking topic06-future-trends

[davesmbp:msc-mad ddrohan$ cd ..
[davesmbp:github ddrohan$ ls
  android-apps-development.png intro.to.android.jpeg
  ddrohan.github.io labs.png
  ds.png mad-2016
  header.png mad.png
  ict mad1.png
[davesmbp:github ddrohan$ cd ict
[davesmbp:ict ddrohan$ ls
  public-site
[davesmbp:ict ddrohan$ ls
  public
[davesmbp:ict ddrohan$ firebase login
  Already logged in as daveydrohan@gmail.com
[davesmbp:ict ddrohan$ firebase init
```

Update available: 3.12.0 (current: 3.9.1)
Run `npm install -g firebase-tools` to update.



You're about to initialize a Firebase project in this directory:

`/Users/ddrohan/Library/Mobile Documents/com~apple~CloudDocs/_wit/github/ict`

? Which Firebase CLI features do you want to setup for this folder? Press Space to select features, then Enter to confirm your choices.

- Database: Deploy Firebase Realtime Database Rules
- Functions: Configure and deploy Cloud Functions
- Hosting: Configure and deploy Firebase Hosting sites



FIREBASE

You're about to initialize a Firebase project in this directory:

```
/Users/ddrohan/Library/Mobile Documents/com~apple~CloudDocs/_wit/github/ict
```

? Which Firebase CLI features do you want to setup for this folder? Press Space to select features, then Enter to confirm your choices. Hosting: Configure and deploy Firebase Hosting sites

Project Setup

First, let's associate this project directory with a Firebase project. You can create multiple project aliases by running `firebase use --add`, but for now we'll just set up a default project.

? Select a default Firebase project for this directory: CoffeeMateFBI (coffeematefbi)

Hosting Setup

Your `public` directory is the folder (relative to your project directory) that will contain Hosting assets to be uploaded with `firebase deploy`. If you have a build process for your assets, use your build's output directory.

```
? What do you want to use as your public directory? public
? Configure as a single-page app (rewrite all urls to /index.html)? No
✓ Wrote public/404.html
? File public/index.html already exists. Overwrite? No
i Skipping write of public/index.html

i Writing configuration info to firebase.json...
i Writing project information to .firebaserc...

✓ Firebase initialization complete!
```

```
davesmbp:ict ddrohan$
```

```
ict — node /usr/local/bin/firebase deploy — 180x40
You're about to initialize a Firebase project in this directory:
/Users/ddrohan/Library/Mobile Documents/com~apple~CloudDocs/_wit/github/ict
? Which Firebase CLI features do you want to setup for this folder? Press Space to select features, then Enter to confirm your choices. Hosting: Configure and deploy Firebase Hosting sites
== Project Setup

First, let's associate this project directory with a Firebase project.
You can create multiple project aliases by running firebase use --add,
but for now we'll just set up a default project.

? Select a default Firebase project for this directory: CoffeeMateFBI (coffeematefbi)

== Hosting Setup

Your public directory is the folder (relative to your project directory) that
will contain Hosting assets to be uploaded with firebase deploy. If you
have a build process for your assets, use your build's output directory.

? What do you want to use as your public directory? public
? Configure as a single-page app (rewrite all urls to /index.html)? No
✓ Wrote public/404.html
? File public/index.html already exists. Overwrite? No
i Skipping write of public/index.html

i Writing configuration info to firebase.json...
i Writing project information to .firebaserc...

✓ Firebase initialization complete!
davesmbp:ict ddऽrohan$ firebase deploy

== Deploying to 'coffeematefbi'...
i deploying hosting
i hosting: preparing public directory for upload...
```

ict — bash — 180x40

? Select a default Firebase project for this directory: CoffeeMateFBI (coffeematefbi)

— Hosting Setup

Your **public** directory is the folder (relative to your project directory) that will contain Hosting assets to be uploaded with **firebase deploy**. If you have a build process for your assets, use your build's output directory.

[?] What do you want to use as your **public** directory? **public**
[?] Configure as a single-page app (rewrite all urls to /index.html)? **No**
✓ Wrote **public/404.html**
[?] File **public/index.html** already exists. Overwrite? **No**
i Skipping write of **public/index.html**

i Writing configuration info to **firebase.json**...
i Writing project information to **.firebaserc**...

✓ Firebase initialization complete!
[davesmbp:ict ddrohan\$ firebase deploy

— Deploying to 'coffeematefbi'...

i deploying **hosting**
i **hosting**: preparing **public** directory for upload...

Error: An unexpected error has occurred.
[davesmbp:ict ddrohan\$ firebase deploy

— Deploying to 'coffeematefbi'...

i deploying **hosting**
i **hosting**: preparing **public** directory for upload...
✓ **hosting**: 313 files uploaded successfully
i starting release process (may take several minutes)...

✓ Deploy complete!

Project Console: <https://console.firebaseio.google.com/project/coffeematefbi/overview>
Hosting URL: <https://coffeematefbi.firebaseio.com>



S R T E

console.firebaseio.google.com/project/coffeematefbi/hosting/main

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CoffeeMateFBI – Hosting – Firebase console https://coffeematefbi.firebaseioapp.com +

Firebase

CoffeeMateFBI

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EARN

- AdMob

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Hosting

DASHBOARD USAGE

Domain

CONNECT DOMAIN

Domain	Type	Status
coffeematefbi.firebaseioapp.com		Default

Deployment history

Status	Time:	Deploy	Files
Current	19 Sep 2017 13:12	daveydrohan@gmail.com oGfeBP	313

Rows per page: 10 1-1 of 1

A red rectangular box highlights the "Deployment history" section of the Firebase Hosting dashboard.

coffeematefbi.firebaseio.com

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Mobile Application Development

Module Home

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15 8

Module Overview & Background



Here you'll find a brief talk about myself, my background and what this Module will cover in the different sections.

1: Android Overview & Tools



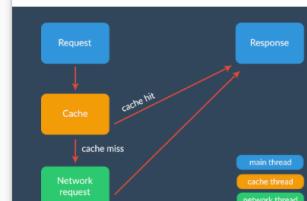
Android introduced a new user interface language to the world, one that is gradually evolving in flexibility and expressiveness. The first application we will build exhibits a range of new concepts you may not have come across before. Here we tour this app in detail, exploring each of the artifacts we have composed, and attempt to get a sense of how they fit together to form a running app.

2: UI Design & App Structure



Here we discuss app design in general, the frameworks available to the app developer and the different approaches that can be followed in the design and development of a mobile app. We begin with some of the more common widgets and complete the material with some of the more advanced UI artifacts used in the design of android apps, focusing on the android UI guidelines for effective navigation.

3: Multithreading & Networking



In this section we take a brief look at persistence within an Android app (via SQLite) but focus mainly on how the Android OS implements multithreading and deals with running tasks in the background. We also investigate the different approaches available to the developer for making http calls and API requests.





Pricing

Products	Spark Plan Generous limits for hobbyists Free	Flame Plan Fixed pricing for growing apps \$25/month	Blaze Plan Calculate pricing for apps at scale Pay as you go
Free Products Authentication (except Phone Auth), Analytics, App Indexing, Dynamic Links, Invites, Remote Config, Cloud Messaging (FCM), Performance Monitoring, and Crash Reporting.	Included	Included Free	Included Free
Hosting GB stored GB transferred Custom domain & SSL	1 GB 10 GB/month 	10 GB 50 GB/month 	\$0.026/GB \$0.15/GB



Remote Config



Update your App without
actually updating it



Remote Config

- Change behavior and config without app update.
- Set in-app default values that app uses to work.
- Override these values from firebase console when app is published.
- Change configuration on the fly.
- Change configuration based on condition. Ideal for A/B testing



Customize Experience

- ❑ Create segments and customize experience
- ❑ Background = blue (default green) if
 - Country = India &&
 - OS Type = Android
- ❑ Discount = 30% (default 5%) if
 - OS Type = iOS
 - Version = 2.3.0



The “2 Line Code” cliché

- ❑ Fetch parameters from remote config server
 - `mFirebaseRemoteConfig.fetch(300).addOnCompleteListener(...)`
- ❑ Make the fetched parameters available to your app
 - `mFirebaseRemoteConfig.activateFetched();`
- ❑ And all is done for your app



Remote Config



Quick DEMO... TBD



S W R E

console.firebaseio.google.com/project/coffeematefbi/config

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CoffeeMateFBI – Remote Config – Firebase console

Firebase CoffeeMateFBI

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Remote Config

PARAMETERS

Customise and experiment with app behaviour using server-side configuration parameters

[Learn more](#) [View the docs](#)

ADD YOUR FIRST PARAMETER

Example: holiday_promotion_enabled = true



S W R E

console.firebaseio.google.com/project/coffeematefbi/config

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CoffeeMateFBI – Remote Config – Firebase console

Firebase CoffeeMateFBI Overview Analytics

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Remote Config

PARAMETERS

This is the key you'll pass to the Remote Config SDK, for example:
config.getBoolean("holiday_promo_enabled");

experiment with app server-side configuration

Parameter key	Default value	Add value for condition ▾
Example: holiday_promo_enabled	(empty string)	Other empty values ▾

CANCEL ADD PARAMETER



Crash Reporting



And finding the root cause



Crash Reporting

- ❑ Monitor fatal and non-fatal errors.
- ❑ Errors are grouped into clusters of similar stack traces.
- ❑ Find bug cause easily - Report consists of stack trace, device characteristics, performance etc.
- ❑ Enable email alerts to be notified of a new crash anytime.
- ❑ Integrate with analytics to find order of events that caused the crash.
- ❑ Seamless across android and iOS.



Implement Crash Reporting

- ❑ Connect your app with firebase console.
- ❑ Add firebase dependency into gradle.
- ❑ Add custom logs wherever required.
 - `FirebaseCrash.log("SQLite syntax error");`
- ❑ Report server side errors with [Google Stackdriver Error reporting](#).



cloud.google.com/error-reporting/

S R T E CoffeeMateFBI – Hosting – Firebase console https://coffeematefbi.firebaseioapp.com Stackdriver Error Reporting | Google Cloud Platform +

Google Cloud Platform Search CONSOLE

Why Google Products Solutions Launcher Pricing Customers Documentation Support > CONTACT SALES

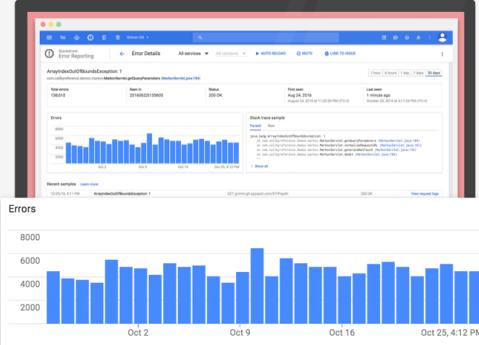
STACKDRIVER ERROR REPORTING

Identify and understand your application errors.

[VIEW STACKDRIVER ERROR REPORTING DOCS](#) [VIEW CONSOLE](#)

Real-time Exception Monitoring and Alerting

Stackdriver Error Reporting **counts, analyzes and aggregates the crashes** in your running cloud services. A **centralized error management interface** displays the results with sorting and filtering capabilities. A dedicated view shows the error details: **time chart**, occurrences, affected user count, first and last seen dates and a **cleaned exception stack trace**. Opt-in to receive **email and mobile alerts** on new errors.





Crash reporting with proguard

- ❑ In **proguarded** apps the stack trace is not sufficient to identify the root cause.
- ❑ Usually we view the mapping files and try to make sense out of it.
- ❑ All of this is done by firebase. Just upload the mapping files and you will see meaningful stack traces.



▼ Exception java.io.FileNotFoundException: /non-existent/file: open failed: ENOENT (No such file or directory)

```
libcore.io.IoBridge.open (IoBridge.java:452)
java.io.FileInputStream.<init> (FileInputStream.java:76)
java.io.FileInputStream.<init> (FileInputStream.java:103)
com.tutsplus.myfirebaseapp.MainActivity.onCreate (MainActivity.java:22)
android.app.Activity.performCreate (Activity.java:6237)
android.app.Instrumentation.callActivityOnCreate (Instrumentation.java:1107)
android.app.ActivityThread.performLaunchActivity (ActivityThread.java:2369)
android.app.ActivityThread.handleLaunchActivity (ActivityThread.java:2476)
android.app.ActivityThread.-wrap11 (ActivityThread.java)
android.app.ActivityThread$H.handleMessage (ActivityThread.java:1344)
android.os.Handler.dispatchMessage (Handler.java:102)
android.os.Looper.loop (Looper.java:148)
android.app.ActivityThread.main (ActivityThread.java:5417)
java.lang.reflect.Method.invoke (Method.java)
com.android.internal.os.ZygoteInit$MethodAndArgsCaller.run (ZygoteInit.java:726)
com.android.internal.os.ZygoteInit.main (ZygoteInit.java:616)
```

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

Data

User data

Country Code: 360

Carrier Code: 260

Carrier: Android

Locale: -

Performance data

VM free: 746.07KB

VM total: 5.16MB

VM max: 64MB

Battery level: -

Charging state:

Charging AC

Connection State:

Wwan

Device data

Manufacturer:

Unknown

Model:

Android SDK built for
x86

Board: Unknown

Android API: 23

Android OS: 6.0

Brand: Android

RAM: 880.51MB

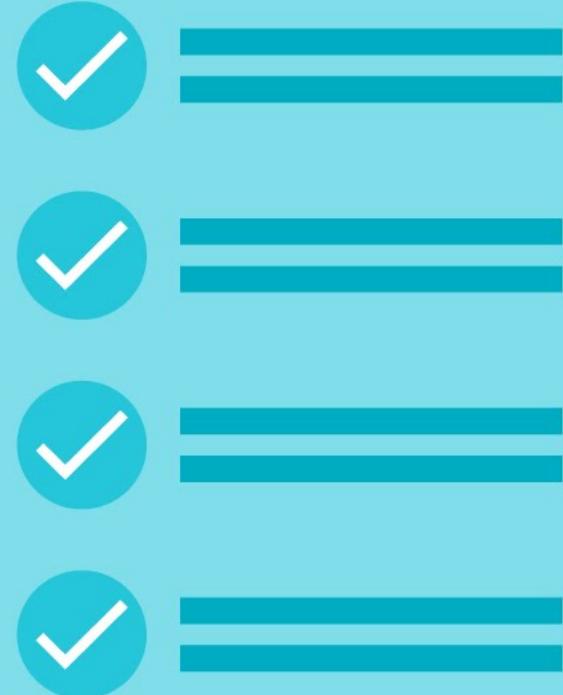
Available on disk: -

Error data

Date:

Sep 2, 2016, 10:56:09
PM

App Version: 1



Test Lab for Android

Test virtually on
popular REAL
devices



Firebase test lab for android

- ❑ Cloud based infrastructure for testing android apps.
- ❑ Test across variety of devices and device configurations.
- ❑ Test results include logs, videos and screenshots.
- ❑ Integrate with android studio and CI systems easily.



S R T E

console.firebaseio.google.com/project/coffeematefbi/testlab/histories

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Firebase CoffeeMateFBI ▾

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Test Lab for Android

TESTS TEMPLATES ?

Test your Android apps against a wide range of devices

[Learn more](#) [View the docs](#)

RUN YOUR FIRST TEST



S R T E

console.firebaseio.google.com/project/coffeematefbi/testlab/run

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Test Lab ← Run a test ?

Choose test type

Robo test

The [Robo test](#) automatically explores your app on a wide array of devices to find defects and report any crashes that occur. Robo test doesn't require you to write app tests.

Instrumentation test

Run the [Espresso](#), [Robotium](#) or [UIAutomator 2.0](#) test that you have written to test your app on a wide array of devices.

Game Loop

A [Game Loop](#) runs specific activities that receive a custom intent.

i Robo test is compatible with apps that use elements from the Android UI framework
If your app uses other UI frameworks (like Unity), the test may only explore your app's first screen.

LEARN MORE

CONTINUE



S R T E console.firebaseio.google.com/project/coffeematefbi/testlab/run/robo https://coffeematefbi.firebaseioapp.com

Firebase CoffeeMateFBI ▾ Go to docs ⋮

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Test Lab ← Run a Robo test ?

① Configure test ② Select dimensions

Upload your app's APK, then select the dimensions that you want to test.

App APK

app-debug.apk BROWSE

CONTINUE

This screenshot shows the Firebase Test Lab interface for running a Robo test. The left sidebar lists various Firebase services, with 'Test Lab' selected. The main area is titled 'Run a Robo test' and displays a two-step process: 'Configure test' (selected) and 'Select dimensions'. It prompts the user to upload their app's APK, which is currently set to 'app-debug.apk'. A 'CONTINUE' button is visible at the bottom right of the configuration step.



S R T E console.firebaseio.google.com/project/coffeematefbi/testlab/run/robo https://coffeematefbi.firebaseioapp.com

Firebase CoffeeMateFBI ▾ Test Lab > Run a Robo test Go to docs ⋮

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Configure test **Select dimensions**

Select the devices, API levels, orientations and locales that you want to run your test on. You must select at least one of each dimension.

Physical devices

Nexus 7 (2013) ASUS

19 21

Pixel Google

25 26

HTC One (M8) HTC

19

Nexus 9 HTC

21

Huawei Mate 9 HUAWEI

24

LG G3 LG

19

LG G4 LG

UPGRADE



console.firebaseio.google.com/project/coffeematefbi/testlab/run/robo

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Firebase CoffeeMateFBI ▾ Test Lab > Run a Robo test Go to docs ⋮

Overview Analytics DEVELOPMENT Authentication Database Storage Hosting Functions Test Lab Crash Reporting Performance GROW Notifications Remote Config Dynamic Links EARN AdMob UPGRADE

Nexus 4 LG
 19 21 22

Nexus 5 LG
 19 21 22 23

Nexus 5X LG
 23 24 25 26

Nexus 6 Motorola
 21 22 23 24 25

Nexus 10 Samsung
 19 21 22

Orientation
 Landscape
 Portrait

Locales
English, Ireland (en_IE) X
Add a locale

Advanced options

Save template 5 devices , 1 orientation , 1 locale

START 5 TESTS



S R T E

console.firebaseio.google.com/project/coffeematefbi/testlab/histories/bh... https://coffeematefbi.firebaseioapp.com

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CoffeeMateFBI

Test matrix	Test type	Started	Total executions	Issues
Matrix No.564145	Robo	10 minutes ago	1	—
Matrix No.721474	Robo	27 minutes ago	3	3 executions crashed
Matrix No.560501	Robo	2 days ago	2	2 executions crashed
Matrix No.738507	Robo	2 days ago	5	1 execution crashed

RUN A TEST



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Test Lab > CoffeeMateFBI ← Matrix No.721474 ?

⚠ Robo test, 28 minutes ago ⓘ

Test execution	Duration	Locale	Orientation	Issues
⚠ Nexus 9, Virtual, API Level 25	14 sec	English, Ireland	Portrait	Crashed
⚠ Pixel, API Level 26	1 min 36 sec	English, Ireland	Portrait	Crashed
⚠ Nexus 6P, Virtual, API Level 26	21 sec	English, Ireland	Portrait	Crashed



S R T E

console.firebaseio.google.com/project/coffeematefbi/testlab/h...

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Test Lab > CoffeeMateFBI > Matrix No.721474 ← Robo test, Nexus 9, Virtual, API Level 25 ?

App crashed during testing

⚠ Failed 21/09/2017, 08:13 14 sec English, Ireland Portrait **VIEW SOURCE FILES**

TEST ISSUES LOGS SCREENSHOTS ACTIVITY MAP VIDEOS PERFORMANCE

java.lang.RuntimeException: Unable to instantiate application ie.cmfbi.main.CoffeeMateApp: java.lang.ClassNotFoundException: Didn't find class "ie.cmfbi.main.CoffeeMateApp" on path: DexPathList[[zip file "/data/app/ie.cmfbi-1/base.apk"],nativeLibraryDirectories=[/data/app/ie.cmfbi-1/lib/x86, /system/lib, /vendor/lib]]

FATAL EXCEPTION: main
Process: ie.cmfbi, PID: 7486
java.lang.RuntimeException: Unable to instantiate application ie.cmfbi.main.CoffeeMateApp:
java.lang.ClassNotFoundException: Didn't find class "ie.cmfbi.main.CoffeeMateApp" on path: DexPathList[[zip file "/data/app/ie.cmfbi-1/base.apk"],nativeLibraryDirectories=[/data/app/ie.cmfbi-1/lib/x86, /system/lib, /vendor/lib]]
at android.app.LoadedApk.makeApplication(LoadedApk.java:802)
at android.app.ActivityThread.handleBindApplication(ActivityThread.java:5377)
at android.app.ActivityThread.-wrap2(ActivityThread.java)
at android.app.ActivityThread\$H.handleMessage(ActivityThread.java:1545)
at android.os.Handler.dispatchMessage(Handler.java:102)
at android.os.Looper.loop(Looper.java:154)
at android.app.ActivityThread.main(ActivityThread.java:6119)
at java.lang.reflect.Method.invoke(Native Method)
at com.android.internal.os.ZygoteInit\$MethodAndArgsCaller.run(ZygoteInit.java:886)
at com.android.internal.os.ZygoteInit.main(ZygoteInit.java:776)
Caused by: java.lang.ClassNotFoundException: Didn't find class "ie.cmfbi.main.CoffeeMateApp" on path:



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Test Lab > CoffeeMateFBI > Matrix No.721474 ← Robo test, Nexus 9, Virtual, API Level 25 ?

⚠ App crashed during testing

⚠ Failed 21/09/2017, 08:13 14 sec English, Ireland Portrait **VIEW SOURCE FILES**

TEST ISSUES **LOGS** SCREENSHOTS ACTIVITY MAP VIDEOS PERFORMANCE

Warning and higher Styled

E 03:16:35.504 **memtrack** Couldn't load memtrack module (No such file or directory)

E 03:16:35.504 **android.os.Debug** failed to load memtrack module: -2

W 03:16:35.624 **dex2oat** Mismatch between dex2oat instruction set features (ISA: X86 Feature string: smp,ssse3,sse4.1,sse4.2,-avx,-avx2,lock_add,popcnt) and those of dex2oat executable (ISA: X86 Feature string: smp,ssse3,sse4.1,sse4.2,-avx,-avx2,-lock_add,popcnt) for the command line:
`/system/bin/dex2oat --zip-fd=6 --zip-location=base.apk --oat-fd=7 --oat-location=/data/app/vmdl1711355130.tmp/oat/x86/base.odex --instruction-set=x86 --instruction-set-variant=silversmont --instruction-set-features=default --runtime-arg -Xms64m --runtime-arg -Xmx512m --compiler-filter=interpret-only --swap-fd=8`

E 03:16:35.625 **cutils-trace** Error opening trace file: Permission denied (13)

W 03:16:35.799 **PackageManager** Not granting permission android.permission.SET_ANIMATION_SCALE to package com.google.android.apps.mtaas.tools (protectionLevel=50 flags=0x3808be44)



S R T E console.firebaseio.google.com/project/coffeematefbi/testlab/histories/bh... Go to docs

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Test Lab > CoffeeMateFBI > Matrix No.721474 ← Robo test, Nexus 9, Virtual, API Level 25 ?

⚠ App crashed during testing

⚠ Failed 21/09/2017, 08:13 14 sec English, Ireland Portrait VIEW SOURCE FILES

TEST ISSUES LOGS SCREENSHOTS ACTIVITY MAP VIDEOS PERFORMANCE

Device Details

Manufacturer	unknown
Brand	generic
Model	GCE x86 phone
Device	gce_x86
Release version	7.1.1
SDK version	25
Play Services	11302470
Version Code	

CoffeeMateFBI has stopped

Open app again

7641e57f.png 03:17

The screenshot displays a crash report for a Nexus 9 device. The 'SCREENSHOTS' tab is highlighted with a red box. The screenshot shows device details and a crash message.



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RUN A TEST

Test matrix	Test type	Started	Total executions	Issues
Matrix No.564145	Robo	10 minutes ago	1	—
Matrix No.721474	Robo	27 minutes ago	3	3 executions crashed
Matrix No.560501	Robo	2 days ago	2	2 executions crashed
Matrix No.738507	Robo	2 days ago	5	1 execution crashed



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Test Lab > CoffeeMateFBI ← Matrix No.564145 ?

Robo test, Just now ⓘ

Failed	Passed	Skipped	Inconclusive
0	1	0	0

Test execution	Duration	Locale	Orientation	Issues
Nexus 9, Virtual, API Level 25	—	English, Ireland	Portrait	—



S R T E

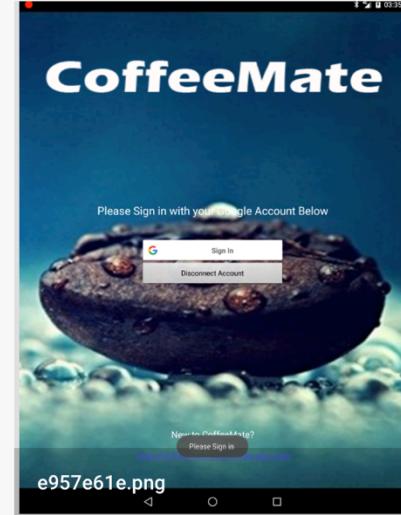
console.firebaseio.google.com/project/coffeematefbi/testlab/histories/bh https://coffeematefbi.firebaseioapp.com

Firebase CoffeeMateFBI Overview Analytics DEVELOP Authentication Database Storage Hosting Functions Test Lab Crash Reporting Performance GROW Notifications Remote Config Dynamic Links EARN AdMob Spark Free \$0/month UPGRADE

Test Lab > CoffeeMateFBI > Matrix No.564145 ← Robo test, Nexus 9, Virtual, API Level 25

Passed 21/09/2017, 08:30 1 min 20 sec English, Ireland Portrait VIEW SOURCE FILES

LOGS SCREENSHOTS ACTIVITY MAP VIDEOS PERFORMANCE







console.firebaseio.google.com/project/coffeematefbi/testlab/histories/bh... [Go to docs](#)

S R T E CoffeeMateFBI – Test Lab for Android – Firebase console https://coffeematefbi.firebaseioapp.com

Firebase

CoffeeMateFBI ▾ Test Lab > Robo test, Nexus 9, Virtual, API Level 25

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Free \$0/month [UPGRADE](#)

W 03:34:02.983 (9) **Finsky(4672): [1] c...** No account configured on this device.

W 03:34:02.989 **Finsky(4672): [1] c...** No account configured on this device.

W 03:34:02.990 (4) **Finsky(4672): [1] c...** No account configured on this device.

W 03:34:02.999 **System** ClassLoader referenced unknown path: /system/priv-app/DownloadProvider/lib/x86

W 03:34:03.005 ClassLoader referenced unknown path: /system/priv-app/MediaProvider/lib/x86

W 03:34:03.006 (2) **Finsky(4672): [292]...** No account configured on this device.

E 03:34:03.027 Finsky(4672): [1] c... onConnectionFailed: ConnectionResult{statusCode=API_UNAVAILABLE, resolution=null, message=null}

W 03:34:03.041 **dex2oat** Mismatch between dex2oat instruction set features (ISA: X86 Feature string: smp,ssse3,sse4.1,sse4.2,-avx,-avx2,lock_add,popcnt) and those of dex2oat executable (ISA: X86 Feature string: smp,ssse3,sse4.1,sse4.2,-avx,-avx2,-lock_add,popcnt) for the command line:

/system/bin/dex2oat --zip-fd=6 --zip-location=base.apk --oat-fd=7 --oat-location=/data/app/vmdl1010021910.tmp/oat/x86/base.odex --instruction-set=x86 --instruction-set-variant=silvermont --instruction-set-features=default --runtime-arg -Xms64m --runtime-arg -Xmx512m --compiler-filter=interpret-only --swap-fd=8

W 03:34:03.041 **dex2oat**

E 03:34:03.041 **cutils-trace** Error opening trace file: Permission denied (13)

W 03:34:03.047 (2) **Finsky(4672): [1] c...** No account configured on this device.

W 03:34:03.054 (4) ... No account configured on this device.

W 03:34:03.214 **PackageManager** Not granting permission android.permission.SET_ANIMATION_SCALE to package com.google.android.apps.mtaas.tools (protectionLevel=50 flags=0x3808be44)



FirebaseStorageEx App *





Test Lab

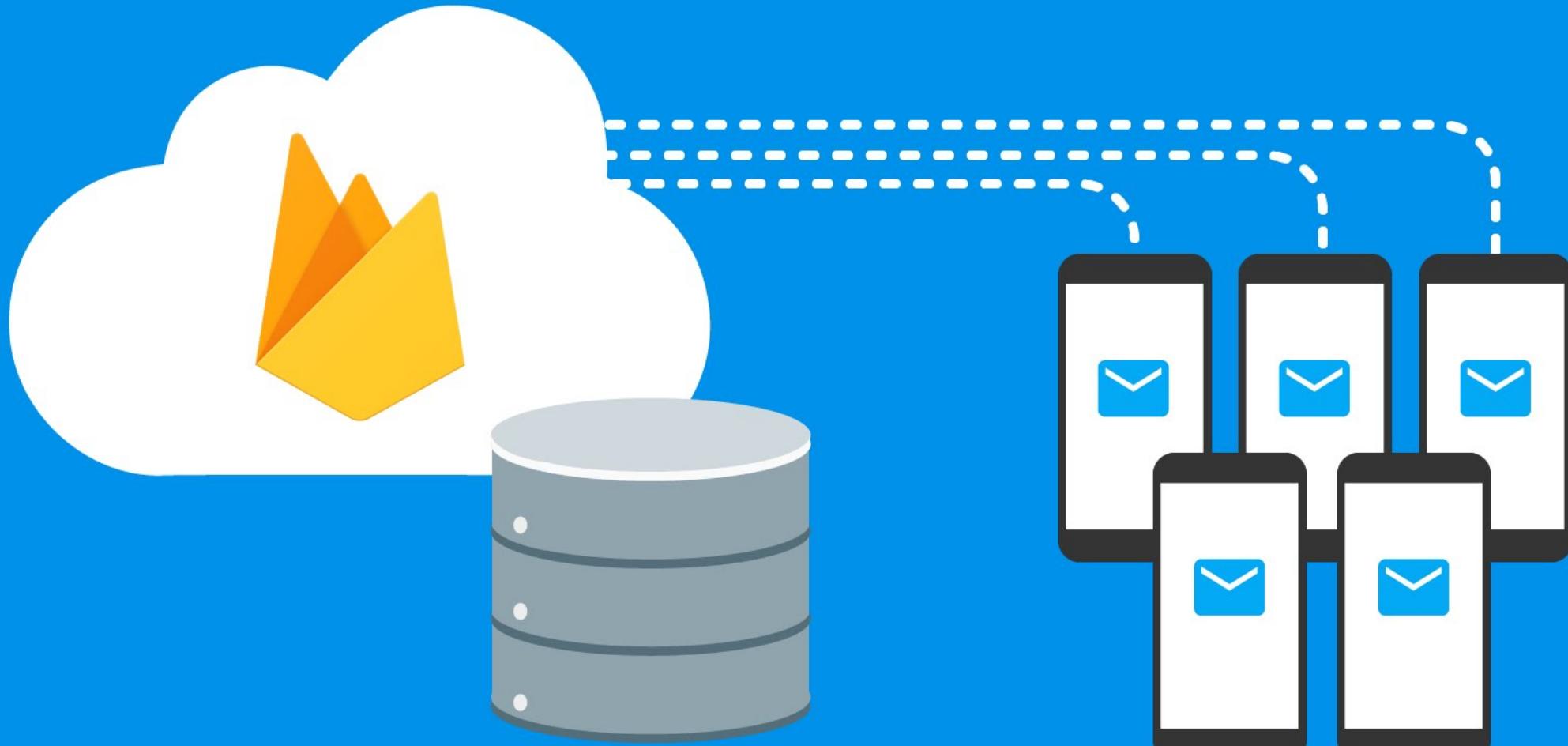


Quick DEMO... (Video)



Pricing

	SPARK Free	FLAME \$25 per month	BLAZE Pay as you go
	Generous limits for hobbyists	Predictable pricing for growing apps	Commodity pricing for apps at scale
Included Free	Analytics, App Indexing, Authentication, Cloud Messaging, Crash Reporting, Dynamic Links, Invites, Notifications & Remote Config	✓	✓
Test Lab	Daily quota or hourly rate	15 tests per day ³	15 tests per day ³ hourly, per device ⁴



Cloud Messaging

The awesome user engagement and more



Firebase Cloud Messaging

- ❑ It is a cross-platform messaging solution that reliably delivers messages at no cost.
- ❑ Send notifications that are displayed to your user. Or send data messages which can be consumed by application code.
- ❑ Distribute messages to your client app in any of three ways — to single devices, to groups of devices, or to devices subscribed to topics.
- ❑ Send acknowledgments from devices back to your server over FCM's reliable and battery-efficient connection channel.
- ❑ 95% of the messages delivered in under 250 milliseconds.



How does FCM works?





FCM message structure

```
{  
  "to" : "APA91bHun4MxP5egoKMwt2KZFBaFUH-1RYqx...",  
  "notification" : {  
    "body" : "great match!",  
    "title" : "Portugal vs. Denmark",  
    "icon" : "myicon"  
  },  
  "data" : {  
    "nick" : "Mario",  
    "room" : "PortugalVSDenmark"  
  }  
}
```



Set up FCM with android app

gradle dependency : compile 'com.google.firebaseio:firebase-messaging:x.x.x'

A service that extends `FirebaseInstanceIdService` is required to handle the creation, rotation, and updation of registration tokens which is required to send the notification or message to specific devices or for creating device groups.

```
<service  
    android:name=". MyFirebaseInstanceIdService">  
    <intent-filter>  
        <action android:name="com.google.firebaseio.INSTANCE_ID_EVENT"/>  
    </intent-filter>  
</service>
```

```
@Override  
public void onTokenRefresh() {  
    String refreshedToken = FirebaseInstanceId.getInstance().getToken();  
    sendRegistrationToServer(refreshedToken);  
}
```



Send FCM from firebase console

- ❑ Open the **Notifications** tab of the Firebase console and select **New Message**.
- ❑ Enter the message text.
- ❑ Select **Single Device** for the message target.
- ❑ In the field labeled **FCM Registration Token**, enter the registration token you obtained in a previous section of this guide.



Receive message

Manifest declaration:-

A service that extends **FirebaseMessagingService** is required if you want to do any message handling beyond receiving notifications on apps in the background.

To receive notifications in foregrounded apps, to receive data payload, to send upstream messages, and so on, you must extend this service.

```
<service  
    android:name=".MyFirebaseMessagingService">  
    <intent-filter>  
        <action android:name="com.google.firebaseio.MESSAGING_EVENT"/>  
    </intent-filter>  
</service>
```



Receive a Message

- ❑ By overriding the method **onMessageReceived**, you can perform actions based on the received RemoteMessage object and get the message data:

```
@Override  
public void onMessageReceived(RemoteMessage remoteMessage) {  
  
    Log.d(TAG, "From: " + remoteMessage.getFrom());  
  
    Log.d(TAG, "Message data payload: " + remoteMessage.getData());  
  
    Log.d(TAG, "Message Notification Body: " +  
        remoteMessage.getNotification().getBody());  
  
}
```



Topic messaging

Subscribe the client app to a topic:

```
FirebaseMessaging.getInstance().subscribeToTopic("Golf");
```

HTTP POST request Send to a single topic:

URL: <https://fcm.googleapis.com/fcm/send>

```
{
  "to": "/topics/Golf",
  "data": {
    "message": "Woods made history!!",
  }
}
```

Topic messaging to multiple topics



Send to a multiple topic:

```
{  
    "condition": "Golf in topics || 'Cricket' in topics",  
    "data": {  
        "message": "Subsidy worth $7mn allotted!"  
    }  
}
```

HTTP response:

```
//Success example:  
{  
    "message_id": "1023456"  
}
```



Device group messaging

Before sending messages to a device group, you must:

- ❑ Obtain registration tokens for each device you want to add to the group.
- ❑ Create the [notification_key](#), which identifies the device group by mapping a particular group (typically a user) to all of the group's associated registration tokens.
- ❑ To create a device group, send a POST request that provides a name for the group, and a list of registration tokens for the devices. FCM returns a new [notification_key](#) that represents the device group



Device group messaging

- ❑ HTTP post to : <https://android.googleapis.com/gcm/notification>

project_id:SENDER_ID

```
{  
    "operation": "create",  
    "notification_key_name": "appUser-Chris",  
    "registration_ids": ["token1", "token2", ..... "token 9"]  
}
```

- ❑ Response format

```
{  
    "notification_key": "APA91bGHXQBB...9QgnYOEURwm0I3lmyqzk2TXQ"  
}
```



Send an upstream message

To initiate an upstream message, the client app sends a request containing the following:

- ❑ The address of the receiving app server in the format **SENDER_ID@gcm.googleapis.com**.
- ❑ A **message ID** that should be unique for each sender ID.
- ❑ The message data comprising the key-value pairs of the message's payload.

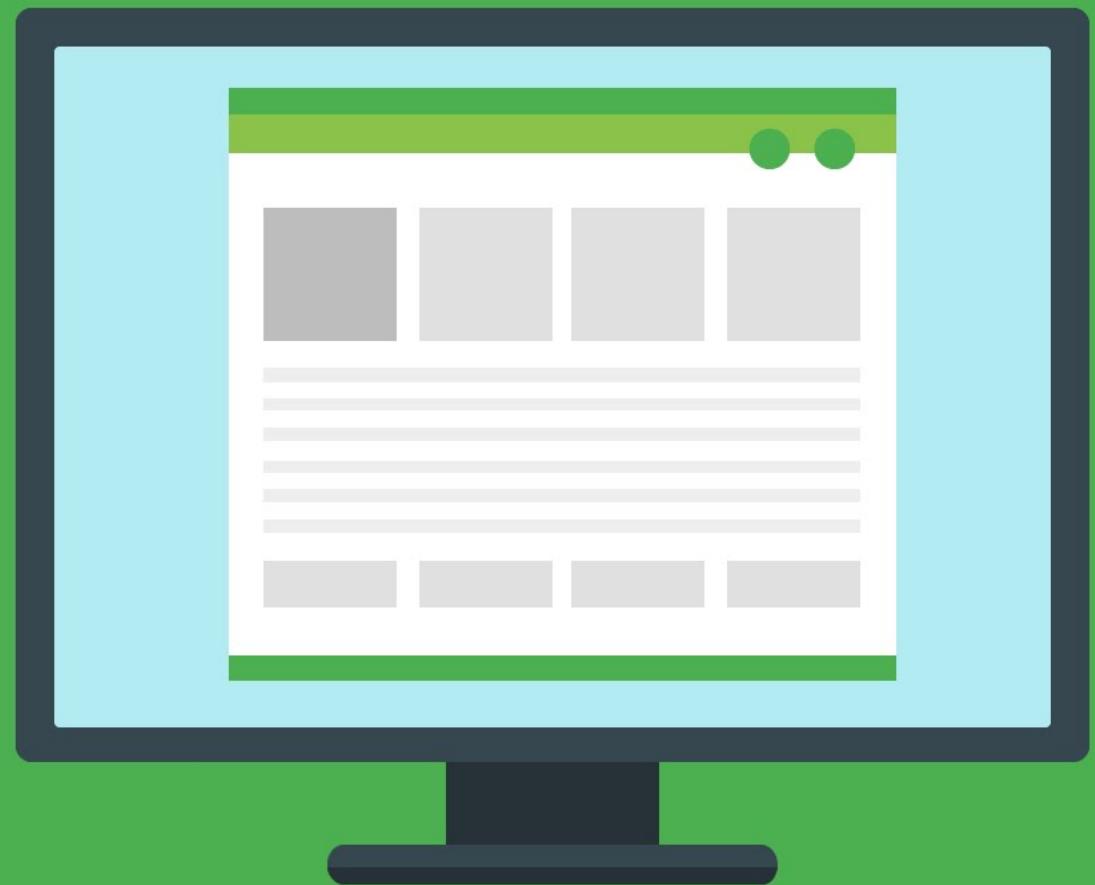
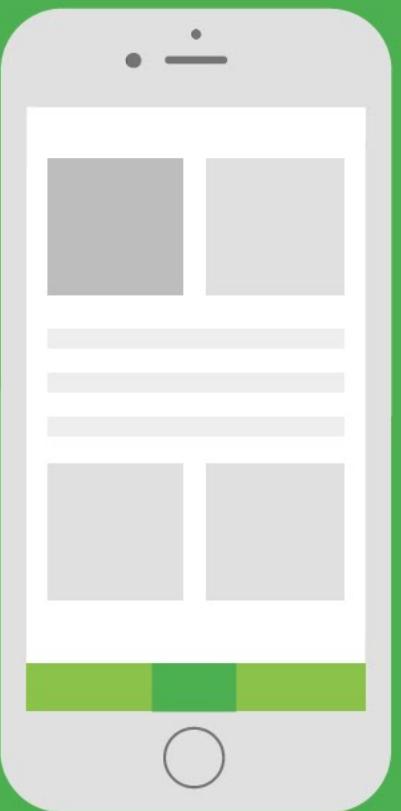
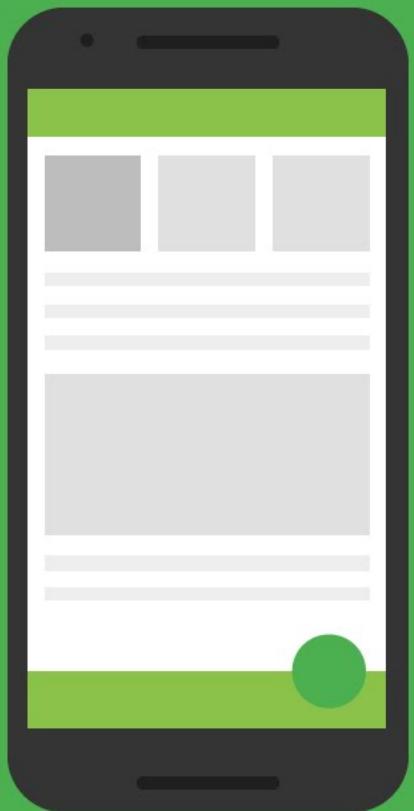
```
FirebaseMessaging fm = FirebaseMessaging.getInstance();
fm.send(new RemoteMessage.Builder(SENDER_ID + "@gcm.googleapis.com")
    .setMessageId(Integer.toString(msgId.incrementAndGet()))
    .addData("my_message", "Hello World")
    .addData("my_action", "SAY_HELLO")
    .build());
```

- ❑ Check the status of upstream messages with callbacks **onMessageSent** and **onSendError**.



Migrating from GCM

- ❑ In the Firebase console, select Import Google Project.
- ❑ All the permissions required by FCM are now added automatically by library.
- ❑ `com.google.android.gms.gcm.GcmReceiver` is already with FCM added automatically. No need to add in manifest.
- ❑ Remove registration.
- ❑ GcmPubSub methods have been integrated and simplified in the `FirebaseMessaging` class.



Dynamic Links

Works the way it's
supposed to



Firebase Dynamic Links

- ❑ When users open a Dynamic Link into an app that is not installed, the app's Play Store page opens, where users can install the app. After users install and open the app, the app displays the deep-linked content.
- ❑ Dynamic Links work seamlessly across iOS, Android, and web apps.
- ❑ If your app needs to be upgraded to open a link, your app automatically opens the link (with appropriate content) after upgrading.
- ❑ Create short links using the Firebase console.
- ❑ Free, unlimited use.

Create a Dynamic Link



Gradle dependency: 'com.google.firebaseio:firebase-invites:x.x.x'

- ❑ In the Firebase Console, open the **Dynamic Links** section. Accept the terms of service if you are prompted to do so.
- ❑ Take note of your project's Dynamic Links domain, which is displayed at the top of the Dynamic Links page. You need your project's Dynamic Links domain to programmatically create Dynamic Links. A Dynamic Links domain looks like *app_code.app.goo.gl*.

You can also create a Dynamic Link programmatically by constructing a URL with the following form:

- ❑ *https://domain/?link=your_deep_link&apn=package_name[&amv=minimum_version][&al=android_link][&afl=fallback_link]*

Open Dynamic Links in your app



- you must call **getInvitation()** in every activity that might be launched by the link, even though the link might be available from the intent using **getIntent().getData()**.
- Calling **getInvitation()** retrieves the link and clears that data so it is only processed once by your app.

intent-filter>

```
<action android:name="android.intent.action.VIEW"/>
<category android:name="android.intent.category.DEFAULT"/>
<category android:name="android.intent.category.BROWSABLE"/>
<data android:host="www.example.com" android:scheme="http"/>
<data android:host="www.example.com" android:scheme="https"/>
</intent-filter>
```

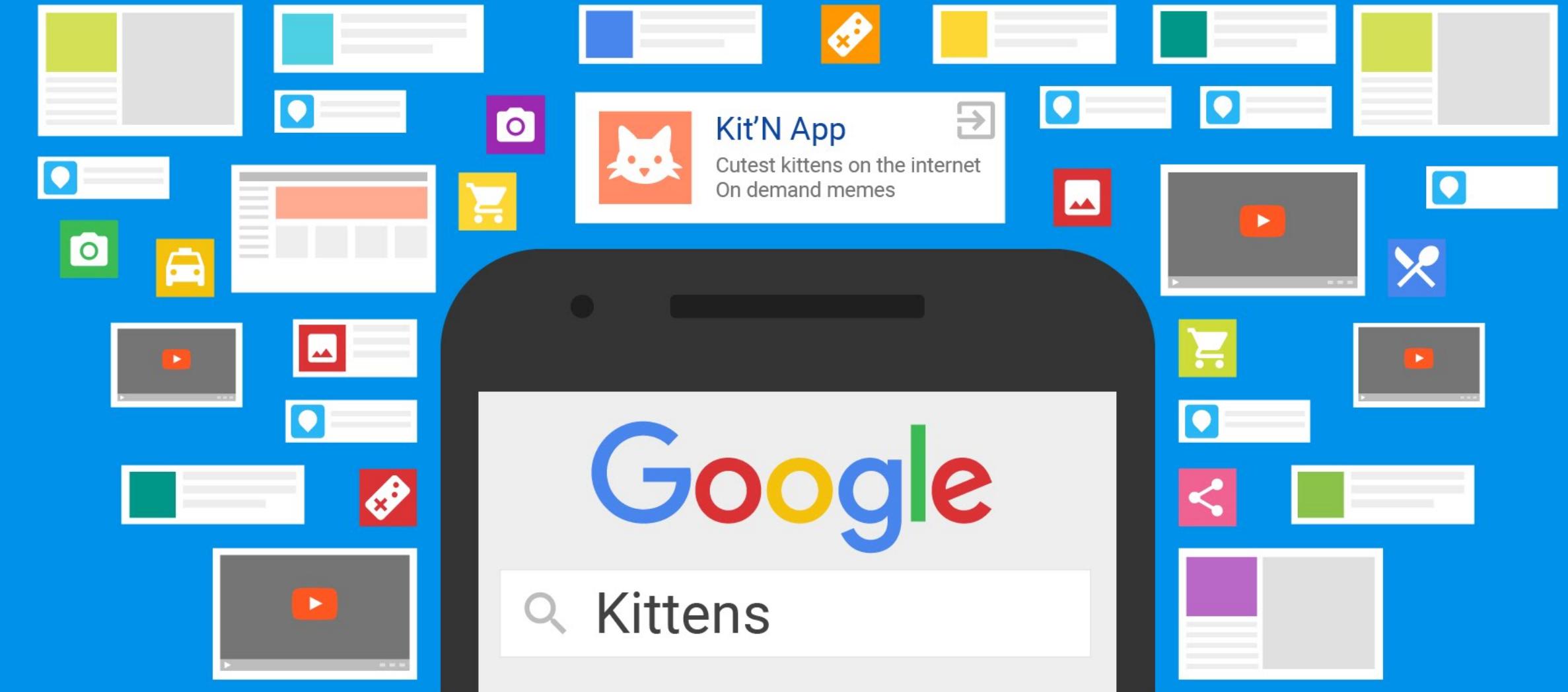
Handle deep links



```
mGoogleApiClient = new GoogleApiClient.Builder(this).enableAutoManage(this, this)
    .addApi(AppInvite.API).build();

boolean autoLaunchDeepLink = false;
AppInvite.AppInviteApi.getInvitation(mGoogleApiClient, this, autoLaunchDeepLink)
    .setResultCallback(
        new ResultCallback<AppInviteInvitationResult>() {

            @Override
            public void onResult(@NonNull AppInviteInvitationResult result) {
                if (result.getStatus().isSuccess()) {
                    Intent intent = result.getInvitationIntent();
                    String deepLink = AppInviteReferral.getDeepLink(intent);
                }
            });
});
```



App Indexing

Measure your Success



App Indexing

- ❑ Firebase App Indexing gets your app into Google Search.
- ❑ If users have your app installed, they can launch your app and go directly to the content they searched for.
- ❑ App Indexing re-engages your app users by helping them find both public and personal content right on their device, even offering query **auto completions** to help them more quickly find what they need.
- ❑ If users don't yet have your app, relevant queries trigger an install card for your app in Search results.

Gradle dependencies: **compile 'com.google.firebaseio.firebaseio-appindexing:x.x.x'**



Enable public content

1. Associate your site and your app

Associate your site with your app using **Digital Asset Link** and build your app against **API level 23** or higher for the Android platform.

Digital Asset Links take the form of a JSON file called **assetlinks.json** in your web server's well-known directory. Configure the following fields in your assetlinks.json file:

```
[  
  {  
    "relation": ["delegate_permission/common.handle_all_urls"],  
    "target" : { "namespace": "android_app",  
                "package_name": "com.recipe_app",  
                "sha256_cert_fingerprints": ["hash_of_app_certificate"] }  
  }]
```

Upload your **assetlinks.json** file and make sure the read access is set as visible to everyone at <https://<your-site>/.well-known/assetlinks.json>.



Enable public content

2 . Route incoming links

```
<activity  
    android:name=".client.RecipeActivity"  
<intent-filter android:label="@string/app_name" android:autoVerify="true">  
    <action android:name="android.intent.action.VIEW" />  
    <category android:name="android.intent.category.DEFAULT" />  
    <category android:name="android.intent.category.BROWSABLE" />  
  
    <data android:scheme="http"  
        android:host="recipe-app.com"  
        android:pathPrefix="/recipe" />  
</intent-filter>  
</activity>
```



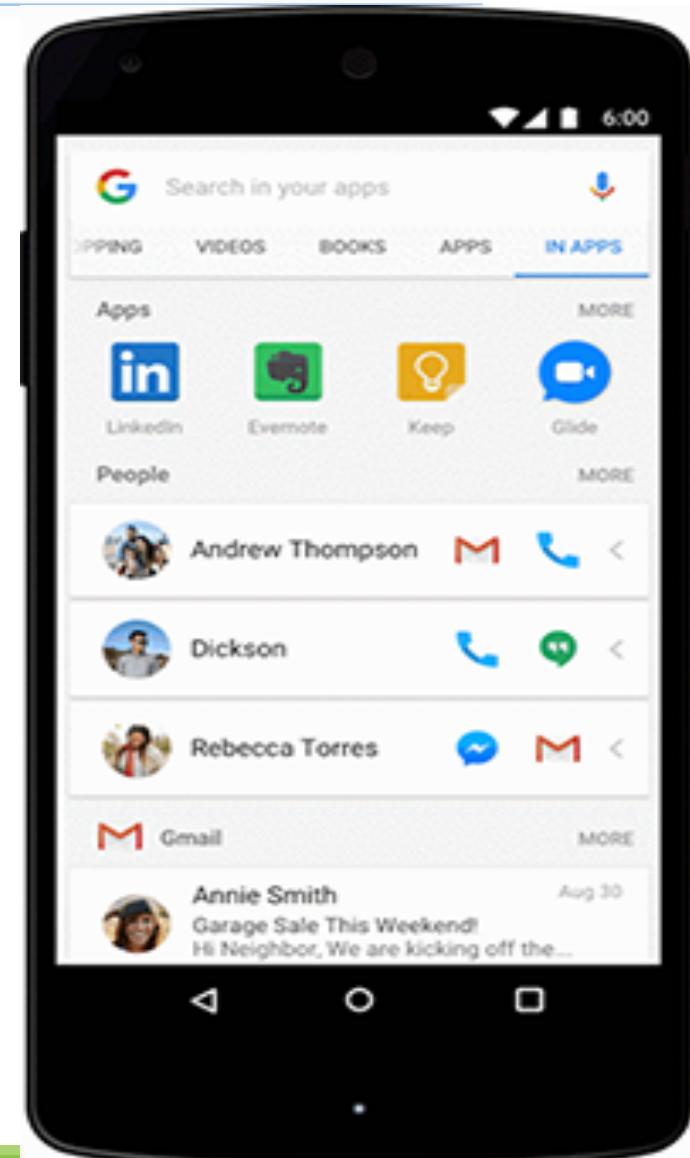
Handle incoming URLs

```
Intent intent = getIntent();
String action = intent.getAction();
String data = intent.getDataString();
if (Intent.ACTION_VIEW.equals(action) && data != null)
{
    // process your link
    String recipId = data.substring(data.lastIndexOf("/") + 1);
}
```

Enable Personal Content Indexing



- Create an IntentService.
- To include items in the app's personal content index, create **Indexable** objects in the same class.
- Set the unique URL and title for each indexable object through the `setUrl()` and `setName()` setters, respectively. **These properties are required**.
- To create your indexable objects more conveniently, use existing builders whenever possible (e.g., for messages, documents, and spreadsheets).
- For content types that don't have custom builders, use the generic `Indexable.Builder()`.



Generate and refresh the index



- ❑ Use intent filters to add user's existing personal content to the on-device index and allow Google Play services to periodically call `AppIndexingService` to update the index
- ❑ With this periodic update, the on-device index accurately reflects any changes that happen to the indexed content over time.

```
<service android:name=".client.AppIndexingService"
    android:exported="true"
    android:permission="com.google.android.gms.permission.APPINDEXING">
    <intent-filter>
        <action android:name="com.google.firebaseio.appindexing.UPDATE_INDEX" />
    </intent-filter>
</service>
```



Remove/update the personal content

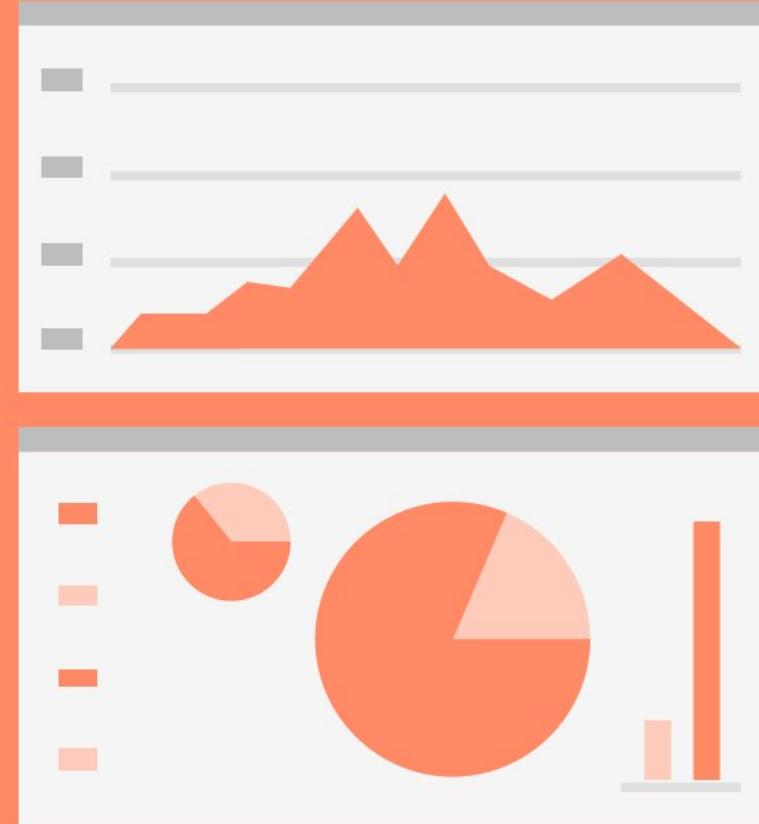
```
FirebaseAppIndex.getInstance().remove(noteUrl);  
FirebaseAppIndex.getInstance().update(noteUrl);  
FirebaseAppIndex.getInstance().removeAll();
```

Define Indexable objects for the following types of content:

- Content that's important to users, such as favorites or content that they may want to access more frequently. For example, documents or songs that they've bookmarked or marked for offline use.
- Content generated in your app, not just accessed by it. For example, contacts that are created by users directly in your app, and stored by your app, not contacts from the phone's directory.



Analytics



Measure your Success



Some important points

- ❑ Do not think RDBMS, think JSON. How data should be structured is very important.
- ❑ Firebase has a recycler view, that integrates with real time database smoothly without any listeners.
- ❑ Test lab which is available in paid plan (Blaze), is an amazing feature for testing your app on different real and virtual devices.
- ❑ Set developer mode to true when testing remote config.



References & Links

- ❑ [Presentation by Kaushal Dhruw & Shakti Moyal 2016](#)
- ❑ <https://firebase.google.com>
- ❑ Demo app available at <https://goo.gl/WBP5fR>



Questions?