

Android Widgets & Firebase Messaging Service



COEN 268 - Group 6

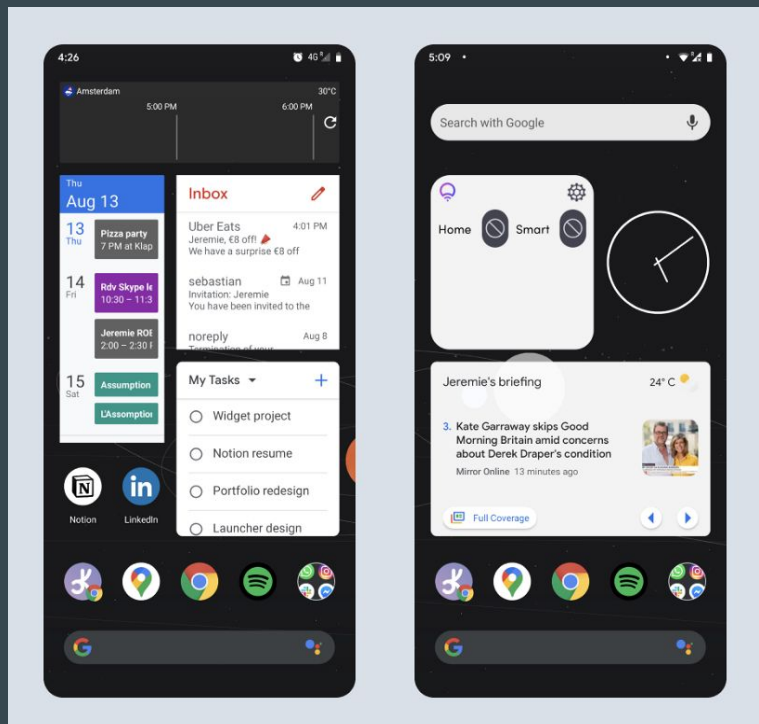
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Android Widgets



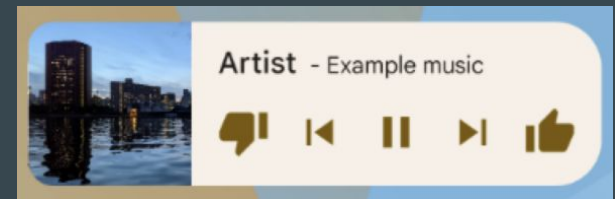
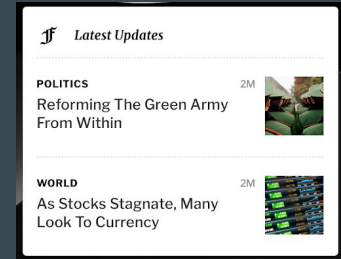
Widgets Overview

- An essential aspect of home screen customization.
- Contains a quick view of an app's most important data.
- Extends app functionality to the home screen for easy accessibility.
- Can be resized to increase or decrease amount of information/functionality.



Types of Widgets

- Information widgets:
 - At-a-glance look for a few crucial information elements.
- Collection widgets:
 - Displays multiple elements of same type.
- Control widgets:
 - Offer the most essential functions directly on the home screen.
- Hybrid widget:
 - Combination of information, collections, controls, and others features.



Widget Design Guidelines

- Content
 - Only contain the most essential content.
 - Must open app to get the full details.
- Navigation
 - Allow users to navigate to the home screen or directly to a frequently viewed page.
- Size Adaptability
 - Users may adjust the widget dimensions.
 - Layout must be flexible to accommodate more or less space.



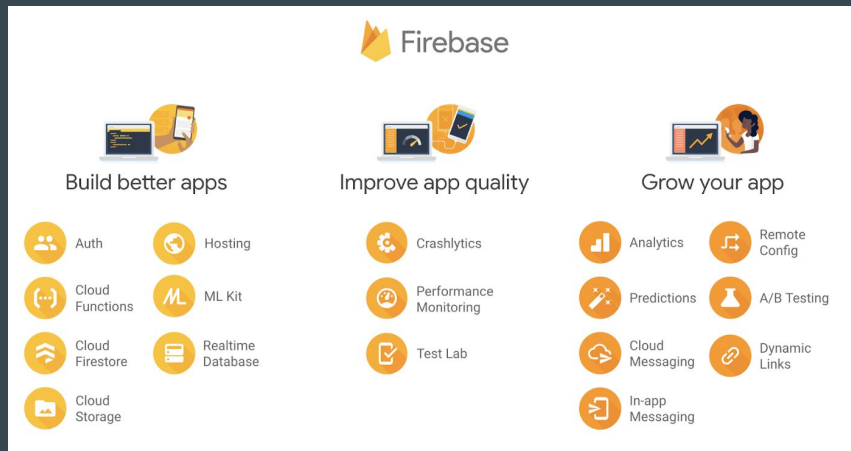
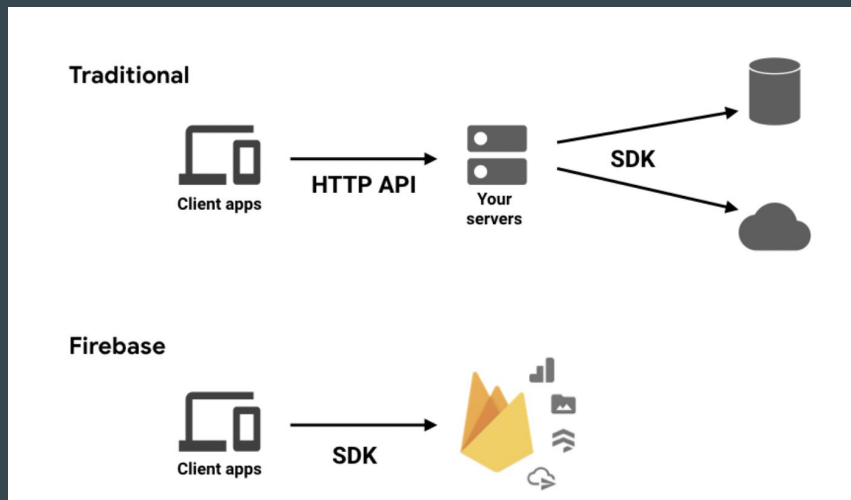
Widget Code Walkthrough and Demo

Firestore Cloud Messaging (FCM)



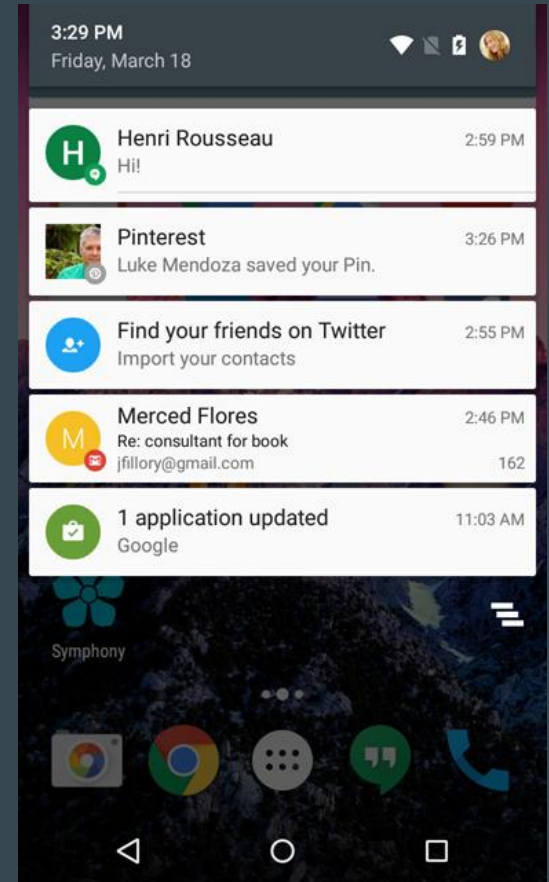
What is Firebase?

- Google-backed application development software.
- Enables developers to develop mobile and web apps.
- The services are hosted in the cloud, and scale with little to no effort on the part of the developer.
- Consists of a huge toolset for things like analytics, authentication, databases, configuration, file storage, push messaging, etc.



What is FCM?

- Firebase Cloud Messaging lets you deliver push messages to indicate something of interest to your app.
- Keeps users engaged with your app.
- Message Types:
 - Notification messages - FCM automatically displays the message to end-user devices on behalf of the client app
 - Data messages - Client app is responsible for processing data messages.



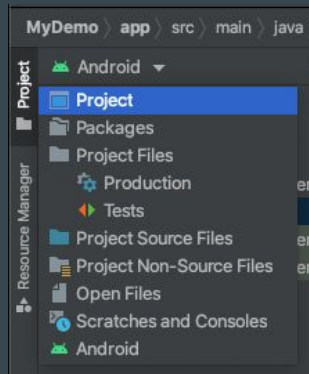
FCM Features

- Versatile message targeting
 - Distribute messages to your client app —to single devices, to groups of devices, or to devices subscribed to topics.
- Advantage:
 - Send a message to members of a particular Analytics audience or Predictions groups.
- Two ways to send a message:
 - Write code on your backend to ping your app.
 - Compose a message in the Firebase console to ping your users with information of interest.

Integration

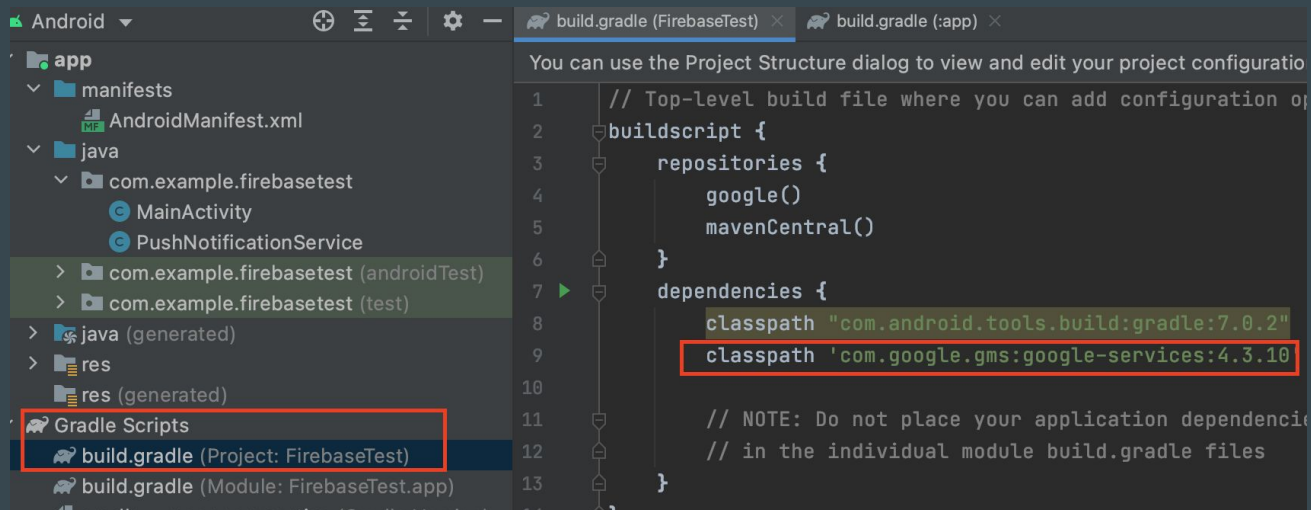


1. Create Android Studio project
2. Create Firebase project and follow steps for connecting app to Firebase
3. In Android Studio
 - a. Add dependencies in project-level gradle and app-level gradle and sync project
4. (Optional for in-app Notifications)
 - a. Create an activity for Push Notification Service
 - b. Add service to manifest
5. Go to the FCM console under Engage > Cloud Messaging
 - a. Create and send push notifications from the FCM console



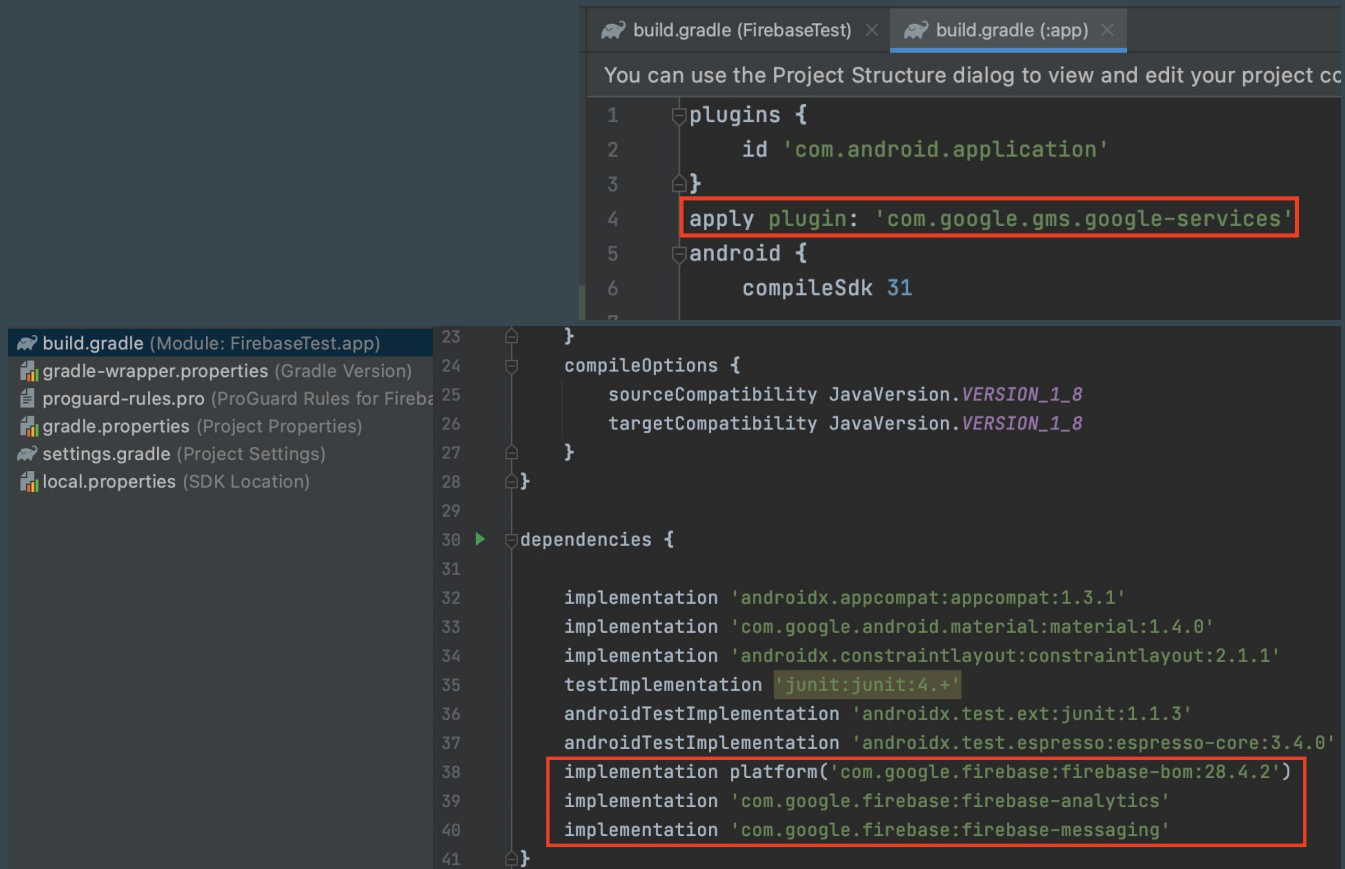
Code

Add dependencies in
project-level
build.gradle



Code

Add dependencies
and plugins in
app-level build.gradle



The screenshot displays an IDE with two tabs at the top: 'build.gradle (FirebaseTest)' and 'build.gradle (:app)'. The 'build.gradle (:app)' tab is active, showing the following code:

```
1 plugins {  
2     id 'com.android.application'  
3 }  
4 apply plugin: 'com.google.gms.google-services'  
5 android {  
6     compileSdk 31  
7 }
```

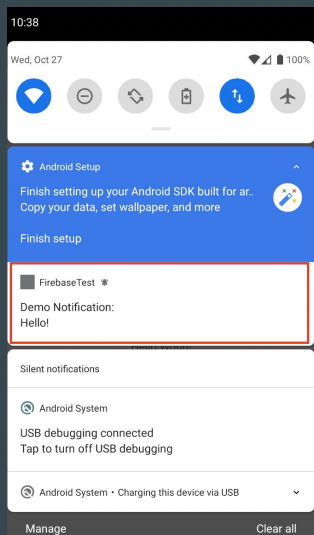
The 'build.gradle (Module: FirebaseTest.app)' tab is also visible, showing the following code:

```
23  
24 compileOptions {  
25     sourceCompatibility JavaVersion.VERSION_1_8  
26     targetCompatibility JavaVersion.VERSION_1_8  
27 }  
28  
29  
30 dependencies {  
31  
32     implementation 'androidx.appcompat:appcompat:1.3.1'  
33     implementation 'com.google.android.material:material:1.4.0'  
34     implementation 'androidx.constraintlayout:constraintlayout:2.1.1'  
35     testImplementation 'junit:junit:4.+'  
36     androidTestImplementation 'androidx.test.ext:junit:1.1.3'  
37     androidTestImplementation 'androidx.test.espresso:espresso-core:3.4.0'  
38     implementation platform('com.google.firebase:firebase-bom:28.4.2')  
39     implementation 'com.google.firebase:firebase-analytics'  
40     implementation 'com.google.firebase:firebase-messaging'  
41 }
```

The 'dependencies' block in the 'build.gradle (Module: FirebaseTest.app)' tab is highlighted with a red box, and the 'apply plugin: 'com.google.gms.google-services'' line in the 'build.gradle (:app)' tab is also highlighted with a red box.

Code

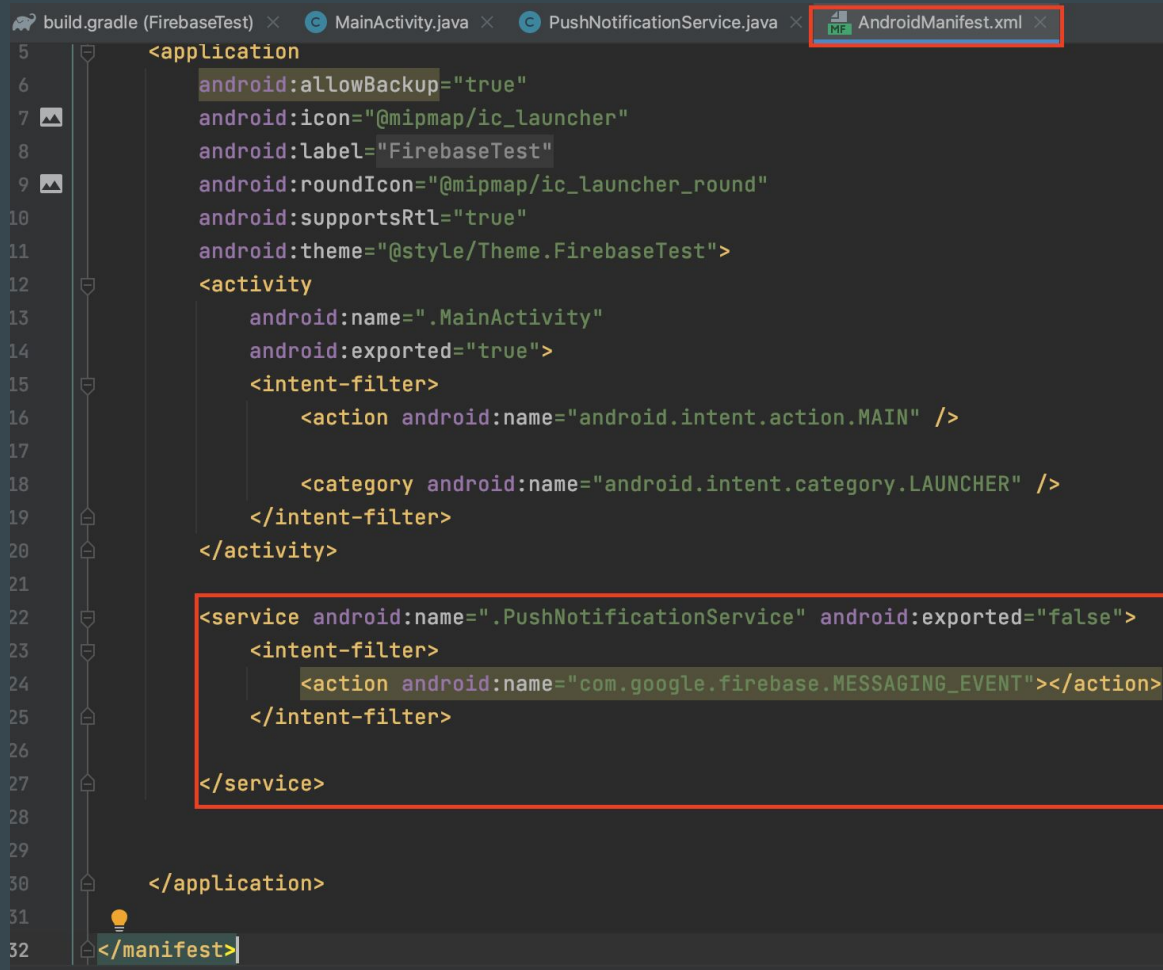
Add a new service for Push Notifications



```
build.gradle (FirebaseTest) x MainActivity.java x PushNotificationService.java x AndroidManifest.xml x
3  import android.app.Notification;
4  import android.app.NotificationChannel;
5  import android.app.NotificationManager;
6
7  import androidx.annotation.NonNull;
8  import androidx.core.app.NotificationManagerCompat;
9
10 import com.google.firebase.messaging.FirebaseMessagingService;
11 import com.google.firebase.messaging.RemoteMessage;
12
13 public class PushNotificationService extends FirebaseMessagingService {
14     @Override
15     public void onMessageReceived(@NonNull RemoteMessage remoteMessage) {
16         String title = remoteMessage.getNotification().getTitle();
17         String text = remoteMessage.getNotification().getBody();
18         final String CHANNEL_ID = "HEADS_UP_NOTIFICATION";
19         NotificationChannel channel = new NotificationChannel(
20             CHANNEL_ID, name: "Heads Up Notification", NotificationManager.IMPORTANCE_HIGH
21         );
22         getSystemService(NotificationManager.class).createNotificationChannel(channel);
23         Notification.Builder notification = new Notification.Builder(context: this, CHANNEL_ID)
24             .setContentTitle(title)
25             .setContentText(text)
26             .setSmallIcon(R.drawable.ic_launcher_background)
27             .setAutoCancel(true);
28
29         NotificationManagerCompat.from(this).notify(id: 1, notification.build());
30         super.onMessageReceived(remoteMessage);
31     }
32 }
```

Code

Add action for
PushNotificationService to
AndroidManifest.xml



```
build.gradle (FirebaseTest) x MainActivity.java x PushNotificationService.java x AndroidManifest.xml x
5      <application
6          android:allowBackup="true"
7          android:icon="@mipmap/ic_launcher"
8          android:label="FirebaseTest"
9          android:roundIcon="@mipmap/ic_launcher_round"
10         android:supportsRtl="true"
11         android:theme="@style/Theme.FirebaseTest">
12      <activity
13          android:name=".MainActivity"
14          android:exported="true">
15          <intent-filter>
16              <action android:name="android.intent.action.MAIN" />
17
18              <category android:name="android.intent.category.LAUNCHER" />
19          </intent-filter>
20      </activity>
21
22      <service android:name=".PushNotificationService" android:exported="false">
23          <intent-filter>
24              <action android:name="com.google.firebase.MESSAGING_EVENT"></action>
25          </intent-filter>
26
27      </service>
28
29
30  </application>
31
32  </manifest>
```

Firestore

Storage

Hosting

Functions

Machine Learning

Release and monitor

Crashlytics, Performance, Test La...

Analytics

Dashboard, Realtime, Events, Conv...

Engage

Predictions

A/B Testing

Cloud Messaging

In-App Messaging

Remote Config

Dynamic Links

AdMob

FirestoreDemo

Go to docs

Cloud Messaging

Notifications

Reports

Search by campaign name, message content, campaign status and platform

Create experiment

New notification

Notification	Status	Platform	Start/Send	End	Sends	Opens
In App Notify Firestore Demo for Class	Completed		26 Oct 2021 16:51	—	<1,000	0%
In App Notification Firestore Demo	Completed		26 Oct 2021 16:50	—	<1,000	0%
Notification Title Hello!	Completed		26 Oct 2021 16:42	—	<1,000	0%
My First Notification YES!!!	Completed		26 Oct 2021 16:39	—	<1,000	0%

0/10 Recurring notifications

Show the previous page

View and analyse detailed FCM message data in BigQuery

Link BigQuery

1 Notification

Notification title ⓘ

Demo Notification:

Notification text

Hello !

Notification image (optional) ⓘ

Example: <https://yourapp.com/image.png>

Notification name (optional) ⓘ

Enter optional name

Device preview

This preview provides a general idea of how your message will appear on a mobile device. Actual message rendering will vary depending on the device. Test with a real device for actual results.

Send test message

Initial state Expanded view

Demo Notification:
Hello !

Android

Demo Notification:
Hello !

iOS

Next

2 Target

User segment

Topic

Target user if...

App



com.example.firebase-test



and

Target another app

Next

3

Scheduling


Send to eligible users

Now


Next

Review message


Notification content

 Hello !

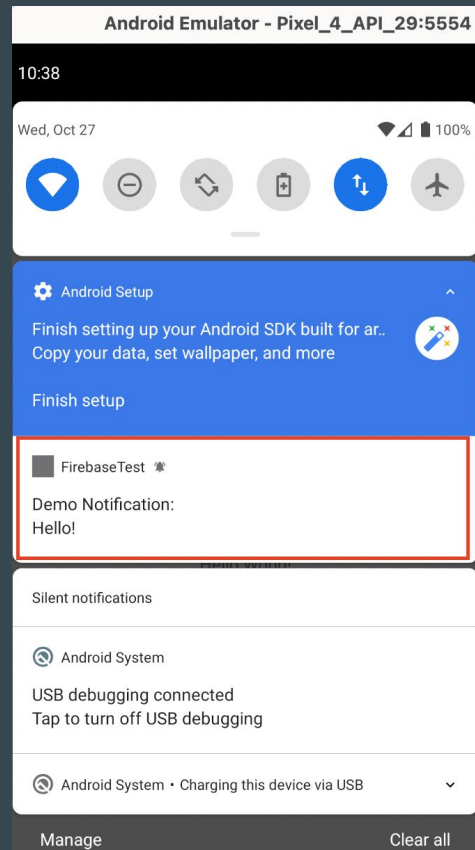
Target

 User segment matching one targeting criterion

Scheduling

 Send now

Cancel **Publish**



FCM Demo

<https://console.firebase.google.com>

References

<https://medium.com/android-dev-hacks/firebase-cloud-messaging-772c9680c97e>

<https://developer.android.com/guide/topics/appwidgets/overview>

<https://medium.com/firebase-developers/what-is-firebase-the-complete-story-abridged-bcc730c5f2c0>