

CREATE-BEST

Module 1 – Creating a Cloud database for your Android Application

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Agenda

- Motivation
- Development of a Back-end
 - Cloud Server
 - Custom Server
 - Mobile Backend as a Service
- Overview of Firebase
- Basics of JSON objects
- Creating a Firebase database
- Reading and Saving data
- Basic Firebase Example

Motivation

- If you are planning to develop a mobile app, chances are that you will require a **backend** for **storing** information, or **managing** content.
- Depending on your needs, your knowledge and the project requirements, you have several options for developing a backend:
 1. **Custom server:** You can set up your own server and host the backend on it. You will have complete control over the server and you can customize it to your specific requirements.
 2. **Cloud servers:** Cloud servers mean virtual servers which run on cloud computing environment. Amazon AWS, Google App Engine and Azure are the most popular cloud server options.
 3. **Mobile Backend as a Service (MBaaS):** BaaS enables you to manage a centralised database that lets your users share content via the cloud.

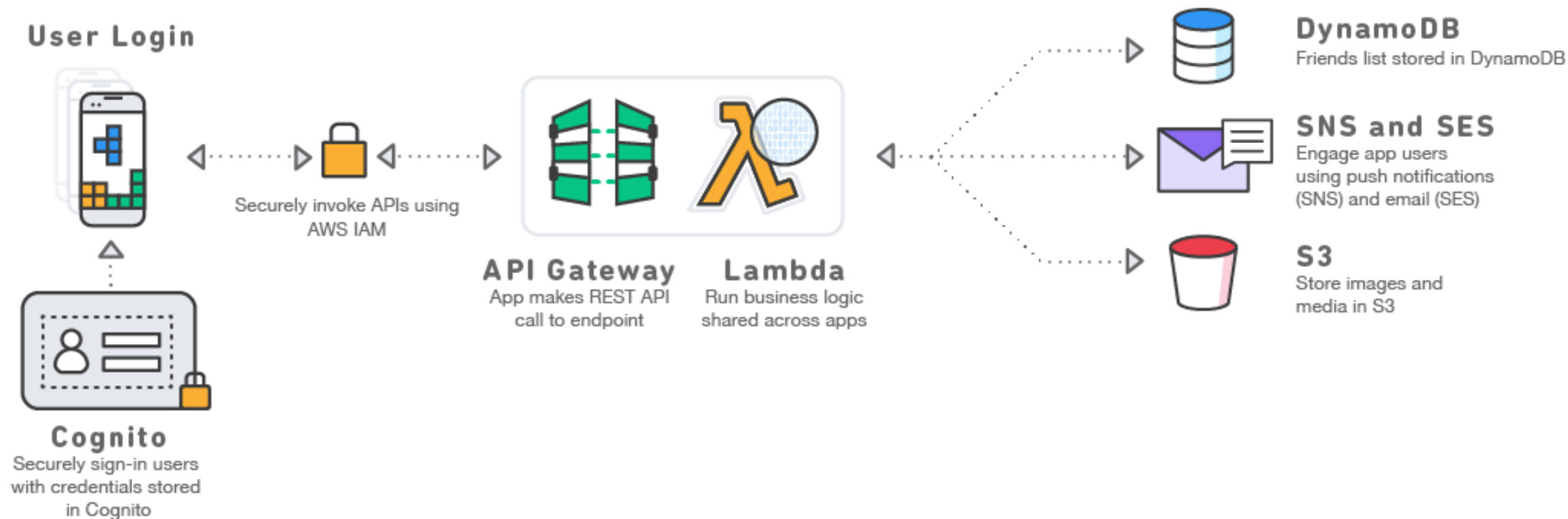
Custom Server

- **What is required?**

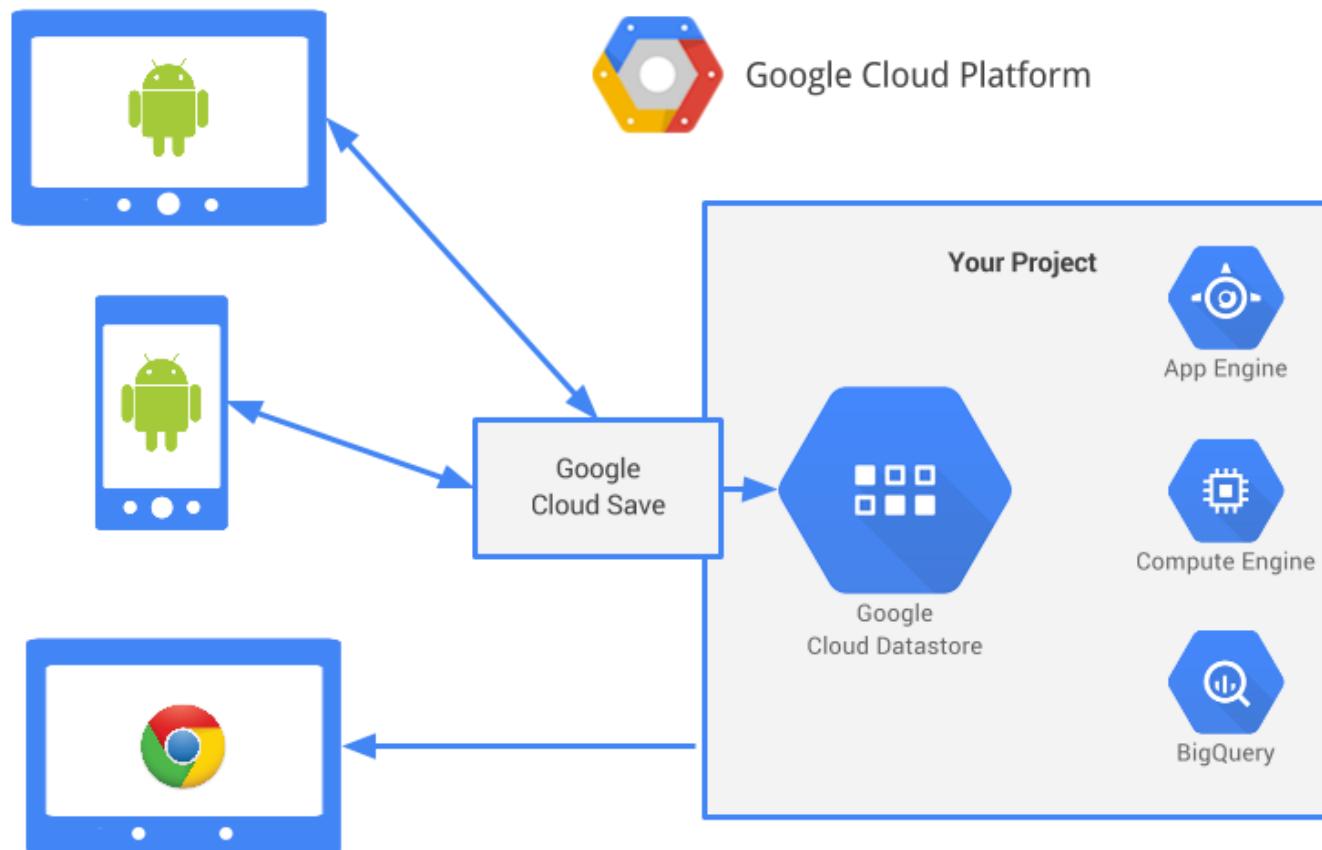
1. Select the technology to be used for the the server-side environment.
2. Setting up the environment
3. Develop an API (REST?)
4. Add Authentication
5. Handle security, routes, etc.
6. And more..



Cloud Server - AWS



Cloud Server – Google Cloud Platform

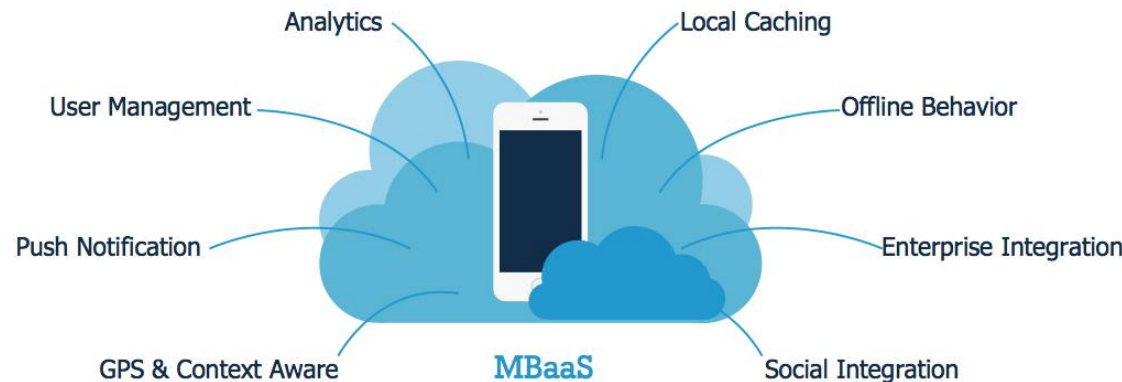


Mobile Backend as a Service (MBaaS)

- The basic idea is similar to having your back-end development, maintenance and management outsourced to another party.

In other words,

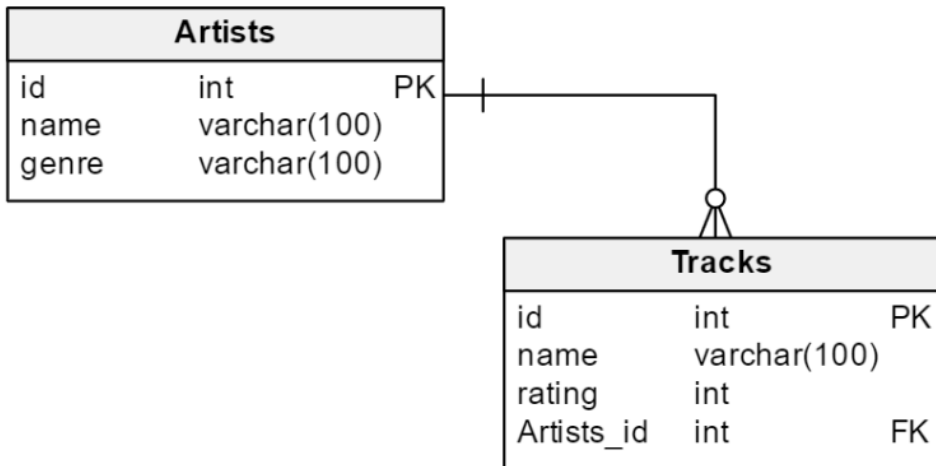
The back-end is made available to developers as a web service.



Ever Heard of Firebase?

- **Firestore**, a popular backend platform acquired by Google in October 2014.
- Firestore allows you to store and sync data to a **NoSQL cloud database**.
 - The data is stored as **JSON**, synced to all connected clients in realtime, and available when your app goes offline.
 - It offers APIs that enable you to **authenticate** users with email and password, Facebook, Twitter, GitHub, Google, anonymous auth, or to integrate with existing authentication system.
 - Other than the Realtime Database and Authentication, it offers a myriad of other services including Cloud **Messaging, Storage, Hosting, Remote Config**, Test Lab, Crash Reporting, Notification, App Indexing, Dynamic Links, Invites, AdWords, AdMob.

Firestore Data Basics – JSON objects



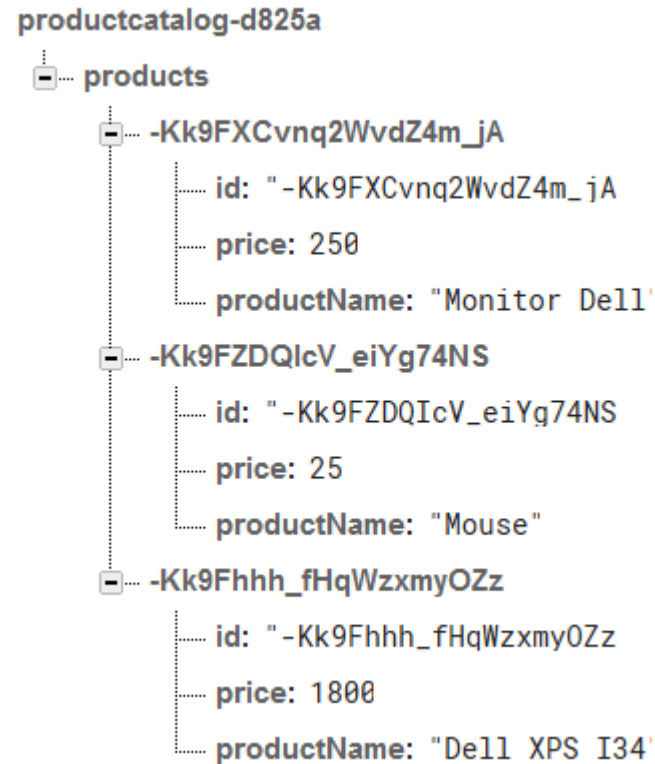
SQL

**NON
SQL**

```
{
  "Artists":{
    "artist_id_1":{
      "name":"Atif Aslam",
      "genre":"Rock"
    },
    "artist_id_2":{
      "name":"Arijit Singh",
      "genre":"Rock"
    }
  },
  "Tracks":{
    "artist_id_1":{
      "track_id_1":{
        "name":"Taj dar e haram",
        "rating":5
      }
    }
  }
}
```

Firestore Terminology

- All Firestore Realtime Database data is stored as JSON objects.

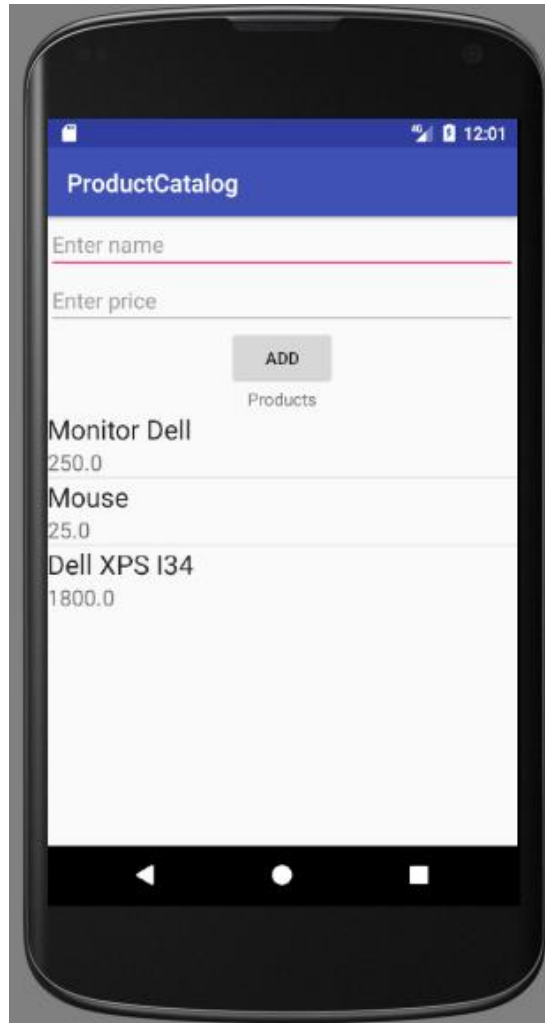


BASIC FIREBASE EXAMPLE

User Interface

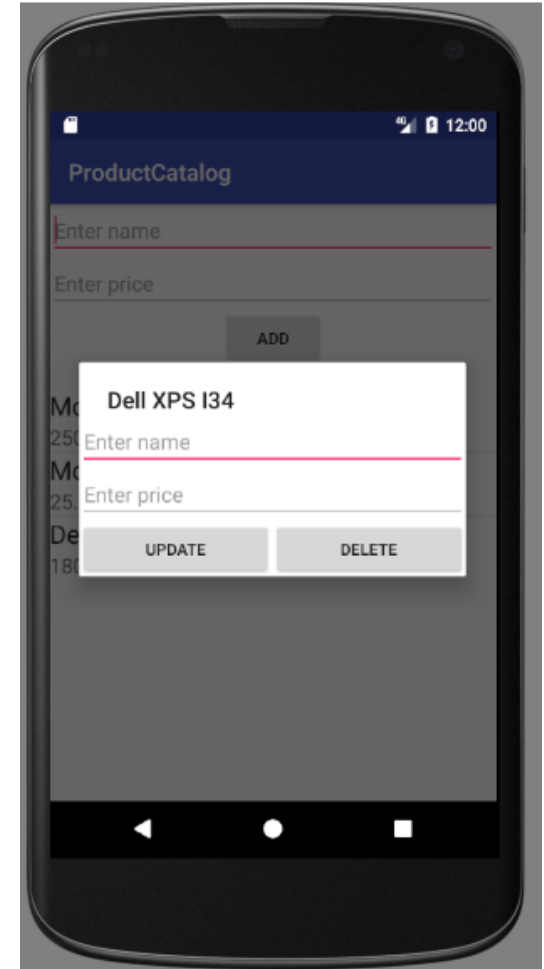
Main Interface: RelativeLayout

- > EditText
- > EditText
- > Button
- > TextView
- > ListView





Update Dialog: LinearLayout

- > EditText
- > EditText
- > LinearLayout
- > Button
- > Button



STEP 1 – Make an Account

- The **free account** gives you the ability to have 100 devices connect to Firebase at a single point in time.

| | Spark Plan Generous limits for hobbyists | Flame Plan Predictable pricing for growing apps | Blaze Plan Calculate pricing for apps at scale |
|--|--|--|---|
| Products | Free | \$25/month | Pay as you go |
|  <p>Analytics, App Indexing, Dynamic Links, Invites, Remote Config, Cloud Messaging, Authentication, and Crash Reporting.</p> | ✓ Included | ✓ Included | ✓ Included |
|  <p>Realtime Database</p> <p>Simultaneous connections ?</p> <p>GB stored</p> <p>GB downloaded</p> <p>Automated backups</p> | <p>100</p> <p>1GB</p> <p>10GB/month</p> <p>✗</p> | <p>Unlimited</p> <p>2.5GB</p> <p>20GB/month</p> <p>✗</p> | <p>Unlimited</p> <p>\$5/GB</p> <p>\$1/GB</p> <p>✓</p> |

It's worth noting that 99% of apps never outgrow the free tier, so it's a great tier to start in.

STEP 1 – Make an Account (cont'd)

- The **free account** gives you the ability to have 100 devices connect to Firebase at a single point in time. It's worth noting that 99% of apps never outgrow the free tier, so it's a great tier to start in.
1. Go to firebase.google.com and **create an account**.
 2. After **logging** in to your account, head over to the [Firebase console](#)
 3. And **create a project** that will hold your app's data.



Firebase

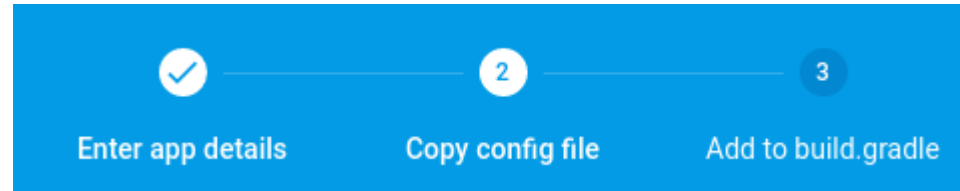
STEP 2: Connect Firebase to Your Application

- To add Firebase to your android application:
 - 2a.** You can follow a **manual** process (three main steps are required).
 - Or
 - 2b.** You can explore and integrate Firebase services in your app directly from **Android Studio** using the **Assistant** window.

If you're using the latest version of Android Studio (version 2.2 or later), we recommend using the Firebase Assistant to connect your app to Firebase.

- **Prerequisites**
 - A device running Android 4.0 (Ice Cream Sandwich) or newer, and Google Play services 10.2.4 or higher
 - The Google Play services SDK from the **Google Repository**, available in the Android SDK Manager
 - The latest version of Android Studio, version 1.5 or higher. **Most recent version is 2.3.1.**

STEP 2a: Manually Connect Firebase to Your Application



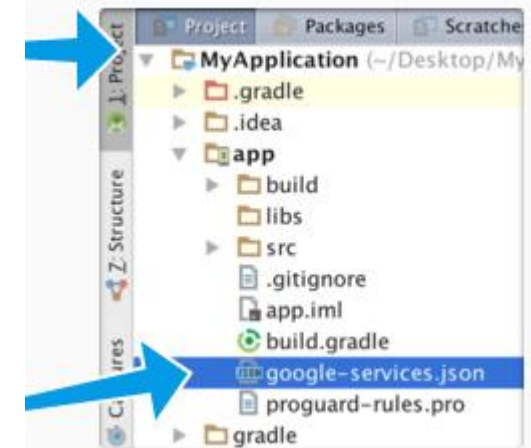
1. Enter app details:

- Create a project:** Enter a name and country/region for the project.
- Enter your Android project's package name** in the window that pops up. If your app is going to use certain Google Play services such as Google Sign-In, App Invites and Dynamic Links then you will have to provide the SHA-1 of your signing certificate. The application we will build won't be using any of these services, so leave this field empty. More info about certificates.

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

- ## 2. Copy Config file:
- The wizard will allow you to generate a configuration file. **Download** the file (google-services.json) and move it into your Android app module root directory.

The JSON file contains configuration settings that the Android app needs to communicate with the Firebase servers. It contains details such as the URL to the Firebase project, the API key.



STEP 2a: Manually Connect Firebase to Your Application (cont'd)

3. Add to build.gradle

The Google services plugin for [Gradle](#) loads the `google-services.json` file that you just downloaded. Modify your `build.gradle` files to use the plugin.

1. Project-level `build.gradle` (<project>/`build.gradle`):

```
buildscript {  
    dependencies {  
        // Add this line  
        classpath 'com.google.gms:google-services:3.0.0'  
    }  
}
```

2. App-level `build.gradle` (<project>/<app-module>/`build.gradle`):

```
...  
// Add to the bottom of the file  
apply plugin: 'com.google.gms.google-services'
```

includes Firebase Analytics by default ?

3. Finally, press "Sync now" in the bar that appears in the IDE:

Gradle files have changed since last sync [Sync now](#)

FINISH

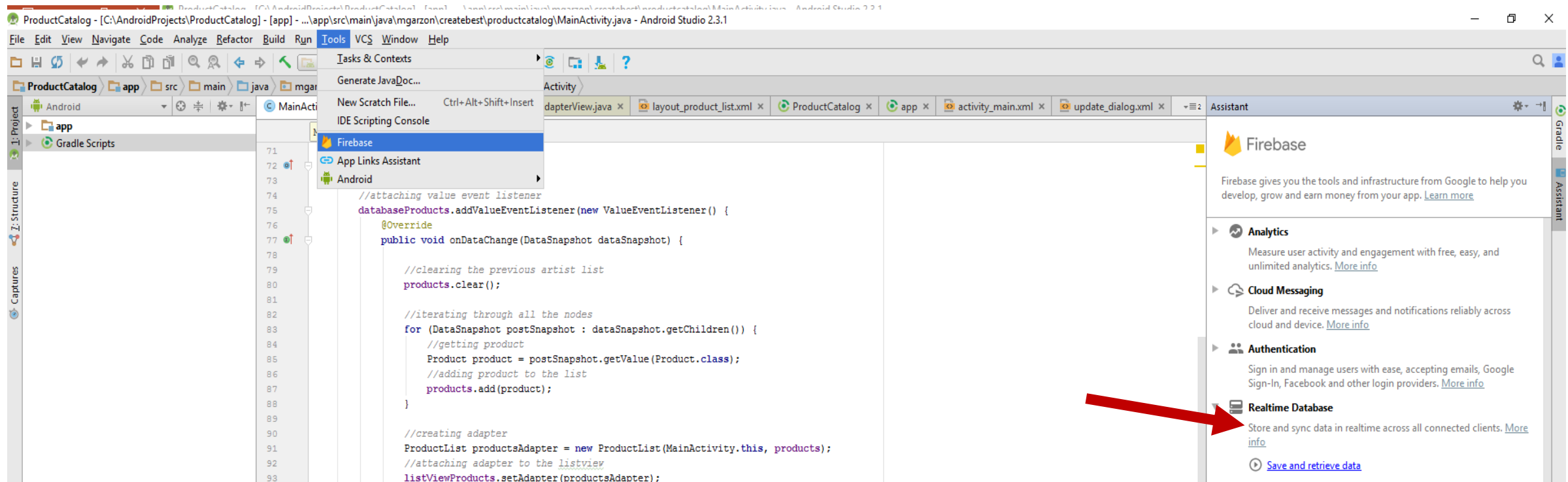
STEP 2b: Connect Firebase to Your Application using Android Studio

First make sure you have installed Google Repository version 26 or higher, using the following steps:

- Click **Tools > Android > SDK Manager**.
- Click the **SDK Tools** tab.
- Check the **Google Repository** checkbox, and click **OK**.
- Click **OK** to install.
- Click **Background** to complete the installation in the background, or wait for the installation to complete and click **Finish**.

STEP 2b: Connect Firebase to Your Application using Android Studio (cont'd)

1. Click **Tools > Firebase** to open the **Assistant** window.
2. Click to expand one of the listed features then click the **Save and Retrieve data** (under Realtime Database) to connect to Firebase and automatically add the necessary code to your app.



STEP 2b: Connect Firebase to Your Application using Android Studio (cont'd)

3. Click **Connect to Firebase** to open the window.
Enter the name for your Firebase project.
4. Click **Add the Realtime Database to your app**.

You are now ready to write and read from your Database!



Save and retrieve data

Our cloud database stays synced to all connected clients in realtime and remains available when your app goes offline. Data is stored in a JSON tree structure rather than a table, eliminating the need for complex SQL queries.

[Launch in browser](#)

1

Connect your app to Firebase

Connect to Firebase

2

Add the Realtime Database to your app

Add the Realtime Database to your app

3

Configure Firebase Database Rules

The Realtime Database provides a declarative rules language that allows you to define how your data should be structured, how it should be indexed, and when your data can be read from and written to. By default, read and write access to your database is restricted so only authenticated users can read or write data. To get started without setting up [Authentication](#), you can [configure your rules for public access](#). This does make your database open to anyone, even people not using your app, so be sure to restrict your database again when you set up authentication.

4

Write to your database

Retrieve an instance of your database using `getInstance()` and reference the location you want to write to.

```
// Write a message to the database
FirebaseDatabase database = FirebaseDatabase.getInst
DatabaseReference myRef = database.getReference("me

myRef.setValue("Hello, World!");
```

You can save a range of data types to the database this way, including Java objects. When you save an object the responses from any getters will be saved as children of this location.

STEP 3 : Configure Firebase Database rules

- The Realtime Database provides a declarative rules language that allows you to define how your data should be structured, how it should be indexed, and when your data can be read from and written to. **By default, read and write access to your database is restricted so only authenticated users can read or write data.**
- To get started without setting up Authentication , you can configure your rules for public access.

Go to the firebase console and specify your rules as follows:

```
1 {  
2   "rules": {  
3     ".read": true,  
4     ".write": true  
5   }  
6 }
```

Step 4: Write and Read Data

To download and set up the sample application in Android Studio:

1. **Download** the ProductCatalog sample app from my personal Github.
2. You can either use the "Download ZIP" button on the Github Page or clone on the command line: <https://github.com/mgarzon/ProductCatalog>
git clone https://github.com/mgarzon/ProductCatalog.git
3. **Import** the project in Android Studio: Click File > New > Import Project.
4. **Implement** the code to **add**, **delete** and **update** a *product* which will be stored at the Firebase database.

THANK YOU!