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Implementation of google firebase in Android app development

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ABSTRACT

The web application has gotten increasingly more dependent upon enormous measure of information base and disorderly information, for example, recordings, pictures, sound, text, documents and other subjective sorts. It is hard for Relational Database Management System (RDBMS) to deal with the unstructured information. Firebase is a somewhat new innovation for dealing with huge measure of unstructured information. It is extremely quick when contrasted with RDBMS. This paper centers around the utilization of Firebase with Android and targets acclimating its ideas, related wordings, benefits and impediments. The paper likewise attempts to exhibit a portion of the highlights of Firebase by creating an Android application.

Keywords: *Firestore, Android, RDBMS*

1. INTRODUCTION

The server utilized for Android applications are Oracle SQL, Microsoft SQL Server, and MySQL which are associated with the server with PHP documents. Then, at that point Firebase appeared for Android applications which utilizes JSON for putting away information. The other servers utilize a table (lines and sections) design for putting away information. Firebase is NoSQL based. There are not very many cloud based servers accessible which are like firebase, as: AWS Mobile Hub-It is incorporated control center that assists with making, construct, test, and screen the portable applications that use AWS administrations. Cloud-Kit It is an Apple structure which assists with saving information also, store resources yet like iOS as it were. Parse Server-It was delivered by Facebook to recreate usefulness of Parse which is an open source server. This is as of now not in presence as Facebook closure this task

1.1 What is Firebase?

Firestore is considered as web application platform. It helps developers“ builds high-quality apps. It stores the data in JavaScript Object Notation (JSON) format which doesn't use query for inserting, updating, deleting or adding data to it. It is the backend of a system that is used as a database for storing data. ^[1]

1.1.1 Firestore Analytics: Provide information about application usage. It is a paid application measurement solution that also provides user engagement. This unique feature enables application developers to understand how users use the application. The SDK has the function of capturing events and attributes by itself, and also allows you to obtain custom data. Provides information about using the application. This is also a paid application metering solution that you can interact with. This unique feature allows app developers to understand how users use their apps. The advantage of the SDK is that it can only log events and functions and collect personal information.

1.1.2 Firestore Cloud Messaging (FCM): Formerly known as Google Cloud Messaging (GCM), it is a paid service that provides cross-platform messaging and information solutions for Android, web apps, and iOS.

1.1.3 Firestore Auth: Firestore Auth supports login providers such as Facebook, Google GitHub, and Twitter. It is a paid service that allows you to authenticate users only with a code provided by the customer. It also includes a user management system that allows developers to enable user authentication using the login email and password stored in Firestore.

1.1.4 Real-time Database: Firebase provides services such as databases and backends in real time. Application developers receive APIs that enable synchronization of application data between clients and storage in the Firebase Cloud. The client library is provided by the company and can be integrated with Android, iOS, and JavaScript applications.

1.1.5 Firebase Cloud Storage: File transfers in Firebase applications are easy and secure, regardless of network quality. Supports Google Cloud Storage, a low-cost storage service. Developers can use it to record images, audio, video, or other user-generated content.

1.1.6 Firebase Test Lab for Android: It provides a cloud-based infrastructure for testing Android applications. Developers can test their applications on a variety of devices and hardware configurations in one process. You can view various test results in the Firebase console, including screenshots, videos, reports, and more. Test labs can automatically test for program errors even when programmers have not written test code for their programs.

1.1.7 Firebase Crash Reporting: Accurate error reports are generated programmatically. Defects are grouped into groups with similar overlapping effects and classified according to severity. Other features include: Developers can log custom events to record the steps that caused the crash.

1.1.8 Firebase Notifications: This app allows mobile app developers to receive targeted user notifications and the service is free.

1.1.9 Cloud Firestore: Cloud Firestore is a flexible and extensible database for Firebase and Google Cloud mobile, web and server development. Similar to the Firebase Realtime Database, it uses a realtime listener to track data from all client apps and provides offline mobile and web support so your app can respond regardless of internet or network connection delays. Cloud Firestore also integrates seamlessly with other Firebase and Google Cloud products, including Cloud Performance.

1.1.10 Dynamic Links: Firebase Dynamic Links are links that work the way you want on many operating systems, whether your app is already installed or not. Dynamic connections provide users with the best experience available on a platform where they have access to connections. When a user opens a Dynamic Link on iOS or Android, the native app can directly access the linked content. When a user opens the same dynamic link in a desktop browser, it can lead to relevant content on your website. Dynamic linking also works through app installs. If a user opens a dynamic link on iOS or Android and doesn't open it while installing the app, the user may be prompted to install the app. After installation, the program will run and you will be able to access the link. You can create Dynamic Links using the Firebase console, REST API, iOS API, or Android Builder, or by adding a Dynamic Link parameter to construct a URL for a specific domain in your app. These settings define which links to access and whether to install programs based on the user interface. If the user opens one of the dynamic links and the app isn't installed yet, the user goes to the Play Store or App Store to install the app (unless otherwise specified) and the app opens. You can then access the link sent to the application to manage the correct internal link to the application.

1.1.11 Remote Configuration: Change the behavior and appearance of the app so that there is no limit to the number of active users per day without releasing updates to the app. Firebase Remote Config is a cloud service that allows you to change the behavior and appearance of your applications without downloading updates. When using Remote Config, you create default values in your program that determine the program's behavior and appearance. You can then override the program defaults for all program users or core user components using the Firebase console or the Remote Config API. Applications can check the update schedule and check for and apply updates from time to time without performance impact.
[2]

1.1.12 Google Cloud Function For Firebase: Cloud Functions for Firebase is a server less framework that allows code to run automatically in the background in response to events fired by Firebase functions and HTTPS requests. JavaScript (TypeScript) code is stored on Google Cloud and runs in a managed environment. No need to manage and develop your own servers. After you write and deploy a function, the Google server will immediately start managing the function. You can directly use the HTTP request to trigger this function, or in the case of a background function, Google's server will listen to the event and execute the function when triggered. As the load increases or decreases, Google will respond by rapidly expanding the number of virtual server instances required to perform its functions. Each function runs independently, using its own configuration in its own environment.
[3]

2. FIREBASE VERSUS OTHER DBMS

Firebase is a NoSQL database that stores and synchronizes data in real time (save documents in real time). MySQL is an open source relational database management system based on the domain-specific SQL language.

SQL or NoSQL? That is the problem. A successful business requires a robust and reliable database. However, there are so many technologies available that you may not know where to start. Firebase and MySQL are two completely different database technologies. Firebase is a NoSQL database. MySQL, as the name suggests, is a SQL database.

	Firebase	MySQL
User Scores	4.5/5	4.4
Price	\$24.99 Starting	Free(Open Source)

	(Free Version Available)	
Developed by	Google	Oracle
Languages	Java, JavaScript, Objective C	Ada, C, C#, C++, Delphi, Java, Python
APIs	Android, iOS, JavaScript, RESTful HTTP	ADO, JDBC, ODBC
Data Model	Stored as JSON Tree	Stored in Relational Model as Rows and Columns(Table)
Technique	Synchronize Data	Fire Query
Schema	Dynamic Schema, data can be added, updated or deleted anytime	Fixed schema. Changes may result in going offline temporarily

3. GAME DEVELOPMENT USING FIREBASE

Firestore makes it easy to add backup and analytics services to your iOS and Android mobile games. SDKs for C++ and Unity allow direct access to Firestore services from C++ and Unity without writing Swift/Target-C or Java/Kotlin code.

4. HOW TO ADD FIREBASE IN ANDROID PROJECT

Make sure you have installed the latest version of Android Studio IDE on your machine.

The android project should be target API level 16 (Jelly Bean) or later and use Gradle 4.1 or later, setup a physical device or emulator to run your app because Firestore SDKs with dependencies on Google Play Services require a physical device or emulator with Google Play Services installed.

Then sign in to Firestore by your google account, and create a new Firestore project and connect your android app with the Firestore project that you have just created.

Then register your app with Firestore project by entering your app's package name and after registering your app successfully obtain your Firestore Android config file (google-services.json) and download it then move that config file to module (app level) directory of your app.

Then add Firestore SDKs to your app by declaring the dependencies of firestore products that you want to use in you app in your module (app level) Gradle file (app/build.gradle) then sync your app to make sure that all the dependencies have necessary version.
implementation platform('com.google.firebase:firebase-bom:28.3.0')

5. FIREBASE DATABASE AND STORAGE

Firestore Realtime Database is a cloud hosted database. The data is stored as JSON and synchronized with each connected client in real time. When you use our iOS, Android and JavaScript SDKs to build cross-platform applications, all your customers will share a real-time database instance and automatically receive updates of the latest data.

Firestore uses Realtime Database Data Sync instead of regular HTTP requests. Each connected device receives an update every few milliseconds. It provides a collaborative and engaging experience without having to think about network code.

Firestore's Realtime Database SDK stores data on disk, so your Firestore app remains responsive when you're offline. Upon reconnection, the client computer gets the lost changes and synchronizes it with the current state of the server. You can access the Firestore Realtime Database directly from your mobile device or web browser. No application server required. Firestore's Realtime Database Security Rules enable data protection and validation. Expression-based rules that are applied when reading or writing data.

The Firestore Realtime Database with Blaze pricing model allows you to partition data from multiple DB instances into a single Firestore project to effectively meet the needs of your application. Simplify authentication by using Firestore Authentication in your project and user authentication in your DB instance. Control access to data in each database using custom real-time Firestore database rules for each DB instance.

How does it work

Real-time Firestore Database allows you to build fully collaborative applications and access the database directly from your client-side code. Data is also stored locally and offline. Real-time events occur, providing a responsive experience for end users. When the device is reconnected, the Realtime Database synchronizes changes to local data via remote updates. This happens when the client is offline and automatically covers the conflict. Realtime Database provides a flexible grammar based on Realtime Database security rules to determine how data is organized and when data is read or written. By integrating Firestore Authentication, developers can control who can access their data and how they can access it. Because Realtime Database is a NoSQL database, it has many improvements and features over relational databases. The Realtime Database API is designed to get things done quickly. This allows you to create great real-time experiences that can serve millions of users without compromising responsiveness. For this reason, it is important to consider how users access and organize data.

6. CONCLUSION

This document focuses on research on the Firestore API provided by Google and its unique features. This document helps to investigate how to use Firestore in Android applications based on the requirements of developers. This also helps to make Android applications faster and more efficient, because PHP does not need to be a third-party language to communicate with the database. Provide a secure channel for direct communication between JAVA and the database. The learning materials are based on the data

provided online and refer to the examples given. Google has been updating Firebase regularly, and AdSense is the testing phase of Firebase. Not only can it be used on Android, but it can also be connected across platforms. This work can be further extended by adding new features and exploring new possibilities in Android applications.

7. REFERENCES

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