

E-Commerce App Development using Flutter Framework

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ABSTRACT

In the recent years, advancement of technology and mobile computing and recent technological advances in Cloud Computing technology give us the path for developing and nurturing advanced services on using Crypto currencies as a method of payment. So our idea is to make a hybrid Application, which is a hybrid app that helps the seller's which particularly focusses on selling and buying materials with the use of crypto and cash as a method of payment. Not only the seller can sell his goods but also, he can be able to track the daily rates about the crypto market. Cloud Computing provided platform for better utilisation of the resource spread across the world. Being a nascent field, it is has a lot of problems like sudden market drop, market hike, etc.. which leaves the engineers with many issues. So, this project is about the creation of an e-commerce app with Flutter Framework and Dart programming language, and to store the data of the user we use Firebase, which is database creation tool founded by google.

Keywords: SSL, Cloud, HTTP, GCM, FCM

1. INTRODUCTION

E-Commerce has become a major shopping platform for goods and materials on a daily basis, with the current growth of crypto currency in the market we decided to formulate an app which does both transactions using crypto and normal cash methods. On addition to it, we decided to add a feature which allows the user to buy and sell crypto currencies using our app. We make sure that the seller as well as the buyer has a crypto wallet for transactions based on crypto currencies.

People still worry that crypto is used for illegal activities, but according to Forbes, at 2020, the criminal share of all cryptocurrency activity was just 0.34% (\$10.0 billion in transaction volume). The only disadvantage on Cloud Computing is security, in order to overcome security issue, we would like to implement Diffie Hellman algorithm into our app. To manage the database we have use Firebase which is a very good alternative of SQL database.

2. LITERATURE SURVEY

2.1 Diffie Hellman

Diffie-Hellman key exchange, also called exponential key exchange, is a method of digital encryption that uses numbers raised to specific powers to produce decryption keys on the basis of components that are never directly transmitted, making the task of a would-be code breaker mathematically overwhelming.

To implement Diffie-Hellman, the two end users Alice and Bob, while communicating over a channel they know to be private, mutually agree on positive whole numbers p and q , such that p is a prime number and q is a generator of p . The generator q is a number that, when raised to positive whole-number powers less than p , never produces the same result for any two such whole numbers. The value of p may be large, but the value of q is usually small.

Once Alice and Bob have agreed on p and q in private, they choose positive whole-number personal keys a and b , both less than the prime-number modulus p . Neither user divulges their personal key to anyone; ideally, they memorize these numbers and do not write them down or store them anywhere. Next, Alice and Bob compute public keys a^* and b^* based on their personal keys according to the formulas

$$a^* = q^a \text{ mod } p$$

and

$$b^* = q^b \text{ mod } p$$

The two users can share their public keys a^* and b^* over a communications medium assumed to be insecure, such as the Internet or a corporate wide area network (WAN). From these public keys, a number x can be generated by either user on the basis of their own personal keys. Alice computes x using the formula

$$x = (b^*)^a \text{ mod } p$$

Bob computes x using the formula

$$x = (a^*)^b \text{ mod } p$$

The value of x turns out to be the same according to either of the above two formulas. However, the personal keys a and b , which are critical in the calculation of x , have not been transmitted over a public medium. Because it is a large and apparently random number, a potential hacker has almost no chance of correctly guessing x , even with the help of a powerful computer to conduct millions of trials. The two users can therefore, in theory, communicate privately over a public medium with an encryption method of their choice using the decryption key x .

The most serious limitation of Diffie-Hellman in its basic or "pure" form is the lack of authentication. Communications using Diffie-Hellman all by itself are vulnerable to man in the middle attacks. Ideally, Diffie-Hellman should be used in conjunction with a recognized authentication method such as digital signatures to verify the identities of the users over the public communications medium. Diffie-Hellman is well suited for use in data communication but is less often used for data stored or archived over long periods of time.

2.2 Flutter Framework

Flutter is an open-source UI software development kit created by Google. It is used to develop applications for Android, iOS, Windows, Mac, Linux, Google Fuchsia and the web. The first version of Flutter was known as codename "Sky" and ran on the Android operating system. It was unveiled at the 2015 Dart developer summit, with the stated intent of being able to render consistently at 120 frames per second. During the keynote of Google Developer Days in Shanghai, Google announced Flutter Release Preview 2 which is the last big release before Flutter 1.0. On December 4, 2018, Flutter 1.0 was released at the Flutter Live event, denoting the first "stable" version of the Framework. On December 11, 2019, Flutter 1.12 was released at the Flutter Interactive event. The major components of Flutter include:

- Dart platform
- Flutter engine
- Foundation library
- Design-specific widgets

Dart platform Flutter apps are written in the Dart language and make use of many of the language's more advanced features. On Windows, macOS and Linux via the semi-official Flutter Desktop Embedding project, Flutter runs in the Dart virtual machine which features a just-in-time execution engine. While writing and debugging an app, Flutter uses Just In Time compilation, allowing for "hot reload", with which modifications to source files can be injected into a running application. Flutter extends this with support for stateful hot reload, where in most cases changes to source code can be reflected immediately in the running app without requiring a restart or any loss of state. This feature as implemented in Flutter has received widespread praise. Release versions of Flutter apps are compiled with ahead-of-time (AOT) compilation on both Android and iOS, making Flutter's high performance on mobile devices possible.

Flutter engine Flutter's engine, written primarily in C++, provides low-level rendering support using Google's Skia graphics library. Additionally, it interfaces with platform-specific SDKs such as those provided by Android and iOS. The Flutter Engine is a portable runtime for hosting Flutter applications. It implements Flutter's core libraries, including animation and graphics, file and network I/O, accessibility support, plugin architecture, and a Dart runtime and compile toolchain. Most developers will interact with Flutter via the Flutter Framework, which provides a modern, reactive framework, and a rich set of platform, layout and foundation widgets. Foundation library The Foundation library, written in Dart, provides basic classes and functions which are used to construct applications using Flutter, such as APIs to communicate with the engine.

Widgets UI design in Flutter involves using composition to assemble / create "Widgets" from other Widgets. The trick to understanding this is to realise that any tree of components (Widgets) that is assembled under a single build() method is also referred to as a single Widget. This is because those smaller Widgets are also made up of even smaller Widgets, and each has a build() method of its own. This is how Flutter makes use of Composition. The docs say: " A widget is an immutable description of part of a user interface." A human being will tell you it's a Blueprint, which is a much easier way to think about it. However, one also needs to keep in mind there are many types of Widgets in Flutter, and you cannot see or touch all of them. Text is a Widget, but so is it's TextStyle, which defines things like size, colour, font family and weight. There are Widgets that represent things, ones that represent characteristics (like TextStyle) and even others that do things, like FutureBuilder and StreamBuilder.

Complex widgets can be created by combining many simpler ones, and an app is actually just the largest Widget of them all (often called "MyApp"). The MyApp Widget contains all the other Widgets, which can contain even smaller Widgets, and together they make up your app. However, the use of widgets is not strictly required to build Flutter apps. An alternative option, usually only used by people who like to control every pixel drawn to the canvas, is to use the Foundation library's methods directly. These methods can be used to draw shapes, text, and imagery directly to the canvas. This ability of Flutter has been utilised in a few frameworks, such as the open-source Flame game engine.

2.3 Design-specific widgets

The Flutter framework contains two sets of widgets which conform to specific design languages. Material Design widgets implement Google's design language of the same name, and Cupertino widgets implement Apple's iOS Human interface guidelines

3. PROPOSED SYSTEM

3.1. Architecture Diagram

The below fig1. Represents the architecture diagram for our app.

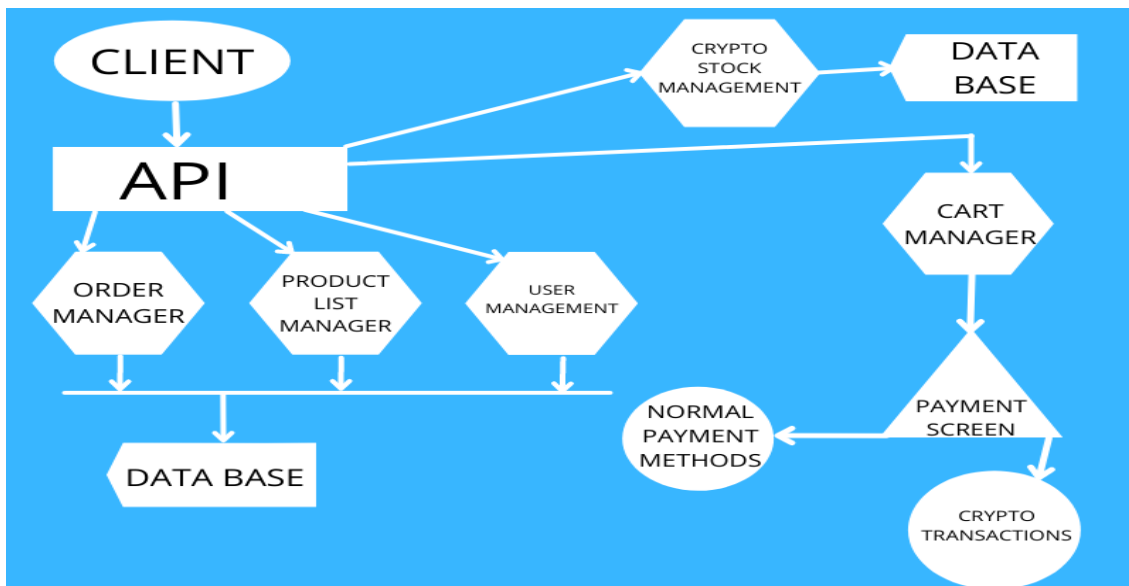


Figure 1- Architecture diagram of the E-commerce app.

4. GOOGLE FIREBASE

Firestore is a mobile and web application development platform developed by Firebase, Inc. in 2011, then acquired by Google in 2014. As of March 2020, the Firestore platform has 19 products, which are used by more than 1.5 million apps. Firestore evolved from Engage, a prior startup founded by James Tamplin and Andrew Lee in 2011. Engage provided developers an API that enables the integration of online chat functionality into their websites. After releasing the chat service, Tamplin and Lee found that it was being used to pass application data that were not chat messages. Developers

were using Envolv to sync application data such as game state in real time across their users. Tamplin and Lee decided to separate the chat system and the real-time architecture that powered it. They founded Firebase as a separate company in September 2011 and it launched to the public in April 2012.

Firestore's first product was the Firestore Real-time Database, an API that synchronizes application data across iOS, Android, and Web devices, and stores it on Firestore's cloud. The product assists software developers in building real-time, collaborative applications. In May 2012, a month after the beta launch, Firestore raised \$1.1 million in seed funding from venture capitalists Flybridge Capital Partners, Greylock Partners, Founder Collective, and New Enterprise Associates. In June 2013, the company further raised \$5.6 million in Series A funding from Union Square Ventures and Flybridge Capital Partners. In 2014, Firestore launched two products. Firestore Hosting and Firestore Authentication. This positioned the company as a mobile backend as a service. In October 2014, Firestore was acquired by Google. A year later, in October 2015, Google acquired Divshot, an HTML5 web-hosting platform, to merge it with the Firestore team.

In May 2016, at Google I/O, the company's annual developer conference, Firestore introduced Firestore Analytics and announced that it was expanding its services to become a unified backend-as-a-service (BaaS) platform for mobile developers. Firestore now integrates with various other Google services, including Google Cloud Platform, AdMob, and Google Ads to offer broader products and scale for developers. Google Cloud Messaging, the Google service to send push notifications to Android devices, was superseded by a Firestore product, Firestore Cloud Messaging, which added the functionality to deliver push notifications to both iOS and web devices. In January 2017, Google acquired Fabric and Crashlytics from Twitter to add those services to Firestore. In October 2017, Firestore has launched Cloud Firestore, a real-time document database as the successor product to the original Firestore Realtime Database.

4.1 Services - Google Analytics

Google Analytics is a cost-free app measurement solution that provides insights on app usage and user engagement.

4.2 Develop - Firestore Cloud Messaging

Formerly known as Google Cloud Messaging (GCM), Firestore Cloud Messaging (FCM) is a cross-platform solution for messages and notifications for Android, iOS, and web applications, which as of 2016 can be used at no cost.

4.3 Firestore Authentication

Firestore Authentication is a service that can authenticate users using only client-side code. It supports social login providers Facebook, GitHub, Twitter and Google as well as other service providers like Google Play Games, Apple, Yahoo, and Microsoft. Additionally, it includes a user management system whereby developers can enable user authentication with email and password login stored with Firestore.

4.4 Firestore Realtime Database

Firestore provides a real-time database and back-end as a service. The service provides application developers an API that allows application data to be synchronized across clients and stored on Firestore's cloud. The company provides client libraries that enable integration with Android, iOS, JavaScript, Java, ObjectiveC, Swift and Node.js applications. The database is also accessible through a REST API and bindings for several Java Script frame works such as Angular JS, React, Ember.js and Backbone.js. The REST API uses the Server-Sent Events protocol, which is an API for creating HTTP connections for receiving push notifications from a server. Developers using the realtime database can secure their data by using the company's server-side-enforced security rules.

4.5 Cloud Firestore

On January 31, 2019, Cloud Firestore was officially brought out of beta, making it an official product of the Firestore lineup. It is the successor to Firestore's original databasing system, Real-time Database, and allows for nested documents and fields rather than the tree-view provided in the Real-time Database.

4.6 Firestore Storage

Firestore Storage provides secure file uploads and downloads for Firestore apps, regardless of network quality, to be used for storing images, audio, video, or other user-generated content. It is backed by Google Cloud Storage.

4.7 Firebase Hosting

Firebase Hosting is a static and dynamic web hosting service that launched on May 13, 2014. It supports hosting static files such as CSS, HTML, JavaScript and other files, as well as support through Cloud Functions. The service delivers files over a content delivery network (CDN) through HTTP Secure (HTTPS) and Secure Sockets Layer encryption (SSL). Firebase partners with Fastly, a CDN, to provide the CDN backing Firebase Hosting. The company states that Firebase Hosting grew out of customer requests; developers were using Firebase for its real-time database but needed a place to host their content.

4.8 Crypto Transactions

Crypto currencies has become a widely used international mode of currency in the recent years we decided to include the mode of buying and selling goods using crypto currency, and we also plan to include the exchange of crypto transactions in our app. So, this app becomes an all-in-one app for the consumer.

5. CONCLUSION

We believe that the implementation of this app would bring a great change in the views of crypto in our country and we believe that this app would be the first app to use crypto as a mode of transaction.

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