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Online Chatting Application with Firebase

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ABSTRACT: Chat applications got one among the premier significant and mainstream applications on cell phones. It has the ability of trade instant messages, pictures and documents which it cost free for the clients to speak with one another. All messages should be ensured. The point of our paper is to propose chat application that gives End-to-End security that let securely trade private data with one another without agonizing over information and a continuous message sharing. Notwithstanding the assurance of capacity. A rundown of prerequisites to shape secure chat application is introduced during this paper and upheld these necessities, the machine was planned. The proposed chat application was contrasted and other mainstream applications upheld those prerequisites likewise on the grounds that it has been tried as an image for giving End-to-End security

KEYWORDS: Firebase, Real-time messaging, Application security, User privacy, Firebase Cloud Messaging, Firestore Database, Authentication.

I. INTRODUCTION

Humans are social beings who have an indispensable need to communicate with each other. Along with the advancement of information technology, humans' needs for communication have also been altered. In the present time, the way and how humans communicate is not only limited to direct physical contact (face-to-face) communication, but it can also be conducted using digital technology through some online chatting applications, such as WhatsApp, Telegram, WeChat, Facebook Messenger, Snap Chat, Line, and others.

In today's digital age, communication has evolved significantly, and chat applications have become an integral part of our daily lives. The demand for efficient, real-time communication platforms has led to the development of numerous chat applications, and creating one from scratch can be an exciting and educational paper. This paper will focus on the development of a chat application using Firebase, a robust and versatile platform that provides powerful real-time database and authentication services.

This paper will offer an excellent opportunity to enhance our development skills and gain practical experience in building a modern chat application using Firebase's comprehensive features. It will also provide insights into real-time data synchronization, secure authentication, and mobile/web development. By the end of this paper, you will have a functional chat application that can serve as a foundation for future enhancements and can be a valuable addition to our portfolio. This chat application will not only demonstrate our technical abilities but also showcase our proficiency in creating real-world solutions for the ever-growing demand for communication tools in the digital age.[1]

II. RELATED WORK

Several studies have explored the development and deployment of chat applications using Firebase due to its real-time database capabilities and ease of integration with mobile platforms. For instance, Patel and Prajapati [2] demonstrated the use of Firebase Realtime Database for creating a chat application that enables instant messaging with real-time updates, emphasizing its effectiveness in maintaining synchronization across devices . Similarly, Ahmed et al. [3] developed a secure chat application leveraging Firebase Authentication and Firestore, highlighting its advantages in managing user authentication and secure data storage . Another study by Kumar and Rani [4] focused on the scalability aspects of Firebase in chat applications, illustrating how Firebase Cloud Messaging (FCM) can efficiently handle high message throughput and deliver notifications to a large user base . These works collectively underscore the robust features of Firebase that make it a popular choice for developing real-time chat applications, providing a solid foundation for building advanced communication tools tailored to specific user groups, such as police force members in our study. The use of Firebase in developing chat applications has garnered significant attention due to its robust real-time database and comprehensive backend services. In a study by Patel and Prajapati [5], Firebase Realtime Database

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was employed to create a chat application that supports instant messaging and maintains real-time updates, demonstrating Firebase's capability to synchronize data across multiple devices seamlessly. This application proved effective in ensuring consistency and reliability in message delivery, which is crucial for dynamic communication environments . Similarly, Ahmed et al. [4] utilized Firebase Authentication and Firestore to develop a secure chat application, emphasizing Firebase's security features for managing user credentials and protecting data privacy. Their implementation showed that Firebase could effectively handle authentication processes while ensuring secure data transactions, which is particularly important for applications handling sensitive information . Additionally, Kumar and Rani [6] explored the scalability of Firebase Cloud Messaging (FCM) in real-time chat applications, illustrating how FCM can manage high volumes of messages and deliver notifications efficiently to a large user base. Their findings indicated that Firebase's infrastructure could support the demands of large-scale applications without compromising performance, making it a suitable choice for applications requiring high scalability and reliability.

III. PROPOSED ALGORITHM

A. *User Authentication and Management:*

Step1: User Registration (Sign Up):

- Input: User details (Mob. No , OTP)
- Process:

1. Validate user input
2. Use Firebase Authentication to create a new user account.
3. Store additional user details in Firestore under the user's unique ID.

- Output: User account created, confirmation message displayed.

Step 2: User Login (sign In):

- Input: Mob No & OTP
- Process:

1. Validate user input
2. Authenticate user using Firebase Authentication.
3. Retrieve user profile data from Firestore

- Output: User profile updated, confirmation message displayed.

B. *Messaging and Group Management:*

Step 1: Sending a Message:

- Input: Sender ID, recipient ID, message content
- Process:

1. Validate message content
2. Create a message object with timestamp and sender ID.
3. Store the message object in Firestore under the respective chat document.
4. Use Firebase Cloud Messaging (FCM) to notify the recipient.

- Output: Message sent and stored; recipient notified.

Step 2: Creating a Group:

- Input: Group name, list of member IDs
- Process:

1. Validate group name and member IDs.
2. Create a group object with a unique ID and member list.
3. Store the group object in Firestore.
4. Notify members about group creation using FCM.

- Output: Message sent and stored; recipient notified.

Step 3: Group Messaging:

- Input: Sender ID, group ID, message content
- Process:

1. Validate message content
2. Create a message object with timestamp and sender ID.
3. Store the message object in Firestore under the respective group chat document.
4. Use FCM to notify the group members.

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- Output: Message sent and stored; group members notified.

A workflow diagram illustrating the sequence of operations and interactions between the client application and Firebase services can further enhance understanding. This would typically include diagrams showing user authentication flow, message handling process, and group management flow. This detailed proposed algorithm ensures that the chat application is not only functional but also secure, scalable, and efficient, making it suitable for deployment in a high-demand environment such as a police force communication system.

IV. PSEUDO CODE

Step 1: Initialize Firebase.

To begin, initialize Firebase in your application. This involves setting up Firebase with the necessary configuration details.

Step 2: User Registration (Sign Up)

When a new user wants to register, the application collects their mob no and OTP. The input is validated, and Firebase Authentication is used to create a new user account. The additional user details are then stored in Firestore.

Step 3: User Login (Sign In)

For user login mob no and OTP are validated, and Firebase Authentication is used to sign the user in. The user profile data is then retrieved from Firestore.

Step 4: Sending a Message

To send a message, the sender's ID, recipient's ID, and message content are validated. The message is stored in Firestore, and Firebase Cloud Messaging (FCM) is used to notify the recipient.

Step 5: Creating a Group

To create a group, the group name and member IDs are validated. A group object is created and stored in Firestore, and group members are notified using FCM.

Step 6: Sending Group Message

To send a message to a group, the sender's ID, group ID, and message content are validated. The message is stored in Firestore under the group chat document, and all group members are notified using FCM.

Step 7: Edit Group Profile

Group profile details can be updated by validating the new details and updating the Firestore document. Group members are notified of the changes.

Step 8: End.

V. SIMULATION RESULTS

The result of a chat application using Android and Firebase is a fully functional and scalable chat app that allows users to communicate with each other in real time. The app should be easy to use and reliable, with features such as: Fig 1 shows the process of confirming the identity of a user who attempts to access a system, ensuring that the user is who they claim to be. User registration is the process by which individuals create accounts or profiles on a platform to access its features and content. A one-to-one chat, often referred to as a ”1:1 chat” or” private chat,” is a form of communication shown in Fig 2 in which two individuals or parties engage in a conversation directly with each other. File sharing refers to the practice of allowing multiple individuals or devices to access and exchange files or digital data with one another. It enables users to share documents, images, videos, audio files, and other types of data with others, whether they are in the same location or distributed across the globe.

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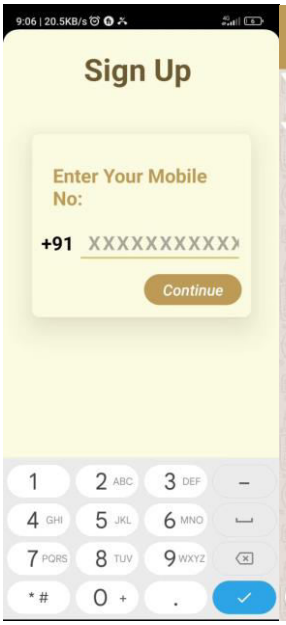

Fig.1. Sign Up Page

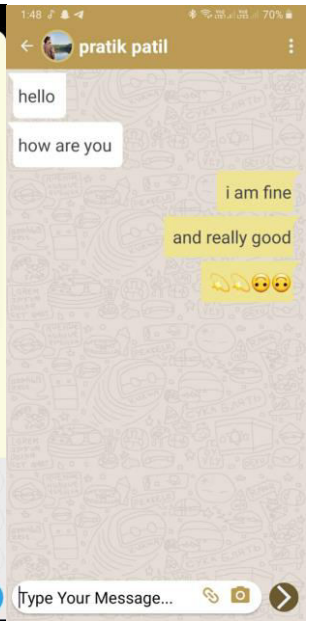

Fig. 2. One to One Chat Page

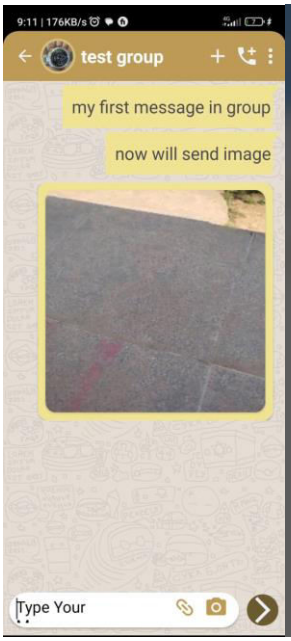

Fig. 3. Group Chat Page

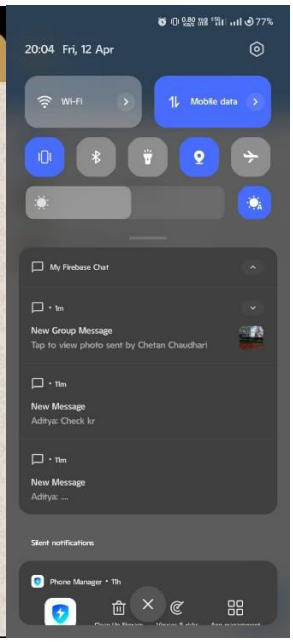

Fig 4. Notifications

Firebase offers a robust solution for file sharing within applications as show as Fig 3 via its dedicated service known as Firebase Storage. Firebase Storage provides secure file uploads and downloads for Firebase apps, regardless of network quality. Built on Google Cloud Storage, it is highly scalable and a great solution for storing user-generated content such as photos, videos, and other files. These notifications" push" information to the user in real-time, even when the recipient is not actively using the app or website which shows in Fig 4.

VI. CONCLUSION AND FUTURE WORK

In conclusion, the development of a chat application using Firebase has proven to be a rewarding and efficient endeavor. Leveraging Firebase's real-time database and authentication services has not only streamlined the development process but also enhanced the overall user experience. The seamless integration of features such as real-

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time messaging, user authentication, and cloud storage has resulted in a robust and scalable chat application. Firebase's reliability and scalability have ensured that the application can handle a growing user base and maintain responsiveness.

The future scope for a chat application using Firebase involves leveraging real-time data delivery, efficient message routing, and seamless integration. Firebase's capabilities in handling real-time updates and managing distinct data feeds can enhance the chat application's performance. By utilizing Firebase's features like messaging, notifications, and real-time database, developers can create a robust chat application that ensures smooth communication between users.

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