



## Shop Chain: An Android Application Simplifying the Shopping Experience in Day-to-Day Life

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 29 Nov 2023	<p>With the surge in the number of people using smartphone devices all over the world, the mobile computing industry has been thriving. There are around 3.6 billion smartphone users worldwide as recorded till 2020 and we expect it to be 4.3 billion by 2023 [1]. In India itself, we have 696 million smartphone users, and it is expected to be 875 million by 2023 [2]. With the increase in the population going online, online shopping has become very convenient. But we still face issues with shopping online at local stores or booking appointments at local hair salons like hunting for a particular item from the store to store only to find it's unavailable or the shop is closed. Through our application "ShopChain", we improve the local store shopping by providing them the opportunity/platform to get their stores online so they can update the customers with live updates about their store.</p>
CC License CC-BY-NC-SA 4.0	<b>Keywords:</b> ShopChain, Mobile Application Development, Android, Kotlin, Google Maps API, Firebase, Android Studio

### 1. Introduction

Have you ever traveled to a store and found out that it is closed or that a particular item is unavailable? Now this problem will not arise. Customers can use our application to learn about the live status of the store and connect to the store. Customers can leave a message having the items which they want to purchase from the store so that by the time they arrive, all the items needed will be packed and they only need to cross-check the items and pay.

The shopkeeper can set the shop's status to closed if he wants to go somewhere urgently or has an emergency. And if an item in the shop is not available, the shopkeeper can mark it as out of stock. As a result, our app will provide all customers with detailed information about the store, thereby improving the shopping experience.

When creating apps, it is necessary to consider the constraints and features of mobile devices. While mobile devices have less processing power and a smaller battery, they add features such as location detection. To develop Mobile applications, specialized integrated development environments such as Android Studio or Eclipse are required [3]. The application is created using Android Studio 4.1 and Kotlin, which is the preferred language for developing Android apps. The application's backend will be running on Firebase Realtime Database.

### LITERATURE SURVEY

During the research on our idea, we came across a few similar apps/sites like Google offering similar features but what was missing is that we still aren't able to shop at our local shop easily and conveniently. For example, Google may allow users to upload photos in addition to the shop owner which can result in misuse of the feature. Also users can't exactly know if the item he/she requires is available in stock or not this results in wastage of time of the customer. Next consider a scenario wherein

a shop needs to be closed urgently due to some issues, how do our shop keeper notify users of this inconvenience?

So how exactly is our application helping out here? We the authors have worked on our project “ShopChain” which will help our users whether shop owners or customers interact with each other in a more convenient manner. We as authors ensure that the customer’s outdoor shopping experience is fruitful and doesn’t turn out to be pointless when they arrive at their favourite stores. Our users can track live status of the shop whether it is about the shop being opened or closed due to unfortunate circumstances or whether a particular item is in stock or not or whether you need to talk with the shop staff to clarify anything, we have made sure our users get all the information. Our users (shop owners) can make users (customers) aware if any offers are ongoing so they never miss out on anything. No being misguided again!

Also, during the research, we realised that not only are the features we offer important. The application needs to be attractive to our users as well as it must be easy to move about through the app. We have carefully studied and designed the UI/UX of the application for the easy understanding and convenience of the users on both ends (customers as well as store owners). The application will also be available in different languages to help our users navigate with ease. Hence, helping all types of audience to easily understand our application and use it as per convenience.

### Motivation

The human race progresses in tandem with technological advancements. The introduction of Android applications into our daily lives has resulted in substantial time and effort savings. People nowadays tend to do their shopping online rather than in-store because it is more convenient and saves time. However, when shopping online, most consumers choose to buy from large retailers rather than small shops. As a result, local and nearby stores are in short demand. This motivated us to create an app that covers the majority of small stores rather than malls or large retailers. Our application will increase demand for shopping through local stores. And hence, their production will also be increased.

### Challenges

While researching our project, we came across various issues that modern-day local shopping and booking of appointments face. We discuss these issues in the sections below.

#### A. Local Shopping

- Not having a clear idea of the status of the shop beforehand (open or close).
- Not knowing what you need/want is available.
- Takes more time if there is a queue of customers.

#### B. Booking of appointments

- Availability of service might be uncertain.
- Lack of communication in case the appointment was cancelled.

### Flow Of Data

All the user and shop-related data are stored on Firebase real-time database which is a cloud-hosted database. The data is stored in JavaScript Object Notation (JSON) format. All users can access the data at real-time from anywhere and on any device.

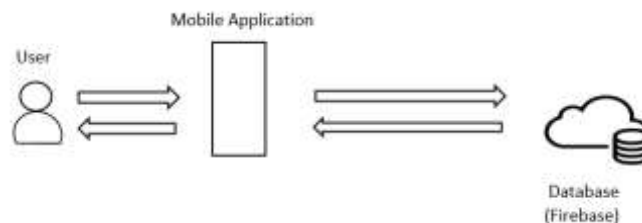


Fig. 1: A representation of how the user interacts with the database through the application.

As seen in the figure above, all users can easily access their information or shop-related information from anywhere through our application which is connected to the firebase realtime database.

## SOLUTION: SHOPCHAIN

After we analyzed our problem, we came up with our solution which was to develop a Native Android Application which we named as “ShopChain”.

### A. Features

- Shows details of the shop like the type of the shop, description, images, rating, currently opened or not.
- We can save to list the shops that we want, it would help find the shop again from the saved list.
- There is an option to call the store to contact the staff if any additional information is required.
- You can also chat with the shopkeeper and discuss your queries.
- Stores can put up notices when they are holding sales so customers can easily find out about them
- There is an option named ‘Navigate’, where it takes google maps to navigate to a particular shop.
- Easily book appointments for a clinic appointment or a visit to a salon.
- In case an appointment is cancelled, staff can easily contact the customer to reschedule their appointment.

### B. Tools and Implementation:

- 1) *Android Studio (v4.1)*: The application is built using Android Studio 4.1 and Kotlin, the preferred language for developing Android applications. Some of the highlights of Android Studio version 4.1 include a new Database Inspector for querying your app's database and enhanced support for on-device machine learning, which now supports TensorFlow Lite models in Android projects.[4]
- 2) *Firebase Realtime Database*: Mobile UI rely on backends to support access. Firebase has been used as the backend database for storing various user details. Firebase Realtime Database is a cloud-based database management system. Data is stored as JSON and is synchronized in real-time to every client that is connected. The Firebase Database lets you build applications by providing secure access to the database [5]
- 3) *Kotlin*: The programming language preferred to develop this application is Kotlin. It is used by over 60% of the professional and experienced Android Developers to increase the productivity of the application and developer’s satisfaction. Under the Apache 2.0 license, Kotlin is a free and open-source project. The project's code is created freely on GitHub, mainly by the JetBrains team, with contributions from Google and others. [6]
- 4) *Google Maps API*: API is abbreviated as Application Programming Interface. We have used Google Maps API to get accurate locations of shops during registration. This will help us suggest nearby shops when a customer searches for shops for the first time.
- 5) *Glide API*: Glide is an open-source media management and image loading application for Android that combines media encoding, memory and disk caching, and resource pooling into a user-friendly interface. Glide provides a flexible API that enables developers to integrate it with almost every network stack [7]. All images of shops, products, and many more will be loaded easily in the application using Glide.

### C. Working:

The android application developed has a simple UI interface which makes it very convenient for new users (whether customers or store owners) to register and login into the application at any time (Fig. 2, used for customer registration). The authentication is handled using Firebase Authentication through mobile OTP verification.



Fig. 2: UI for registration, user sign-up registration

During store registration (Fig. 3), we have used Google Maps API to get accurate latitude and longitude of the location of the store. This will help in suggesting nearby shops to customers. This will be executed by getting the latitude and longitude of the customer's current location and using Google Maps Direction API. Google Maps Direction API will help to calculate the distance between the customer and the shops.



Fig. 3: UI for registration, shop registration

All shop-related details are fetched from the Firebase Database which are collected from the shop owner at the time of registration. Customers can easily access this information in the "Discover stores" menu in the navigation drawer (Fig. 4).



Fig. 4: Navigation Drawer Layout.

The application offers users the option to save shops that they wish to have quicker access to. This will help them save stores they frequently visit and never miss an update about it.

The application makes use of various Application Programming Interface (API) like Google Maps API, Google Maps Direction API, Glide, etc. Application Programming Interface is an intermediary software facilitating the communication between two different applications.

The working of an API can be seen in the above diagram (Fig. 5), where application B sends a request for data to the API which in turn fetches this information from application A and the information is then retrieved by application B through the API.



Fig. 5: Working of an API.

limitations

The application allows customers to communicate with shopkeepers directly in order to obtain information and discuss about the goods and services offered by the shop. However, everything comes with its set of limitations which are worked on in future updates. Some of the current limitations include the following:

- Due to the number of shops and shop customizations, the app's current features are unable to meet all of our needs.
- Features such as online payments, payment history, saving a specific product for future use, directly ordering online, providing a history of clinic or other appointments are not available at the moment.

#### FUTURE ENHANCEMENTS

As we discussed the limitations of the current status of our application, there is a need for always improving the application with future updates. Some of the features for future enhancement include:

- Online payments would allow consumers to pay directly for the services they use.
- Customers will benefit from an interface that helps them to choose items and add them to their shopping carts, while merchants will benefit from the opportunity to advertise their goods and services.
- QR Code scanning is a tool that can be helpful for saving and communicating with a shop that you happened to visit at random.
- Another significant problem is that we are unable to validate shops on a large scale. As a result, it would be advantageous to the shopkeeper if we included a feature that allows them to register with limited authentication criteria, such as KYC.

#### 4. Conclusion

Due to the extensive functionality of smartphone applications, they have become an integral part of our daily life. Due to the exponential growth in the number of users, it is important to provide a well-designed, bug-free, and user-friendly application. Our technology Shop Chain is intuitive to use and beneficial to all users in their everyday routines. It will enhance customer interaction in all shops, even small ones, and will allow consumers to receive the most up-to-date information from their favorite location through our app. Customers can quickly order goods from the shop by sending them a note with a list of desired items or by personally calling them. Our application enables them to keep track of the shop's status and inventory. As a consequence, our application would significantly improve the shopping experience.

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