

# Hyperlocal Delivery Service Application Development using Flutter

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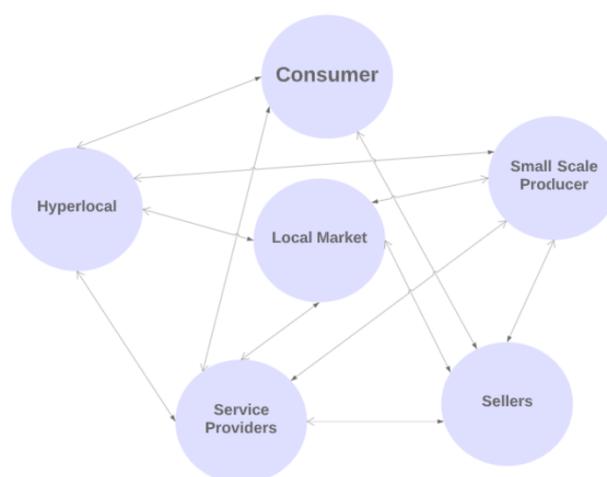
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**Abstract** - As the name suggests, Hyperlocal focuses on the close-by region/marketplace. Hyperlocal delivery is a concept where the delivery service provider concentrates on local (nearby geographical area) customers. A Hyper-local business model integrates the offline and online marketplace and optimizes the workflow, increases efficiency, meets customer demand, and improves local business. By developing this app, our goal is to reduce the impact of Covid19(Corona Virus) on small-scale businesses and local stores. We aim to provide the local customer with the products they need in a timely and safe manner at their convenience. This application provides the local shop owners and business owners an opportunity to expand. We will use a hybrid hyperlocal model to reach our goal as it provides both quality assurance and the possibility to scale. Our app will be cross-platform compatible because of the use of flutter framework. Flutter is a user-interface software development framework developed by googled for developing high-performance applications using dart as a base programming language.

**Key Words:** Hyperlocal, delivery, cross-platform, flutter framework, marketplace

## 1. INTRODUCTION

As the name suggests, Hyperlocal focuses on a specific geographical area/region. It limits itself to the information of that particular local area. A Hyperlocal quantity or activity is based on, operates, and thinks to develop its specific area [4]. There are various use-cases of the hyperlocal model, such as hyperlocal journalism, hyperlocal weather forecasts, etc. This paper focuses on the delivery aspect of the hyperlocal model. Hyperlocal delivery is a concept in which the delivery service provider is concerned with only the local customers, i.e., it focuses on delivering goods and products to the customers of that specific geographical area only. The USP of the hyperlocal delivery model is its ability to deliver products very quickly. The hyperlocal delivery model connects local vendors and shopkeepers to the local region's e-commerce market, allowing them to deliver their products and meet the needs of local customers quickly. It also ensures that local customers receive the products they require in the shortest amount of time possible. A hyperlocal delivery model has a delivery timeframe ranging from 15 minutes to 120 minutes. A few hyperlocal activities are shown below in the Fig 1 [4].



**Fig-1:** Hyperlocal Activities

The Aggregator-based and Inventory-based models are two of the most common types of hyperlocal delivery models. In the Aggregator-based hyperlocal delivery service model, the owner acts as a mediator between the shopkeepers and customers, i.e., it connects the local retailers with local customers using an application and fulfilling the delivery needs.

One of the main disadvantages of the aggregator-based model is that maintaining the quality of the product becomes a hassle. In the Inventory-based hyperlocal delivery service model, the owners source their products directly from the brands and sellers and creates an inventory of them. He manages the inventory based on customers' demands and delivers the product to customers. The possibility of expansion and scalability is significantly less in the inventory-based model. To address this problem, we are working on a hybrid hyperlocal delivery system. That utilizes the advantages of both aggregator-based and inventory-based hyperlocal models and reduces their disadvantages. We will connect the customers and local vendors using a mobile application.

Many local vendors were forced to close down due to Covid19, and they could not earn a living. The majority of them had to struggle to re-establish their businesses. To reduce shop owners' concerns and offer them the opportunity to establish an online presence. Local merchants are unable to achieve large revenues because of E-commerce MNCs. To assist in stabilizing the economy and providing local vendors a chance to compete and earn profit. A hyperlocal delivery service system is required. The majority of Indian hyperlocal delivery systems are unstructured. Shop owners and retailers are unable to comprehend customer needs and communicate with the customers using the available hyperlocal delivery systems. Most of the major hyperlocal e-commerce start-ups and firms are only available in the metropolitan cities. Hyperlocal e-commerce systems present in tier-2 and tier-3 are not reliable and they also lack optimization. For example, the hyperlocal e-commerce apps in my city are not even able to provide a tolerable user experience let alone reliable delivery. All the tier-2 and tier-3 cities need a well-optimized and reliable hyperlocal e-commerce firm. We tend to provide our city with a reliable and easy to use hyperlocal delivery service app.

The app we mentioned is developed using Flutter, a user-interface (UI) framework developed by Google in 2016 and the app will be compatible with both android as well as android. The application development will be an ongoing process, so that we make changes based on the future need. As the development technology is a UI Framework, the UX and UI components of the application will be especially refined due to the nature of the technology in use and this is precisely one of the major reasons for choosing this technology as in the modern market, the aesthetics of the application has taken a slight edge over even the performance of the application [1].

## 2. CONTEXTS (Theory)

**Flutter:** Flutter is a UI framework based on dart language developed by Google, used to develop cross-platform compatible applications. Flutter reduces the time overhead of the development cycle of an application by rendering the UI directly into the OS's canvas rather than through a native framework [1]. Flutter is fast, productive, and flexible for developing natively compiled, cross-platform applications from a single codebase. Flutter offers a large and well-maintained open-source library of UI elements which are known as widgets. Widgets are well optimized for designing and developing environments, widgets also make the development procedure simpler. Flutter provides Null safety feature, but the best features of the flutter are hot-reload and hot-restart, these features allow the application to render changes made to code almost immediately in seconds.

**Dart:** Dart is the programming language on which flutter is based, it is developed/built by Google. Dart language is optimized for fast application on any platform and for the UI. Dart can be used to build web, mobile, or desktop applications. Dart has a C-style syntax and is a garbage-collected, object-oriented, class-based language [1]. Some of the features of dart language are concurrency, extensive libraries, flexible compilation, speed, type-safe, null safety, browser support, community support.

**Firebase:** Firebase is a web application platform that allows us to build, release, and monitor web, mobile and desktop applications. It helps developers in building high-performance and quality applications. Firebase was released in April 2012 and is currently managed by Google. Firebase mostly serves as a backend technology for the applications. Firebase provides services such as authentication, firestore database, real-time database, cloud-storage, hosting, and machine learning. These services are secure and can be used to store client data and files. Firebase helps developers build a reliable and high-performing backend.

## 3. LITERATURE REVIEW

### 3.1. An Effective Approach of Hyperlocal based Services in Smart Cities

The hyperlocal model is unique. It is possible to concentrate on specific social interests. The source community also includes factors corresponding to product demand. Communication among people of colour in this body is critical. Sample.

The model is capable of logging the necessary data. Investigating the interests and lives of those who live there. The hyperlocal model has some drawbacks as well. test. The internet is now used by original dealers, making the learning process vulnerable. I hope you will be obedient and work with the service in the right direction. Shipping is also a major issue in this state, and even real consumers are hesitant to purchase a product. If the shipping cost is prohibitively expensive, use Treasury. The success of this model is also dependent on careful planning. Make a deal. With a diverse range of people. Service, communications, distribution, and sales are the most critical phases of the hyperlocal model. The main actors and the four stages they manage. It is critical to comprehend the significance of each step in determining the potential for transnational trade in a specific population. Which services should be in the maintenance phase are available on their own or through third-party apps like WhatsApp and Twitter. This is excessive. Includes a brief demographic survey as well as checks to determine. This is significant because certain service types are in high demand. The most crucial stage of the hyperlocal sales model. To empower transregional businesses, the quality of sales must be improved. A link from a hyperlocal system to a communication system allows for communication with a colourful actor (Stoner or a system that interacts with the content) system. The distribution becomes a critical step. Hyperlocal businesses compete with one another to deliver their product or service at the quickest and cheapest possible time.

### 3.2. A framework of hiring strategy for workforce hiring in a hyperlocal food delivery

Hyperlocal firms compete with one another to supply their product or service as quickly as possible and at the lowest possible cost. The motivation for the above work arose due to the flexibility of delivery requirements for people at different hours. Hiring too many people who deliver will result in better results and a better customer experience. However, it will be more expensive and lead to a reduction in the number of personnel delivering services on time during times of low demand. Rent an insufficient quantity of deliveries instead, which may result in some requests not being completed. This may also result in order response times that are too long for targeted customers to tolerate. This strategy is possible seems to save money on the Delivery Organization even though it sacrifices a certain level of customer service.

**Table-1: Literature Review**

Sr. No.	Paper Title [Ref.]	Author names	Conclusion	Research Gaps
1	An Effective Approach of Hyperlocal based Services in Smart Cities	Pranav Khatri, Anshul Ranjan	The success of hyperlocal business model depends on the number of active users, active-cities and the location.	Conclusion was based on the data of only three companies.
2	E-commerce trends during COVID-19 Pandemic	Anam Bhatti, Hamza Akram, Hafiz Basit	Overall sale of the e-commerce has increased exponentially during a pandemic.	Research was based on just the percentage (%) of sale increased.
3	A framework of hiring strategy for workforce hiring in a hyper-local food delivery organization.	Debadyuti Das, Chirag Yadav	Developed an optimization model to reduce the human resource cost for the delivery firm.	Makes the delivery scheduling a little complicated.

## 4. PROPOSED METHODOLOGY

System Overview: Hyperlocal delivery service app is a mobile application developed using flutter and firebase. It is based on hybrid hyperlocal model. It enhances the shopping experience of the local customers by using hyperlocal e-commerce. Following are the features of hyperlocal delivery service app:

- Sign Up/Login

- Filter for products
- Fast shipping method
- View orders
- Product/order management
- New seller onboarding
- Order and Delivery notifications
- Optimized delivery routing
- Customer relationship management
- Refunds

The Software Development Life Cycle (SDLC) model that we used for the application development procedure is SDLC-Iterative model. In Iterative model, the implementation of sub-part of application is done and the similar sub-part implementation procedure is repeated until the application is completely developed. It is called iterative model because the development is done in iteration. We use the Iterative model because it best suited our requirements, we were able to show-case the implementation of the app at times, testing of features was also easy because of the iterative approach.

The designing of the application was done in Figma, it is a web-based designing and prototyping tool. After the completion of the design, we started building the applications UI page by page using flutter. We use Material design widgets (UI elements of flutter) for developing the UI. Login Page, Sign Up Page, Home Page, Admin Page, Nearby Store Page, etc., are some of the pages/screens of our app. We used media-queries for the sizing of the widgets. Simultaneously the required data for each page was being added to the firebase firestore database or the firebase cloud storage. Development of each page was done iteratively. For login and signup, we used the authentication service provided by the firebase. Most of the pages will be dynamically generated using the data from firebase based on the requirements of the user.

The local customer will be able to buy the products from nearby store using an application and get that product delivered to them under half an hour. The app provides them a way to buy product based on categories or from the nearby stores they prefer. Local stores owners will be able to register their store on the app and sell their products via e-commerce. Stores owners can themselves add the products to the database or can take help from our admins. The delivery of the product will be done by delivery executives. This leads us to the next problem which is vehicle routing problem.

Vehicle routing problem is considered as NP-hard problem. This problem is related to the optimization of the routes that the delivery executives should take in order to minimize the cost and travelling distance. We are using the OR tools provided by google for solving this problem. Google OR-tools is an open-source software suite used for solving linear programming, vehicle routing and related problems. We use the Direction-API one of the services provided by OR-tools for optimizing the delivery routes.

We are also providing order tracking and order alerts feature to the customers. As soon as the customer places the order, they will be notified via a SMS with their order details. We are able to do this using Twilio API.

We are also working on the collaborative-filtering based recommendation algorithm for our application, as it helps personalize the user experience as well as boost sales.

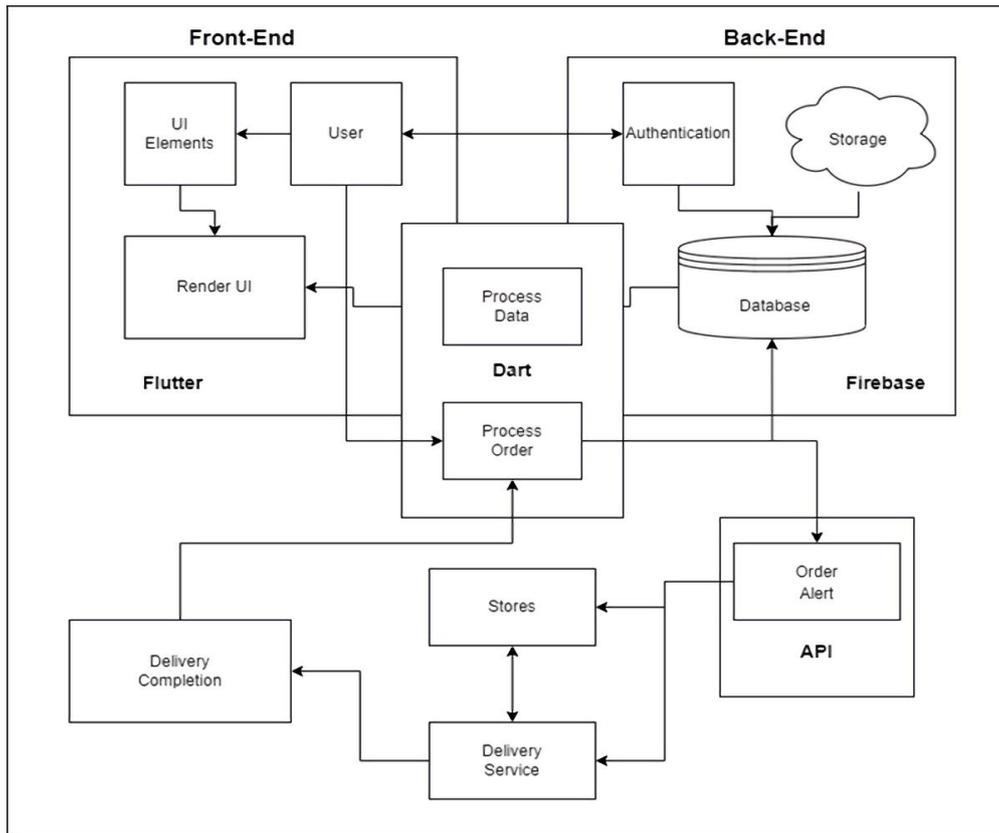


Fig-2: Proposed System Block Diagram

There are three main components namely Frontend, Backend, Order processing, and delivery, of the application as it can be seen from the block diagram. All these components are inter-related and communicate using the dart language. The workflow or the uses of the application is shown in the below Fig. 3.

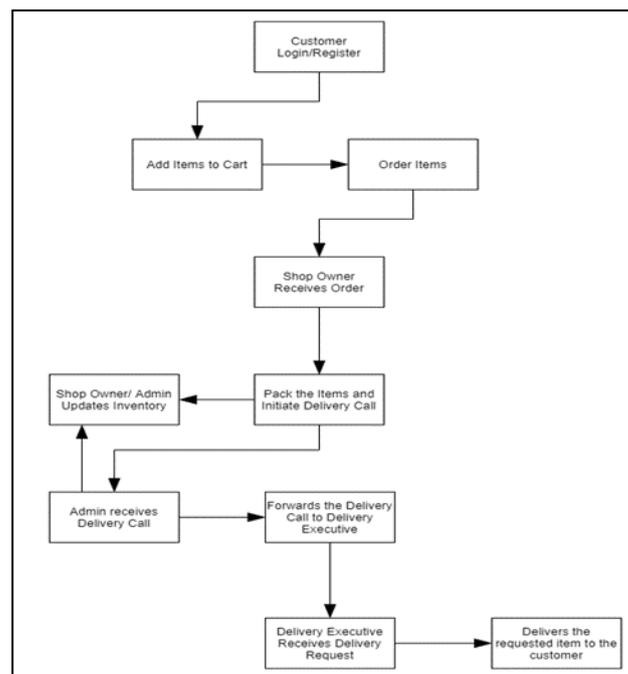


Fig-3: Workflow Diagram

As it can be seen the process starts when the user logs in and it is completed when the product is delivered. There are many other tasks such as adding products to the cart, ordering, order alerts to store owners, changes to inventory, etc., completion of these above-mentioned tasks in proper sequence enables us to maintain user experience and deliver products to the customer. From a programming point of view, all these tasks have their own particular classes, which help maintain order and proper execution. It can be better understood by viewing the class diagram. A class diagram is a unified modeling language type diagram that describes the structure of the system using the system's classes, their attributes, methods, and the relationships among objects.

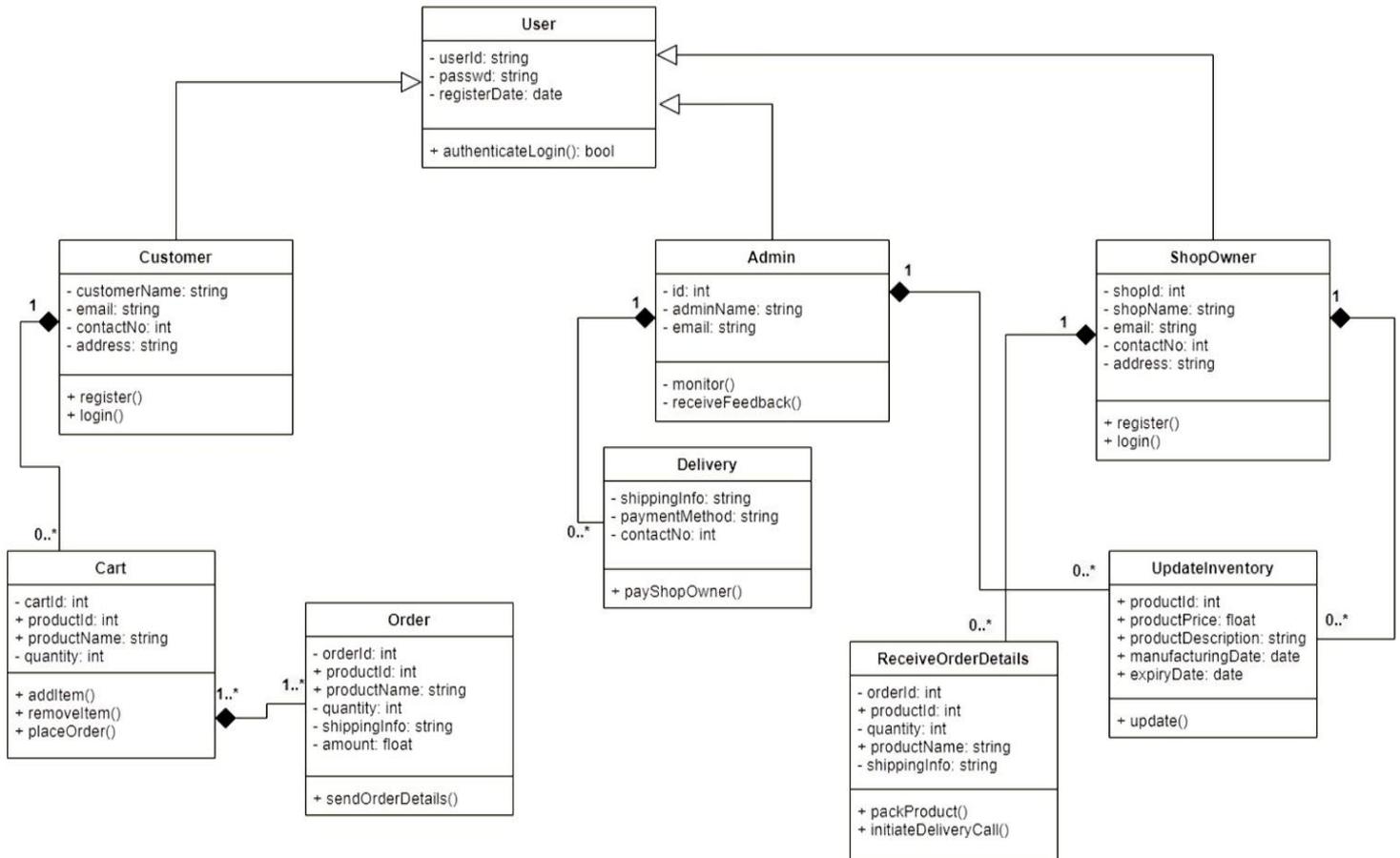


Fig-4: Class Diagram

4. IMPLEMENTATION:

We have completed the development of the alpha version of our application. We did the testing on the emulator as well on the mobile phone. It worked properly without any rendering or out-of-bound errors. I have attached the screenshots of the few pages/screens.

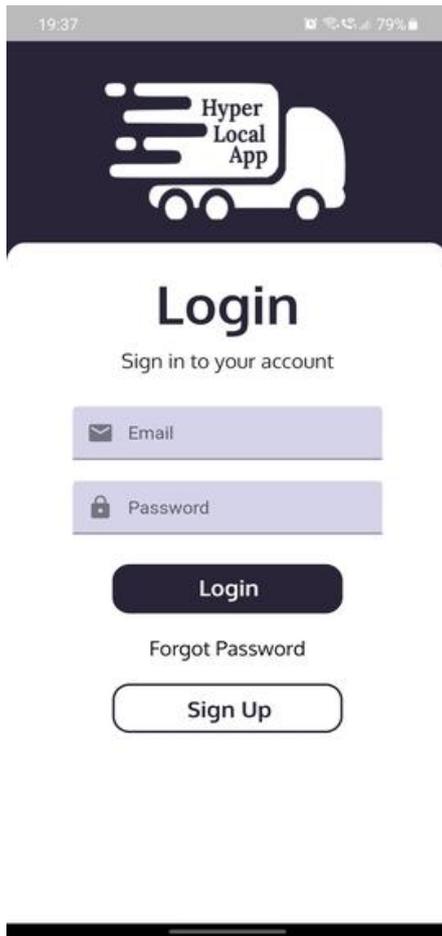


Fig-5: Login Page



Fig-6: Home Page

## 5. RESULTS:

We have developed the alpha version of our application. The application is responsive and it provides all the functionalities that were mentioned. We can use this app to order food from the nearby stores and get them delivered to us in under 30 minutes. Because of the use of hybrid hyperlocal delivery system, we are able to maintain the product quality. Using the Google's OR-tools we are able to deliver product as quickly as possible. Overall, the deployed app will enable us to meet customer demand in a timely and efficient manner.

## 6. CONCLUSIONS:

The hyperlocal service app helps us to stabilize the economy. Covid19 really disrupted the market flow because of which many local vendors had to shut down their shops, many customers were unable to get the essential items they needed. The Hyperlocal model provides an opportunity to local-stores to expand their businesses. Local vendors are able to increase their profit using digital means. Customers are getting the products they need at their doorstep with all safety precaution. The hyperlocal market seemed to be growing at the fastest rates in the years. Most of the new startups are concentrating on this model so this gains more importance.

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