

DESI KHAO - E-Commerce Application

A Project Report Submitted
in Partial Fulfilment of the Requirements
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Bachelor of Technology

In

**DEPARTMENT OF COMPUTER SCIENCE AND
ENGINEERING**

By

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to

**DEPARTMENT OF COMPUTER SCIENCE AND
ENGINEERING
INDIAN INSTITUTE OF INFORMATION TECHNOLOGY**

KOTTAYAM-686635, INDIA

April 2021

DECLARATION

I, **Gaurav Kanwat (Roll No: 2017BCS0020)**, hereby declare that this report entitled "**Desi Khao - E-Commerce App**" submitted to the **Indian Institute of Information Technology Kottayam** towards the partial requirement of **Bachelor of Technology in DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING** is an original work carried out by me under the supervision of **Dr. Keshab Nath**, and has not formed the basis for the award of any degree or diploma, in this or any other institution or university. I have sincerely tried to uphold academic ethics and honesty. Whenever a piece of external information or statement or result is used then, that has been duly acknowledged and cited.

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CERTIFICATE

This is to certify that the work contained in this project report entitled "**Desi Khao - E-Commerce App**" submitted by **Gaurav Kanwat (Roll No: 2017BCS0020)** to the **Indian Institute of Information Technology Kottayam** towards the partial requirement of **Bachelor of Technology in DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING** has been carried out by [him/her] under my supervision and that it has not been submitted elsewhere for the award of any degree.

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April 2021

(Dr. Keshab Nath)

Project Supervisor

ABSTRACT

E-Commerce is a market that is constantly evolving, there are so many reasons for the same, such as advancement in the technologies used, online market gaining popularity day by day, etc. This project is about developing an e-commerce application, like an amazon application but focuses on agriculture and organic related products. The main aim of the project is to develop an e-commerce application to provide the necessary tools and items to the Users and make organic farming easier for them. These are the various steps that can be performed in this app:

The users can sign up/login into the app, after verifying their number, they can look for a specific item or explore the app for different products, add them to the cart and make purchases, gets recommendations based on their products purchases, get notified whenever there is something new onboard or any updates related to the application, the design of the application and security of the user is something which required thorough reading and some research. The application Desi Khao is being developed using the software Android Studio using Java and some libraries as the main language, and for communication to the user, XML is being used. For testing purposes, both mobile simulators and physical devices were used.

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Chapter 1

Introduction

E-Commerce has improved the business methods by giving businesses the opportunity of selling goods and services online, not only the opportunity but also giving traders the possibility of trading to different sites as well as different parts of the countries. It gives advantages to the users as well as they also have the advantage of buying goods not only at any time but also from anywhere, using a device which is connected to the internet, previously, it was only popular on computers, as the mobile phones were not capable of performing these tasks, but in this age of wireless technology, mobile phones came out to be an advantage for both, the buyers and the sellers, it is easier for customers to order it by mobile phones as it has the advantage over using a computer just to order goods, while the seller is also satisfied by fulfilling the requirement of the customer. The figure below shows how e-commerce is becoming popular in India in the last 7 years:

Number of digital buyers in India from 2014 to 2020 (in millions)

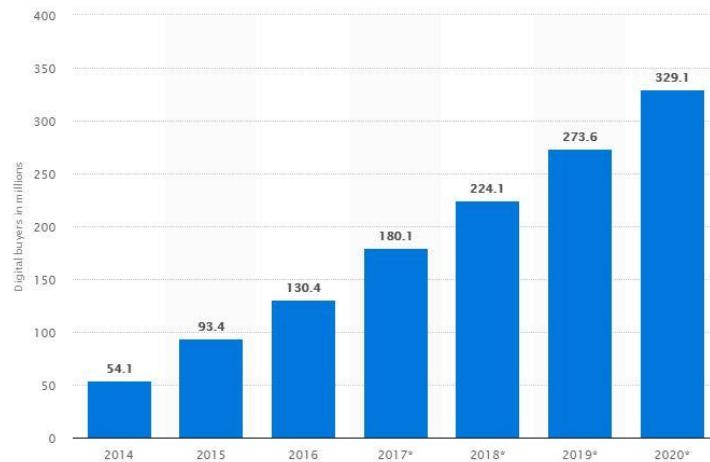


Figure 1: Number of customers for e-commerce applications (2014-2020)

The application Desi Khao is developed by taking into consideration those who are related to agriculture and interested in buying organic products, The application Desi Khao has two major goals, to provide tools to the users who are interested in organic farming and, to provide knowledge to them about the tools and products which are related to organic farming. This application only provides products and food items related to agriculture industries.

1.1 Project Scope

The aim of this application is to provide the products and services to the customers, which are related to organic and agriculture fields. There are several e-commerce apps and websites which deliver the same, but this application is focused on a single niche which is related to the agricultural field. This application focuses on delivering agricultural products to the customer, they can also read about them in the app itself. The users can download the app from playstore, they can explore the app and read about different products, add items to their wishlist and sign up and login to make purchases, and further get notification about any offers and new updates. The usage of mobiles has increased over the previous year, and India currently stands at second place in the World in the number of active mobile users, this alone shows the demand of better applications in future. Developing an application which focuses on a particular niche will provide a better user experience.

Chapter 2

Literature Survey

Literature Survey presents various analyses and research made in the field of your interest and the results already published, taking into account the various parameters of the project and the extent of the project.

In paper [1], G. Linden, B. Smith and J. York have explained how amazon implements recommendation algorithms in their website. There are various algorithms this company uses to increase their productivity and bring them thousands of new users every day. They mentioned various algorithms like Traditional Collaborative Filtering, Cluster Models, Search-Based Methods, Item-to-Item Collaborative Filtering,etc and explained how these algorithms work. This paper focuses on scaling different algorithms according to the users as amazon has a big customer base. In paper [2], by Karnouskos S. We see a brief discussion on implementation of a payment method that has been mentioned as one of the reasons for rapid development of e-commerce businesses, and some of the most important mobile payment procedures that are relevant to the development of mobile payment services. The relation between the customer (payer) and the merchant (payee) is called an MP arena, they discuss how the customers and merchant transact via the mobile payment process, whose main players also includes the mobile network operators, various institutes, the government, the device, software, and also the service provider. There are some factors which affect mobile payment services such as simplicity and usability, user friendly interface, the availability of the services, the level of risk users are taking while using it, and security and trust of the customer. They discuss the current scenario of the mobile payment system and how it can be a good long term scenario for the future.

In paper [3], M. H. Eldefrawy, K. Alghathbar and M. K. Khan discusses OTP-based two-factor authentication, The requirements and considerations before implementing such a system in an application, the SMS cost, SMS lateness, International roaming and the SMS security. The OTP system uses an algorithm to provide a unique key, which is generated every time an OTP is requested from the server, it uses an equation which generates a finite sequence of single-use passwords from a single secret called as seed, which is only known to the user, then the

algorithm applies hash function for N times to the seed to form a chain of length N, which then makes a communication with the user side, user calculates the OTP and host then authenticates the user by checking the following equality holds, and this is how hash function is applied to make an OTP a good two-factor authentication, they also suggests some more methods and came up with their own method which is an extension of Lamport's idea. There are some limitations of implementing this system in this paper as well, An intruder can still attack and how these attacks can be avoided, these points are discussed in the paper. In paper [4] S. Kumar, M. A. Qadeer and A. Gupta, have discussed implementing location-based services using Android, a location-based service providing services based on the current or known location, which is supported by electronic map platforms. LBS provides users with contents, such as nearest restaurants or hotels, which are retrieved by a spatial database stored remotely in the LBS server. They explain the various architectures of the LBS system, such as pull-based model, in this, a location proxy establishes between client application and LBS application, when the client initiates LBS request, their location is attached to the request by Location proxy and then forwarded to LBS application, similarly there are two more architectures of LBS system, Poll-based model, and Push-based model respectively.

In paper [5] G. Adomavicius and A. Tuzhilin discuss and analyze different recommendation algorithms to find the rating of a product or a movie, they use different recommendation algorithms like Content-based, collaborative, and hybrid approach which combines both content-based and collaborative methods. They discuss the method of combining separate recommendation algorithms: Firstly, combine the outputs (which is rating) obtained from individual recommender systems into one final recommendation using linear combination of ratings or a voting scheme. The hybrid system of different recommendation equations resulted in giving a better ratings system instead of using a single algorithm at a time. However, there are still some limitations to this theory, such as the time taken to execute a hybrid recommendation system was more than doing it individually, and the current generation of algorithms still requires further improvements. In paper [6] Halaweh, M. describes how the use of cash on delivery (COD) methods increased even after having so many different payment methods such as credit cards, debit cards, e-cash and e-wallets. The aim of this research is to compare COD with other payment methods and definitely consider the implication of it in the applications for customers and e-vendors. By offering COD as a payment option, e-commerce companies can actually target more customers and so increase sales.

2.1 Limitations

In Desi Khao, I started building this application such that it is related to selling items related to agriculture and organic side, there are so many apps like Amazon, Flipkart, Alibaba, etc, which does the same, but they have some flaws:

The main reason is their target audience, these apps sell almost every item, which grabs the audience of every category, but the quality of items drops as they increase the scale of their target, consider an example, you are buying clothes from Amazon, from the same place you decided to buy some shoes, or anything related to the kitchen, you don't know the quality of items you are getting from here, instead of something branded. On the other hand, if you are buying shoes from known brands, you have the trust built on them for a long time. Currently, if we talk about our niche, there are so many users, who buy different organic products from these websites and apps mentioned above, but if they get it from the brands which have expertise in that field, they are gonna trust it more and the overall experience will be better for them as well as for the brands.

Currently, there are a few applications that are delivering something similar to "Desi Khao" but not exactly what it does, applications like trust basket, Licious, Ferns & Petals, etc, provides tools and helping out the consumers related to agriculture and farming, but some of them lack in providing the complete knowledge of agriculture field for someone completely new to this, not only those but even someone who is experienced enough, needs the knowledge and products, which is available at one place.

Organic products are the need of this time when everyone is worried about so many health issues, they are becoming cautious of all the diseases which come from having chemically grown food items (fertilizers, etc). In India, the agrochemicals market size reached a value of almost USD 4.5 billion in the year 2020. The market is further expected to grow at a CAGR of 8.6% between 2021 and 2026 to reach a value of almost USD 7.4 billion by 2026, which is a worrisome figure considering the side effects of having chemical-induced food items.

India Agrochemical Market, by Product:
2020-2027

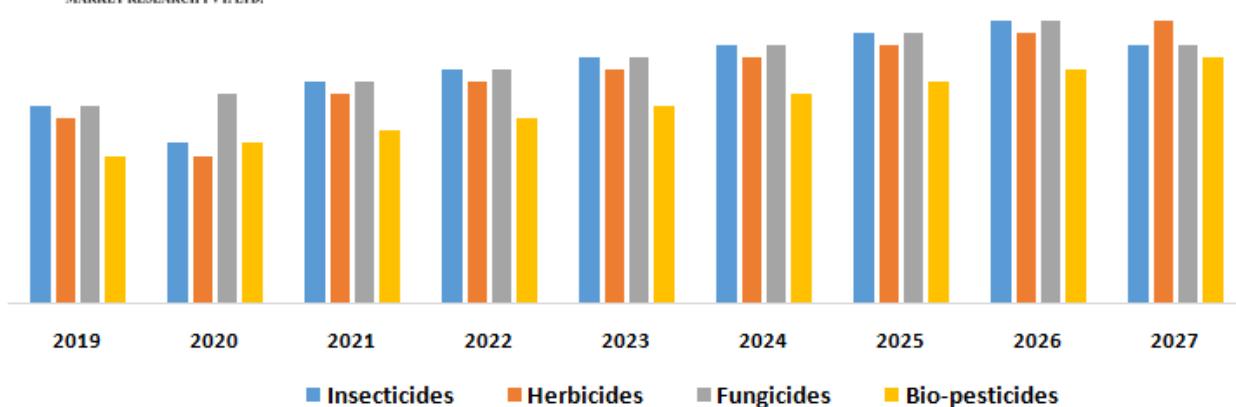


Figure 2: Indian agrochemical market 2020-2027

Figure 2 represents the market of chemicals in the agriculture field and how much it is estimated to grow in the future.

2.2 Motivation

The motivation comes from various cities where people related to agriculture are showing their interest in organic farming and they are utilizing the knowledge they have. People are focusing on having more and more natural food items and the sales of organic produce rose 14.2% in 2020, representing an increase of \$1 billion to \$8.5 billion according to the 2020 Organic Produce Performance Report sent to Food Dive by the Organic Produce Network and Category Partners. Even the Indian organic food market stood at a value of USD 849.5 million in 2020. The market is further expected to grow at a CAGR of about 20.5% in the forecast period of 2021 and 2026 to reach a value of about USD 2601 million by 2026.

India Organic Food Market Size, By Region, By Value, 2013–2023F

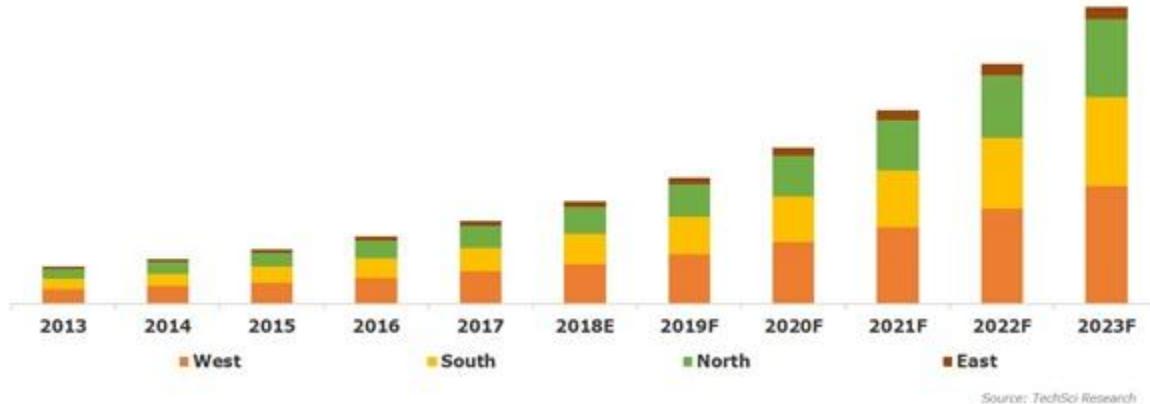


Figure 3: Indian Organic Food Market by 2023

The growth clearly suggests that It is necessary to eat food items and supplements which are chemical-free and organic, also after lockdown due to COVID-19, everybody is cautious before buying any edibles, people are learning to grow their vegetation and gaining the knowledge to do so at the same time. Because, some people are interested in doing organic farming on their own, but they don't know how to start, what to do, while some people know how to do it, but they lack the necessary tools and products required to do it. This is what the application will provide, the necessary tools which are required to do organic farming as well as the knowledge related to everything available on the app.

Chapter 3

Proposed System

In this section, we will discuss the activities which make the application, such as the authentication system, User Database Management system, recommendation systems, payment system, etc, which are the necessary part of this application, the study involved in it, and the final result that I have come up with. These are that system which is the backbone of this application:

3.1 Authentication

Despite the growing number of innovative ways to authenticate users, password-based authentication is still one of the most popular methods of all [9]. Passwords can easily be memorized and users at no cost are able to use them in their daily life. On the other hand, passwords can be forgotten because of a mixture of different passwords of various accounts [10]. This feature will give users a secure and simple Signup and Login Screen. The Signup will only be completed once your phone number is verified by the OTP verification system; it is used to ensure any kind of fraud related to transactions and credit cards is avoided. The Signup screen has various fields, such as username, full name, password, phone number, gender, date of birth, while the Login screen has fields phone number and password, so that it will be easier for a user to log in, There are a few options on the Login screen as well such as forget the password, which will allow users to change their password after OTP verification, and a remember me checkbox which will automatically fill your details next time you open up the Login screen. On successful Login, users can access further activities which are available in the app and these further activities can only be accessed by a User of the app.

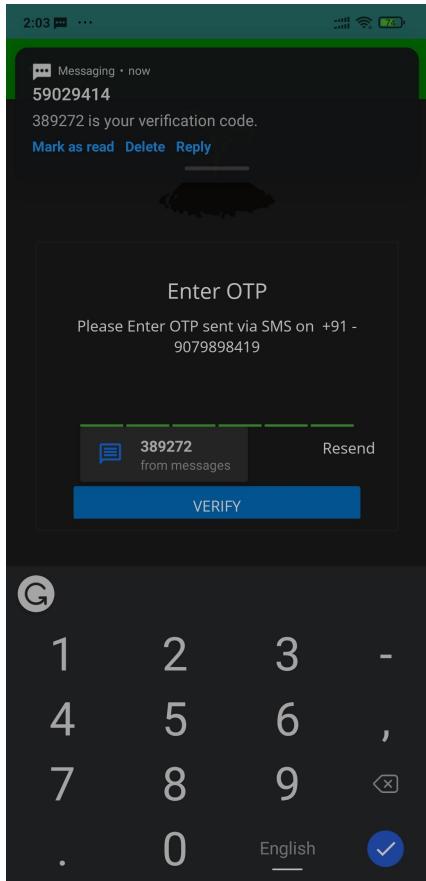


Figure 4: OTP verification

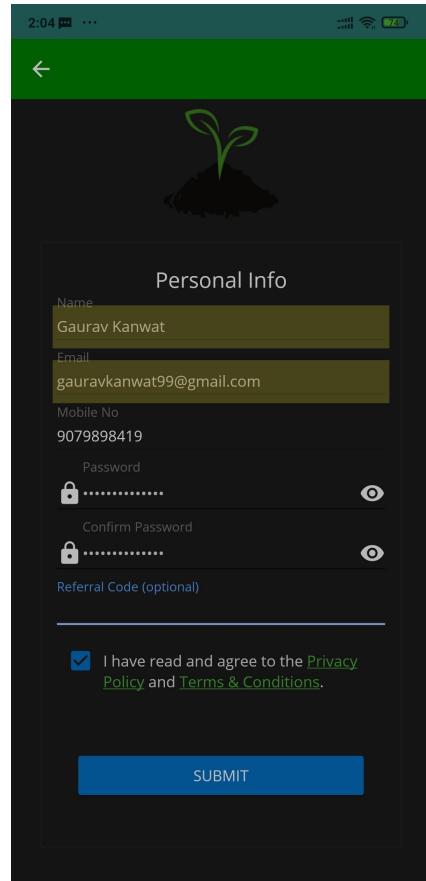


Figure 5: Signup Screen

OTP Verification: The idea of an OTP was first suggested by Leslie Lamport in the early 1980s. The OTP principle emphasizes that each time the user tries to log on, the algorithm produces pseudorandom output, thus improving the security. Thus, to avoid replay attack vulnerability, an OTP is a password that is only valid for a single login session or transaction. The need of adding an OTP verification is to avoid having multiple accounts from the same number, the users need to have a dedicated space for them to fulfill their business needs, it could be anything and in this case, a dedicated space is required by the user so that they can add items in their wishlist and cart, making purchases with their account simplifies the process of delivering products to that

particular user. Also, OTP prevents fraud by confirming that a user making any transaction is the same as the credit card owner.

Sign up: Sign-up is not a necessary part of any application, it is only required while making purchases so that we know the details required to deliver the products the user is making any order and transactions. However, it is not the priority of the application, because of these reasons:

- I. The main focus of an app should be to attract everyone rather than only those who are signing up
- II. Users should see the real value of the app and then decide on creating an account in the app.
- III. The user feels less anxious when using an app that doesn't ask them to log in.

3.2 User Database Management

The User Database is managed by Google Firebase which is currently based on WebSockets, which can both send and receive messages in real-time. WebSockets allow for a higher amount of efficiency compared to REST because they do not require the HTTP request/response overhead for each message sent and received. The Firebase Realtime Database is a NoSQL cloud-based database that syncs data across all clients in real time, and provides offline functionality. Data is stored in the Realtime database as JSON, and all connected clients share one instance, automatically receiving updates with the newest data.

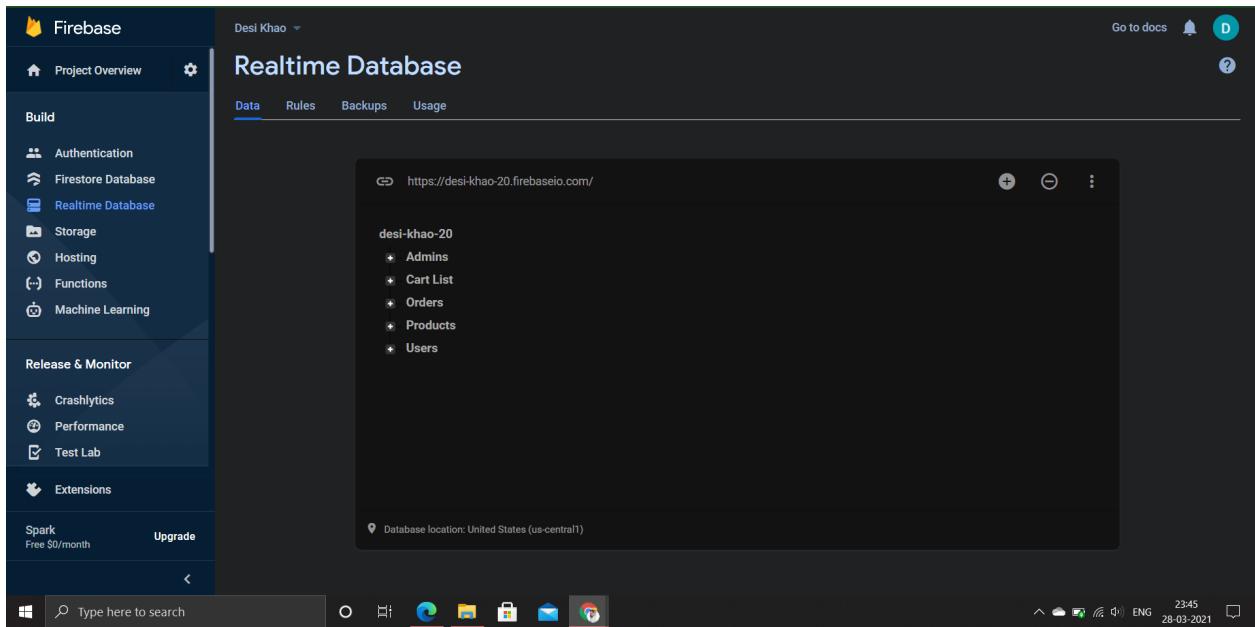


Figure 6: Firebase database with different nodes

Firebase Database: The Firebase Realtime Database is a cloud-hosted NoSQL database that lets you store and sync your users in real-time. In this database, there happens a dedicated long-term connection between client and server, so Any update on the client is transmitted to the server without initiating a new connection as a connection already exists. Also, the server pushes the update to other connected users as the connection already exists.

3.3 Recommendation System

A recommendation system helps users find compelling content in a large collection of data, Recommender system has emerged as a major research interest that aims to help users to find items online by providing suggestions that closely match their interest. These are the algorithms aimed at suggesting relevant items to users (items being movies to watch, text to read, products to buy, or anything else depending on industries).

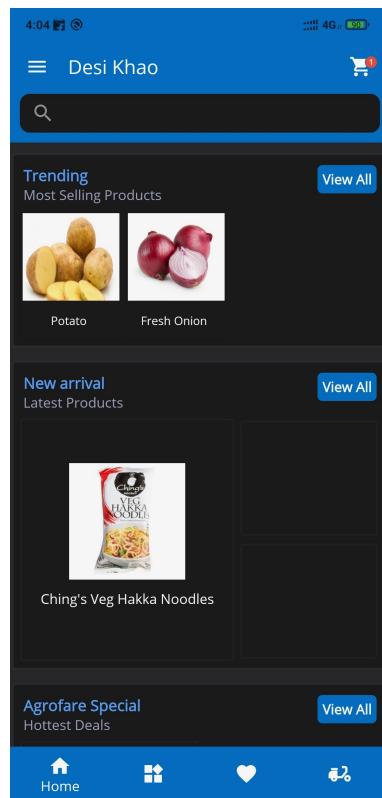


Figure 7: A preview of recommended items to the User

There are three main types of recommender systems:

- I. **User-based or Collaborative filtering:** tells what items are popular among people who are similar to that user, similarity is based on how close we graded the same items (e.g. if we both gave 4 stars to the same songs).
- II. **Content-based:** Recommends more items similar to other items that a user has liked in the past.
- III. **Knowledge-based:** a bit like content-based, but with more complex modeling inside.

We used Collaborative filtering to recommend items similar to the items they like, in this e-commerce application.

3.3.1 Traditional Collaborative Filtering

Collaborative Filtering is the most common technique that is being used to recommend products to the users based on the other user's ratings. A traditional collaborative filtering algorithm represents a customer as an N-dimensional vector of the item, here, the vector components are positive if the user likes the item or rated it positively, and negative if the user rated it negatively, which means they didn't like the item. The formula for the similarity between two customers A and B can be represented as:

$$\text{similarity}(\vec{A}, \vec{B}) = \cos(\vec{A}, \vec{B}) = \frac{\vec{A} \bullet \vec{B}}{\|\vec{A}\| * \|\vec{B}\|}$$

Figure 8: Cosine Similarity Formula

Here, we are measuring the cosine of the angle between two vectors, A and B. Using the above technique for recommendation is computationally expensive. The time complexity could reach $O(MN)$ in the worst case, where M is the number of users and N is the number of items in the database. However, It is possible to make it inexpensive is to reduce the data size, but this will also reduce the quality of the recommendation algorithm

3.4 Payment Methods

The application has various payment methods, such as cash on delivery, and online payment (currently RazorPay is added), which comes very handy for the users. This is done by sending a payment token to the payment provider, that is the user.

The steps considered while implementing payment system in the app are:

- I. Define a payment API for your payment provider (like Google Pay, Paytm, PhonePay, etc).
- II. Request a payment token for your payment provider.
- III. Describe your allowed payment methods.
- IV. Create an instance for PaymentsClient.
- V. Now, create a PaymentDataRequest object that will be needed to get information from the payer.
- VI. Now, as the user provides information, we need to register the event handler for user gestures and handle the response object.

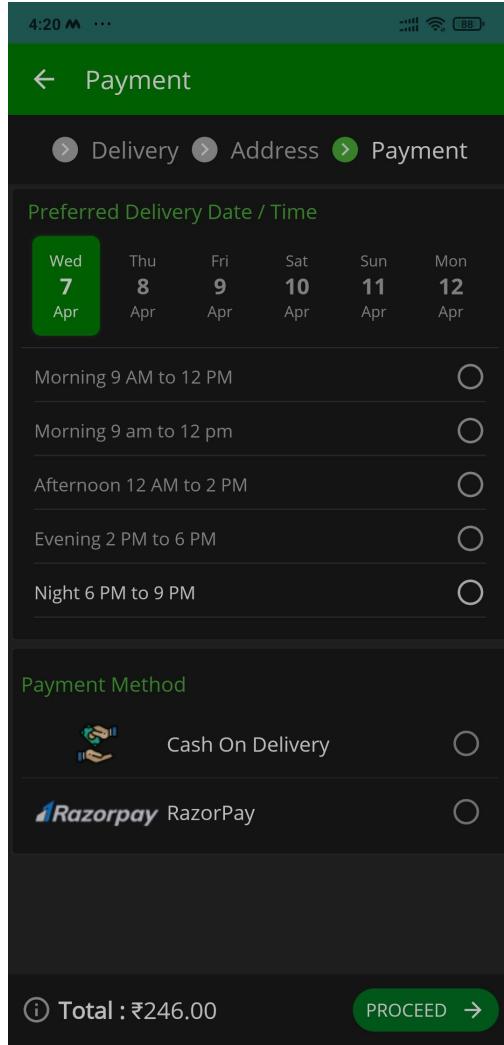


Figure 9: Two different payment methods, Cash on Delivery and RazorPay.

Currently, there are two different methods a user can complete the payment process as follows:

Cash On Delivery: Cash on delivery (COD) enables the customer to make a cash payment when a product is delivered to their home or to a location of their choosing. This is sometimes called a “post payment” system because the customer receives the goods before making a payment (Rouibah, 2015). COD has become increasingly

popular in recent years in India, Gulf Cooperation Council (GCC) countries, Thailand, Vietnam, and Poland (Copenhagen Economics, 2013; Hamid, 2014; International Finance Corporation, 2014; Nair, 2016; Rouibah, 2015). In India, for example, COD accounts for 50–80% of online transaction payments (Ernst & Young, 2013); in the United Arab Emirates, the figure is about 60% (Hamid, 2014).

RazorPay: This is the online method present in the application, for now, the payment mode in the database is stored as ONL for the users who made the payment online, as well as the amount paid. To implement RazorPay's online payment feature in the application. Firstly, create a business account on razorpay.com, then create the API key, copy it, and then paste it into the LocationManager class.

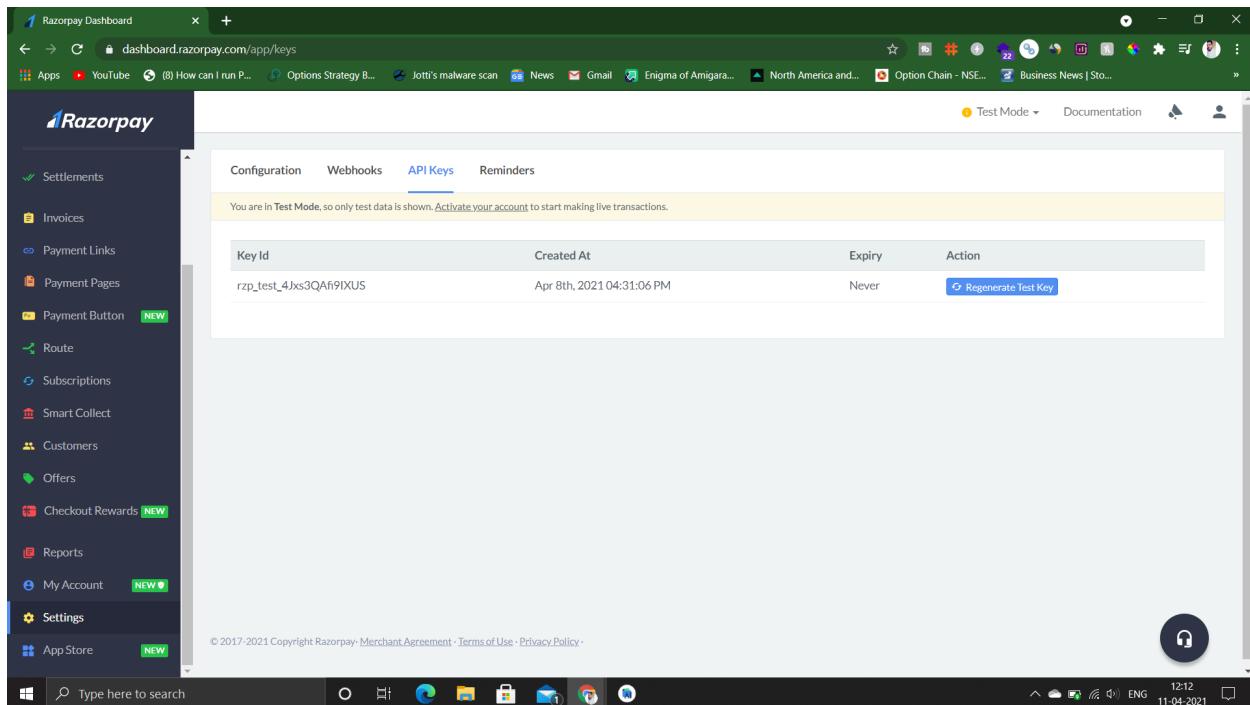


Figure 10: RazorPay dashboard and API Key used in the code

3.5 Location Based Services (LBS)

While the first location based services (LBS) appeared in the early 1990s (e.g. ActiveBadge), LBS became a fast-developing research field only in the early 2000s, mainly due to the discontinuation of the selective availability of Global Positioning System (GPS) by the U.S. President Bill Clinton in May 2000. This discontinuation has made GPS more responsive to civil and commercial users worldwide. Since that time, more and more GPS-based applications have appeared, resulting in a strong interest in LBS from both academics and industry. The application provides tracking of your orders which utilizes the Java class LocationManager and updates the location of the orders every minute. How LocationManager works and how this location tracker was implemented in the app is given below:

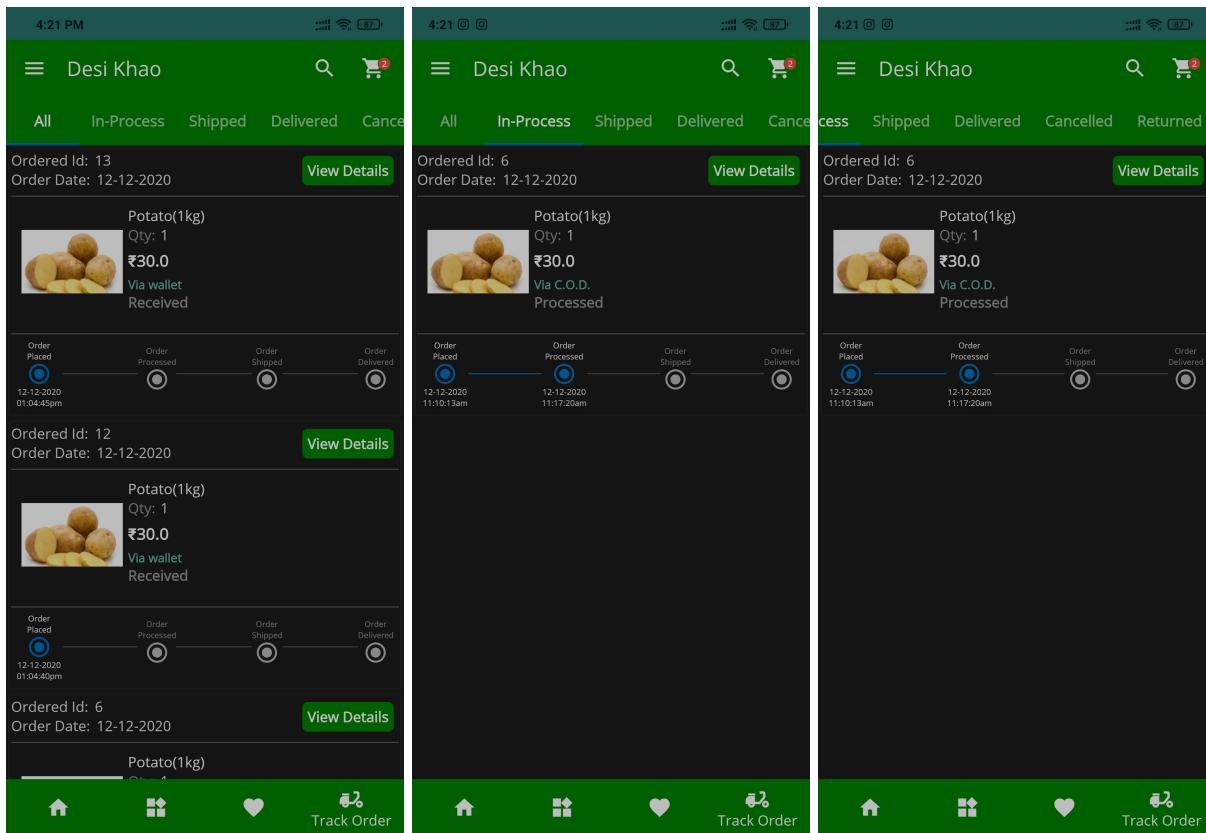


Figure 11: Figure showing different products that are ordered, in-process, and shipped respectively.

Location Tracker: The location tracker system has been implemented using the class LocationManager, it provides access to system location services. So, these services allow applications to obtain periodic updates of the device's geographical location, this can also be used to notify the users whenever the device enters the proximity of a given geographical location.

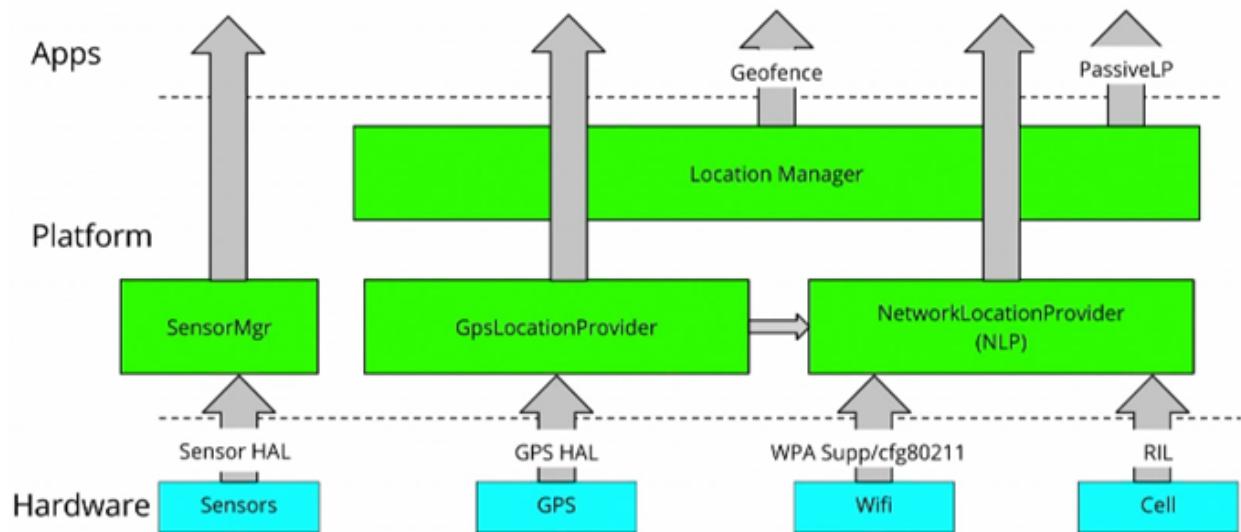


Figure 12: State of Platform API's with Location Manager

Chapter 4

System Design

In this section, we will discuss the approaches towards the system based on application, user interface, or database, what methods we had to follow to achieve certain goals in each section and what studies went behind to make them better with time.

4.1 Design Approach

This project is based on the functional design approach, a Function Oriented design is a method to software design where the model is decomposed into a set of interacting units or modules where each unit or module has a clearly defined function. Thus, it helps in understanding the design of the application by explaining its various aspects like use case diagrams, flow charts, etc.

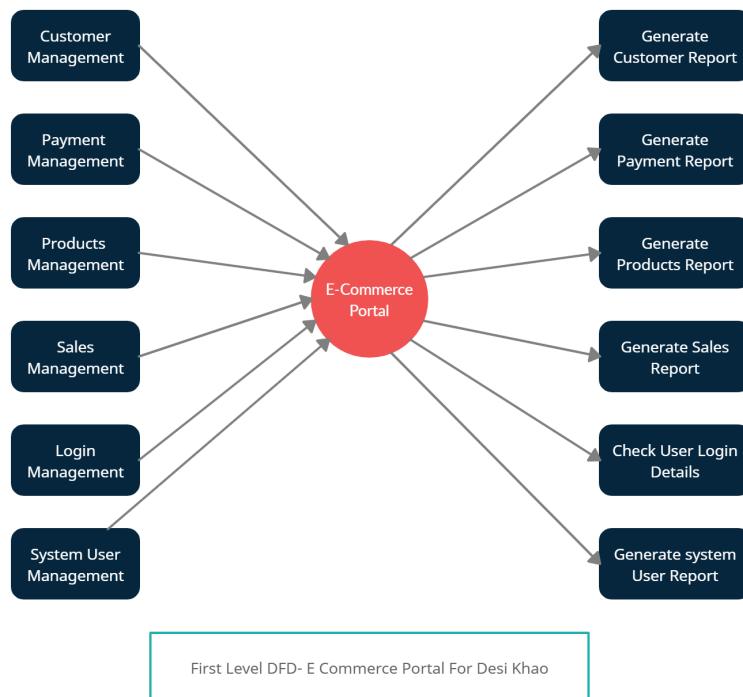


Figure 13: First level Data Flow Diagram for Desi Khao

First Level Data Flow Diagram: First level DFD() of the application shows how the system is divided into subsystems (processes), each of which deals with one or more data flows to or from external agents and which together provide all of the functionality of the E-Commerce Portal System as a whole.

Main entities and output of First Level DFD:

- I. Processing product records and generating reports of all products.
- II. Processing customer records and generating reports of all customers.
- III. Processing payment records of all the customers and generating reports of the same.
- IV. Processing sales records and generating reports.
- V. Processing login records and generating reports of all login activities.
- VI. Processing shipping records and generating all reports of shipping.

4.2 Application Design

Application Design involves analyzing and gathering the customer's business needs, then designing or proposing some solutions to meet the business requirements. It proceeds in parallel with conceptual design. Consider when the designer is designing a database, the designer should be aware of the applications that will run on the database. An important part of database design is to specify the functional characteristics of these transactions early in the design process. This ensures that the database will include all the information required by these transactions.

The main motive of the system design is to explain the complete scenario using a use case diagram, which makes it very clear to understand by clarifying the application by deriving the use cases for all functionalities in the form of diagrams for the users.



Figure 14: Use Case diagram for User and Admin.

Use case diagram: The above-given use case diagram summarizes the details of Desi Khao's users and their interactions with the system, use case diagrams capture the dynamic behavior of a live system. It should be as simple as possible, should be complete, should represent all the interactions with the use case, and should at least describe a single module of the system.

4.3 User Interface Design

It should be simple for a user to interact with the app, we should use only a few clicks or navigation among the features when using the application to avoid any kind of hassle. There are multiple activities throughout the app, but there are two main activities, Login or Signup, and Main Activity.

The screen below is the main activity page of the application, where you can search different items, without logging in, and add them to your wishlist, however, to place an order, you have to log in, once logging in, your account will be displayed on drawer activity, from there you can manage your account, account details, addresses, cart, wishlist, wallet, and your transaction history as well.

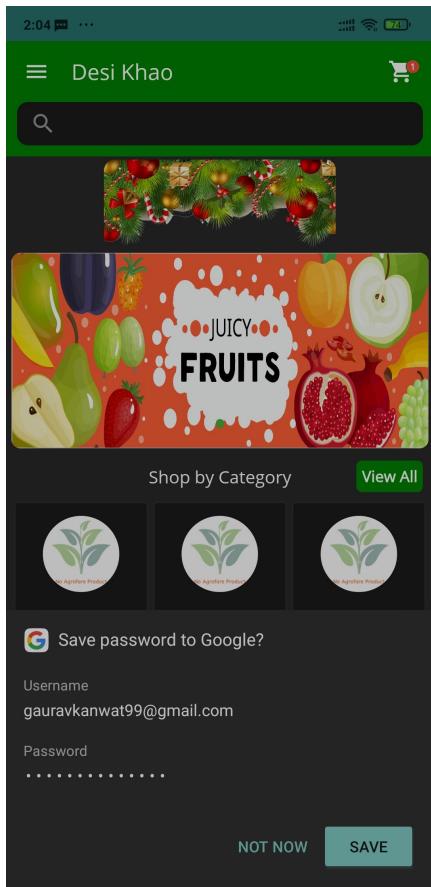


Figure 15: User Main activity page

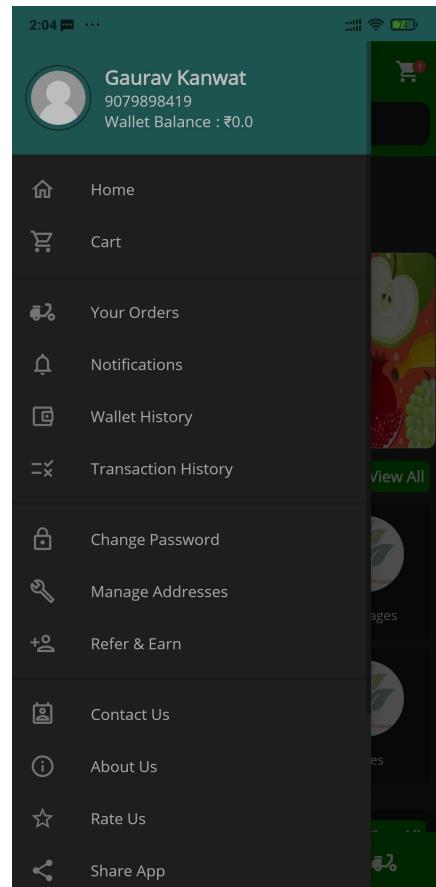


Figure 16: User Main drawer activity

User main activity page: This is the page where users will land after completing their signup and login activities, from here they can explore the app and use it according to their convenience.

User main drawer activity: This is the page for all different activities you can go from, you can open up your cart, watch your orders, read all the notifications, your wallet history, and many more. This is one of the most used activities in all the apps.

4.4 Database Design

The database should be designed in such a way that it should be easy to access and manipulate by the admins. Database definition and database manipulation operations should be performed accordingly to add, delete, and update values. In this project, I have used a real-time database which is provided by Firebase which is an open-source database, it is easy to use and can be used online without any hassle of downloading it. Instead of HTTP requests, Firebase uses data synchronization, so that every time any data changes, any connected device receives that update within a few milliseconds. The Firebase database is cloud-hosted, the data is stored as JSON and it is synchronized in real-time to every user in the database.

4.5 Methodology

Agile Software Development Methodology is a practice that is widely used in many projects as it has many advantages such as it promotes continuous iteration of development and testing throughout. It is reviewed frequently in the form of small tasks or iterations and made into action by executing it. After completing tasks for each iteration, each task could be reviewed and moved to the next iteration.

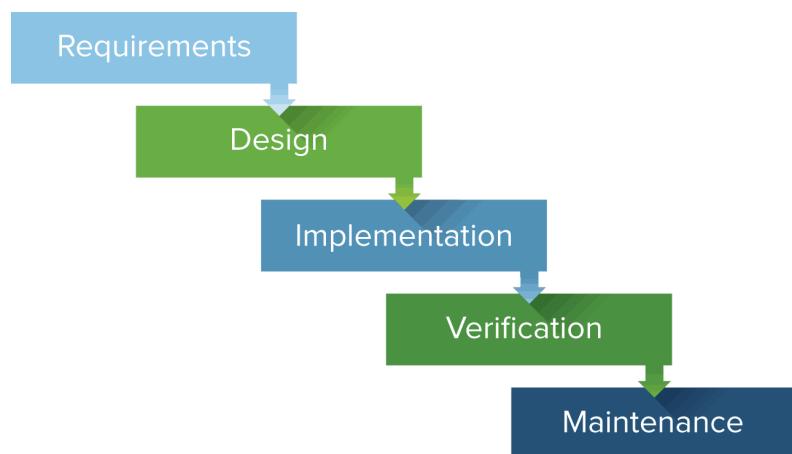


Figure 17: Waterfall Methodology

The main advantage of using this method is that we can change the requirements or design even in the middle of the project when the situation arises. Also, code maintenance is easier as compared to Waterfall Approach. Waterfall methodology is all about structure and moving from one phase to the next, so there is no flexibility in changing the requirements when we develop the project as we have to decide the working flow of the project even before the start of the project or at least before it gets complex and works according to that. Only if the designing part is done, we can move to construction, testing, and support. As this is not a team project, I have approached this project using agile methodology by applying its principles.



Figure 18: Agile Method

Chapter 5

Software Requirements Specification

5.1 Data Requirements

The set of data that is involved in a project is defined using data requirements. The required data here is the User's data for the Signup page, and the items and product information that is saved in the database. Without their data, the user won't be able to continue the further processes which require the details, and without the item information, the admin won't be able to display the items for the Users. The data requirements from the users are Username, email, password, mobile number (with country code), and referral code (optional).

5.2 Functional Requirements

Functional Requirements are properties that must exist in the final system. For any application available, we need to download them from the play store or iStore, depending upon their platforms, further, the applications could be either free or paid depending upon the provider. To use this application, users have to download it from the play store, they need not Sign up or Log in, they can still surf around the app and check different products, just like how an e-commerce app performs, however, if a user wants to access all the features which include ordering the items which are available on the app, they must Sign up and log in.

5.3 Performance Requirements

Performance requirements are the requirements that were considered while developing the application, these are, the application should be quick and responsive whenever a user interacts with it, it should run in all specified software and hardware requirements from the design phase, it should deliver the information to the User whenever it crashes or any other issues arises, the information given to the user should be clear and exact must be delivered, These are the performance requirements of an application:

5.3.1 Response time

It refers to the amount of time the application server takes to return the results of a request to the user. It is affected by several factors, such as network bandwidth, number of users, number and type of requests submitted, etc.

5.3.2 Scalability

It is the function of the application to manage an increasing number of customers, clients, and users. It is important to scale up the application as per the requirements, because, to maintain a positive user experience for the app over thousands of users, taking advantage of increased traffic due to some reasons and handling it effectively, and also it is necessary for the growing businesses.

5.3.3 Platform dependencies

It refers to applications that run under only one operating system, in this case, it runs only on android for now, but it should be compatible with multiple devices in order to gather a larger customer base.

5.3.4 Fault Tolerance

It is a property that enables a system to continue operating properly in the event of the failure of some of its components, in this case, the faults could be network issues, connectivity issues, or the crashing of the app.

5.4 Operating Environments

The operating environment is usually not a full operating system, rather it is a form of middleware that rests between the operating system and the application. The application is designed to work on the newer mobiles, it will run only on these given conditions:

- I. The application will only be available for the Android operating system for now.
- II. It shall only be used with compatible android devices.
- III. The User shall use this application on Android OS version 8.1 and above (API 27 and above). The user should have active internet access to use it.

5.5 Design and Implementation

In the design and implementation section, we will discuss what were all the languages used, the dependencies and servers, etc required to develop the frontend and backend part of the app.

The dependencies required in the application are Gradle v4.1.3 and above, which is a project building system, Google services v4.3.5 and above, in order to utilize all the google services for the backend as well as frontend part of the app, Google firebase crashlytics v2.3.0 to report all the crashes and fix stability issues that come during the development, and flutter wave v1.0.49.1 that can be easily implemented inside Android Studio

The repositories required in the app are jitpack from jitpack.io which provides ready-to-use packages, also Maven from midtrans.com for the frontend part of the application. The constraints Programming language used for the main application is Java Programming and the language for the database is also JSON which is the default language of Google Firebase, and the user interface language is XML (eXtensible Markup Language) which is used to develop the frontend part of the application.

5.5.1 Design & Performance Limitations

The application runs on almost all devices, but there are some limitations that users have to remember. The User should have a stable Internet connection, If the connection is broken or they have a poor connection, the app might not work up to its full potential, the user will not be able to sign up or login without an active connection. The User should have minimum required memory space in their android device, the app is user friendly and will not be something that will take huge memory in mobile, still, users should be aware of their memory available in the mobile, it will not install if free memory is less than required, The users should have at least required operating environments to run the app, as the required version of the Operating System is 8.1 or above user using older smartphones will not be able to use this application.

3.5 User Documentation

The User will see an On-Boarding Screen, if they run the app for the first time, it will be a regular user guide that will help them get familiarized with the app. The Home Screen has all the features the user can access, except a few features that can be only accessed after they are logged in. The Users data will be stored and will be used for various activities such as granting permission after verification, details required while ordering will be used to complete the process. The contact information will be posted on the app if the user wants to contact us regarding any queries. They will be able to contact us regarding any problems.

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Chapter 6

Implementation and Testing

In the Implementation section, we will discuss the implementing languages, IDE's, tools, technologies, about Android Studio and its different components

6.1.1 Java

As the project being developed is an Android application, the language here used as the default programming language is Java. These applications can be built using Java and an IDE (Android Studio or Java). Java is a class-based, object-oriented programming language that is a popular and widely used language across the world as it is designed to have as few implementation dependencies as possible. Java is a language that is preferred to use in various kinds of applications like Web, Mobile, Desktop, and also Big Data.

6.1.2 IDE's, Tools and Technologies

Android Studio is the IDE (Integrated Development Environment) for Android Operating System, it is solely designed to develop Android applications, not only develop but to design, maintain, test, debug, and publish an app also. The main feature of the IDE is to integrate all Java files, layout files into a single project easily, hence making it easier to publish the application.

6.1.3 Android Software Development Kit (SDK)

Android Software Development Kit is an installable package that contains multiple core software developing tools that are required to develop the application, hence reducing our workload of writing a lot of code.

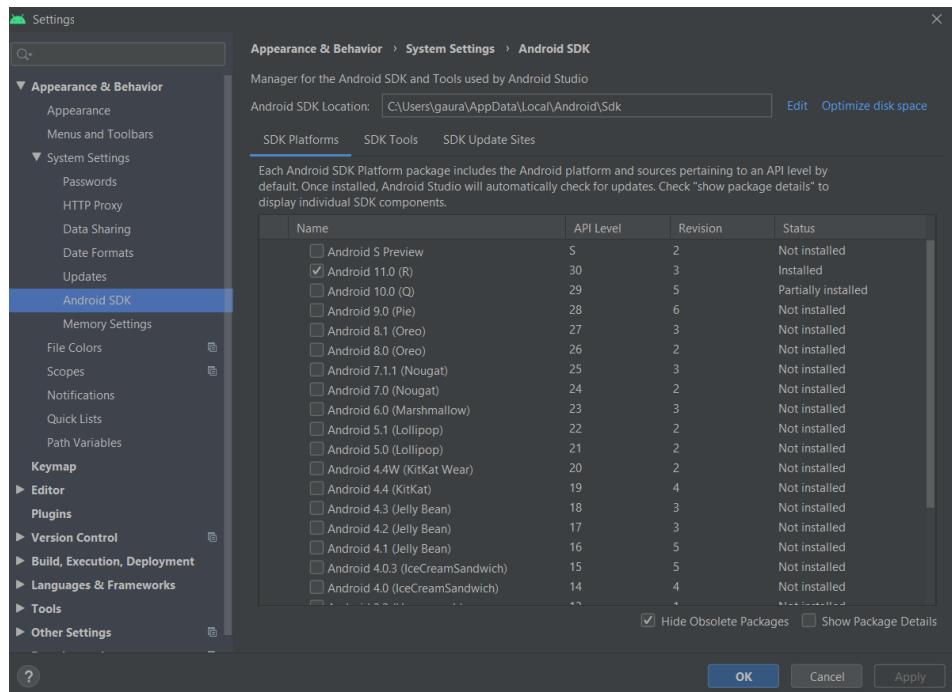


Figure 19: Android SDK platforms and different versions

Android Software Development Kit (SDKs) facilitates the creation of applications by having a compiler, debugger, and software framework. They are normally specific to a hardware platform and operating system combination. To create applications with advanced functionalities such as advertisements, push notifications, etc; most application software developers use specific software development kits.

6.1.4 Android Debug Bridge (ADB):

Android Debug Bridge is a command-line tool that lets us communicate with the device (Virtual or physical devices). It facilitates various device actions, such as installing and debugging apps. While building the application it comes in handy to check how the application is running on the device. It also provides a Unix shell where you can give various commands on a device. It is a client-server program that includes three components:

- I. **A Client:** which sends commands, The client runs on your development machine. You can invoke a client from a command-line terminal by issuing an ADB command.
- II. **ADB or A daemon:** runs commands on a device. The daemon runs as a background process on each device.
- III. **A server:** which manages communication between the client and the daemon. The server runs as a background process on your development machine.

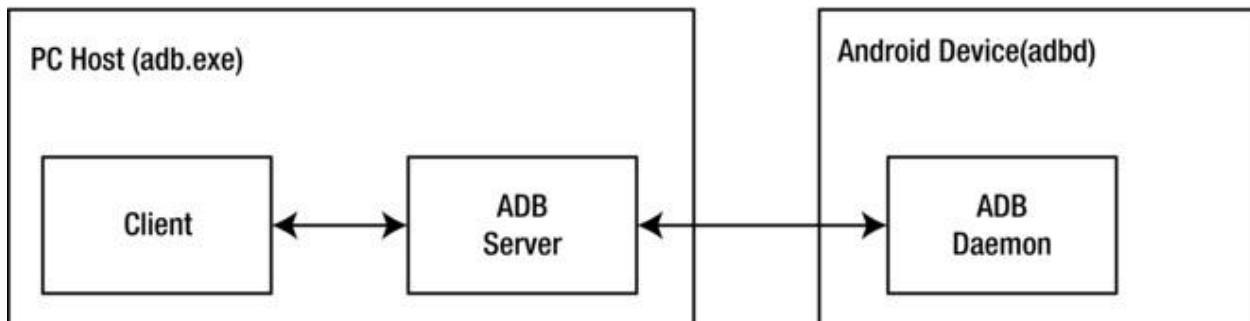


Figure 20: A depiction of Android Debug Bridge

6.1.5 Gradle Build

Gradle is a build automation tool for multi-language software development. As it supports multi-language, it works for Java as well. It is generally used for multi-project builds, which can be integrated into one later on. We put all our implementations, dependencies, and plugins, into Gradle Scripts, so the general purpose of Gradle is to maintain the project we are working on.

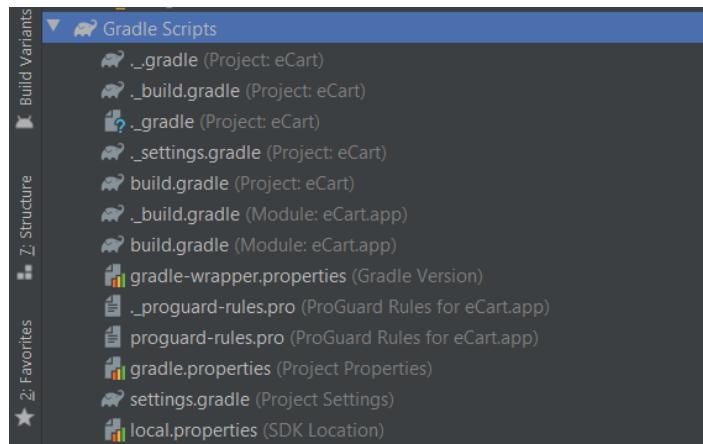


Figure 21: Gradle Scripts

6.2 Testing

It is a good practice to design the test plannings and decide the scope of your work on the project. Firstly, define a scope of testing, identify the testing type, plan your risks and issues, then create test logistics.

6.2.1 Test Planning & Test Activities

There are various test activities included for this project, such as:

- I. Black Box Testing: In this, we start by writing sample test cases, and then manual testing is done to check different functionalities of the tested portion.
- II. White Box Testing: Once the functionalities testing is done and approved, then the internal logic is tested to ensure the application does not have any logical errors.
- III. Unit Testing: Once all the functionality and logical testing are completed, we can check individual modules for further smaller errors that may arise because of smaller modules.
- IV. Integration Testing: After individual module testing, testing the integrating modules to check if there is a problem or errors while integrating modules.
- V. System Testing: Once all the modules are integrated, the complete system testing should be done, and make sure the application is working under all the compatible settings.



Figure 22: Different steps in Test planning

Chapter 7

Experimental Results

7.1 Guest Main and Search Page

These are the main page the Guest land on when they open the app for the first time, they can search for various items, go through different categories, add different items to the wishlist and do many more things, but to place an order or to track an order they have to log in to their account first.

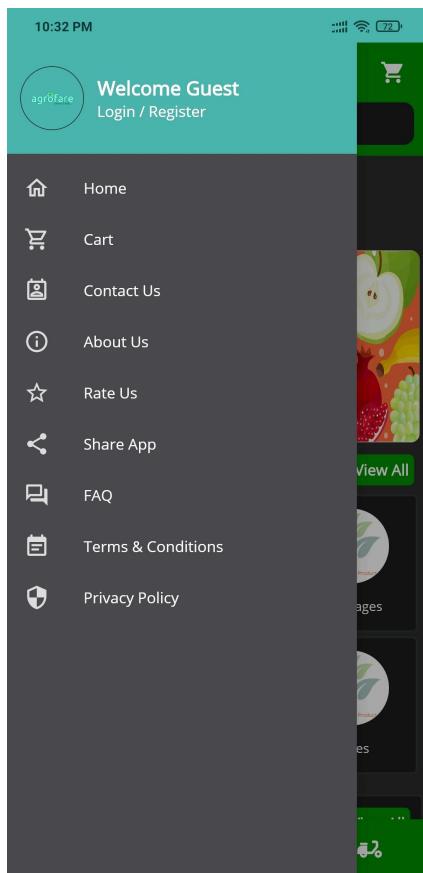


Figure 23: Guest drawer Activity

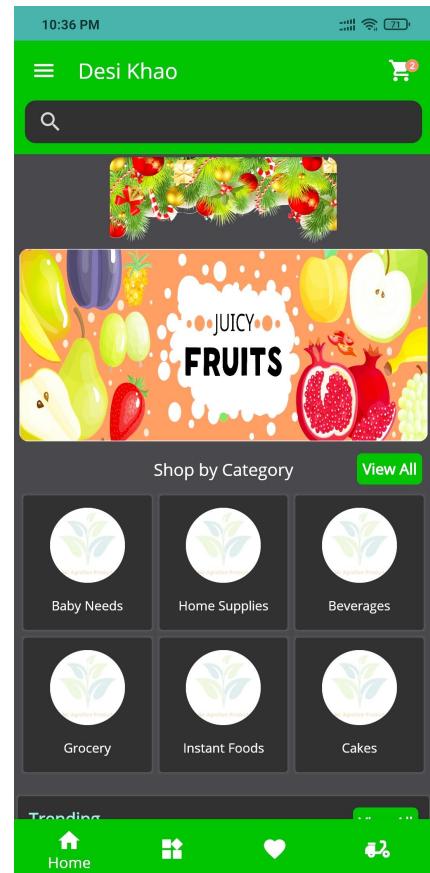


Figure 24: Guest Main Activity

7.2 Login Screen

To login, the user has to provide their mobile number and password, once logged in they can their credentials will be saved for the next time they will open up the app, if they do not have an account, they can sign up by providing their details like Mobile number, adding a password, and a referral code as well (optional) to get coupons and discounts.

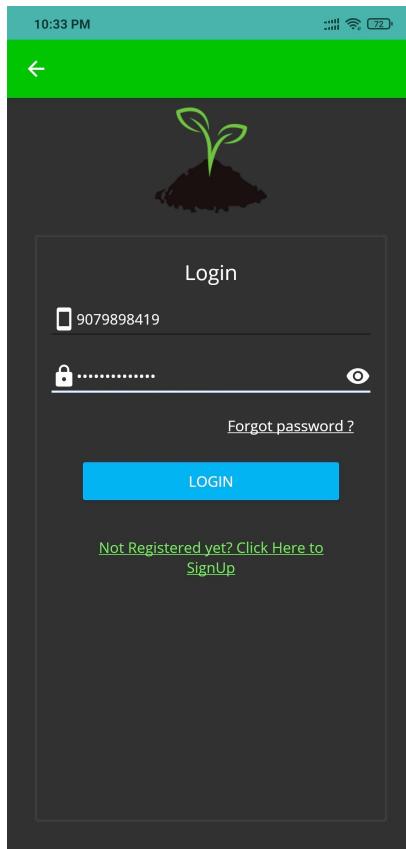


Figure 25: Login Page

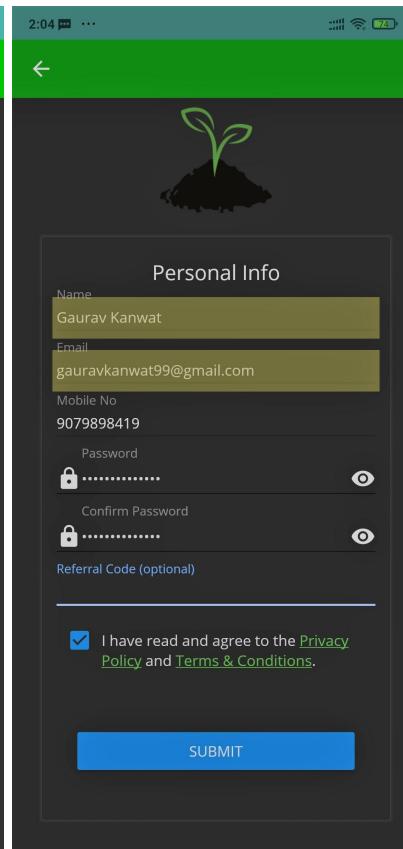


Figure 26: Sign up Page

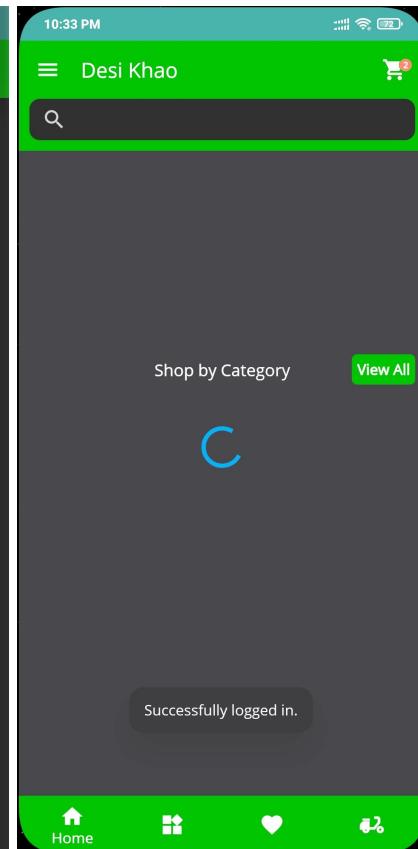


Figure 27: User Main Page

- I. **Login Page:** This is where users can put their credentials in order to login into the application, they can also change the password in case they forgot it, by pressing “forgot password?”, also they can directly signup if they don’t have an account, by clicking on “Click here to Signup”.

- II. Signup Page:** This is where the users can signup to create an account by providing their details like username, email, password, mobile number, etc.
- III. User Main Page:** This is where the signed-in users will land after completing the signup process and from here they can explore the applications further.

7.3 Make changes in user details

Users can change their credentials and their password in the Profile section, as well as they, can upload their profile picture.

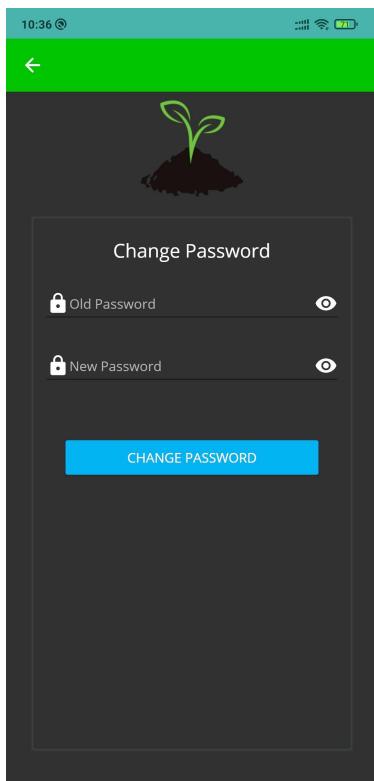


Figure 28: Change password

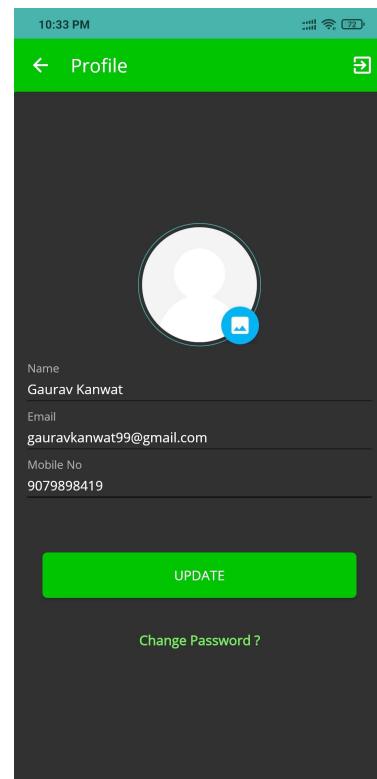


Figure 29: Update User Credentials

- I. **Change Password:** Here the user can request a change in password by providing a new password, but before it an OTP request will be sent to the user to confirm it then they can proceed further to change it.
- II. **Update User Credentials:** Here the users can change their personal information by typing in the provided fields and clicking the update button, they can also upload their profile picture if they want to do so.

7.4 Store in wishlist/cart

Guests/Users can store different products in their wishlist for the future and can directly add them to the cart from this list, it makes it easier to make a list of all required items in a place where they can remove items that are not required.

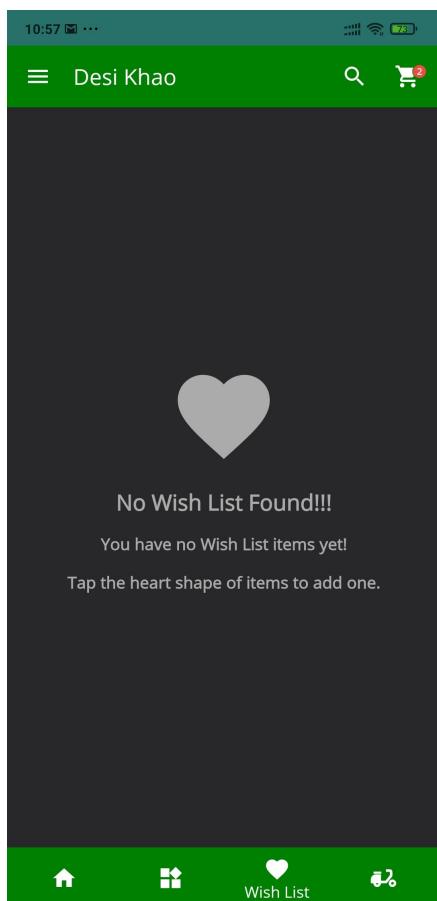


Figure 30: Empty Wishlist

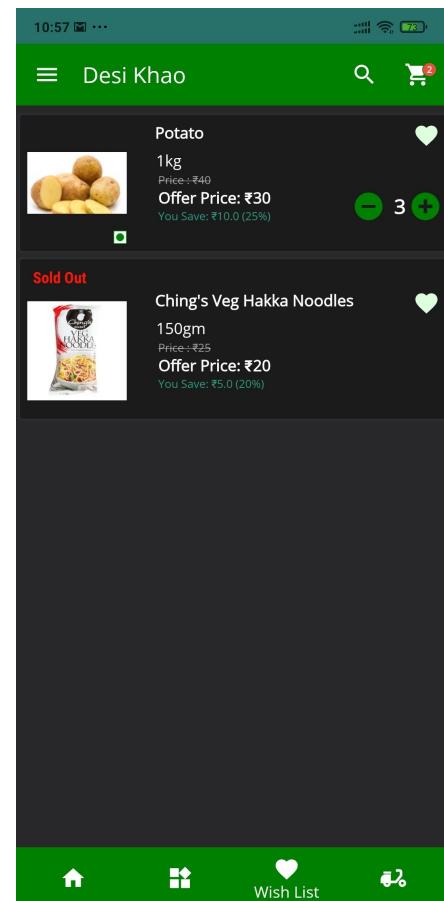


Figure 31: Wishlist with some products

I. **Wishlist:** This is where the users or guests can store their favorite items which they can order, later on, this can also be used as a list for all the items users want to purchase, they can also manipulate the quantities of different items, they can remove it or they can read about these products by clicking on them.

7.5 Product Details & Similar Products

Users can tap on different items to read about them and also search for similar products by clicking the Similar Products button, or scrolling below.

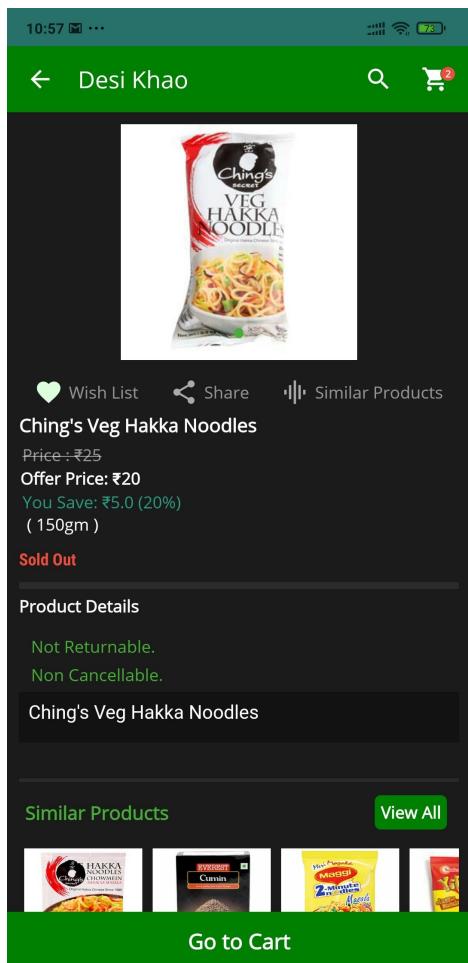


Figure 32: Product Details

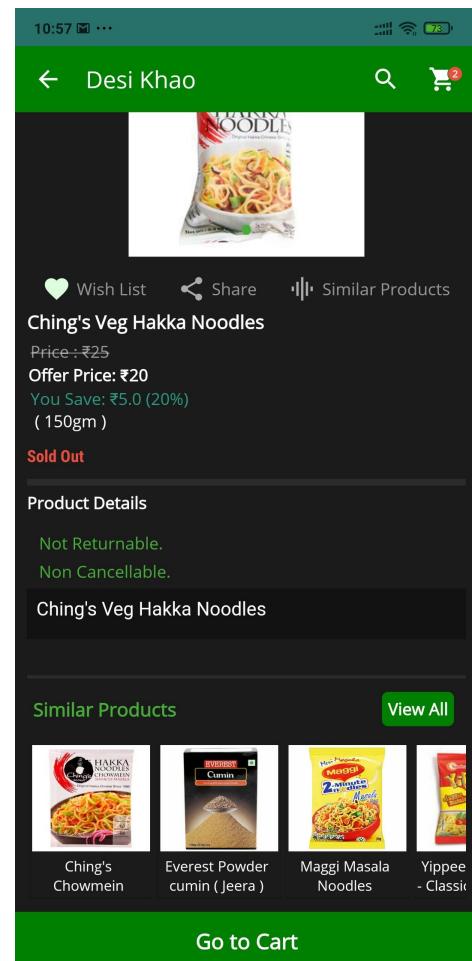


Figure 33: Similar Products

- I. **Product Details:** Here the users will get the complete details about the products, and the instructions as well, they can also check if products are not Refundable, not cancellable and can remove or add them to their wishlist, share them with someone on other applications, and also view similar products in the list.
- II. **Similar Products:** Here the users will get recommendations of all the products which are similar to the product which is in focus, here they can simply compare prices, quantity, availability, etc.

7.6 Checkout and Payment

After clicking the checkout from the cart, the total amount will be shown to the users, and all the details of their orders as well.

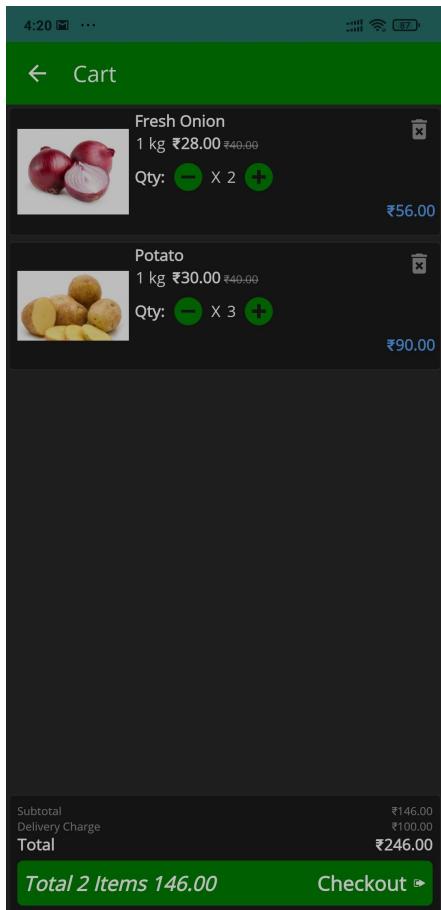


Figure 34: Cart

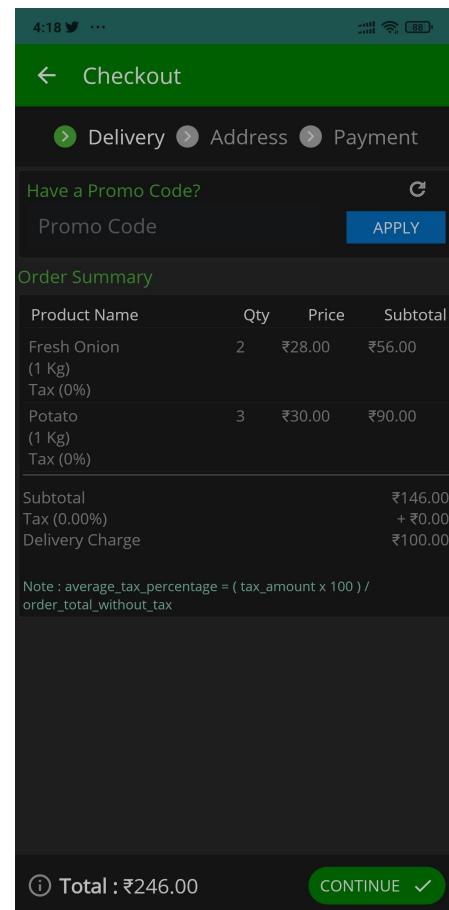


Figure 35: Checkout with product details and the amount

- I. **Cart:** The cart will store all the products which the users want to purchase, here, they can also make a list of different products, add them, remove them, maintain the quantity, etc and check for the total prices on the Checkout button.
- II. **Checkout:** Once clicking the Checkout button the user will be taken to the Checkout page where the short summary of their orders will be displayed telling them the total amount, details of different products, the taxes, and total charges, etc.

Once verifying the details, users have to add an address (if they are purchasing for the first time), the address will be saved in the database, also they can add multiple addresses and can select one address while checking out their orders.

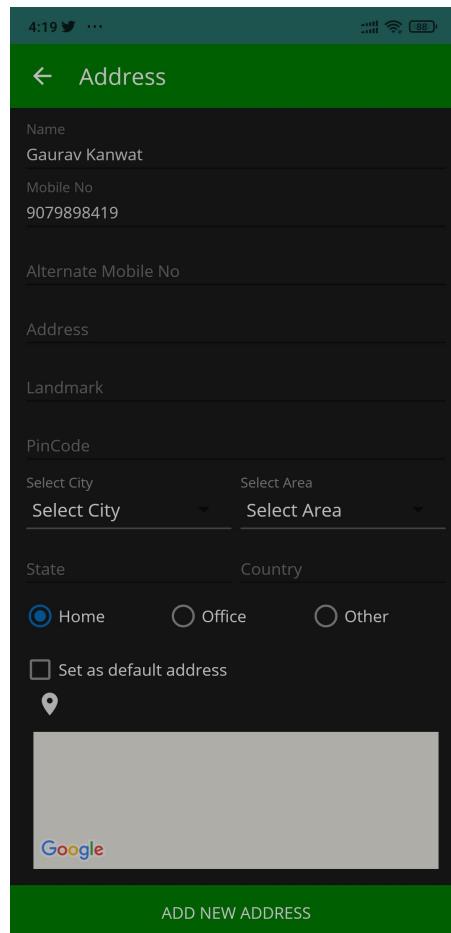


Figure 36: Adding new Address

I. Address: On this page, the users are required to give the address details where the order is supposed to be delivered, where they can store different addresses in one place, and from next time onwards they can simply tap on one of the addresses and they will be directly taken to next page, if they are using it for the first time they are required to provide the details like alternative mobile number (optional) in case of emergency, the complete address, nearby landmark, Pincode, their city, their state and they can choose if this address is their work address, home address, or other, they can also choose to set this address as their default address.

7.7 Payment

Users can make payment either online or on delivery of the orders, currently, there is only one online payment method using Razorpay, other options will be added later.

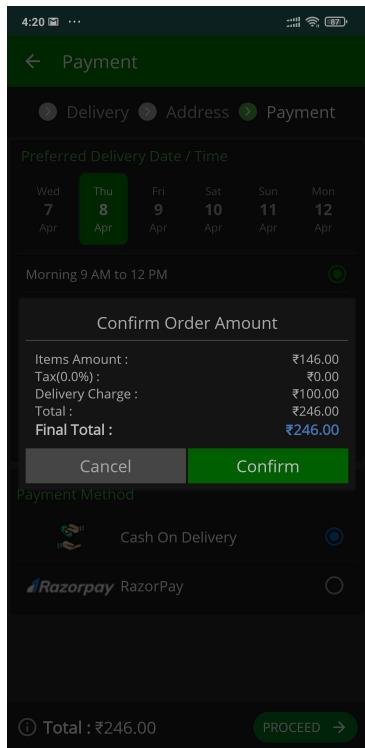


Figure 37: Cash On Delivery

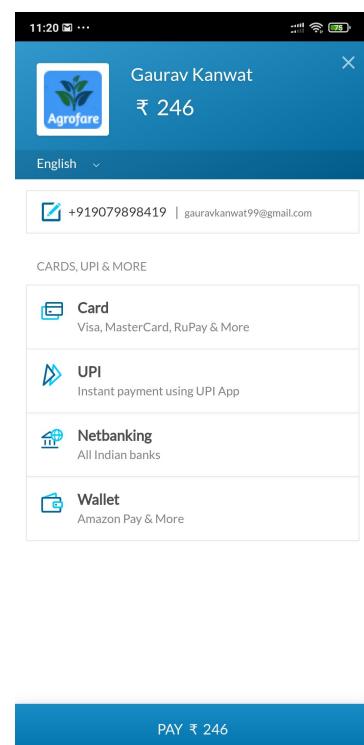


Figure 38: RazorPay (Online)

- I. **Cash On Delivery:** The user can opt to choose the Cash On Delivery (offline) payment method, here they will be asked to confirm the total amount which will be billed once the order is delivered to their location.
- II. **RazorPay:** User can opt to choose the RazorPay (online) payment method, here they will be taken to the payment gateway of Razorpay where you can use different methods to complete the payment, like, Card method, UPI (Google pay, Paytm, Paypal, etc), and they will be given the bill once the orders are delivered to the location.

7.8 Track your Order

Once an order is placed, users can start tracking their orders and they can cancel their orders anytime they want.

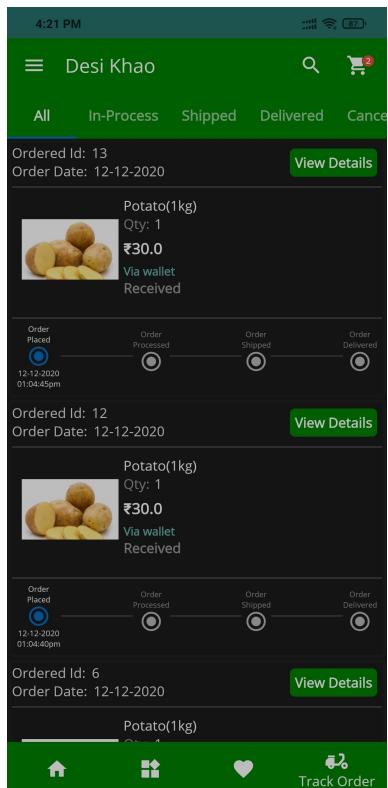


Figure 39: Tracking all the orders

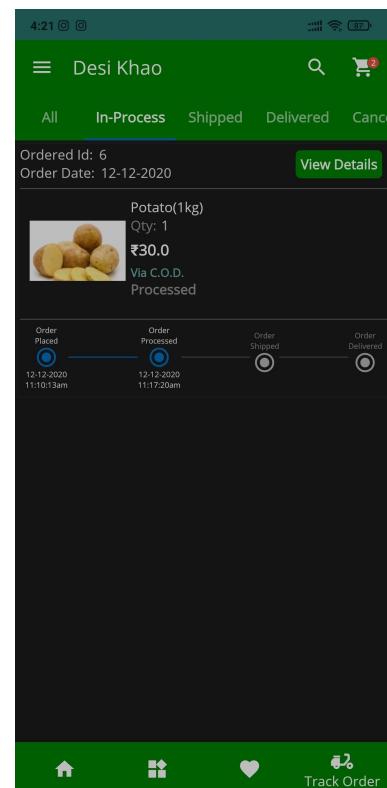


Figure 40: Tracking all in-process orders

7.8.1 Tracking all the orders

Here, the users can track all the orders which are placed, they can track the order ID, order date, the quantities, and where they are currently, there are four different levels, an order placed, order processing from the seller, order shipped, and order delivered.

There are different sections for different stages of orders, making it easier for the users to track a particular order.

In this application, we are following these steps to track the order:

- I. We are getting latitude and longitude coordinates of the system which is connected with the orders and it updates GPS coordinates every 1 minute
- II. From GPS coordinates, we can find out the location of the orders, so we update that also every 1 minute.
- III. Now, comparing the two given coordinates, the Pincode will provide the approximate location of the customer and we can further use the complete address to deliver it to the exact location.
- IV. Once the order is successfully delivered, we turn the GPS off in the application for that particular order and repeat the same for another.

Chapter 8

Future Work and Conclusion

There are several upcoming features for Desi khao that will be challenging to add and update. Some of them could be as follows:

- I. Adding multiple Online payment systems to make it easier for the users to make payment online.
- II. Making the login and sign-up processes more secure for the users, to avoid any kind of misuse of the information.
- III. Adding more products in the database and improving the recommendation algorithm and making it run efficiently every time the application is opened up.
- IV. Implementing this application in the iOS platform as well because we have a huge iOS or iPhone user base.

8.1 Conclusion

This project gave me a good understanding of how to develop an Android application and how to publish it in real-time, using various libraries to perform different tasks for different modules like libraries for connecting to a web server, payment gateway, storing data, and retrieving it from databases.

This app is about providing organic products and all the things related to agriculture and organic food as well, there are not so many applications based on this and people are starting to take food and health seriously, Desi Khao will provide them all those items which are necessary to have a healthy lifestyle.

Also, this is the time where demand for online food items, which are healthy, is the most. Many companies have started investing in Mobile-commerce because of increasing demand day by day, people don't want to go out shopping because of various reasons, one of them is Lockdown. So, considering everything, this is a good time to look after healthy options they can get at home.

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