

one-Q-shop

Submitted in partial fulfillment of the requirements
for the degree of

B.E. Information Technology

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CERTIFICATE

This is to certify that the project entitled **”one-Q-shop”** is a bonafide work of **”Lenin Bardeskar (171057), Dominic Silveira (171032), Joel Monis (171044)** submitted to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of Bachelor of Engineering in Information Technology.

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Literature Review Report for B.E.

This project report entitled "*one-Q-shop*" by *Lenin Bardeskar (171057)*, *Dominic Silveira (171032)* & *Joel Monis (171044)* is approved for the degree of *Bachelors of Engineering in Information Technology*.

1. _____

2. _____

Date: 27-05-2021

Place: Mumbai

Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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ABSTRACT

The conventional shopping process is very time-consuming and cumbersome for the sick, the elderly and families with toddlers. Online shopping businesses easily gather data about user behavior, choices and opinion. There is no such facility for retail or wholesale stores. Large workforce is required to manage stores and inventories. Long queues and crowded stores may drive away customers. Therefore, a shopping assistant application would be useful in creating a better shopping experience for customers while increasing profits for the stores. The proposed solution is cheaper to implement as well as faster than handheld scanners, which have been in use in shopping avenues and malls..

This project aims at developing an android based M- commerce application that would help improve the conventional shopping experience while helping businesses to increase their customer base and revenue. The project would require mobile devices with our application installed on them.

The Android application provides a Bar Code scanning feature with budget monitoring and would help automate the billing process thereby reducing check-out queues. The application also provides a feature through which the user can get the optimum shopping route for products through the market.

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Chapter 1

Introduction

1.1 Introduction to domain of project

Nowadays shopping malls and avenues are usually filled with long queues at the billing desk, resulting in wastage of time for customers. Malls are infamous to be overly crowded during weekends which makes customers choose to look for other options, thus hampering the business of malls. Through this application we aim to rectify this problem to minimize wastage of time and enhance customer experience. The ultimate aim is to completely eradicate the waiting queue for billing in a given supermarket whilst also keeping up the conventional pattern of shopping.. We aim to provide efficient and safe payment options to the customer thus saving them a lot of time and hassle. The usage of the app shall lead to customers spending little time in the supermarket yet completing their shopping, thus reducing crowd and enhancing business. Data mining technologies shall help the retailers understand their customer base better and help retain their customers just as any e-commerce site does. An android application that allows registered users to scan the products they want at the time of placing them in the shopping cart and pay via our application that offers cashless, hasslefree, secure payments. This application also provides recommendations based on selected products and past history of current/other users below it. In our proposed system each product has a barcode on it. When a customer wants to buy a product he/she shall scan the barcode attached to that product to add it to the cart. In similar manners, deletion of products from the cart can also be done. Upon payment, an e-bill shall be given to the customer along with an option to opt for home delivery of the products or a scheduled pickup.

1.2 Major Challenges in said domain

- Seamless internet connectivity.
- Database management.
- Cloud storage.
- Lag/Delay in updation and deletion of data.
- Payment Gateway failures.

1.3 Motivation

Shopping malls and avenues are popular places for weekly shopping trips for families. They are becoming increasingly crowded - there are long queues at the checkouts. With the world undergoing a pandemic or post pandemic situation, crowded places Thus, such a conventional shopping process is very time-consuming and cumbersome for sick, elderly and families with toddlers. Online shopping businesses easily gather data about user behavior, choices and opinion. There is no such facility for retail or wholesale stores. Large workforce is required to manage stores and inventories. Long queues and crowded stores may drive away customers. Therefore, in-store analytics for better understanding of customer behavior, insights will be useful for creating better shopping experience and increasing profits thereby. The proposed solution is cheaper to implement than handheld scanners, which have been used in shopping malls and avenues and wholesale stores.

1.4 Problem Statement

The formulation, creation and implementation of an android based mobile application to provide an online cashless, queueless, time saving and safe billing system in any clothing-accessories superstore or mall; whilst also providing the store managers an insight into the users' shopping patterns and analytics.

Chapter 2

Literature Review

2.1 Existing Work

2.1.1 Literature review related to exiting system/methodology

Table 2.1: Comparison of existing system

Sr. No.	Title of Paper	Review	Analysis/Limitations
[1]	Content-based recommender system for on-line stores using expert system.	The recommender system uses a collaborative filtering system for recommending suitable items and an expert system for evaluating the popularity of items.	Different suitable products recommendations are shown simultaneously at every login using the knowledge base for recommendation.
[2]	Aspects based Opinion Mining from On-line Reviews for Product Recommendation.	Sentiment Score Predictor is used for recommendation as it helps us to extract the important aspects of the products to be considered before buying that particular product.	A data set which consists of mobile categories of ten different mobile brands and each mobile has a set of reviews was used for training the model. All the product reviews are collected from online review website amazon.in
[3]	Online Shopping Recommender System Using Hybrid Method.	System generates two types of recommendation: personal recommendation and item-based recommendation.	Users can give rating and review to a product or shop on the scale of 1 to 5. The most viewed product list contains recommendations for non members and new users also, which is generated based on the most frequently viewed products by members.

2.1.2 Literature review related to existing algorithms

Table 2.2: Comparison of algorithms

Sr. No.	Title of Paper	Review	Analysis/Limitations
[1]	Content-based recommend-er system for online stores using expert system.	The recommend-er system uses a collaborative filtering system for recommending suitable items and an expert system for evaluating the popularity of items.	The algorithm adapts the content based on user preferences and the content viewed by the user. The algorithm is also built for showing items from similar users after the first login to decrease the effect of cold start problem.
[2]	Aspects based Opinion Mining from On-line Reviews for Product Recommendation.	Sentiment Score Predictor is used for recommendation as it helps us to extract the important aspects of the products to be considered before buying that particular product.	Aspect ranking of products to identify and prioritize the aspects of products based on the online reviews given by the customers. The aspects which are commented by the customers and the opinions on those aspects are considered to be the measures for ranking. The product aspects are extracted and then the opinions on those aspects are identified via sentiment dictionaries, finally the aspects are ranked based on their sentiment score.
[3]	Online Shopping Recommender System Using Hybrid Method.	System generates two types of recommendation: personal recommendation and item-based recommendation.	Content-based filtering subjectivity covered factor drawback was solved in collaborative-filtering. The users should state whether they like the recommendation or not, to improve the recommendation. Personal recommendation is only preferred by the user who already did some activities like rate or view an item.

2.1.3 Literature review related to tools/technology/framework

Table 2.3: Comparison of tools/technology/framework

Sr. No.	Title of Paper	Review	Analysis/Limitations
[1]	Content-based recommender system for on-line stores using expert system.	The recommender system uses a collaborative filtering system for recommending suitable items and an expert system for evaluating the popularity of items.	The system is created in the LFLC (Linguistic Fuzzy Logic Controller) tool.
[2]	Aspects based Opinion Mining from On-line Reviews for Product Recommendation.		The system is created using Sentiment Score Predictor.
[3]	Online Shopping Recommender System Using Hybrid Method.		The system is created using Hybrid Method, which consists of both content-based and collaborative filtering.

2.2 Gap identified

- In [1], the recommender system generates recommendations based on user preferences and the content viewed by the user. The algorithm doesn't check for the recommendation based on ratings given.
- In [2], an aspect ranking method was used which identifies the key aspects of a product from customer reviews. This Framework encloses four main constituents, i.e., Aspects extractor, Aspect grouping, Sentiment score prediction and Aspects ranking based on aspect dictionary and opinion. However the algorithm doesn't focus on given ratings and views.
- In [3], collaborative filtering is implemented to produce personal recommendation and item-based recommendation. Users can only state whether they like the item-based recommendation or not. But the personal recommendation is only preferred by the user who already did some activities: rate or view an item. However, the feedback taken from users for item-based is only used to improve item-based recommendation, whereas personal recommendation is not improved with users' feedback from item-based recommendations.

Chapter 3

Proposed Methodology

3.1 Problem Formulation

This project aims to develop an Android Application that provides shopping assistance to customers in shopping malls and avenues by automating the billing process using bar-code or QR code as well as give recommendations to users based on their shopping patterns and similar products.

3.2 Problem Definition

Shopping malls and avenues are popular places for occasional outings for families. shopping malls and avenues are becoming increasingly crowded - there are long queues at the checkouts. Thus, such a conventional shopping process is very time-consuming and cumbersome for sick, elderly and families with toddlers. Online shopping businesses easily gather data about user behavior, choices and opinion. There is no such facility for retail or wholesale stores. Large workforce is required to manage stores and inventories. Long queues and crowded stores may drive away customers. Therefore, in-store analytics for better understanding of customer behavior, insights will be useful for creating better shopping experience and increasing profits thereby. The proposed solution is cheaper to implement than handheld scanners, which have been used in shopping malls and avenues and wholesale stores.

3.3 Scope

The proposed technology can be used in shopping malls, super markets, retail stores, and wholesale stores. The customer gets recommendations based on current users/other users shopping patterns. The user also has the option to pay through the inbuilt payment gateway if they do not want to waste time at the checkout queues. We can enhance the application further by adding new products and updating the existing products information depending upon market scenario in the applications database. We can also add features like offers such as discounts tailored to the user based on their purchasing history. This history is saved in the database that can be accessed by the user.

3.4 Proposed Methodology

The user will download the application and install it on their Android devices. Users will search or scan the product barcode and details of the product will be provided. Below the scanned product details, recommendations will be provided to the user based on the number of buys, ratings, number of views and reviews provided by the current user or other users. Users can also provide feedback if they like the recommendation or not. If the User clicks on the product and buys it will also be recorded as a feedback for the recommendation system. The proposed algorithm used in this project is a combination of Collaborative, Content-based and Sentiment score based recommendation systems. Based on viewing, rating, total buys and reviews data, recommendations are generated. Users will provide feedback if they like the recommendation or not. Based on the feedback recommendation system will be improved.

3.5 Features of proposed System

- Users can scan the product barcode to get complete details of the product clearly without searching for information on the product and add the product to the cart.
- Users will get recommendations based on the number of buys, ratings, number of views and reviews provided by the current user or other users.
- Users will be able to checkout and make payment via UPI instead of standing in the queue and can choose an option to opt for home delivery of the products or a scheduled pickup.

Chapter 4

System Analysis

4.1 Functional Requirements

There are a lot of software requirements specifications included in the functional requirements of the Online Shopping Mall Management System.

The system accepts the following as an input:

1. Registration Details: This is entered by the user when the user first installs and sets up the application. Details such as Name, Address, User-ID, Password, Email-ID, are to be filled to store into the database.
2. Scanned Product: The user scans the barcode attached to the product, thus sending the details of the product as an input to the system.
3. User Selection: The selection of an operation via touching the screen to perform 'Login', 'Add to Cart', 'Scan', 'Checkout' etc.

The system provides the following as an output:

1. Product Details: As the user scans the product, complete information about the product is displayed on his/her phone.
2. Card Details: A complete list of items which the user has added to the cart is displayed on the device when the user clicks on the cart.
3. Billing Information: The complete list of purchased products with its corresponding price and the total amount to be paid is displayed on the screen.

4.2 Non-Functional Requirements

There are a lot of software requirements specifications included in the non-functional requirements of the one-Q-shop, which contains the following: Performance requirements:

1.
 - The application must be able to run on all smartphones.
 - The scanning process must be done within seconds.
 - The connection establishment between the mobile device and the server should take minimal time.

- The information about orders placed by users must be updated timely and accurately.
- 2. Operating constraints: User must be logged in to perform operations like “Add to cart”, “Scan”, “Logout” etc.
- 3. Platform constraints:
 - The application must be compatible with Android Phones.
 - The camera resolution user for scanning must be 2 MP or above.
- 4. Accuracy and precision: The information obtained after the scanning process must be accurate and concise.
- 5. Security and Safety Requirements:
 - The main requirement is the security of the database servers.
 - The user information obtained after the registration process must be protected and secured in the database.

4.3 Specific Requirements

Hardware :

- A mobile phone with following specifications.
 - * Internal Memory: 8 GB or above.
 - * RAM: Minimum 2GB.
 - * Operating System: Android.
- PC with standard specifications.
- Barcodes.

Software :

- Git
- Windows/Linux OS
- Android Studio
- VS Code
- MySQL Workbench
- Postman
- Chrome/Firefox Browser

4.4 Use-Case Diagrams

Table 4.1: Use Case Diagram Description

Actors	Description
Customer	<ul style="list-style-type: none"> • Gets path for the product • Scans the barcode <ul style="list-style-type: none"> – Gets product Information – Adds product to cart • Gets bill for product purchased • Adds budget limit • Pays the bill <ul style="list-style-type: none"> – Netbanking – Debit card – UPI • Gets product recommendations • Help
Administrator	<ul style="list-style-type: none"> • Manages the database • Manages the server
Assistant of Shop- ping mart	Help

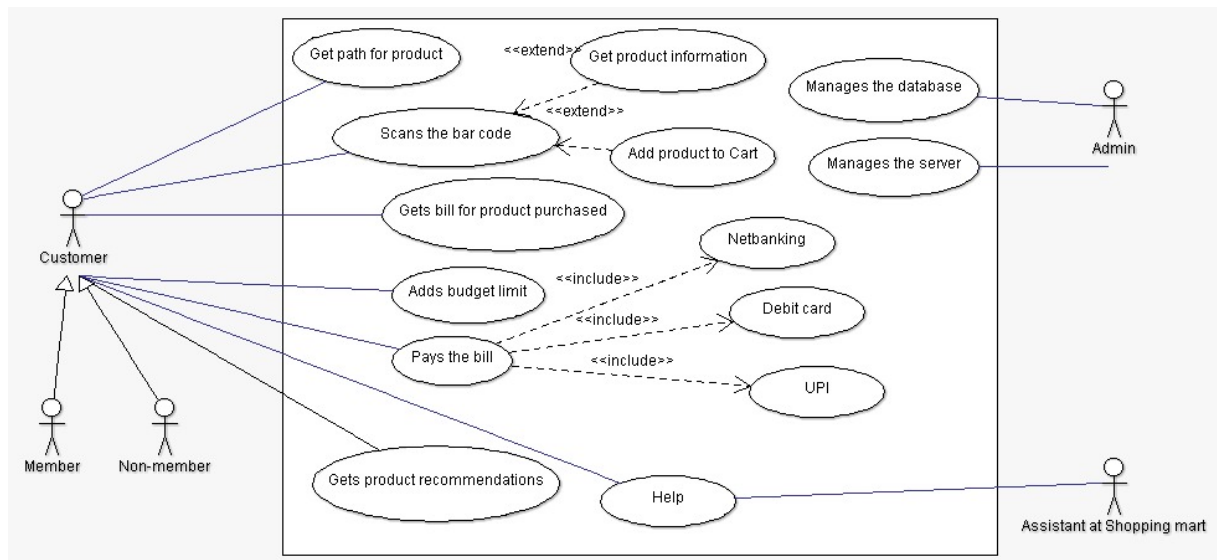


Figure 4.1: Use Case Diagram

Table 4.2: Use Case Diagram Description

Actors	Description
Customer	<ul style="list-style-type: none"> • Gets path for the product • Scans the barcode <ul style="list-style-type: none"> – Gets product Information – – Adds product to cart • Gets bill for product purchased • Adds budget limit • Pays the bill <ul style="list-style-type: none"> – Netbanking – Debit card – UPI • Gets product recommendations • Help
Administrator	<ul style="list-style-type: none"> • Manages the database • Manages the server
Assistant of Shop- ping mart	Help

Chapter 5

Analysis Modeling

5.1 Data Modeling

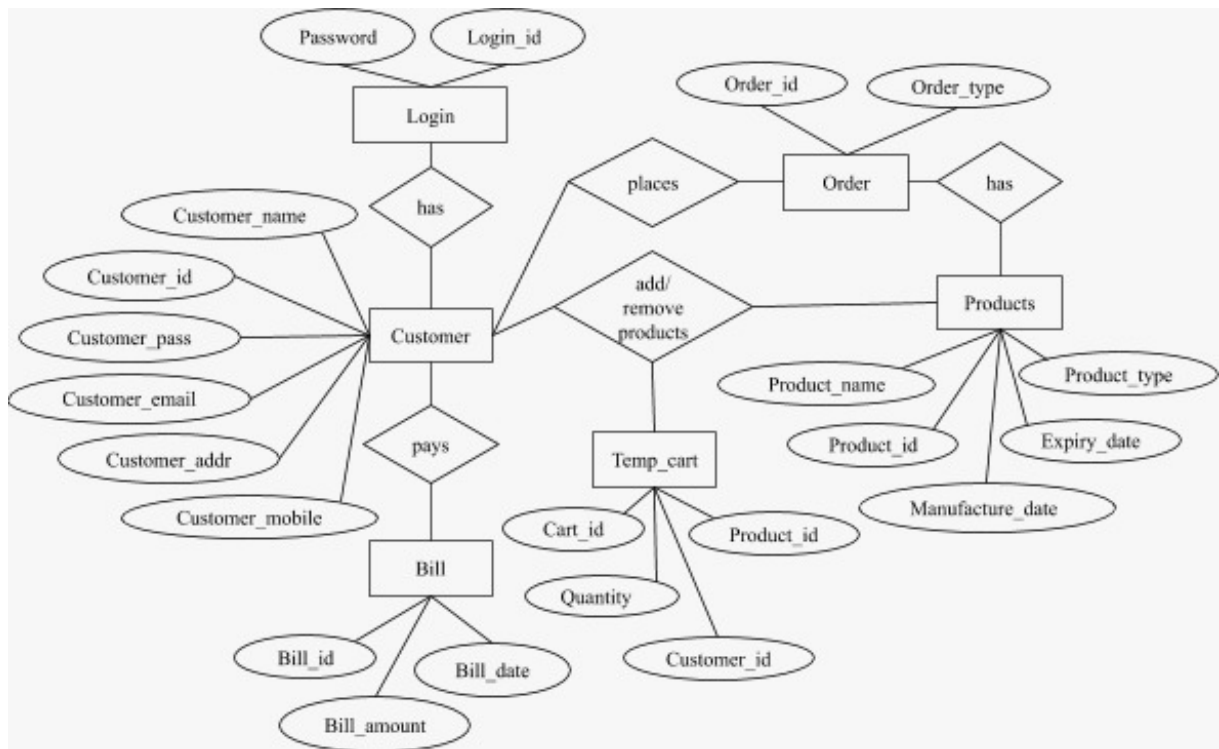


Figure 5.1: Entity Relationship Diagram

5.2 Activity Diagram

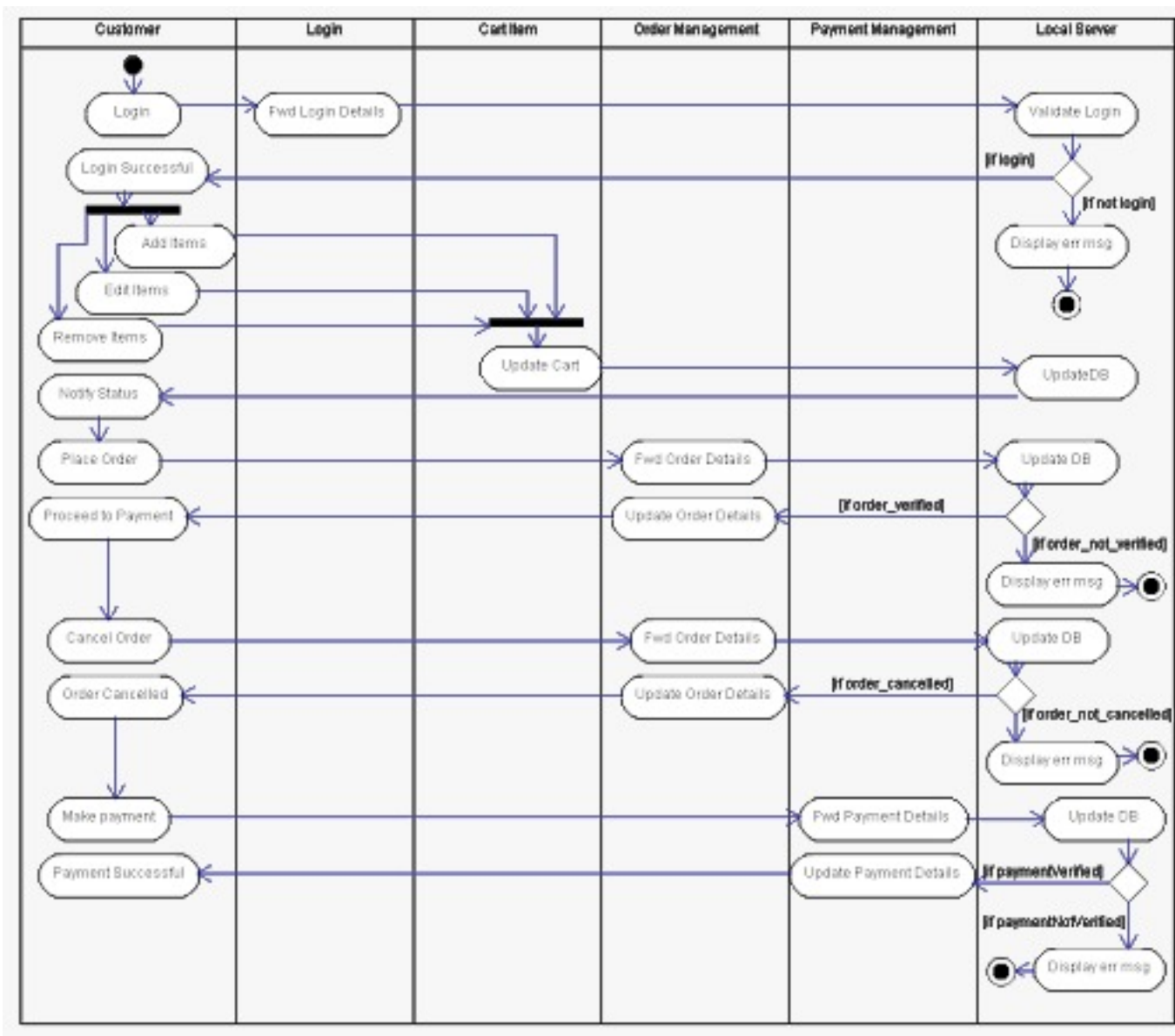
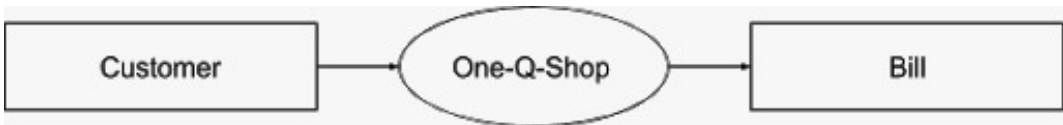
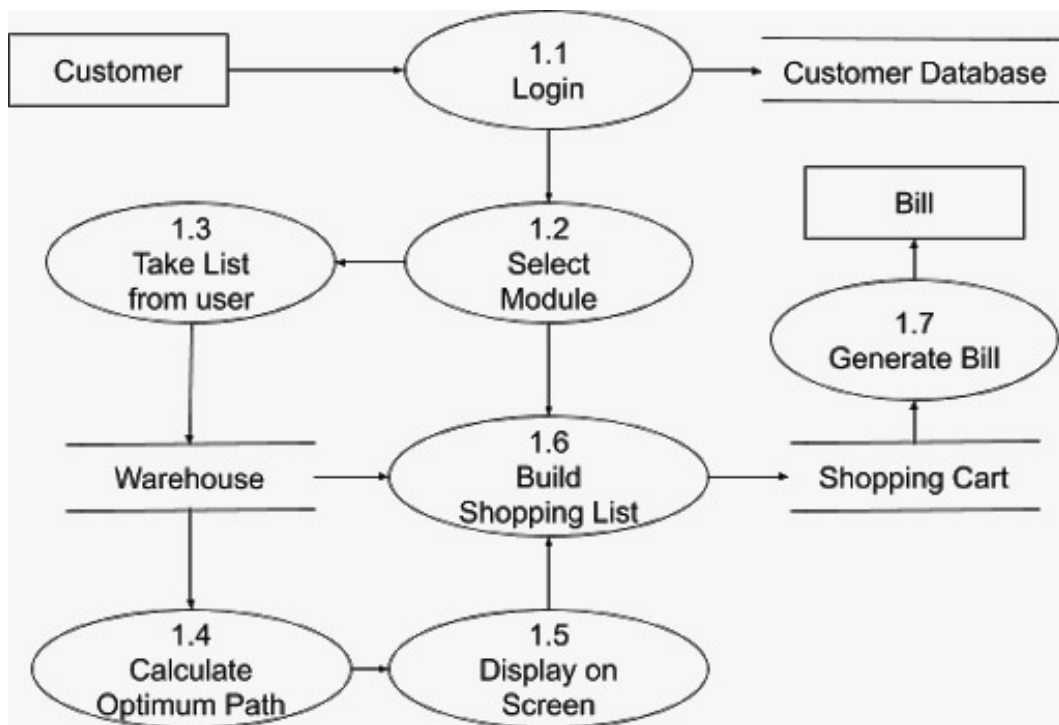


Figure 5.2: Activity Diagram.

5.2.1 Functional Modeling



In DFD level 0, the entire system is represented with the help of - input, processing and output. Users interact with the system on one end, while Shopping management system manages the user interactions and processes the bill.



In DFD level 1, the processing block written as “One-Q-Shop” is broken down in smaller parts to show its components and how data flows inside that block.

5.3 TimeLine Chart

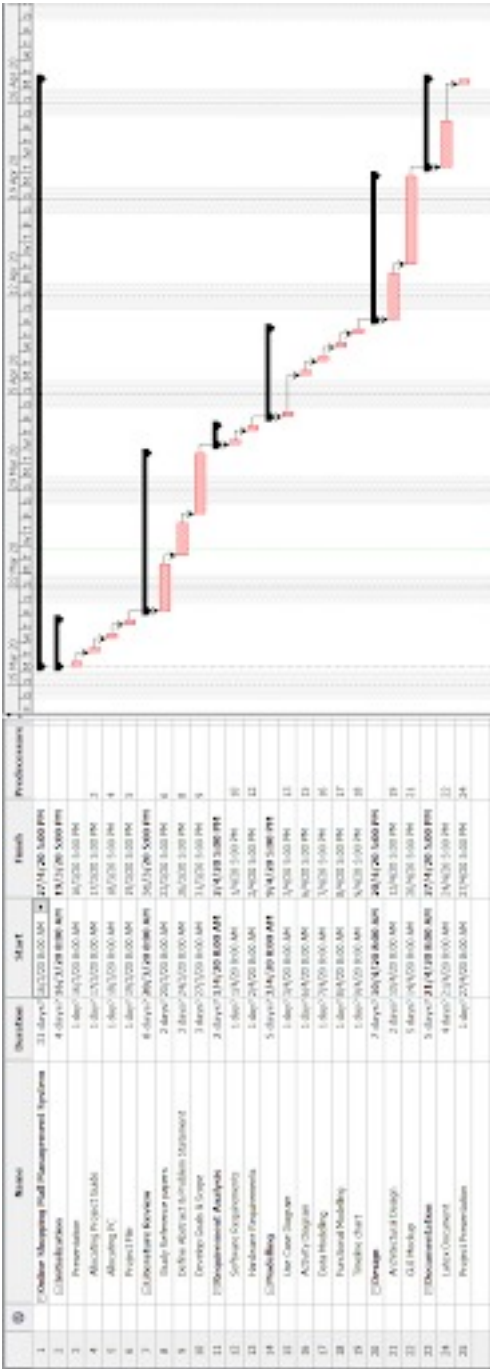


Figure 5.3: Time Chart Tasks.

Chapter 6

Implementation

6.1 Methodology

End-user downloads the Android application and installs it on their mobile devices. Each product in the shopping store will have a unique Barcode or QR-code attached to it. The user opens the application on his mobile and scans the Barcode or QR-code that is attached to the product. The product information is displayed on the user's mobile screen and the user can add/update/delete the product from the cart. The user can add/update/delete products from the cart via the products list page or the carts page.

The user can checkout and enter the shipping address and proceed with UPI payment. After successful payment, the user can view the invoice on the cart's history page. The invoice PDF link can also be shared via the application.

The data transfer is controlled by a centralized server which is located at the store center. The application created is a client-server-based system with the client being an Android application installed on the user's Android phone and the server is implemented in Django.

The proposed model will allow a customer to purchase products from the shopping store in a quick, three-step process: Scan, Add and Pay. A customer must have a Smartphone with the application downloaded to continue with the shopping. If a user is using the system for the first time, he/she will have to register with the system by providing an email ID and password and other authentication details. For any visit hence, the user can then log in using the email ID and password.

Once the user finishes shopping and reviewing the shopping cart, he/she can then complete the shopping session by clicking on the checkout option where they can provide their shipping address and complete the payment.

Chapter 7

Testing

Software testing is defined as an activity to check if the actual results match the expected results and to ensure that the software system is defect free.

It involves execution of a software component or system component to evaluate one or more properties of interest. Software testing also helps to identify errors gaps or missing requirements. It can be done either manually or using automated tools.

7.1 Types of Testing

- **Integration Testing**

Testing of all integrated modules to verify the combined functionality after integration is termed as Integration Testing. Modules are typically code modules, individual applications, client and server applications on a network, etc. This type of testing is especially relevant to client/server and distributed systems.

- **System Testing**

Under System Testing technique, the entire system is tested as per requirements. It is a Black-box type testing that is based on overall requirement specifications and covers all the combined parts of a system.

- **Unit Testing**

Testing of an individual software component or module is termed as Unit Testing. It is typically done by the programmers and not the testers, as it requires a detailed knowledge of the internal program design and code. It may also require developing test driver modules or harnesses.

- **White Box Testing**

White Box Testing is based on the knowledge about the internal logic of an application's code. It is also known as Glass box Testing. Internal software and code working should be known for performing this type of testing. These tests are based on the coverage of code statements, branches, paths, conditions, etc.

- **Black Box Testing**

Black Box Testing, which is also known as behavioral, opaque-box, closed-box, specification-based or eye-to-eye testing, is a software testing method that analyses the functionality of a software/application without knowing much about the internal structure/design of the

item that is being tested and compares the input value with the output value. The main focus of the black box testing is on the functionality of the system as a whole.

7.2 Test Cases

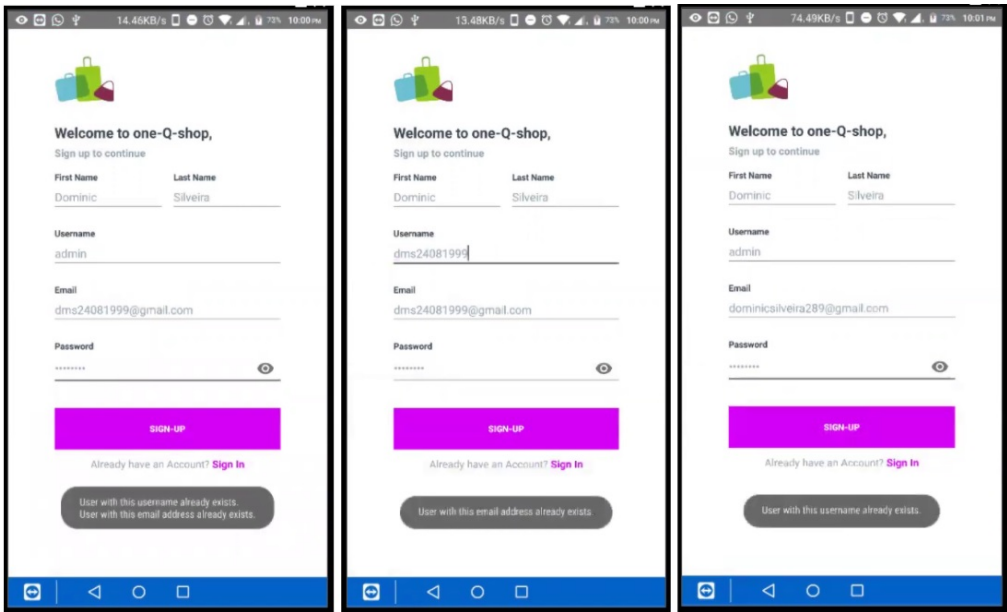


Figure 7.1: Testing of Registration form

Figure7.1 Shows different test cases for different fields in the form.

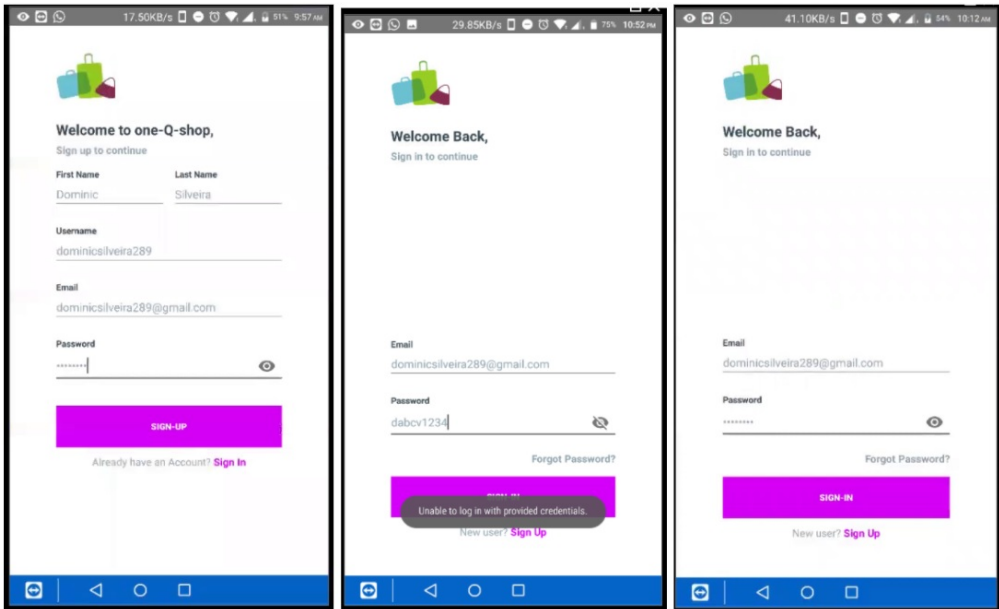


Figure 7.2: Testing Sign In form

Figure7.2 Shows test cases of the sign in form

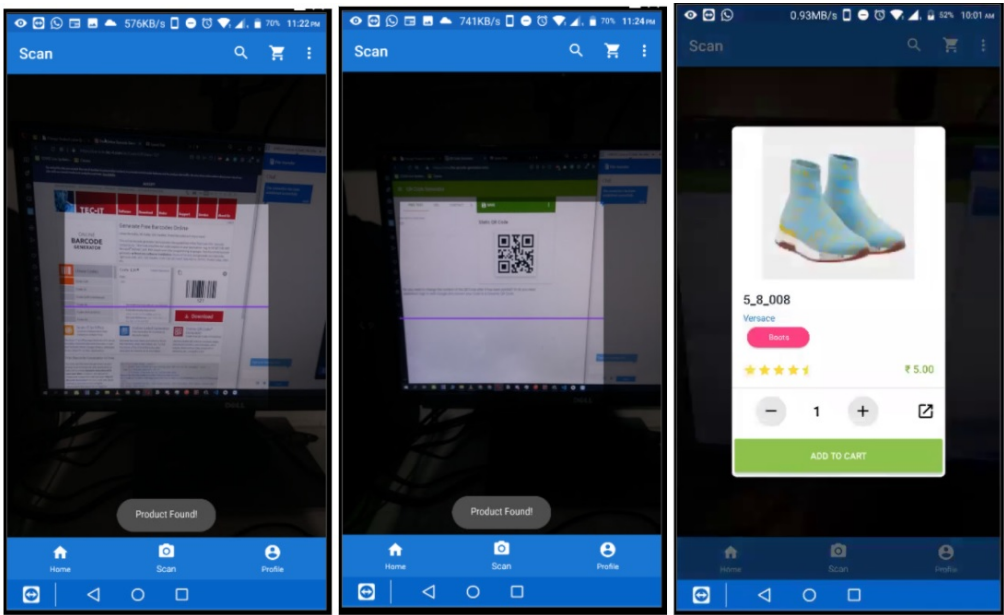


Figure 7.3: Testing of scanner module

Figure7.3 Shows scanning of Bar code and QR code to find product.

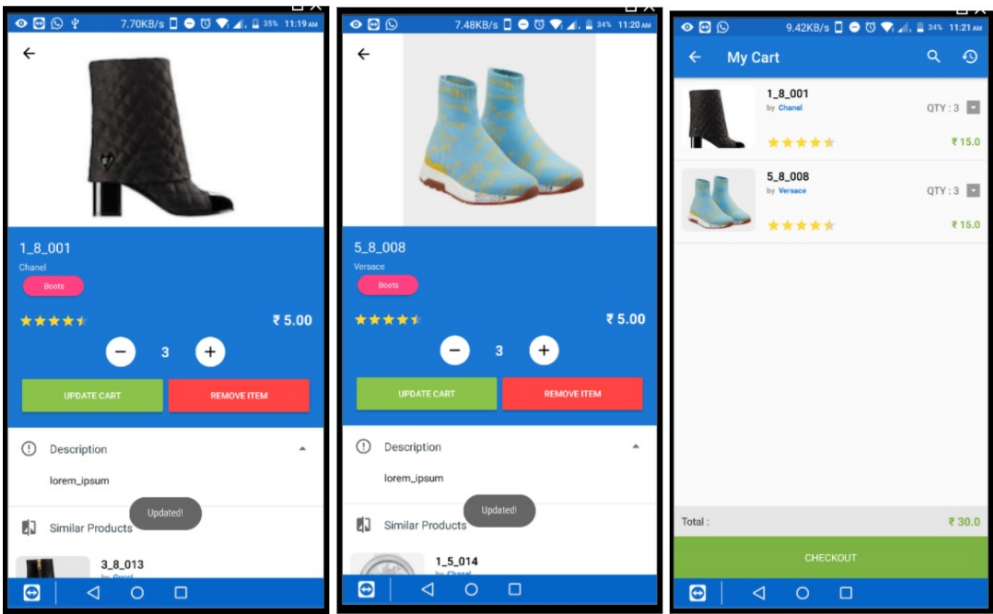


Figure 7.4: Adding products

Figure7.4 Shows products being added and the product being updated in the cart.

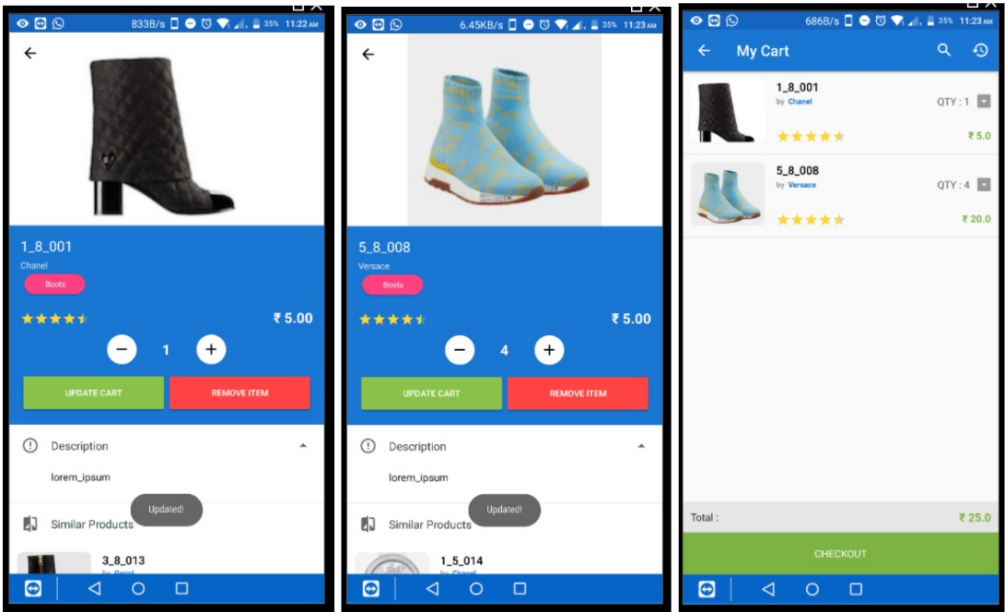


Figure 7.5: Updating products

Figure7.5 Shows product count being changed and the product being updated in the cart.

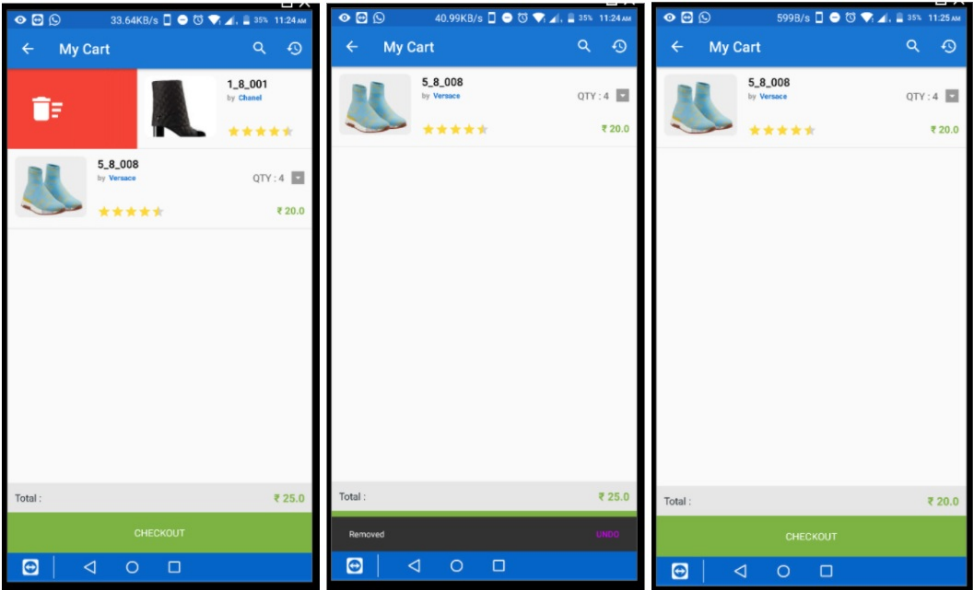


Figure 7.6: Removing products

Figure7.6 Shows products being removed and the product being updated in the cart.

Chapter 8

Results and Discussions

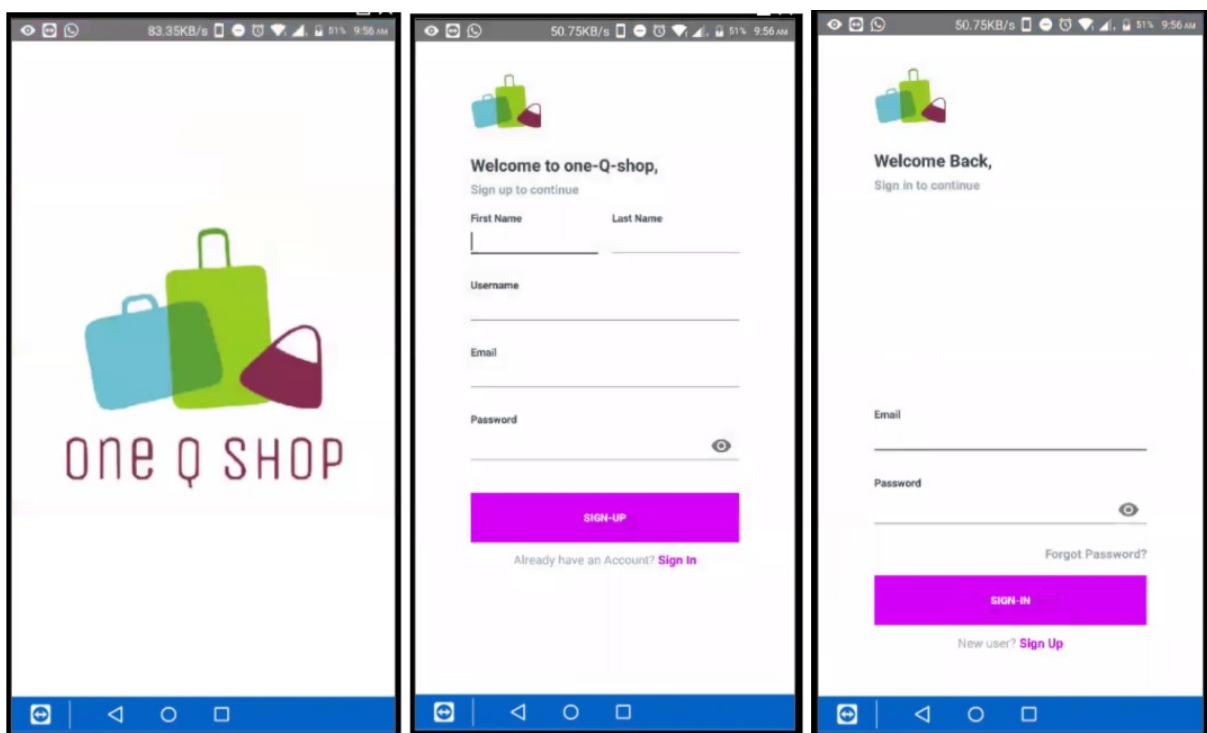


Figure 8.1: Start up, Register, Login

Figure8.1 Shows the start up page, Sign up page and the Sign in page.

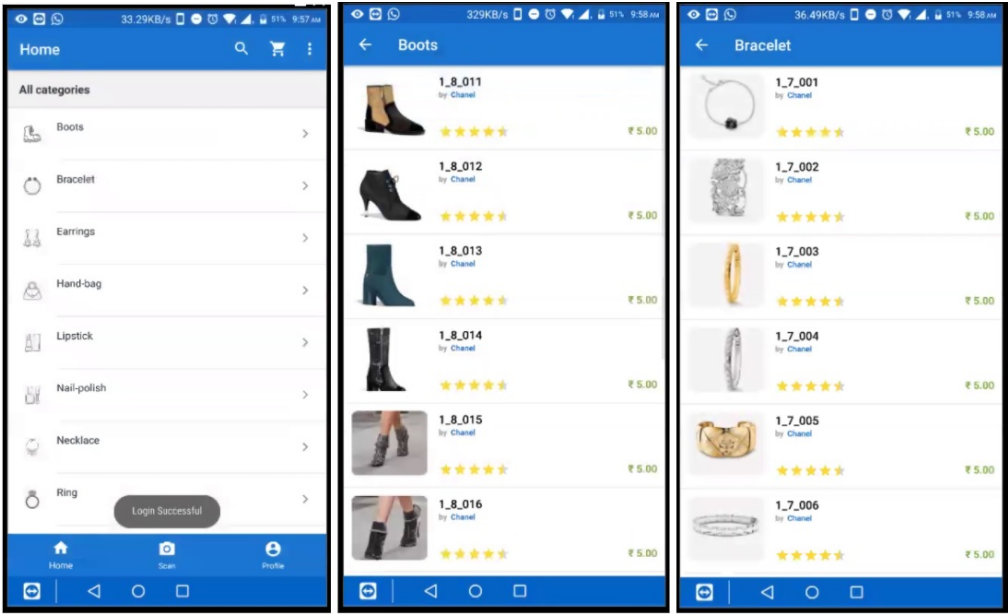


Figure 8.2: Home, products

Figure8.2 Shows the Home page, and the list of products in the said categories selected from the home page.

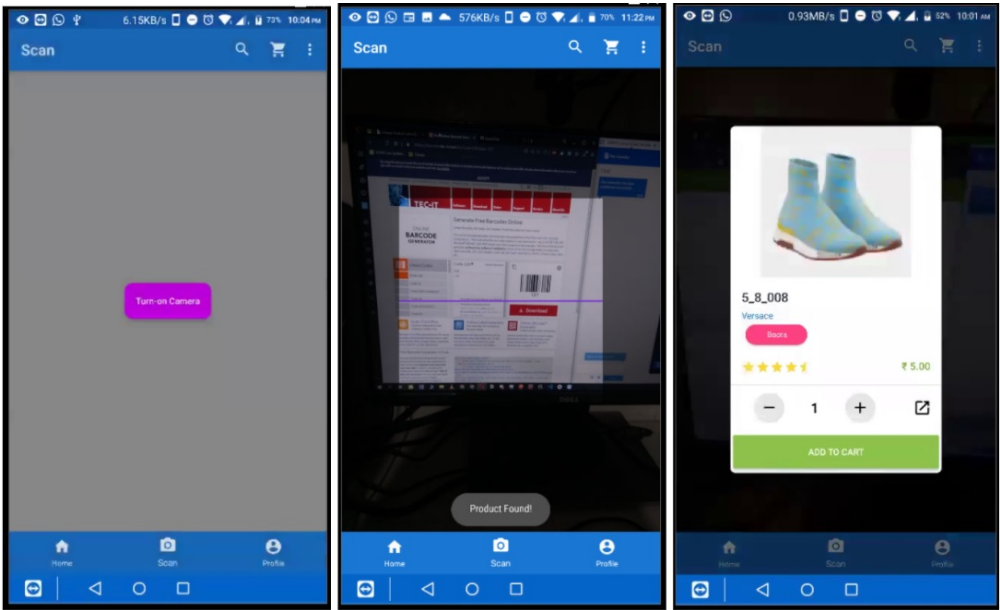


Figure 8.3: Working of scanner

Figure8.3 Shows the scan page and the product after scanning the bar code.

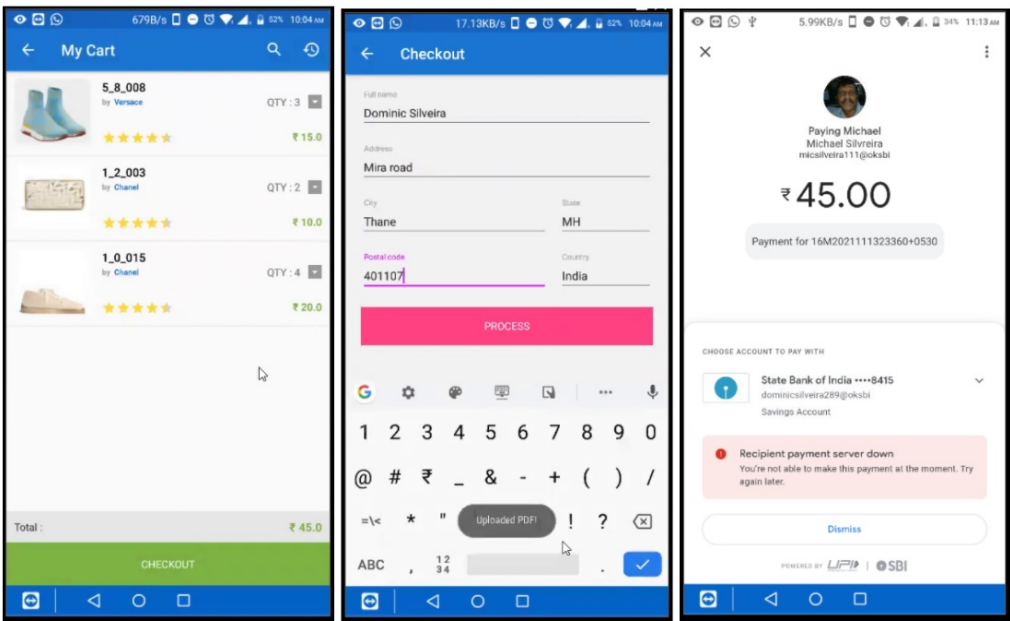


Figure 8.4: Cart, Checkout

Figure8.4 Shows the cart and the checkout along with the payment gateway.

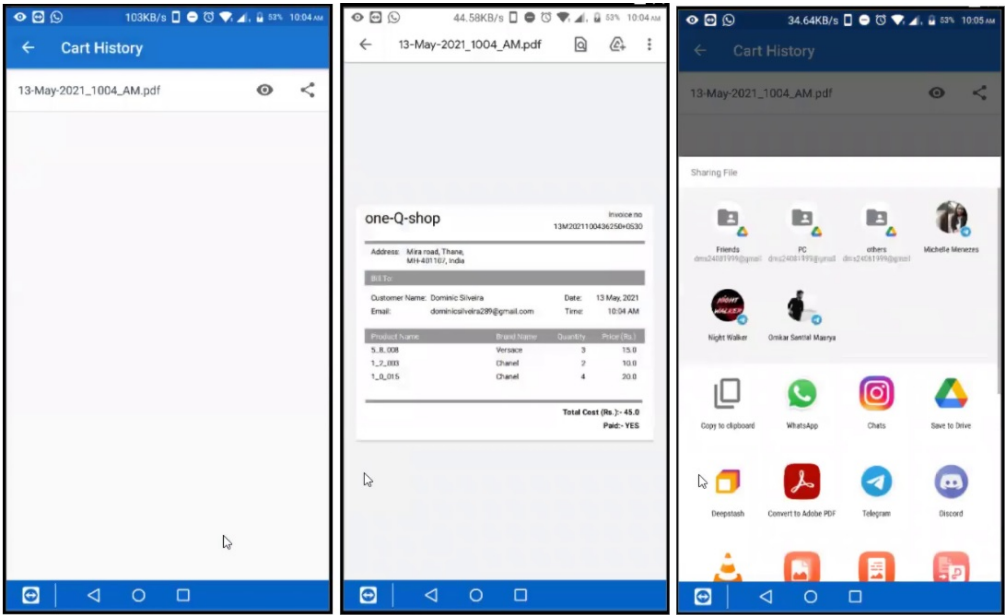


Figure 8.5: Cart history, Invoice

Figure8.5 Shows the cart history and the invoice.

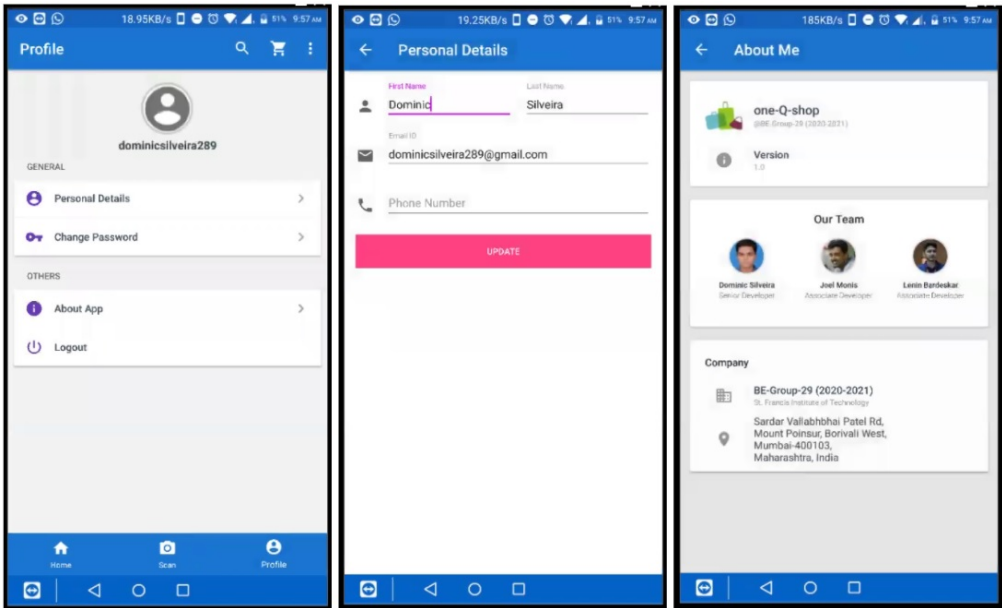


Figure 8.6: Profile page

Figure8.6 Shows Profile page along with the sub-pages of Personal details and about app.

Chapter 9

Conclusion and Future Scope

9.1 Conclusion

One-Q-Shop aims at facilitating the shopping process while not hampering the customer's shopping experience. The project automates the conventional shopping process and helps eradicate the long queues one usually encounters in a shopping scenario. The process of scanning a barcode or QR code and adding it to the cart for payment is not as much of a rarity, making it even more easier for the customers to get accustomed to. Barcodes are easily available and exist across all products, which hence does not incur any extra cost that would have been incurred for any other systems to have been implemented. Predictions made by the recommendation system helps customers get similar and related products without having to manually search for them. Cashless payments help in stopping the spread of any virus or diseases spreading through touch and hence in such critical times, the project ensures the safety of customers as every store would aim to. All-inclusive, One-Q-Shop helps provide a safe, fast, easy yet the same old shopping experience in a post-pandemic world to each and every customer in their shopping journey.

9.2 Future Scope

The application once implemented collects user data over a period of time which can then be used to analyze customer behavior, shopping patterns, etc. and thus help in suggesting ideas to improve business and market segmentation

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