EasyCart Mobile Application

Higher National Diploma in Software Engineering

Final Project Report

HDSE 21.2F

School of Computing and Engineering

National Institute of Business Management (NIBM)

Kandy

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Supervisor: Mr. Sandaruwan Herath

"The project is submitted in partial fulfilment of the requirement of the Higher National Diploma in of Computing Software Engineering of National Institute of Business Management"

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ABSTRACT

Our proposed project is to develop a mobile application named "EasyCart" that aims to help small shops in Sri Lanka increase their customer base and sales. The application will enable shop owners to sell their products online and reach a wider audience. It will provide a user-friendly interface that allows customers to browse through a variety of products and place orders easily. Additionally, the app will offer features like in-app payments, order tracking, and personalized recommendations. Our team plans to leverage the latest mobile technologies and development frameworks to create a robust and scalable application. The goal of this project is to provide a simple and effective solution for small shop owners to compete in the digital marketplace and reach more customers.

DECLARATION

“I certify that this project does not incorporate without acknowledgement, any material previously submitted for a Higher National Diploma in any institution and to the best of my knowledge and belief, it does not contain any material previously published or written by another person or myself except where due reference is made in the text. I also hereby given consent for our project report, if accepted, to be made available for photocopying and for interlibrary loans, and for the title and summary to be made available to outside organizations”.

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1. Introduction

1.1 Introduction to EasyCart

Considering the current economic situation in Sri Lanka, the price of goods has become unaffordable to people. To address this problem, we have envisioned a mobile application named "Easy Shopping" that offers a discount system to users. With the widespread use of smartphones, our application will provide a convenient and accessible way for people to purchase goods at a lower cost. Our app will enable small shop owners to advertise their businesses and offer discounts to customers. This will provide them with a platform to increase their customer base and sales. Our vision is to develop an easy-to-use and efficient mobile application that will help people purchase goods at a more affordable price, while also supporting small businesses in Sri Lanka. With the use of Kotlin programming language and the latest mobile technologies, we aim to deliver a high-quality and reliable application that meets the needs of both customers and shop owners.

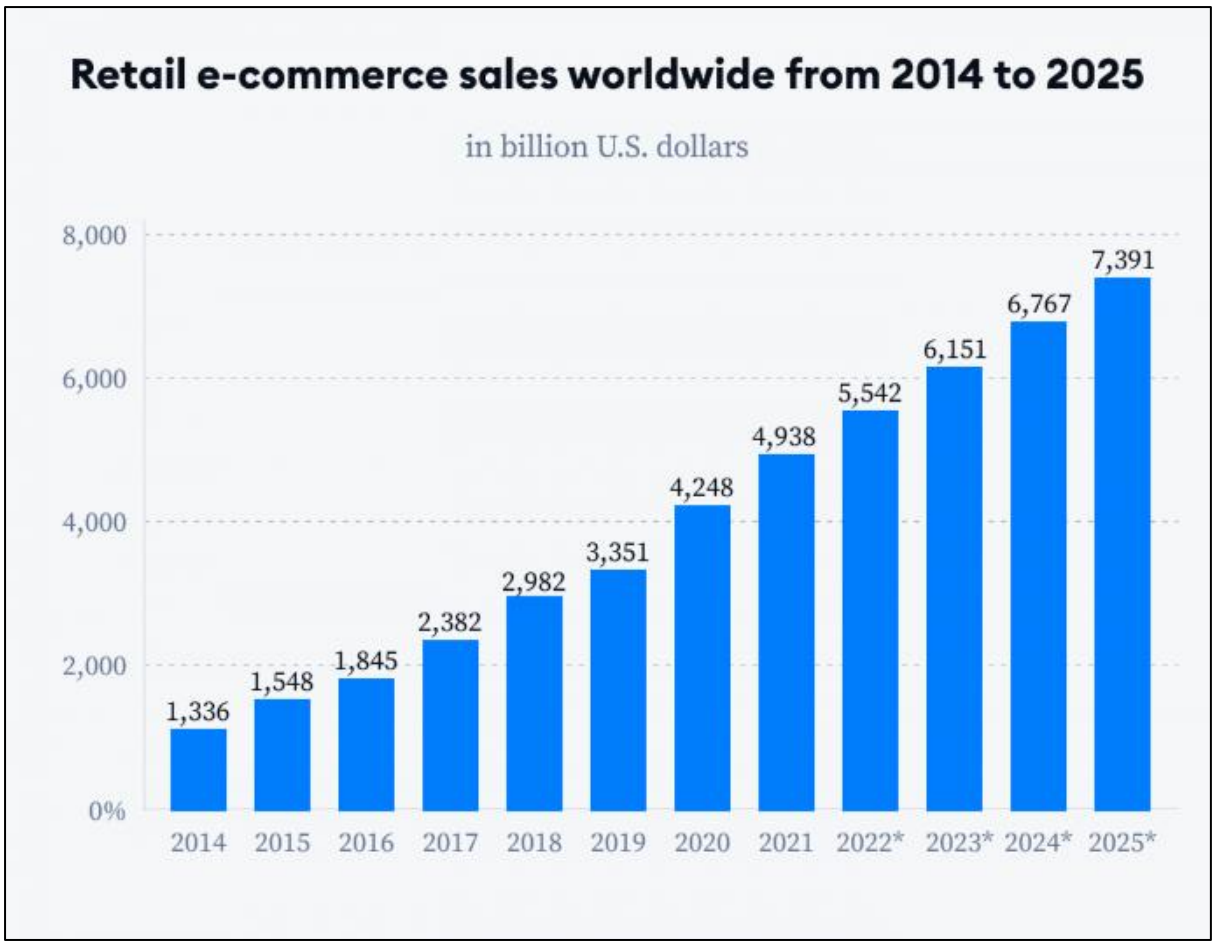

Figure 1.1 – Stats of retail e-commerce sales moving to online stores in USA

1.2 Application Structure

- **Homepage**

- **User Interface**
    - ✓ User Login
    - ✓ User Registration
    - ✓ GPS Navigation
        - Enter Location
    - ✓ Product Details
        - Select Products
    - ✓ Add to Cart
        - Display Total
    - ✓ Check Out
        - Star Point Rating
        - Add Comment / Suggestion
    - ✓ Thank You

- **Admin Interface**
    - ✓ Admin Registration
    - ✓ Stock Inventory
        - Add Items
        - Update Items
        - Delete Items
    - ✓ Ongoing Purchase

1.3 Operations in the Application

FUNCTIONAL REQUIREMENTS

Functional requirements define the fundamental actions that must take place in the application in accepting the inputs and in processing and generating the outputs. These are listed as “shall” statements starting with “The system shall….

Login Module - This module is provided for the administrator and the users such as Product buyer and seller who have both registered and unregistered themselves in the app. These logins are provided according to the need of the systems.

- Input - Email and password
- Process - After entering the Email and the password by user process of validation occur to identify whether Email and password is available in the database or not.
- Output - Registered user can access the app and other special services.

Administrator Module - The administrator is provided with email and password with which he/she can access the system. Administrator is given permission to maintain the databases, verifies registered users and to process deliveries.

- Input - Username and password.
- Process - Process of validation will occur.
- Output - Administrator will maintain the database, will perform the product seller process and deliveries.

User Module - As users are the main source of the site, the following facilities are available through this module.

Can search the products according to their need.

Can order products online and pay via credit card or cash or by visiting.

Can search the nearest retail shop and pre order.

Can get information about the products.

Delivery on time and reservations.

- Input - Email, password.
- Process - Process of validation will occur.
- Output - User can access the app via the GPS location, purchase and rate the service.

APPLICATION FUNCTION

The complete application is comprised of various functions.

Functions available to general user-

- User can access the information about various products and quantity.
- User can become a member of the site by registering himself.
- User can buy products online, add them to the cart and personalize it.
- Users can filter the products available.
- Feedback facility, notifying customers with the nearest retail shops and offers.
- Users can reach the shops through google map or by direct contact.
- Selected categories can be further explored by user.

Function available to Administrator

- Administrator will add, update, or delete the Products in the database.
- Administrator also provides the discounts on the Products.
- Notifies the customer once the registration is successful.
- Administrator can change the password.
- Monitors the orders, payments and the online delivery.

1.4 Problem Definition

Considering the current economic situation, the price of goods has become unaffordable for people.

Since most of them have smartphones, we decided to introduce a discount system using a mobile app.
Through advertisement, a backdrop is created for the sellers to market their business. This gives them the ability to increase their customer base.

Our vision is to develop an Easy Shopping mobile application to provide the facility to purchase goods against the current economic situation.

1.5 Project Objectives

The objective of this project is to develop an e-commerce application for every retail shop to expand the business, increase efficiency of resource management, allow customers to access the nearest retail shop to satisfy their needs and wants, encourage retail entrepreneurs, to digitalize the ecommerce field for the future and to reach more customers via Online Platform.

1.6 Proposed System

The "EasyCart" mobile application is designed to provide a discount system for users in Sri Lanka who are looking to purchase goods at a lower cost. The system will consist of two main components: a customer-facing mobile app and a seller-facing web portal.

The mobile app will be available for download on both Android and iOS platforms and will allow customers to browse through a variety of products offered by small shops in their local area. Customers will be able to view product details, images, and pricing, and will have the ability to add items to their cart and make payments securely within the app. The app will also offer personalized recommendations based on the customer's browsing history and purchase behavior.

The seller-facing web portal will provide small shop owners with the ability to create a profile for their business, upload product images and descriptions, set pricing, and offer discounts. Sellers could track their sales and customer behavior through the portal. The portal will be accessible via any web browser and will offer a simple and intuitive interface for sellers to manage their business.

Both the mobile app and web portal will be developed using the Kotlin programming language and the latest mobile and web development technologies. The system was designed to be highly scalable and reliable, with a focus on providing a seamless and user-friendly experience for both customers and sellers. Overall, the "Easy Shopping" system aims to provide a convenient and accessible way for people in Sri Lanka to purchase goods at a lower cost, while also supporting small businesses and promoting economic growth.

1.7 Chapter Summary

Project Plan

- A Problem
- Define a problem.
- Justify the needs for a computerized solution.
- Identify the functions to be provided by the systems along with the constraints.
- Determine goals and requirements of the system.

- Developing a solution strategy
- Outline several solution strategies.
- Conduct a feasibility strategy.
- Develop a list of priorities for the product characteristics.

- Planning the development process
- Define a life cycle model and an organizational structure for the project.
- Plan the configuration management, quality assurance and validation activities.
- Establish the preliminary cost for app development.
- Develop preliminary estimates for the computing resources required to operate and maintain the system.

2. Methodology

2.1 Introduction

The purpose of this chapter is to explain in detail the research methods and the methodology implemented for this study. The chapter will explain first the choice of research approach, then the research design, as well as the advantages of the research tools chosen. This will be followed by a discussion on their ability to produce valid results, meeting the aims and objectives set by this dissertation.

The chapter then goes on to discuss the sample size and the sampling strategy applied and the data analysis methods which have been used.

2.2 Data Collection Method(s)

Data is a troupe of figures, symbols, objects, events and facts collected from various sources. Data can be categorized under two main categories: primary data and secondary data. Primary data is derived from first-hand experience and has never been utilized before. Statistical methods, polls, surveys, interviews, Delphi technique and focus groups comes under primary data collection methods. Primary Data Collection methods can be divided into two types such as qualitative and quantitative data Collection methods. Under qualitative data collection methods, regular interviews were carried out with retail businessman to get the data. As well as that under quantitative data collection methods observations and research were conducted.

2.3 Software Process Model

The software process model that used to create was waterfall model.

Waterfall Model

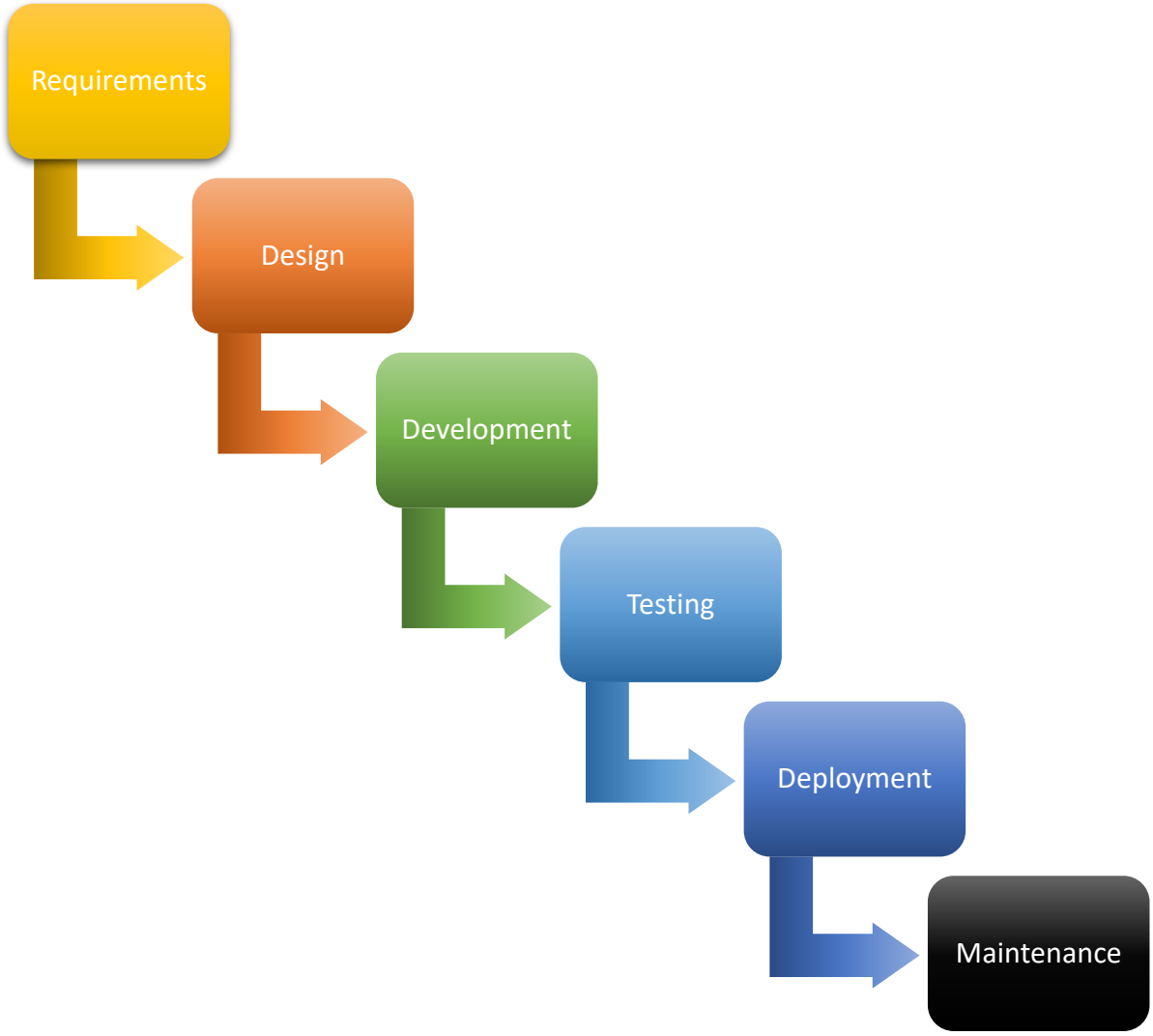

Figure 2.1 – Waterfall software process model

2.4 Software Development Tools

Software development is a collection of computer science activities involved with the process of developing, designing, deploying, and supporting software. The sequence of questions or programs that inform a computer what to do is referred to as software.

Hardware Requirements:

- Mobile devices with Android OS 5.0 or higher or iOS 11 or higher
- Desktop or laptop computer with a web browser (Chrome, Firefox, or Safari recommended)
- Internet connection for both mobile devices and web browser

Software Requirements:

- Kotlin programming language
- Android Studio or Xcode for mobile app development
- Firebase or a similar cloud service for backend development
- Web development tools such as HTML, CSS, and JavaScript for web portal development
- MySQL or a similar database management system for data storage
- Payment gateway integration for in-app purchases
- Advertising platform integration for sponsored content
- In addition to the above requirements, the development team will need to have access to appropriate hardware and software development tools, including a suitable development environment and testing devices. They will also need to ensure that the system was designed to be compatible with a variety of mobile devices and web browsers.

2.5 Testing Strategies

Software testing is a process of determining if the actual system software meets the expected requirements and ensuring that the software product is free of defects. It entails running software/system components through their paces using manual or automated methods to enhance one or more desired properties. The goal of software testing is to find mistakes, gaps, or slight changes in comparison to the actual requirements.

Software testing is classified into three categories such as.

- Functional testing
- Non-functional testing
- Maintenance

Benefits of testing strategies

- Customer satisfaction - The primary goal of any product is to satisfy its clients. UI/UX testing guarantees that users have the greatest possible experience.
- Security - It is the most fragile and delicate advantage of software testing. People want to buy things that they can rely on. It aids in the prevention of dangers and difficulties.
- Product quality - It is a need for any software product. Monitoring guarantees that buyers receive a high-quality product.
- Cost effective - It is an absolute requirement for any software application. Buyers are assured of receiving a high-quality product because of monitoring.

Software flaws can be costly or even deadly, thus testing is essential. The most important testing strategies are unit testing, integration testing, validation testing and system testing.

TEST CASES

- App is properly linked or not - Whether they are redirected to desired interface or not.

- Information passed – If an interface passes some parameter to another interface then it should be checked that the interface get the correct information, whatever is passed by the previous interface.

- Output should be correct – Every functionality of the app should be checked properly whether it gives the right result or not generally test is performed with known results. If the output of the app is matched with that result the app is working fine.

TEST CASES FOR ALL THE INTERFACES

Table 1 – Test cases

Serial number	Description	Expected Result	Actual Result	Result
1	Issues with database connection	Expected to build the connection with database successfully	Not successful database connection	Cleared out the syntax errors and managed to connect database successful.
2	Issues with passing values through HTML forms	Expecting all the values to be passed to the next page	Not been able to pass all the important values through forms	Passing those values through hidden inputs
3	Some CSS files get cached in the browser	Expected to see the style changes been applied in the page	The style changes won't take effect in the page	Passed a dummy value to avoid caching in the browser
4	Complex validations using JavaScript	Expecting to see smooth functioning of event handlers	Event handlers not working properly	After referencing sites managed to correct the event handlers
5	Merging separate interfaces done by team members	Expected to see the perfect output when merging the code	Lots of CSS issues and troubles with smooth functioning	Used iframe tag given by HTML to avoid crashing of code

2.6 Implementation Plan

A software implementation strategy is used to guide the flow of introducing new software or updating existing software. The plan breaks the implementation process into distinct milestones and specifies the implementation timetable and resources required.

Benefits of using an implementation plan

- Carries your strategic objectives to life while minimizing the use of material and human resources.
- Assists your firm in effectively configuring the system and ensuring that employees with the necessary experience are involved in all procedures.
- Guides entrepreneurs in efficiently establishing the services and providing that all procedures are carried out by workers with the relevant experience.
- Aids your organization in clearly assigning roles and tasks within the team to prevent job duplication.
- Greatly reduces on time-consuming decision-making.
- Ensures that a company's long-term goals are accomplished.

To ensure that the implementation process runs as smoothly as feasible employees should be informed about forthcoming changes as soon as necessary. By appointing a responsible person to handle any employee queries, train them, and supply all relevant information upon request. Informing the team of the new software's clear benefits and how it will improve the way the entire firm operates leads to clear mindset of how it should be implemented properly.

2.7 Chapter Summary

This chapter include the details and the research methods used during this study. How the data collected for the study, the software process model that used in development, the hardware tools and software tools used in development and the testing strategies of all the interfaces are described here with a clear view and implementation plan also having a major part in this chapter.

3. Analysis

3.1 Introduction

A UML diagram is a diagram based on the UML (Unified Modelling Language) with the purpose of visually representing a system along with its main actors, roles, actions, artifacts, or classes, to better understand, alter, maintain, or document information about the system.

Use-Case Diagrams describe the high-level functions and scope of a system. These diagrams also identify the interactions between the system and its actors. The use cases and actors in use-case diagrams describe what the system does and how the actors use it, but not how the system operates internally.

A Data Flow Diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination.

3.2 UML Diagrams

Use Case Diagram of EasyCart

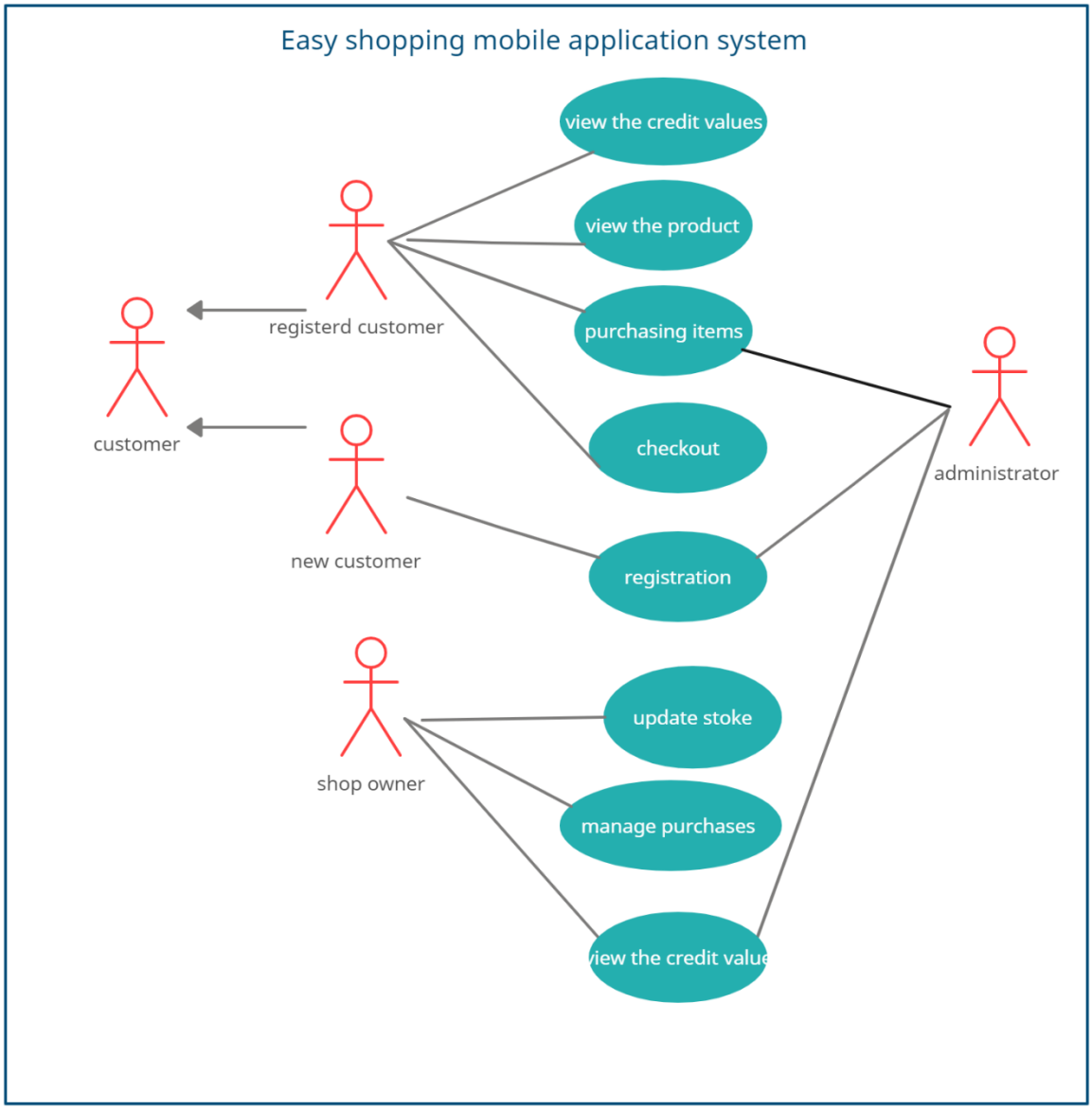

Figure 3.1 – Use Case Diagram of EasyCart

Data Flow Diagram of EasyCart

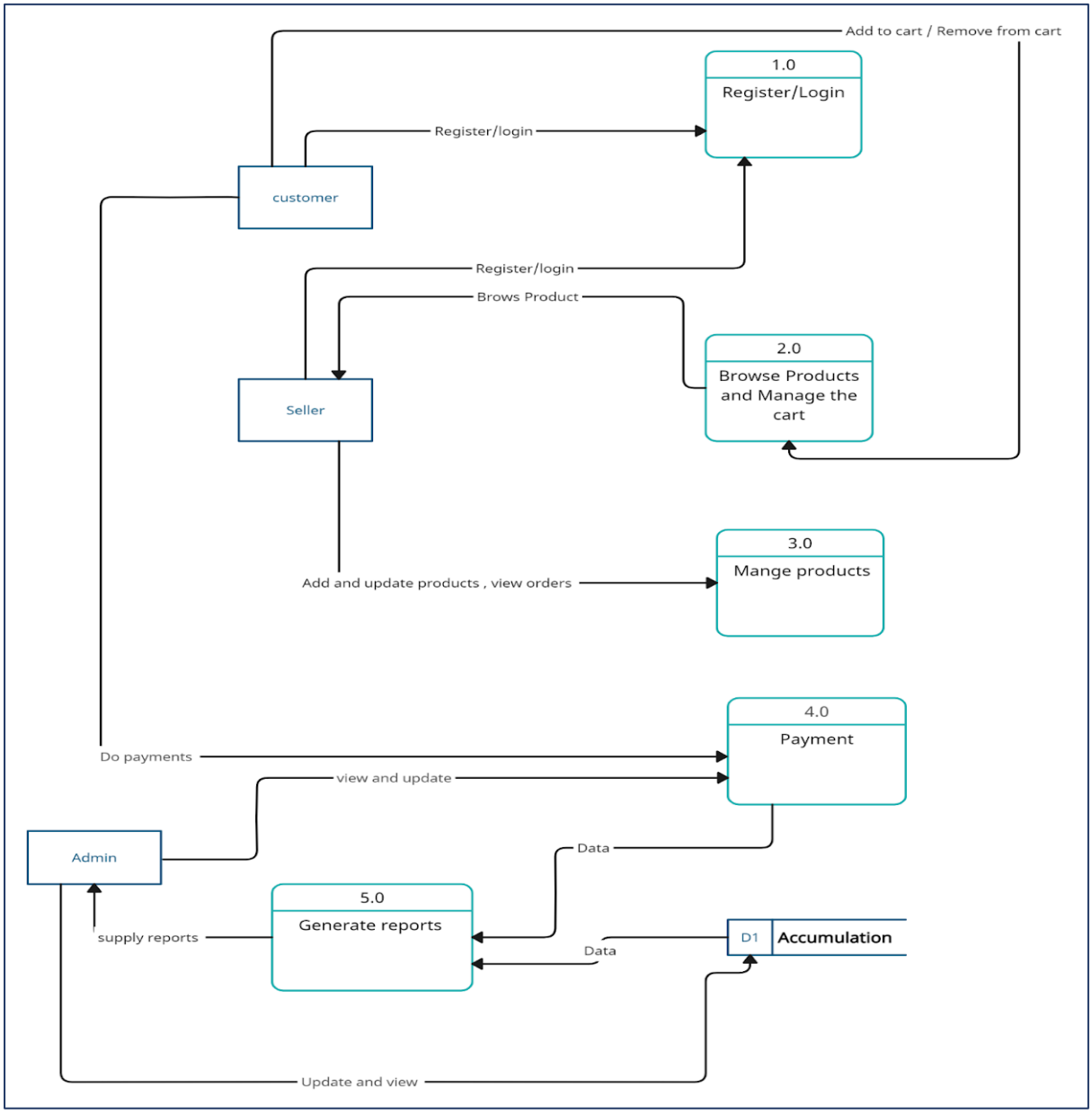

Figure 3.2 – Data Flow Diagram of EasyCart

3.3 Chapter Summary

This chapter helps to understand the system and its activities in a logical way. By the diagrams such as use case diagram and data flow diagram the user can get a view how the finale app will be and how it will work.

Further, this helps the businessman to get an idea to improve the system in an efficient way and how it works.

4. Solution Design

4.1 Introduction

Based on the design that came up during the analysis, as the next step implementing the solution was started. As planned in the beginning of the project our main tools for implementing the solution are.

1. Android Studio
2. MySQL

MySQL was used as our main text editor throughout the project because of its simplicity and adaptability for a variety of languages. The fact that it was adaptable was so important for our project because a mobile app was developed with a combination of languages such as

1. HTML
2. CSS
3. JavaScript

All these languages were used to develop our website because of their unique tasks provided to the site. HTML is the main language which decides the basic structure of the app, CSS is the language which provides the attractiveness for the structured website and JavaScript deals with functionalities of the site while Firebase was used as the cloud service for backend development which keeps the connection with databases and maintains the consistency of the app.

With the support of the above-mentioned tools/resources the phase of implementing the solution started as soon as the project proposal got approved. For the clarity of implementation of the main interfaces.

1. Interface Design
2. Database Design
3. Administration Design

4.2 Interface Design

The Interface is one of the main important factors when developing a mobile app because no matter how much simple the process is without an attractive interface, we'll never be able to increase the online market.

Hence, with reference to modern themes and based on attractive theme colours, an attractive home page was designed.

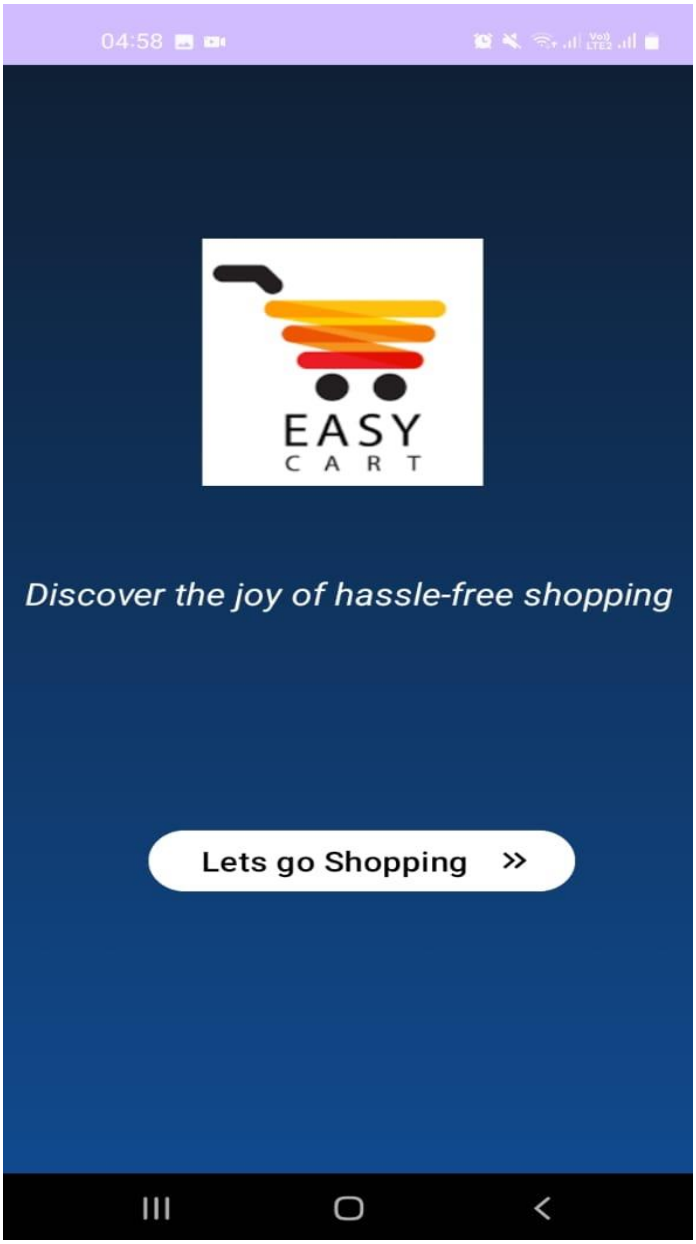

Figure 4.1 – Home Page

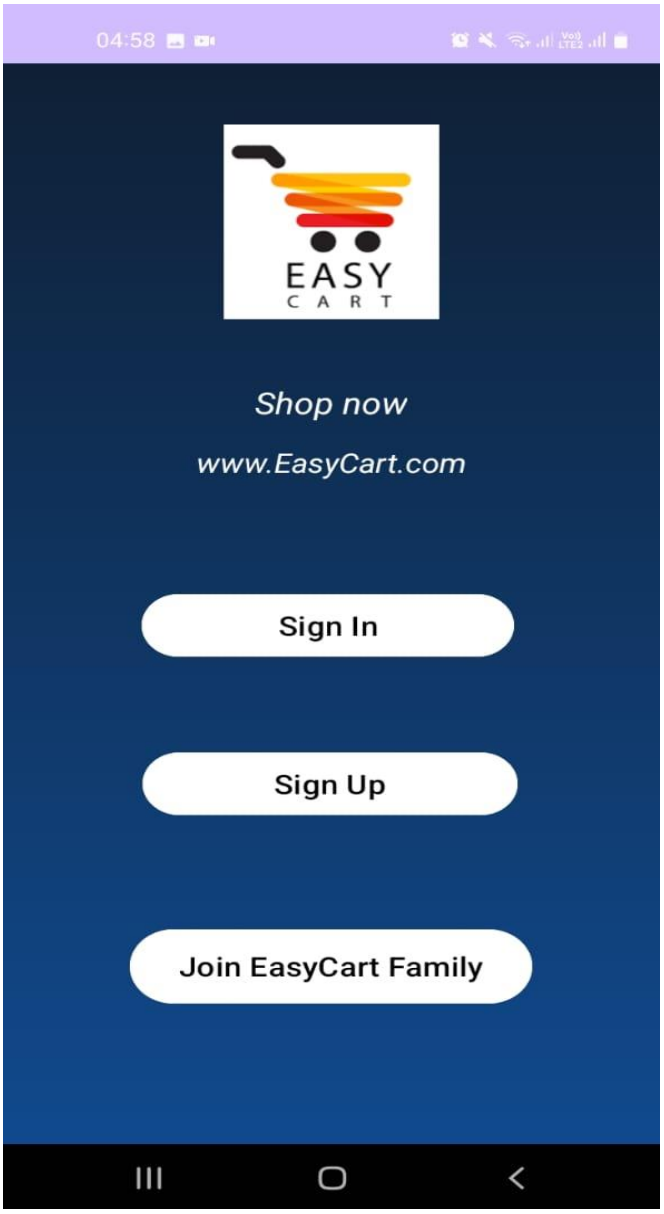

Figure 4.2 – User Sign-Up

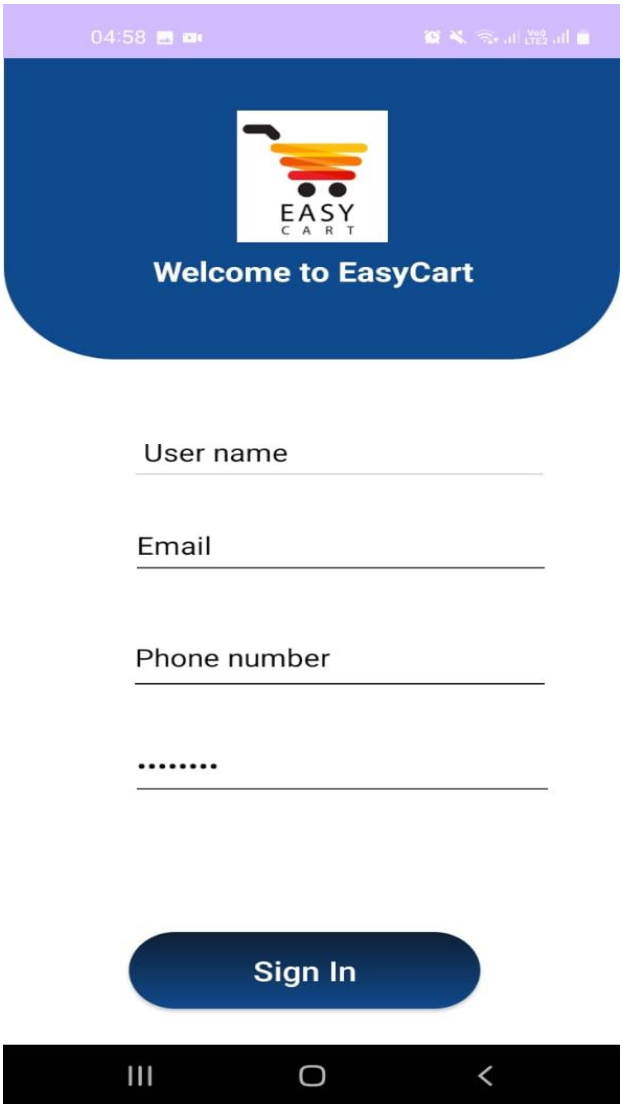

Figure 4.3 – User Registration

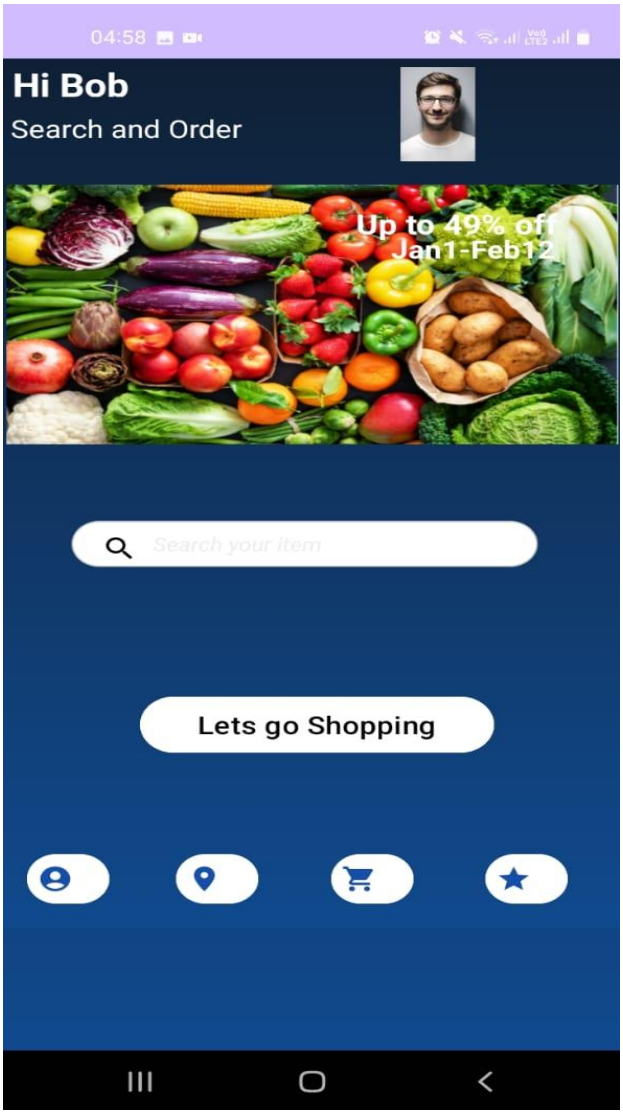

Figure 4.4 – User Interface

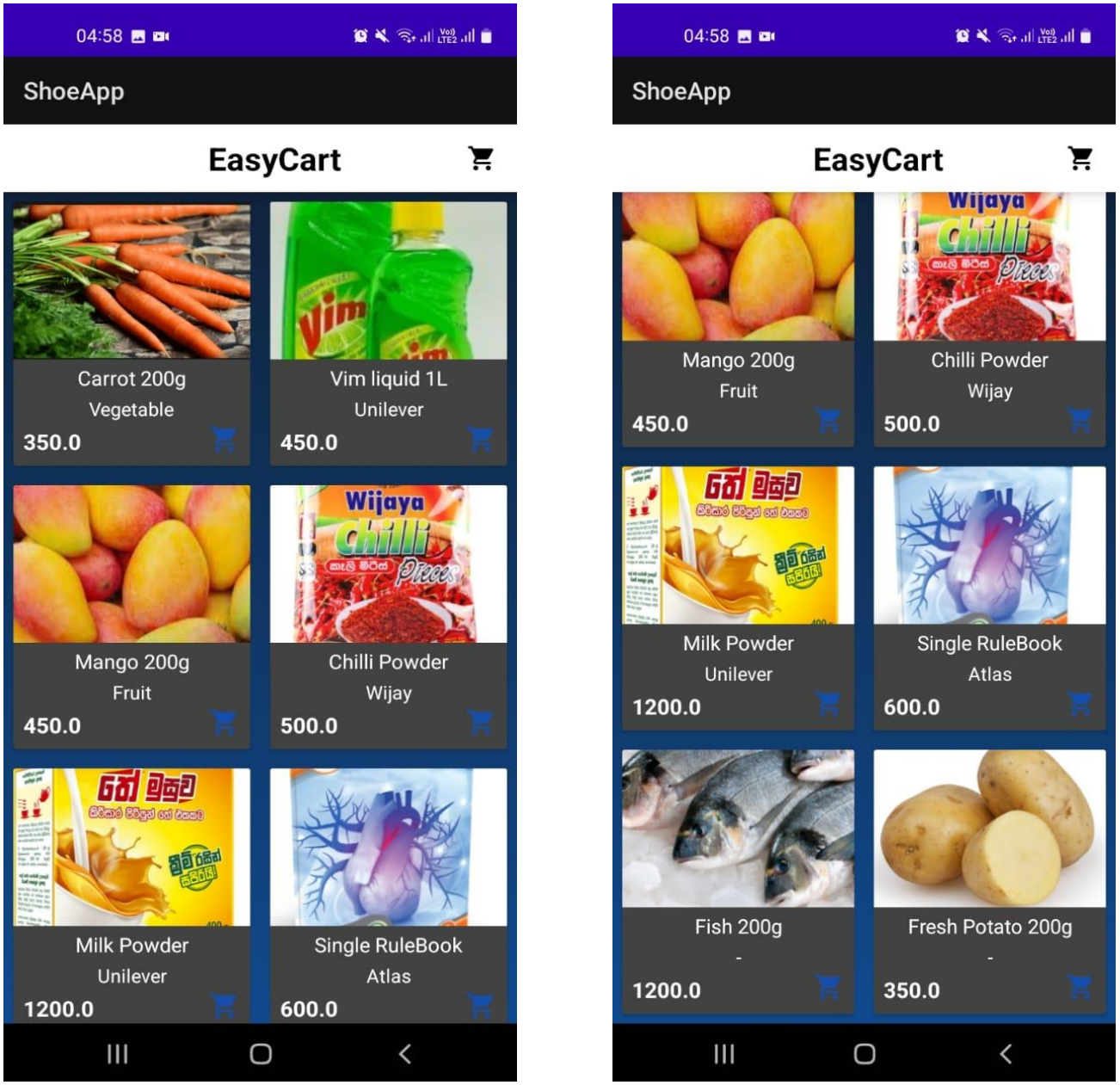

Figure 4.5 – Product Details Interface

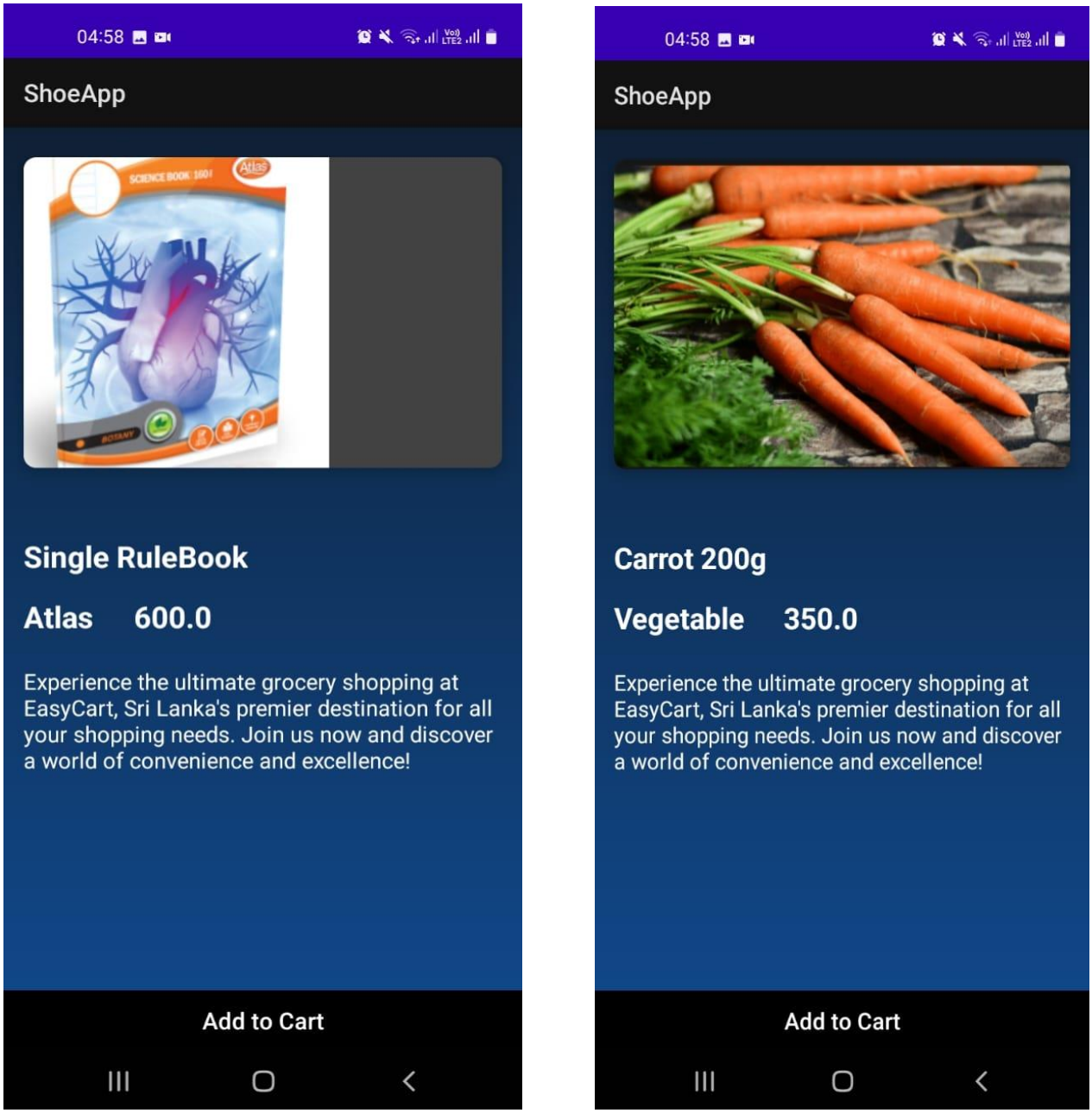

Figure 4.6 – Add to Cart Interface

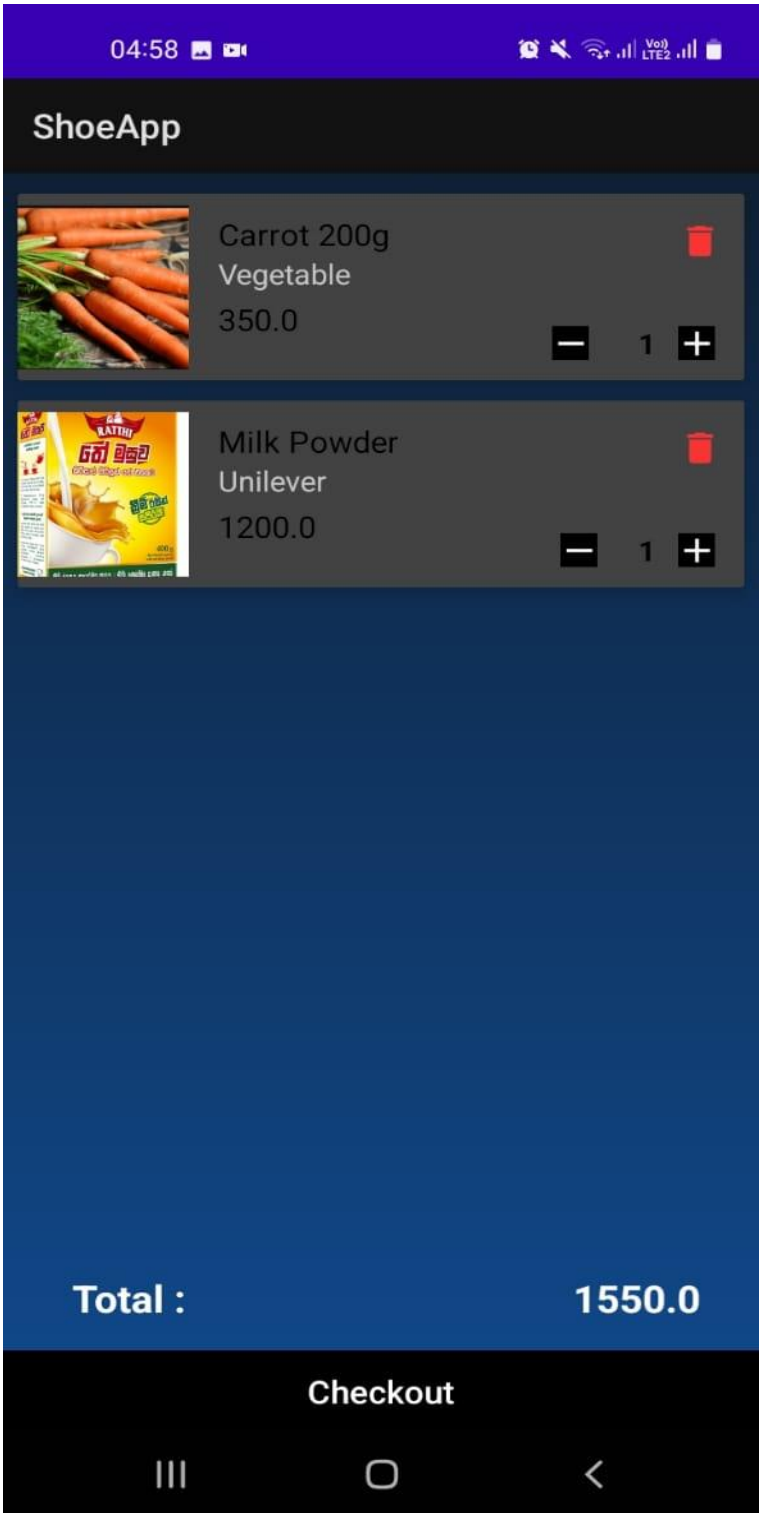

Figure 4.7 – Checkout Interface

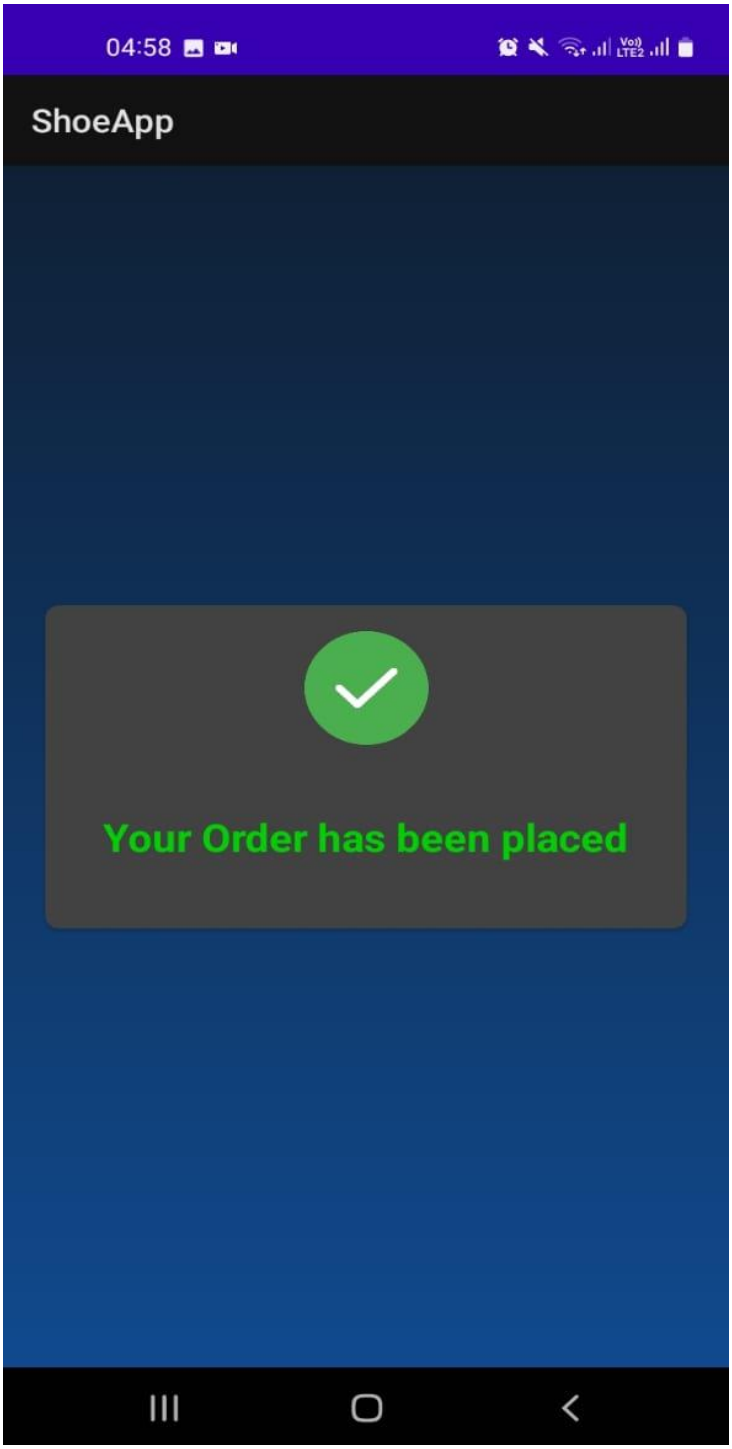

Figure 4.8 – Thank You Interface

4.3 Database Design

As mentioned in the introduction, the MySQL database sends and retrieves data from the database. To maintain smooth functioning on the app following tables in database ‘EayCart’ has been created.

4.4 Administration Design

While the main app investigates customer needs, there is another site which is separated from the main site that helps administration perform their functionalities.

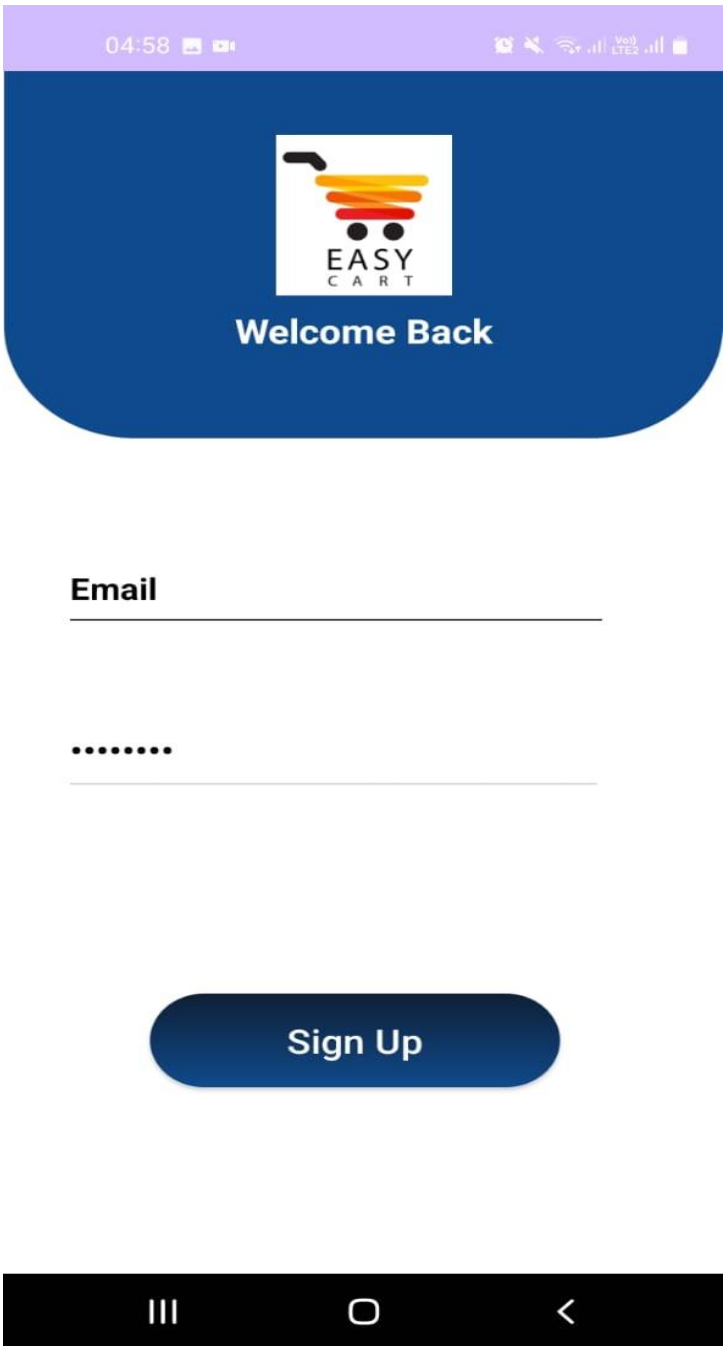

Figure 4.9 – Admin Login Interface

5. Conclusion

In conclusion, the "EasyCart" mobile application is proposed as a solution to help small shop owners in Sri Lanka to increase their customer base and provide a discount system for users who are struggling with the current economic situation. The system will consist of a customer-facing mobile app and a seller-facing web portal, both of which will be developed using Kotlin programming language and the latest mobile and web development technologies. The system will require mobile devices with Android OS 5.0 or higher or iOS 11 or higher, desktop or laptop computers with a web browser, and an internet connection. Other software requirements include Firebase or a similar cloud service for backend development, web development tools, MySQL or a similar database management system, payment gateway integration, and advertising platform integration. Our team is committed to delivering a high-quality and reliable system that meets the needs of both customers and sellers and provides a seamless and user-friendly experience. The "EasyCart" system aims to support small businesses and promote economic growth in Sri Lanka, while also providing a convenient and accessible way for people to purchase goods at a more affordable price.

Goals of the Project

1. Safe and fast service for the customer
    - Given the Covid-19 pandemic situation and the current economic crisis of the country people tend to use online platforms for transactions because it's unsafe and hard for people to come to the shops. Therefore, through our project customers can access to shop products efficiently without worrying about their safety.
2. A wide exposure for the shop products
    - The shops used to provide their service and products to people in a relatively smaller geographical area. But now with the E-commerce site, it will get an island wide exposure for their service and products.
3. Automated management
    - Getting rid of the tedious manual management and introducing easy, efficient and accurate automated management system.
4. Increase the online market.
    - Above mentioned facts help the shops increase their online market and overall market, bringing them more profit.
5. Overcome the modern business competition.
    - Modern day shops which aren't updated with latest technology tend to lose in the business world. Therefore, by updating the shops with the latest technologies and providing a better market, the safety of the company's future is ensured.

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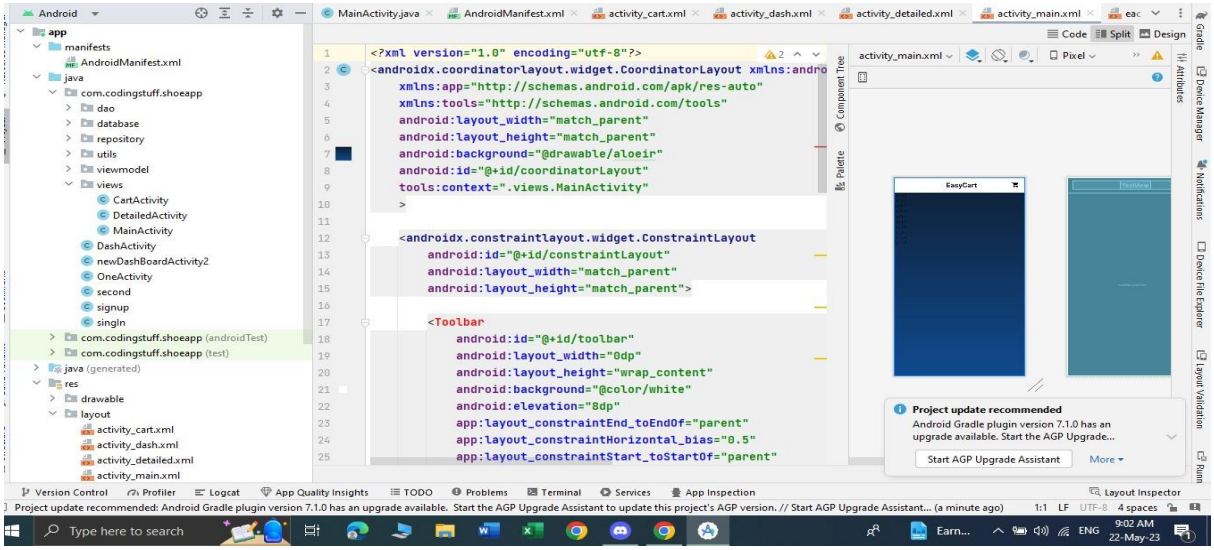
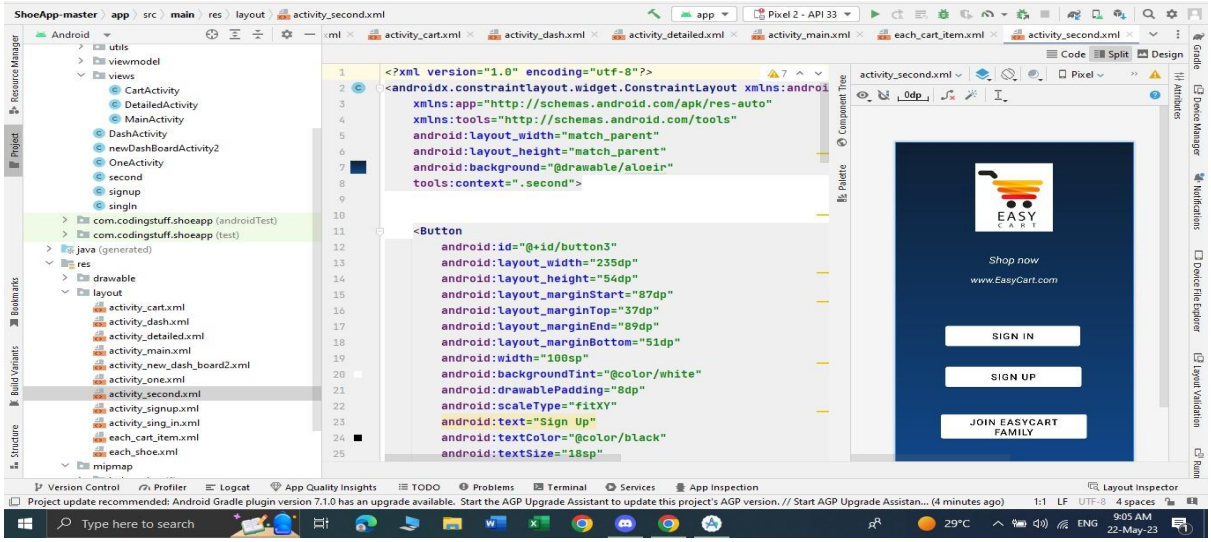
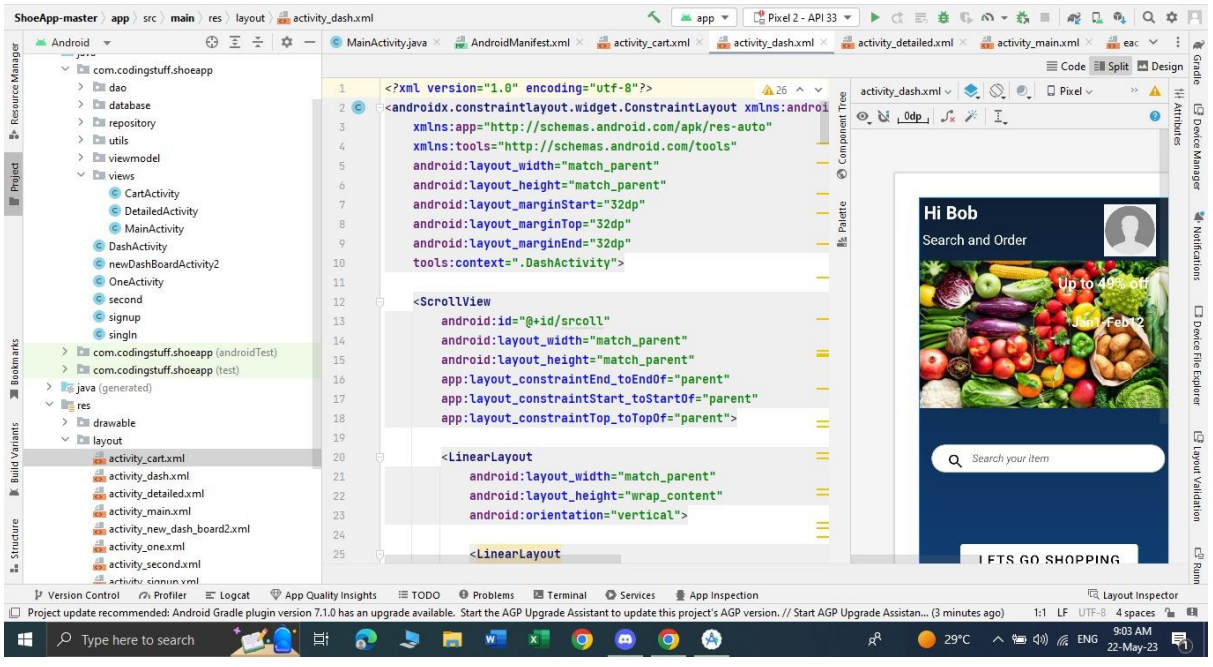
3. Youtube Available from: https://youtu.be/amnSAwVytHg [accessed April 2023].

Screenshots of the Code







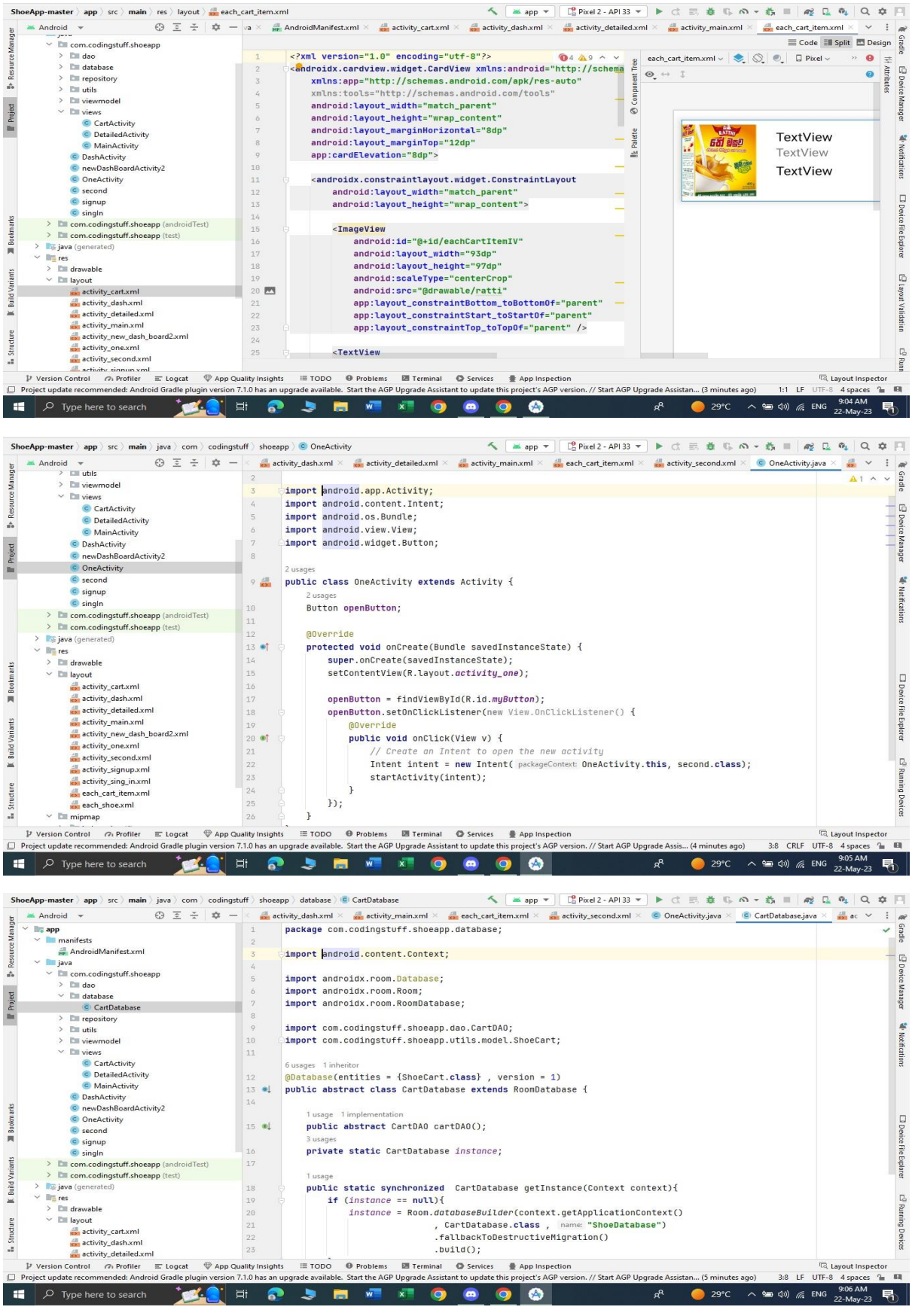


Figure 5.1 – Code Interface

II. Appendices

Project schedule

Table 2 – Project schedule

Tasks	Time
Planning	Week 1
Information gathering and Analysis	Week 2
Preparation of the proposal	Week 3
Project proposal submission	Week 4
Presentation and approval	Week 5
Designing of the app interfaces	Week 6
Creating the app and coding	Week 7 to Week 10
Creating database	Week 11
Initial testing	Week 12
Final testing	Week 13
Error and bug fixing	Week 14
Final improvisations	Week 15
Project submission and presentation	Week 16