

An online fruit shopping mobile application for Ghanshyam Fruits Limited in Kenya

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Business Information Technology

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Declaration

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the research proposal contains no material previously published or written by another person except where due reference is made in the research proposal itself.

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Abstract

As the social economy grows, several Kenyan residents are choosing to shop over the internet due to circumstances like bad weather, traffic and other factors. Therefore, delivery of fresh fruits from the Kenyan fruit markets on online platforms are very reliable. In addition, too much competition in the market is causing low demand and perishability of fruits from the companies. Ghanshyam Fruits Limited, a company in the Kenyan fruit industry is faced with challenges of being unable to expand and outsource within the market.

The project proposal is an endeavor to give benefits of internet shopping to clients in the fresh fruit market. This will assist in purchasing fruits in the company anywhere through web by utilizing an android gadget. An android application that will allow the consumer to shop, pay and get the fruits at ease. In this manner the client will get the service of internet shopping from his favorite company in the fruits market. The tools to be used in the project would be, android studio and Firestore database tools. Lastly, if the company provides an online platform for shopping fresh fruits, they will not lose any clients and will have an opportunity to develop, for example, Amazon. Since the application is accessible in the smartphone it is effortlessly and consistently accessible.

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List of abbreviations

App Application

IDE Integrated Development Environment

Ltd Limited

Chapter 1. Introduction

1.1 Background

Kenyan markets have begun to make inroads into the fruits and vegetables category. Fruits and vegetables are being imported from various countries like Egypt, South Africa, UAE and Europe. The difference between imported fruits and the fruits that are available in our markets is that the imported ones are high-grade exotic quality. They are available packaged in cartons and are generally appealing to the attention as they are not faulty. One major good thing about coping with imported fruits as opposed to the other category of fruits is that they have a tendency to fetch better profit margins. (AsokoInsight, 2020)

According to (Dannenberg & Lakes, 2013) the increase in development of modern transport and logistics systems has caused an increase in the competition between different production systems. Moreover, causing a seasonal pattern in production which affects the price of the commodities (Tegemeo Institute of Agricultural Policy and Development, n.d.). This causes an increase in competition to the fruit wholesalers importing fruits to the markets in Kenya

Currently, the fruit wholesale market takes place at Nakumatt Highridge (Nairobi-Kenya) parking lot from 3a.m to 8a.m Monday to Saturday. Some of the wholesale companies, Ghanshyam Fruits Ltd is one of them have no store to sell its fruits. Hence the market early in the morning.

The proposed application aims to make Ghanshyam Fruits Ltd well known to customers for a benefit and growth of the business and also to allow consumers to purchase fruits without having to go to the market early in the morning.

1.2 Problem statement

Due to many wholesalers selling the same types of fruits, it is difficult for companies to benefit or get more capital to expand and outsource the business. The fruits are imported from numerous countries and they don't last for a very long period in the cold storage where they are stored. One of the challenges being faced by the fruit companies is the perishability of the fresh fruits in the cold store because of low demand caused by too many companies selling the same fruits in the market. The seasonality of fruits is equally affected in the market as specific fruits are produced at specific times depending the countries the fruits are imported from.

This work proposes of a mobile application which will allow consumers to purchase fresh fruits over the internet as most customers choose to shop online nowadays. The application will be very relevant to the company as time to time, the company has had a few challenges like perishability of imported grapes due to low demand as there are other wholesalers in the market selling the same fruit but at a lower. Hence, the solution is very helpful to Ghanshyam Fruits Ltd since they will have room for expansion as it will give a rise in customer growth and more demand of fruits causing less wastage of exotic fruits.

1.3 Aim of the project

The aim of the project is to come up with an application to display the fruits available for consumers to purchase and the ones that are out of stock with an option of delivery to the address chosen by the consumer.

1.4 Specific objectives

- i. To evaluate the current approaches of selling fruits.
- ii. To review existing fruits selling information systems and mobile applications.
- iii. To develop an online fruit shopping mobile application.
- iv. To test and evaluate the developed application.

1.5 Justification

This project is crucial because the application will promote efficient sale of fruits which in turn will bring more profit and reduce fruits wastage within the company. This will cause an expansion of consumers as more people will understand about the products with wholesale prices and hence there will be more demand for the products within the company. The application will ensure that the company will get extra income to expand the business as more customers will be familiar with the company's exotic products.

1.6 Scope

The research focuses on a fruits shopping system for Ghanshyam Fruits Ltd. The developed mobile application will enable customers to shop for fruits at their own ease and on the other hand benefit the company to grow more. The platform shall also be able to focus on displaying fruits in stock

with their prices. Furthermore, delivery approach and a reward system for users who shop from the application for 3 or more consecutive days will be worked on. Effort will be put to deliver a security proof system with necessary encryption to ascertain the integrity and accuracy of data. A sequential approach will be adopted throughout the development cycle to ensure new ideas are put in every step of the cycle

1.7 Limitation

Time will be a limiting factor in the early stages of the development cycle.

Chapter 2. Literature review

2.1 Introduction

This chapter reviews the existing literature on the fruit market industry on markets based in Kenya, the place of the current markets and the trends of the fresh fruits. It will emphasize on the challenges faced with growing the business. Later in the chapter, a way of solving the problem faced by the companies, Ghanshyam Fruits Ltd being one of them in the fresh fruit market will be discussed.

2.2 Presently used approaches for selling fruits

Many fruit markets in Kenya have a currency system (a system where goods/services are exchanged upon an agreed amount of money (Hall, 2019)) of selling fruits. The wholesalers are engaged in a manual system where they gather at specific marketplaces and sell fruits in exchange of money despite the competition amongst them. Some wholesalers opt to personally contact buyers like caterers(restaurants), retailers and stall holders to trade the fruits before they perish.

A few companies dealing with selling fresh fruits and vegetables have online platforms like websites and applications in which customers can get their day to day grocery shopping done.

2.3 Challenges faced with the current approach of selling fruits

The biggest challenge faced by Ghanshyam fruits Ltd as being one of the companies in the fruit industries is that there is too much competition at the marketplace due to too many companies selling the same fresh fruits at the same place. This leads to fruits getting perished as they are less sold which then leads to the company not being able to grow and outsource.

2.4 A review of possible development technologies

According to (Rajagopalan, 2017) mobile phone penetration and internet growth has become rapid and people are preferring to shop groceries from home. One of the ways of controlling the gaps in the business is by coming up with a unique and secure application that will help the business grow which will allow the customers to shop from home and get fond of the business easily. The platform will allow consumers to buy fresh fruits, make payments over the internet and get the fruits delivered at their homes.

2.5 Related works

Some of the related works include:

2.5.1 Kalimoni Greens

Kalimoni greens is a website that allows consumers to purchase farm fresh and 100% organic products. The company is a member of Kenya Organic Agriculture Network (KOAN) and their main goal is to support local farmers by providing them with a market. The products they sell on the website are fruits, veggies, fresh meats and dairy. The website also provides the users a platform where they can pay for fruit packages which is delivered to the charity. The system may not be sufficient as there is limitation to products produced by the farmers seasonally hence making the consumers less interested in the platform (Kalimoni greens, 2020)

2.5.2 The Hawkers market

The Hawkers market, permitted by the city council, which is in Limuru Road, Nairobi is one of the most famous grocery markets where many retailers stand at their stalls to sell their groceries. The retailers have a currency system for selling their groceries. The advantage about this market is that a customer will not be limited to groceries as you will find all kinds of groceries in the market. As the main thing considered by consumer is safety, this manual system is inefficient because it is not safe due to it being a crowded and dirty area, there is a lot of pick pocket around the area (Hawker's market, n.d.)

2.5.3 Zucchini Greengrocers Ltd

Another related online platform is the Zucchini Greengrocers Ltd. This platform allows a customer to purchase fruits, vegetables, cheese, various items from the bakery and many more. Delivery timings on the website has been specified which allows the customer to plan for his/her shopping accordingly. Zucchini Greengrocers also own stores in numerous malls hence great demand from customers. The website is an advantage to people who love cooking it has modules of legumes and pulses, oil, cooking ingredients, breakfast ingredients hence allowing a customer to shop everything from one place (Zucchini Greengrocers LTD, n.d.)

2.6 Gaps in the existing works

The main challenge experienced in the current systems is that a mobile application system is not provided hence there is no easy access to the system as a user will have to open a browser and type in the address. It might seem easy, but the user will face many difficulties with this. Too much competition will be faced by the retailers in the marketplace as some of them sell the same type of fruits and vegetables which easily causes the fresh fruits and vegetables to perish faster as they are not sold, and they don't quite last for more than 8 months. Another main challenge is lack of customer growth which makes the grocery companies to have less benefit or capital to expand and outsource the business.

2.7 Conceptual framework

The proposed system will allow any consumer to view the fruits and services obtained by the company. Once the consumer desires the fruit/s, he/she will need to add the fruit/s in his/her shopping cart which will require them log in/sign up. Once the consumer has filled in the details of logging in, the fruits wished to purchase will be finalized in the cart a mode of payment will be chosen and address for delivering the fruits will also be required. Once the payment is done, a concept note will be sent to the consumers email. The conceptual diagram below shows how the proposed system functions.

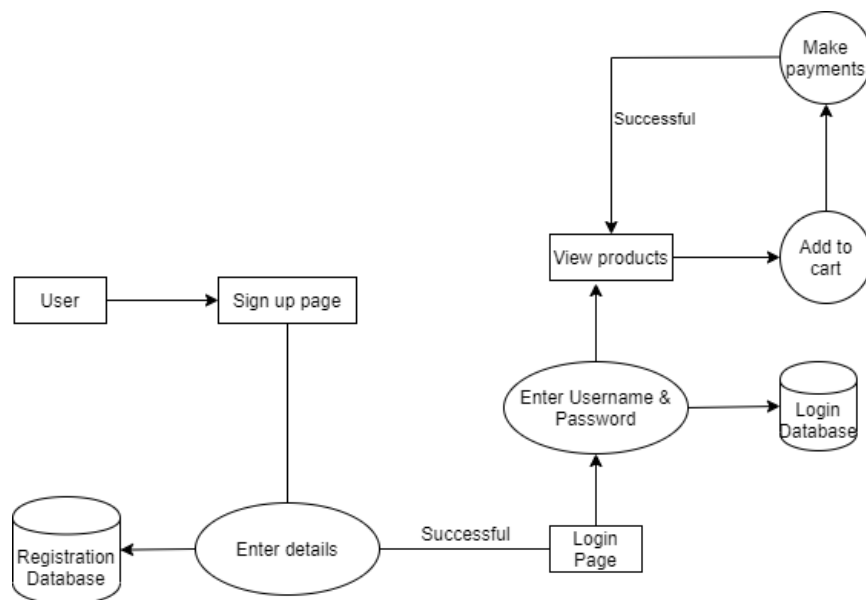


Figure 1: Conceptual framework

Chapter 3. System Development Methodology

3.1 Introduction

This chapter focuses on the summary of the applied methodology that will be used for the proposed system. A methodology is an approach of carrying out the system development life cycle (Kendall & Kendall, 2011). The development methodology used for the system is the incremental waterfall methodology (multi-waterfall cycle) which will ensure the system is created in the due date.

3.2 Incremental waterfall methodology

The Incremental waterfall methodology is the process of development where each recurrence passes through the five steps:(requirement, design, coding, testing and maintenance) where after each successful release, the system adds a new function to the preceding release until the absolute objective is achieved. This is the most reliable development method for the system because it will provide the customer with the important functionality first (Bahattab, 2015). The figure below shows the steps of the incremental waterfall methodology.

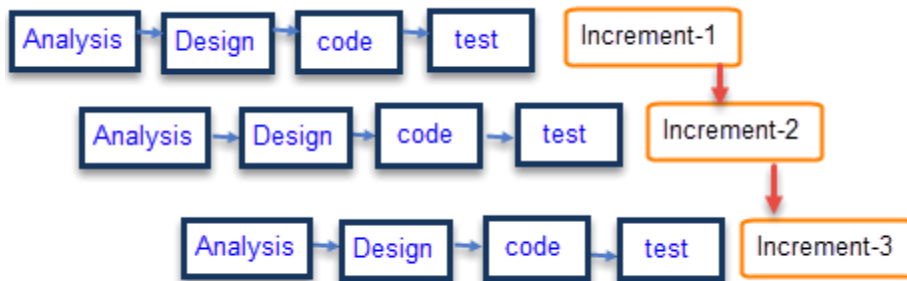


Figure 2: Incremental waterfall model as represented by (guru99, 2020)

3.2.1 Requirements specification

These refer to the software specifications and features for the system are agreed upon by the clients and the developer, gathered and documented for further development process.

3.2.2 Design

The gathered information from the previous stage is analyzed and a high-end function design is implemented.

3.2.3 Coding

At this stage, all the requirements will be converted to Android studio, SQLite and Firestore.

3.2.4 Testing

This phase deals with testing and checking if the solution on the application has met the requirements. Moreover, bugs will be found and will be fixed at this stage.

3.2.5 Maintenance

After the application is released, this stage will take care of making changes and correcting errors found within time.

The application will go through the five phases in the methodology multiple number of times until the final goal is achieved.

3.2.6 Analysis

System requirement analysis is the procedure of identifying and determining the end users' expectations and gathering requirements for a system that will solve a problem (Wasson, 2006). The system will use Object Oriented Analysis and Design (OOAD) where the requirements will be identified, developed and organized around the system's object model (Dennis, Haley, & Roth., 2012) hence being the most appropriate method for the proposal.

3.3 Functional requirements

These are the functions the system performs (Dennis, Haley, & Roth., 2012). The functional requirements included in the system are:

- i. **Customer authentication** – all users will have to register/log in to application to view and shop for the products
- ii. **User profile** – this is the profile page where the user can view his/her details used while registering. From this module, the user will be allowed to change his/her password and edit the delivery address details. All other information will require admin privilege.
- iii. **Registration** - for a user to checkout, he/she must be a member of the portal
- iv. **Login** – the registered users will use this portal to log in and checkout the products added to their cart, the password will be encrypted for security purposes and a link will be provided to reset a password incase the user has forgotten his/her password

- v. **Push notification** – the admin will send any kind of news to the members
- vi. **Log out** – the customer can log out after purchasing a product

3.4 Non-functional requirements

This is statement of a non-behavioral necessity in the system that describes a trait. Example, the appearance of an entity (Wasson, 2006)

- i. **Safety and security requirements** – the system will not cause any harm to the users. It will use a secured database and the network security will be very intense to avoid viruses and hacking.
- ii. **Performance** – the application will run smoothly in all android devises
- iii. **Order information** can not be able to be altered after ordering

3.5 Design

System design is the structure of the system architecture based on requirements (Dennis, Haley, & Roth., 2012)

The approach will use the two UML diagrams:

- i. A class diagram will show the objects like inheritance and polymorphism and their relationships within the system
- ii. A sequence diagram will be used to show the interactions between the different actors and objects within the system

3.6 System Development Tools and Techniques

The tools and techniques to be used to create an efficient platform are:

- i. **Android studio**

Android studio is a widely integrated development environment (IDE) that implements new tools for app development for Android operating system. The IDE will be ideal as it is a straightforward environment for developing applications and it allows users to send push notifications to the application.

ii. Cloud Firestore

This is a scalable database for mobile, web and server development from Firebase and Google cloud. It keeps your data in sync and offers offline support for mobile and web so you can build responsive apps regardless of internet connectivity. The real-time database is appropriate to use in the proposed system since it allows all the application clients to share instance of the database and automatically receive updates with latest data.

iii. SQLite

SQLite is a back-end database that is built into all mobile phones and most computers. SQLite will be appropriate to make the shopping cart more efficient.

3.7 Back box testing

The system will undergo a black box method of testing it. This will be the most reliable method of testing as normal unit testing will be done rather than a complex test. Additionally, the developer will focus on whether the system meets the requirements stated in the specifications.

3.8 Domain of execution

The mobile application will be developed to run smoothly on all android smartphones and tablets to make it convenient for the user. The mobile application will be able to be accessed from anywhere and, it will be able cost effective as a customer will only need to have their phones to interact with the system.

3.9 Proposed Modules and System Architecture

The modules in the system shall be:

- i. A user-friendly homepage that will allow any user to view the types of products available within the company which is determined and manipulated by the administrator
- ii. A user registration module that will enable the user to key in his/her personal details to become a member of the portal. And a log in module to allow a member to checkout
- iii. A cart that enables a customer to add items that show the total price and the quantity if the item selected
- iv. A secured database shall be developed to store and predict data about users and products

- v. Analytics and reporting that will be available to administrators for accounting purposes
- vi. The administrator module that where products will be managed by the administrators only

Chapter 4. System Analysis and Design Description

4.1 Introduction

This chapter will provide a list of the identified system requirements and the approaches that were used in the process of gathering the system requirements during the analysis phase.

4.2 Requirements Gathering

This involved the collection of the different requirements for a shopping system. There are different methods used by researchers to gather and understand the system requirement. Some of these methods include use of questionnaires, observation, documentation review, interviews, brainstorming, personal experience and many more.

The first method used to gather the system requirement direct observation which is a passive qualitative requirement gathering method. The method ensured to get detailed and firsthand information on the fruit market. It helped us know the questions we are going to ask the users while using other methods of requirements gathering and we were able to know of what processes should be improved by the use of system to be developed.

The other method used was is quantitative in nature. Open-ended questionnaires were presented to a targeted population of customers shopping for fruits in the market and the results were analysed to understand the user requirements in relation to the fruits selling application that has been automated and monitored as compared to the manual selling.

4.3 System Requirements

4.3.1 Functional requirements

The functional requirements for the system are listed in the table below

FR1	The system should allow the customer to login upon sign-in
FR2	The system should allow the customer to view products in stock
FR3	The system should allow the customer to view his/her profile
FR4	The system should allow the customer to add a product to his/her cart
FR5	The system should allow the customer to view the total of the number of items in the cart
FR6	The system should allow the customer to request for a password incase he/she has forgotten

FR7	The system should allow the admin to add and delete products
FR8	The system should allow the admin to view registered customers
FR9	The system should allow the admin to generate monthly reports
FR10	The system should allow the admin to update the products

4.3.2 Non-functional requirements

NFR1	The system should allow the user and admin to navigate the user interface with ease
NFR2	The system should only grant access to registered customers to add products to the cart
NFR3	The system should be adequately fast
NFR4	The system should provide security for users and their details

4.4 System Architecture

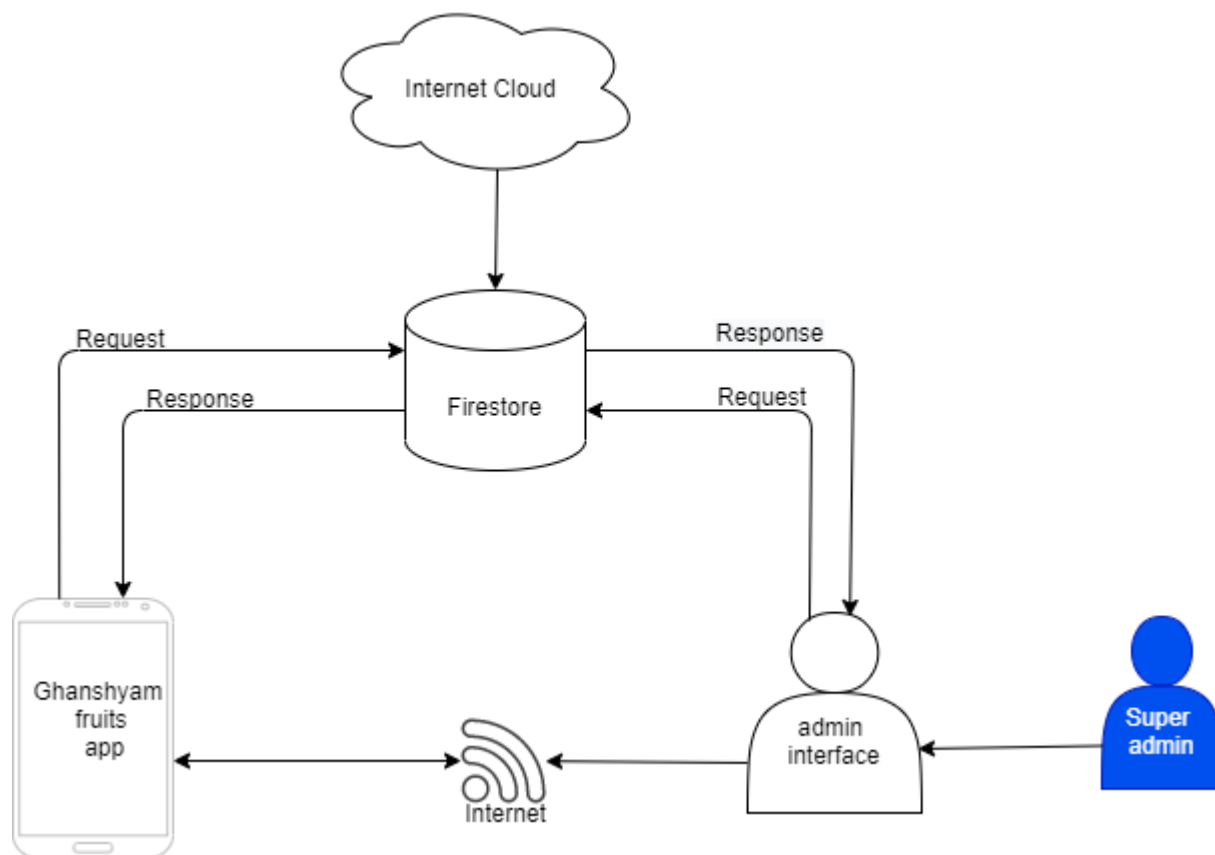


Figure 3: System architecture

The system architecture contains the admin interface which is accessed through a phone. It is where the admin can view the users and add or delete the fruits available. The super admin manages all the administrators and updates them on the fruits available and price of the fruits. The client side is also accessed through a mobile application. It is where a customer will navigate through the products and place and order. The order details are stored in a request in the database (Firestore).

4.5 System Designs

4.5.1 Use Case Diagram

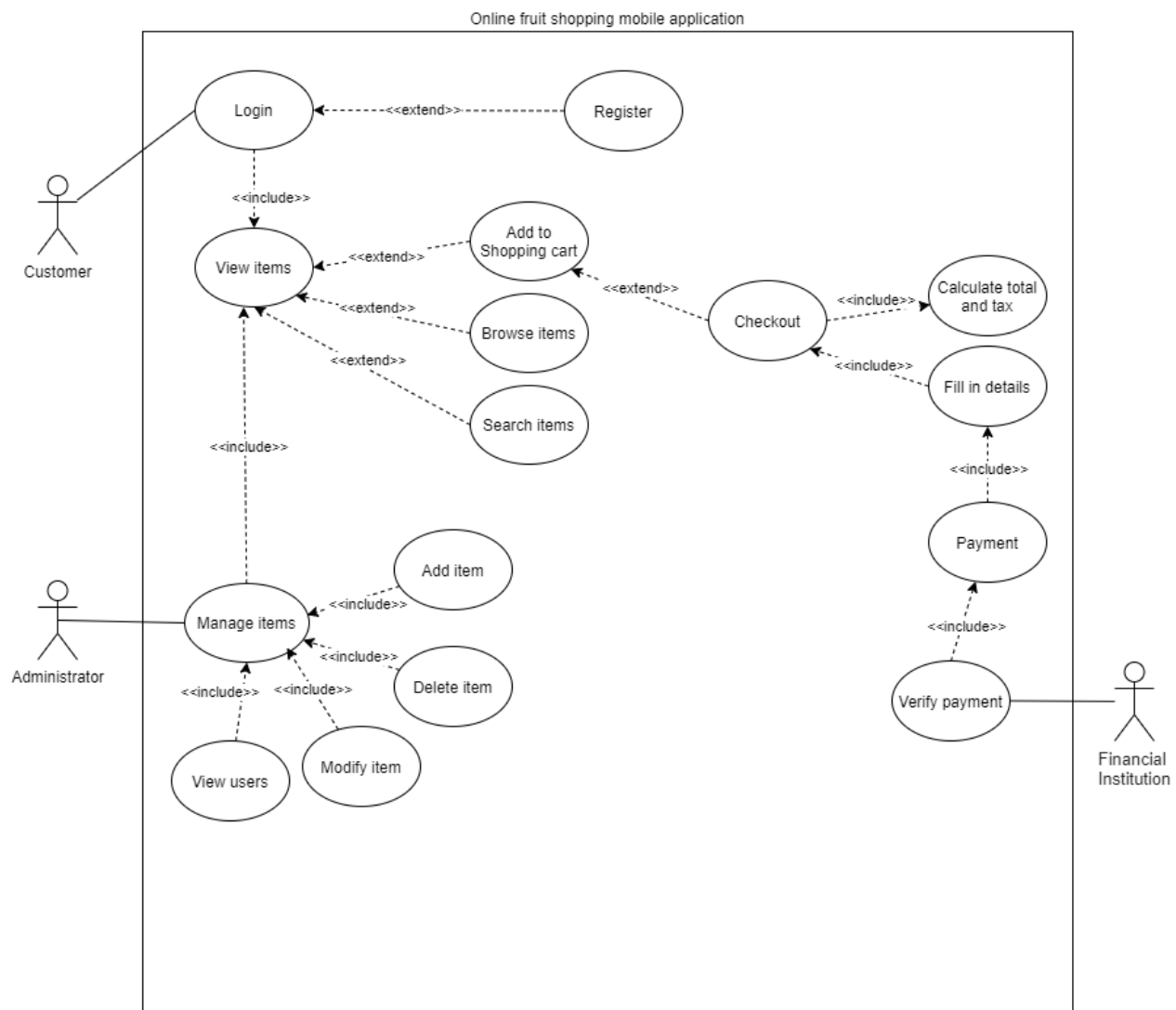


Figure 4: Use case diagram

The use case diagram above illustrates the requirements of the various users of the fruits shopping system.

4.5.2 Sequence Diagram

The sequence diagram below illustrates the objects involved during the development of the fruits shopping system and the sequence of the messages exchanged between them to fulfill the specified requirements.

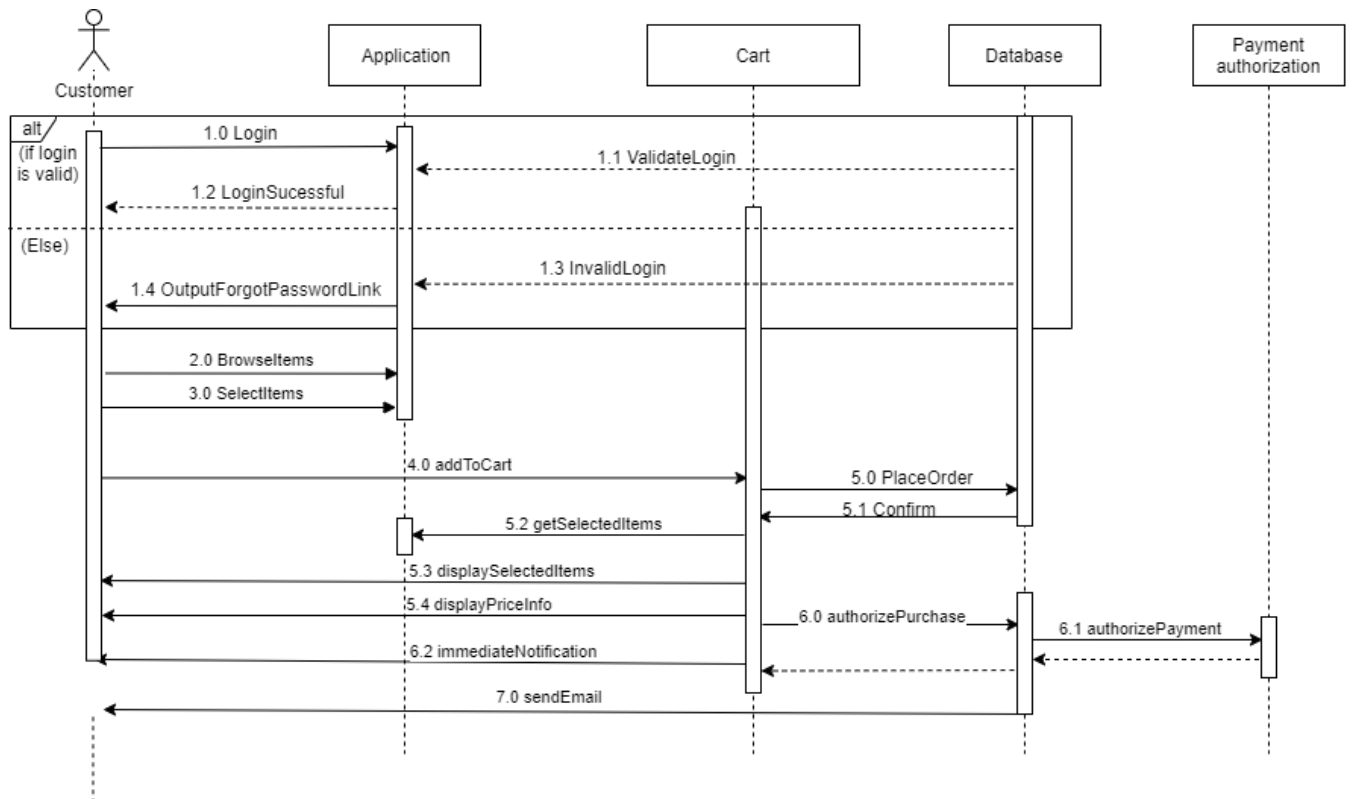


Figure 5: Use case diagram

4.5.3 Class Diagram

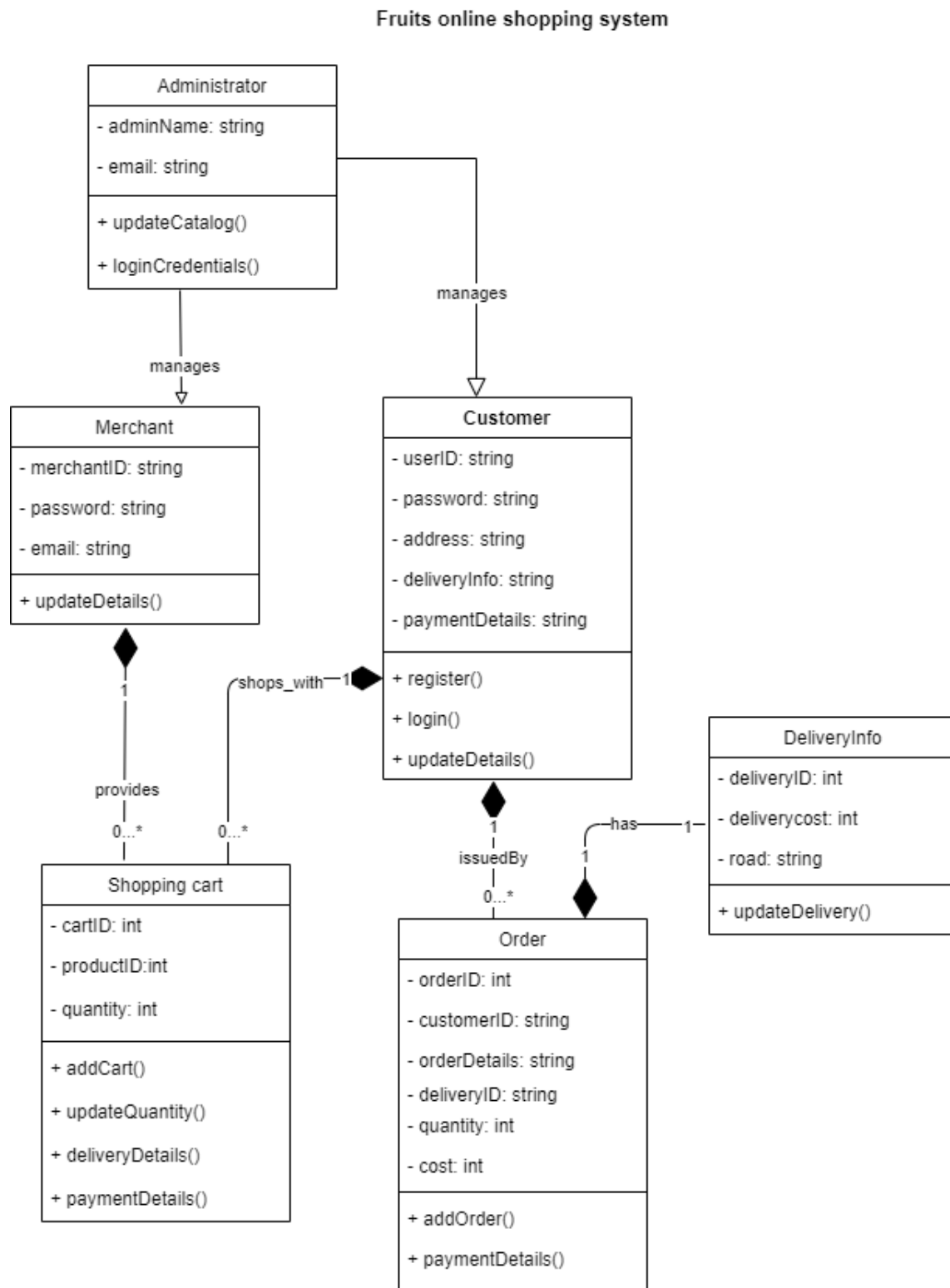


Figure 6:Class diagram

4.5.4 Entity relationship diagram

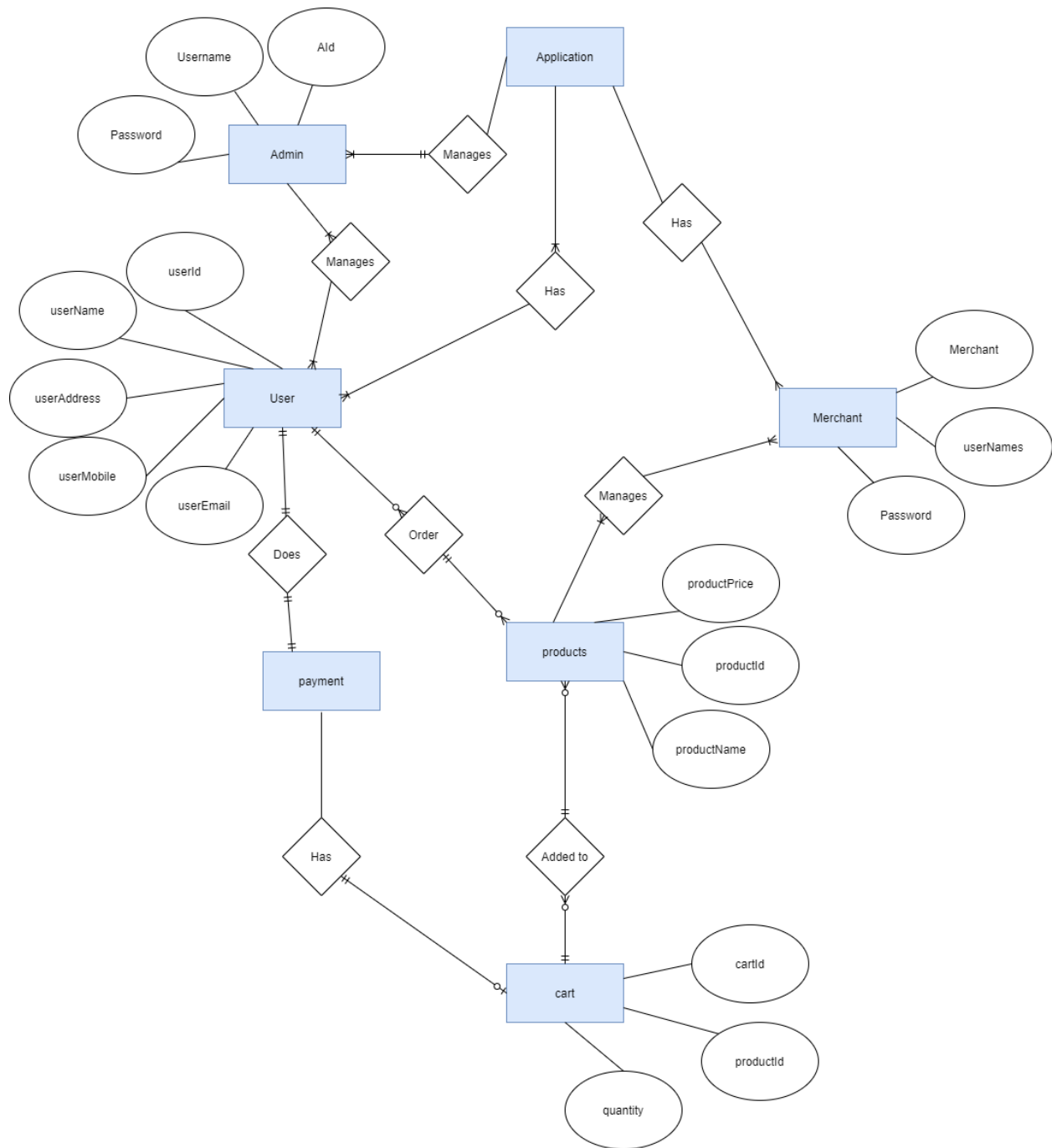


Figure 7: Entity relationship diagram

4.5.5 Database Schema

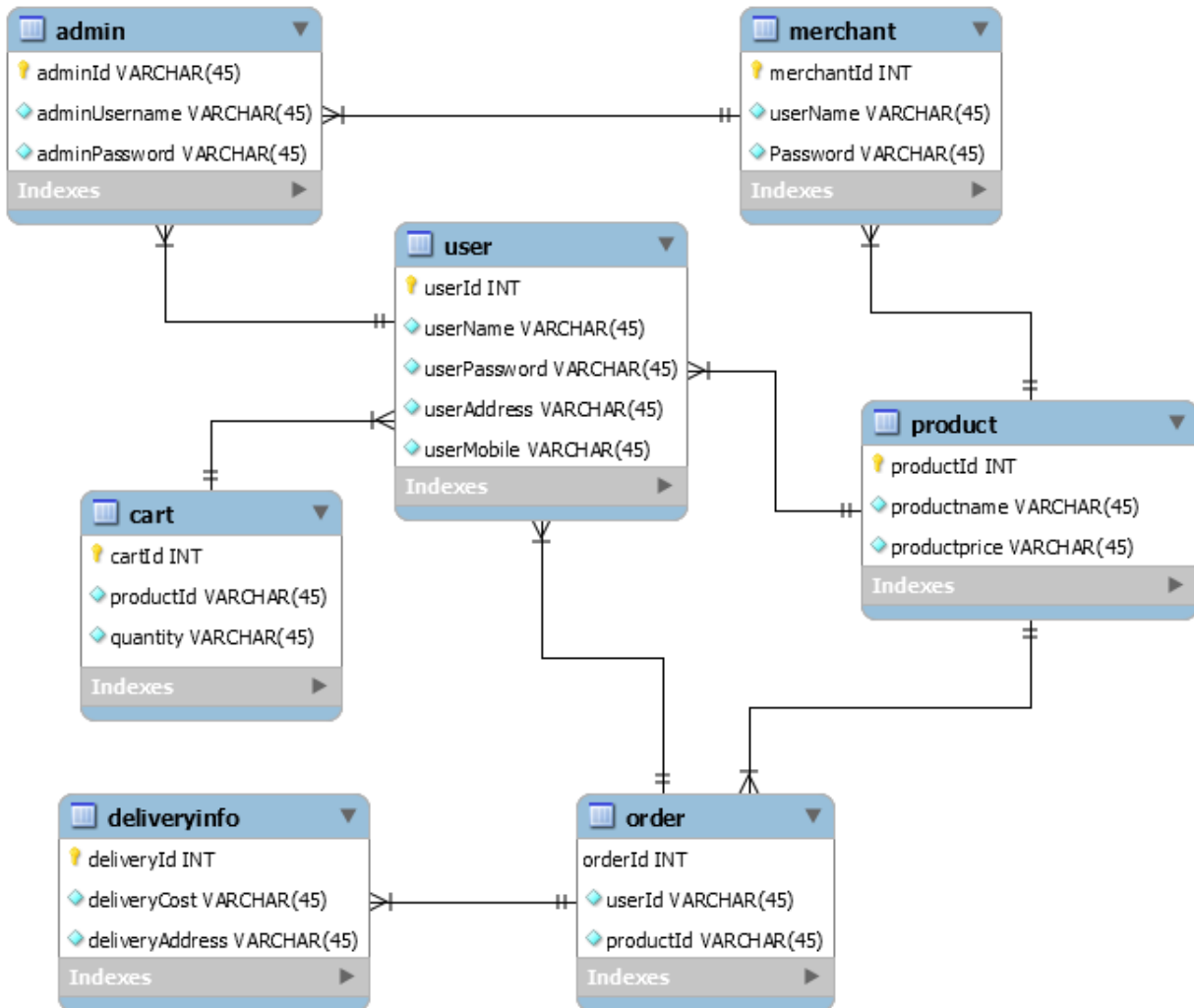


Figure 8: Database schema

4.5.6 Class Diagram

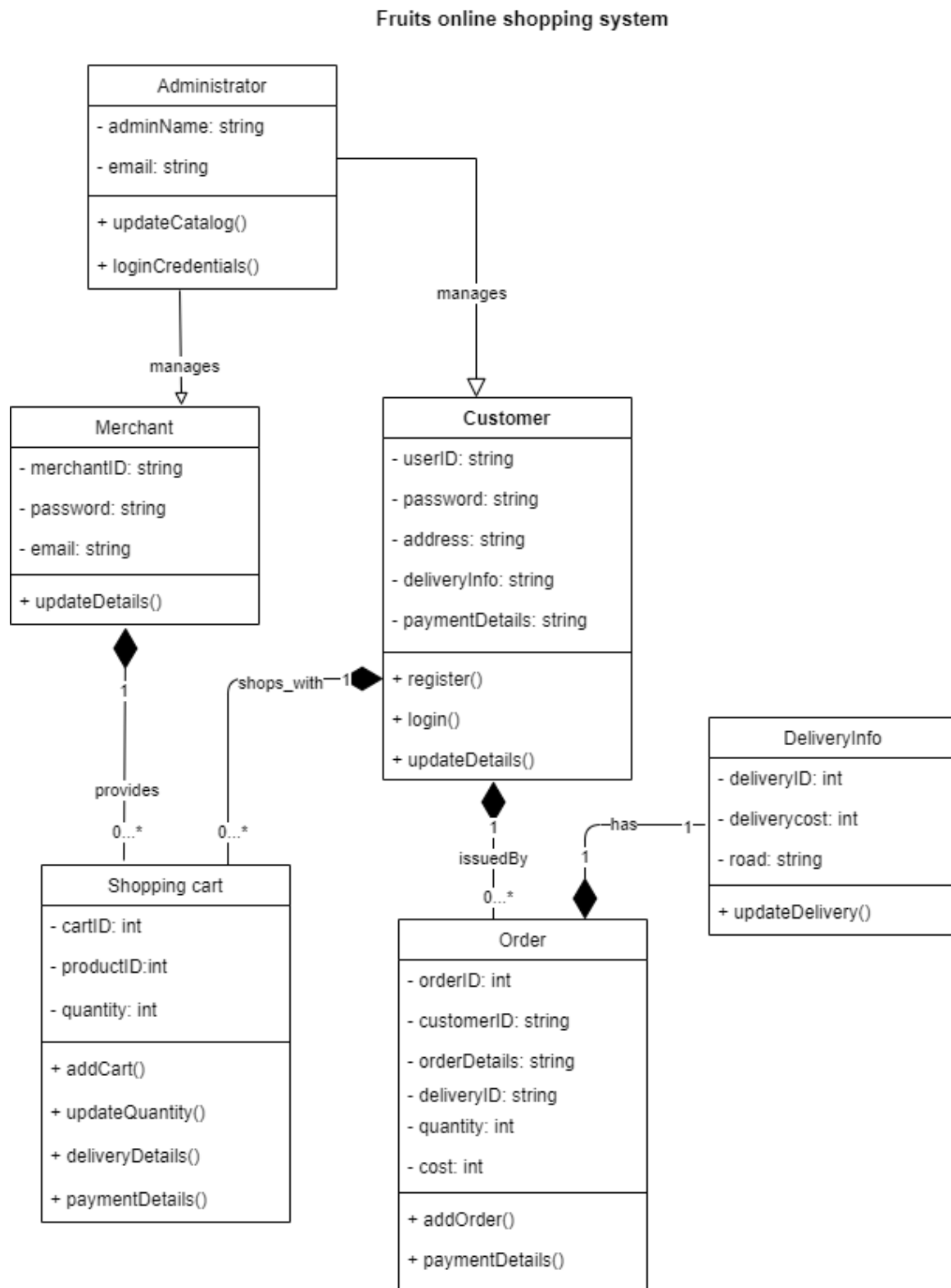


Figure 9: Class diagram

Chapter 5. System Implementation and Testing

5.1 Introduction

This chapter focuses on system development and majorly covers on what the system requires and the purpose of the different sections of the system. It will also focus on testing and detecting the system failures so that the defects are worked on before the system is implemented in the society.

5.2 System implementation

The system was built onto MVC framework. The Model-View-Controller is an architectural plan that divides an application into three logical components which handle specific development aspects of the application. The Model deals with all the data-related logic that the user interacts with, the view is used for User Interface logic and the controller acts as an interface between Model and the view.

5.3 System Testing

The section focuses on the system testing and whether the system has succeeded or not.

Test ID	Related requirement	Inspection check	Pre- condition	Test data	Priority level
1	FR1	Does the system allow customer to login upon sign up	A customer must login to view the products and shop for the products	Username: Sneha Password: *****	High
2	FR2	Can the customers view products in stock	User must log in to view products	Log in	High

3	FR3	Does the system allow customers to view his/her profile	One must enter all the details while signing up to view the profile upon login	Order data	High
4	FR4	Can the system allow the customer to add a product to his/her cart	One must log in and choose products to add to cart	Order data	High
5	FR5	Can the customer view the total of the number of items in the cart	A customer must add products to the cart to view the total and the number of items	Order data	Medium
6	FR6	Can a customer request for his password if forgotten	A user must remember the email entered upon signup to change the password via a link sent to the email	Customer data	High
7	FR7	Can the admin add and delete the products	Admin must have the right to log in as admin		Medium

8	FR8	Can the admin view registered customers	The admin must have the privileges to log in as admin	Admin data	Low
9	FR9	Can the system allow the admin to generate monthly reports	The admin must be able to see the previous orders	Admin data	Low
10	FR10	Can the admin update the products	The admin must be able to log in and have product information to update the products	Product images, prices	Low

Chapter 6. Conclusions, Recommendations and Future works

6.1 Introduction

This chapter summarizes the system and what the system has been able to achieve and provide conclusions related to the fruits selling application as opposed to the manual selling of fruits. Additionally, the chapter will also mention modules that will enhance the system functions under future works

6.2 Discussion

As mentioned in chapter 1, the system aimed embrace technology in operations of a fruits selling company. The system in the end was able to comprise an editable application where the user from the client side can view the fruits available. After viewing, one can choose to add to cart if he/she decides to purchase it and checkout. The customer can view his/her profile which consists of information like name, phone number and address. In the end the system was able to deliver a user-friendly application for a customer to purchase fruits.

For the admin module, the admin can add the fruits available and the ones that are not available can be viewed as out of stock by the user. The admin can also view the users and the orders made by the users which can be used to generate reports weekly or monthly. In the end, the system achieved a logical flow that a customer could easily view the fruits and eventually place and order of the fruits desired.

6.3 Conclusion

In the process of implementing the system, it was noted that technology has provided customers with better online shopping experience and will continue to do so for years coming. With the rapid growth of companies, people have concluded that online shopping will take overtake in-store shopping.

While this has been the case in some areas, there is still demand for stores in market areas where the consumer feels more comfortable seeing and touching the product being bought. However, the availability of online shopping has produced a more educated consumer that can shop around with relative ease without having to spend a large amount of time.

6.4 Recommendation

For the online fruit selling application to work, the devices used by the users of the system while accessing the application are required to be connected to the internet.

6.5 Future works

The system is aiming to integrate with M-Pesa API to enable a customer add module of payment via M-pesa and adding a module that will enable the customer to get door-step delivery of the fruits purchased. As a result of adding the payment module a proper reporting module would need to be developed to generate reports of payment information.

In addition to that the system will also add a module that allows a customer to design his/her own fruit basket for various occasions. This add fruits to a virtual basket and the user will be able to view the basket and later on purchase the fruit-hamper basket.

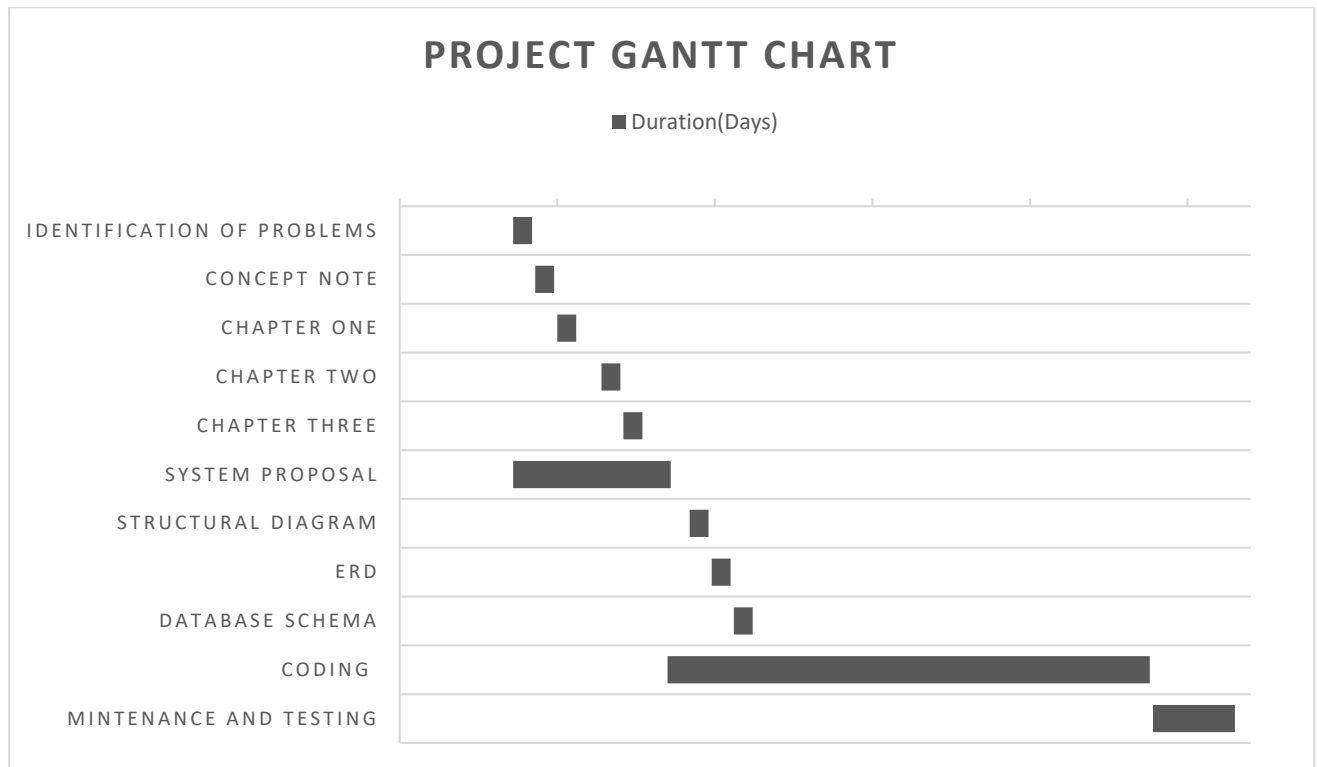
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Appendix A: Time schedule



Appendix A Project Gantt chart