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e-shop an advanced grocery store management system

A STUDY PRESENTED AS A PARTIAL FULFILMENT OF THE REQUREMENT FOR BSC DEGREE IN COMPUTER SCIENCE

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ACKNOWLEDGEMENT

Successfully completion of any type of project requires helps from a number of persons. But first and foremost, we want to thank our Creator God because without His permission and willingness, everything would be in vain. We convey our sincere gratitude to our academic supervisor. Without her kind direction and proper guidance this platform system would have been a little success. In every phase of project her supervision and guidance shaped this paper to be completed perfectly. (Artificial Intelligence) Programming telegram channel members, we thank you.

ACRONYMS

APIs: Applications Program Interfaces

APK: Android Application

APP: Application

Auth: Authentication

GUI: Graphical User Interface

HTTP: Hyper Text Transfer Protocol

IDE: Integrated Development Environment

IO: Input Output

IOS: iPhone Operating System

IPA: iPhone Application

JSON: Java Script Object Notation

OTP: One-Time Password

OS: Operating System

UI: User Interface

UML: Unified Modeling Language

UX: User Experience

VS: Visual Studio

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Chapter 1

1 Introduction

A management system is the way in which an organization manages the interrelated parts of its business in order to achieve its objectives. It is a set of policies, processes and procedures used by an organization to ensure that it can fulfill the tasks required to achieve its objectives. These objectives cover many aspects of the organization's operations (including financial success, safe operation, product quality, client relationships, legislative and regulatory conformance and worker management).

A Grocery store management system enables chain grocery stores to improve many day-to-day processes, such as online whole sales, inventory management, and loyalty product' management. Our management systems reduce inefficiencies and make the existing grocery retail operations more reliable.

The Grocery store management system deals with the whole sale of products and managing the whole products of the company wholesale in one system. This system also offers customers to buy and order products easily with their phone. The purpose of the Grocery Store Management System is to automate the existing manual system with the help of computerized equipment and full-fledged computer software, fulfilling their requirements, so that their valuable data/information are often stored for an extended period with easy accessing and manipulation of the same. The required software and hardware are easily available and straightforward to figure with. Grocery Store Management System, as described above, can lead to an error-free, secure, reliable, and fast management system. It can assist the user to consider their other activities rather than consider the record keeping. Thus, it'll help organizations in better utilization of resources. It is possible for organizations to maintain computerized duplication. In other words, one does not have to be distracted by irrelevant information in order to succeed in the knowledge. The project is developed with the objective of making the system reliable, easier, faster, and more informative. Basically, the project describes the way to manage permanent performance and better services for the clients.

The online Grocery Store documents a purchaser to submit online commands for items and facilities from a store that distributes both walk-in clients and online customers. The online Store system grants an online display of all the matters they want to wholesale from store.

The system has both web and mobile App grounded application assists customers to select their products. Customers provide their all detail regarding address and contact and they get their chosen products in their home. Since E-commerce has seen a tremendous growth in the past decade. An important feature of an online grocery system is to arise up with

suitable recommendations, which can help the user make quick decisions, so that they don't have to spend additional time. They can easily order and access products with their phone.

1.1 Background of organization

A grocery store management system, also known as a retail management system, refers to a software solution used to efficiently manage the operations of a grocery store. The system helps store managers to handle a wide range of tasks, including inventory management, sales tracking, and customer management.

Earlier, managing a grocery store was a manual and time-consuming process, with managers relying on paper-based systems and manual calculations to keep track of inventory and sales. However, with the advent of technology, a grocery store management system automates many of these tasks, allowing store managers to focus on providing better customer service and increasing store efficiency.

The system can handle tasks such as tracking inventory levels, generating sales reports, managing customer data, and processing transactions. It can also provide real-time data and insights into store operations, helping store managers to make informed decisions and improve overall store performance. Additionally, the system can be integrated with point-of-sale (POS) systems, barcode scanners, and other relevant technologies to streamline store operations even further.

In general, a grocery store management system provides a valuable solution to store managers, offering increased efficiency and improved decision-making capabilities. With its ability to automate many manual tasks and provide real-time data and insights, the system helps stores to operate more efficiently, leading to increased sales and profits.

1.2 Statement of Problem

In the current context the customer who want to buy product should go to the store and buy his product which is time consuming for the customer and has no information if product is available at that time. Also the store manager has no control over the customer also the store manager use manual set up to control store products and their availability in the store which is also time consuming and tiresome and also lead to not providing well-established information for the customer if the product they need is available or not at the time they need.

Currently there is no universal system that is widely used by grocery stores to manage their inventory, sales, customer relationships, staff scheduling, and more .Customers who want to buy products should have to go to the shop.

The current system can connect the customer to seller easily. It helps streamline operations, optimize workflows and provide accurate insights in to sales and inventory data. The current system solve the exiting problem by customers shouldn't have to go to the store to buy or order products he can purchase wherever he/she is by his smart phone also the store manager can easily control customers order, availability of products and displaying items in the right order sales analysis. This system also save time for both seller and customer.

1.3 Objective of the project

1.3.1 General objective
The general objective of our project is to analyze, design, and implement and test the web and mobile application management system for Grocery store whole sale management in Addis Ababa and special zones of Oromia.

1.3.2 Specific objective
The specific objective always derived from general objective. The specific objectives are:

- To design system component that notify the distribution time using notification for the customers, delivery man and store admin.
- To design system component for storekeeper as they will have Login page, View profile and Manage items.
- To design customer side app that is different from delivery guy app.
- To design admin panel for the store admin that has full control over customers, deliveries and store items etc.
- Implementing the proposed system platform

1.4 Feasibility study

The feasibility study is an evaluations and analysis of the project. Feasibility assessment unveils the economic, technical and time area. Risks that are involved in implementing of the project .it is a required activity for all information system project and could potentially be a large undertaking. The following are major feasibilities that concern our system.

1.4.1 Economic feasibility

To use this system users only need to have smart phones and internet access. Also the store manager control all features of the store without any manual work and it does not consume and paper cost and person to audit the sales analysis so the system cost only for internet both the customer and the store manager. Therefore our system is economically feasible

1.4.2 Time feasibility

The system provide every information for the users through the application so users can see and purchase products without goes to the store, also the store manager doesn't have to write and information if there is order, if the order is delivered and any other information about store products the system provide all the way are handled. Therefore our system is time feasible

1.4.3 Technical feasibility

The work for this project done with latest technologies like flutter that provide cross-platform mobile application development for iOS and android with one code base so if we want to provide iOS version we don't have to develop the application by other new language and since we have large amount of people are using smart phone the system can adhere most people. Therefore our system is technically feasible

1.5 Significance of the project

The Grocery Store Management System is an important software application for keeping track of inventories, tracking sales, and monitoring customer orders. It can help retailers simplify product stocking, accurate inventory tracking and management, efficient point-of-sales process systems, lower overhead costs, analyze supplier performance and more.it helps them easily communicate with their customers deliveries and also help delivery person if there is order and where is the order delivered easily.

The significance of the project is:

- Make social life and daily life easy and introduce to new technology.
- Grow the country technologically by introducing new technology.
- It helps the company owners to control their shop, customers where ever they are through their phones.

1.6 Beneficiaries of the project

The Direct beneficiaries of a grocery store management system are the owners and customers.

- Owners : By using this type of system, they can improve inventory control, reduce costs, track sales trends, track orders and control the quantity and the availability of the products in the store
- Customers : Customers also benefit from grocery store management systems when it comes to accurately billing them for their purchases and efficiently tracking loyalty programs and discounts

The Indirect beneficiaries of a grocery store management system are the delivery man and other co-workers.

- Delivery : the delivery man also benefit from this software when it comes to he has full access wherever he is if there is order and where is the order delivered by using his smart phone
- The telecom company like Ethio telecom and Safaricom in as internet service provider
- Shops also benefited by selling mobile cards.
- The Company who provide OTP SMS verification for the app also benefited from this application
- The government also benefited from the app by collecting tax payment
- The hosting provider for the backend API also benefited from this system

1.7 Methodology

1.7.1 Research Type

First of all important data should be collected or gathered before solution domain at any work. There are so many ways or methods to gather information from different sources. The focus of these methods:-

- Observation

We will try to observe the distribution of whole sale around merkato markets wholesale shops.

- Interview

We have interviewed different whole sale shop sellers to get important information related to our project. And also how they sale the product and the relationship they have with their customers.

1.7.2 Sampling Method

~~There was~~ around 10 questions some actors in grocery store sale. First we will ask the store manager because he has full understanding whole sale and the existing problem in controlling the customer order store products and much more. We will also ask the delivery person how he deliver the ordered products and how he communicate with the store manager and the customer. We ask both of them around merkato market.

1.7.3 System design and analyze tools

1.7.3.1 System design

The system use Object-oriented programming (OOP) software development model that focuses on creating reusable code and modularizing applications for easy maintainability. OOP utilizes objects made up of data and behavior or functions. With OOP, we are able to make the application easier to use, maintain, and extend by creating abstractions that represent real-world problems. We also use Agile software development which relies on strong object-oriented programming practices to ensure that design and coding decisions are modularized as much as possible. Agile software development is a set of values and principles which guide teams in developing solutions through collaboration, iteration and flexibility. Agile focuses on delivering working software quickly, responding rapidly to changing user needs and frequently assessing progress. The Agile approach typically involves breaking development down into small chunks of work, called sprints, allowing the team to adjust quickly while meeting deadlines and improving the quality of the solution. At its core, Agile encourages collaboration between developers, product owners and stakeholders throughout the development process.

1.7.3.2 Tools

Hardware Tools

- I5 processor based computer

- 320GB Hard Disk

- Monitor

- 4GB RAM

- Smart Phone

- paper

Software Tools

- Android studio

- Postman

- Vs Code

- Window10

- Web browser

- Lucid chart

- Microsoft word

Programming Languages

- NodeJs
- Flutter
- Mongo dB
- ReactJs
- Tailwindcss

1.8 Scope and limitation

1.8.1 Scope

The Scope of this project will surround Addis Ababa city and it Oromia special zones the surround the capital. This system allow users to order resources through their phones wherever they are in the city.

1.8.2 Limitation

The limitations of our systems are:-

  ➢ It support English and Amharic language only.
  ➢ Users can access with their smart phone.
  ➢ Does not work if there is no internet access.
  ➢ It support android phones

1.9 Risk, assumption and constraints

1.9.1 Risk

The main risk assessment task is to identify the risks, analyze them, and then prioritize them. In prioritizing risks, some of the risk we identify in this project include.

- Transaction risks: Payment transaction through bank and online payment system may crashed

• Data loss or corruption: Issues with system backups, hard drive failures, security breaches, or other data loss or corruption issues can lead to a partial or total loss of valuable grocery store data.

• Inventory mismanagement: Inaccurate tracking of inventory can lead to problems like wrong orders being sent out, stock outs and shortages, overstocking products that might be seasonal, or even large-scale theft.

• Data privacy: The National Grocers Association places a high value on protecting customer information and service data with appropriate safeguards such as encryption and access control protocols.

- Operational risks: The grocery store may assume operational risks by adopting new business processes or implementing new technologies, which may result in unexpected disruptions or inefficiencies.

1.9.2 Assumption

The assumption to overcome the payment problem is to payment is payed through cash on delivery. The customer pay the money for the product that has been ordered when delivered. And try to use role based authorization for data privacy problem

1.9.3 Constraints

- Resource limitations: The store may have limited staffing, space, or other resources, which may constrain its ability to implement new initiatives or expand operations.
- Financial limitations: The store may have limited budget or financial resources, which may constrain its ability to invest in new technologies or expand operations.
- Time limitations: The project may not delivered at a time

1.10 Organization of the project

In this chapter ~~the paper~~ try to introduce the grocery store management system which solves the problem we phase in the manual system of product management, order management customer management and sells analysis. We also explain the objective and feasibility of this system and the way we are going to build the entire system from scratch in agile software development model. Also we try to explain the risk and constraint that this system has.

1.11 Budget allocation

The budget for the grocery store management system include

equipment	price
Pc core i7 6gen	60000
paper	3000
Pen and other writing equipment's	100
OTP for message verification	500

Table1.1 budget allocation

1.12 Work plan

Activity	November	December	January	February	March	April	May	June
Proposal	�							
Requirement analysis		▩						
System design			▩					
Implementation				▩	▩	▩	▩	
Presentation and submission date								▩

Table1.2 work plan

Chapter 2

1. ## Business area analysis and requirement definition

2.1 Introduction

This section analyzes a list of current system technical, functional, and non-functional requirements as gathered from customers and stakeholders to assist in determining the business area analysis of the grocery store management system to be developed. This paper used a survey directed using semi-structured interviews and questionnaires to sample customers, employees, and stakeholders in the grocery store industry. The questionnaires employed closed-ended questions. Therefore, the findings of this data analysis lead to the design, implementation, and testing of the system to help improve the efficiency and customer satisfaction of grocery stores.

The data collected from the survey and interviews can provide valuable insights into the technical, functional, and non-functional requirements of the grocery store management system. The results can help to determine the business area analysis of the system and identify the specific needs and preferences of the target user group. This information can then be used to guide the design, implementation, and testing of the system.

1.2.1 Detailed analysis

The systems help businesses optimize their performance. They are allow for streamlined operation and customer service, providing features like automatic inventory management, loyalty tracking, paperless checkout processes and customer surveys. By accurately tracking stock levels and successful marketing campaigns, managers can maximize profits while remaining profitable. Furthermore, efficient use of customer data ensures that offers are targeted to the right customers, resulting in better conversion rates.

A grocery store management system also helps automate the process of selling groceries. For example, the system can keep inventory levels up to date automatically as items are sold or

returned to the store. This allows employees to quickly identify what is available and when it is expected to arrive. Furthermore, platforms typically include automated replenishment suggestions based on historic sales data or suggested ordering from suppliers to maintain optimal stock levels.

Finally, many systems offer reporting capabilities that provide clear insight into both POS activity and customer preferences. As such, managers can determine which products are proving popular with shoppers and make informed decisions about how best to merchandise them in-store or possibly feature them in marketing campaign stake of consumer demands for certain items too large for the store's capacity can easily be adjusted by leveraging product-integrated online merchant services. Ultimately, ongoing analysis of consumer patterns will help ensure profitability over time as customers continue to turn to the store for their shopping needs.

2.2.2 Current System

Currently, there is no comprehensive system available for managing grocery stores. Grocery stores traditionally employ a variety of disparate systems to manage their inventories, pricing, orders, staff schedules and customer loyalty programs. This lack of a unified grocery store management system makes it difficult to smoothly coordinate all the different elements of store operation and gain visibility into customer behavior. A well-designed system could help grocers better prioritize their tasks and optimize operations while providing shoppers with a more streamlined checkout experience.

2.2.3 Players of the existing system

1. Grocery store staff (cashiers, managers, stockers)
2. Customers
3. Suppliers
4. Vendors
5. Signage services (for marketing and advertising)
7. Heating/cooling system technicians (to keep climate-controlled environments)
8. Delivery/transportation services
9. Automated checkouts (where available)

2.2.4 Proposed system

Proposed System in Online Grocery Store Management System is an ecommerce platform that provides customers with a convenient and user-friendly way to purchase grocery items from the comfort of their own home. The system will allow customers to view a comprehensive list of available grocery items, select desired quantities, add them to their virtual shopping cart, and complete their purchases using various payment options. The system also offers the ability for customers to receive notifications when new products become available or when discounted grocery items are released. Additionally, the system provides back-end support for store staff in terms of inventory management, order processing and customer support.

2.3 Requirement Gathering

2.3.1 Requirement Gathering techniques

The team conducting the project utilized questionnaires and interviews as a means to gather information through a combination of manual paper surveys and personal interviews. A total of 15 participants were surveyed, with a gender split of 10 males and 5 females, all within the age range of 18-60.

The results showed that the majority of those surveyed, 12 go to the shop to buy products and 3 3 buy the product through personal connections. The distance of these stores from their place was also a factor, with 8 people finding them too far, 4 finding them close by. All 15 participants agreed that go to the shop resulted in added costs and time consuming.

These findings can provide valuable insights into the current process of buy products and inform the development of a more efficient system. The results highlight the challenges and issues that need to be addressed, such as the distance and cost associated with using agencies. The team can use this information to design, implement, and test a system that meets the needs and preferences of the target user group in Ethiopia.

2.4 Functional requirement

1. User authentication

3. Shopping cart

4. Payment gateways integration

5. Inventory management

6. Order processing

7. Customer account management

8. Reporting and analytics

9. Checkout system

10. Customer management

11. Employee management

12. Data security

ID	FR-01
Name	Registration
Input	First Name, Father Name, Phone Number, Password, Verification Code, Profile Picture
Description	The user will be able to access what the system has to offer
Output	The user is successfully registered
Dependency	Phone OTP authentication code

Table 2.1: Registration

ID	**FR-02**
Name	**Login**
Input	Phone and Password
Description	The users will log into the system using their account in order to access the services.
Output	The user successful login
Dependency	FR01

Table 2.2: Login

ID	**FR-03**
Name	**Category List**
Introduction	System shall show all product categories provided by store manager
Input	Categories
Description	system will let the user to choose the categories.
Output	show all products in that category
Dependency	Null

Table 2.3: List of Category

ID	**FR-04**
Name	**Product List**
Introduction	system shall show all products provided by store manager
Input	Products
Description	system will let the user to choose the products
Output	show product details
Dependency	Null

Table 2.4: List of Product

ID	**FR-05**
Name	**view product details**
Introduction	user shall get detailed information about product price per quantity
Input	products, amount of money
Process	system collect all the information about selected product
Output	show product details
Dependency	Null

Table 2.5: Product Details

ID	**FR-06**
Name	**search products**
Introduction	user shall search his desired products
Input	user word
Process	system collect all products that match his/her search
Output	show product
Dependency	Null

Table 2.6: Search Products

ID	**FR-07**
Name	**order product**
Description	user shall order products that he added to the cart
Input	products, user location, user contact information
Process	system collect all products that match his/her search
Output	system collect all the information and send notification to the store manager
Dependency	FR-02

Table 2.7: Order Product

ID	**FR-08**
Name	**cancel order**
Description	user shall cancel his request
Input	reason for cancel order
Dependency	Fr-02, Fr-07

Table 2.8: Cancel Order

ID	**FR-09**
Name	**track order**
Description	system shall allow user to track his order progress pending, on the way or delivered
Input	order status
Process	system accept the order status information from the delivery man and send to the store manager and the customer
Dependency	Fr-02, Fr-07

Table 2.9: Track Order

ID	FR-10
Name	reject order
Description	store manager shall reject or cancel customer order
Input	reason for reject order
Process	the system send notification to the customer why his order is rejected
Dependency	Fr-02, Fr-07

Table 2.10: Reject Order

ID	FR-11
Name	accept order
Description	store manager shall accept customer order
Process	the system send notification to the customer to notify his order has been accepted
Dependency	Fr-02, Fr-07

Table 2.11: Accept Order

ID	**FR-12**
Name	**add category**
Description	system shall allow the store to add new product category
input	name, image
Dependency	admin Login

Table 2.12: Add Category

ID	**FR-13**
Name	**add product**
Description	system shall allow the store to add new product
input	name, image, price, category, available quantity
Dependency	admin Login

Table 2.13: Add Product

ID	**FR-14**
Name	**assign delivery man**
Description	system shall allow the store manager to assign delivery man to specific customer order
input	order information
Process	the system will send notification to the assigned delivery man about
Dependency	admin Login

Table 2.14: Delivery Man/ Deliver Orders

2.4.1 Actor Description

Client: In the GSM System, a client is a user who signs and logs into an application in order to obtain access to services. After signing in, the client will perform tasks such as selecting category, viewing Product details, ordering Product, canceling requests, tracking order, etc.

Administrator: In the GSM System administrator is in charge of overseeing the overall service. Like adding categories, Products.

Delivery-Man: the delivery man take the order which is assigned by the admin and responsible for delivering the order to the customer and notify the admin about the delivery status.

2.5 Non-Functional Requirements

1, Availability of 12/7 customer support

    The customers can order the product from morning 2:00pm to 6:00am and can get support from the employees

2. Accessibility to data backups and reports

3. Scalability to manage large number of customers

4. Secure authentication system for user accounts and access control

By implementing robust input validation at both the front-end and the backend, the grocery store management system can ensure that user data is accurate and secure, and that the system is protected from malicious attacks. If the user input does not fit the front end validation the system will not allow the user to send his data to the database so that the backend will not be busy for every user request and verifying the user input is correct or not

5. User friendly interfaces for easy navigations

6. Support for online ordering and delivery systems

7. Real-time synchronization with suppliers and inventory tracking.

Since the number of concurrent users of the system greater than two so heat multiple customers can order the same product at time. Since the system work asynchronously if one customer order

the product and the available quantity of the product in the store zero the system automatically notify the user that he can't order the product because of unavailability of the product.

8. Comprehensive stock management system

10. System alerts for low stock levels/out-of-stock items

11. The system use roll based authorization for the store admin the delivery man and also the customer so the system control every action of the user beside of his roll.
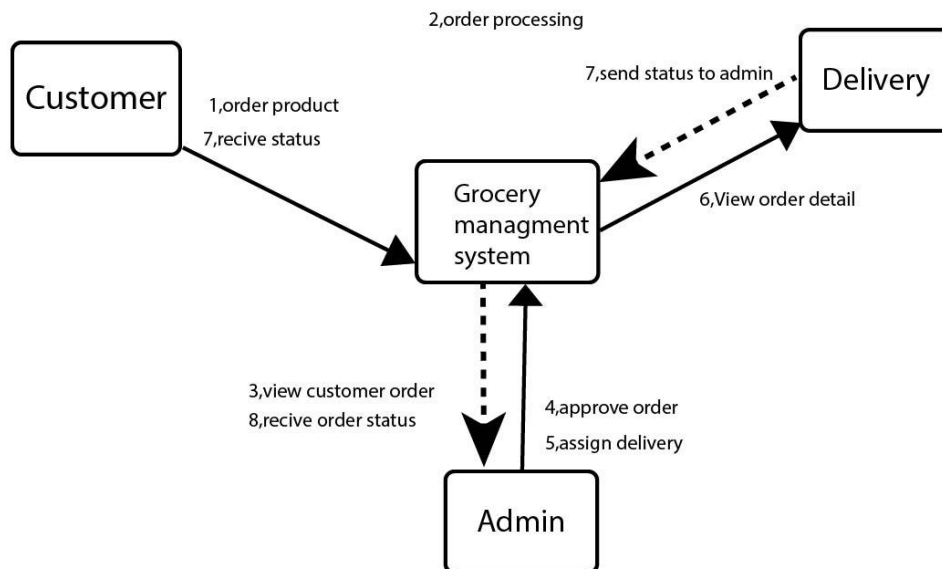
2.6 . Collaboration modeling
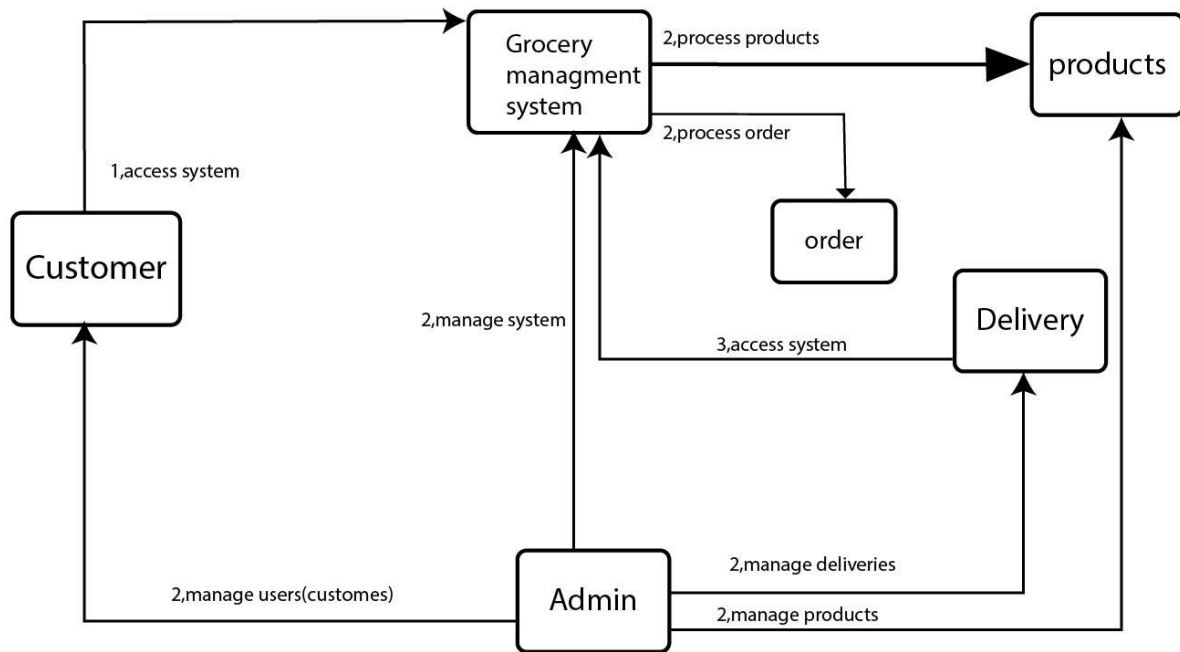

Fig2.1: Collaboration model for order product

Fig2.2: Collaboration model for grocery store management system

Chapter 3

3.1. Introduction

The section discusses the use of Object-Oriented Analysis and Design (OOAD) in the development of a system. OOAD is a method for designing software that emphasizes on the objects that make up the system and how they interact with one another. By using this approach, the system's functionality, device modeling, and design, subsystem decomposition, security processes, deployment and component diagram can be modeled.

The system architecture in this case involves different project participants, each with their own design method for communicating with one another. The actors in the system interact by passing messages to each other.

Based on the data review, a framework will be created to assist in the search for grocery store workers in the company. This framework will be tested to ensure that it meets the requirements of the system and is able to communicate effectively with all actors involved.

In summary, OOAD is an efficient method for designing software systems as it helps to clearly understand the system's functionality and how different objects and actors interact with one another.

3.1. Business rule identification

The grocery store management system has its own set of guidelines and procedures for the use of its platform. This procedure helps to achieve the business objectives, satisfy customers and employees, make wise use of services, and comply with laws and regulations. This ensures that the system is used in an efficient and responsible manner, promoting a positive and productive environment for all users of the platform

BR-1	The customer should have valid address detail and should pay the valid amount of the for the product he is ordered
Br-2	To use the delivery app the delivery man should get allowance from the store manager.

Table3.1 business rule identification

3.2. UI identification

|	
UI-01	Splash screen
UI-02	Login Screen
UI-03	register Screen
UI-04	Phone verification Screen
UI-05	Category list Screen
UI-06	Product list screen
UI-07	Product detail
UI-08	My Order screen
UI-09	Checkout list
UI-10	profile screen
UI-11	Profile setting
UI-12	Order detail
UI-13	Admin dashboard
UI-14	Category list
UI-15	Product list
UI-16	Users list
UI-17	Delivery list
UI-18	Order list
UI-19	Category add
UI-20	Category edit
UI-21	product add
UI-22	Product edit
UI-23	Order detail
UI-24	User detail
UI-25	Delivery detail
UI-26	notification
UI-27	Delivery app order list
UI-28	Delivery app order detail
UI-29	Delivery app profile
UI-30	Delivery app home dashboard
UI-31	Forgot password screen
UI-32	reset password screen

Table3.2 ui identification

3.3. Essential use Case Diagram
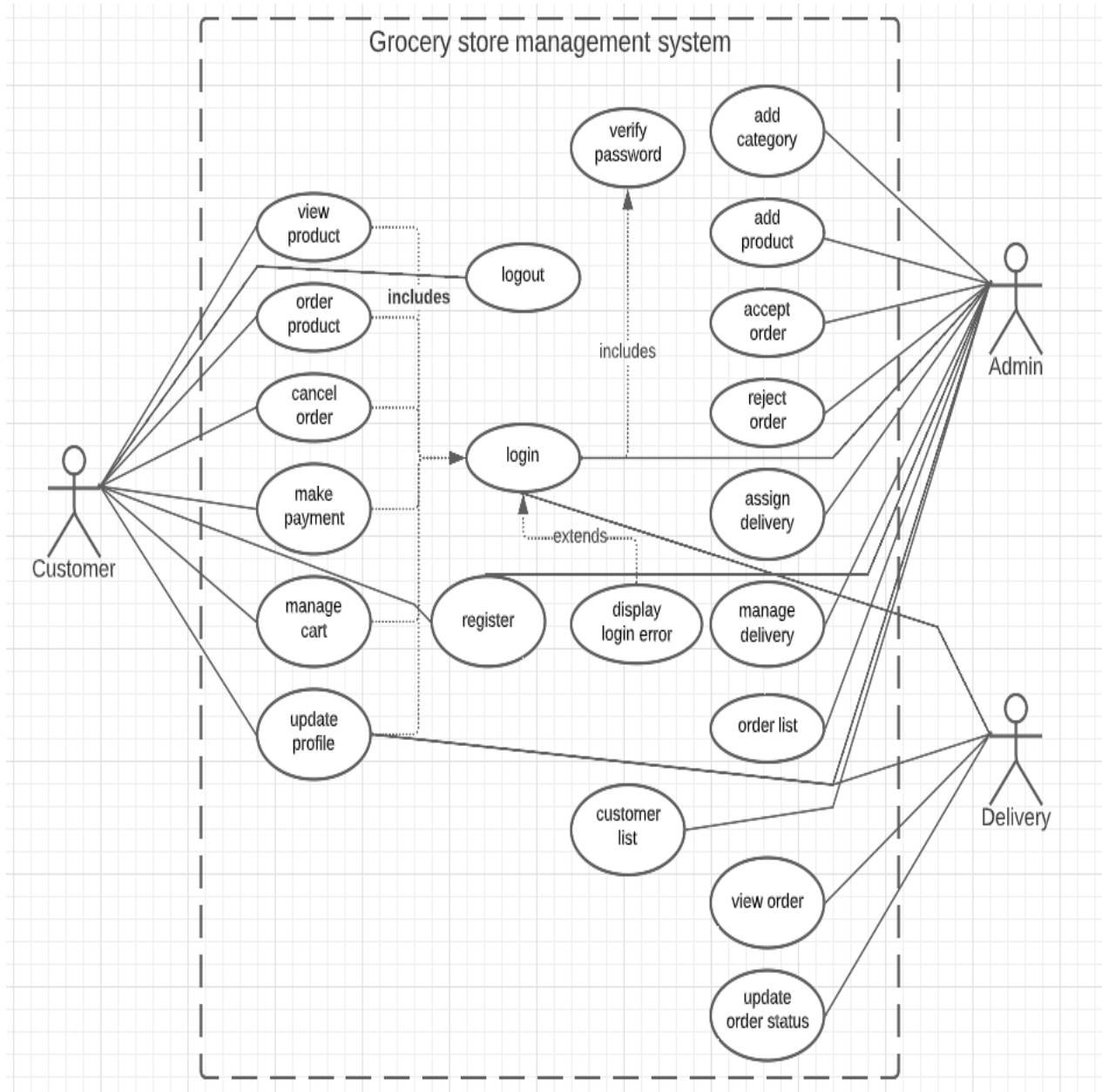
Figure3.1 use case diagram

3.4. Actor Identification

There are three main actor in the grocery store management system. These include

Ac-01	Administrator	Responsible for control and mange customer products, deliveries and all related to the store.
Ac-02	Customer	People who use the system
Ac-03	Delivery	Responsible for deliver products to customer that he/she assigned by the administrator and notifying the admin about the order status

Table3.3 actor identification
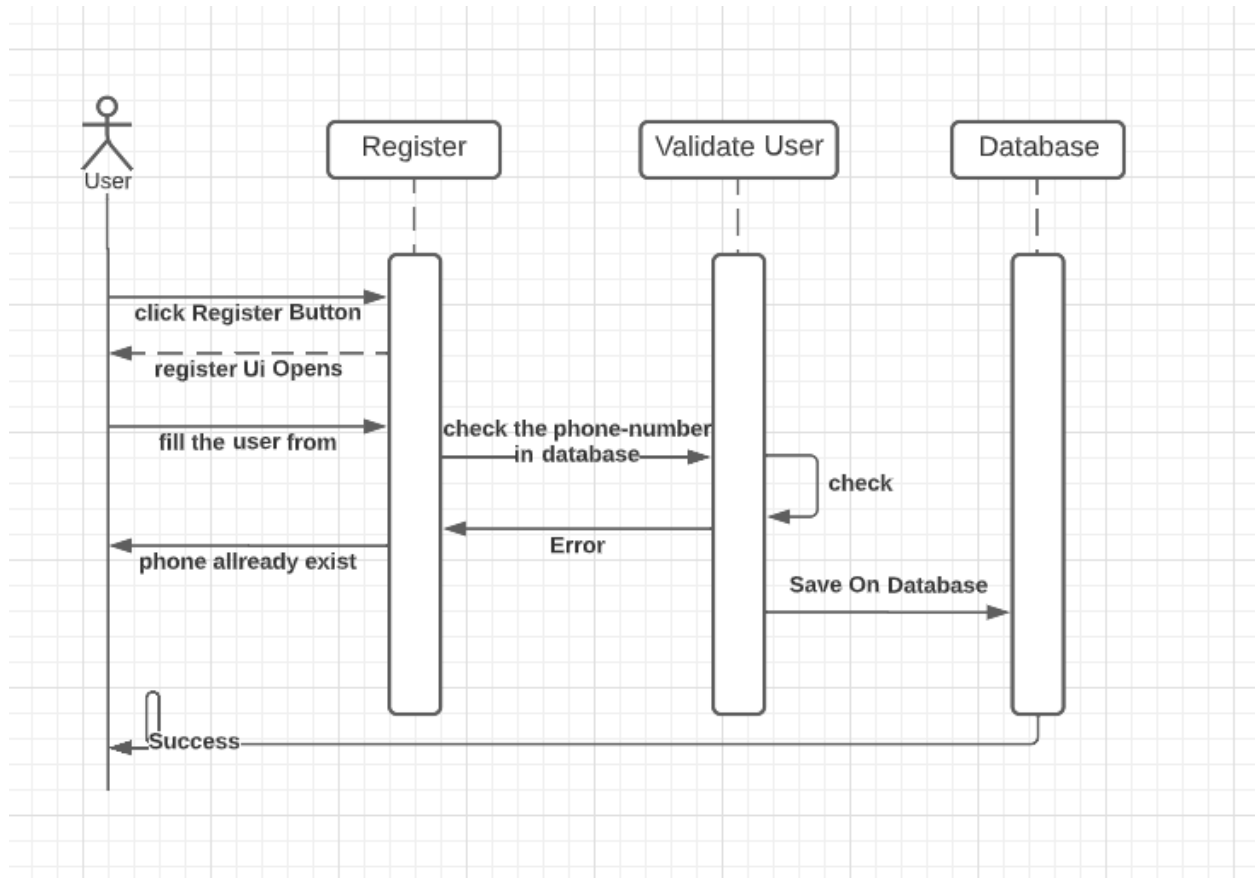
3.5. Sequence diagram

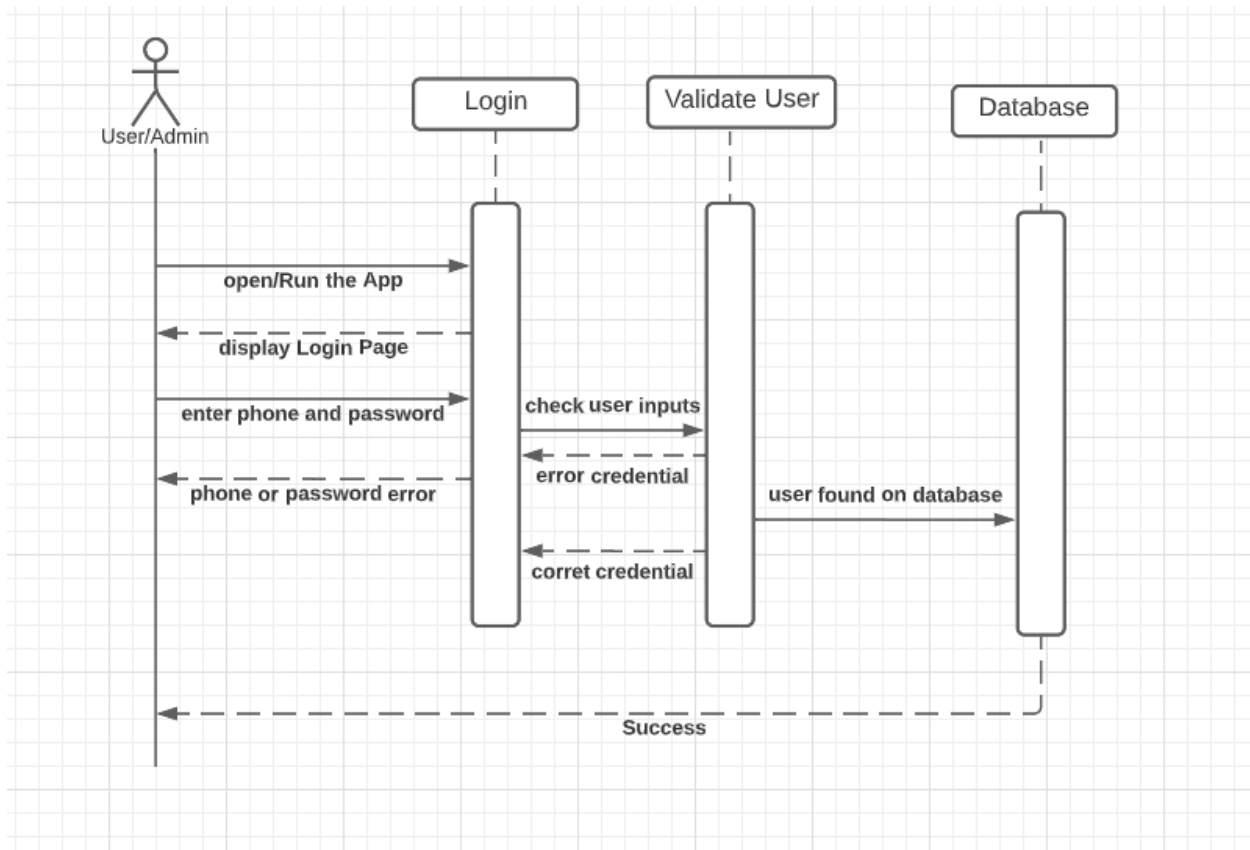Figure3.2 : sequence diagram for registration
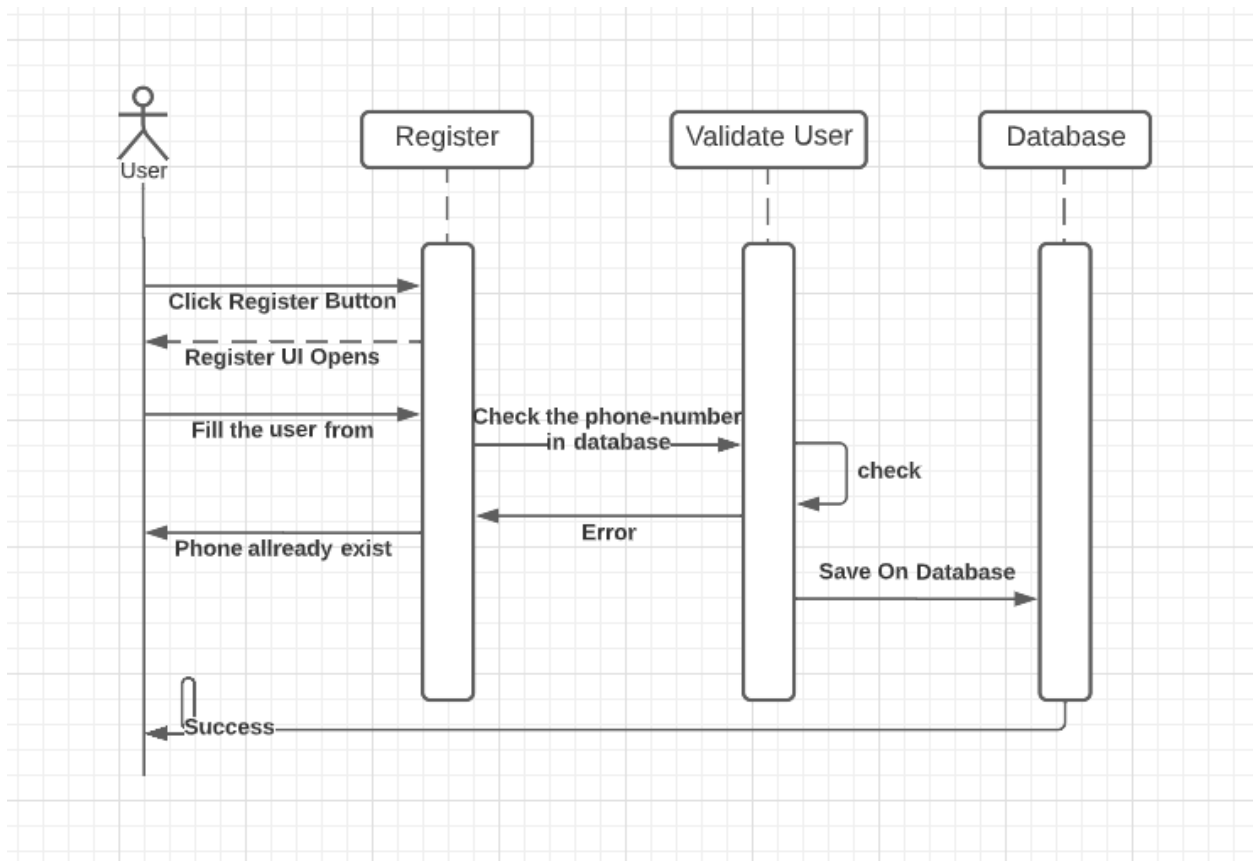
Figure 3.3 : sequence diagram for login

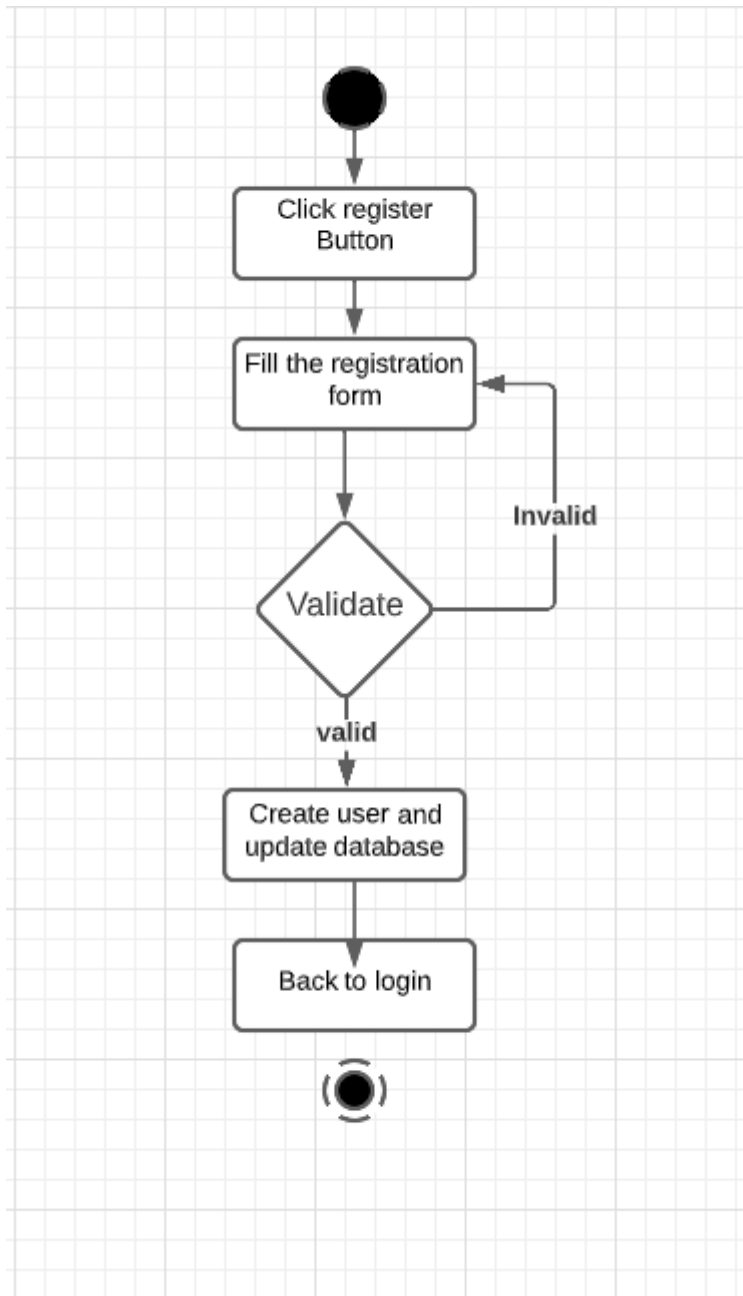Figure3.4 : activity diagram for login

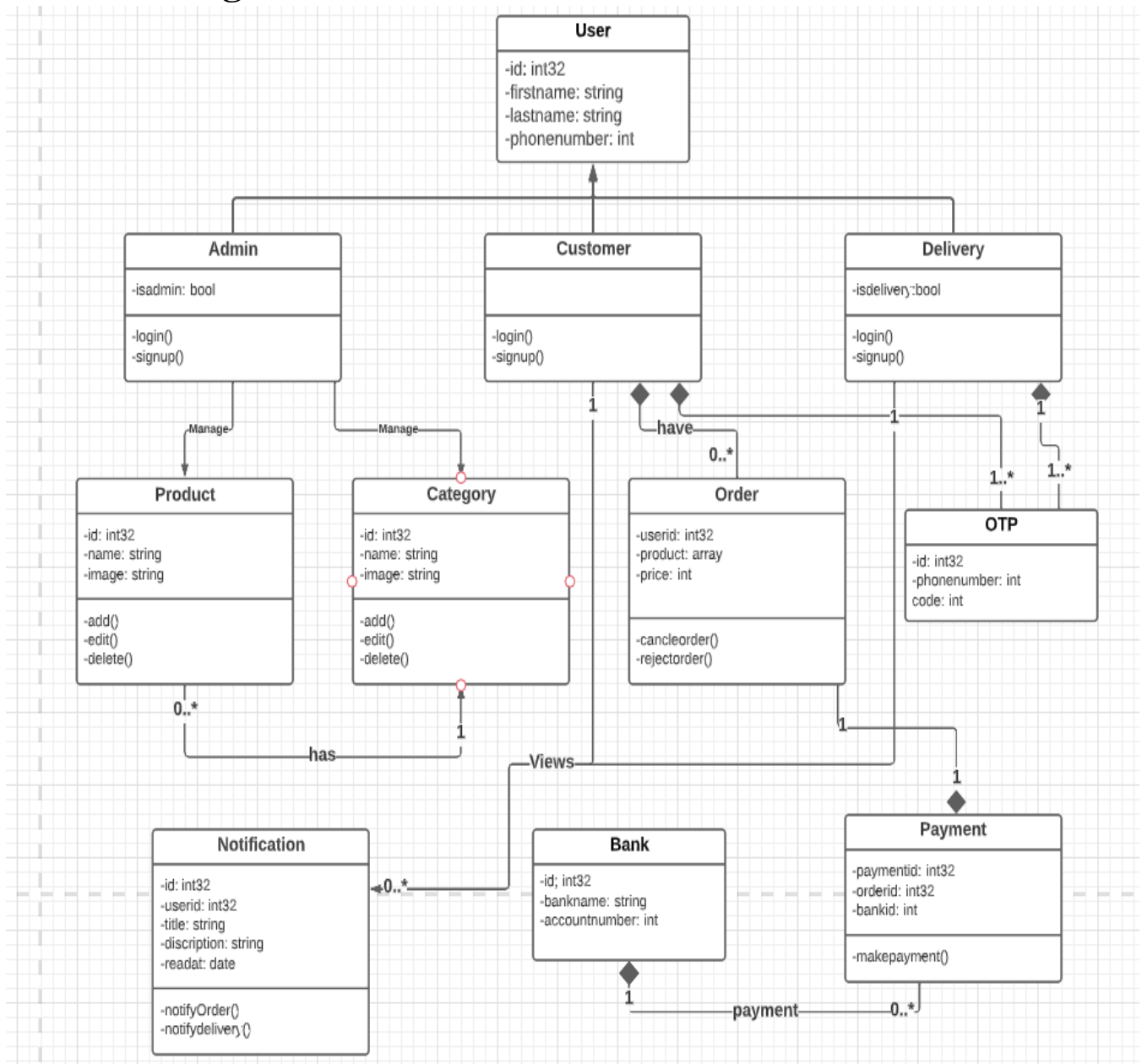Figure 3.5 : activity diagram for registration

3.6. class diagram

Figure 3.6 : class diagram

Chapter Four

System Design

4.1 Database normalization

Database normalization is the process of organizing data in a relational database in such a way that it minimizes data redundancy and dependency, and maximizes data integrity. It involves creating a set of tables with well-defined relationships between them, and enforcing a set of rules to ensure that the data is stored in a consistent and efficient manner. This is done by dividing large tables into smaller, more manageable ones and defining relationships between them, so that data is stored in a logical and organized way. The goal of normalization is to minimize data duplication and improve data integrity, making it easier to update, query and maintain the database.

Since we are using NoSQL database MongoDB, normalization can refer to the process of organizing the data in a logical and consistent manner, in order to minimize duplication and improve data integrity. This can be achieved by dividing the data into smaller, more manageable collections, and defining relationships between them. For example, instead of storing all the data in a single collection, it can be split into multiple collections and linked together through reference or embedding.

The traditional concept of first, second and third normal forms (1NF, 2NF, and 3NF) primarily applies to relational databases, which use a table-based structure to store data. In MongoDB, a NoSQL document-oriented database, the data is stored in a format known as BSON (binary JSON) and collections rather than tables. As such, the traditional concept of normal forms does not directly apply to MongoDB.However, the principles of normalization can still be applied to MongoDB in a way that is suitable for its document-based structure.

4.1 Database normalization

User Schema

Field Name	Data Type	Key Constraint
_id	object ID	Primary Key
first Name	String	Not null(required)
Last Name	String	Not null(required)
email	String	Not null(required)(unique)
phone	number	Not null(required)(unique)
password	String	Not null(required)
Profile Image	String	-
address	Object	Not null
Is Admin	Boolean	Default(false)
Is Delivery	Boolean	Default(false)

Otp Schema

Field Name	Data Type	Key Constraint
_id	object ID	Primary Key
phone	String	Not null(required)
code	String	Not null(required)
Is Used	Boolean	Default(false)
Is For Forget	Boolean	Default(false)

Category Schema

Field Name	Data Type	Key Constraint
_id	object ID	Primary Key
name	String	Not null(required)
icon	String	Not null(required)

Product Schema

Field Name	Data Type	Key Constraint
_id	object ID	Primary Key
Product Name	String	Not null(required)
Product Price	Number	Not null(required)
Product Description	String	Not null(required)(unique)
Product Image	Array[String]	Not null(required)(unique)
Available Quantity	Number	Default(0)

Order Schema

Field Name	Data Type	Key Constraint
_id	object ID	Primary Key
Products	Array of objects[{}]	Not null(required)
Total Price	Number	Not null(required)
Product Description	String	Not null(required)(unique)
is Approved	Boolean	Default(false)
Is Rejected	Boolean	Default(false)
Status	String	-
Delivered date	Date	Not null(required)

Notification Schema

Field Name	Data Type	Key Constraint
_id	object ID	Primary Key
Title	String	Not null(required)
Description	Number	Not null(required)
Read at	Date	Default(null)

2nd Normal Schema

Product Schema

Field Name	Data Type	Key Constraint
_id	object ID	Primary Key
category ID	object ID	Referenced(category schema)
Product Name	String	Not null(required)
Product Price	Number	Not null(required)
Product Description	String	Not null(required)(unique)
Product Image	Array[String]	Not null(required)(unique)
Available Quantity	Number	Default(0)
Profile Image	String	-

Order Schema

Field Name	Data Type	Key Constraint
_id	object ID	Primary Key
customer ID	object ID	Referenced(user Schema)
Products	Array of objects[{}]	Not null(required)
Total Price	Number	Not null(required)
is Approved	Boolean	Default(false)
Is Rejected	Boolean	Default(false)
Status	String	-
Delivered date	Date	Not null(required)
Delivery ID	object ID	Referenced(user Schema)

Payment Schema

Field Name	Data Type	Key Constraint
_id	object ID	Primary Key
customer ID	object ID	Referenced(user Schema)
order ID	object ID	Referenced(user Schema)
Bank ID	object ID	Referenced(user Schema)
amount	number	Not null

4.3 Deployment Diagram

A deployment diagram in the Unified Modeling Language (UML) is a type of diagram that shows the physical hardware elements of a system and how they are connected. It provides a visual representation of the components that make up a system and the relationships between those components. Deployment diagrams are used to model the physical deployment of software components on hardware nodes, and can be used to describe the architecture of a distributed system. They can be used to specify the physical connections and dependencies between hardware elements, and to indicate how software components are deployed on those elements.
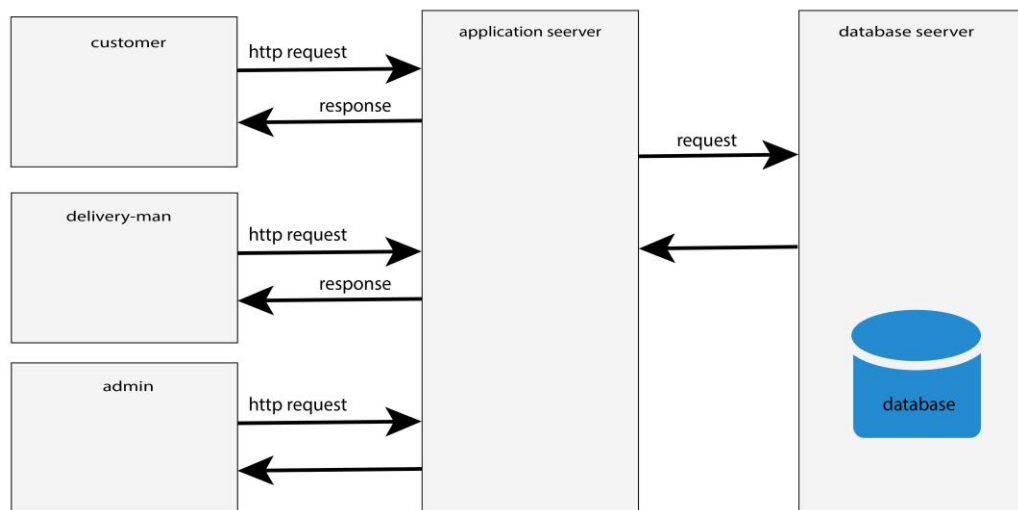
Figure 4.1 deployment diagram

Conclusion

In conclusion, a grocery store management system is an essential tool for modern grocery store operations. The system offers a comprehensive range of features, from inventory management and product ordering to sales tracking and customer engagement. By implementing this system, grocery store owners can streamline their operations, reduce waste, improve customer satisfaction, and increase profitability. Additionally, the system enables owners to analyze data and make informed business decisions, which can contribute to the overall growth of the store. Overall, a grocery store management system is an effective investment that can provide a significant return for the grocery store and its customers.

Recommendation

A grocery store management system is an essential tool for improving the operations and customer experience of a grocery store. It helps to streamline inventory management, reduce waste, and provide real-time data on stock levels and ordering needs. In addition, the system allows store managers to tailor their offerings to the needs and interests of their customers, building customer loyalty and increasing sales over time. Overall, a grocery store management system is a crucial investment for any grocery store looking to stay competitive in a rapidly changing retail landscape.

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