AI Based Inventory and Sales Optimizer

ADEEL AHMED

MUHAMMAD HARIS

DEPARTMENT OF COMPUTER SCIENCES
COMSATS UNIVERSITY ISLAMABAD,
ATTOCK CAMPUS – PAKISTAN

SESSION 2017-2021

AI Based Inventory and Sales Optimizer

Undertaken By:

ADEEL AHMED
CIIT/FA17-BCS-061/ATK
MUHAMMAD HARIS
CIIT/SP17-BCS-053/ATK

Supervised By:

Madam SADIA IJAZ

A DISSERTATION SUBMITTED AS A PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE IN SOFTWARE ENGINEERING

DEPARTMENT OF COMPUTER SCIENCES
COMSATS UNIVERSITY ISLAMABAD,
ATTOCK CAMPUS – PAKISTAN

SESSION 2017-2021

UNDERTAKEN

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_____
Adeel Ahmed
FA17-BCS-061

Dated: _____

_____
Muhammad Haris
SP17-BCS-053

Dated: _____

FINAL APPROVAL

Certified that we have read this project report submitted by Mr. (Adeel Ahmed/Muhammad Haris) and it is, in our judgment, of sufficient standard to warrant its acceptance by Department of Computer Science, COMSATS University Islamabad, Attock campus, for the (BS degree) in Computer Science.

Committee:

1. External Examiner _____
   (Examiner Name)
   Designation
   University Name

2. Supervisor _____
   (Madam Sadia Ijaz)

3. Chairperson _____
   (Chairperson Name)

4. Dean/Director _____
   (Dean/Director Name)

DEDICATION

Dedicated to my parents, teachers, and best friends

ACKNOWLEDGEMENT

We would like to express our gratitude to my primary supervisor, Madam SADIA IJAZ, who guided us about this project, and without her supervision and assistance, we would not be able to bring this project to its completion. I would also like to appreciate my friends and family who supported me during the timeline of this project.

We also acknowledge the help provided by the lab staff and all faculty staff of the computer science department to provide enough courage and support which helped us in completing our project in COMSATS University Islamabad, Attock campus.

PROJECT BRIEF

PROJECT NAME	/* AI BASED INVENTORY AND SALES OPTIMIZER*/
ORGANIZATION NAME	/* COMSATS*/
OBJECTIVE	/* TO MAINTAIN, TRACK SALES RECORD AND HELP IN OPTIMIZATION OF PRODUCTS STOCK */
UNDERTAKEN BY	/* ADEEL AHMED, MUHAMMAD HARIS */
SUPERVISED BY	/* MADAM SADIA IJAZ */ /* DESIGNATION */ /* COMPUTER SCIENCE */ /* COMSATS UNIVERSITY ISLAMABAD, ATTOCK CAMPUS*/
STARTED ON	/* START DATE */
COMPLETED ON	/* END DATE */
COMPUTER USED	/* HP NOTEBOOK 250 G4 */

SOURCE LANGUAGE	/* JAVA, PHP */
OPERATING SYSTEM	/* ANDROID */
TOOLS USED	/* ANDROID STUDIO, MYSQL, XAMPP, SUBLIME TEXT, ADOBE ILLUSTRATOR */

ABSTRACT

The purpose of this Android application project is to provide a platform for shopkeepers or small business owners who will not be able to simply track and maintain a record of their daily sales or purchase activities, but also will be able to keep the inventory updated with the latest items which are mostly sold or in which users are mostly interested to buy them and to forecast the number of sale items in coming time through the use of AI. This application will be best suitable to be used by shops or small-scale business owners. This application will also allow its users to maintain data backup their value able data on local or on Google drive storage.

To use this application the users simply must register with their unique Email, Password, and other details like shop or store Name, Phone Number, Address, etc. After they have successfully registered for the first time they have to update their inventory database, by adding sale product details and their barcode code. Once the database of inventory has been created then from onwards the inventory products are simply updated using bar code through scanning it and entering the amount of specific item. Users will be also able to add details about their customers and vendors, to track other stats and analytics like profit or loss, commission, sales report on a daily, weekly, or monthly basis, etc not only in numbers but also in graphs. The application will be designed in a way to be secured enough with minimal and modern for easy and flexible use by even a layman person, so maximum people could benefit through this application.

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Chapter 1

Introduction

1.1 Project Background

The idea behind the proposal of this app is that the trade or finance sector of any country plays an important role in its GDP from small to mega-scale. So, while keeping this thing in our mind we decided to develop an app that will not only assist the business or shop owners to track and maintain the data of their business products or stock but will also perform some smart operation like giving useful suggestions about most selling products and making future sales predictions of different products based on the previous data. So, based on these suggestions shop owners will be able to keep their stock updated for future product sales to enhance their business.

This app will replace the manual or traditional paperwork system of maintaining and tracking data about sale products. So ultimately it will assist shop or business owners to get rid of paperwork expenses and will also help to save their time as compared to a manual paperwork system.

Figure 1.1 Traditional paperwork system

1.2 Brief

In this overall process, we are maintaining our database and tracking our stock products by simply installing this app on our android smartphone. So, the very first step in this whole proves will be that the user is first asked to register or signup by providing the required details like name, email, phone, password, etc. and afterward, he can log in using these credentials. Now the user will enter the product details of his

stock like the product name, category, id, image, purchase price, sale price, quantity, barcode and can customize these details according to his choice. So, for the very first time, the user will have to manually create a database and its entries, but later he can simply scan a barcode of any item from his smartphone using this app to update its details in inventory. This unique feature of barcode scanning will help to save a lot of time for shop or business owners while purchasing and selling any item.

Afterward, there will be another section of vendors and customers where users will be also able to add the details about them like their Name, Phone number, address, etc. and these details will be used while buying any item from a vendor or selling any item to his customers.

Another useful option in this app is tracking stats and transactions which the user can filter out on a daily, weekly, or monthly basis. Through this feature, users will be able to check how many products are sold and purchased and what is the amount and revenue generated or spent through them respectively. Moreover, the user will be also able to check profit or loss made through any item on a different time basis.

To remain updated or to be aware of any product quantity in stock is very important to keep the business in a running state. So, there will be an option of "Check Status" through which user can check shortlisted item which is below specific quantity and their stock needs to be updated. Through this feature, the user will be able to check inventory status and remain updated in real-time just on a button click instead of manually checking each item.

The most unique and core feature behind the development of this app is not only to track the sales items and business stats but instead it's the use of AI and data mining to optimize and predict the sale items by any shop or business owner to keep their inventory updated. So, through analyzing the trend that which product is currently most sold, or products which are usually purchased with other items and in which users are most interested we can achieve our goal.

1.3 Relevance to Course Modules

1.3.1 Machine Learning

In this course, we studied different machine or model training algorithms like "Neural Network" which will be used to perform sales forecasting using current data of the user.

1.3.2 Artificial Intelligence

We studied this course in 6^{h} semester and we will be using AI along with data mining different data mining algorithms like "Apriori" or "Eclat" to know about the most sold products and interests of the customers.

1.3.3 Report Writing Skills

In his course, we learned about how to write professional reports and other formal documentation, for our FYP and in our professional life. So, this course is helping a lot at this stage while preparing this documentation.

1.4 Literature Review

This part contains the details about the previous related work and reports that have been completed. So, if we talk about the work efforts that have been done in the past 2 centuries to replace the manual system of inventory management done by human beings is described below.

In 1889, Herman Hollerith developed the first modern automatic computation machine. Replacing pen and paper and saving countless hours, the tabulator and sorter machine was specially designed to record information using punch cards. [1]

In the mid-1970s, the barcode was introduced as a primary inventory management tool. This helped drive down costs for inventory management because retailers in the United States and Canada didn't have to purchase multiple barcode readers to scan competing barcodes. [2]

In the early 1980s, personal computers began to be common and popular. This further pushed down the cost of barcodes and readers. It also allowed the first versions of inventory management software to be put into use, which was a new base for the upcoming era of future revolution towards the development of inventory management systems or apps. [3]

Nowadays some of the modern and simple inventory management apps that are available on the play store are listed below.

1.4.1 Daily Sales Record App

The app for the business which saves your time & money without any technical knowledge. A simple way to Track Unlimited Sales, Profit, Stock, Generate Invoice,

CRM, POS & much more for FREE. Smartly designed for small-business owners and entrepreneurs.

1.4.2 Stock Management App

This app can be used by all types of businesses and organizations that have inventory. The expected benefit of this app is accurate and smooth inventory counting and record, and frictionless communication between inventory and sales teams, and inventory and purchasing teams.

1.5 Methodology and Software Lifecycle for This Project

So, for the development of this project, we will be using the "Iterative Approach" because we can distribute our goals and requirements in several chunks that can be incrementally implemented and delivered. At any stage, the plan is made just for the next increment and not for the whole project.

Therefore, we will be using the "Iterative Approach" due to its flexibility as it can easily accommodate any new requirements or changes in the current system. It also aids in improvement based on lessons learned from previous iterations. A basic flow process of the "Iterative Approach" is shown in the diagram below.

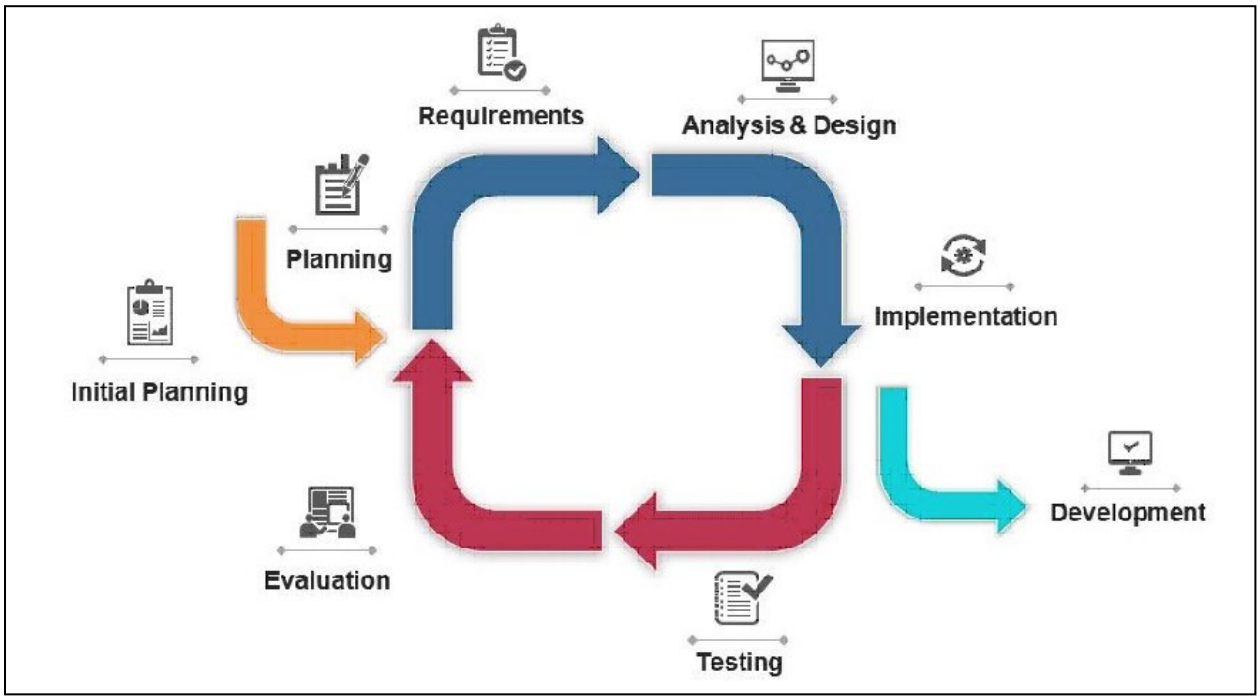

Figure 1.2 Iterative Approach diagram

Chapter 2

Problem Definition

2. Problem Definition

The main aim of our project is to automate the manual operation of inventory management and also provide the sales predictions and useful suggestions about the most selling products to maintain the stock updated for future sales.

2.1 Problem Statement

As technology evolution is getting fast day by day so people are getting more dependent on technology. Technology is almost impacting every aspect of our life so, on behalf of this approach we decided to develop an app to assist shop or small warehouse owners to facilitate them from their smartphones. While proposing this idea we kept in our mind that these people usually cannot afford a computer operator or hire an accountant who will be responsible to maintain the records of sales and inventory to run the business successfully. So, in this aspect, this free app will provide major benefits to them by saving their time and money. Not only this but it will also help to optimize their sales and keep the inventory updated with the most selling products.

2.2 Deliverables

2.2.1 Mobile based application interface:

A responsive and meaningful mobile-based application interface for android devices that will allow the user to explore through the application in their perspective and ultimately will provide easiness and comfort to them.

2.2.2 Inventory setup:

Here users will have to enter the products detail which are currently present in his inventory and can customize them in different categories based on his own choice.

2.2.3 Image and barcode uploading:

The users will be able to upload images of different products in their inventory list and their barcodes also if they are available.

2.2.4 Barcode scanner:

The barcode uploaded by the user of any specific product can be used later to update its details in inventory later onwards by simply scanning it through the app which will save a lot of time.

2.2.5 Product sale prediction and optimization:

This section is about the suggestion and sales provided by AI and data mining algorithms by analyzing the previous sales records of any user to help in optimizing his sales and maintain the stock of products in inventory.

2.2.6 User data export and backup:

This section is about saving the previous value able data of the user. So, to preserve it we will be creating a local backup or a google drive backup.

2.3 Development Requirements

Following are the requirements which must be fulfilled by the user to run this app smoothly on his android smartphone.

2.3.1 OS requirement

Smartphone with Android OS 4 or above than this.

2.3.2 Software requirements

IDE: Android Studio, IDLE or PyCharm

Programming Language: Java, Python

2.3.3 Other tools

For designing app graphics, we will use Adobe Illustrator.

For making documentation we used Word. And for presentation we used PowerPoint.

2.4 Current System

Following are the related features of our system in running state which is successfully tested.

The system can

- Allows the registration of the user with the required details.
- The user can log in and logout of the system using his credentials.
- The system also allows the user to enter the product details and upload its image and barcode.
- Users can view the products entered into their database.
- The system also allows the user to enter the details of his vendors and customers.
- Users can customize their products based on category and brand.

Chapter 3

Requirements Analysis

3. Requirement Analysis

Software Requirement Analysis (SRS) provides a basic understanding of functional as well as non-functional requirements of any system. We valued this approach very much as a starting point of our project because it serves as a written contract between us and the project committee. It highlights the possible features and functionalities of our project. With the help of SRS, we tried to make a clear understanding of the system deliverables to the project committee.

3.1 Use Case Diagram

The use case diagram of our system is given below. The user is the main entity or focal point in this application. First, he will log in or register to start using this app, and then will carry on other operations.

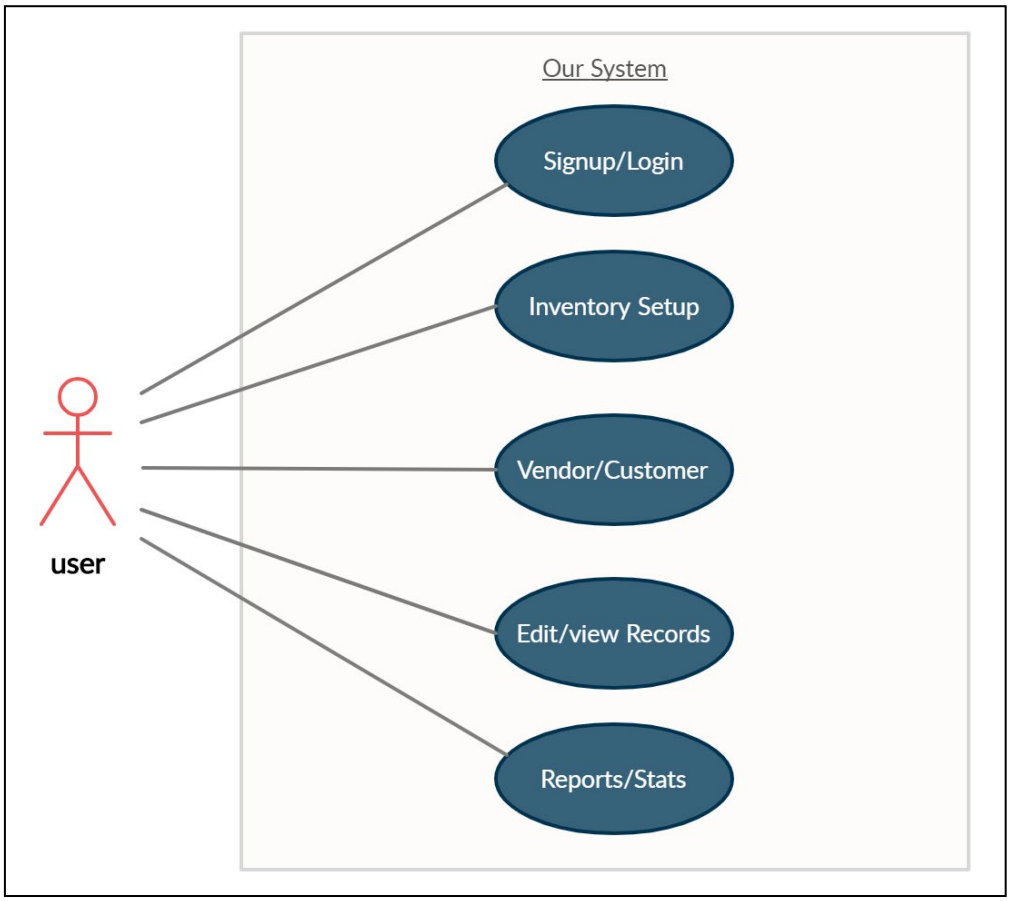

Figure 3.1 Use Case Diagram

3.2 Detailed Use Case

The use cases shown in the figure above are separately described below with clear details and action taker.

3.2.1 Signup/Login

Use case name: Signup/Login

Action: User

Summary: The user will provide the required details for the login or signup process, as an initial step to use this application.

Pre-condition: The user must provide correct details while signup and use similar details to login into the system; otherwise he has to face errors.

Post-condition: After signing in user can freely explore the app to carry on other processes.

3.2.2 Inventory setup

Use case name: Inventory setup

Action: User

Summary: The user will set up his inventory database when using this app for the first time. He can enter different details about the stock products and can also upload their image, barcode. He can even customize his stock products in different subcategories as per his choice.

Pre-condition: The user will enter the name. Price, image, and other similar details for his products for inventory setup.

Post-condition: The user can also edit these details afterward whenever required.

3.2.3 Vendor/Customer

Use case name: Vendor/Customer

Action: User

Summary: The user can enter the details about his vendors and customers which will be used at the time of purchasing or selling any item.

Pre-condition: The user will enter the name. phone number, address, etc, and other similar details for his vendors and customers.

3.2.4 Edit/View Record

Use case name: Edit/View Record

Action: User

Summary: This section contains all the details about the products, vendors, and customers. Here users can view each of them in detail and can edit, update, or delete them.

Pre-condition: The user can view, edit, delete all the records of products, vendors, and customers he has entered before.

Post-condition: User can still view, perform an update, and delete operation on the current data.

3.2.5 Report/Stats

Use case name: Report/Stats

Action: User

Summary: User can check all the business stats and reports and can get an idea about the items sold and purchased, profit and loss, etc on a daily, weekly, monthly basis.

Pre-condition: The user can only view the stats on a different time basis, but he can't modify them.

Post-condition: Stats and reports are generated by the system from time to time by analysing the user sales data.

3.3 Functional Requirements

Functional requirements are the requirements that must be present in any system to fulfill its purpose of development, and without those functionalities, a system is considered worthless. So, the functional requirements of our system include;

- Allows the user to sign up to using the app for the first time.
- Users can log in to the app after registering them successfully.
- Add inventory products and their details.
- Can also add image and barcode of inventory products.
- Customize the products on basis of different categories and brands.
- Add customer's and vendor's details.
- Update the product details by just simply scanning its barcode from the app.
- Review and update all the details of products, vendors, and customers by simply filtering out different factors.
- Users can view and track all the stats and records of sales and purchase, profit, and loss on different time periods.

- The system will update the user about the real-time stats of the products in his stock. Moreover, users can just check shortlisted items that are below specific quantity just on a button click.
- Use of local or Google drive storage to back up valuable data of the user.
- To predict or forecast the future sales of any product using ML algorithms like 'Neural network' to keep the stock updated.
- To know about the most selling products and the one which is often sold usually with the other products using data mining algorithms like "Apriori" or "Eclat".

3.4 Non-Functional Requirements

Non-Functional requirements of any system are those requirements that specify the quality and reliability of the system, and if these are not present in our system then still we can move our progress ahead. Following are some of the non-functional requirements of our system.

5.4.1 Efficiency

Our system is efficient, as it does not require much effort or hard work to operate and can be simply operated even by a layman.

5.4.2 Performance

Our system is optimized and it performs very well on all android devices of OS 4 or above. It requires very little time to perform any operation on user action.

3.4.3 Flexibility

The system provides great flexibility to the user just like customizing the product details in a very easy way of his choice.

3.4.4 Usability

Our system is super easy to use by shop or warehouse owners and can be simply operated even by a layman.

3.4.5 Availability

Our system will be published on the Google play store and will be available for free of cost to be used on any android device.

3.4.6 Reliability

Our system is tested various times to produce and generate 100% reliable and accurate results.

Chapter 4

Design and Architecture

4. Design and Architecture

After gathering all requirements of our system, the next step is to start planning that how we are going to design or develop our project, and how many resources, costs, time, benefits, or other items are required. After planning we move to the designing and architecture phase which specifies which techniques and methods we can use to develop our project. It is also the most challenging phase of project development.

4.1 System Architecture (Block Diagram)

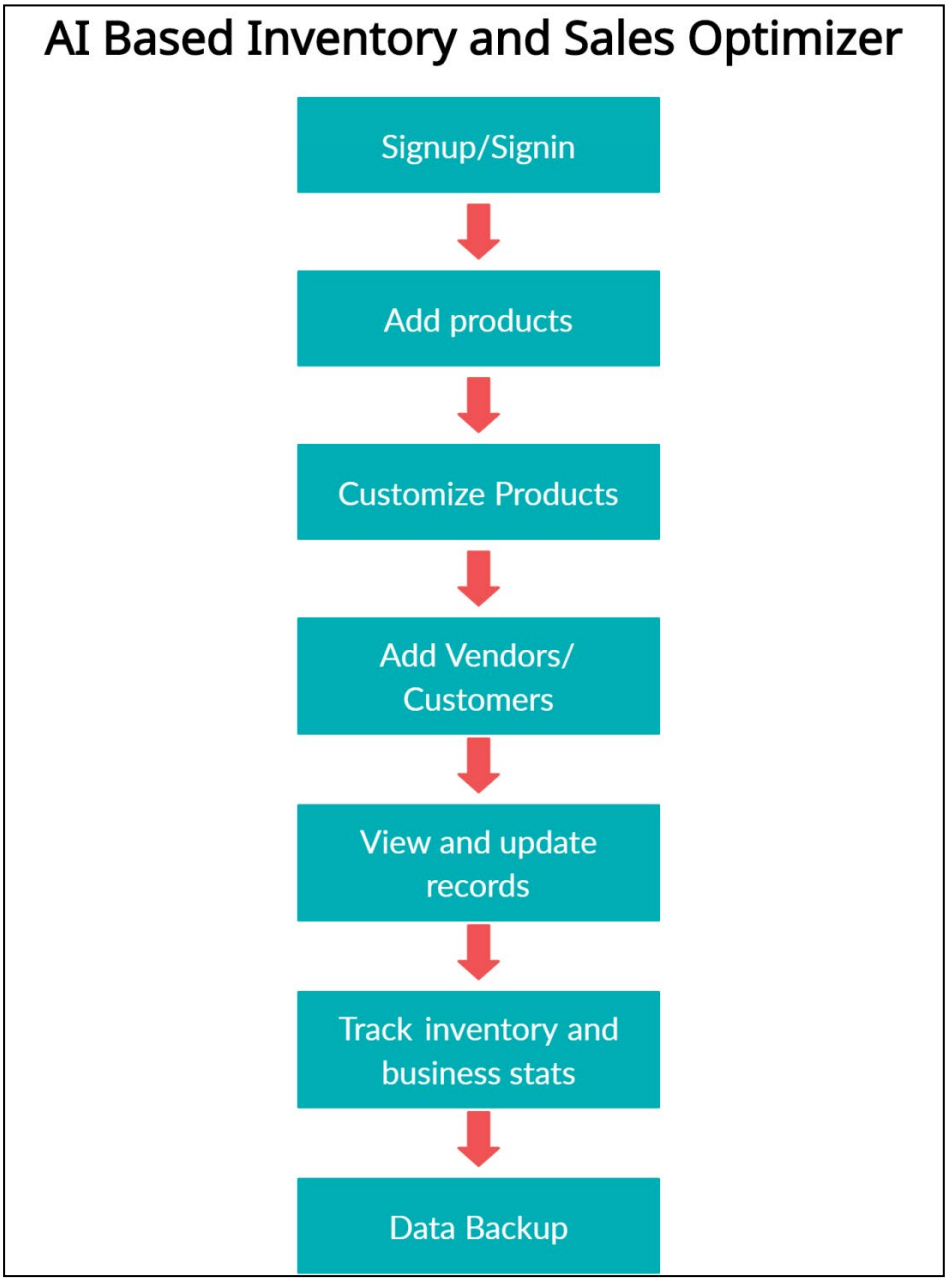

Figure 4.1 System Architecture Diagram

4.2 Process Flow Representation

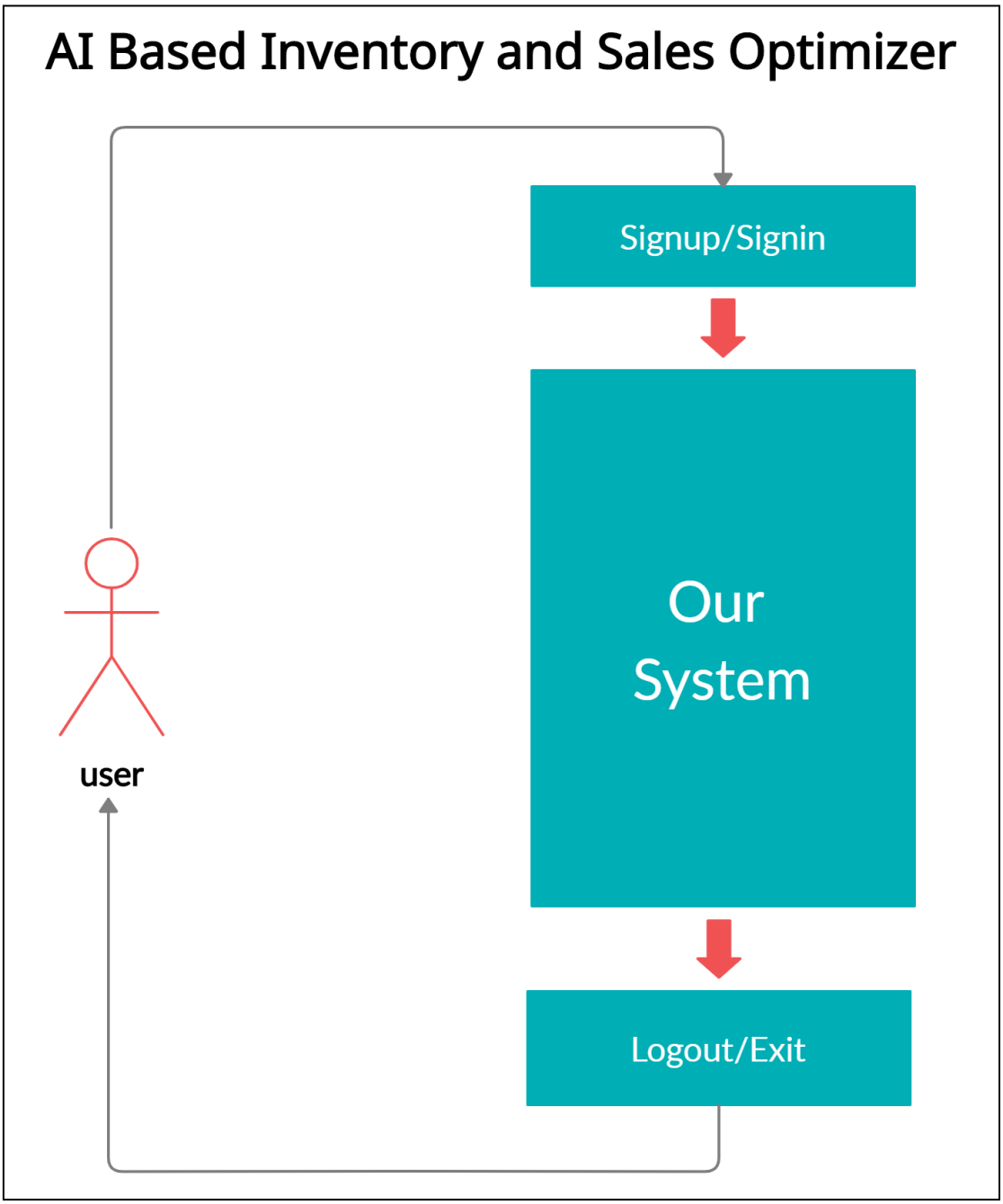

Figure 4.2 DFD level 0

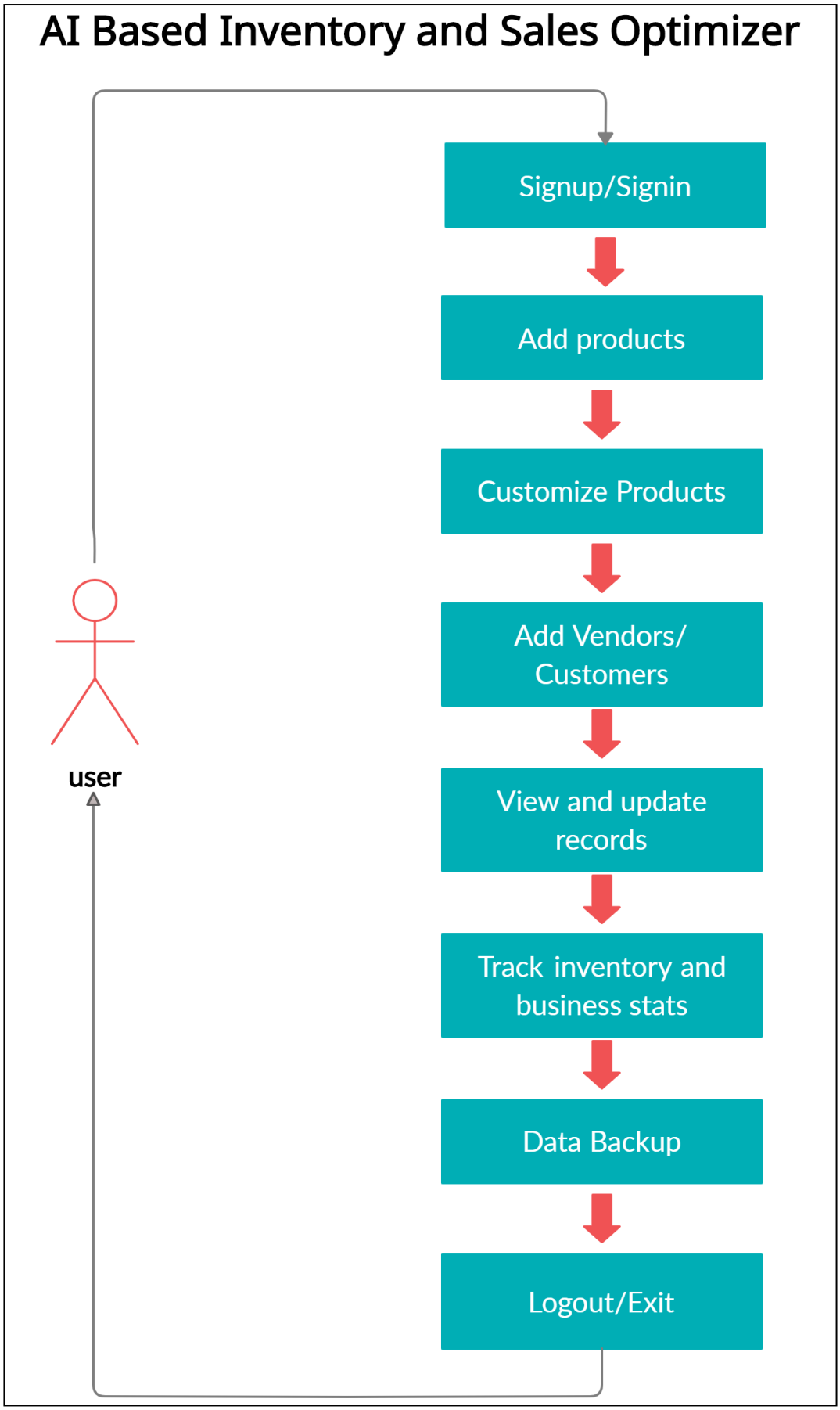

Figure 4.3 DFD Level 1

4.3 Sequence Diagram

The figure given below is the sequence diagram of our system. The user will first sign up or login into the system with required details and similarly will perform other operations as shown in the figure below.

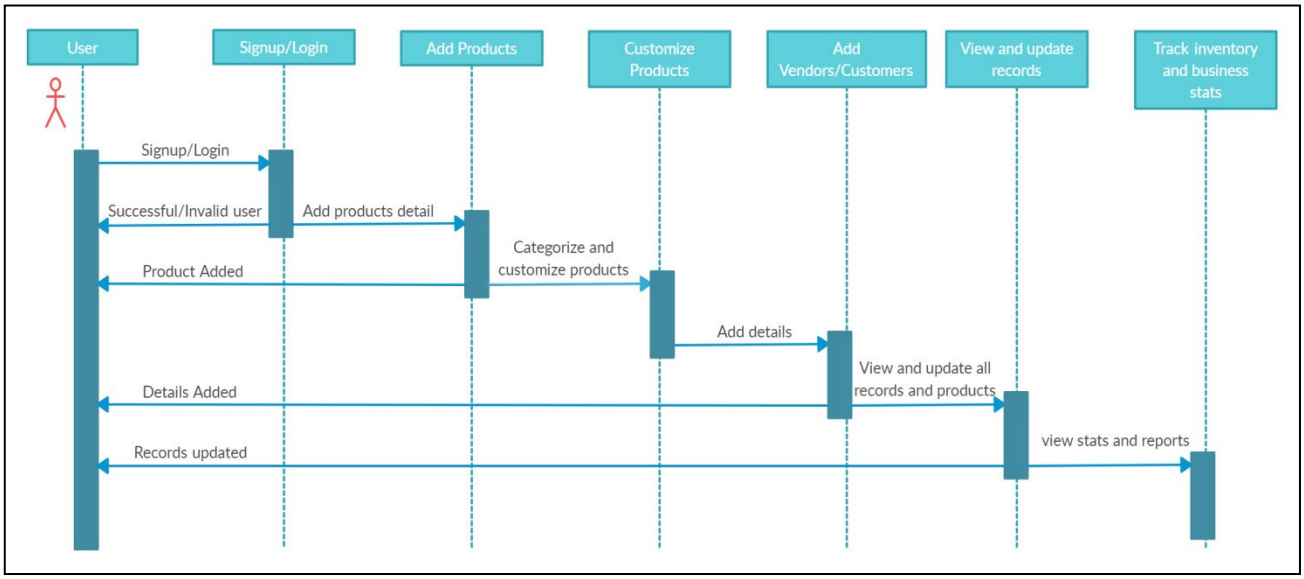

Figure 4.4 Sequence Diagram

4.4 Class Diagram

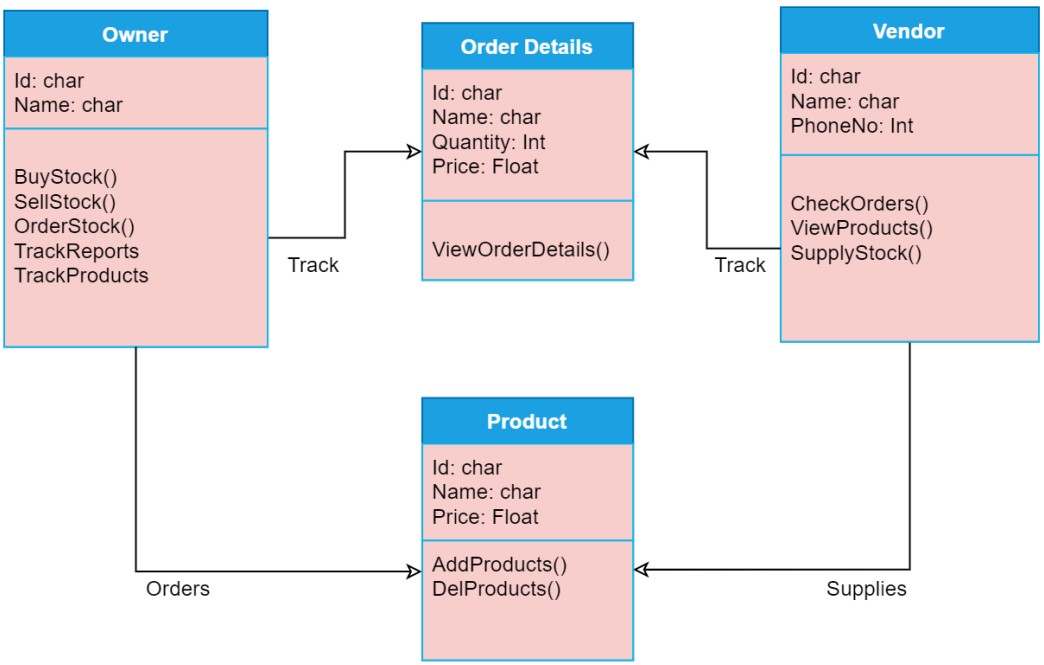

Figure 4.5 Class Diagram

4.5 Activity Diagram

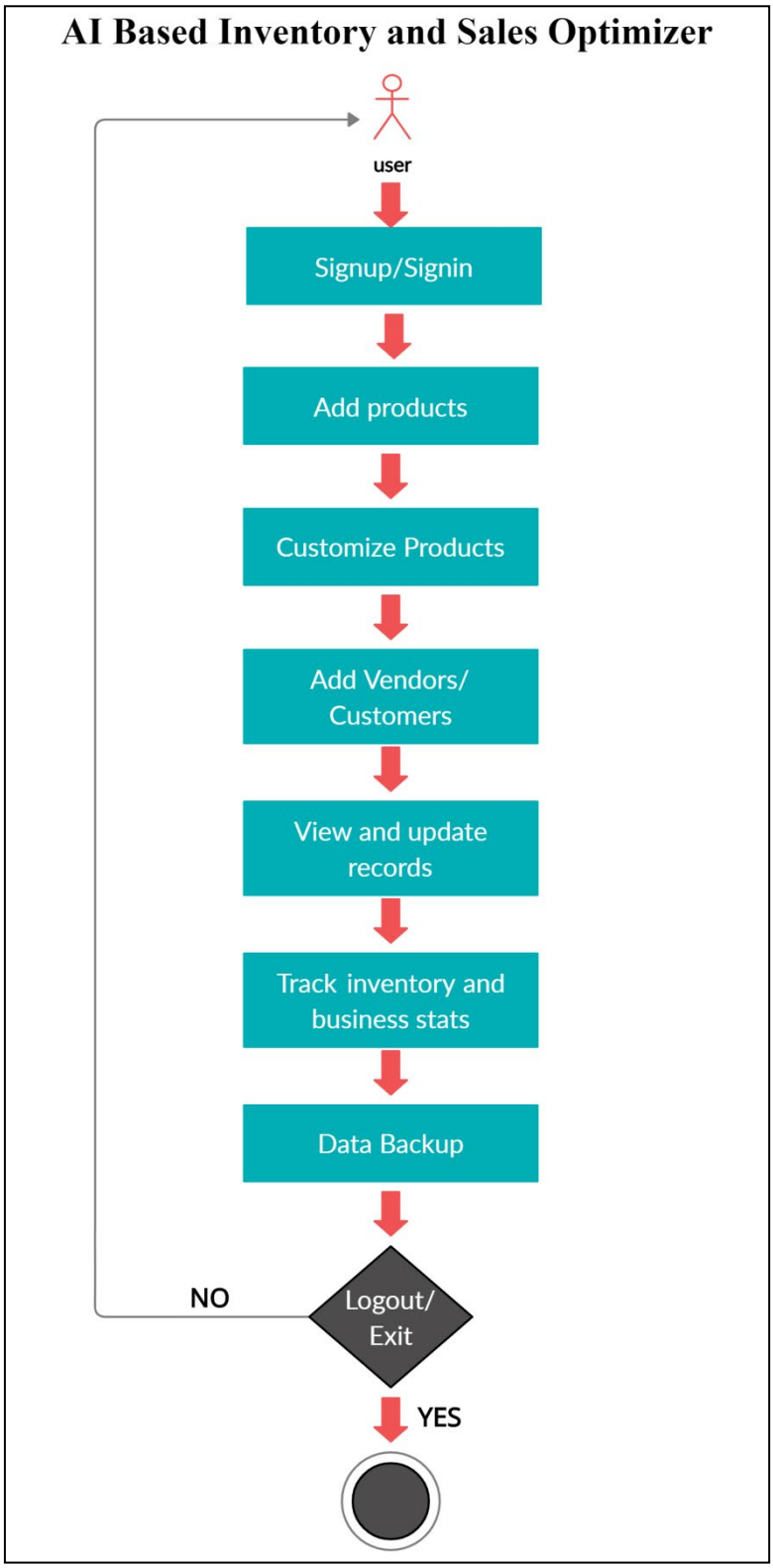

Figure 4.5 Activity Diagram

4.6 E-R Diagram

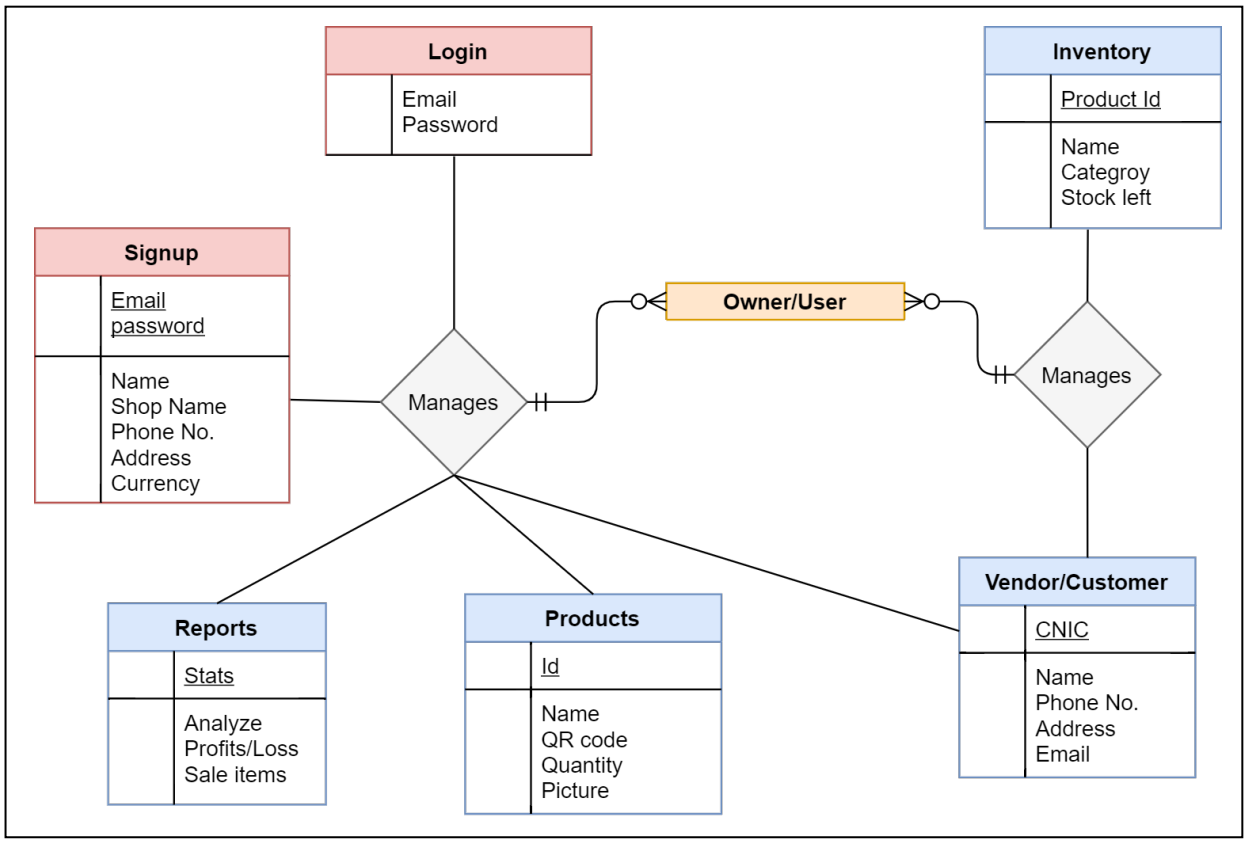

Figure 4.5 E-R Diagram

Chapter 5

Implementation

5. Implementation

This chapter is the overview of the different tools used in the development of this Android app and the important stages of the development process through which it went. For the development of our application "AI Based Inventory and Sales Optimizer" each important implemented strategy is described in this chapter and the different tools that are used in the development are also listed below.

5.1 Tools

- Android Studio
- XAMPP
- MYSQL
- Sublime Text

5.1.1 Android Studio

Android Studio is the official IDE or platform from Google's to build Android operating system-based apps, based on JetBrains' IntelliJ IDEA software. It can be download for Windows, macOS and Linux based operating systems. To support application development within the Android operating system, Android Studio uses a Gradle-based build system, emulator, code templates, and GitHub integration.

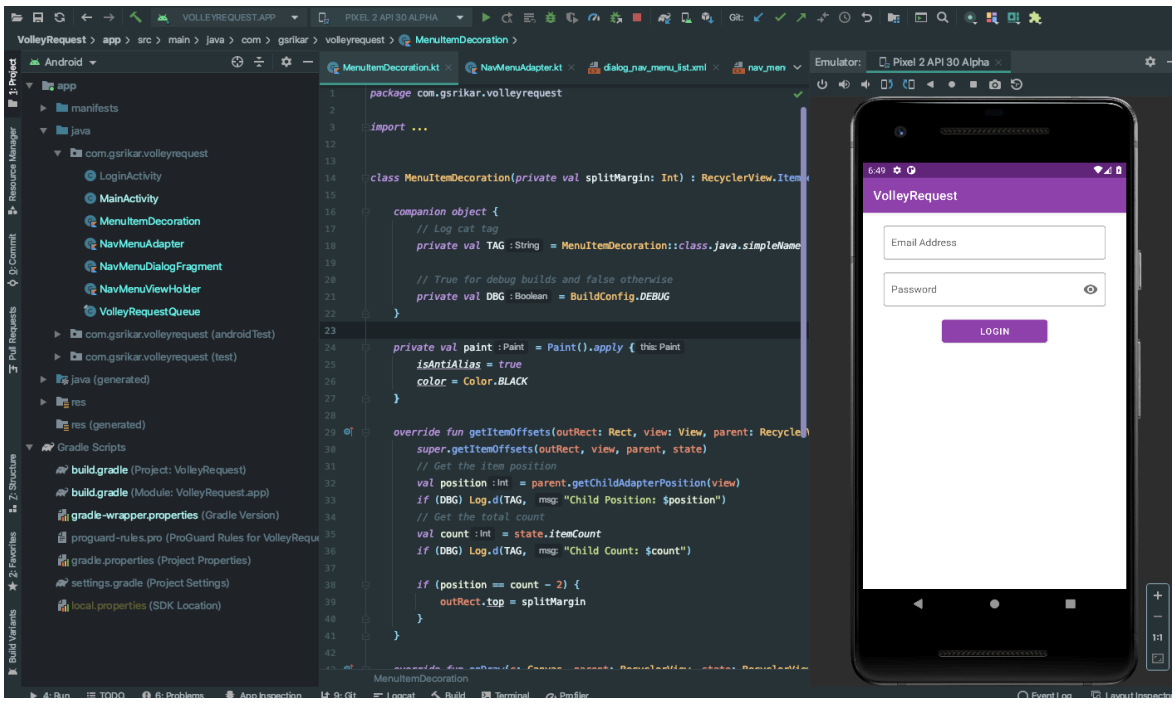

Figure 5.1 Android Studio Window

5.1.2 XAMPP

XAMPP is one of the mostly used cross-platform web servers, which actually helps the developers in creating and testing their programs on a local webserver. Xampp was developed by the Apache Friends, and its native source code can be revised or modified by the audience. It consists of Apache HTTP Server, MariaDB, and interpreter for the different programming languages like PHP and Perl. It is available and supported by different OS such Windows macOS and Linux.

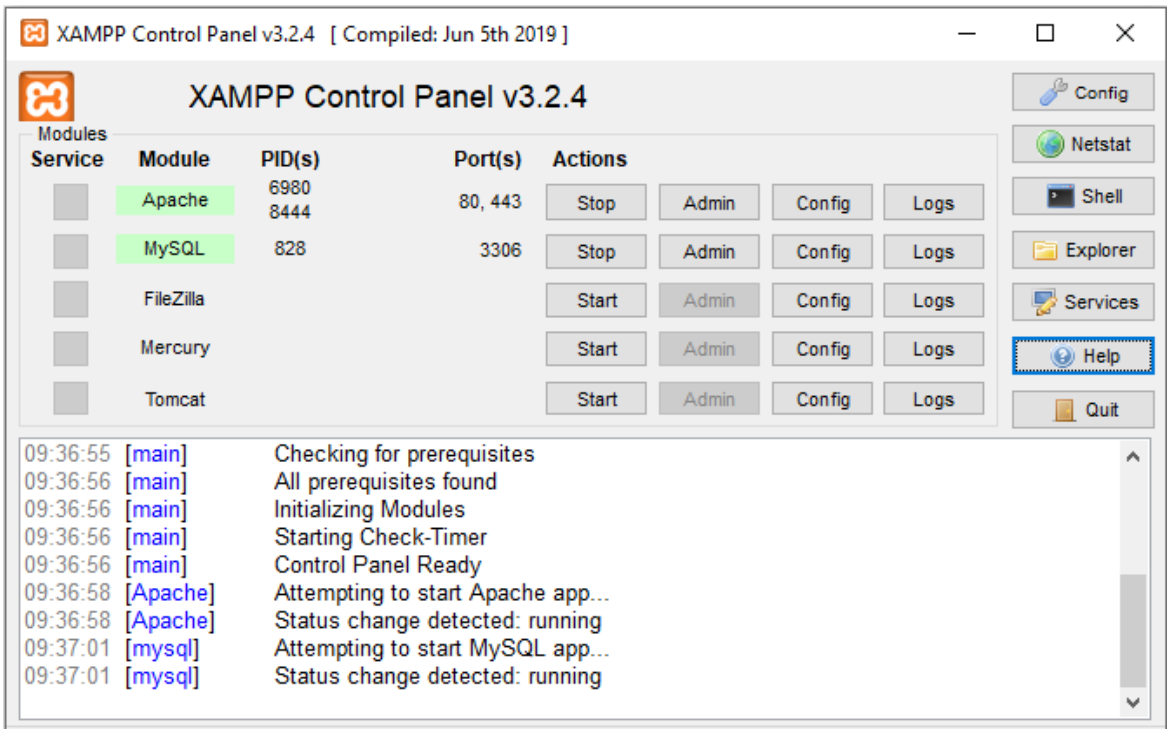

Figure 5.2 XAMPP Control Panel

5.1.3 MYSQL

We are using MYSQL database for our Android app and it will work when we use XAMPP server along with it by creating our personal system as a server. MYSQL is an open source and relational database management system which is actually based on the SQL (Structured Query Language) queries. It is among one of the most popular languages for data assessment and management of the records in the table. MySQL is free and also open source software under the GNU license.

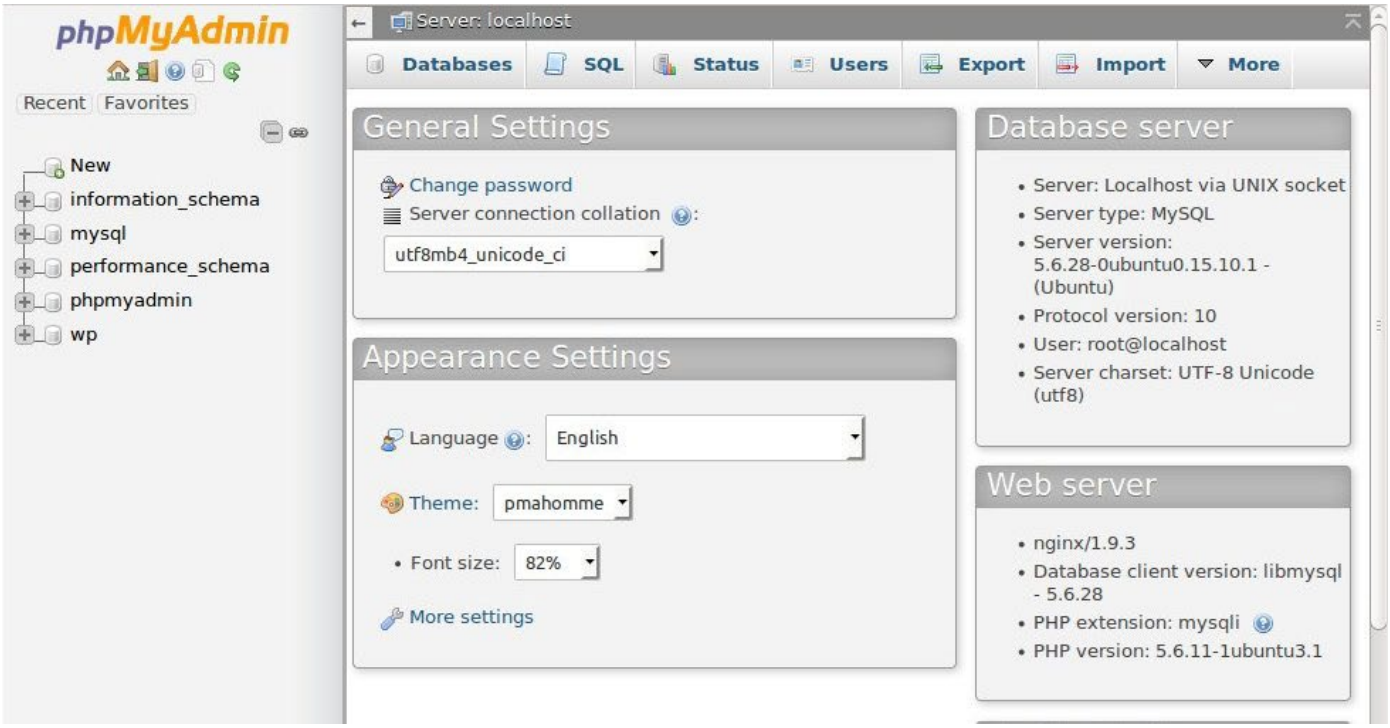

Figure 5.3 MySQL Database

5.1.4 Sublime Text

Sublime Text is one off the powerful cross-platform text editor with a Python application programming interface (API). It usually supports many programming languages, and uses different plugins, typically community-built and maintained under free-software licenses to provide extra functions that can be added by users. It includes other unique and useful features such as highlighting any syntax errors, file type identification, plug-in and packages which make it an idea IDE to code.

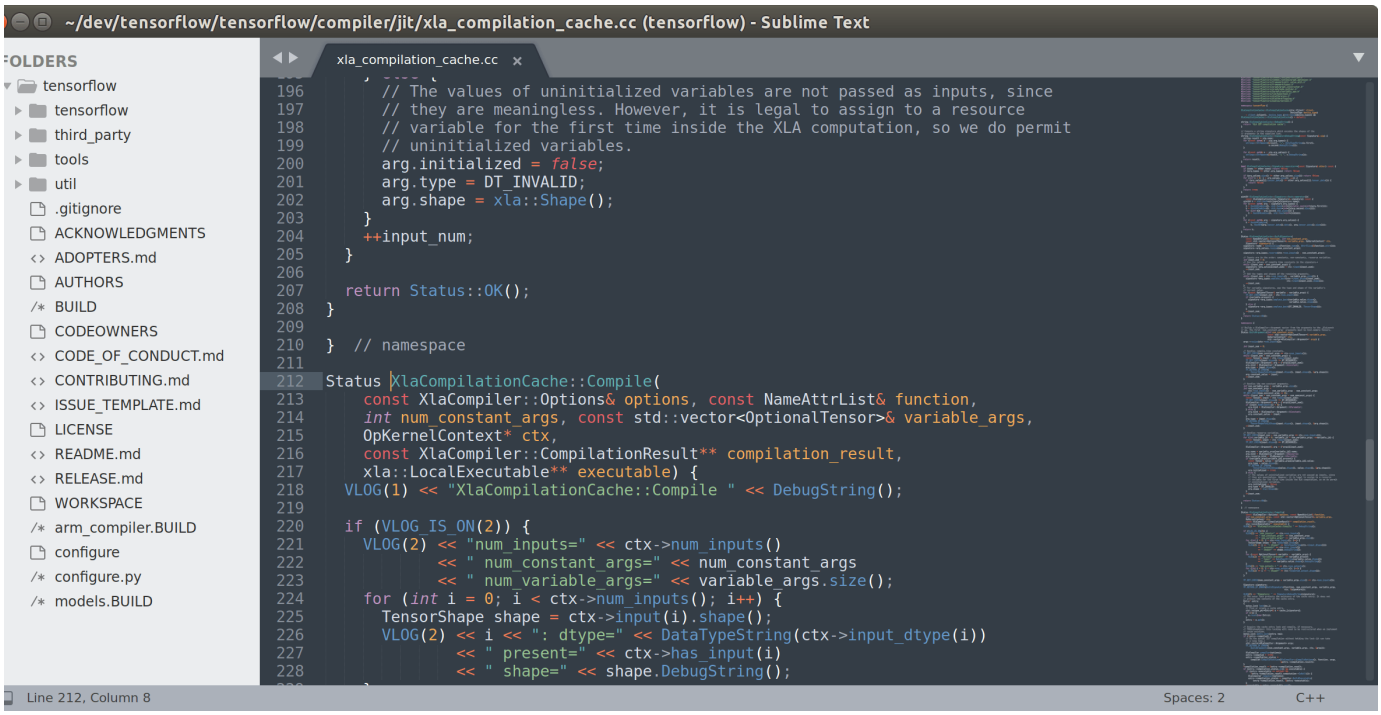

Figure 5.4 Sublime Text Window

5.2 Technology

This section is the about the overview of the different modern technologies like programming languages, databases used in the development of this Android app. So, for the development of our application “AI Based Inventory and Sales Optimizer” we used languages Java, PHP and SQL database that are described below.

5.2.1 Java

Android Apps are usually developed in JAVA programming language using Android SDK (Software Development Kit). As of now, that's really your only option for native applications. Java is a very popular programming language developed by Sun Microsystems. Some other languages like C, C++, Scala etc. can also be used for Android Apps development, but JAVA is mostly used and preferred for Android Apps Development over other programming language. JAVA application runs on JVM (JAVA Virtual Machine) but Android has its own virtual machine called Dalvik Virtual Machine (DVM) optimized for mobile devices.

5.2.2 PHP

PHP is object-oriented language that to help create dynamic mobile apps and web applications. It is mostly used for that apps which require database integration. Some of the famous PHP frameworks such as Laravel, Lumen, CodeIgniter, and Symfony are being used on large scales for designing mobile apps that require complex backend and data migration. Usually large-scale app projects prefer PHP as it simplifies caching, authentication, and even routing.

5.2.3 SQL database

MySQL Database is a fully managed database service for deploying cloud or native based apps. It is a relational database management system based on SQL. It is most widely used for various purposes, including data warehousing, e-commerce etc. Basically, MySQL is like a database server for storing and manipulating data, defining the relationship of each table. Clients can make requests by typing specific SQL statements on MySQL. The application on the server will then respond according to the query and required information will finally appear on the user side.

5.3 Development Stages for Application

The project "AI Based Inventory and Sales Optimizer" is developed in the following different stages which are described below. Our project is Android based and we mentioned about each activity or interface performing its task. So the major and discrete development stages which we went through stepwise to achieve final desired end product in the given time.

5.3.1 Sign up

If a new user installs the app and don't own any account previously then he would go through registration phase by clicking on sign up button. Once clicked the signup page will appear where he will provide the required details, and then he will be able to sign in through his credentials. The user CNIC and Email id must be unique.

5.3.2 Login Page

So, this is the first page that will be visible after user launches the app. If the user owns his account if he already has gone through registration process then he will be able to sign in and access the app by providing his email and password. After entering

the valid login details when he clicks on the login button he will be redirected to app homepage.

5.3.3 Home page

Now finally when user has gone through previous 2 stages then after the verified login the user be able to view home page of our app. On the home page different options are displayed for various purposes. So, homepage of any app or website is the first impression to its users and has all the necessary options which are most useful.

5.3.4 Navigation Drawer

Sidebar Navigation drawer is among one of the most important part of UI panel that shows us our app's main navigation menu. The sidebar menu appears when the user touches the drawer  icon in the app on left side or by swiping the finger from left edge of the screen. Basically, it is used as shortcut to quickly navigate to and fro between different app activities which may not be present on the app homepage.

5.4 System Design and Interface

The GUI (Graphical User Interface) or visual interface is the most essential part through which user interacts with the app. UI should be designed effectively to meet user expectations and support the system functionality. Likewise, we designed our app GUI in a way that each activity is fully functional and responsive according to user input and commands. At the same time our interface is pleasing and quite straightforward to be easily used by even a layman.

Figure 5.5 Splash Screen

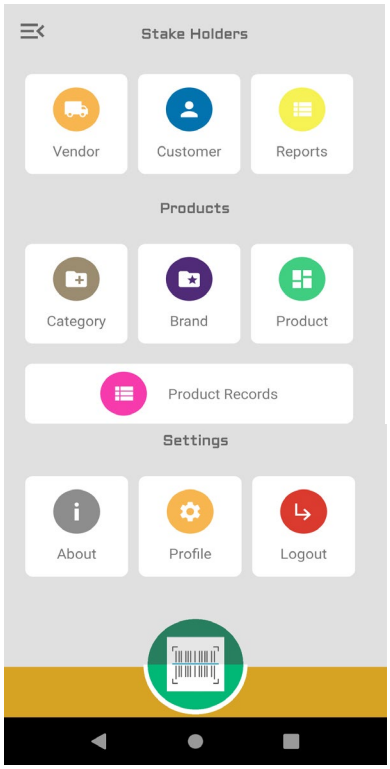

Figure 5.6 Home Screen

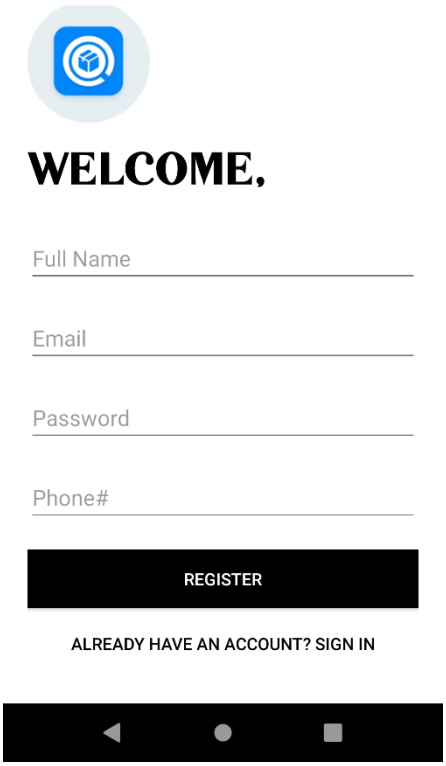

Figure 5.7 Signup Screen

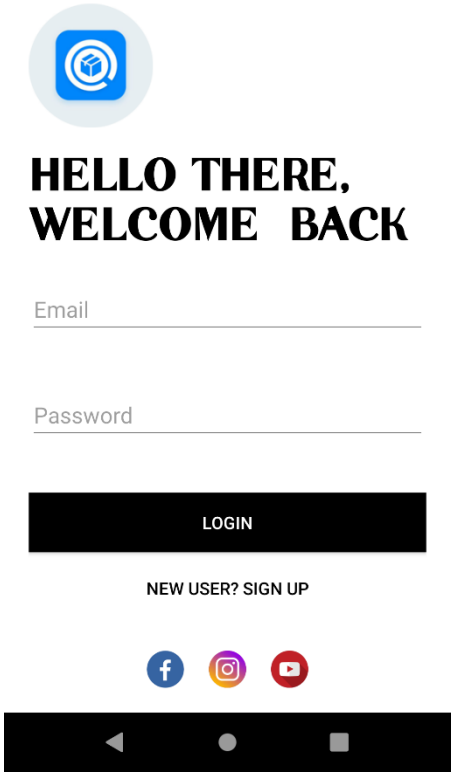

Figure 5.8 Login Screen

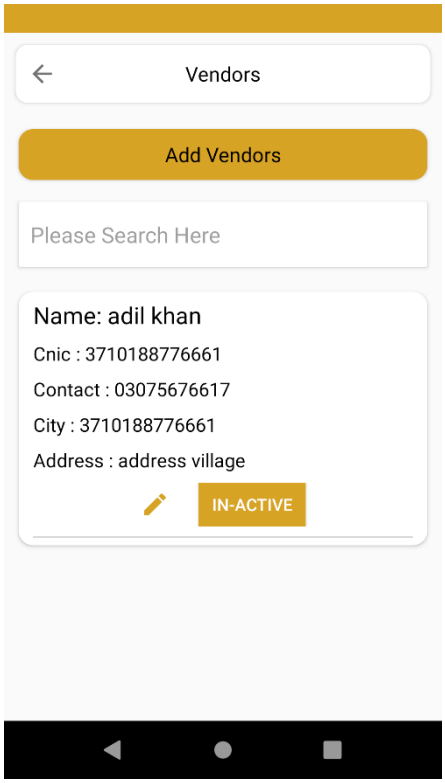

Figure 5.9 Vendors Screen

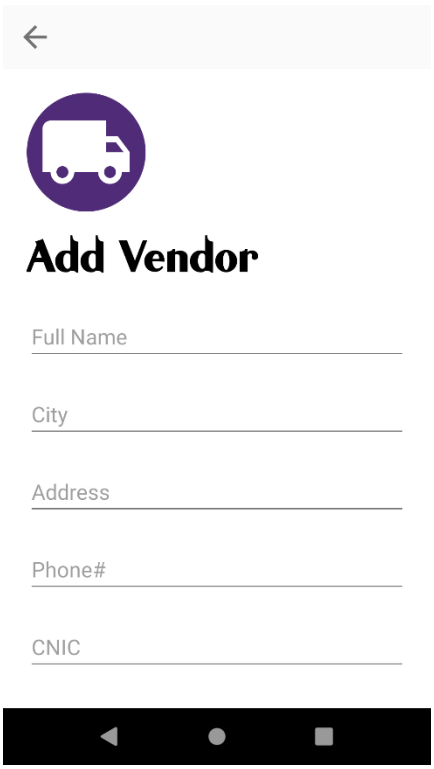

Figure 5.10 Add Vendor

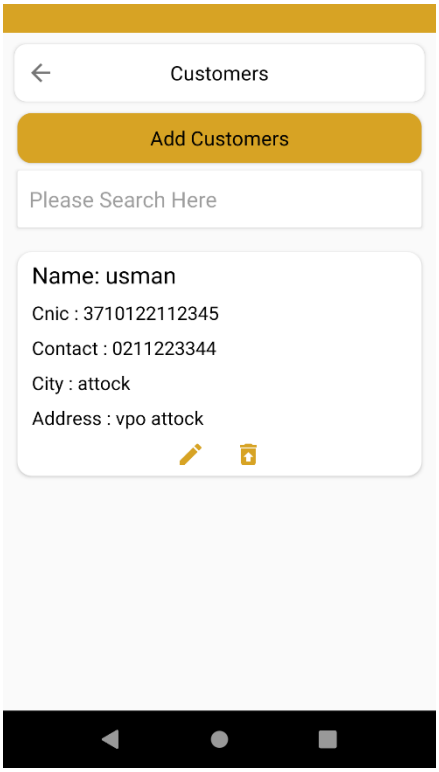

Figure 5.11 Customers Screen

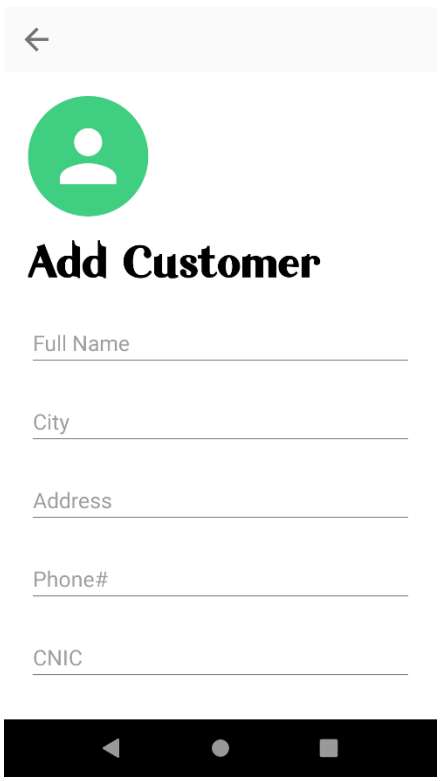

Figure 5.12 Add Customers

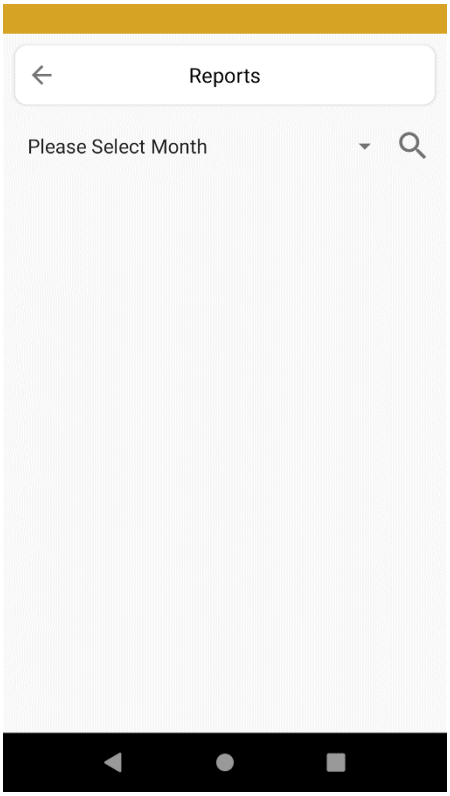

Figure 5.13 Reports Screen

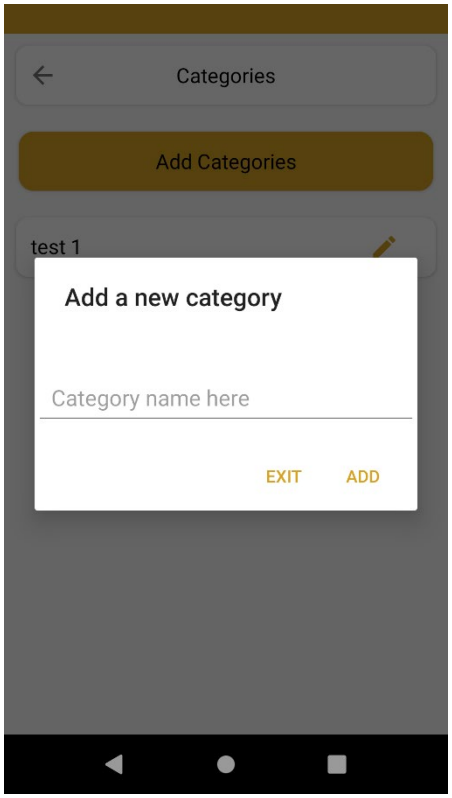

Figure 5.14 Add Products Category

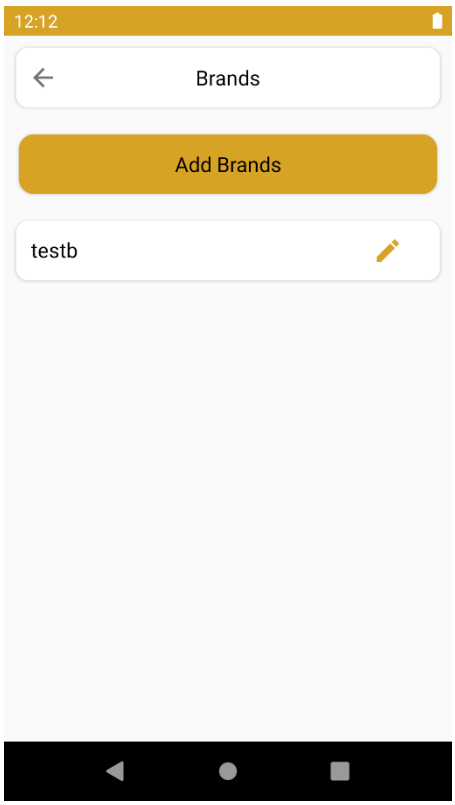

Figure 5.15 Add Products Brand

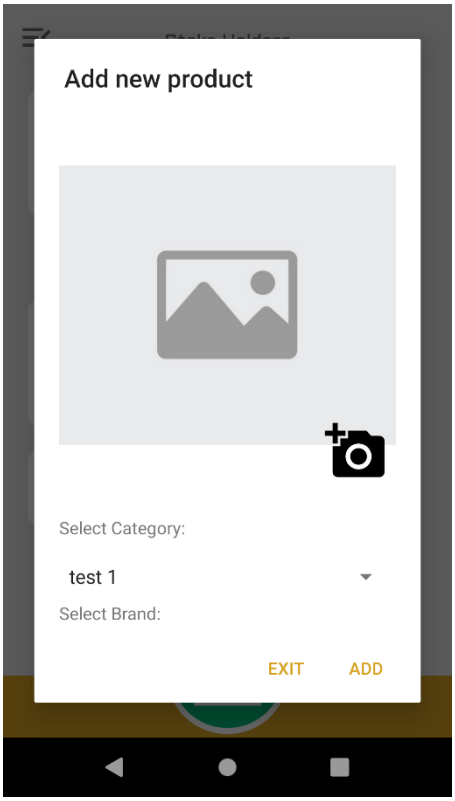

Figure 5.16 Add Products info

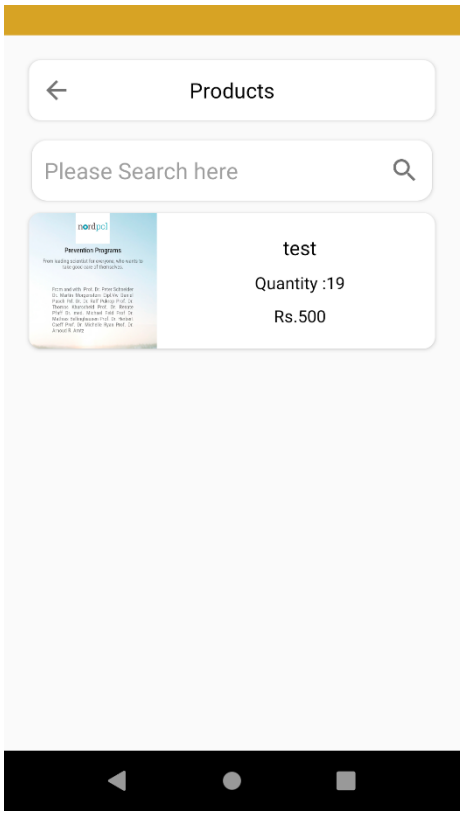

Figure 5.17 Products Screeen

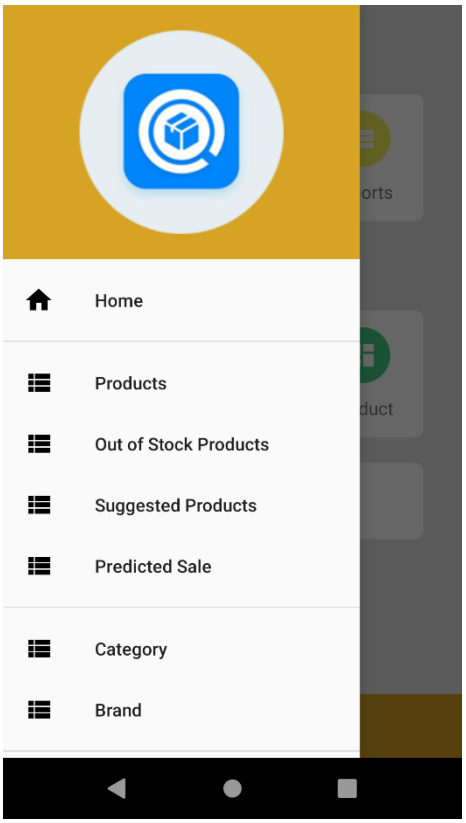

Figure 5.18 Navigation bar

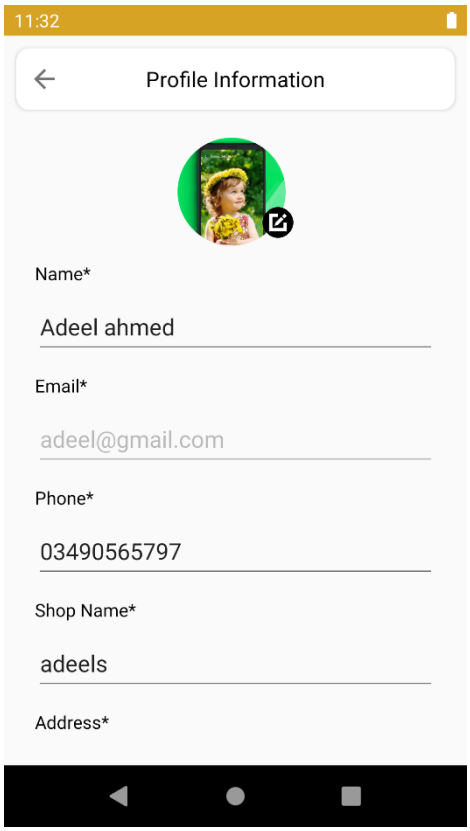

Figure 5.19 User Profile

Chapter 6

Evaluation and Testing

6. Evaluation and Testing

In system testing and evaluation every phase or module of our system is fully tested and verified to be functional in responsive way. Our focal point was to test each and every user activity like user's registration and storing data in database. Validation of each module is very important because in case if user enters any wrong input it can result in system crash or failure.

6.1 Objectives

The primary objective of testing is to investigate any bugs and issues, so system can run error free after being launched. There are various types of mobile app testing techniques like functionality, usability and consistency testing, which ensures quality control from all angles. In general, an app must be tested so that when launching globally it works seamlessly. In brief we can say;

- Testing is procedure of using an application with intension of recognizing maximum errors.
- A successful test is that reveals any unusual mistake.
- An accurate test is one that has a high probability of discovering errors, which exist in the current system.
- A successful test ensures the quality and reliability of the system.

6.2 Unit Testing

It is a testing level where we test every individual module or component of system while being developed to achieve desired outcome. This testing was applied to both Signup and Sign in stages where in case any user enters some invalid value then a message will be prompted to him to enter correct details in valid format. This testing was performed on singular modules and components. The principle parts are getting information from database through queries and to recover list data from database.

6.3 Functional Testing

After unit testing, the next stage was to test system functionalities which the system will perform. The goal of functional testing is to check the functionalities that works under the defined requirements. So, this testing was done on various stages of our

app, e.g sign up & log in, check records, send request, view orders history etc to verify that they are functional in a proper way.

6.4 System Testing

We just fully focused on accurate testing of the system throughout the design and implementation phase while testing the shop owner and vendor activities that they perform and storing or retrieval of data from database. This evaluation was done for testing each and every module of the system and to spot the errors which occur with the database or app interface.

6.5 Test Cases

Steps	Action	Expected Result	Actual Result	P/F
1	Phone started	Application will not start	Application is not launched	P
2	Phone menu opened	Application icon will be displayed	Icon displayed in phone menu	P

Table 6.1: Test Case – Application Start

Steps	Action	Expected Result	Actual Result	P/F
1	Sign up	Account created	Account created successfully	P
2	Enter Login details	Session logged in	User directed to app after login	P
3	Press login or signup button	Data will be sent to or retrieved from database	Data is stored or retrieved from database	P

Table 6.2: Test Case – User Login/Sign Up

Steps	Action	Expected Result	Actual Result	P/F
1	Insert information	Information displayed in database and web service	Information displayed	P
2	Check information	Information will entered into right fields as it is	Information entered into the right fields as it is entered	P

Table 6.3: Test Case – Data Store

Steps	Action	Expected Result	Actual Result	P/F
1	Sign in to the application	Successfully sign in to driver application	Signed in successfully to driver application	P
2	Display user interface	Successfully show user interface	User interface is displayed successfully	P
3	Add inventory Products	Products should be added to database	Products added successfully	P
4	Add customers and vendors	Vendors/customers data should be added	Vendors/customers data added	P
5	View stock products	Database products should be displayed	Products were visible to user	P
6	View sales record and report	History of items and stats should be visible	Items sold and stats were visible	P
7	View most selling items	Most selling item should be visible	Items sold mostly were visible	P
8	Log out from the application	Log out successfully from the application	Successfully logged out	P

Table 6.4: Test Case – Shop Owner Module

Steps	Action	Expected Result	Actual Result	P/F
1	Check for shop owner orders	To view the orders list from the shop owners	Vendor can view shop owner orders	P
2	Log out from the application	Log out successfully from the application	Successfully logged out	P

Table 6.5: Test Case – Vendor Module

Chapter 7

Conclusion and Future Work

7. Conclusions and Future Work

"AI Based Inventory and Sales Optimizer" Android app will be a great blessing for shopkeepers or warehouse owners who will not be able to simply track and maintain a record of their daily sales or purchase activities, but also will be able to keep the inventory updated with the latest items which are mostly sold or in which users are mostly interested to buy them and to forecast the amount of sale items in coming time through the use of AI. This application will be best suitable to be used by shops or small-scale business owners because the system will overcome their daily routine problems which are being faced by these people during their work.

7.1 Future Work

There could be couple of changes possible in future which would make the system handier and more useful. Some planed future implementations are mentioned below,

- Local payment gateways implantation within the app like Jazzcash.
- The iOS platform version for this app may be planned in near future.
- Publishing this app to popular app stores so max people can excess it across the globe.
- Suggestions and recommendation algorithm to made more precise to accurately predict the products which are mostly sold out.
- Customer module can be also considered to be an addition in current system.

Appendix A

List of Reference Variables

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Ai based Inventory

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