CS4433-SOFTWARE ENGINEERING PROJECT
GROUP 9

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RE KAOFELA POS SYSTEM DOCUMENT

“FOR SMALL SCALE BUSINESSES”

Table of Contents

Chapter 1: Introduction

1.1 Abstract

Point of sale applications are common these days. Advancements in the digital age have created a need for high speed processing, efficient POS applications to replace manual operations. A web based point of sale system is a web application which carries out all the functions of a manual system and electronic cash registers and much more. A web based point of sale system gives retailers the ability to store employee and inventory records. This is crucial as retailers can keep track and categorize inventory in an easy way and generate reports with a click of a button. The system ensures data security, scalability and remote accessibility.

1.2 Introduction

ReKaofela Point of Sales is a web application that tracks sales and manages inventory in a small retail business. The system includes keeping a record of the users of the system and the inventory in the business. Each user has a unique identifier that allows them to log in the system.

1.3 Problem Statement

Sales is an important part of any business. Profits and losses are dependent on the accuracy of the information from sales made to aid decision making. As a result of the dependency of the business on its sales, there is a need for system that enhances the accuracy of the accuracy of the feedback provided (e.g by cashiers) back to management. The traditional methods of handling the transaction process are very slow and inefficient. Reports made in the manual system are not always accurate and reliable. Also the use of manual method delays management decision taking because the reports for the management's decision making comes very late and are not accurate.

1.4 Aim

The aim of this project is to design and implement a user friendly Web Based Point of Sale (Web based POS) application that provides a seamless and secure payment experience for customers of small scale businesses, while also providing valuable insights into sales trends, employee productivity and inventory levels.

1.5 Purpose of the requirements document

This document outlines the requirements for a web-based point-of-sale (POS) system designed to streamline and enhance the sales and inventory management processes for a small retail business. By clearly defining the project goals, assumptions and constraints, this document serves as a comprehensive blueprint for the development and implementation of an effective POS solution tailored to the specific needs of the business.

1.6 Scope of the product/system

The scope of this Web Based Point of Sale (Web based POS) is to provide a seamless and secure payment experience for customers of small scale businesses, while also providing valuable insights into sales trends, employee productivity, inventory levels and customer preferences.

1.7 Definitions, acronyms and abbreviations

Chapter 2

2.1 Product perspective

This web-based POS system shall be simple and easy to use by providing a user-friendly interface since small retail businesses may not have dedicated IT staff. The system shall allow fast and efficient transactions with features such as quick item look-up and speedy checkout process to contribute to seamless customer experience. It shall also allow the owners of the business to manage their inventory, by being easily alerted when there is a decline in inventory levels and the ability to add new products effortlessly. The owners or managers shall also access the system on their mobile phones so as to monitor sales, check inventory, and manage transactions remotely, providing flexibility and convenience. While maintaining simplicity, the system also prioritizes security of the business data. The system shall implement robust security measures to safeguard sensitive business information.

2.2 Product functions

- Sales Processing: The product allows businesses to record and process sales transactions. They can scan bar codes, input item details and calculate the total cost of the purchase.

- Inventory Management: The product can track inventory levels in real time so that the business knows which products are in stock, which ones need to be reordered and entails low stock alerts.

- Receipt printing: The product should generate receipts summarizing record of the customers' transactions also including cashier's details.

- Employee management: The product will manage employee access, time tracking, employee shift scheduling and sale commissions.

- Promotions and discounts: The product should apply discounts to selected items in the stock saving time for manually editing item prices to apply discounts.

- Security: The product should restrict some of the functionalities such as protecting sensitive data and prevent unauthorized access.

- Customer Management: Include features in the program for additional functionality such as Customer Relationship Management (CRM). This system manages interactions with current and future customers at both retail and wholesale levels by creating individual customer accounts.

This information is accessible at any time and is used for marketing campaigns, post-purchase email reminders, newsletters, etc. The CRM system is meant to better serve customers, increase customer willingness to pay and retain customer loyalty. (Cote & McCarthy, 2015)

2.3 User characteristics

This Point of Sale web-based system is going to have two users only, the manager or owner of the business and the front-line shop attendants. The user characteristics with respect to the manager:

- The manager should be comfortable with using technology and willing to learn the features and functionalities of the POS system. This includes understanding the Database Management System (DBMS).

- He/ She should have strong analytical skills as the POS system generates valuable data and use these skills to leverage this data to make informed decisions about inventory management, pricing strategies, and the overall business performance.

- Managers must have good training and communication skills since they play a vital role in training staff on how to use the system effectively.

- Managers must prioritize the security of customer and business data. This includes setting up access controls, monitoring for unusual activities, and staying informed about security updates for the POS system.

The user characteristics with respect to the front-line attendant/cashier:

- Cashiers should be technically competent as this will enable them to quickly learn and adapt to the POS system, as efficiency in using the system contributes to smooth and fast transactions.

- Although the POS system shall be designed to be user friendly, cashiers need to possess some basic computer skills to navigate the interface.

2.4 GENERAL CONSTRAINTS

- Hardware Limitations: The device that may be running the POS system may not be that powerful limiting users with speed, processing power and storage for keeping inventory

• Scalability: The system is limited to small scale retailers only, meaning if the business grows there may be problems and functionality limitations.

• Data Backup and recovery: The system will not be able to recover on going transactions if it happens the device running the POS crashes or powers off.

• Internet Connectivity: The device running the system has to be connected to the internet in order to be able to send receipts to customers using emails.

2.5 ASSUMPTIONS AND DEPENDENCIES

• Stable Power Supply: - Assumption: The POS system assumes a stable and reliable power supply to operate efficiently. - Dependency: Dependency on uninterrupted power sources or backup solutions in case of power outages.

• Internet Connectivity: - Assumption: The system assumes consistent and reliable internet connectivity for real-time data processing and transactions. - Dependency: Dependency on a stable internet connection, with considerations for backup solutions in case of network issues.

• User Training: - Assumption: Users are assumed to be adequately trained to operate the POS system. - Dependency: The system's effectiveness depends on user proficiency, emphasizing the need for training programs.

• Security Measures: - Assumption: Assumption that security measures (such as firewalls, anti-virus software) are in place to protect the POS system from potential threats. - Dependency: The system relies on the implementation and maintenance of robust security measures.

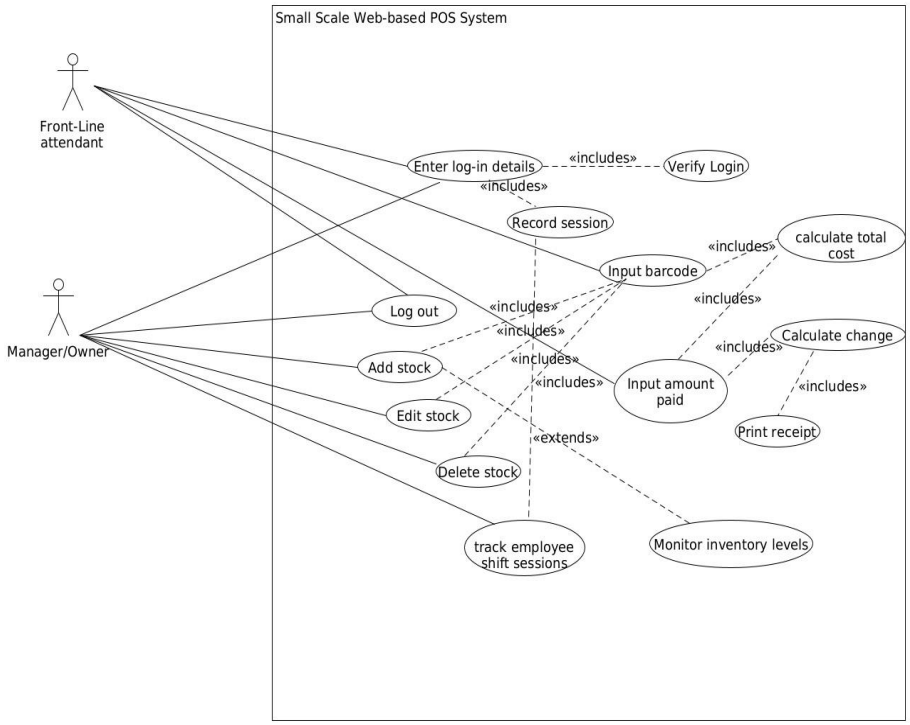
• Product Bar coding: - Assumption: Products are assumed to have bar codes for efficient scanning and tracking. - Dependency: The system depends on products having scan-able bar codes; manual entry might be necessary for items without bar codes.

• Inventory Accuracy: - Assumption: The accuracy of inventory levels is assumed to be maintained. - Dependency: Regular inventory audits and accurate tracking mechanisms are necessary to fulfil this assumption.

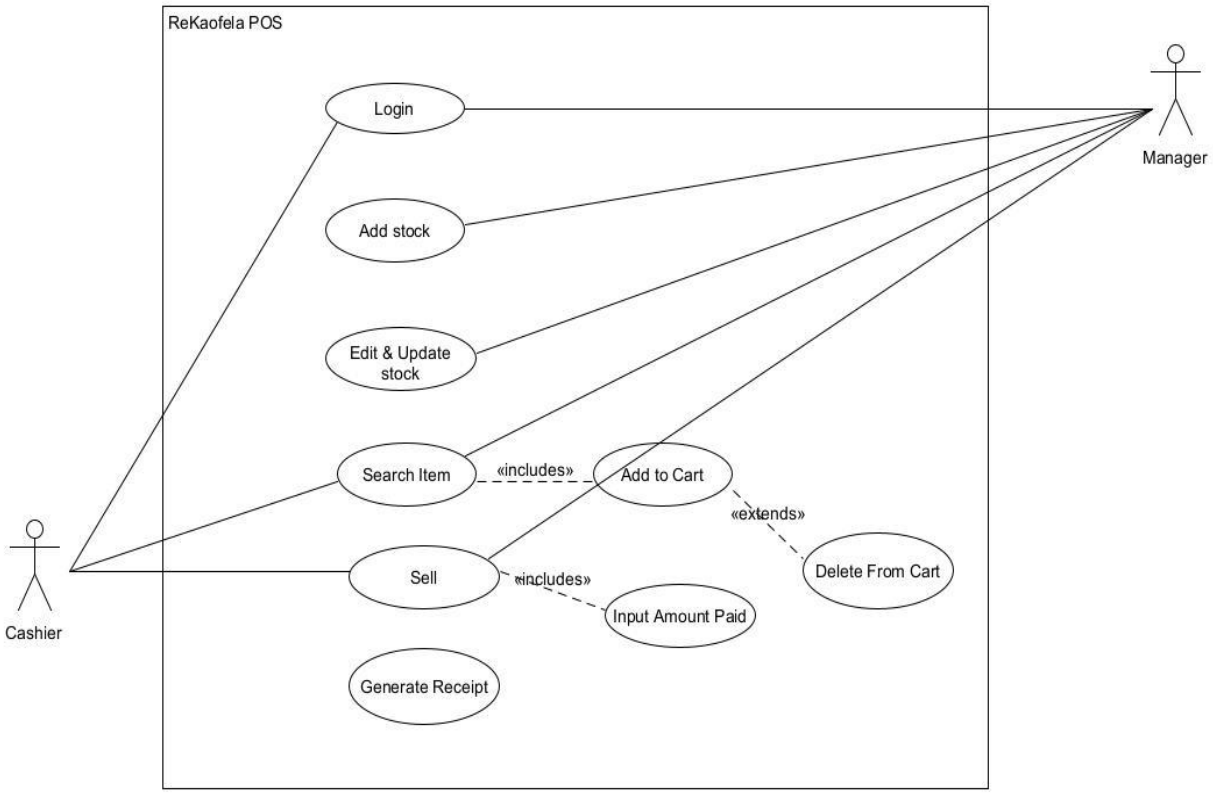
2.3 System Design

2.3.1 UML Design

Initial Use Cases Diagram



Implemented Use Cases



3.1 Non-functional requirements

• Performance: -Response Time: The system should have low latency, providing quick response times for user interactions. -Throughput: The system should be able to handle a specified number of transactions per second or per minute to meet peak load demands.

• Availability: - The system should be available and accessible to users a certain percentage of the time (e.g., 99.9% uptime). - It should have a mechanism for handling server failures, ensuring continuous service.

• Reliability: - The system should be reliable, minimizing the likelihood of failures or errors during normal operation. - It should have mechanisms for data recovery and system restoration in case of failures.

- Security: - User Authentication: Strong authentication mechanisms should be in place to ensure that only authorized users can access the system. Audit Trails: The system should maintain detailed logs of user activities for auditing and forensic purposes.

- Usability: - The user interface should be intuitive and user- friendly. - The system should provide adequate feedback to users during transactions and other interactions. - Accessibility features should be implemented to ensure usability for users with disabilities.

- Compatibility: - The system should be compatible with various web browsers (e.g., Chrome, Firefox, Safari) and devices (desktops, tablets, smart phones). - It should be responsive, adapting to different screen sizes and resolutions.

3.2 Functional requirements

With respect to all the users:

- The users shall login via password and their unique IDs. With respect to the system(the services the system makes on behalf of its users):

- The system shall be able to track all the users' work activities, whether they are working overtime or not (record session).

- The system shall be able to maintain a loyal customer database with reference to the CRM system.

- The system shall be able to restrict sensitive data access to cashiers such as company profits which are only to be seen by the manager or owners.

- The system shall be able to generate receipts and reports for the manager's analysis.

- The system shall be able to do calculations, compute profits, tax, discounts and sale commissions.

- The system shall be able to monitor inventory levels so as to alert the manager to order new inventory. With respect to the manager/ owner of the business:

- The owner or manager of the business shall be able to input (input individual stock barcodes), update and store stock into the store's database.

• The manager shall be able to track employee work sessions. With respect to the cashier:

• The front-line attendant shall be able to input the amount of cash the customer is paying with.

• The cashier shall be able to input/scan items' bar codes when the customers pay.

3.4 EXTERNAL INTERFACE REQUIREMENTS HARDWARE INTERFACE:

• Barcode scanner: To enable identification of products during both purchases and sales. Can also be used when inputting stock into the system.

• Keyboard: The keyboard will be used for accessing the numpad for performing manual calculations like multiplication, addition, subtraction and division within the internal calculator provided by the POS system.

• Mouse: The mouse will be used for navigating the system and performing tasks like clicking and dragging within the POS system.

3.3 External interface requirements

3.3.1 Hardware interface:

- Barcode scanner: To enable identification of products during both purchases and sales. Can also be used when inputting stock into the system.
- Keyboard: The keyboard will be used for accessing the numpad for performing manual calculations like multiplication, addition, subtraction and division within the internal calculator provided by the POS system.
- Mouse: The mouse will be used for navigating the system and performing tasks like clicking and dragging within the POS system.

3.3.2 Software interfaces:

USER INTERFACES:

• UI: The user interface provides a build in calculator that has visible buttons for manual calculations. There is also text area for entering amount of money handed in by the customer and

an enter button that authorizes the automated calculator to give out the amount of the change. The POS also offers a functionality of searching the items using the bar-code or item name, so there is a text input area for such. The items being scanned during the purchase are being displayed in a vertical form respectively for the cashier to see their detailed description including quantity and prices, there's also an option to manually input the quantity of the items to save time. On the top right corner there's a settings button/icon that when clicked there's prompt that prompts the user to enter user-name and password for the manager such that if the user-name and password match that of the manager then the system will open a different window showing a new interface for entering the items in the database, viewing daily sales records, functionality to update the items inside the database, edit prices and descriptions of the items.

3.4 TOOLS TO BE USED:

- Local web server Xampp to be used for testing.

- MySQL DBMS:

  Reasons:

  1. It is an Open Source.

- JavaScript:

  Reasons:

  1. It creates a dynamic and interactive experience.
  2. Widely used to program web based systems.

- PHP:

  Reasons:

  1. It is Open Source.
  2. It is scalable as it can be used to develop POS systems of all sizes.
  3. It is easy to learn and flexible.

4. links the back-end and front-end of the system.

- HTML:

Reasons:

1. HTML is a backbone of every web based application, serving as a basic mark-up language that browsers use to render visual presentation of every website.

- CSS

Reasons:

1. For styling the POS system.
2. Widely used to program web based systems.

3.6 Software process model to be used:

Evolutionary software process

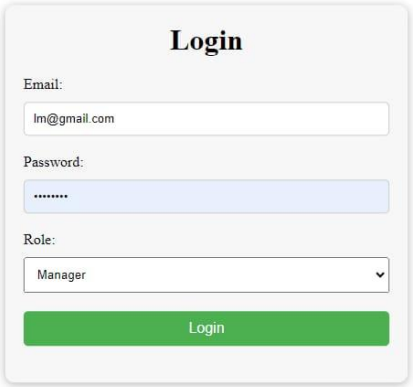
Benefits:

1. Adaptability to changing requirements
2. Incremental development allows for early release of functional components
3. It promotes continuous improvement

Chapter 4: Verification and Validation

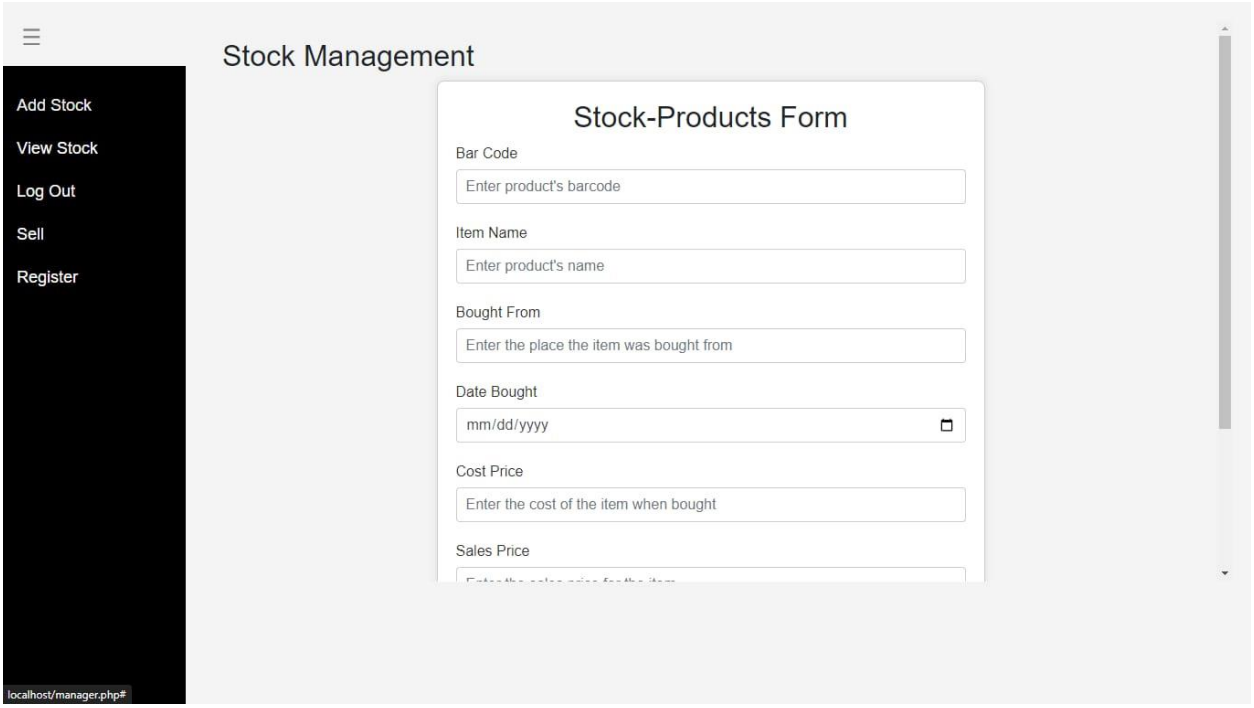
4.1 System Verification

The specific user, that being either manager(admin) or cashier(staff) is allowed to log into the system.



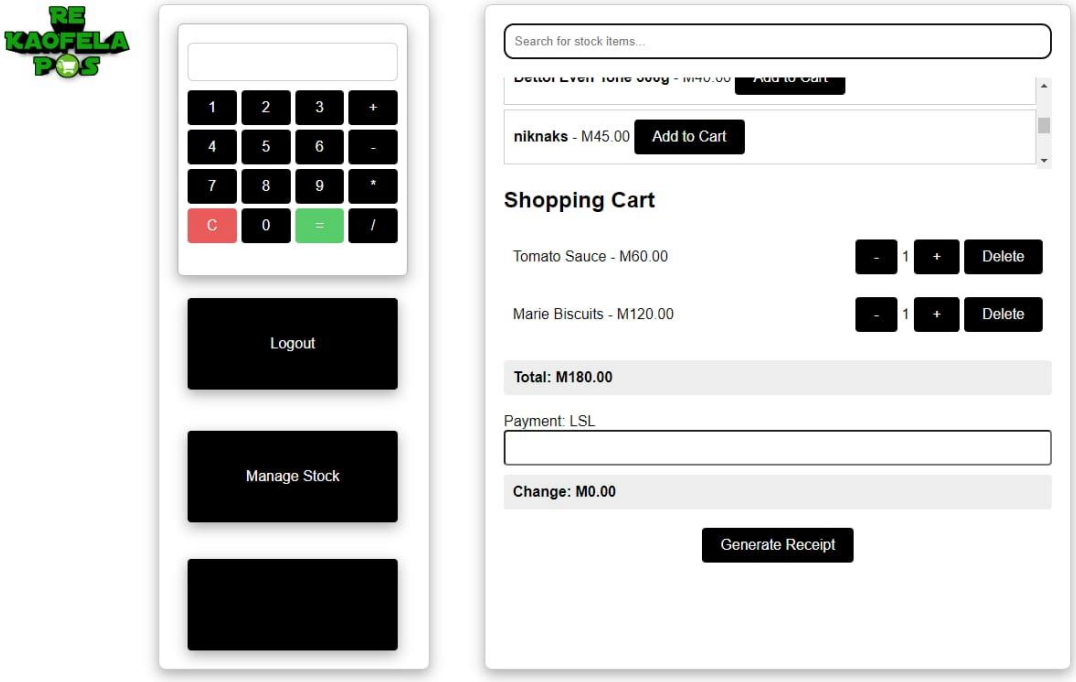
User is authentic, when an option of Admin(the manager or business owner) is selected, the following functionalities are available:

With the options shown in the menu, the manager is able to add stock, delete and update stock through the view stock option. He/she can also register cashiers into the system as well as sell like an ordinary cashier in the absence of one. And can also log-out.

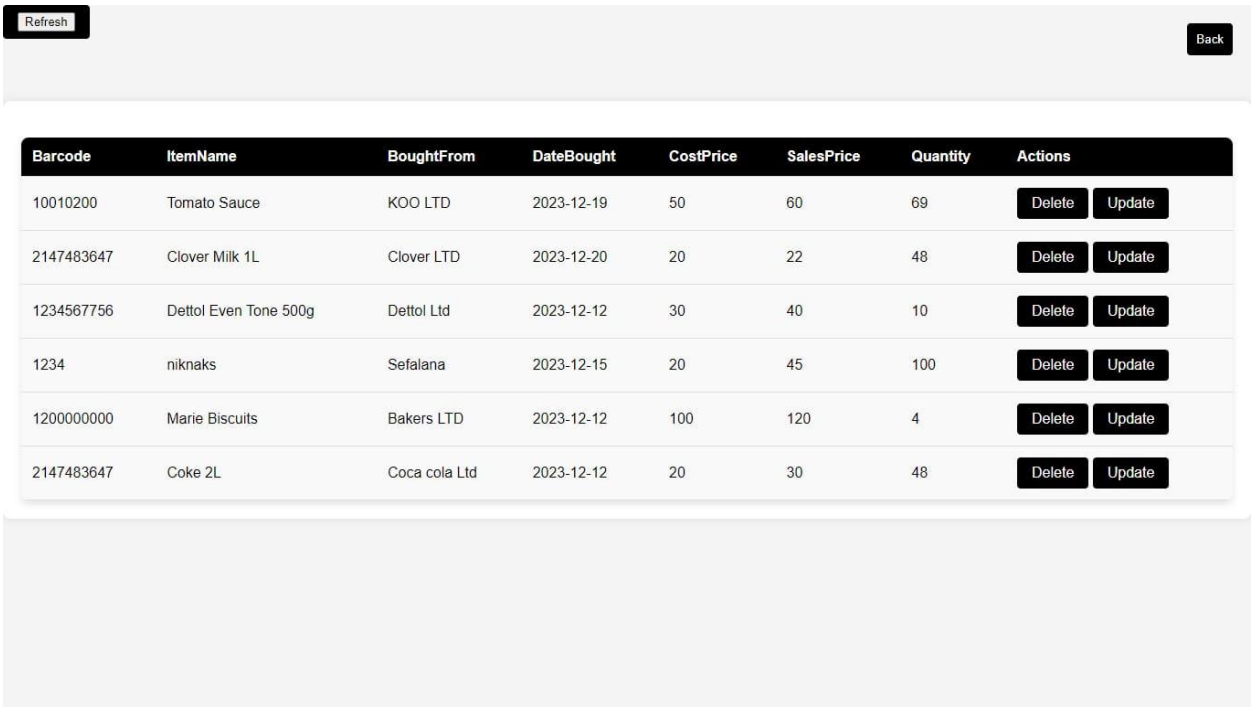


When the register option has been selected:

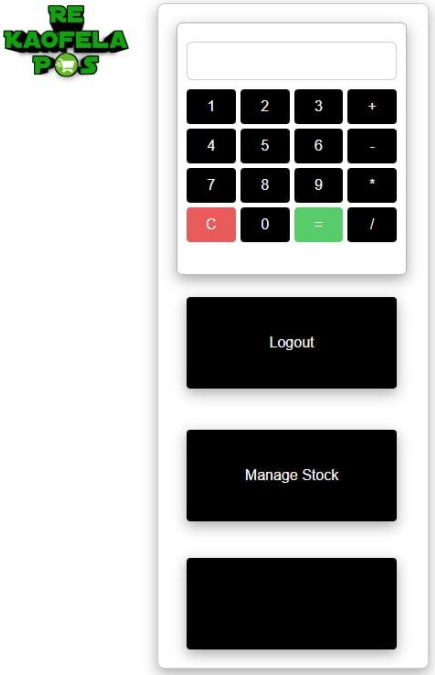
When the sell option has been chosen:

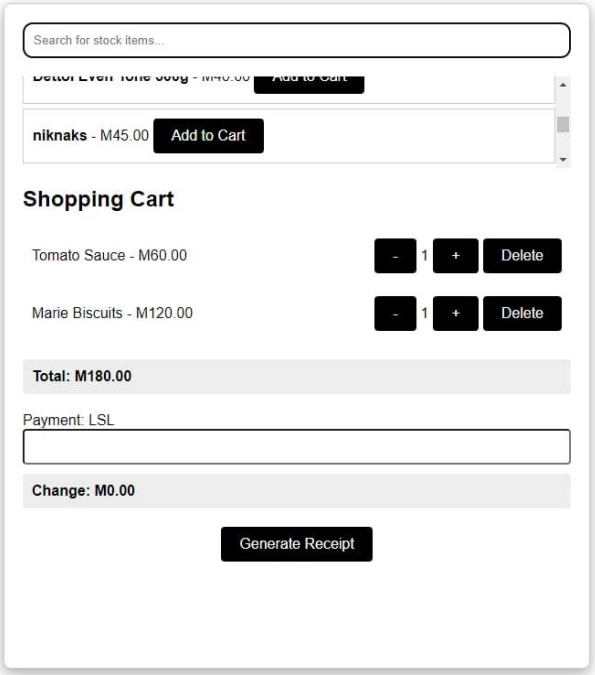


When the view stock option has been selected:



When user is logged in as staff, the following functionality is available:





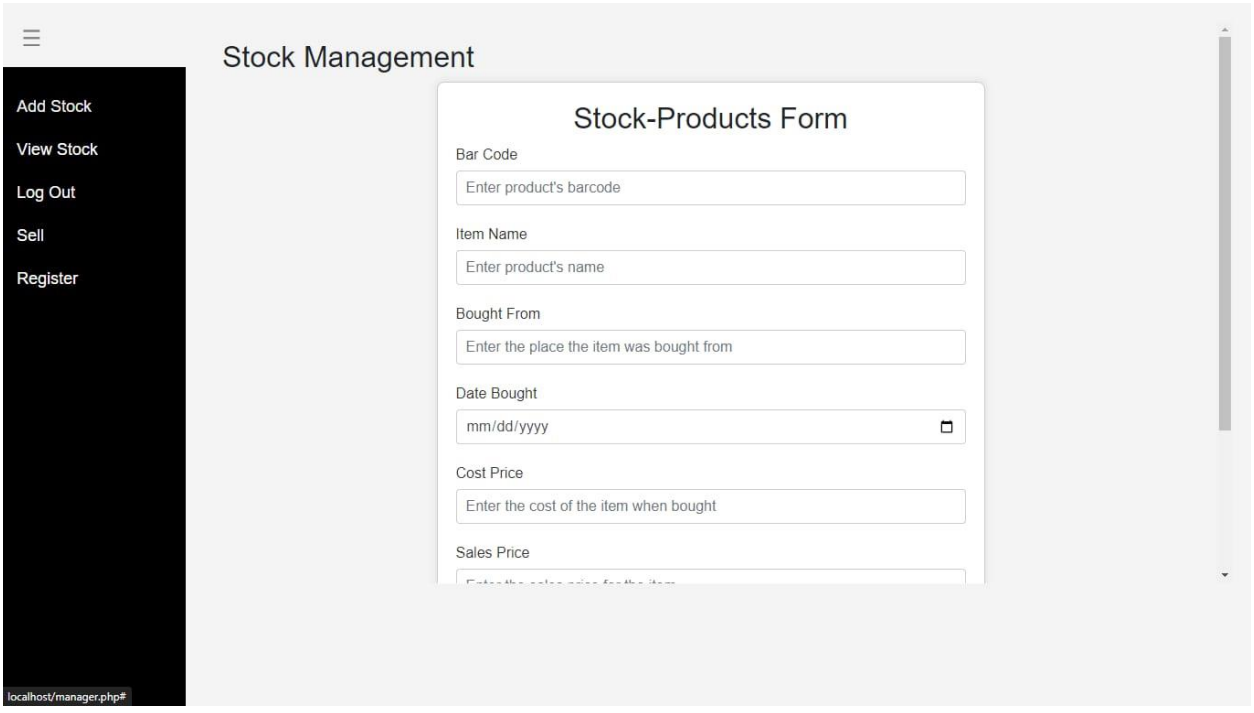
4.2 System Validation

System has the following capabilities:

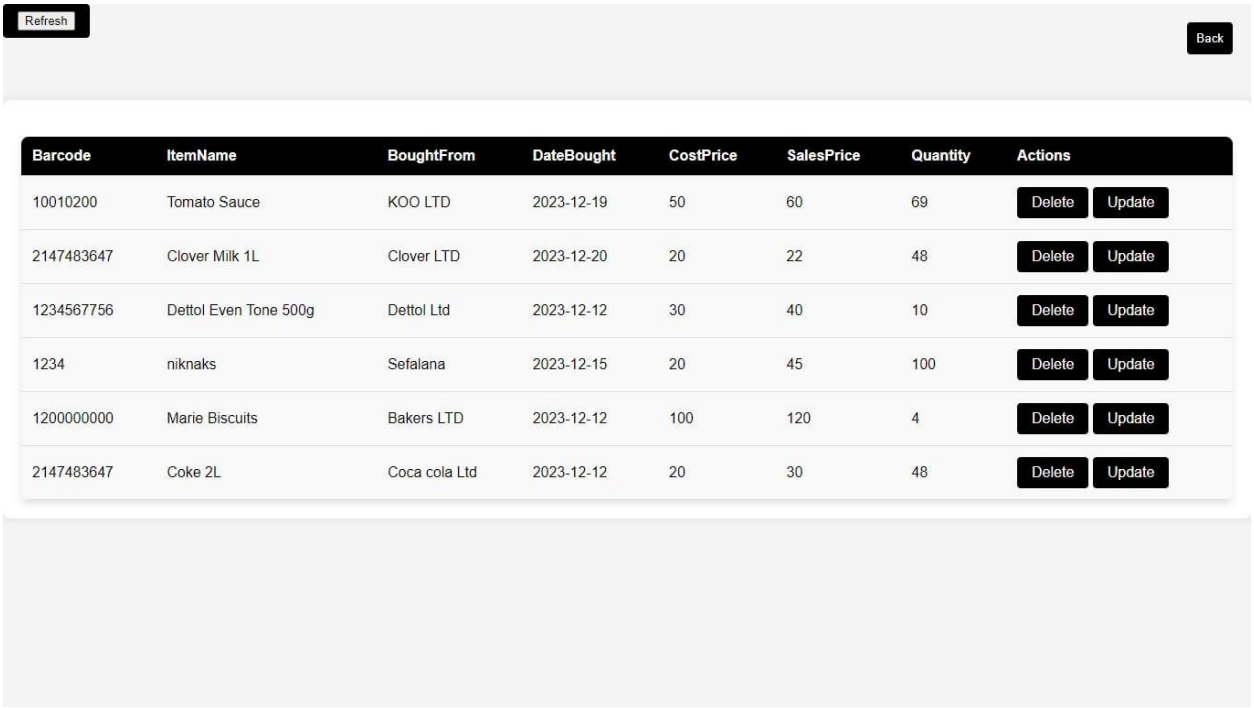
a). Allow manager to add stock, register new staff, update, view and delete stock. The stock history can be retrieved from the database.

Register new staff:

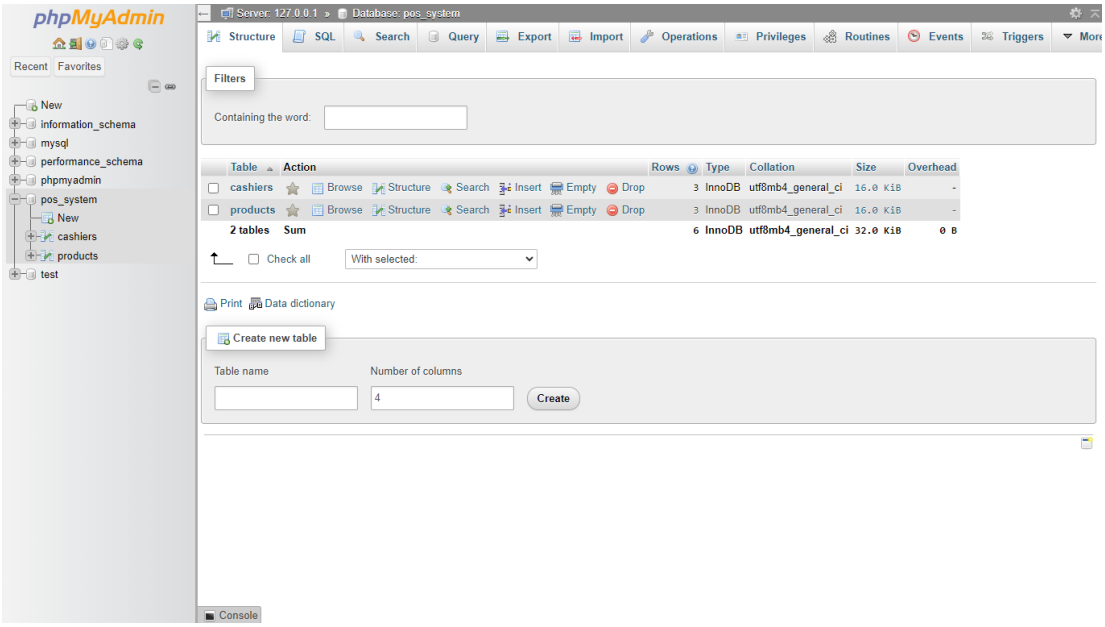
Adding stock food, toiletries and detergents as stock in totality:



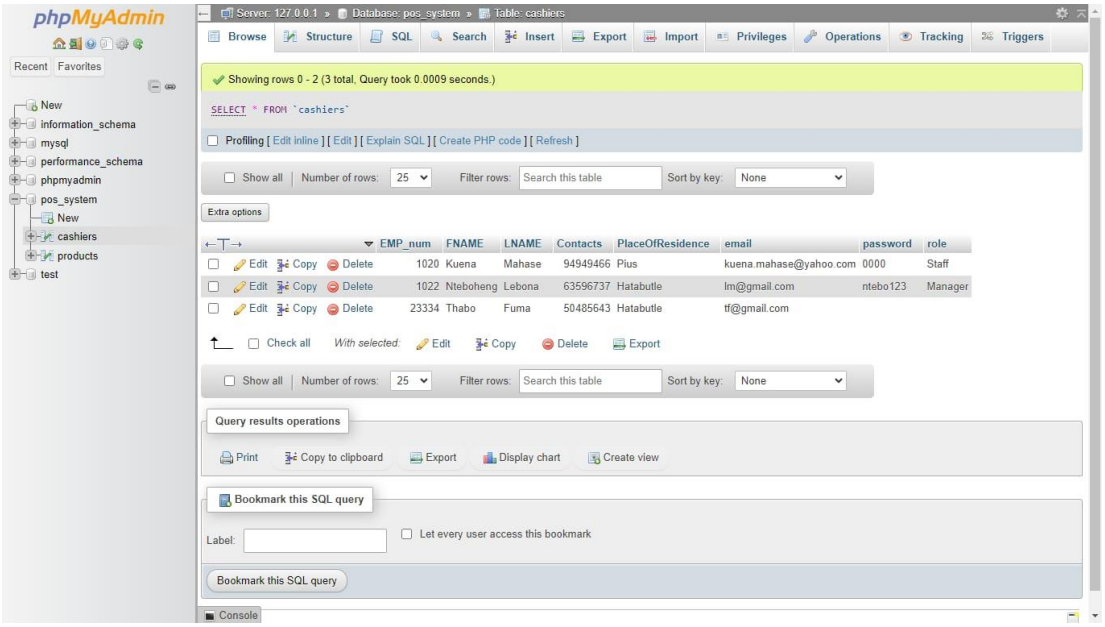
Updating, viewing and deleting stock:’



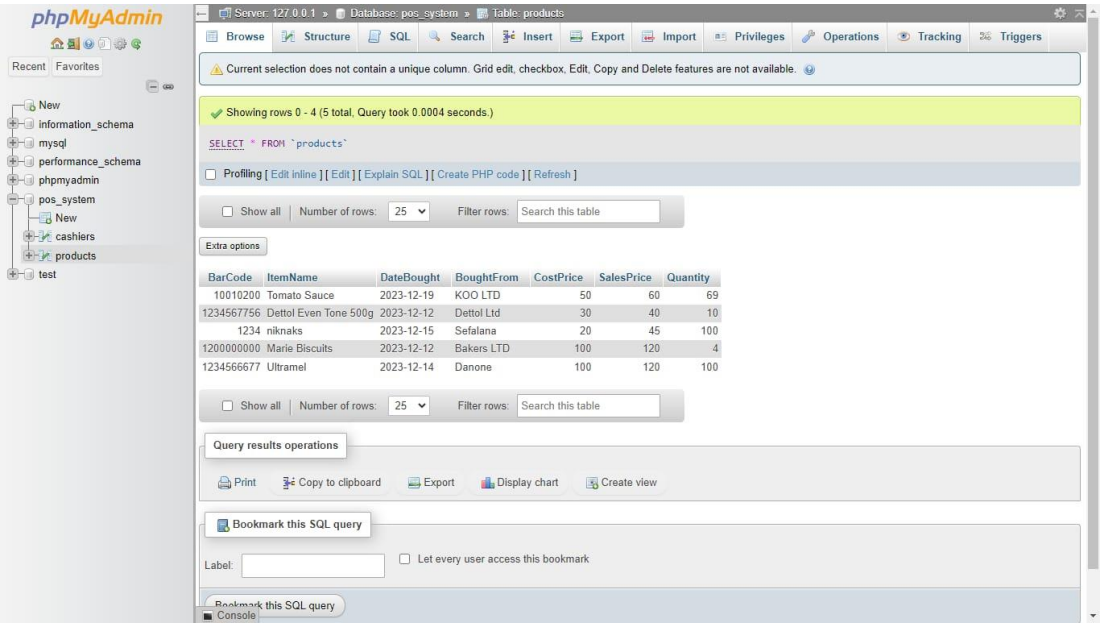
The database tables:



The cashiers table:



The products table:



Chapter 5

5.1 Problems and Failures

The system only sells one item at a time, it cannot sell multiple items at a time. After a successful sale, the system does not have the functionality to note which stock has been sold, so the cashier would have to keep record of all the receipts in order for the manager to track which stock was sold. A method that computes discounts was not implemented into the code. We were not able to include functionality that tracks cashier's session.

5.2Conclusion

The success of any system is dependent on its usage. It is therefore hoped that the system will be put to use under optimum conditions that satisfy its requirements. Given the required maintenance, the system will help facilitate sales by tracking and storing relevant data needed for effective sales management

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