Design and Implementation of Inventory System for Local Shop

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DECLARATION

We, hereby, declare that the work presented in this report is the outcome of the investigation performed by us under the supervision of **Imran Hossen, Lecturer,** Department of Computer Science and Engineering, Sonargaon University, Dhaka, Bangladesh. We reaffirm that no part of this project has been or is being submitted elsewhere for the award of any degree or diploma.

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ABSTRACT

Inventory management is a crucial aspect of business operations, particularly for small and local shops where efficient stock control directly affects profitability and customer satisfaction. Traditional manual inventory systems are often time-consuming, error-prone, and inefficient, making it difficult for shop owners to maintain accurate stock records and generate useful reports.

This project presents the design and implementation of a web-based inventory management system for a local shop. The system is developed using ASP.NET Core MVC, C#, and Microsoft SQL Server to automate inventory operations such as product management, purchase tracking, sales management, and inventory reporting. The system ensures real-time stock updates by automatically adjusting inventory levels during purchase and sales transactions.

The proposed system provides a user-friendly interface that allows authorized users to manage inventory data efficiently without requiring advanced technical knowledge. Testing results demonstrate that the system improves accuracy, reduces human error, and enhances overall operational efficiency. The system is suitable for small and local shops and can be extended in the future with additional features such as barcode integration and mobile application support.

ACKNOWLEDGMENT

At the very beginning, we express our deepest gratitude to the Almighty Allah for granting us the strength, patience, and ability to complete this project successfully.

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We would also like to thank all the faculty members of the Department of Computer Science and Engineering for their guidance and support during our academic journey. Finally, we express our heartfelt gratitude to our families and friends for their constant encouragement and moral support.

LIST OF ABBREVIATIONS

ASP.NET	Active Server Pages .NET
CRUD	Create, Read, Update, Delete
DB	Database
ERD	Entity Relationship Diagram
MVC	Model View Controller
ORM	Object Relational Mapping
RDBMS	Relational Database Management System
SQL	Structured Query Language

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Inventory management plays a vital role in the smooth operation of any business organization, especially for small and local shops[1]. Inventory refers to the collection of goods or materials that a business holds for the purpose of selling or production. Proper inventory management ensures that the right products are available at the right time and in the right quantity. Without an efficient inventory system, businesses often face problems such as stock shortages, overstocking, financial losses, and customer dissatisfaction.

In many local shops, inventory management is still handled manually using notebooks, registers, or basic spreadsheets. These traditional methods are time-consuming, error-prone, and inefficient in today's fast-paced business environment. Manual inventory handling makes it difficult to track stock levels accurately, manage sales and purchases efficiently, and generate meaningful reports for decision-making.

With the rapid advancement of information technology, computerized inventory systems have become essential for improving business efficiency. A web-based inventory management system provides automation, accuracy, and real-time monitoring of stock, sales, and purchases. Such systems help shop owners reduce human error, save time, and improve overall productivity.

This project focuses on the design and implementation of an inventory system for a local shop using modern web technologies. The proposed system is designed to manage products, categories, purchases, sales, and inventory reports efficiently. The system aims to provide a user-friendly interface that can be easily operated by shop owners without requiring advanced technical knowledge.

1.2Problem Statement

Local shop owners often face several challenges due to the lack of a proper inventory management system. Manual record-keeping does not provide accurate and up-to-date information about stock levels. As a result, shop owners may run out of essential products or store excess inventory, leading to financial loss.

Another major problem is the difficulty in tracking daily sales and purchases. Without a centralized system, calculating profit, monitoring fast-moving products, and maintaining historical records becomes complicated. Additionally, manual systems do not support automated report generation, which is necessary for business analysis and planning.

Security and data consistency are also significant issues in traditional systems. Records can be lost, damaged, or manipulated easily. Therefore, there is a strong need for a reliable, secure, and automated inventory management system that can efficiently handle inventory operations for local shops.

1.3Objectives of the Project

The main objective of this project is to design and implement a web-based inventory management system that can simplify inventory operations for local shop owners.

The specific objectives of the project are:

- To develop a user-friendly inventory management system for local shops
- To manage product categories and product information efficiently
- To automate purchase and sales operations
- To track stock quantity accurately in real time
- To generate inventory and sales reports for decision-making
- To reduce human error and improve operational efficiency

1.4Scope of the Project

The scope of this project is limited to the development of a web-based inventory system suitable for small and local shops. The system allows authorized users to manage categories, products, purchases, sales, and inventory reports through a centralized platform.

The system does not include advanced features such as online payment processing, multi-branch inventory synchronization, or mobile application support. However, the designed system can be extended in the future to include additional features as per business requirements.

1.5 Methodology

The development of this project follows a structured methodology consisting of several stages. Initially, system requirements were gathered by analyzing the needs of local shop owners. Based on the requirements, the system architecture and database design were prepared.

After the design phase, the system was implemented using ASP.NET Core MVC and MS SQL Server. Entity Framework was used for database operations. The system was then tested to ensure correctness, usability, and reliability. Finally, the system outputs were analyzed and documented.

1.6 Organization of the Project Report

This project report is organized into five chapters. Chapter 1 introduces the background, problem statement, objectives, scope, and methodology of the project. Chapter 2 presents a review of existing inventory management systems and related studies. Chapter 3 describes the system design, architecture, database design, and implementation details. Chapter 4 discusses the system results and output analysis with screenshots. Finally, Chapter 5 concludes the project and outlines possible future enhancements.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

A literature review provides an overview of existing studies, systems, and technologies related to the proposed project. The purpose of this chapter is to analyze previously developed inventory management systems and identify their strengths and limitations. By reviewing related works, it becomes possible to understand the current practices in inventory management and to justify the need for the proposed system for local shops.

Inventory management systems have evolved significantly with the advancement of information technology. From manual record-keeping to fully automated web-based solutions, various approaches have been developed to improve accuracy, efficiency, and decision-making capabilities. This chapter discusses the concepts of inventory management, existing systems, and related research works relevant to this project.

2.2 Overview of Inventory Management System

An inventory management system is a process or software solution used to track, control, and manage stock levels of goods in a business. The primary goal of an inventory system is to ensure that products are available when needed while minimizing excess stock and operational costs.

A well-designed inventory management system helps businesses maintain accurate records of products, monitor sales and purchases, and generate reports for business analysis. It also assists in reducing manual workload, preventing data inconsistency, and improving overall business efficiency. Inventory systems are widely used in retail shops, warehouses, supermarkets, and manufacturing industries.

2.3 Manual Inventory Management System

In many local shops, inventory management is still performed manually using paper registers or notebooks. In some cases, simple spreadsheet tools are used to record product details, sales, and purchases. Although manual systems are easy to implement and require minimal cost, they suffer from several limitations.

Manual inventory systems are highly dependent on human accuracy. Errors in calculation, data duplication, and missing records are common issues. Updating stock information manually is time-consuming and does not provide real-time data. Moreover, generating reports from manual records is difficult and inefficient, which limits proper business analysis and decision-making[9].

2.4 Computerized Inventory Management System

Computerized inventory management systems were introduced to overcome the limitations of manual systems. These systems use software applications to store, process, and retrieve inventory data efficiently. Computerized systems allow faster data entry, accurate calculations, and automated report generation.

Most modern inventory systems are database-driven and provide features such as product management, sales tracking, purchase management, and stock monitoring. Computerized systems significantly reduce human error and improve data security. However, some systems are complex, expensive, and require technical expertise, which makes them less suitable for small and local shops.

2.5 Web-Based Inventory Management System

With the widespread use of the internet, web-based inventory management systems have become increasingly popular. These systems can be accessed through a web browser and allow users to manage inventory data from any location with internet connectivity.

Web-based systems offer several advantages, including centralized data storage, real-time updates, multi-user access, and platform independence. Such systems are cost-effective and scalable, making them suitable for small businesses and local shops. Many researchers have proposed web-based inventory solutions to improve stock management, sales monitoring, and reporting efficiency.

2.6 Review of Related Works

Several studies have been conducted on the design and implementation of inventory management systems. Previous research works highlight the importance of automation in inventory control and demonstrate how computerized systems improve accuracy and efficiency.

Some studies focus on desktop-based inventory systems, while others propose web-based solutions using modern frameworks and databases. These systems typically include modules for product management, purchase and sales tracking, and reporting. Although these systems are effective, many of them are designed for large enterprises and lack simplicity for small shop owners.

2.7 Limitations of Existing Systems

Despite the availability of various inventory management systems, many existing solutions are not suitable for local shops. Some systems are expensive and require high implementation costs. Others are complex and difficult to use for non-technical users.

Additionally, certain systems do not provide real-time stock updates or flexible reporting features. These limitations create a gap between existing solutions and the practical needs of small and local shop owners. Therefore, there is a need for a simple, affordable, and user-friendly inventory management system tailored specifically for local shops.

2.8 Summary

This chapter reviewed different types of inventory management systems, including manual, computerized, and web-based approaches. The review highlights that although many systems exist, they often fail to meet the specific requirements of local shops due to cost, complexity, or lack of usability.

The analysis of related works and existing systems justifies the development of the proposed web-based inventory system for local shops, which aims to provide an efficient, accurate, and user-friendly solution. The next chapter describes the design and implementation details of the proposed system.

CHAPTER 3

SYSTEM DESIGN AND IMPLEMENTATION

3.1 System Overview

The proposed system is a web-based Inventory Management System designed for managing daily inventory operations of a local shop. The system automates the process of product management, purchase and sales tracking, stock control, and report generation. It aims to reduce manual effort, minimize errors, and provide accurate real-time inventory information.

The system allows authorized users to log in and perform inventory-related operations through a user-friendly interface. It ensures that stock quantity is automatically updated whenever a purchase or sale is recorded. The system is suitable for small and local shops that require a simple, reliable, and efficient inventory solution.

3.2 System Architecture

The inventory system follows the Model–View–Controller (MVC) architectural pattern. This architecture separates application logic, user interface, and data access, which improves maintainability and scalability.

- **Model:**
  Handles business logic and database entities such as Products, Categories, Purchases, Sales, and Users.
- **View:**
  Represents the user interface developed using Razor View (.cshtml) files. It displays forms, tables, and reports to users.
- **Controller:**
  Acts as an intermediary between the Model and the View. Controllers process user requests, perform business logic, and return appropriate views.

This layered architecture ensures a clean separation of concerns and improves the overall system performance and security.

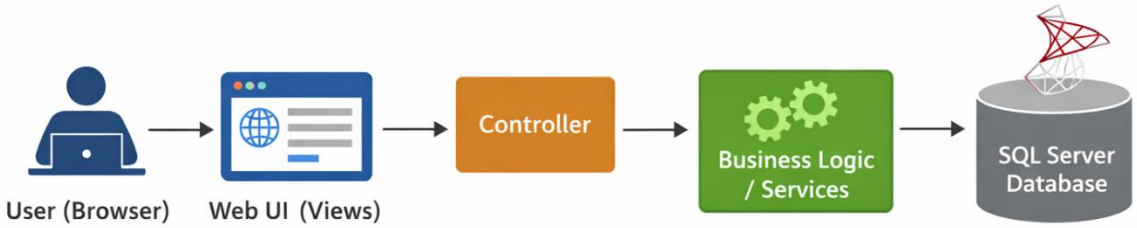

Figure 3.1: *System Architecture of the Inventory Management System.*

3.3 Technology Used

The following technologies were used to develop the proposed inventory system:

- **Programming Language:** C#
- **Framework:** ASP.NET Core MVC (.NET 6)
- **Frontend:** HTML, CSS, Razor View Engine
- **Backend:** ASP.NET Core Controllers
- **Database:** Microsoft SQL Server
- **ORM Tool:** Entity Framework Core

These technologies were chosen because of their reliability, performance, and suitability for developing secure web-based applications.

3.4 Database Design

The system uses Microsoft SQL Server as the backend database. A relational database design is implemented to ensure data consistency and integrity. The database stores information related to users, products, categories, purchases, sales, and inventory transactions [3][7].

3.4.1 Database Tables

The main tables used in the system are:

- Users
- ProductCategories
- Products
- Purchases
- PurchaseDetails
- Sales
- SaleDetails

Relationships are established using primary keys and foreign keys to maintain referential integrity.

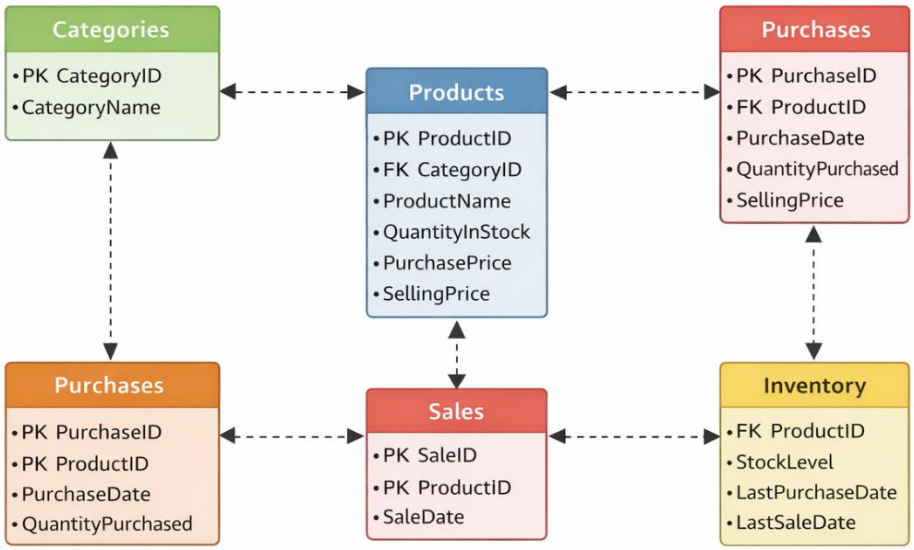

Figure 3.2: *Entity Relationship Diagram of the Inventory System.*

3.5 Module Description

The system is divided into several functional modules. Each module performs a specific task in the inventory management process.

3.5.1 User Authentication Module

This module allows users to log in and access the system securely. Only authenticated users can perform inventory operations. Session management is used to control user access and maintain security.

3.5.2 Category Management Module

This module allows users to create, update, view, and delete product categories. Categories help organize products and make inventory management easier.

3.5.3 Product Management Module

The product module manages product-related information such as product name, category, purchase price, sale price, and stock quantity. Users can add new products and update existing product information.

3.5.4 Purchase Module

The purchase module records incoming stock. When a purchase is added, the system automatically increases the stock quantity of the corresponding products. Purchase details are stored for future reference.

3.5.5 Sales Module

The sales module handles outgoing stock. When a sale is recorded, the system automatically decreases the product stock quantity. This ensures real-time inventory accuracy.

3.5.6 Report Module

This module generates inventory and sales reports. Users can view summarized information such as total stock, sold items, and closing stock. Reports help shop owners analyze business performance.

3.6 Workflow of the System

The workflow of the inventory system begins with user authentication. After successful login, the user is redirected to the dashboard, which displays an overview of inventory status.

The user can then perform operations such as managing categories and products, recording purchases and sales, and generating reports. Stock quantities are updated automatically based on purchase and sales activities.

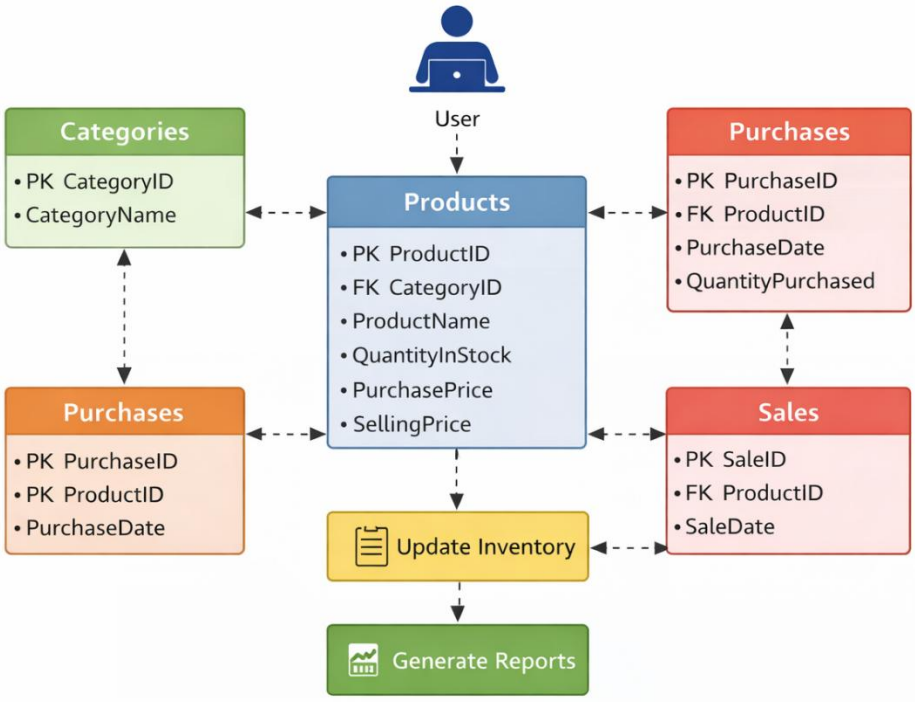

Figure 3.3: *Workflow of the Inventory Management System.*

3.7 Security and Data Integrity

The system ensures data security through user authentication and session validation. Unauthorized users are restricted from accessing system functionalities. Data integrity is maintained using relational database constraints and controlled CRUD operations through Entity Framework.

3.8 Summary

This chapter presented the design and implementation details of the proposed inventory management system. The system architecture, technologies used, database design, and functional modules were discussed in detail. The system is designed to provide an efficient, secure, and user-friendly inventory solution for local shops.

The next chapter discusses the system results and output analysis with screenshots.

CHAPTER 4

RESULT AND DISCUSSION

4.1 System Output Overview

This chapter presents the results and outputs of the implemented inventory management system. The system was tested by performing different operations such as user login, product management, purchase entry, sales entry, and report generation. The outputs confirm that the system functions correctly and fulfills the project objectives.

All operations were performed using real data, and the system successfully updated inventory records in real time. The graphical user interface provides a simple and user-friendly experience suitable for local shop owners.

4.2 Login and Dashboard Output

After successful authentication, the user is redirected to the dashboard page. The dashboard provides a summary of important inventory information, including total products, total categories, current stock status, and overall system overview. This helps the user quickly understand the current inventory condition.

Figure 4.1 illustrates the login interface of the system, while Figure 4.2 shows the dashboard summary after successful login.

Figure Captions:

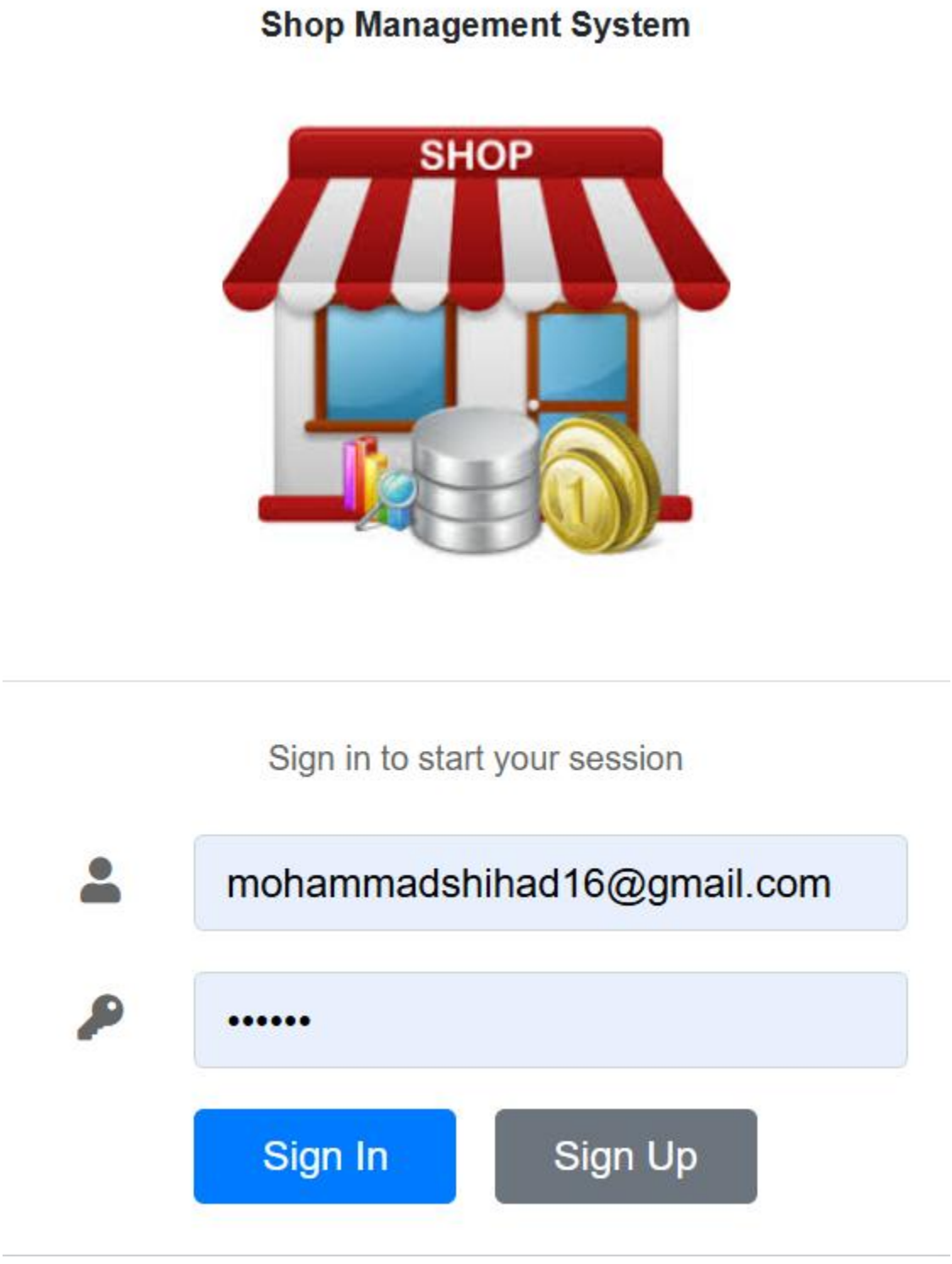

Fig. 4.1: User login interface of the inventory management system

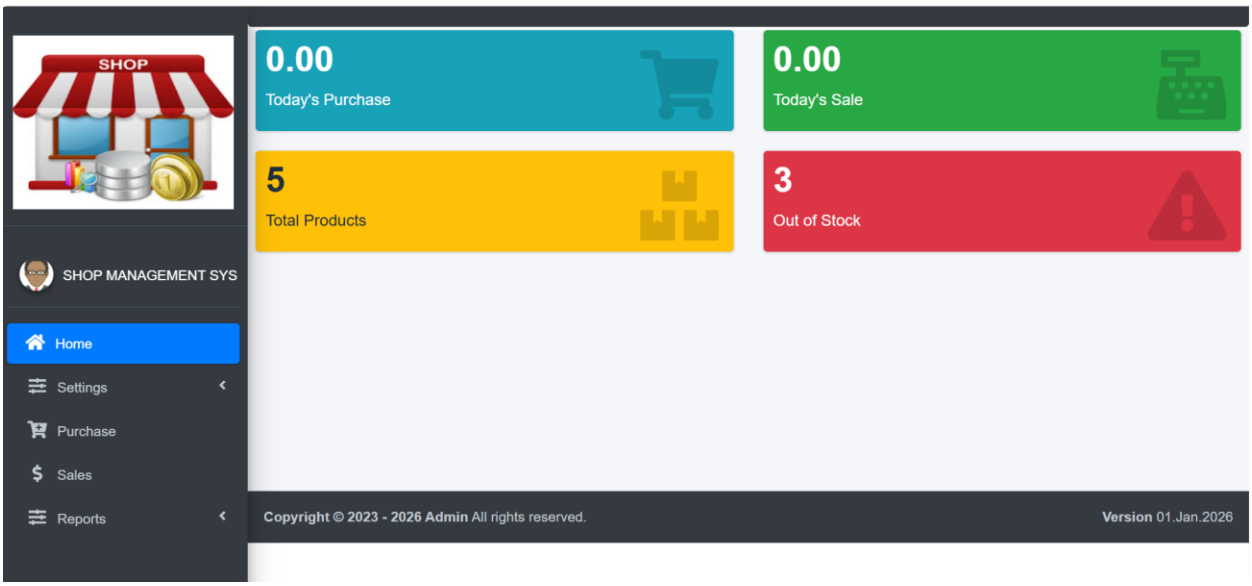

Fig. 4.2: Dashboard overview showing inventory summary

4.3 Category and Product Management Output

The category management module allows users to add, update, view, and delete product categories. This helps organize products efficiently. The product management module enables users to manage product details such as product name, category, purchase price, sale price, and stock quantity.

The system displays all product information in a tabular format, allowing easy modification and monitoring. Figure 4.3 shows the category list interface, and Figure 4.4 presents the product management page.

Figure Captions:

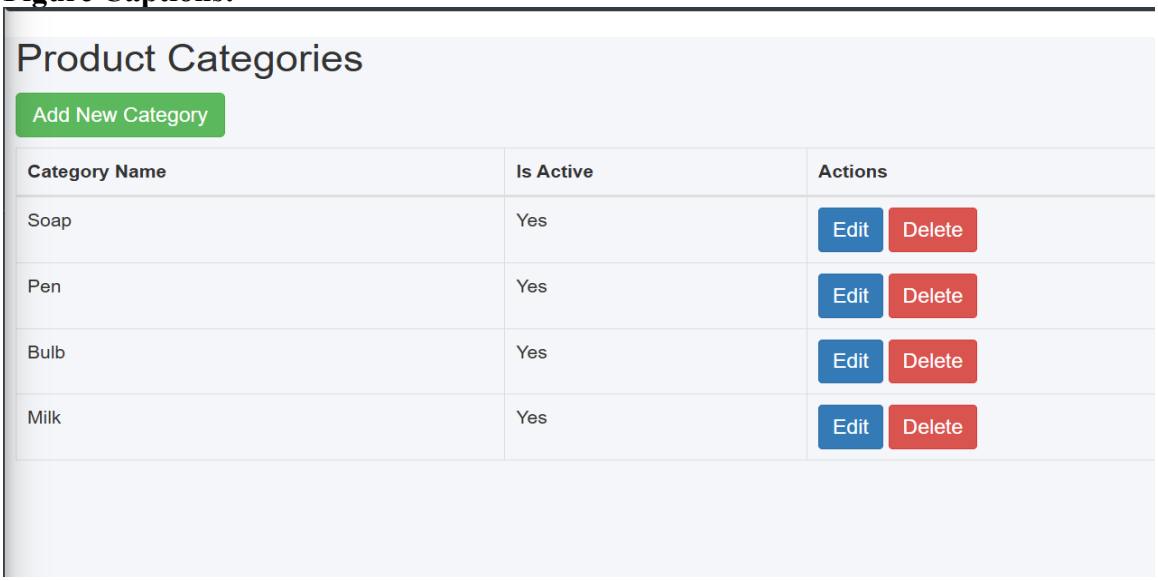

Fig. 4.3: Category management interface

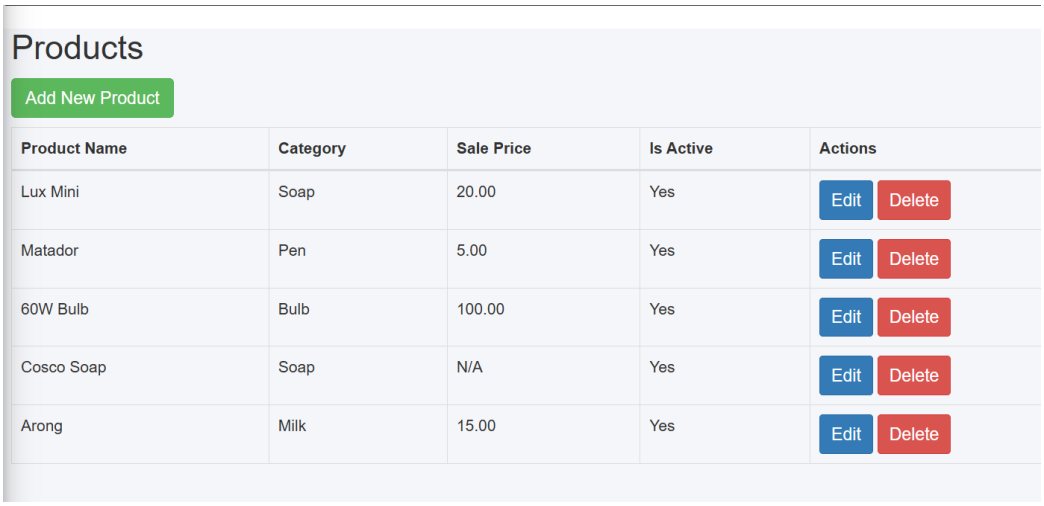

Fig. 4.4: Product management interface showing product list

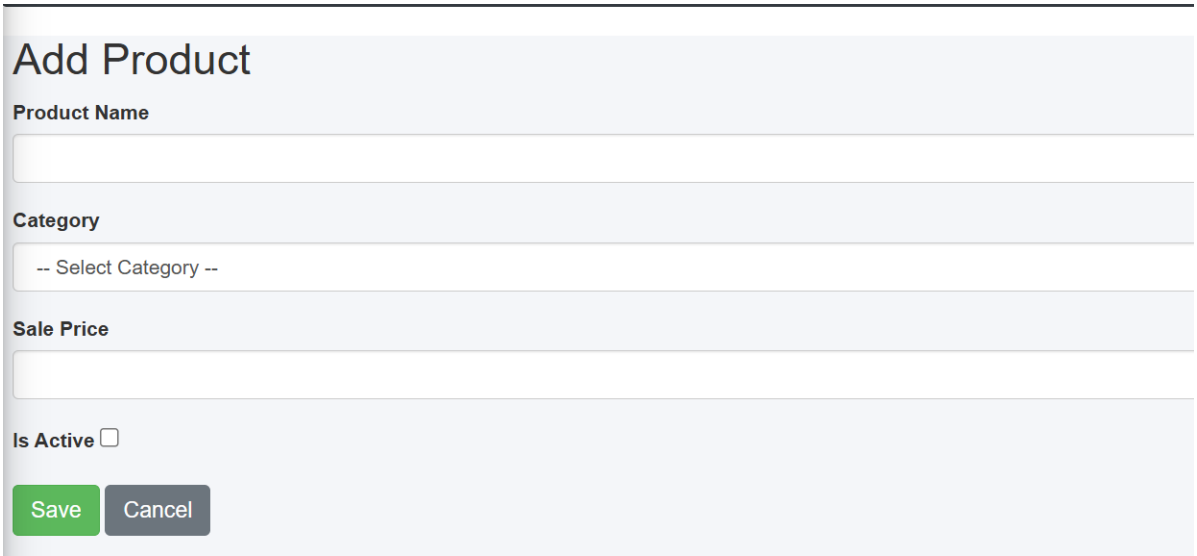

Fig. 4.5: Product management interface showing product Entry

4.4 Purchase Operation Result

The purchase module is used to record incoming stock. When a purchase entry is created, the system automatically increases the stock quantity of the corresponding products. This ensures accurate and real-time inventory updates.

The purchase details page displays purchase date, supplier information, and purchased items. Figure 4.6 shows the purchase entry form, and Figure 4.7 displays the purchase details output.

Figure Captions:

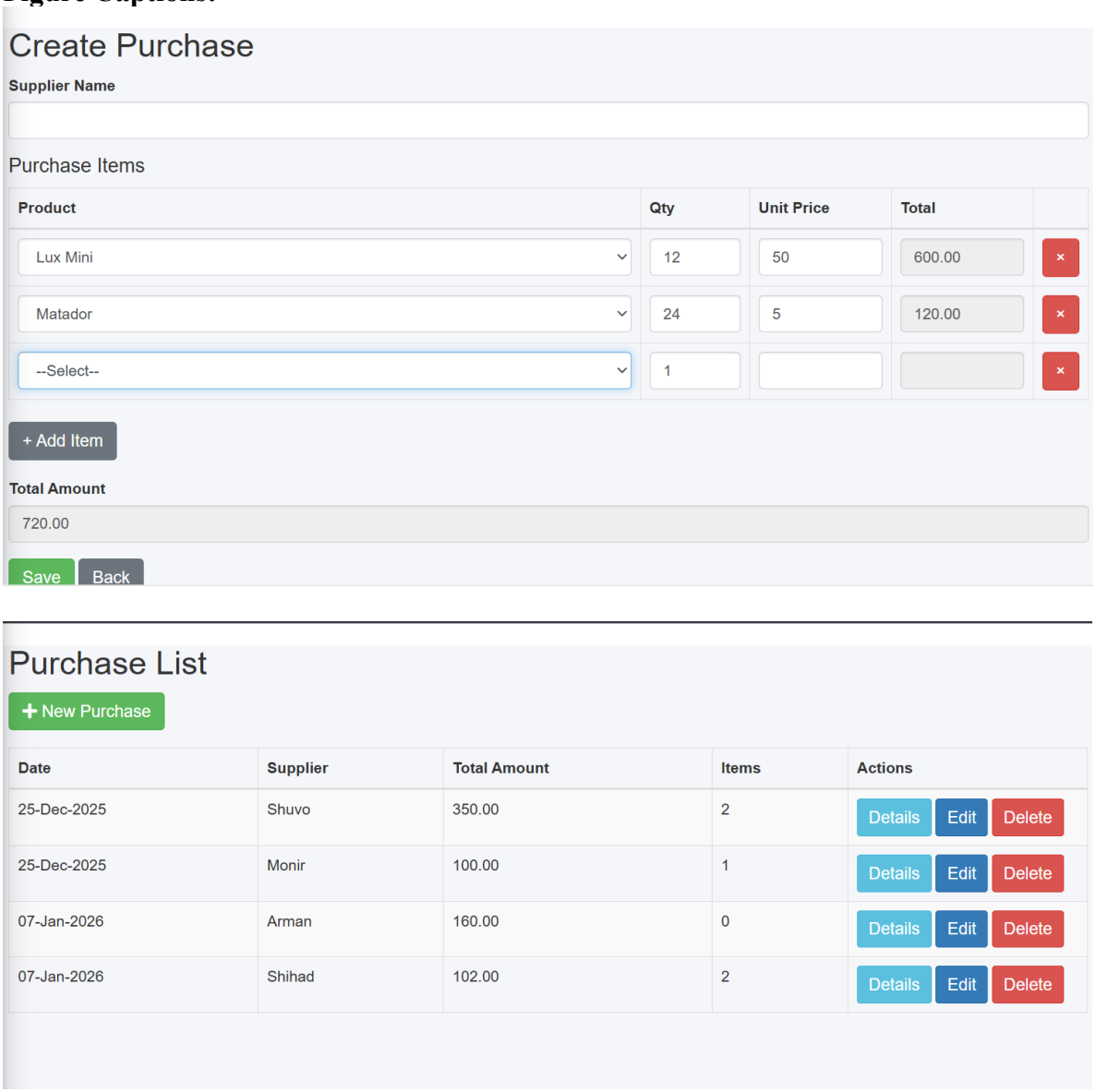

Fig. 4.6: Purchase entry form

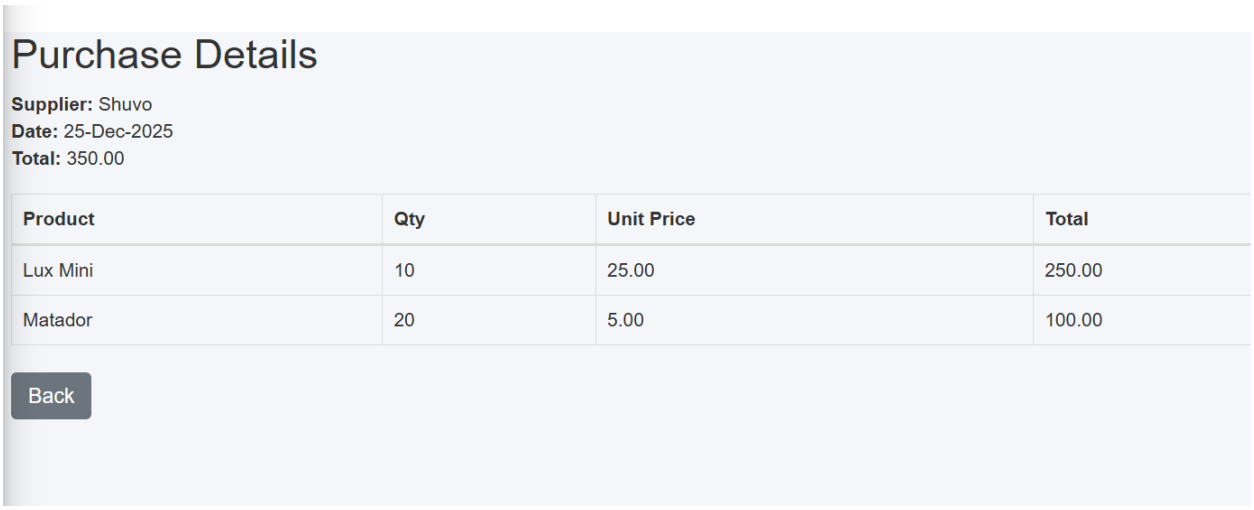

Fig. 4.7: Purchase details showing stock increment

4.5 Sales Operation Result

The sales module records outgoing stock. When a sales entry is completed, the system automatically decreases the stock quantity. This feature prevents over-selling and ensures inventory accuracy.

The sales output includes customer information, sold items, quantities, and total amount. Figure 4.8 demonstrates the sales entry interface, and Figure 4.9 shows the sales details page.

Figure Captions:

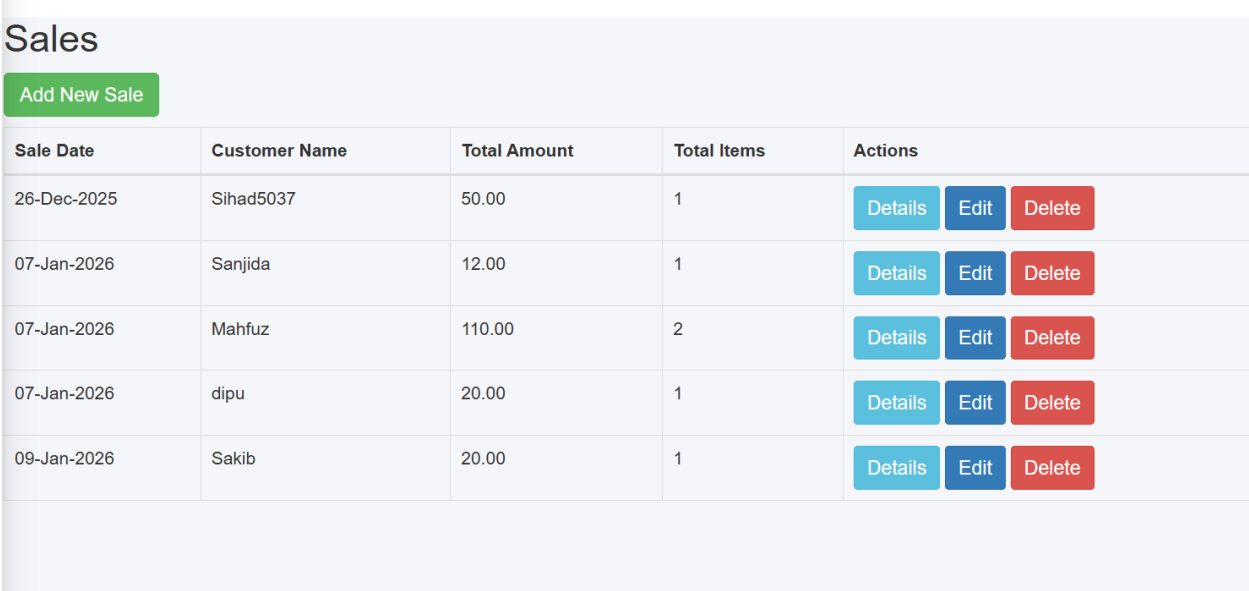

Fig. 4.8: Sales entry interface

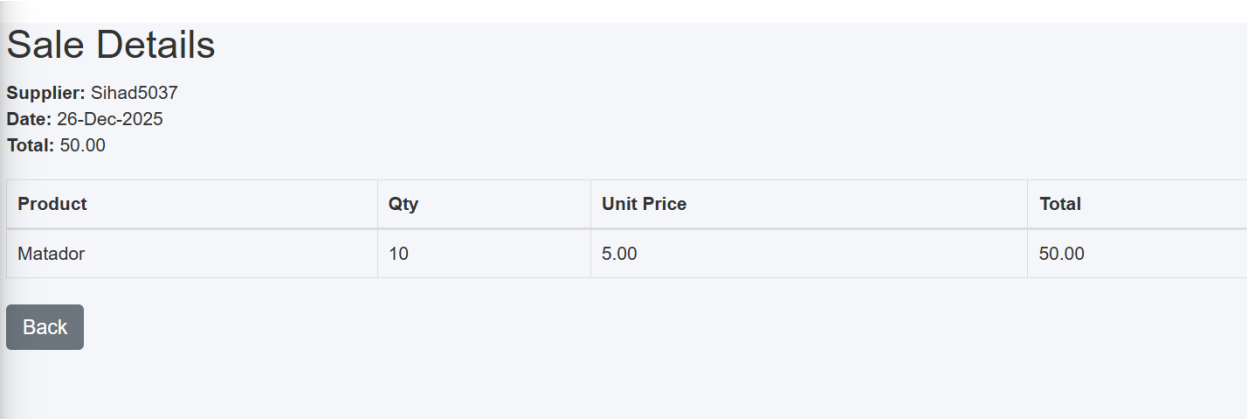

Fig. 4.9: Sales details showing stock reduction

4.6 Inventory Report Output

The report module generates inventory summaries and transaction reports. Users can filter reports by product or date range. The inventory report displays purchase quantity, sales quantity, and closing stock.

This feature helps shop owners analyze stock movement and make informed decisions. Figure 4.10 presents the inventory report output.

Figure Caption:

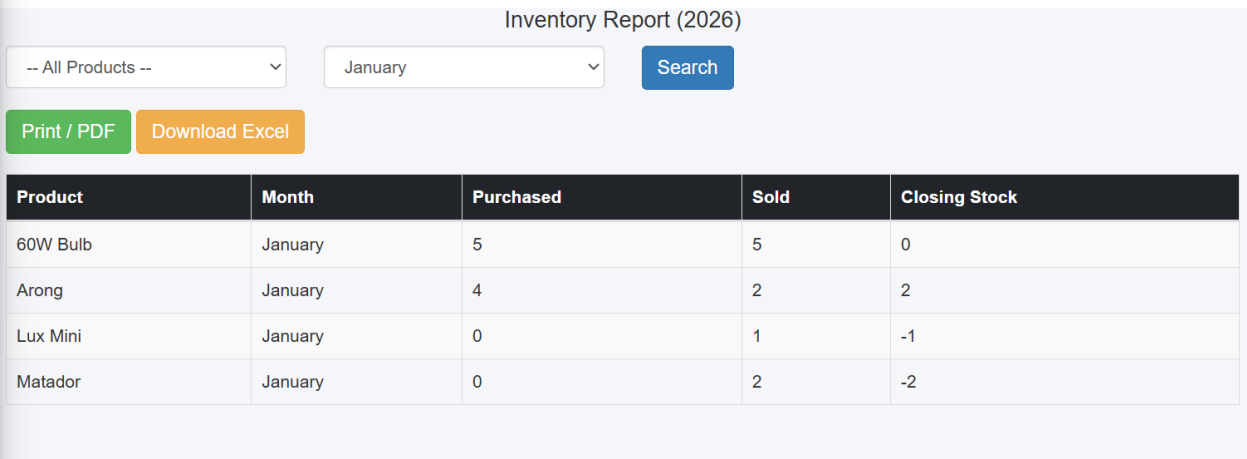

Fig. 4.10: Inventory report showing stock summary

4.7 Discussion

The system successfully automates inventory management tasks for local shops. Automatic stock updates during purchase and sales operations reduce human error and ensure data accuracy. The user-friendly interface makes the system easy to use even for non-technical users.

Compared to manual inventory systems, the implemented system provides faster processing, real-time data access, and improved reporting capabilities. The system meets the project objectives and offers an effective solution for managing inventory in small and local shops.

CHAPTER 5

CONCLUSION AND FUTURE WORK

5.1 Conclusion

This project presented the design and implementation of a web-based inventory management system for a local shop. The primary objective of the system was to simplify inventory operations by automating product management, purchase and sales tracking, stock control, and report generation. The developed system successfully addresses the limitations of traditional manual inventory management methods.

The system provides real-time inventory updates, which helps reduce stock mismatches and human errors. By using a centralized database and automated stock calculations, the system ensures accurate and consistent inventory records. The user-friendly interface allows shop owners to operate the system easily without requiring advanced technical knowledge.

The implementation of modern web technologies such as ASP.NET Core MVC and Microsoft SQL Server has improved system reliability, security, and performance. The system was tested under various operational scenarios, and the results demonstrate that it functions effectively and meets all defined project objectives. Therefore, the proposed inventory management system can be considered a practical and efficient solution for local shops.

5.2 Limitations

Although the developed system meets its primary objectives, it has some limitations. The system is designed as a web-based application and requires an active internet connection to operate. It currently supports single-shop inventory management and does not include multi-branch synchronization.

Additionally, advanced security features such as role-based access control and data encryption are limited. The system also does not include mobile application support, which may reduce accessibility for some users.

5.3 Future Work

The inventory management system can be further enhanced by incorporating additional features in the future. Some possible future improvements include:

- Integration of barcode or QR code scanning for faster product entry
- Development of a mobile application for improved accessibility
- Implementation of multi-shop or multi-branch inventory management
- Advanced role-based access control and security enhancements
- Cloud deployment for improved scalability and availability

These future enhancements would make the system more robust, scalable, and suitable for a wider range of business environments.

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