Sri Lanka Institute of Information Technology

Faculty of Computing

Year 2 – Semester 1 (2025)

SE2030 - Software Engineering

Project Title: Web-based Inventory Control System

Final Report

Group ID: 2025-Y2-S1-MLB-B10G2-06

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25/10/2025

1. Introduction

1.1 Project Overview

This project report outlines the creation of a Web-based Inventory Control System for Southern Goods Distributors Pvt Ltd, a growing distributor in Sri Lanka. The company was using manual methods like paper records and spreadsheets to manage its inventory. This led to several problems, including frequent stock errors, order delays, and a lack of real-time inventory information.

To solve these issues, we developed a central web application that is effective and easy to use. The new system uses live data and automatic alerts to make inventory management more efficient and improve the company's overall performance.

1.2 Objectives

The main goal of this project was to build a secure system that can grow with the company and solve its current challenges. Our key objectives were to:

- Create a central web-based system for real-time inventory tracking.
- Reduce errors in stock counting and order picking through automation.
- Allow staff to check stock levels instantly to make better decisions and improve customer service.
- Design an easy-to-use system that requires minimal training.
- Automate the process of creating and sending purchase orders to suppliers.

1.3 Target Users and Stakeholders

This system is designed for various users within the company:

- Business Owner: Views high-level reports to make strategic decisions.
- Inventory Manager: Tracks stock levels and manages the reordering process.
- Warehouse Staff: Handles the physical inventory, including receiving and shipping goods.
- Sales Staff: Checks stock availability for customer orders.
- Suppliers: Receive automated purchase orders from the system.
- System Administrator: Manages user accounts, system security, and data backups.

1.4 Scope and Limitations

Our project scope was to design and build a web-based inventory system to replace the company's manual methods. Core features include real-time stock tracking, automated purchase orders, warehouse management, business reporting, and secure user access.

Our system has the following limitations:

- It requires a stable internet connection for work.

- There is no offline mode available.
- Moving the company's existing data into the new system will take some initial effort.
- Some staff members may need training to get used to the new system.
- The system's full effectiveness depends on suppliers being able to receive digital purchase orders.

2. Requirements

2.1 Functional Requirements

Our system was built to perform the following main functions:

- Real-time Inventory Dashboard: Provides a live view of stock levels and sends low stock alerts.
- Purchase Order Management: Automatically creates, sends, and tracks purchase orders.
- Business Reporting & Analytics: Generates reports on sales, stock value, and product performance.
- Warehouse Operations Interface: A mobile-friendly interface for warehouse staff, with barcode scanning capabilities.
- User and Access Management: Provides secure, role-based access for all users.
- Automated Data Backups: Performs regular backups to prevent data loss.

2.2 Non-Functional Requirements

Our system was also designed with these quality attributes in mind:

- Performance: Ensures that users can access data quickly.
- Security: Implements role-based access and secure login to protect data.
- Scalability: The system is designed to handle future company growth.
- Usability: The interface is simple and easy to navigate.
- Reliability: The system includes dependable backup and recovery procedures.

2.3 Constraints and Assumptions

Our project was developed with the following constraints and limitations in mind:

- Internet Dependency: The system requires a constant internet connection to operate, as there is no offline mode.
- Initial Data Migration: Moving the company's existing data from paper records and spreadsheets into the new system will require a significant initial effort.
- Training Requirement: Some staff members, particularly those accustomed to manual processes, will require training to fully adapt to the new digital system.
- Supplier Digital Readiness: The system's full efficiency relies on suppliers being able to receive and

process digital purchase orders.

- No Native Mobile App: The system is a responsive web application and does not have a dedicated, installable mobile app.

3. Design

3.1 System Architecture

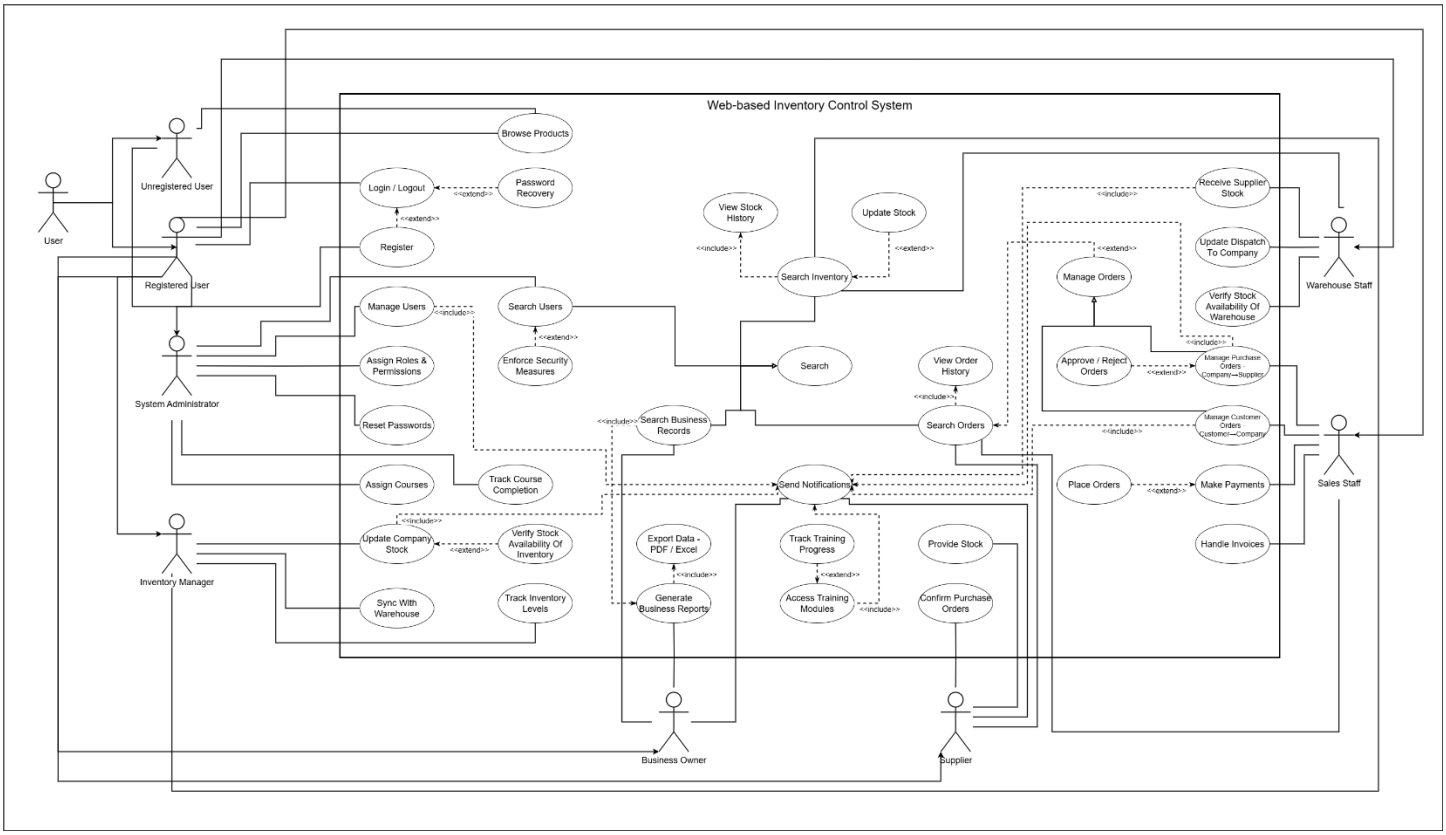
We used a three-tiered architecture for the system, which separates the user interface, the core application logic, and the database. This structure makes our system easier to manage and scale.

The main parts of the architecture are:

- Users: The different people who use the system based on their job roles.
- Core System: The main web application that includes all key functions, like reporting, user management, and stock control.
- Data: A central SQL Server database where all information is stored and managed, ensuring that the data is consistent and accurate.

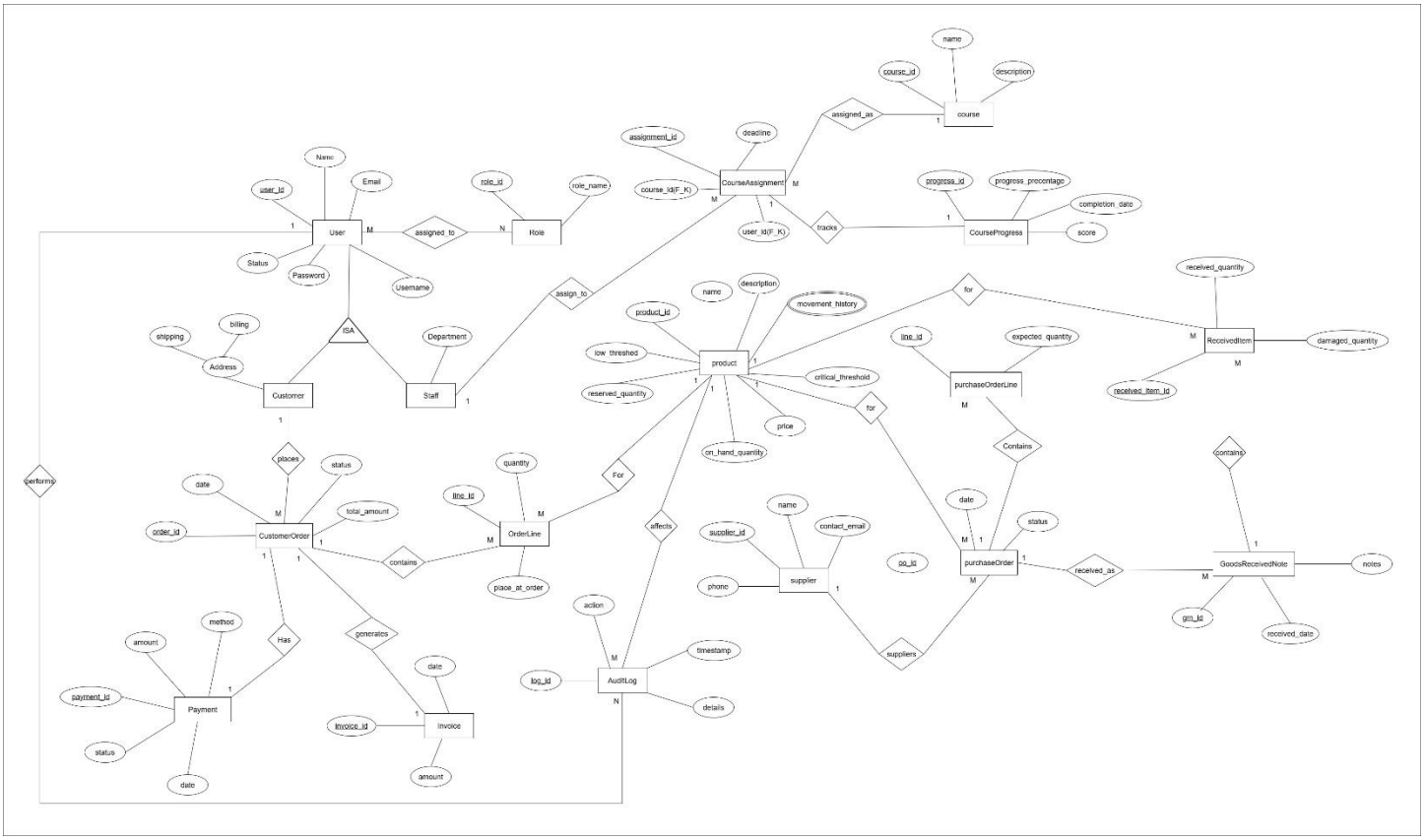
3.2 Use Case Diagram

This diagram shows how different users interact with our system and its main features.



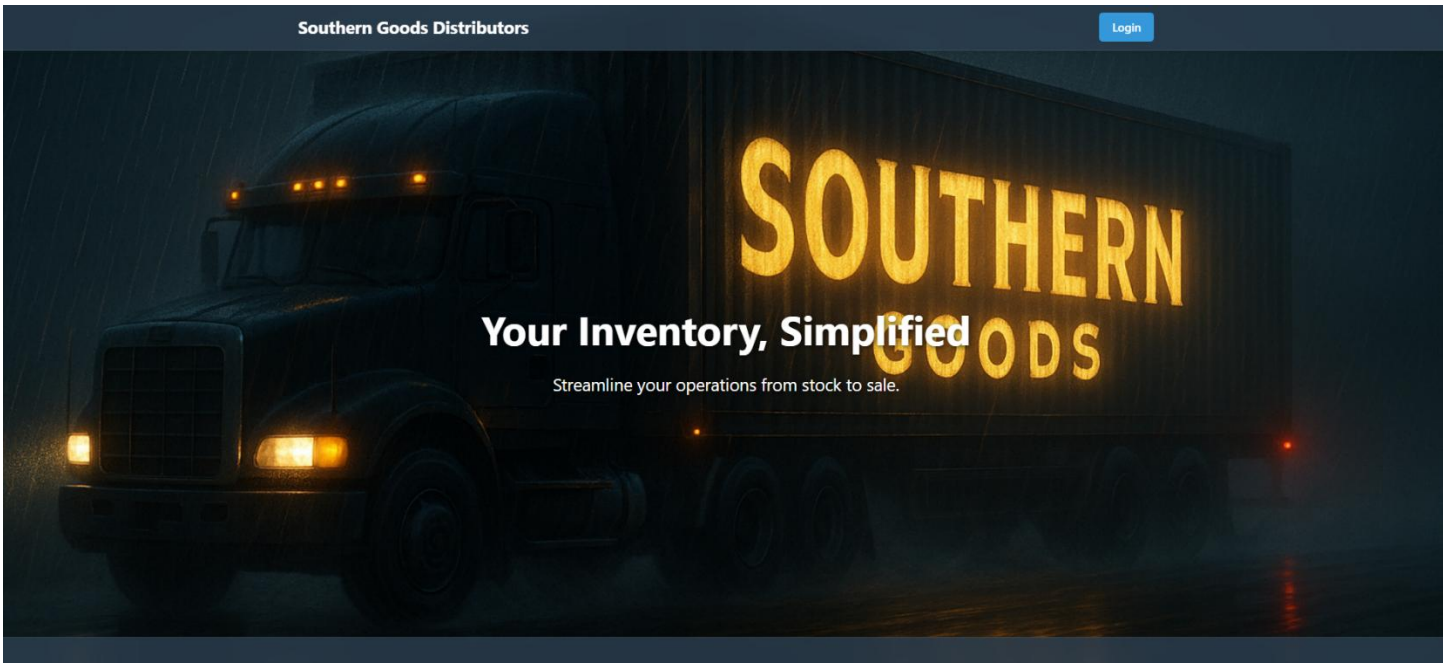
3.3 ER Diagram

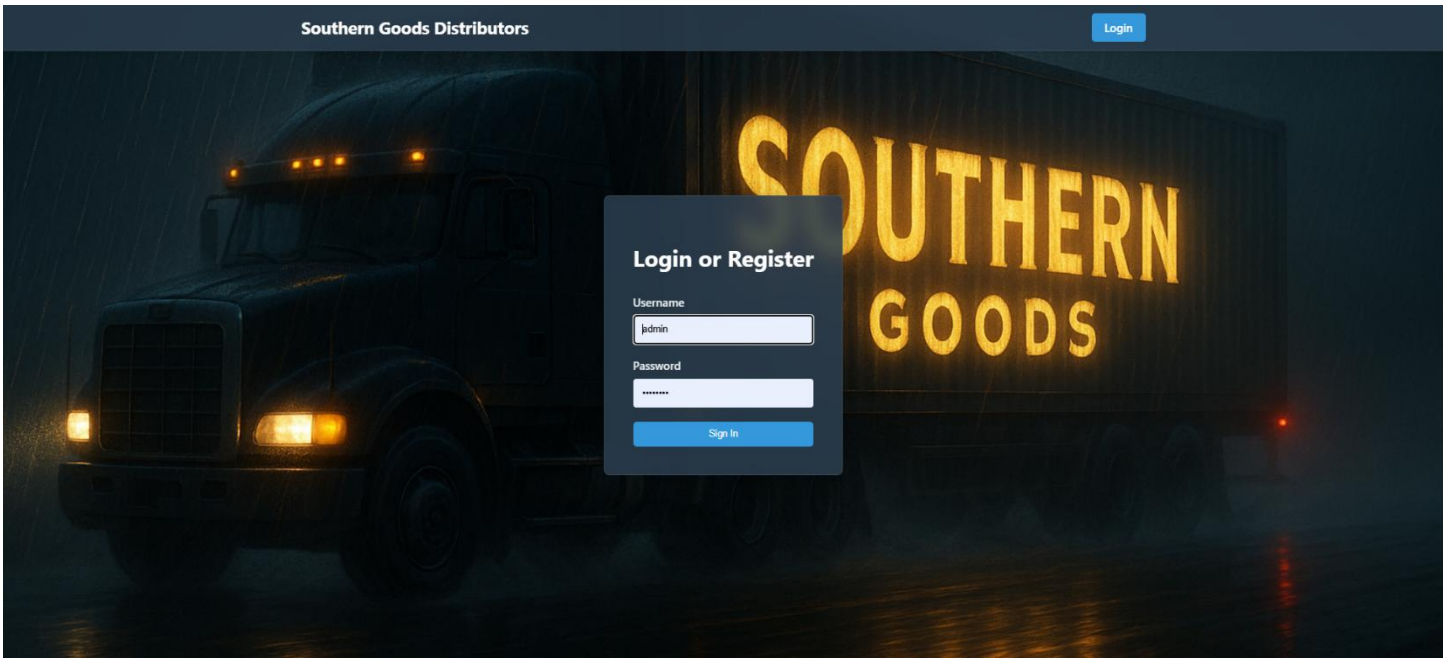
This EER diagram served as the foundational blueprint for our project's database. It allowed us to visually map out the essential components of our system, such as Products, Customers, and Suppliers, and define the relationships between them. By creating this clear and organized plan from the beginning, we were able to build a logical and efficient database, which was crucial for ensuring all features of the inventory control system would function correctly and work together seamlessly.

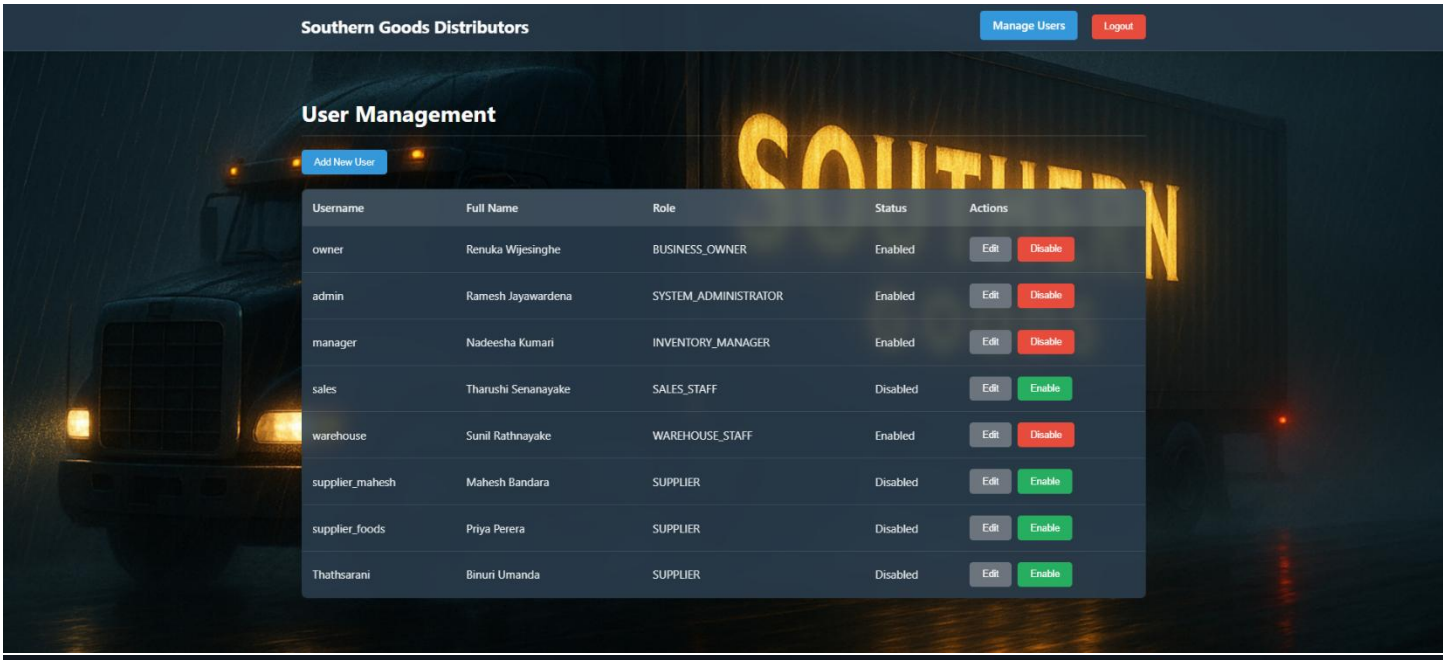


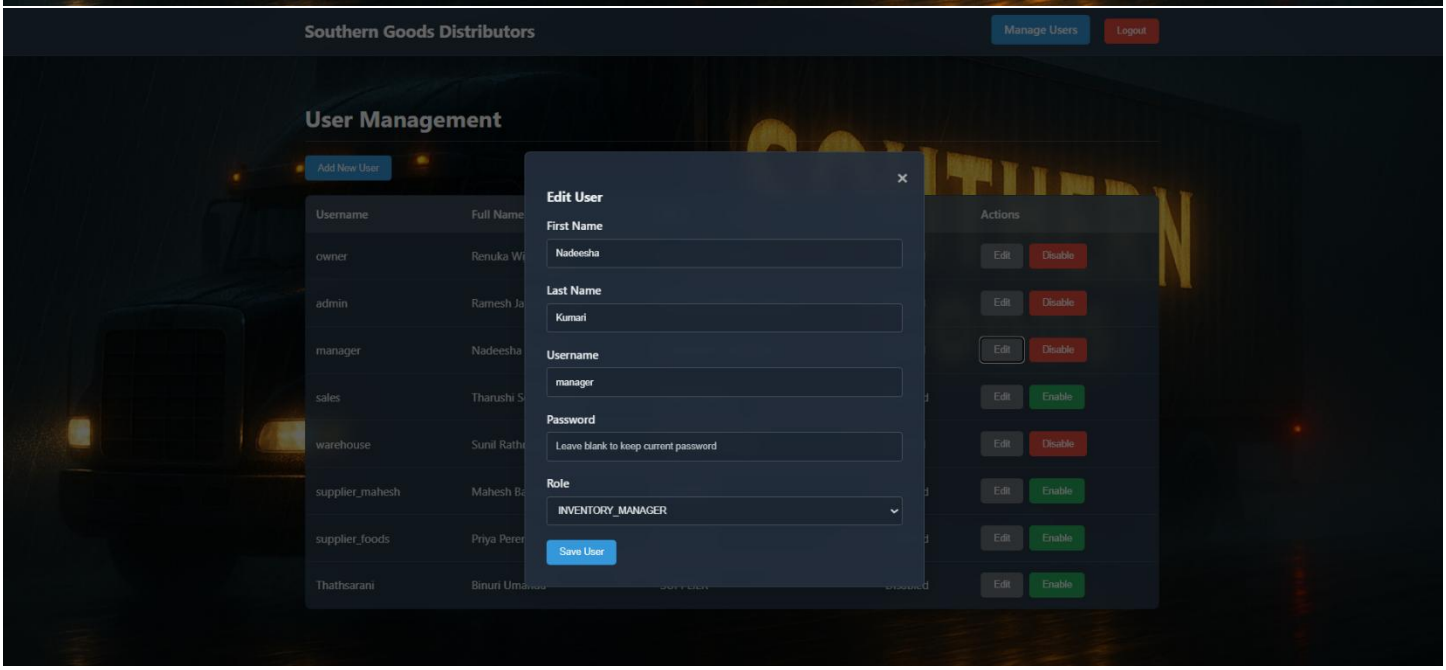
3.4 UI Sketches and Screenshots

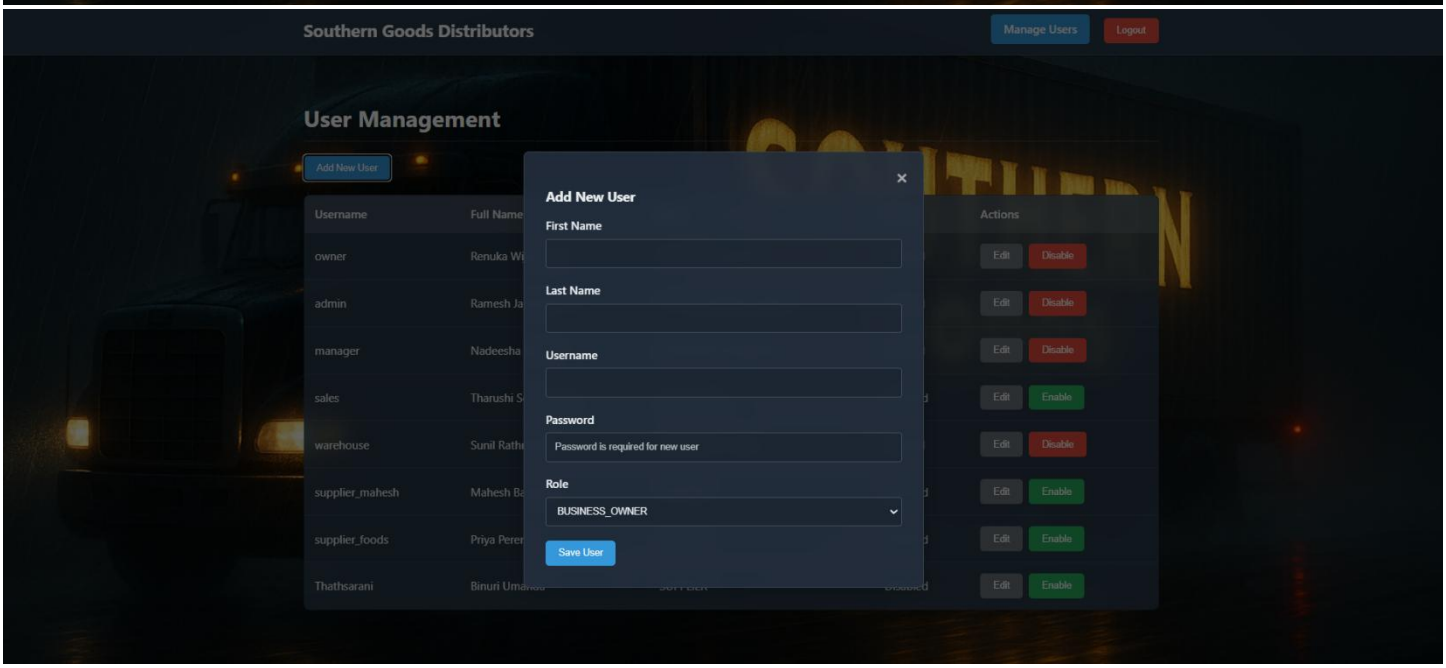
The user interface was designed to be clean and easy to use on different devices.

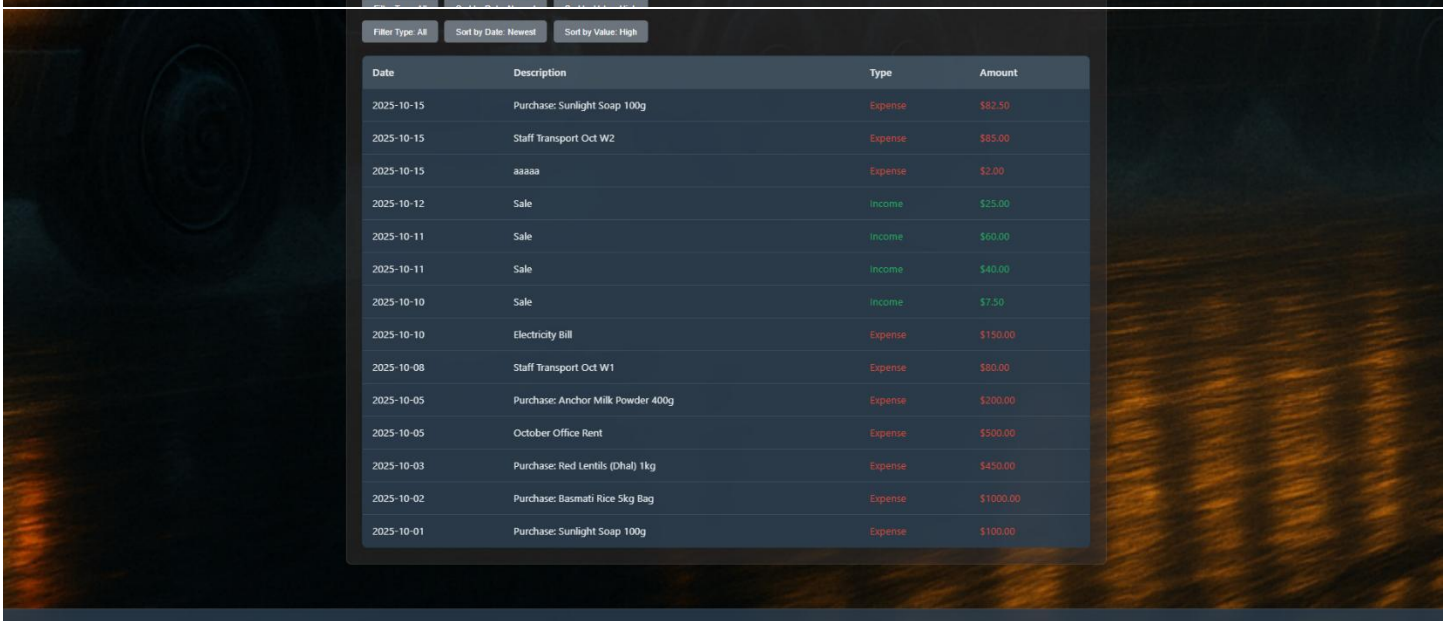




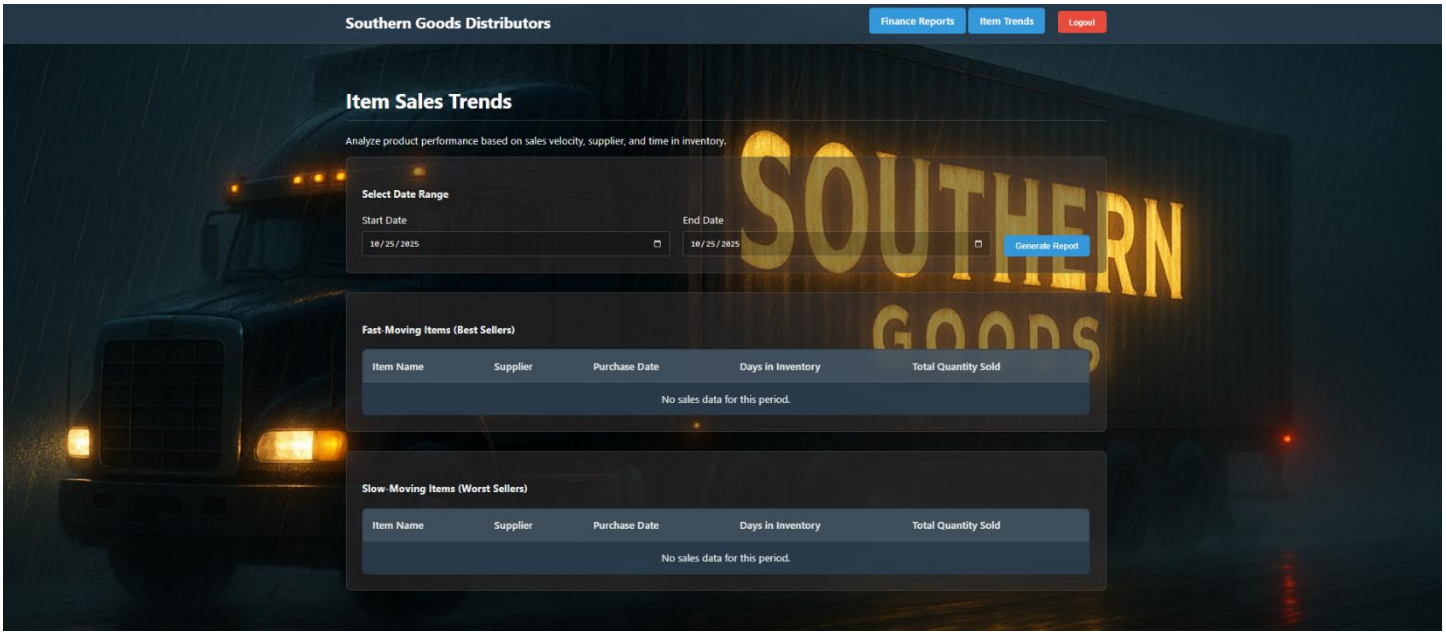

Southern Goods Distributors
Manage Users
Logout
User Management
Add New User
Username
Full Name
Role
Status
Actions
owner
Renuka Wijesinghe
BUSINESS_OWNER
Enabled
Edit
Disable
admin
Ramesh Jayawardena
SYSTEM_ADMINISTRATOR
Enabled
Edit
Disable
manager
Nadeesha Kumari
INVENTORY_MANAGER
Enabled
Edit
Disable
sales
Tharushi Senanayake
SALES_STAFF
Disabled
Edit
Enable
warehouse
Sunil Rathnayake
WAREHOUSE_STAFF
Enabled
Edit
Disable
supplier_mahesh
Mahesh Bandara
SUPPLIER
Disabled
Edit
Enable
supplier_foods
Priya Perera
SUPPLIER
Disabled
Edit
Enable
Thathsarani
Binuri Umanda
SUPPLIER
Disabled
Edit
Enable

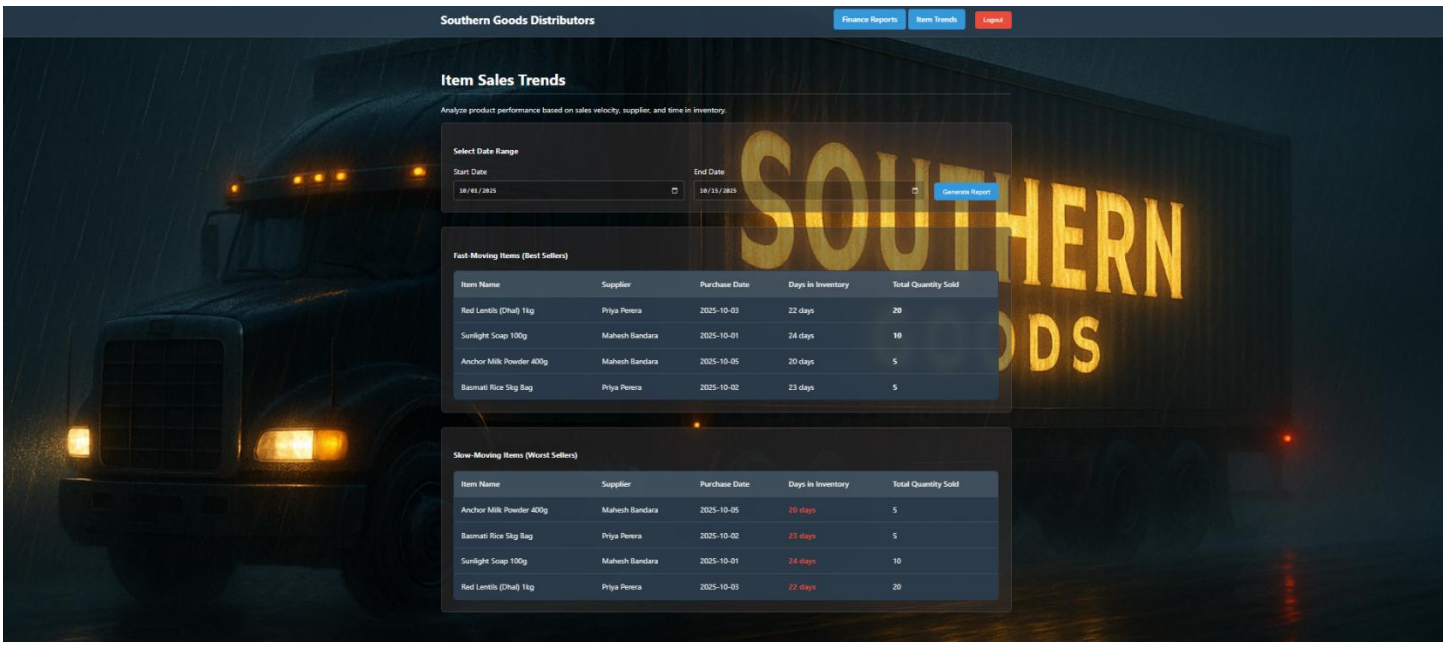

Southern Goods Distributors
Manage Users
Logout
User Management
Add New User
Edit User
First Name
Nadeesha
Last Name
Kumari
Username
manager
Password
Leave blank to keep current password
Role
INVENTORY_MANAGER
Save User


Southern Goods Distributors
Manage Users
Logout
User Management
Add New User
Add New User
First Name
Last Name
Username
Password
Password is required for new user
Role
BUSINESS_OWNER
Save User



Date	Description	Type	Amount
2025-10-15	Purchase: Sunlight Soap 100g	Expense	$82.50
2025-10-15	Staff Transport Oct W2	Expense	$85.00
2025-10-15	aaaaa	Expense	$2.00
2025-10-12	Sale	Income	$25.00
2025-10-11	Sale	Income	$60.00
2025-10-11	Sale	Income	$40.00
2025-10-10	Sale	Income	$7.50
2025-10-10	Electricity Bill	Expense	$150.00
2025-10-08	Staff Transport Oct W1	Expense	$80.00
2025-10-05	Purchase: Anchor Milk Powder 400g	Expense	$200.00
2025-10-05	October Office Rent	Expense	$500.00
2025-10-03	Purchase: Red Lentils (Dhal) 1kg	Expense	$450.00
2025-10-02	Purchase: Basmati Rice 5kg Bag	Expense	$1000.00
2025-10-01	Purchase: Sunlight Soap 100g	Expense	$100.00


Southern Goods Distributors
Finance Reports
Item Trends
Logout
Item Sales Trends
Analyze product performance based on sales velocity, supplier, and time in inventory.
Select Date Range
Start Date
10/25/2025
End Date
10/25/2025
Generate Report
Fast-Moving Items (Best Sellers)
Item Name
Supplier
Purchase Date
Days in Inventory
Total Quantity Sold
No sales data for this period.
Slow-Moving Items (Worst Sellers)
Item Name
Supplier
Purchase Date
Days in Inventory
Total Quantity Sold
No sales data for this period.


Southern Goods Distributors
Finance Reports
Item Trends
Logout
Item Sales Trends
Analyze product performance based on sales velocity, supplier, and time in inventory.
Select Date Range
Start Date
10/01/2025
End Date
10/15/2025
Generate Report
Fast-Moving Items (Best Sellers)
Item Name
Supplier
Purchase Date
Days in Inventory
Total Quantity Sold
Red Lentils (Dhal) 1kg
Priya Perera
2025-10-03
22 days
20
Sunlight Soap 100g
Mahesh Bandara
2025-10-01
24 days
10
Anchor Milk Powder 400g
Mahesh Bandara
2025-10-05
20 days
5
Basmati Rice 5kg Bag
Priya Perera
2025-10-02
23 days
5
Slow-Moving Items (Worst Sellers)
Item Name
Supplier
Purchase Date
Days in Inventory
Total Quantity Sold
Anchor Milk Powder 400g
Mahesh Bandara
2025-10-05
20 days
5
Basmati Rice 5kg Bag
Priya Perera
2025-10-02
23 days
5
Sunlight Soap 100g
Mahesh Bandara
2025-10-01
24 days
10
Red Lentils (Dhal) 1kg
Priya Perera
2025-10-03
22 days
20

4. Implementation

4.1 Tools and Technologies Used

The system was built with a modern set of tools to ensure it is effective and secure:

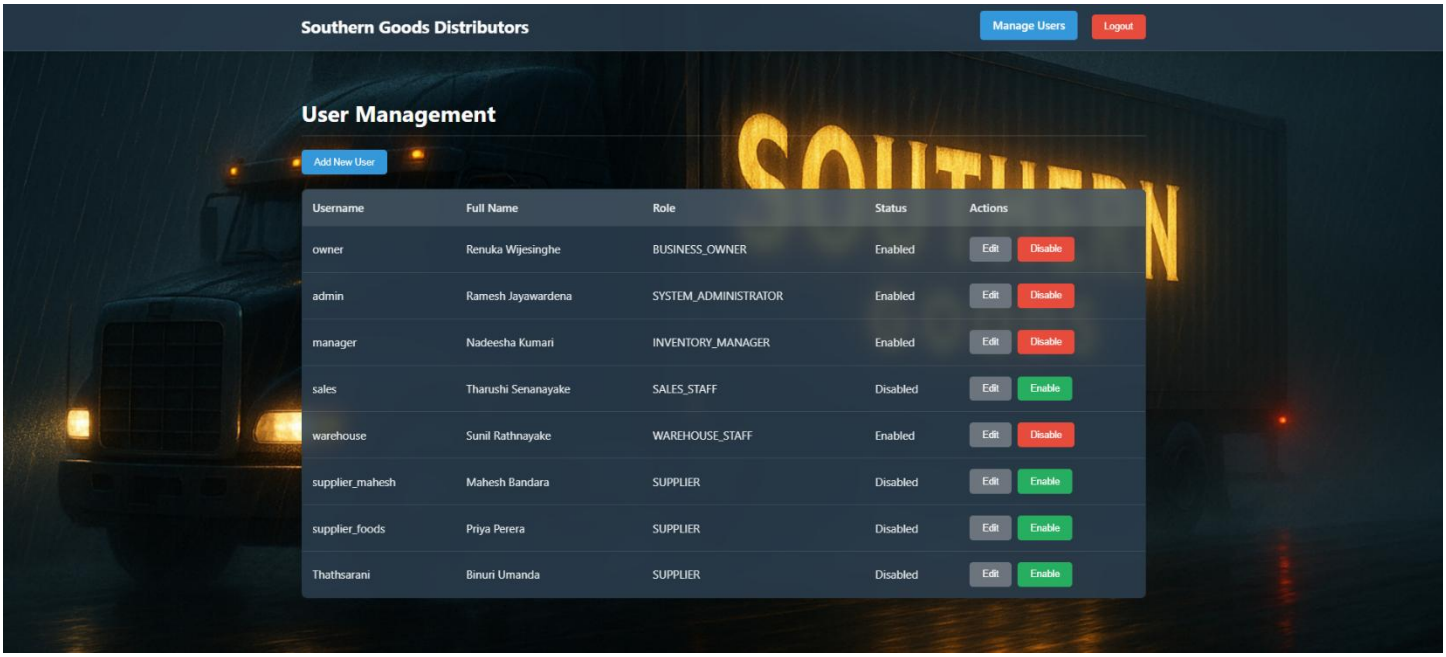
- Backend: Java, Spring Boot (including Spring Web, Spring Security, Spring Data JPA)
- Frontend: Thymeleaf, HTML, CSS, JavaScript
- Database: Microsoft SQL Server
- Build Tool: Apache Maven
- Version Control: Git and GitHub

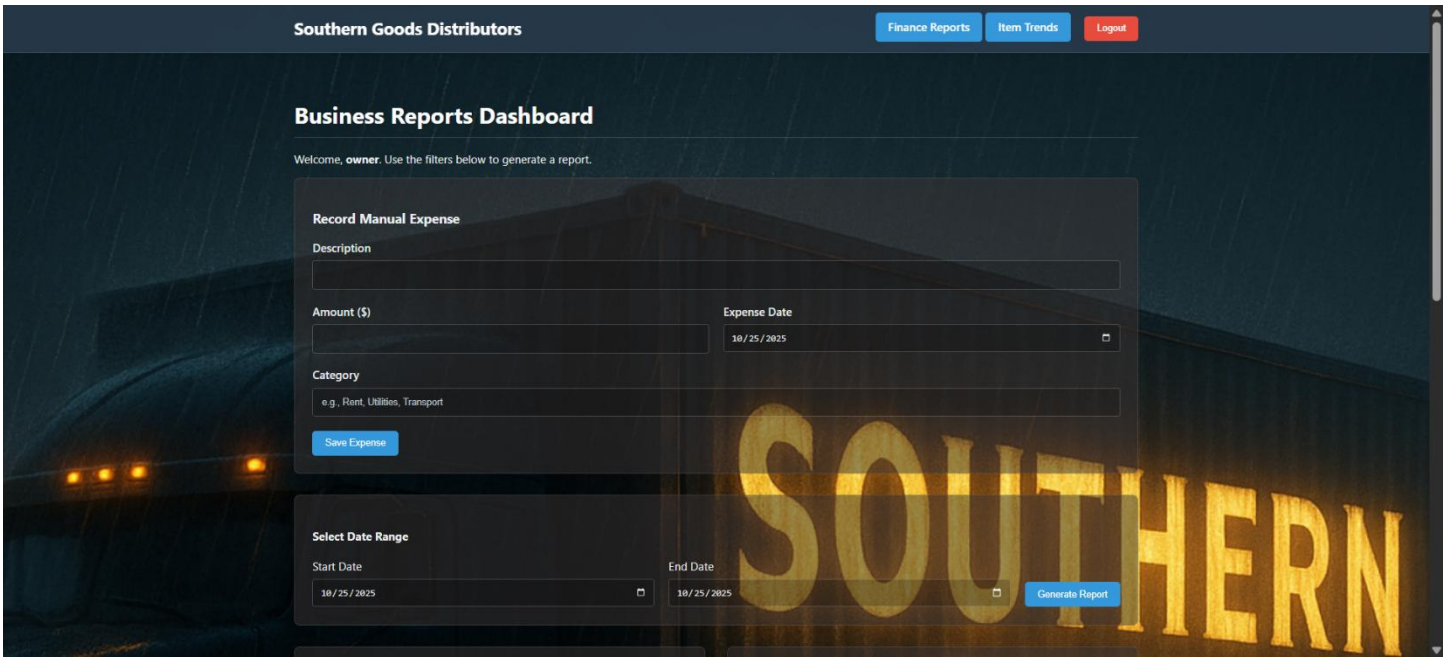
4.2 Key Features Developed

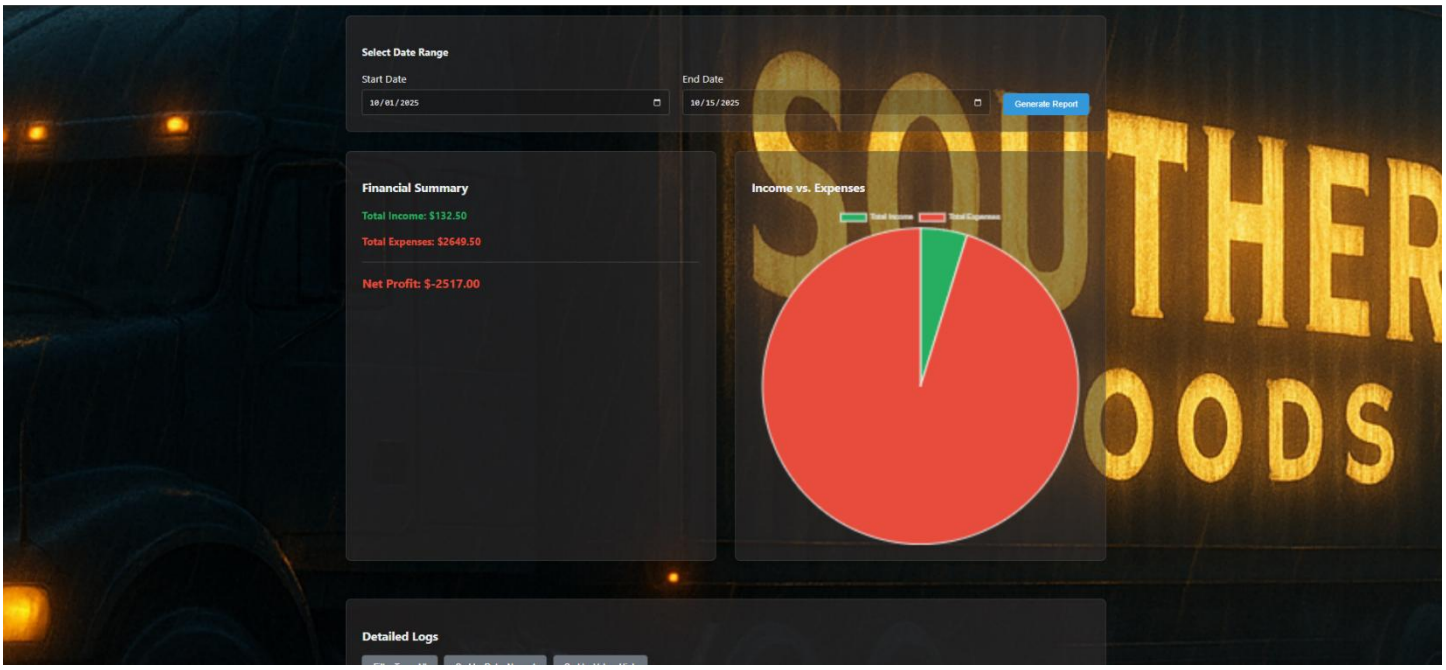
- Secure User Login: A secure login system was created using Spring Security, with different access levels for each user role.
- User Management: A complete interface for administrators to add, view, update, and delete users.
- Financial Reporting: A dashboard for the business owner to see financial summaries and sales trends, with charts created using Chart.js.
- Responsive Design: A user interface that works well on both computers and mobile devices.

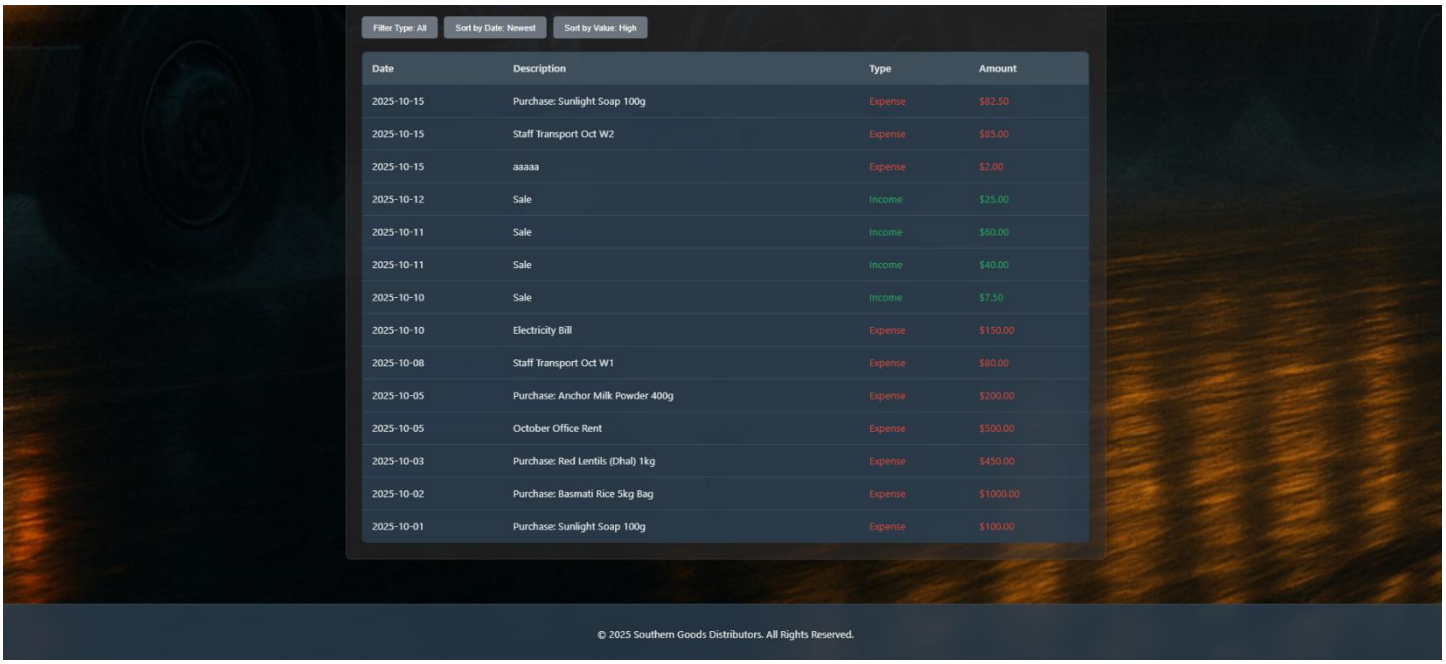
4.3 Screenshots of Core Functions

Here are some images of the system in action:




Southern Goods Distributors
Finance Reports
Item Trends
Logout
Business Reports Dashboard
Welcome, owner. Use the filters below to generate a report.
Record Manual Expense
Description
Amount ($)
Expense Date
10/25/2025
Category
e.g., Rent, Utilities, Transport
Save Expense
Select Date Range
Start Date
10/25/2025
End Date
10/25/2025
Generate Report


Select Date Range
Start Date
10/01/2025
End Date
10/15/2025
Generate Report
Financial Summary
Total Income: $132.50
Total Expenses: $2649.50
Net Profit: $-2517.00
Income vs. Expenses
Detailed Logs


Filter Type: All
Sort by Date: Newest
Sort by Value: High
Date
Description
Type
Amount
2025-10-15
Purchase: Sunlight Soap 100g
Expense
$82.50
2025-10-15
Staff Transport Oct W2
Expense
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aaaaa
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Income
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2025-10-10
Sale
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2025-10-02
Purchase: Basmati Rice 5kg Bag
Expense
$1000.00
2025-10-01
Purchase: Sunlight Soap 100g
Expense
$100.00
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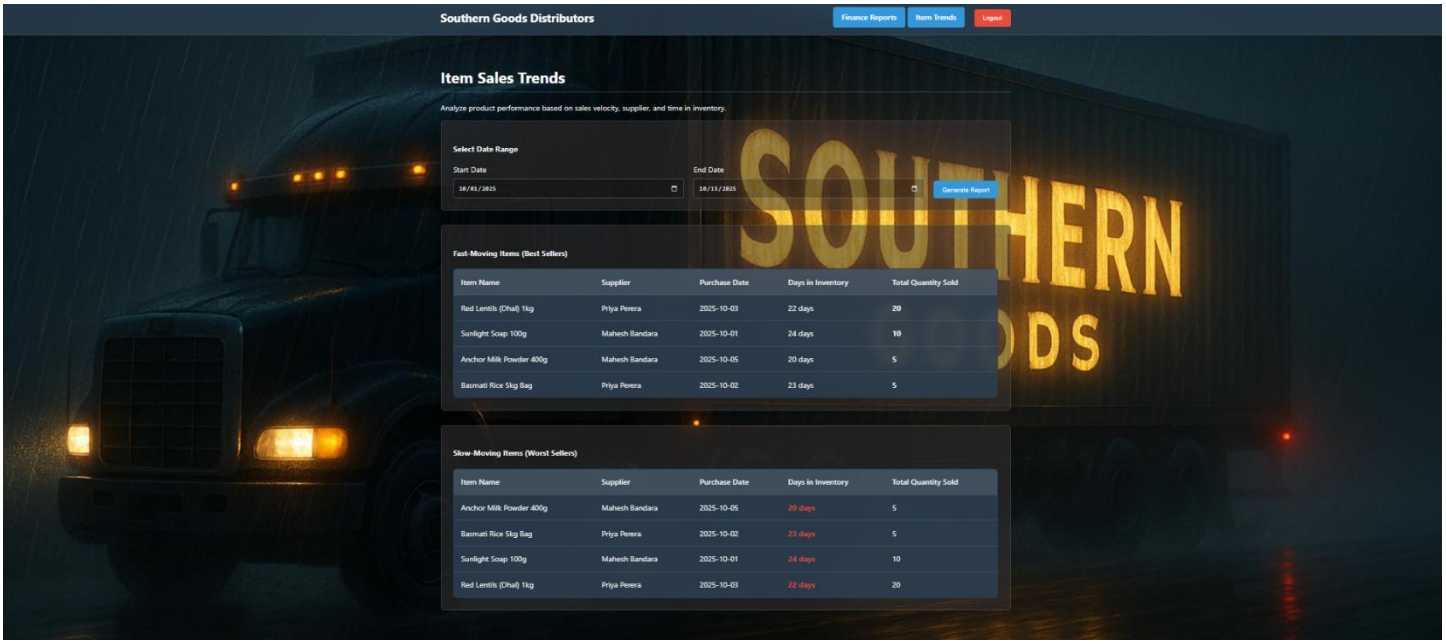
Southern Goods Distributors
Finance Reports
Item Trends
Logout
Item Sales Trends
Analyze product performance based on sales velocity, supplier, and time in inventory.
Select Date Range
Start Date
10/01/2025
End Date
10/15/2025
Generate Report
Fast-Moving Items (Best Sellers)
Item Name
Supplier
Purchase Date
Days in Inventory
Total Quantity Sold
Red Lentils (Dhal) 1kg
Priya Perera
2025-10-03
22 days
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Anchor Milk Powder 400g
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2025-10-05
20 days
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Basmati Rice 5kg Bag
Priya Perera
2025-10-02
23 days
5
Slow-Moving Items (Worst Sellers)
Item Name
Supplier
Purchase Date
Days in Inventory
Total Quantity Sold
Anchor Milk Powder 400g
Mahesh Bandara
2025-10-05
20 days
5
Basmati Rice 5kg Bag
Priya Perera
2025-10-02
23 days
5
Sunlight Soap 100g
Mahesh Bandara
2025-10-01
24 days
10
Red Lentils (Dhal) 1kg
Priya Perera
2025-10-03
22 days
20

5. Project Management

5.1 Agile Approach and Sprint Summary

We used the Agile (Scrum) method to manage this project. This allowed us to develop the system in stages and make adjustments based on regular feedback.

The project was divided into four sprints.

- Sprint 01: Foundation and User Management: Set up the project, database, and user login system.
- Sprint 02: Core Inventory & Warehouse Operations: Built the main features for managing inventory.
- Sprint 03: Order Processing and Sales Dashboard: Automated purchase orders and created the sales dashboard.
- Sprint 04: Reporting, Analytics, and Finalization: Developed the reporting features and completed final testing.

5.2 Task Distribution Among Team Members

Each team member was responsible for a major part of the system:

Member	**Major Function**
Mummullage B.U.T (IT24102699)	Business Reporting
Priyamalka WDN (IT24102758)	Inventory Dashboard
Panagodage N.M.H (IT24102784)	Purchase Order Automation
Sooriyabandara U.R.G.W.K (IT24102798)	Warehouse Interface
Alahakoon A. M. J. P (IT24102795)	User Management
Siriwardane K.D.D.D (IT24102773)	Scalability & Training

5.3 Project Timeline

The project followed a timeline from week 3 to week 14:

Week(s)	**Key Activities**
Week 3	Finalized project concept and requirements.
Weeks 4-5	Designed system architecture and created UI mockups.
Weeks 6-9	Developed backend features, including inventory and reporting modules.
Weeks 10-11	Tested the system, fixed bugs, and gathered feedback.
Weeks 12-14	Completed final documentation and prepared for the final presentation.

6. Conclusion & Future Work

6.1 Summary of Achievements

This project successfully created a modern, web-based inventory system for Southern Goods Distributors. The new system replaces their old manual methods and meets all the project goals. It provides real-time inventory tracking, automates ordering, and offers valuable reports for business owners. We are confident this system will improve efficiency and support the company's growth.

6.2 Challenges Faced

During the project, we faced a few challenges:

- Integrating the frontend and backend: It was challenging to make sure the user interface updated in real-time as data changed in the backend.
- Database Design: Creating an efficient database structure that could handle all the system's needs was complex.
- Implementing Security: Setting up secure user access with different permission levels required careful work.

6.3 Suggestions for Improvement or Extension

- Advanced Analytics: Use machine learning to predict sales and recommend stock levels.
- Mobile App: Create a dedicated mobile app for warehouse staff.
- Supplier Portal: Build a portal for suppliers to manage their orders directly.
- Accounting Integration: Connect the system to accounting software to automate financial tasks.

7. Individual Contribution, Teamwork & Lessons Learned

Member	Role & Contributions	Challenges Faced	How Challenges Were Overcome	Key Lessons Learned
Mummullage B.U.T (IT24102699)	Led the development of the reporting module.	Combining data from different sources for financial reports was complex.	Used DTOs and Java Streams to organize and process the data effectively.	Learned about data modeling and creating dynamic reports.
Priyamalka WDN (IT24102758)	Led the design of the inventory dashboard.	Making sure the dashboard updated in real-time was a performance challenge.	Used JavaScript to update the interface without slowing down the system.	Became more skilled in frontend development and creating good user experience.
Panagodage N.M.H (IT24102784)	Led the development of the purchase order automation.	Integrating an email service for notifications was difficult.	Researched and implemented a reliable email service with error handling.	I learned about integrating third-party services and automating workflows.
Sooriyabandara U.R.G.W.K (IT24102798)	Led the development of the warehouse interface.	Making the interface work well on mobile devices with barcode scanners was a technical challenge.	Used responsive design and tested on different devices to ensure it worked correctly.	Gained experience in full-stack development and integrating hardware with web applications.
Alahakoon A. M. J. P (IT24102795)	Led the implementation of user management and security.	Securing the system and setting up role-based access was a critical task.	Used Spring Security to implement a robust authentication and authorization system.	I gained a deep understanding of web application security.
Siriwardane K.D.D.D (IT24102773)	Led the system architecture and scalability planning.	Designing a system that could grow with the company was a major architectural challenge.	Choose a modular design that makes it easy to add new features in the future.	I learned about software architecture and the importance of planning for scalability.

8. References

[1] Spring, "Spring Boot," Spring.io. [Online]. Available: https://spring.io/projects/spring-boot.

[2] Thymeleaf, "Thymeleaf," Thymeleaf.org. [Online]. Available: https://www.thymeleaf.org/.

[3] Microsoft, "SQL Server," Microsoft.com. [Online]. Available: https://www.microsoft.com/en-us/sql-server.

[4] Apache Maven, "Apache Maven Project," Maven.apache.org. [Online]. Available: https://maven.apache.org/.

[5] Chart.js, "Chart.js," Chartjs.org. [Online]. Available: https://www.chartjs.org/.

[6] I. Sommerville, *Software Engineering*, 10th ed. Harlow, United Kingdom: Pearson Education, 2016.

[7] C. J. Date, *An Introduction to Database Systems*, 8th ed. Boston, MA, USA: Addison-Wesley, 2004.

[8] C. Walls, *Spring Boot in Action*. Shelter Island, NY, USA: Manning Publications, 2016.

[9] Oracle, "Java," Oracle.com. [Online]. Available: https://www.java.com/.

[10] Spring, "Spring Security," Spring.io. [Online]. Available: https://spring.io/projects/spring-security.

[11] Git, "Git," git-scm.com. [Online]. Available: https://git-scm.com/.

[12] GitHub, Inc., "GitHub," GitHub.com. [Online]. Available: https://github.com/.

[13] JetBrains, "IntelliJ IDEA," jetbrains.com. [Online]. Available: https://www.jetbrains.com/idea/.

[14] The Eclipse Foundation, "Eclipse IDE," eclipse.org. [Online]. Available: https://www.eclipse.org/.

[15] Amigoscode, "Spring Boot Tutorial for Beginners | Full Course 2025," *YouTube*, Apr. 21, 2025. [Video]. Available: https://www.youtube.com/watch?v=Cw0J6jYJtzw.

[16] Coding Tech, "Spring MVC Thymeleaf Tutorial with CRUD Example and Source Code," *YouTube*, Jan. 3, 2024. [Video]. Available: https://www.youtube.com/watch?v=do7XqcaIkVk.

[17] Coding Shuttle, "Complete Spring Security Tutorial in One Video | JWT | OAuth2 | RBAC," *YouTube*, Sep. 20, 2025. [Video]. Available: https://www.youtube.com/watch?v=ibxPpCVJXNY.

[18] Phegon Dev, "Complete Inventory Management System using Java | Spring-boot | Angular | 2025 Latest," *YouTube*, Jan. 31, 2025. [Video]. Available: https://www.youtube.com/watch?v=4kmOfaXyR5I.

[19] Code with Murad, "Inventory Management System Project using Spring Boot and React JS | Full Stack Java Application," *YouTube*, Jun. 2, 2024. [Video]. Available: https://www.youtube.com/watch?v=KfnmRJWrL2A.

[20] Codebun, "Inventory Management System Project in java using Spring Boot and Hibernate with source code," *YouTube*, Jan. 5, 2024. [Video]. Available: https://www.youtube.com/watch?v=sEgsy2fWBBg.

[21] "Spring Boot Project | Full Stack Project with Spring Boot & React," *YouTube*. [Online]. Available: https://www.youtube.com/playlist?list=PLyfNWFabKtrJbz2V_mwojtg-adIVmU5es.

9. Appendix (Optional)

If any diagrams or images in this report are not clear, please refer to the links below for high-resolution versions.

Design Documents and Other Materials:
https://github.com/IT24102699/Web-based-Inventory-Control-System-for-Southern-Goods-Distributors-Pvt-Ltd