

# **INFOSYS SPRINGBOARD**

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Internship Project Report

## **INVENTORY MANAGEMENT SYSTEM**

(Healthcare / Pharmacy)



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I would like to express my sincere gratitude to **Infosys Springboard** for providing me with the opportunity to undertake this internship and work on the project titled “**Inventory Management System for Healthcare (Pharmacy)**”.

I am thankful to the mentors and instructors for their valuable guidance, continuous support, and constructive feedback throughout the development of this project, particularly in backend development, database handling, and system integration. Their insights helped me enhance my technical skills and gain an understanding of real-world applications of inventory management systems in the healthcare domain.

I would also like to thank my friends and family for their encouragement and support, which motivated me to successfully complete this project.

## ABSTRACT

Efficient inventory management is crucial in the healthcare sector, especially in pharmacy operations where accurate stock tracking and expiry control are essential. Manual inventory systems often result in stock mismatches, expired medicines, and operational inefficiencies.

The **Inventory Management System for Healthcare (Pharmacy)** is designed to automate and streamline inventory-related activities such as medicine management, stock monitoring, expiry alerts, and report generation. The system provides a secure authentication mechanism and role-based user access to ensure data integrity and controlled operations, with backend logic handling data processing and validation.

By implementing this system, pharmacies can reduce human errors, improve stock visibility, prevent medicine shortages, and ensure timely availability of essential drugs. This project highlights the practical application of backend development and database management to solve real-world problems in the healthcare domain.

## INTRODUCTION

Inventory management is a critical function in the healthcare sector, particularly in pharmacy operations where medicines must be stored, tracked, and dispensed with high accuracy. Pharmacies handle a wide variety of medicines, each associated with specific batch numbers, expiry dates, and regulatory requirements. Maintaining these records manually can be inefficient and increases the risk of errors.

In a pharmacy environment, improper inventory control may lead to problems such as medicine shortages, overstocking, and distribution of expired drugs, which can directly affect patient safety. Additionally, manual systems do not provide real-time visibility of stock levels, making decision-making difficult for pharmacists and administrators.

The **Inventory Management System for Healthcare (Pharmacy)** is designed to address these challenges by automating inventory operations. The system enables efficient management of medicines, real-time stock monitoring, expiry and low-stock alerts, and controlled user access, with backend processes ensuring secure data handling, validation, and reliable system performance. By implementing this system, pharmacies can improve operational efficiency, reduce wastage, and ensure the timely availability of essential medicines.

## **PROBLEM STATEMENT**

In many healthcare pharmacies, inventory management is still carried out using manual registers or basic record-keeping methods. As the number of medicines increases, maintaining accurate records of stock quantity, batch numbers, and expiry dates becomes difficult and time-consuming.

The absence of a centralized and automated system often leads to issues such as stock shortages, overstocking, and unintentional storage or sale of expired medicines. These problems not only cause financial losses but also pose serious risks to patient safety and regulatory compliance due to lack of reliable backend data processing and validation.

Additionally, manual systems do not provide timely alerts for low stock levels or nearing expiry medicines, making it difficult for pharmacy staff to take preventive action. Lack of proper reporting and backend-supported stock analysis further affects decision-making. Hence, there is a need for an efficient inventory management solution that can streamline pharmacy operations, ensure data accuracy, and improve overall healthcare service quality.

## OBJECTIVES OF THE PROJECT

The primary objective of the **Inventory Management System for Healthcare (Pharmacy)** is to develop an efficient and reliable system that can manage pharmacy inventory in an organized and accurate manner. The project aims to reduce the dependency on manual record-keeping and minimize errors related to stock handling and medicine tracking.

Another important objective is to maintain accurate and real-time records of medicines, including stock quantity and expiry details. This helps pharmacies ensure the availability of essential medicines while avoiding overstocking and unnecessary wastage due to expired drugs.

The system also focuses on monitoring stock levels and generating timely alerts for low stock and near-expiry medicines. These alerts enable pharmacy staff to take preventive actions, such as restocking medicines on time and removing expired items, thereby improving patient safety.

Additionally, the project aims to improve operational efficiency by simplifying inventory-related tasks and providing structured inventory records. Overall, the system supports better inventory control, enhances decision-making, and contributes to effective and safe pharmacy management.

## SCOPE OF THE PROJECT

The scope of the **Inventory Management System for Healthcare (Pharmacy)** is focused on providing an efficient solution for managing pharmacy inventory operations. The system is designed to handle daily inventory activities such as medicine record maintenance, stock monitoring, and alert generation in a systematic manner.

This project covers the management of medicines including their availability, stock levels, and expiry status. It supports secure access for authorized users and helps pharmacies maintain organized inventory records. The system improves accuracy in inventory handling and reduces manual workload for pharmacy staff.

The scope of the project is limited to inventory-related operations within a pharmacy environment. It does not include advanced features such as online payment processing or third-party integrations. However, the system provides a strong foundation that can be enhanced in the future to support additional functionalities as per requirements.

## PROPOSED SYSTEM

The proposed **Inventory Management System for Healthcare (Pharmacy)** is designed to overcome the limitations of traditional manual inventory methods. The system provides a centralized platform to manage all pharmacy inventory operations in an organized and efficient manner.

The proposed system maintains accurate records of medicines, including stock quantities and expiry information. It enables controlled access for authorized users, ensuring data security and proper inventory handling. The system also supports alert mechanisms to notify users about low stock levels and nearing expiry medicines, allowing timely action.

By automating inventory processes, the proposed system reduces human errors, improves accuracy, and enhances operational efficiency. It provides better visibility of inventory data and supports effective decision-making, ultimately contributing to improved pharmacy management and patient safety.

## TECHNOLOGY STACK

The following technologies are used in the development of the **Inventory Management System for Healthcare (Pharmacy)**:

Layer	Technology Used
Frontend	HTML, CSS, JavaScript
Backend	Spring Boot
Database	MySQL
IDE / Tools	Visual Studio Code
Server	Apache Tomcat (Embedded in Spring Boot)
Architecture	Web-based Application

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This technology stack ensures a scalable, secure, and efficient system for managing pharmacy inventory. The frontend technologies provide a responsive and user-friendly interface, while the backend handles business logic and data processing. MySQL is used for reliable data storage and retrieval.

## SYSTEM ARCHITECTURE

The **Inventory Management System for Healthcare (Pharmacy)** is designed using a structured architecture that separates different functionalities of the system into distinct layers. This architectural approach helps in improving system performance, security, and ease of maintenance. Each layer of the system has a specific role and communicates with other layers in a controlled manner.

The user interface layer acts as the interaction point between the user and the system. Through this layer, users can perform actions such as logging into the system, managing medicine records, checking alerts, and viewing reports. All user requests are forwarded to the application layer for processing.

The application layer is responsible for handling the core logic of the system. It processes user requests, validates input data, manages inventory operations, and controls access based on user roles. This layer ensures that all business rules related to pharmacy inventory management are properly enforced.



The database layer stores all essential data related to medicines, users, stock levels, and transaction records. It ensures secure storage and quick retrieval of information whenever required. Any update in inventory is reflected in the database, allowing real-time availability of data.

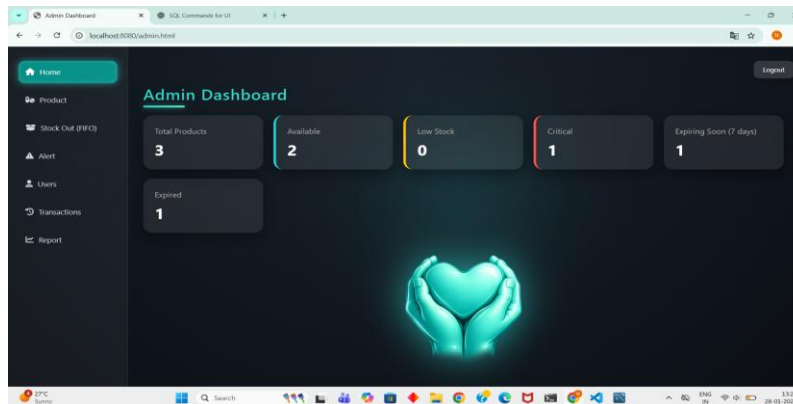
Overall, this architecture ensures smooth data flow, accurate inventory tracking, and reliable system performance. The separation of layers also allows the system to be easily enhanced or modified in the future without affecting other components.

### Architecture Flow (Textual)

User Interface → Application Logic → Database  
Database → Application Logic → User Interface

## MODULE DESCRIPTION

The **Inventory Management System for Healthcare (Pharmacy)** is designed in a modular manner, where each module performs a specific function. This modular approach helps in better organization of the system, easier maintenance, and smooth functioning of pharmacy inventory operations. All modules work together to ensure accurate stock control, data security, and efficient management.



### 1. Authentication Module

The Authentication Module is responsible for providing secure access to the **Inventory Management System for Healthcare (Pharmacy)**. This module ensures that only authorized users can log in to the system and perform actions according to their assigned roles. It plays a crucial role in protecting sensitive pharmacy data such as medicine records, stock details, and reports.

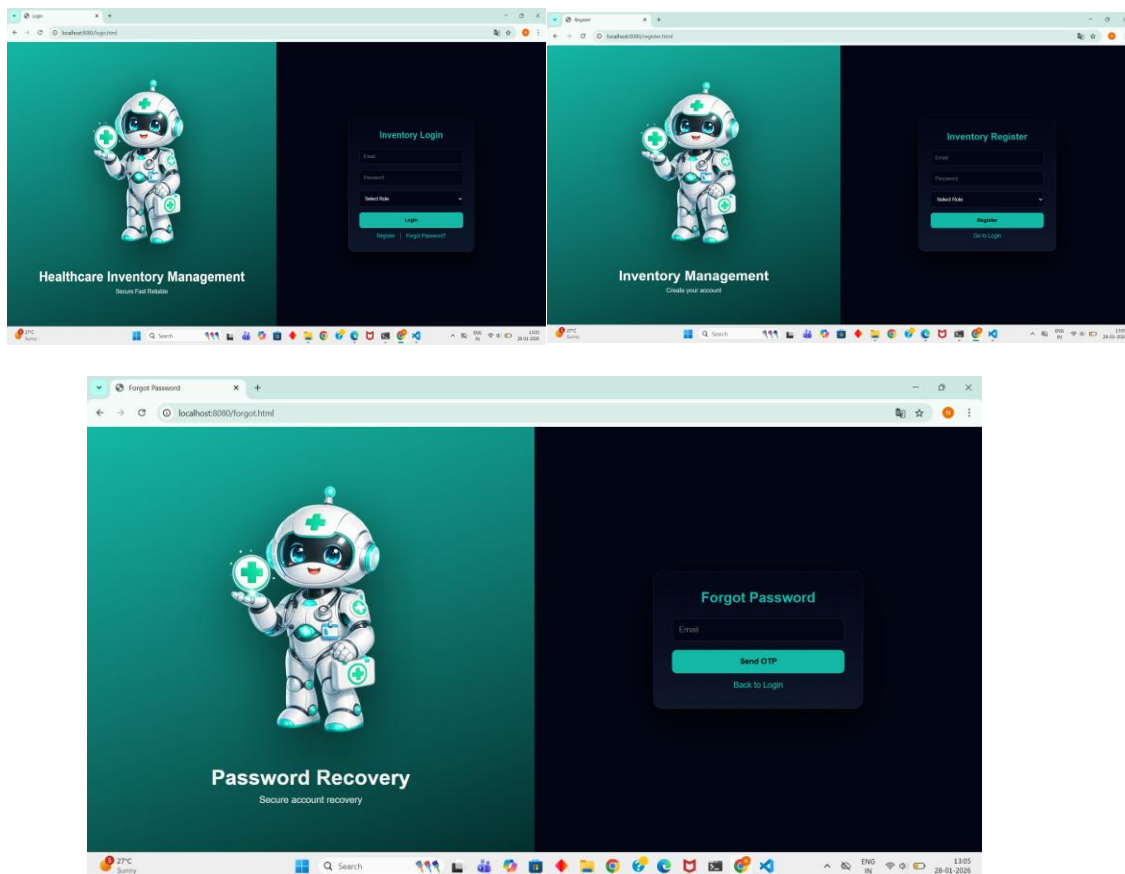
This module validates user credentials at the server level and enforces role-based access control.

When a user attempts to access the system, they are required to enter valid login credentials. The system verifies these credentials and checks whether the user is registered and active. If the credentials are correct, access to the system is granted; otherwise, the user is denied access.

This module also supports role-based access control. Different users, such as administrators and pharmacy staff, are provided access to system features based on their roles. This prevents unauthorized actions and ensures accountability within the system.

### Working of Authentication Module

1. The user enters login credentials through the login interface.
2. The system validates the entered credentials.
3. User role and access permissions are verified.
4. If validation is successful, the user is redirected to the dashboard.
5. If validation fails, an error message is displayed.



By implementing secure authentication and controlled access, this module ensures data confidentiality, system reliability, and safe pharmacy operations.

## 2. Product (Medicine) Management Module

The Product (Medicine) Management Module is one of the core components of the **Inventory Management System for Healthcare (Pharmacy)**. This module is responsible for maintaining complete and accurate records of all medicines available in the pharmacy. It helps pharmacy staff manage medicine information in an organized and systematic manner.

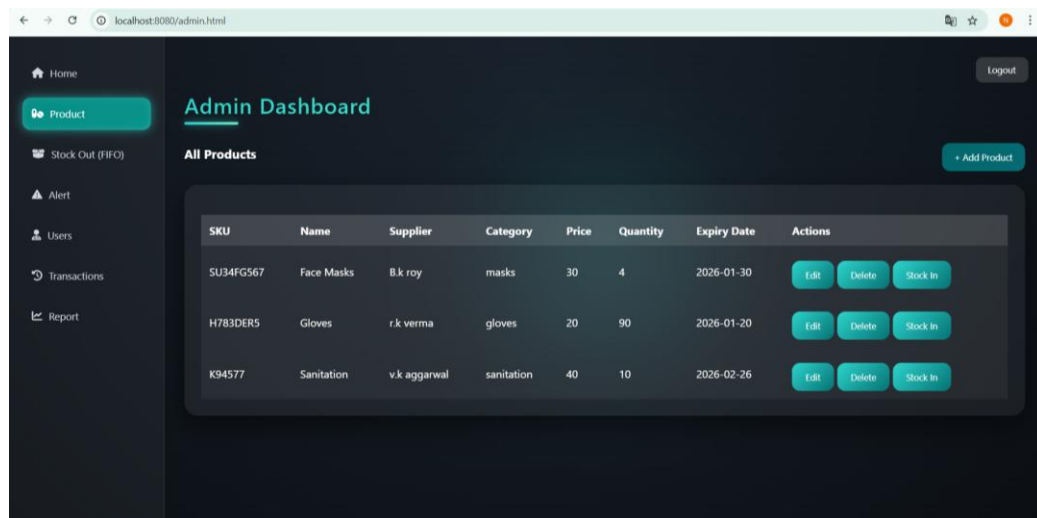
Using this module, authorized users can add new medicines along with essential details such as medicine name, batch number, quantity, and expiry date. Whenever there is a change in stock or medicine information, the system allows users to update the records accordingly. Medicines that are no longer required or have expired can also be removed from the system.

This module ensures that the pharmacy always has up-to-date information about its inventory. By maintaining accurate medicine records, the system supports effective stock monitoring and reduces the chances of errors related to medicine handling.

All medicine operations are processed through backend services to ensure data consistency.

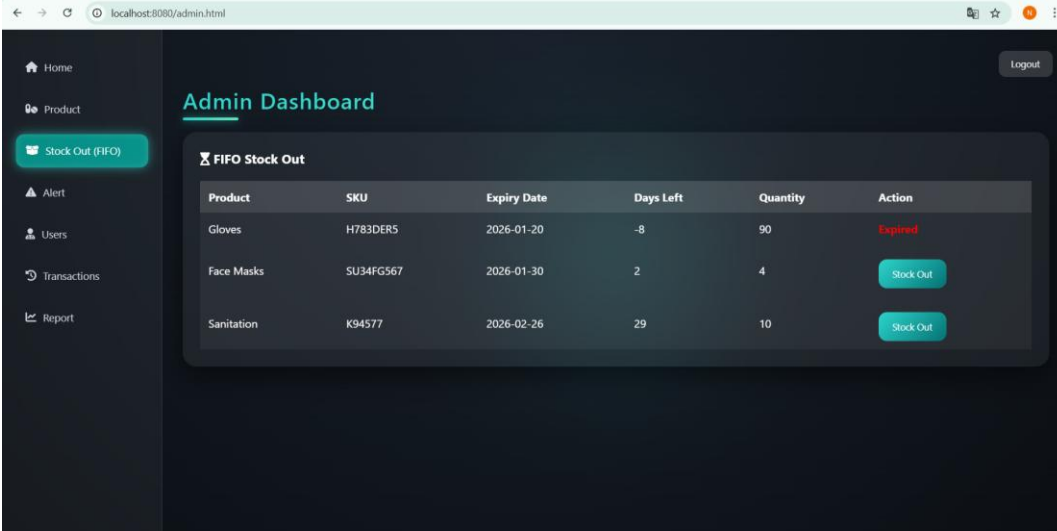
### Working of Product (Medicine) Management Module

1. The user accesses the medicine management section after successful login.
2. New medicine details are entered into the system.



3. The system validates the entered data.
4. Medicine records are stored or updated in the inventory database.
5. Stock quantity is automatically updated after any modification.

Through this module, pharmacies can maintain structured medicine records, improve inventory accuracy, and ensure smooth inventory operations.



The screenshot shows a web application interface for an Admin Dashboard. On the left is a dark sidebar with navigation links: Home, Product, Stock Out (FIFO) (highlighted in green), Alert, Users, Transactions, and Report. The main content area has a dark background and is titled 'Admin Dashboard' in green. Below the title is a section labeled 'FIFO Stock Out' containing a table with the following data:

Product	SKU	Expiry Date	Days Left	Quantity	Action
Gloves	H783DER5	2026-01-20	-8	90	Expired
Face Masks	SU34FG567	2026-01-30	2	4	Stock Out
Sanitation	K94577	2026-02-26	29	10	Stock Out

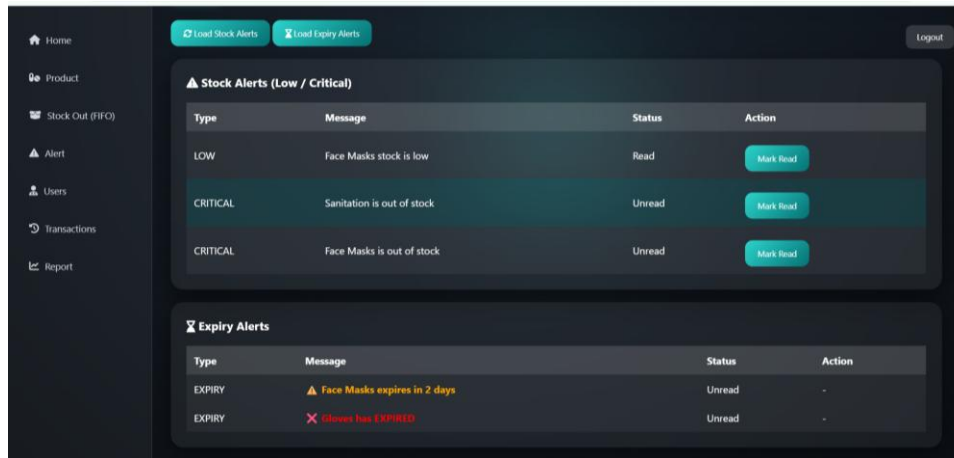
### 3. Alert Module

The Alert Module is a critical component of the **Inventory Management System for Healthcare (Pharmacy)**. This module helps pharmacy staff stay informed about important inventory conditions such as low stock levels and nearing expiry dates of medicines. It plays an important role in preventing medicine shortages and reducing wastage due to expired drugs.

The system continuously monitors the inventory data stored in the database. Whenever the quantity of a medicine falls below a predefined minimum level, the system generates a low-stock alert. Similarly, when a medicine approaches its expiry date, the system produces an expiry alert to notify the user in advance.

These alerts help pharmacy staff take timely actions such as reordering medicines or removing expired stock, thereby ensuring patient safety and smooth pharmacy operations.

Backend logic continuously evaluates stock and expiry conditions to trigger alerts.



## Working of Alert Module

1. The system regularly checks medicine stock quantities and expiry dates.
2. Predefined conditions for low stock and expiry are evaluated.
3. If any condition is met, an alert is generated.
4. Alerts are displayed on the dashboard for user notification.
5. The user takes necessary action based on the alert.

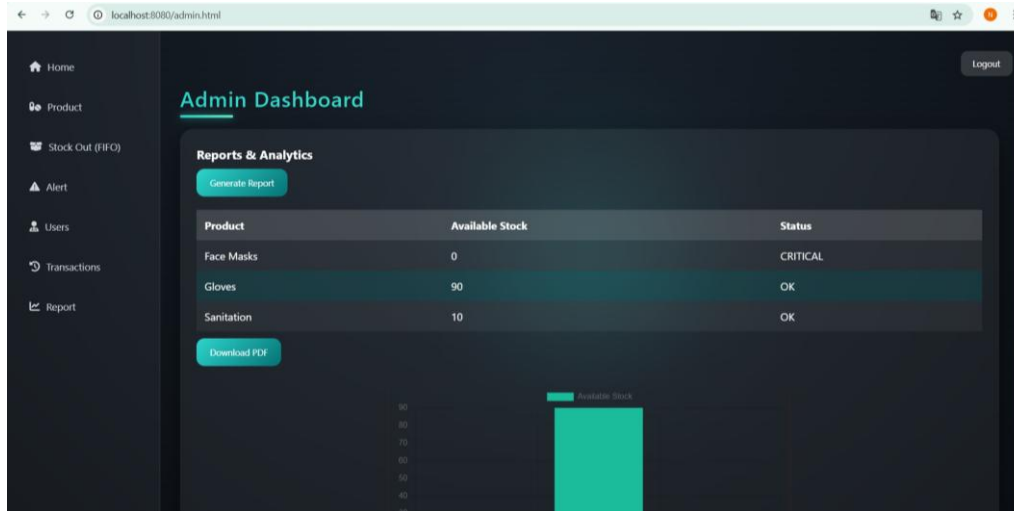
By providing timely notifications, the Alert Module improves inventory control, reduces risks, and supports effective pharmacy management.

## 4. Report Module

The Report Module provides a detailed and structured view of pharmacy inventory activities. This module helps users analyze inventory status, track medicine movement, and understand overall stock performance. Reports generated by this module support better planning and informed decision-making.

Through this module, users can view different types of reports related to stock availability, medicine expiry, and inventory transactions. These reports help in identifying trends such as frequently used medicines, low-stock items, and nearing expiry products.

Reports are generated by processing inventory data at the backend.



## Types of Reports

Report Type	Description
Stock Report	Displays current stock levels of medicines
Expiry Report	Lists medicines nearing or exceeding expiry
Transaction Report	Shows stock in and stock out activities

## Working of Report Module

1. The user selects the required report type.
2. The system retrieves relevant inventory data from the database.
3. Data is processed and formatted into a report.
4. The generated report is displayed to the user.
5. The user can review inventory status and take necessary action.

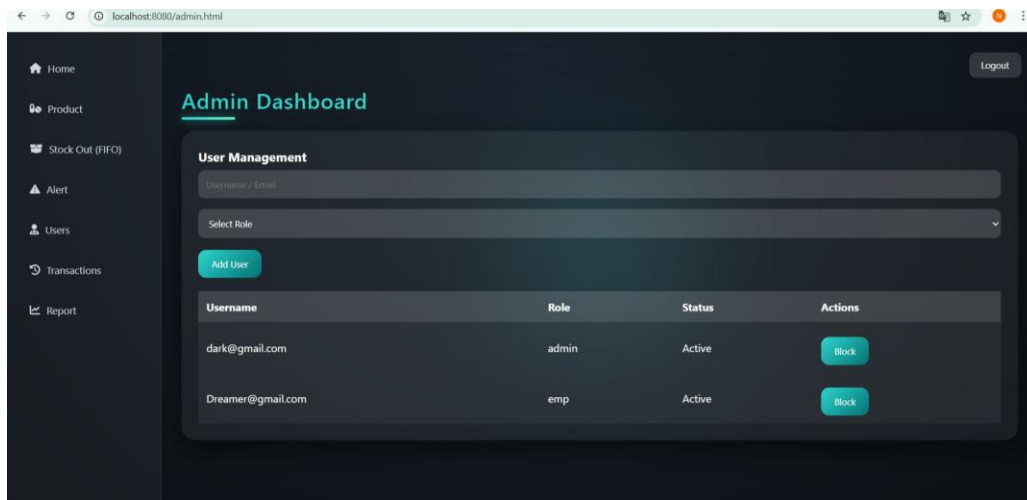
The Report Module ensures transparency in inventory operations and helps maintain accurate records for pharmacy management.

## 5. User Management Module

The User Management Module is responsible for controlling and managing users of the **Inventory Management System for Healthcare (Pharmacy)**. This module ensures that only authorized individuals can access the system and perform operations according to their assigned roles.

Through this module, the administrator can add new users, update existing user information, assign roles, and manage access permissions. By defining clear user roles, the system maintains accountability and prevents unauthorized actions within the pharmacy inventory.

This module is essential for maintaining data security and smooth system operations, especially in environments where multiple users interact with the inventory system.



### Working of User Management Module

1. The administrator accesses the user management section.
2. New users are added or existing user details are updated.
3. Roles and access permissions are assigned to users.
4. User information is stored securely in the system.
5. Access control rules are applied during user login.

By managing user access effectively, this module enhances system security, ensures proper usage, and supports efficient pharmacy operations.

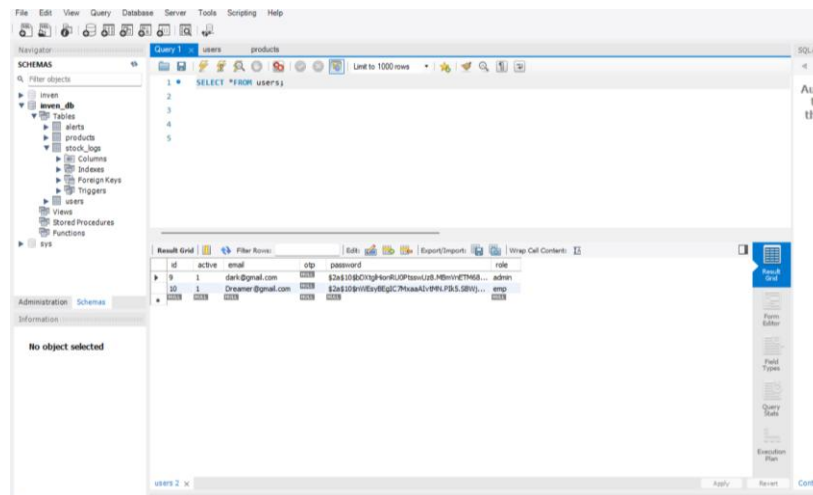
## DATABASE DESIGN

The database is a crucial component of the **Inventory Management System for Healthcare (Pharmacy)**. It is responsible for storing, managing, and retrieving all data related to medicines, users, stock levels, and inventory transactions. A well-structured database ensures data accuracy, consistency, and efficient system performance.



The database is designed in a relational manner where different tables are linked to each other. This helps in maintaining organized records and supports smooth data flow between system modules.

Database relationships and constraints were carefully designed to maintain data integrity. Backend services interact with the database using structured queries for reliable data management.



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## Medicine Table

This table stores complete details of medicines available in the pharmacy.

Field Name	Description
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medicine_id	Unique identifier for each medicine
-------------	-------------------------------------

medicine_name	Name of the medicine
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batch_number	Batch number of the medicine
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quantity	Available stock quantity
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expiry_date	Expiry date of the medicine
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price	Price of the medicine
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## User Table

This table stores information about users who can access the system.

Field Name	Description
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user_id	Unique identifier for each user
username	Login username
password	Encrypted user password
role	User role (Admin / Staff)
status	Active or inactive user

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### Stock Transaction Table

This table records stock movement activities such as stock in and stock out.

Field Name	Description
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transaction_id	Unique transaction identifier
medicine_id	Reference to medicine table
transaction_type	Stock In / Stock Out
quantity	Quantity involved
transaction_date	Date of transaction

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### Alert Table

This table helps in tracking alerts related to low stock and expiry.

Field Name	Description
------------	-------------

alert_id	Unique alert identifier
medicine_id	Reference to medicine table
alert_type	Low Stock / Expiry

## Field Name Description

alert\_date     Date when alert is generated

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The database design ensures that inventory data is stored systematically and can be accessed efficiently by different modules. Proper relationships between tables help maintain data integrity and support reliable inventory operations.

## IMPLEMENTATION DETAILS

### IMPLEMENTATION DETAILS (Backend Role Highlighted)

The **Inventory Management System for Healthcare (Pharmacy)** is implemented as a web-based application using a structured development approach. The system is divided into frontend, backend, and database layers to ensure smooth functionality, scalability, and easy maintenance.

The frontend of the system is developed using **HTML, CSS, and JavaScript** to provide a user-friendly and responsive interface. Through this interface, users can interact with the system to manage medicines, view alerts, and generate reports.

The backend of the system is implemented using **Spring Boot**, which plays a central role in handling application logic and system operations. Backend services are responsible for processing user requests, validating input data, enforcing role-based access control, and managing secure communication between the frontend and the database. Core functionalities such as authentication, medicine management, alert generation, and report processing are handled at the backend level to ensure reliability and data integrity.

The **MySQL** database is used to store all inventory-related data, including medicine details, user information, stock transactions, and alert records. Backend services interact with the database to perform accurate data storage and retrieval, ensuring real-time updates and consistency across the system.

Overall, the system implementation emphasizes robust backend processing, secure data handling, and efficient database management, resulting in a reliable and effective pharmacy inventory management solution.

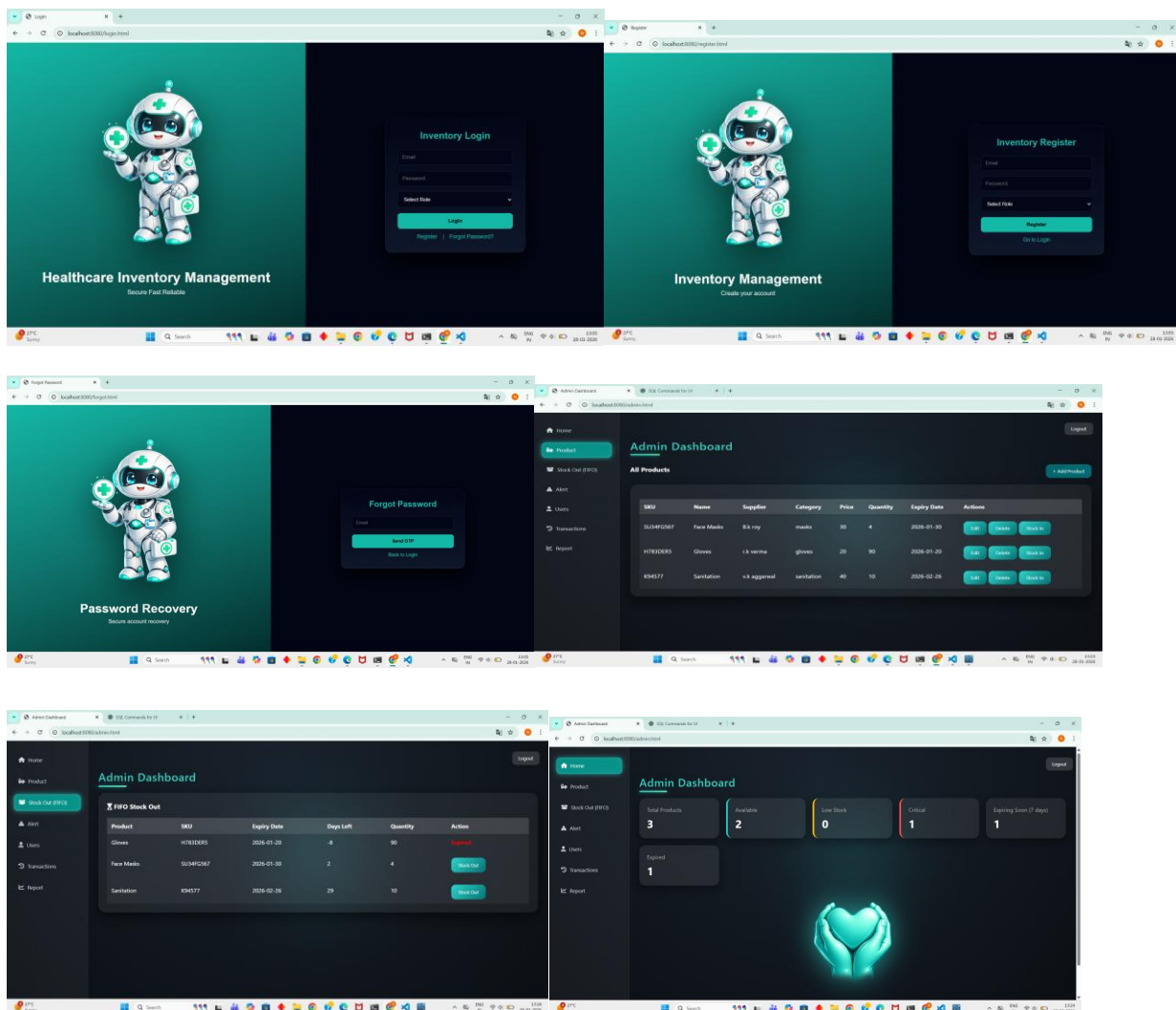
## RESULTS AND OUTPUT

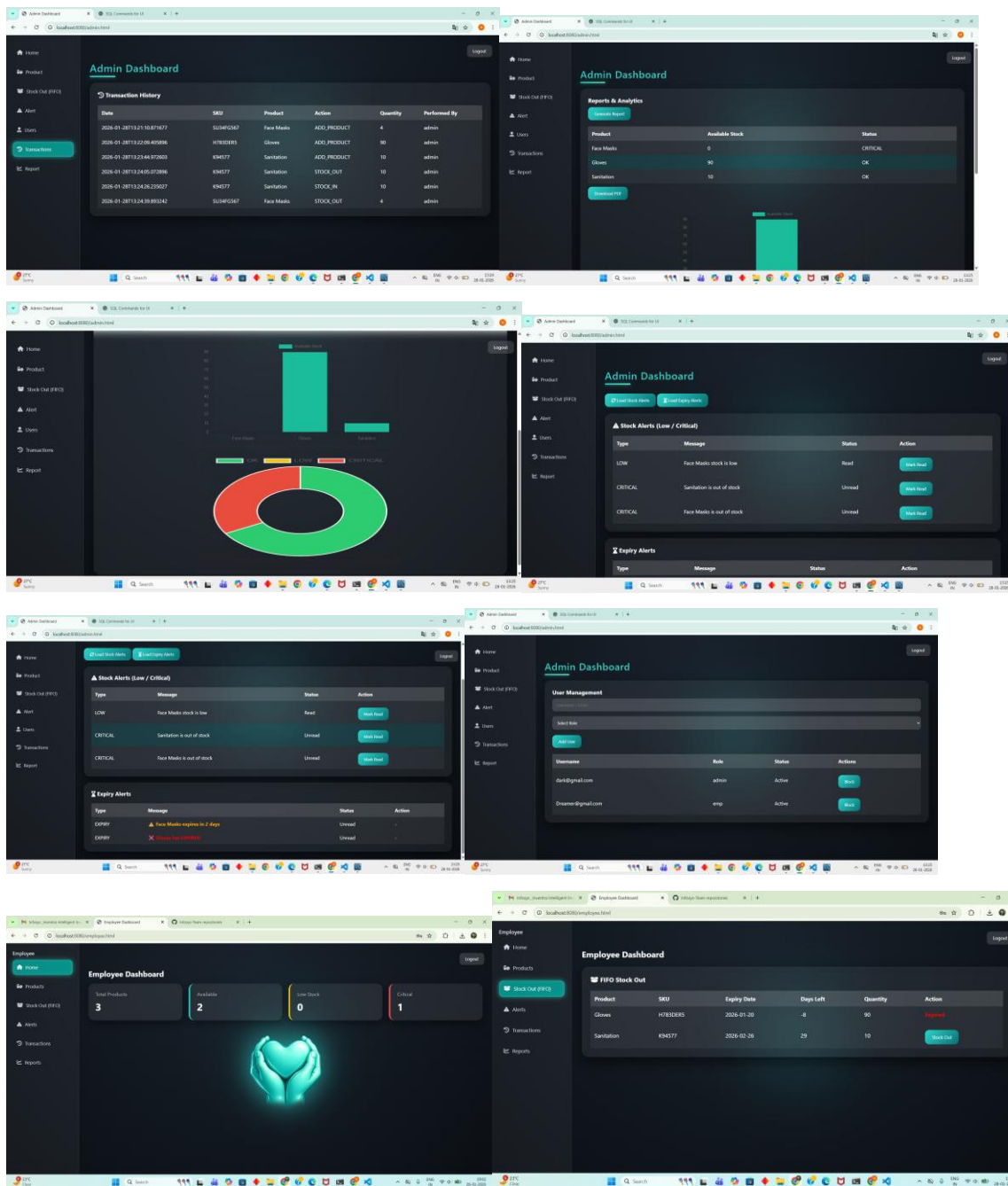
The **Inventory Management System for Healthcare (Pharmacy)** was successfully implemented and tested to verify its functionality and performance. The system was able to manage pharmacy inventory operations efficiently and accurately.

After implementation, the system allowed users to securely log in and perform inventory-related tasks based on their roles. Medicine records were added, updated, and managed smoothly, and stock levels were accurately reflected in real time. The alert mechanism worked effectively by notifying users about low stock levels and medicines nearing expiry.

The report generation feature provided clear insights into inventory status, helping users analyze stock availability and transaction history. The system reduced manual effort, minimized errors, and improved overall efficiency in pharmacy inventory management.

The output of the system was verified using multiple test cases, and screenshots of the login page, dashboard, medicine management screen, alerts, and reports were captured to demonstrate the successful working of the application.





## USER ROLES AND ACCESS CONTROL

The **Inventory Management System for Healthcare (Pharmacy)** is designed with role-based access control to ensure data security and proper system usage. The system supports two types of users: **Admin** and **Employee**. Each user is provided access according to their responsibilities.

### User Roles

## User Role Access Description

Admin	Has full access to the system, including user management, medicine management, alerts, and report generation
Employee	Has limited access, such as viewing medicine details, managing stock operations, and viewing reports

The Admin user is responsible for managing the overall system and controlling user access. The Employee user is restricted from performing sensitive operations such as managing users or modifying system configurations. This separation of access ensures system security and accountability.

## TESTING

Testing is an important phase of the **Inventory Management System for Healthcare (Pharmacy)** to ensure that all modules work correctly and meet the system requirements. The system was tested using different test cases to verify functionality, accuracy, and access control for different users.

Both **Admin** and **Employee** roles were tested to confirm that role-based access restrictions are properly enforced. Testing helped identify and fix errors, ensuring reliable and smooth system performance.

Backend services were tested to ensure correct data processing, role-based access enforcement, and error handling.

### Types of Testing Performed

- **Functional Testing:** To verify that each module performs its intended function.
- **Login and Access Testing:** To ensure secure authentication and role-based access.
- **Database Testing:** To verify correct storage and retrieval of inventory data.

### Sample Test Cases

Test Case	Description	Expected Result
Login Test	Valid user login	User successfully logged in
Role Access Test	Employee access to admin features	Access denied
Medicine Entry Test	Add new medicine	Medicine added successfully

Test Case	Description	Expected Result
Alert Test	Low stock condition	Alert generated
Report Test	Generate stock report	Report displayed correctly

Successful testing confirmed that the system performs accurately, maintains data integrity, and enforces proper access control for different users.

## CHALLENGES FACED

During the development of the **Inventory Management System for Healthcare (Pharmacy)**, several technical and functional challenges were encountered. One of the primary challenges was designing an efficient database structure that could handle medicine records, stock quantities, expiry dates, and user information in a consistent and reliable manner.

Implementing role-based access control was another significant challenge. Differentiating between admin and employee users and restricting access to sensitive features required careful planning and validation to ensure system security without affecting usability.

Managing real-time inventory updates, especially during stock in and stock out operations, was also challenging. Ensuring that stock quantities were accurately updated and reflected immediately across the system required proper coordination between different modules.

Additionally, generating timely alerts for low stock and near-expiry medicines demanded continuous monitoring of inventory data. Integrating frontend components with backend services and handling data validation further required extensive testing and debugging.

Addressing these challenges provided valuable learning experience and enhanced understanding of full-stack application development in a healthcare environment.

Major challenges included implementing secure authentication, managing database relationships, and ensuring real-time data consistency across modules.

## CONCLUSION

The **Inventory Management System for Healthcare (Pharmacy)** was successfully designed and implemented to address the challenges of manual inventory handling in pharmacy operations. The system provides an efficient and reliable solution for managing medicine records, stock levels, expiry tracking, and user access.

By automating inventory processes, the system reduces manual errors, improves data accuracy, and enhances overall operational efficiency. Features such as role-based access control, alert generation, and report management contribute to better inventory monitoring and decision-making.

This project provided practical exposure to real-world application development and enhanced understanding of inventory management in the healthcare domain. Overall, the system meets its objectives and serves as a useful tool for effective pharmacy inventory management.

This project significantly improved my understanding of backend development, database management, and secure application design.

## FUTURE SCOPE

The **Inventory Management System for Healthcare (Pharmacy)** provides a strong foundation for efficient inventory control; however, the system can be further enhanced with additional features in the future.

The system can be extended to support barcode scanning for faster and more accurate medicine identification. Mobile application support can also be introduced to allow inventory management through smartphones or tablets.

Integration with cloud services can improve data accessibility and scalability, enabling pharmacies to manage inventory across multiple branches. Advanced reporting and analytics features can be added to provide better insights into medicine usage patterns and demand forecasting.

Additionally, features such as supplier management, automated purchase ordering, and notification through email or SMS can further improve system efficiency and usability. These enhancements would make the system more robust and suitable for large-scale healthcare environments.



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