INVENTRA – Intelligent Inventory Management System

A Project Completion Report submitted as part of the
Infosys Springboard Virtual Internship 6.0

Submitted By:
Jerusha

Internship Duration: 8 Weeks

Abstract

The Inventra – Intelligent Inventory Management System is a full-stack web application developed to automate and improve traditional inventory management practices. Many organizations still rely on manual registers or spreadsheet-based systems for tracking inventory, which often leads to data inconsistency, human errors, delayed updates, and lack of real-time visibility. These issues negatively impact operational efficiency and decision-making.

Inventra addresses these challenges by providing a centralized, secure, and database-driven solution for managing products, tracking inventory levels, generating low-stock alerts, and viewing reports. The system integrates secure user authentication, structured data handling, and real-time monitoring to ensure accuracy and reliability. Developed using Spring Boot, MySQL, and a web-based frontend, Inventra demonstrates a practical and scalable inventory management solution suitable for small to medium-scale business environments.

Objectives

The primary objectives of the Inventra project are:

- To design and implement a secure inventory management system
- To provide authentication using JWT-based security
- To enable efficient product and inventory management
- To maintain accurate and real-time stock records
- To identify low-stock conditions and generate alerts
- To provide inventory reports for analysis and decision-making
- To ensure a modular architecture that supports scalability

Problem Statement

Traditional inventory management methods often involve manual data entry or spreadsheet-based tracking. These approaches are time-consuming and prone to errors, leading to inaccurate stock records, delayed restocking, and poor inventory visibility. Organizations may face frequent stock shortages or excess inventory due to the lack of real-time monitoring.

There is a need for a centralized and automated inventory management system that ensures secure access, real-time tracking, automated alerts, and structured reporting. Inventra is designed to address these challenges by replacing manual processes with a digital, intelligent, and secure inventory solution.

Project Description

Inventra is designed as an intelligent inventory management platform that modernizes conventional inventory workflows. The system maintains a centralized digital record of products and inventory quantities, enabling users to track stock availability accurately at any time.

The application follows a modular design and is divided into five core modules: Authentication, Product Management, Inventory Management, Low Stock Alert, and Reports. Each module is responsible for a specific function, ensuring clarity, maintainability, and secure system operation. Through real-time updates and automated monitoring, Inventra reduces manual effort and improves inventory accuracy and efficiency.

System Architecture & Workflow

The Inventra system follows a client–server architecture. Users interact with the system through a web-based frontend interface. Requests from the frontend are sent to the backend using RESTful APIs.

User authentication is handled using JWT tokens to ensure secure access. The backend processes business logic, communicates with the MySQL database to store and retrieve inventory data, and sends responses back to the frontend. This architecture ensures secure communication, modular design, and smooth integration between frontend and backend components.

System Modules Overview

The Inventra system is divided into five major modules:

- Authentication Module,
- Product Management Module,
- Inventory Management Module,
- Low Stock Alert Module,
- Reports Module.

This modular approach improves system organization, simplifies maintenance, and allows future enhancements without affecting existing functionality.

Authentication Module

The Authentication Module is responsible for securing access to the system. It provides functionalities such as user registration, login, and password recovery. Only authenticated users are allowed to access and manage inventory data.

JWT-based authentication is implemented to validate user sessions. Upon successful login, a token is generated and verified for subsequent requests. This ensures secure communication between frontend and backend and prevents unauthorized access to sensitive data.

Product Management Module

The Product Management Module allows users to manage product-related information within the system. Users can add new products, update existing product details, view product lists, and delete products when required.

Each product record includes essential attributes such as product name, price, and quantity. This module ensures that product data is stored in a structured and consistent manner, supporting accurate inventory tracking.

Inventory Management Module

The Inventory Management Module tracks and maintains stock levels in real time. Inventory records are automatically updated during stock-in and stock-out operations, ensuring that the system always reflects current product availability.

This module helps prevent issues such as overstocking, stock shortages, and data mismatch. Accurate inventory tracking improves operational efficiency and supports effective stock control.

Low Stock Alert Module

The Low Stock Alert Module continuously monitors inventory levels and identifies products whose quantity falls below a predefined threshold. When such conditions occur, the system generates alerts to notify users that restocking is required.

This proactive alert mechanism helps avoid stock-out situations and operational delays. It enables timely decision-making and improves inventory responsiveness.

Reports Module

The Reports Module provides summarized and analytical views of inventory data. It allows users to view inventory status, stock summaries, and related reports through a user-friendly interface.

By converting raw inventory data into meaningful insights, this module supports better planning, monitoring, and decision-making.

Technology Stack

The Inventra system is developed using the following technologies:

Frontend: HTML, CSS, JavaScript
Backend: Spring Boot (Java)
Database: MySQL
Authentication: JWT (JSON Web Token)
Tools: Postman, VS Code, MySQL Workbench

Project Execution Details

The project was developed in a structured and phased manner. Initial stages focused on requirement analysis and system design. Authentication and database design were implemented first to establish a secure foundation.

Subsequent stages included the development of product and inventory modules, implementation of low-stock alert logic, frontend-backend integration, and testing. The final stages involved debugging, report generation, and documentation.

TIMELINE OVERVIEW

- Week 1: Requirement analysis and planning
- Week 2: System design and database setup
- Week 3: Backend development
- Week 4: Frontend development
- Week 5: Integration and testing
- Week 6–7: Dashboard and alert enhancements
- Week 8: Documentation and final presentation

Learnings

Through this project, the following skills and knowledge were gained:

- Full-stack web application development,
- REST API design,
- JWT-based authentication and security,
- Database design and MySQL integration,
- Frontend–backend communication,
- Debugging,
- Testing,
- Documentation.

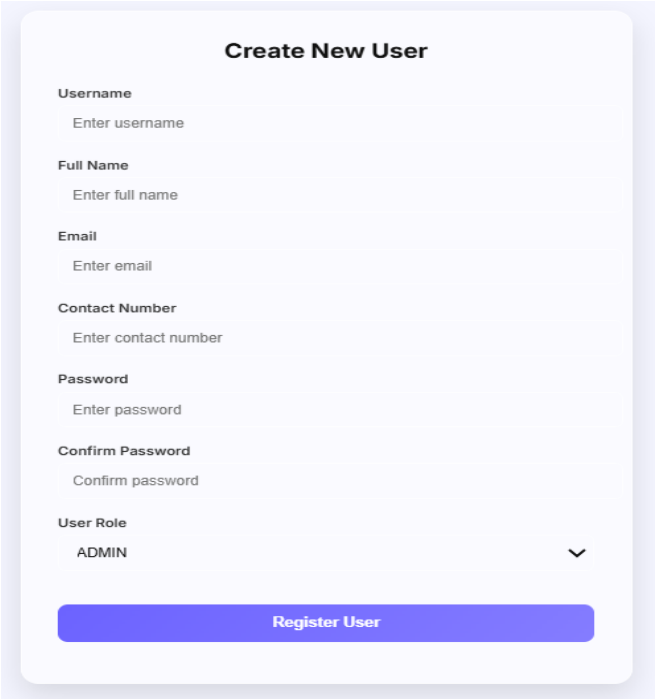
Challenges & Solutions

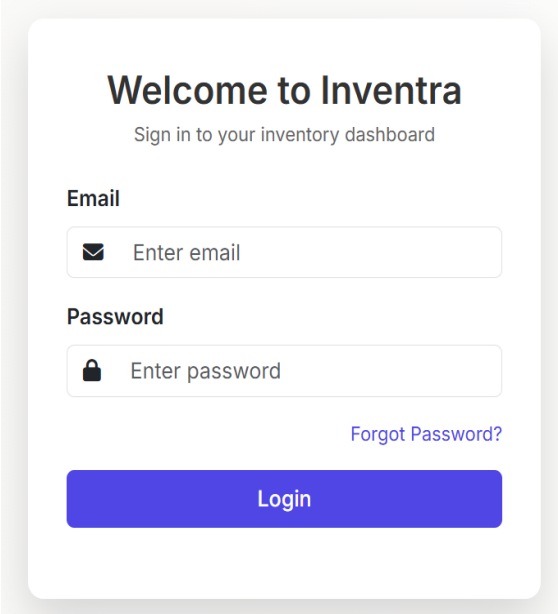
One of the major challenges faced was implementing secure user authentication. This was resolved using JWT-based authentication and access validation.

Managing product and inventory data efficiently was addressed by designing a structured relational database. Low-stock detection was implemented using threshold-based logic, and frontend-backend communication issues were resolved through proper REST API design and CORS configuration.

Snapshots / Screenshots

Figure 1: Authentication Module





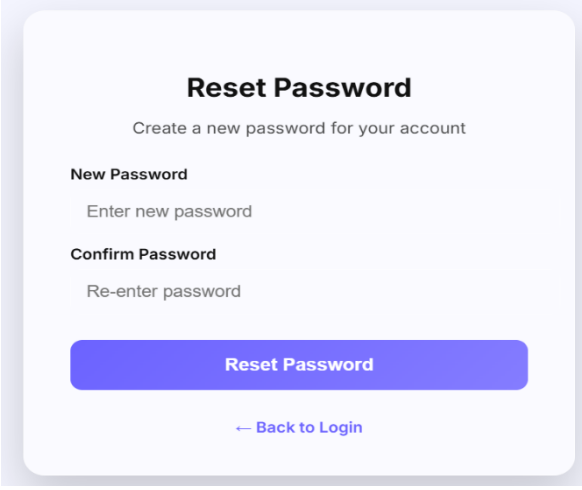


Figure 2: Product Management

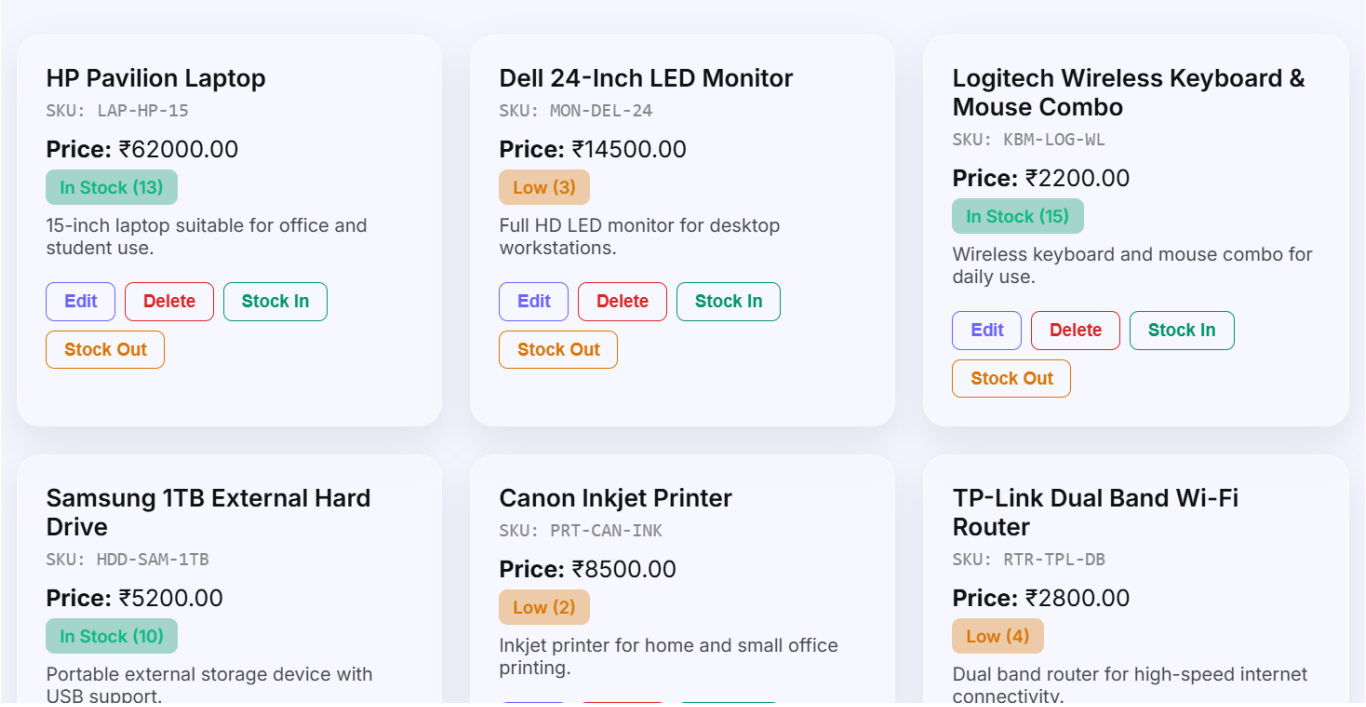


Figure 3: Low Stock Alert

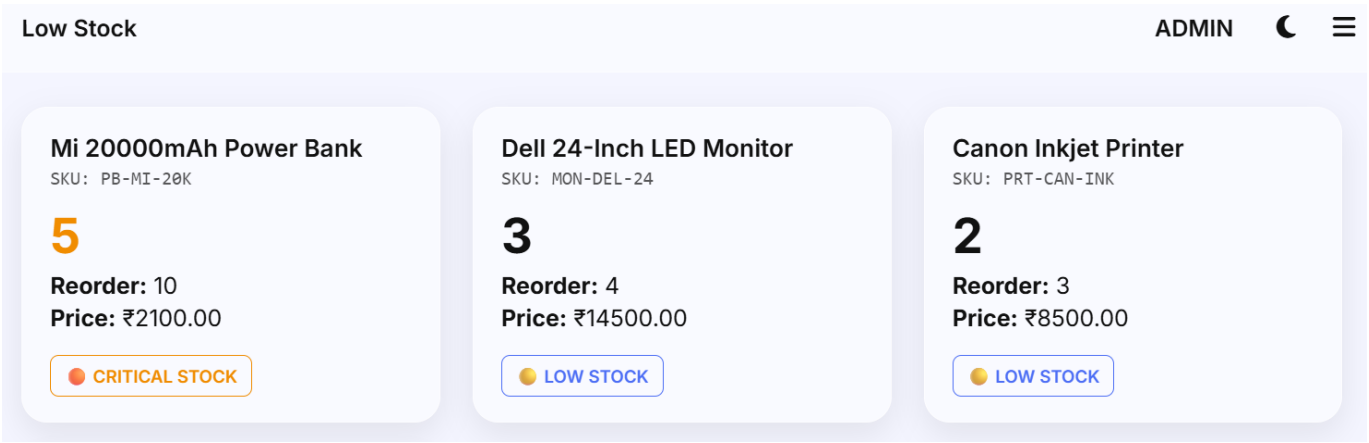
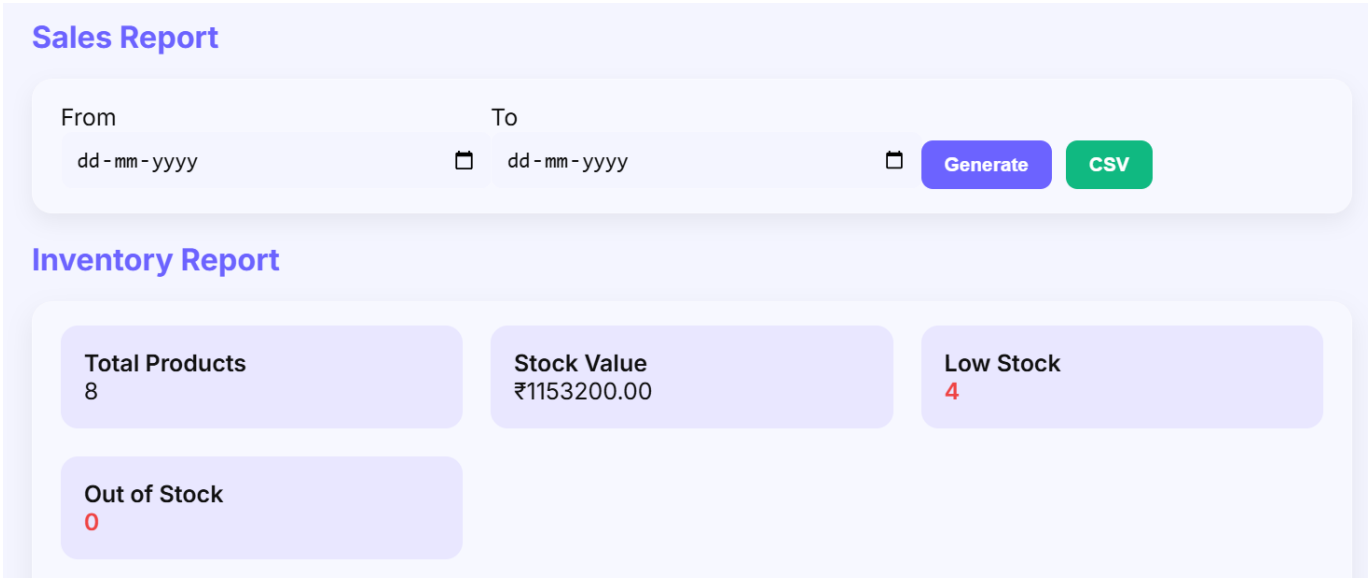


Figure 4: Reports Module



Conclusion

The Inventra – Intelligent Inventory Management System successfully demonstrates a secure, scalable, and practical solution for managing inventory operations. By automating inventory tracking, alert generation, and reporting, the system reduces manual effort and improves accuracy.

The project provided valuable hands-on experience in full-stack development, authentication, database management, and system integration, making it suitable for real-world inventory environments.

Acknowledgement

The Inventra – Intelligent Inventory Management System successfully demonstrates a secure, scalable, and practical solution for managing inventory operations. By automating inventory tracking, alert generation, and reporting, the system reduces manual effort and improves accuracy. The project provided valuable hands-on experience in full-stack development, authentication, database management, and system integration, making it suitable for real-world inventory environments.