Sri Lanka Institute of Information Technology

Software Engineering | SE2030

2025 | Year 2 Semester 1

Group ID: 2025-Y2-S1-MLB-B6G2-07

Final Report

Web-based Musical Instrument Selling System

Student ID	Name
IT24102374	Wickramaarachchi M. H
IT24101551	Kuyilini. T
IT24101536	Alwis P.G.R.M
IT24101325	Gammanpila J.P
IT24101520	Athukorala A. P. H. B
IT24101376	Nishshanka N.P.S.M.

B.Sc. (Hons) in Information Technology

Contents

Introduction

Project Overview

Web-Based Musical Instrument Sales System is an online shopping site that is aimed at facilitating an effortless shopping process for customers and yet possessing the entire management tool set for internal users. It caters to all levels of users ranging from customers viewing the online shop to the internal groups who control the business, such as administrators, sales personnel, and managers. Important features support the whole sales process: an online product directory for browsing, safe online ordering and payment, and real-time tracking for customers. Behind the scenes, key inventory management and financial reporting tools make all business operations efficient and data driven.

Objectives

The main objectives of the Web-Based Musical Instrument Sales System are to:

1. Provide a user-friendly online shopping experience for customers looking to purchase musical instruments.

2. Ensure secure online transactions and payments for customers using multiple payment methods.

3. Implement real-time inventory management and low-stock notifications for internal users (administrators and sales staff).

4. Offer order tracking functionality, ensuring customers can follow their orders from placement to delivery.

5. Generate financial reports that allow administrators to monitor and optimize business performance.

Stakeholders

• Customer – Browses products, reads reviews, adds to cart, checks out, tracks orders.

• Sales Staff – Responds to customer inquiries, updates promotions, views sales dashboards.

• Delivery Team – Updates order delivery status, manages returns, optimizes delivery routes.

• Manager – Views reports, approves supplier restocks, monitors staff performance.

• Supplier – Uploads/updates product catalogs, receives restock notifications, tracks payments.

• Admin – Manages users, orders, stock, and payments.

Scope and Limitations

Scope

The system includes the following features:

- Admin Management: User account and permission management for administrators.

- Product Display: A product catalog with advanced filtering, sorting, and viewing options.

- Online Ordering and Payment: A secure shopping cart and multiple payment methods.

- Stock Management: Real-time stock monitoring and low-stock notifications.

- Order Tracking: Real-time order tracking with logistics partners.

- Financial Reporting: Sales and financial reports for administrators.

Out of Scope

- Physical Store Integration: The system does not integrate with any physical retail store or inventory management.

- Custom Product Configuration: Customers cannot personalize or configure custom instruments (e.g., color or features).

- Multi-language Support: The system is designed only for one language (e.g., English).

- International Shipping: Currently, the system only supports domestic deliveries.

Limitations

- Simulated Transactions: All payments are simulated through a mock gateway and do not involve real financial transactions.

- No Live Deployment: The system is a prototype and is not intended for public deployment.

- Limited Testing: Due to time constraints, testing was minimal and limited to internal verification. There was no extensive user testing or bug fixing.

- Scalability: The system is designed to handle low to moderate traffic and may not perform well under heavy load or during peak usage times.

- Short Development Timeline: The project was completed within 1 – 1.5 months, which limited the time for refinement and feature expansion.

Requirements

Functional Requirements

The Musical Instrument Sales System must support an array of key functionalities to meet the diverse needs of its users effectively. These requirements form the basis for the system's functional capabilities:

• Admin Management: This functionality allows administrators to manage and regulate user accounts, monitor system performance, and adjust settings for best operation. It includes facilities for adding/deleting users, verifying registrations, and managing permissions.

• Product Display: This functionality enables the system to show a full inventory of musical instruments with details such as instrument type, brand, price, availability, and high-quality images. Customers can browse and filter products to find their choice easily.

• Online Ordering and Payment: This feature provides customers with the feature of selecting instruments, adding them to a cart, and purchasing them using a secure online payment process. It supports multiple modes of payment like credit cards and digital wallets for ultimate convenience.

• Stock Management: This module tracks the stock of instruments in real time, allowing employees to modulate stock levels upon sale or restocking. It has even automated notifications to remind administrators when stock is getting low, thereby eliminating overselling.

• Order Tracking: This option gives the customer real-time tracking of their orders from receipt to delivery. It connects with logistics operators to provide accurate tracking data, increasing transparency and trust.

• Financial Reporting: Using reports of sales performance, revenues and expenditure helps administrators to make better financial choices based on sales data.

Non – Functional requirements

Other than the core functionalities the system should be able to also satisfy some non-functional requirements to offer high-quality customer satisfaction and operational reliability:

• Performance: All transactions and queries should be executed within less than 2 seconds to maintain the user's experience responsive even at times of maximum usage.

• Security: Secure encryption schemes must be employed for payment processing and storage of user data, following GDPR, and protection from data breaches.

• Usability: The interface should be easy to use and accessible, having a responsive design that loads gracefully on desktops, tablets, and mobiles for everyone.

• Reliability: The system should have 99.9% uptime to reduce interruptions, backed by routine maintenance and backup systems.

• Scalability: The system should be able handle more user traffic and data volume, especially during high demanding times such as holiday seasons, without affecting the performance.
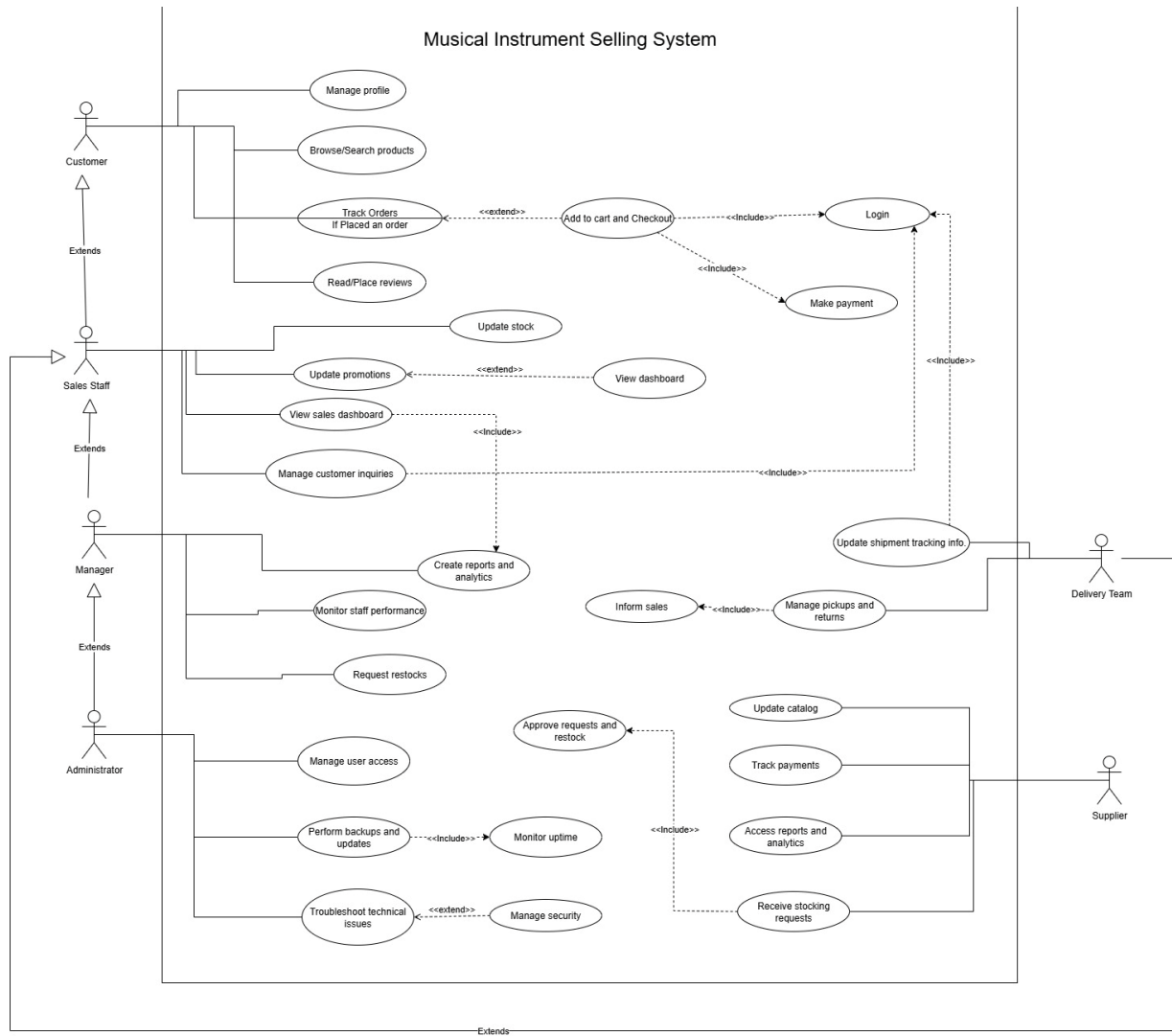

Constraints or Assumptions

Assumptions:

- The system assumes all users have reliable internet access.

- Payments are simulated using a mock gateway and will not involve real financial transactions.

- The system will be accessed via modern web browsers such as Chrome, Firefox, and Edge.
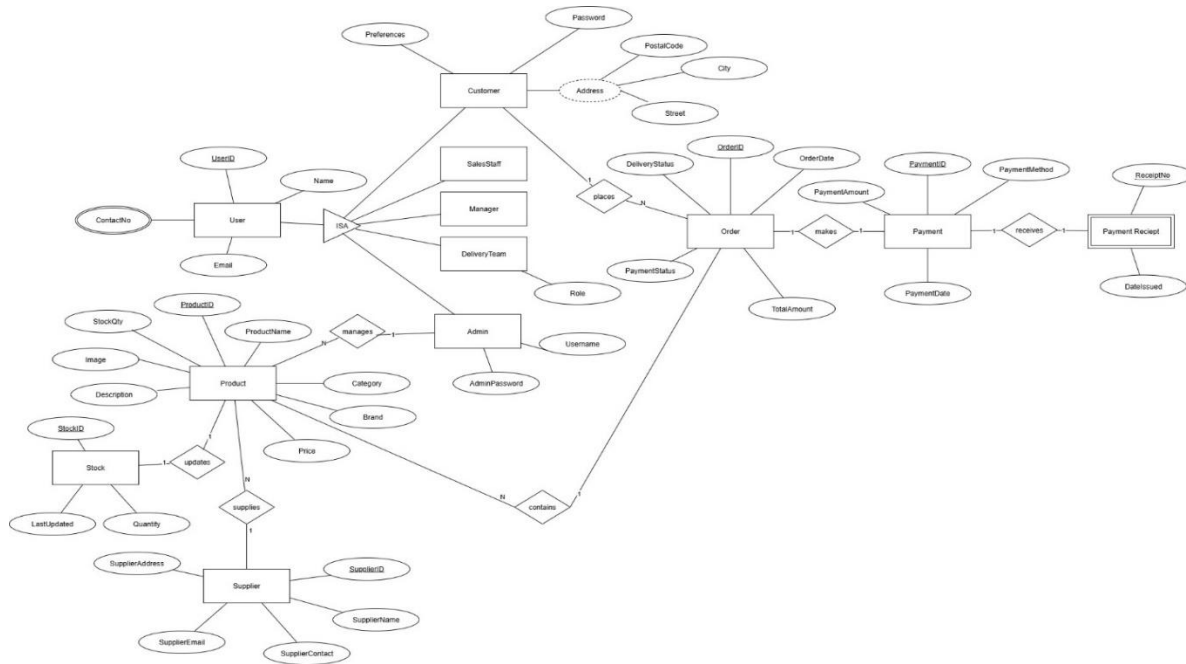
Constraints:

- The project was developed within a limited timeframe (1 – 1.5 months), so only core functionalities were implemented, and there was no time for extensive user testing.

- Open-source tools and free hosting were used to minimize costs, which limited certain advanced features (e.g., premium payment gateways).

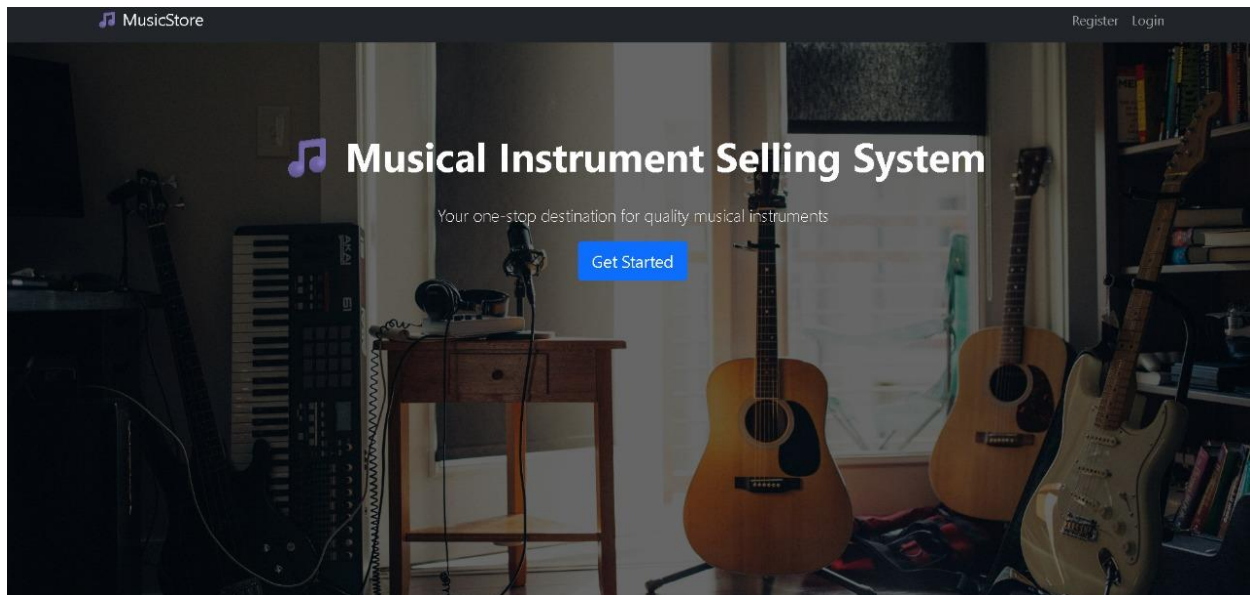- Scalability and performance optimization were not prioritized due to time constraints.

Design

Use Case Diagram

Musical Instrument Selling System

Database Diagram

UI Sketches/Screenshots

Implementation

Tools and Technologies used

The system was built using the following tools and technologies:

- **Frontend**: HTML and CSS

- **Backend**: Java Language

- **Database**: MySQL for managing product, user, and order data.

- **Payment Gateway Using Design Patterns**: Simulated payment system for mock transactions.

- **Version Control**: Git and GitHub for version control and collaboration.

Key Features Developed

Admin Management: Developed functionality for administrators to manage users, orders, and inventory.

Product Display: Implemented product listing and advanced filtering options for customers to browse musical instruments.

Online Ordering and Payment: Enabled customers to add items to the cart and complete purchases via a mock payment system.

Order Tracking: Integrated simulated order tracking functionality for customers to monitor their order status.

Stock Management: Built real-time stock tracking with automated low-stock notifications for administrators.

Financial Reporting: Implemented basic financial reporting for administrators to review sales and revenue data.
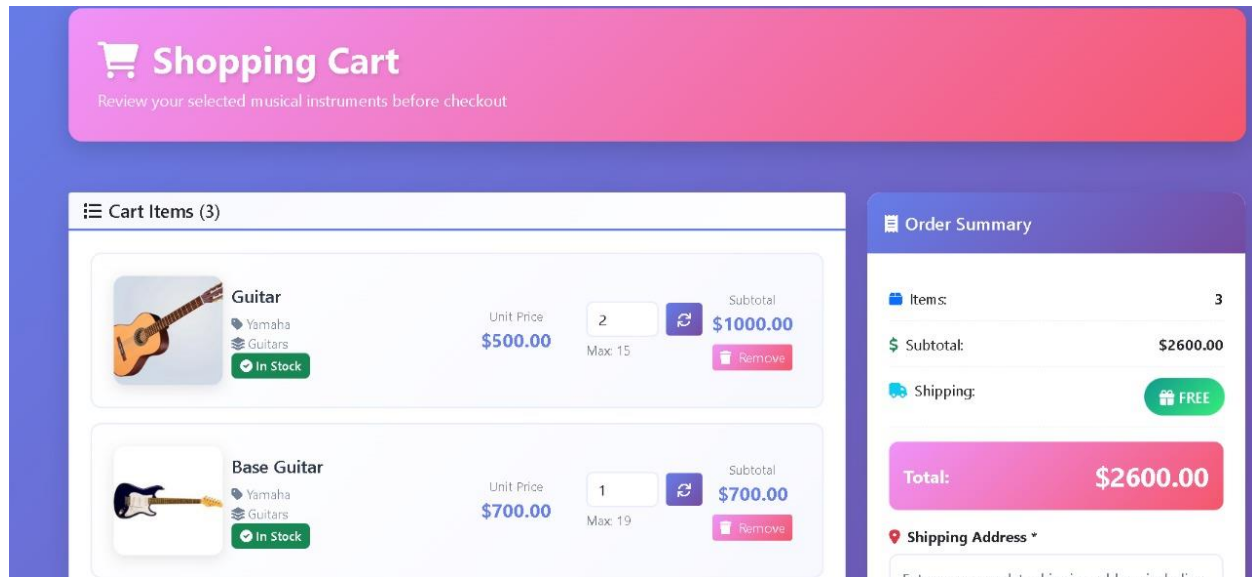
Screenshots of Core Functions

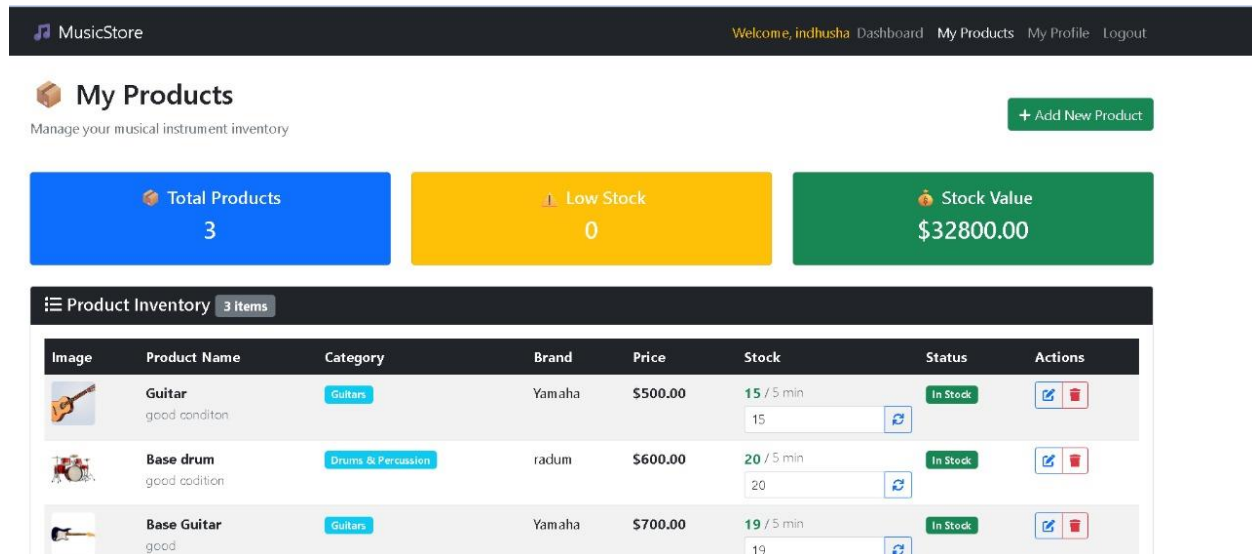*Figure 1 Online ordering and payment*

Figure 2 Product Display

📄 Financial Records

+ Add New Record | Back to Reports

ID	Type	Title	Description	Amount	Actions
1	Income	income	good	$100.00	Edit Delete
2	Expense	products	test	$1000.00	Edit Delete

Figure 4 Financial Management

🛒 Order Management

🏃 Pending 20	✅ Confirmed 12	🚚 Shipped 0	📦 Delivered 2	✖ Cancelled 0	📊 Total 34

Order ID	Customer	Date	Amount	Payment	Delivery Status	Actions
#2	havindu	2025-10-18 15:48	$1000.00	COMPLETED	✅ Confirmed ⌄	👁 View 🗑 Delete
#3	havindu	2025-10-18 16:06	$500.00	COMPLETED	📦 Delivered ⌄	👁 View 🗑 Delete
#4	havindu	2025-10-18 16:32	$600.00	COMPLETED	📦 Delivered ⌄	👁 View 🗑 Delete
#5	havindu	2025-10-18 18:01	$1200.00	COMPLETED	✅ Confirmed ⌄	👁 View 🗑 Delete
#6	havindu	2025-10-18 18:06	$1100.00	PENDING	⏳ Pending ⌄	👁 View
#7	havindu	2025-10-18 18:32	$500.00	PENDING	⏳ Pending ⌄	👁 View
#8	havindu	2025-10-19 12:50	$1100.00	PENDING	⏳ Pending ⌄	👁 View
#9	havindu	2025-10-19 13:06	$500.00	PENDING	⏳ Pending ⌄	👁 View
#10	havindu	2025-10-19 13:10	$500.00	PENDING	⏳ Pending ⌄	👁 View
#11	havindu	2025-10-19 13:14	$500.00	PENDING	⏳ Pending ⌄	👁 View

Figure 3 Order Tracking
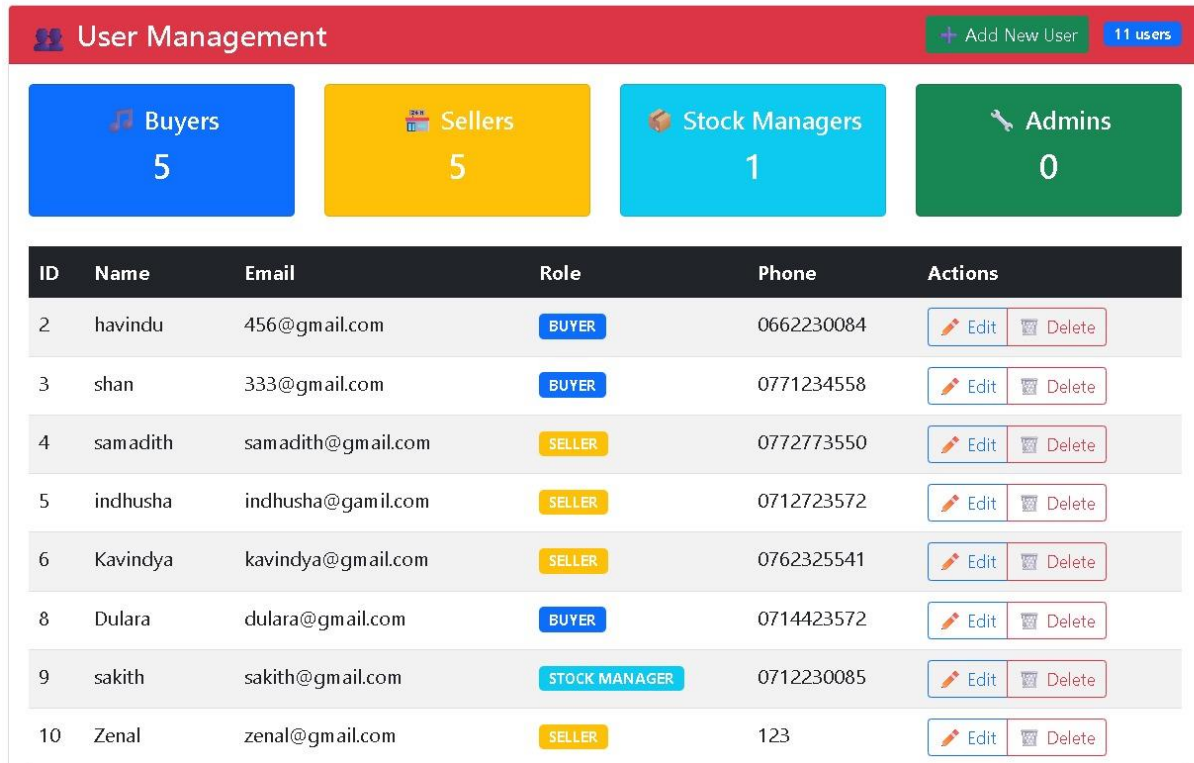
Figure 5 Admin Management
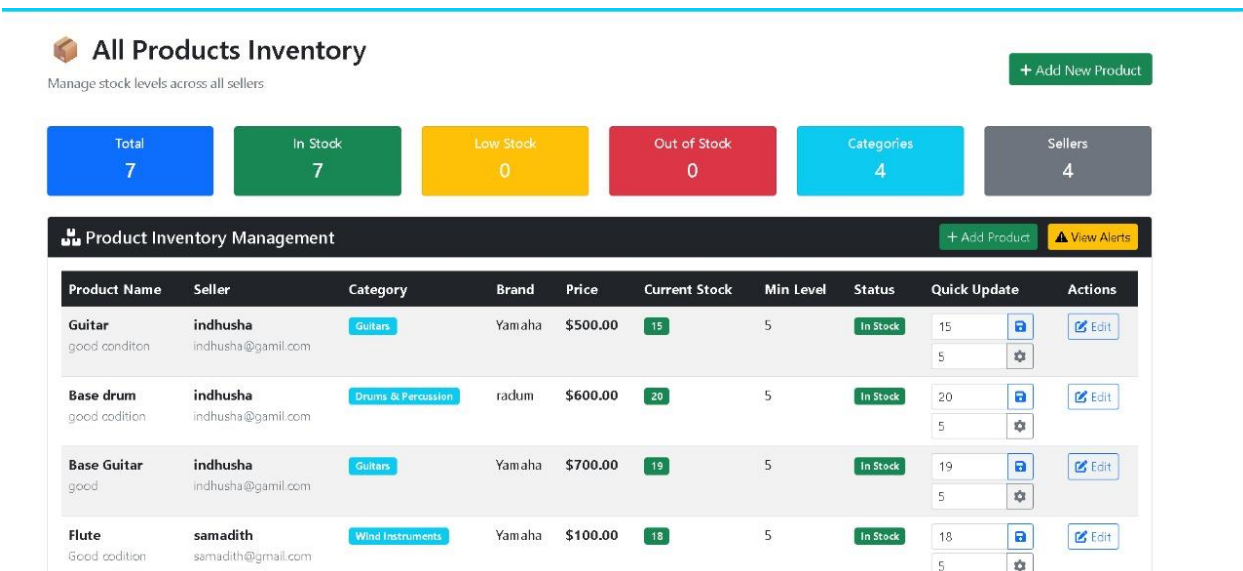
Figure 6 Stock Management

Project Management

Agile Approach and Sprint Summary

Sprint 1 (Foundation Sprint)

Duration: 2 weeks **Goal:** Establish core system infrastructure and basic user management

User Story	Assignee	Story Points	Status
Admin account registration	Alwis P.G.R.M.	5	Completed
User authentication setup	Alwis P.G.R.M.	5	Completed
Customer product browsing	Gammanpila J.P.	8	Completed
Basic stock viewing	Nishshanka N.P.S.M.	8	Completed

Sprint 2 (Core Functionality Sprint)

Duration: 2 weeks **Goal:** Implement product and order management

User Story	Assignee	Story Points	Status
Customer order tracking	Athukorala A.P.H.B.	3	Completed
Stock level updates	Nishshanka N.P.S.M.	3	Completed
Product filtering and search	Gammanpila J.P.	5	Pending
Admin product management	Alwis P.G.R.M.	5	Completed
Online payment integration User role assignments	Wickramaarachchi M.H.	3	Completed
User role assignments	Alwis P.G.R.M.	3	Completed

Sprint 3 (Advanced Features Sprint)

Duration: 2 weeks **Goal:** Implement security and support features

User Story	Assignee	Story Points	Status
Customer contact form submission	Kuyilini T.	8	Completed
Admin user history access	Alwis P.G.R.M.	5	Completed
System health monitoring	Alwis P.G.R.M.	8	Pending
Password reset configuration	Wickramaarachchi M.H.	8	Completed
Order status monitoring	Athukorala A.P.H.B.	5	Pending

Sprint 4 (Analytics & Reporting Sprint)

Duration: 2 weeks **Goal:** Complete analytics system and advanced reporting features

User Story	Assignee	Story Points	Status
Admin sales analytics	Kuyilini T.	13	Completed
Financial revenue reports	Kuyilini T.	13	Completed
System-wide analytics	Kuyilini T.	8	Pending
Order trend monitoring	Athukorala A.P.H.B.	5	Pending
Stock trend analysis	Nishshanka N.P.S.M.	8	Pending
Payment gateway management	Wickramaarachchi M.H.	8	Completed
Data export features	Kuyilini T.	5	Completed
Authentication enhancements	Alwis P.G.R.M.	8	Pending

Task Distribution Among members

Wickramaarachchi M. H - IT24102374

- Payment gateway management
- Online ordering process

Kuyilini. T - IT24101551

- Customer contact form submission
- Financial revenue reports
- System-wide financial analytics
- Data export features

Alwis P.G.R.M - IT24101536

- Admin account registration
- User role assignments
- Admin user history access
- Authentication enhancements

Gammanpila J.P - IT24101325

- Customer product browsing
- Product filtering and search
- Admin product management

Athukorala A. P. H. B – IT24101520

- Customer order tracking
- Order status monitoring
- Order trend monitoring

Nishshanka N.P.S.M. - IT24101376

- Basic stock viewing
- Stock level updates
- Stock trend analysis

Development Phases

Wickramaarachchi M. H - IT24102374 - Built the Online Ordering part, which would be the system customers use to place their orders.

Kuyilini. T - IT24101551 – Developed Financial Reports, meaning they oversaw creating reports related to sales, revenue, and other financial data to analyze the revenue.

Alwis P.G.R.M - IT24101536 - Developed the Admin Panel, the internal dashboard used by the business administrators to mainly manage the website, the users and overall access to the website.

Gammanpila J.P - IT24101325 - Developed Product Display, that shows how products are shown to customers on the website pages and search through items using filtering methods.

Nishshanka N.P.S.M. - IT24101376 - Managed the Stock Management system, which keeps track of inventory, product counts, and stock levels.

Athukorala A. P. H. B – IT24101520 - Created the Online Order Tracking feature, allowing customers to see the status of their orders after purchase.

Conclusion and Future Work

Summary of achievements

The Use Case Modelling task was completed successfully in the sense that it allowed the team to identify the actors, use cases, and their relationships for the system. A fully populated Use Case Diagram was created along with complete scenarios for each group member's assigned functionality so that system requirements were clear to guide further development.

This successful planning was mirrored in the implementation, as can be seen from the outcomes of the test cases. All the test cases for the next six major functions were passed successfully:

- Product Display (10/10 passed)
- Admin Management (10/10 passed)
- Online Ordering and Payment (10/10 passed)
- Stock Management (10/10 passed)
- Order Tracking (15/15 passed)
- Financial reporting (10/10 passed)

The core functionalities of the system for the customers, staff, and admins were implemented as intended and working properly.

Challenges Faced

The most issues were discovered in Financial Reporting module testing and notification generation, where several key test cases failed.

- Data Validation Failure :The system failed to validate mandatory fields. When an attempt was made to create a report with a blank "Report Name", the system incorrectly "accepted blank field and created report" instead of displaying the anticipated error message.
- System Crash : The system did not handle invalid data elegantly. For an invalid date range (end date prior to start date), the "System crashed instead of showing error.".
- Access Error : When a user who was logged in as a "Customer" (non-admin user) attempted to access reporting functionality, the System allowed access and user deleted a report instead of presenting a "Permission denied" message.

Suggestions for Improvement

Further development can be aimed to enhance the functionality of the system and the customer satisfaction based on the "Open Issues" that were identified during the design phase and improve accordingly to the client requirements:

1. For Product Display: Implement advanced sorting capabilities and have a "favorites" feature for shoppers to save products.
2. For Online Ordering: Develop a "guest checkout" option so that customers can order without needing to set up an account. A business rule must also be defined to determine if "Cash on Delivery" orders are given the same or different priority as pre-paid orders.
3. For Order Tracking: Could improve customer satisfaction in the tracking page with a live courier API using map view of the delivery zone.
4. For Financial Reporting: Add features for automatically generated reports to be emailed (daily, weekly, or monthly). The system also needs to have a definition of how returns and refunds are handled in the financial calculations.

Individual Contribution, Teamwork and Lessons Learned

Name	Specific Role	Challenges Faced	How overcame those Challenges	Lessons learned	Reflection
Wickramaarachchi M. H	Developed the Online Ordering and payment gateway component	Integrating the ordering system with the backend and ensuring smooth data flow between customer inputs and order processing was challenging.	Worked closely with the backend team to debug API connections and implemented input validation to prevent errors.	Learned the importance of clear communication, modular coding, and testing early to reduce integration issues.	The online ordering system worked well after integration. Could improve UI responsiveness and add real-time order confirmation in the future.
Kuyilini. T	Handled Financial Reports, creating modules that generate sales and revenue summaries.	Encountered issues in retrieving accurate data for financial calculations and formatting reports.	Validated data sources and implemented proper data aggregation logic; also used consistent formatting for better readability.	Gained better understanding of data accuracy, report generation, and attention to detail in financial analytics.	The reports were successfully generated; however, automating report scheduling would make the system more efficient.
Alwis P.G.R.M	Developed the Admin Panel, which allows administrators to manage products, users, and orders.	Designing an intuitive yet secure dashboard interface and handling access control were challenging.	Conducted research on admin dashboard design, implemented role-based access control, and tested thoroughly with sample data.	Learned about user access management, security importance, and frontend-backend synchronization.	The admin panel functioned effectively, though future improvements could include analytics widgets for faster insights.
Gammanpila J.P	Responsible for Product Display, including layout, product details, and gallery design.	Ensuring all product data displayed dynamically and consistently across devices was difficult.	Used responsive design principles and dynamic data fetching techniques to ensure correct display on all devices.	Learned about responsive web design, data binding, and the value of consistent styling.	The product display looked appealing and user-friendly. Could enhance performance by optimizing image loading.

Athukorala A. P. H. B	Created the Online Order Tracking feature, allowing customers to view their order status.	Integrating live order updates and maintaining accurate status display was challenging.	Worked on linking the tracking system with order status changes in the backend and tested multiple scenarios for accuracy.	Learned the importance of backend synchronization, user experience design, and testing under different scenarios.	The tracking system enhanced customer satisfaction. Could improve it by adding push notifications or email updates in future versions.
Nishshanka N.P.S.M.	Managed the Stock Management System, tracking product inventory and updates.	Handling synchronization between stock levels and order data to prevent mismatches was a key issue.	Implemented update triggers after every order and added validation checks for stock availability.	Learned about data consistency, transaction management, and the need for real-time updates in inventory systems.	The stock system worked reliably; future improvement could involve automatic low-stock notifications.

References

- H. M. Deitel and P. J. Deitel, *Java: How to Program*, 11th ed. Pearson Education, 2017.
- M. Hall, *Core Servlets and JavaServer Pages: Volume 1: Core Technologies*, 2nd ed. Sun Microsystems Press, 2003.
- Oracle, "Java Platform, Standard Edition Documentation," Oracle, 2024. [Online]. Available: https://docs.oracle.com/javase/8/docs/
- Oracle, "Java Servlet Technology," Oracle, 2024. [Online]. Available: https://docs.oracle.com/javaee/7/tutorial/servlets.html
- GitHub, "Git Documentation," GitHub, Inc., 2024. [Online]. Available: https://docs.github.com/
- JetBrains, "IntelliJ IDEA Documentation," JetBrains s.r.o, 2024. [Online]. Available: https://www.jetbrains.com/idea/documentation/

Appendix

Github repository of the project :

https://github.com/IT24101536/MusicalInstrumentSystem