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Saveet Ventures Inventory Management Web-based System

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Abstract

With the growing technology in business operations, the need for effective inventory management systems has become increasingly critical. Saveet Ventures, a veterinary product supplier in Negeri Sembilan, currently relies on manual methods like spreadsheets and physical records. This approach creates challenges like limited real-time visibility, frequent stock discrepancies, and inefficient data management. This project aims to design, develop, and test web-based inventory management system using a structured approach and prototype model tailored to address these challenges by using Visual Studio Code and DBeaver. The proposed system replaces existing manual processes with an automated platform that integrates essential modules, including login and registration, vendor management, inventory management, customer management, sales, and report generation. The development follows the prototype model, incorporating user feedback through iterative testing. The findings highlight the system's strength in delivering real-time inventory tracking through low stock notifications, minimizing human error, and enhancing decision-making with reporting and data visualizations.

1. Introduction

Inventory plays a vital role in the operational and financial structure of organizations across all sectors. Efficient inventory management helps reduce unnecessary expenses while ensuring resource availability. In the veterinary industry, especially for suppliers of veterinary products and equipment, maintaining accurate inventory is crucial to meeting high safety standards and ensuring timely delivery to clinics [1]. This project focuses on developing a web-based inventory management system for Saveet Ventures, a veterinary product supplier. The system aims to enhance stock tracking, prevent stockouts, streamline procurement, and improve overall service delivery through real-time updates and automated alerts for low stock and product expiration[2].

Currently, Saveet Ventures uses a manual method involving physical receipts, ledgers, and Microsoft Excel spreadsheets to track inventory and sales. This method is time-consuming, prone to human errors, lacks real-time stock visibility, and becomes inefficient as sales and product categories increase. The administrator Mrs. Jnitha Nair, under the business owner Mr. Prasad Robindran, along with managers and staff members, faces challenges such as inconsistent data, misplaced documents, and manual duplication of spreadsheets for stock calculations. These issues result in inaccurate inventory records, delays in restocking, and reliance on estimations that affect business decisions.

To overcome these challenges, the proposed web-based system will allow registered administrators and staff to manage inventory, vendors, customers, and sales efficiently. Administrators will have additional access to manage user details and generate reports, while staff members can handle day-to-day inventory and sales

operations. The system provides key advantages such as real-time inventory tracking, reduction of manual errors, time-saving data entry, stock control, and automated reporting for better decision-making [3]. Ultimately, implementing this system will improve inventory accuracy, boost operational efficiency, and support sustainable business growth.

This paper consists of five sections. Section 1 describes the project background. Next, Section 2 covers the related works. Besides, Section 3 elaborates on the methodology applied and the system analysis and design of the proposed system, while Chapter 4 summarizes the results and output of the proposed system. Lastly, Section 5 gives the conclusion on the current works and highlights the future work to be performed in the implemented system.

2. Related Work

The American Production and Inventory Society (APICS) defines inventory as the branch of business management concerned with planning and controlling inventories [4]. In this case, the integration of advanced methods and technologies is essential for businesses to remain competitive and efficient. This discussion will focus on three pivotal technologies which are management systems, inventory systems, and web-based technology.

2.1 Management System

Management systems serve as structured frameworks that integrate people, processes, and technology to enhance efficiency and adaptability in dynamic business environments. These systems, supported by socio-technical systems theory, emphasize the balance between technology and human interaction, fostering innovation and creativity in organizational processes[5]. Components such as Management Information Systems (MIS), Customer Relationship Management (CRM), and data management provide real-time insights, streamline workflows, and improve decision-making. For businesses like Saveet Ventures, leveraging these systems can optimize operations, enhance customer relations, and ensure effective inventory tracking.

However, adopting advanced management systems also poses challenges, including high implementation costs, resistance to change, and the need for employee training. Despite these hurdles, the benefits far outweigh the drawbacks, offering improved inter-departmental collaboration, resource optimization, and increased customer satisfaction through personalized services. For Saveet Ventures, integrating MIS and CRM functionalities into a web-based platform can modernize inventory management, reduce waste, and improve scalability to meet industry standards. The long-term advantages of such systems make them essential for any modern business aiming to stay competitive in today's fast-paced market.

2.2 Inventory Management System

Inventory management is a critical aspect of business operations, as it balances the availability of goods to meet customer demand with the cost-efficiency of leaner operations. Saveet Ventures, a veterinary product supplier, currently relies on manual inventory management using spreadsheets and physical records, which leads to inefficiencies and limits scalability. Effective inventory systems, such as those employing Just-In-Time (JIT) or Lean Manufacturing approaches, minimize excess inventory and reduce storage costs[6]. Categorizing inventory accurately and implementing structured processes across all departments are key to maintaining optimal stock levels and ensuring smooth operations. These methods, combined with modern automation tools, streamline inventory tracking, reduce errors, and enhance decision-making.

To address its operational limitations, Saveet Ventures aims to implement a modern, digital inventory management system. This system will integrate features such as automated low-stock and product expiration alerts, centralized data storage, and real-time inventory tracking. By transitioning to a digital platform, Saveet Ventures can improve efficiency, optimize inventory costs, and provide reliable service to its growing customer base. This solution will enable better stock management, reduce disruptions in order fulfillment, and position the company for future growth in the competitive veterinary supply market.

2.3 Web-Based Platform

Web-based systems have revolutionized inventory management by leveraging internet technology to streamline operations, improve decision-making, and enhance data visibility. Unlike manual systems, web-based inventory management provides real-time tracking of stock levels, sales, and restocking needs from any location with internet access. By utilizing a centralized database, web-based systems ensure up-to-date inventory data, reducing risks like overstocking or stockouts.

Modern web-based platforms offer advanced tools and frameworks, such as Node.js, React, and Laravel, which empower developers to create robust, interactive, and responsive applications. For Saveet Ventures, implementing a web-based inventory system would provide real-time data synchronization, and seamless

scalability, enabling efficient inventory management and driving operational excellence. This solution will also allow Saveet Ventures to integrate automated alerts for low stock, enabling proactive stock management and minimizing disruptions to order fulfillment. With a centralized platform for data storage and access, Mr. Prasad and his staffs will be able to streamline inventory control across all product category, providing faster and more reliable service to its customers.

In developing a new inventory management system for Saveet Ventures, it is essential to study similar systems currently in use. An in-depth study yields important information about what works and what doesn't. Throughout the development process, this information base facilitates well-informed decision-making, lowering uncertainty and improving outcomes of the project. Thus, three similar inventory management systems that are currently in use have been chosen and analyzed. The systems studied were Ecount Inventory Management System, Zoho Inventory Management System, and Sortly Inventory Management System. The comparisons between these systems and the proposed system are shown in **Table 1**.

Table 1 *System's Comparison*

System / Features	Ecount Inventory Management System	Zoho Inventory Management System	Sortly Inventory Management System	Saveet Ventures Inventory Management System
Login and Registration Module	√ User id, code and password	√ Email id or phone number and password	√ Email and password	√ user id and password
Sales Management	X	X	√	√
Inventory Management	√	√	X	√
Customer Management	√	√	X	√
Vendor Management	X	√	X	√
Report Generation	√	√	√	√
Low Stock Notification	X	X	X	√
Supplier Merchandise	X	X	X	√
Dashboard	X	X	X	√
Usability Platform	Cloud and Web-based	Cloud and Web-based	Web-based	Web-based
Free Access	X	X	X	√

Table 1 provides a clear comparison to help identify the strength and limitations of each system. It includes their key modules like login, registration, sales, customer, vendor and inventory management. Features like report generation, low stock notification, supplier merchandise, and dashboard are also highlighted.

3. Methodology

The chosen methodology model for the development of Saveet Ventures inventory management system is prototype model. The prototyping method is a system development technique where the prototype is utilized to provide an overview of the system development that will be carried out to the user [7].

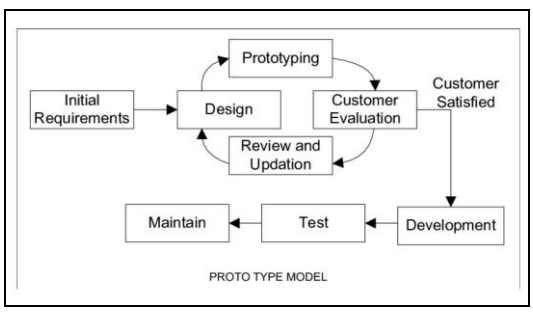

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Fig. 1 *Prototyping Model [8]*

Fig 1 illustrates the prototyping model. In the prototype method, it allows users to know what the stages of the system are like so that the system can function properly according to user needs [9]. Prototyping is also an iterative process that turns user requirements into a functional system that is constantly enhanced by analysts and users collectively [10]. **Table 2** shows the tasks carried out by Prototype Methodology to develop Saveet Ventures Inventory Management System.

Table 2 *Software Development Activities*

Phase	Task	Output
Planning	Gather information through interviews, propose the new system, identify objectives, scope, user needs, and list all required tasks.	Current workflow, project proposal, Gantt chart.
Analysis	Study the existing manual system and identify system and stakeholder requirements.	Technical specifications, Hardware and software specifications, System flowchart, DFD and ERD.
Design	Create detailed flowcharts, design the database structure, and develop an initial prototype for stakeholder feedback.	System architecture, database schema, data dictionary, low-fidelity prototype, UI design.
Implementation	Build the database, develop the system, and integrate the code with the database.	Program code and MySQL database.
Testing	Test all modules and database, identify and fix bugs, and get feedback from end users.	User Testing, and review from end user.

The Prototype Model is used to develop the Saveet Ventures Inventory Management System because it fits well with the project's needs. It allows customers to spot missing features early, and their feedback helps developers make improvements to meet expectations. Developers can also adjust the prototype as needed. Each phase has clear goals to ensure the system meets all requirements by the end of development.

3.1 System Requirements

The system requirements include functional, non-functional, user, and technical needs. The main features of the system are login and registration, user management, inventory management, sales management, report generation, and low stock notifications. These requirements are shown in Table 3 and Table 4.

Table 3 *Functional Requirements*

No	Module	Description
1.	Login and Registration Module	• Allow administrator to register new manager and staff with new account credentials. • Allow the administrator, managers and staffs to login with their user email, and password. • Allow administrator, managers and staffs to be notified for any invalid input. • Redirect the valid users to dashboard when login is successful. • Allow the administrator to edit or update the existential manager and staffs in the system. • Allow the administrator to delete the users in the system. • Allow the administrator to view the list of users permitted in the system with their roles.
2.	Inventory Management Module	• Allow manager, staffs and administrator to create, update and store new product data in the database. • Allow manager, staffs and administrator to view and filter the inventory for the categories, and all listed products respectively. • Allow manager, staffs and administrator to delete the product data in the database. • Allow the products stock to reduce automatically if a sale is recorded.

		• Allow all users to be notified of low stock inventory product alerts.

Table 3 *(cont)*

No	Module	Description
3.	Sales Management Module	• Allow managers, staffs and administrator to create and store new sales record in the database. • Allow staffs and administrator to view, update and delete the sales record in the database. • Allow administrator and manager to update sales invoices. • Allow administrator and manager to update and delete sales shipment. • Allow manager, staffs and administrator to track customer purchase history with invoices. • Allow staffs to update sales shipment.
4.	Customer Management Module	• Allow manager, staffs and administrator to create, view, update, and delete customer records in the database. • Enable manager, staffs and administrator to filter customer records based on specific criteria.
5.	Vendor Management Module	• Allow managers, staffs and administrator to view, update, and delete vendor records in the database. • Enable manager, staffs and administrator to filter vendor records based on specific criteria.
6.	Supplier Merchandise Module	• Allow managers, staffs and administrator to create, view, update, and delete stock order records in the database.
7.	Report Management Module	• Allow administrator and manager to generate monthly sales and inventory report according to preferences. • Allow administrator and manager to generate reports in pdf.

Table 3 outlines seven main modules of the Saveet Ventures Inventory Management System, each with specific functions. These include secure login, inventory tracking with alerts, sales processing, customer and vendor records, and report generation for insights.

Table 4 *Non-Functional Requirements*

No	Requirement	Description
1.	Performance	• The system must handle multiple users simultaneously. • The system must load pages or features within 60 seconds.
2.	Operational	• The system must send automated notifications for low stocks. • The system must maintain a seamless integration between core modules and sub modules.
3.	Security	• The system must restrict access to registered users only. • The system must protect user data with encryption protocols.
4.	Scalability	• The system should be scalable to accommodate increasing product listings, customer records, and sales transactions as Saveet Ventures grows.
5.	Cultural and political	• The system should be able to work on any web browser. • The system must use Ringgit Malaysia(MYR) as the default currency.

Table 4 outlines the non-functional requirements for the Saveet Ventures Inventory Management System, emphasizing performance, security, and scalability. These ensures the system supports efficient operations, protects data, and provides a consistent experience across devices, making it a strong and future-ready solution.

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Table 5 *User Requirements*

No	Requirement
1.	All users must have an account with valid username, email and password.
2.	All users must be notified for any invalid input.
3.	All newly registered users must be able to create new password.
4.	Administrator should be able to approve reset password requests from users.
5.	Administrator should be able to create new staffs and managers in the system.
6.	Administrator should be able to update the existential staffs and managers in the system.
7.	Administrator should be able to delete the staffs and managers in the system.
8.	Administrator should be able to view the list of users permitted in the system.
9.	All users should be able to create and store new product data.
10.	All users should be able to view, update, delete and filter the inventory for the categories, and all listed products respectively.
11.	All users should be able to create, modify, delete and view supplier merchandise records.
12.	Administrator and managers should be able to create and store vendor details.
13.	Administrator and managers should be able to modify and delete the vendor data.
14.	Staffs should be able to view the vendor list in table.
15.	All users should be able to create and store new sales record.
16.	All users should be able to view and delete the sales record.
17.	All users should be able to view and update sales invoices.
18.	All users should be able to view and update shipments records.
19.	All users should be able to be notified of low stock inventory alerts through email and system pop-up.
20.	All users should be able to create and store customer details.
21.	All users should be able to modify and delete the customer data.
22.	Administrator and managers should be able to generate monthly sales and inventories report.
23.	Administrator and managers should be able to save the generated report in pdf.

Table 5 highlights the user requirements for the Saveet Ventures Inventory Management System, ensuring security, efficiency, and user-friendliness. Administrator manage user accounts, while tools for product, vendor, and sales management streamline operations. Features like low-stock alerts and PDF sales reports support proactive restocking and informed decisions, meeting the needs of staffs, managers and administrator.

3.2 System Analysis

Context diagrams give a basic overview of how the system interacts with users, showing the inputs and outputs between them [9]. In contrast, a Data Flow Diagram (DFD) shows how data moves between different processes in the system. Appendix A shows the context diagram, while Appendix B shows the Level 0 DFD for the Saveet Ventures Inventory Management System. The context diagram in Appendix A shows how the system interacts with the administrator and staff. Administrators manage users, inventory, vendors, customers, and generate reports, while staff handle daily tasks like stock updates and sales. The system helps reduce errors and supports better decision-making.

The Level 0 DFD of the Saveet Ventures Inventory Management System shows how the Administrator and Staff interact with six main processes and nine data stores. Administrators manage users, inventory, vendors, and reports, while staff handle sales and stock updates. The system ensures smooth data flow, accurate records, and supports better inventory management and decision-making.

An Entity Relationship Diagram (ERD) is a visual representation of how different entities (objects or concepts) relate to each other in a system [10]. ERDs are commonly used in database design to model the structure of a database and ensure data integrity. In this Saveet Ventures Veterinary Inventory Management System, 6 tables have been identified, which are User, Category, Product, Inventory, Supplier and Sales. Appendix C illustrates the ERD of Saveet Ventures system based on the data stores created in DFD.

3.3 System Design

This section outlines the system design for the Saveet Ventures Inventory Management system, focusing on its architecture, class diagram, and interface design.

3.3.1 System Architecture

During the design phase, the system's main functions and modules were defined. The architecture of Saveet Ventures Inventory Management System uses a Modular Layered Architecture, where each layer handles specific tasks. This structure shows how different parts of the system work together. The architecture design is shown in Appendix D.

3.3.2 Schema Table

The following are the relational schema from the database for each table that have been designed and extracted from the Entity Relationship Diagram (ERD) diagram available for the Inventory Management System for Saveet Ventures are:

i. User Role(roleId, roleName)
ii. User(userId, userName, userContact, userAddress, userPassword, roleId, userEmail,loginCount)
iii. Category(categoryId, categoryName, categoryDescription, createdAt, updatedAt, categoryStatus)
iv. Vendor(vendorId, vendorName, vendorContact, vendorAddress,vendorEmail, vendorStatus, createdAt, updatedAt)
v. Inventory_product(productId, categoryId, vendorId, productName, productDescription, productQuantity, wholesalePrice, retailPrice, productExpiration, createdAt, updatedAt, productStatus)
vi. Supply Merchandise(vendorId, productId, categoryId, logId, changeType, quantityChanged, costPrice,totalCost, createdAt, updatedAt, changeReason)
vii. Sales(salesId, productId, salesDate, salesQuantity, salesTotal, customerId, soldBy)
viii. Invoice(invoiceId, invoiceType, customerId, vendorId, invoiceDate, totalAmount, productId, paymentStatus, paymentMethod, createdAt, updatedAt)
ix. Shipment(shipmentId, shipmentNumber, invoiceId, shipmentDate, deliveryDate, shipmentStatus, carrier, customerId, createdAt, updatedAt)
x. Customer(customerId, customerName, customerContact, customerEmail, customerAddress, customerStatus, createdAt, updatedAt)
xi. Notification(notificationId, notificationType, message, productId, createdAt, readAt)
xii. Userlog(id, userId, action, module, description, createdAt)
xiii. Password Reset Request(requestId, userId, status, requestedAt,approvedAt, approvedBy)

3.3.3 Interface Design

Figure 2 to 10 illustrate the initial interface sketches of the Saveet Ventures Inventory Management System. These sketches represent the planned layout and navigation flow of key modules, including user login, dashboard, user management (admin only), product inventory, sales management, vendor details, customer management, supplier merchandise, reports, and notification features.

Fig. 2 *Login Page*

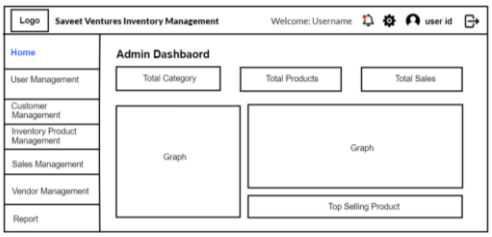
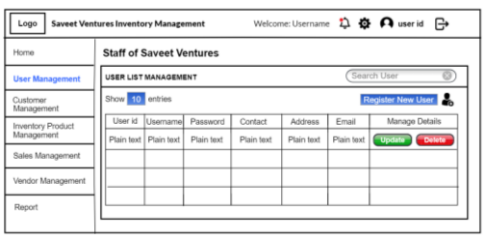


Fig. 3 *Administrator Dashboard Interface*

The login interface in Fig.2 displays the system name, logo placeholder, and a user-friendly form with role selection and a bold login button. Fig.3 shows the admin dashboard features a header, vertical menu, and key sales metrics for quick insights and easy navigation.



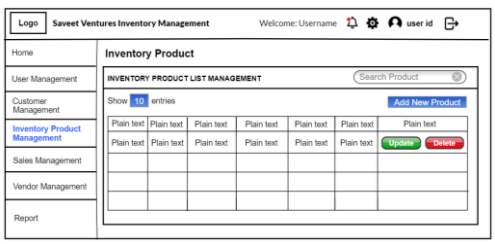


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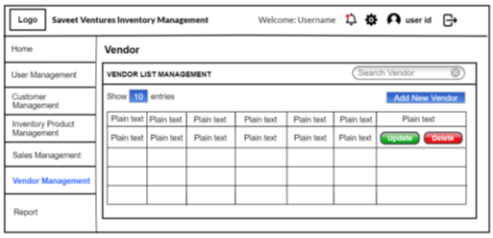
Fig. 4 *User Management Interface*

Fig. 5 *Inventory Management Interface*

Figures 4 and 5 show User and Inventory Management interfaces with a consistent layout, including a sidebar, header, and functional content area. Each features tables with search, update/delete actions, a "Register New User" button, and pagination for easy management.



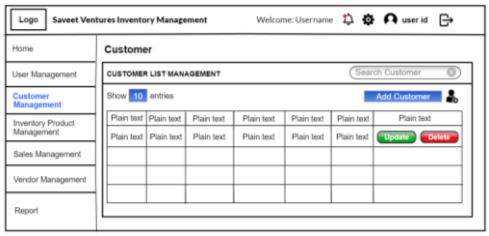
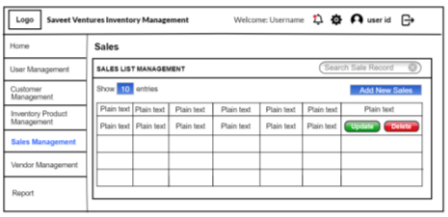


Fig. 6 *Vendor Management Interface*

Fig. 7 *Customer Management interface*

Figures 6 and 7 display Vendor and Customer Management interfaces with a consistent layout, featuring a top header and side navigation menu. Both provide tailored central areas with titles, dropdowns, and buttons for efficient data entry and management.



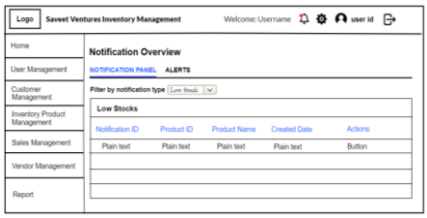


Fig. 8 *Sales Management Interface*

Fig. 9 *Notification Interface*

Fig. 10 *Report Interface*

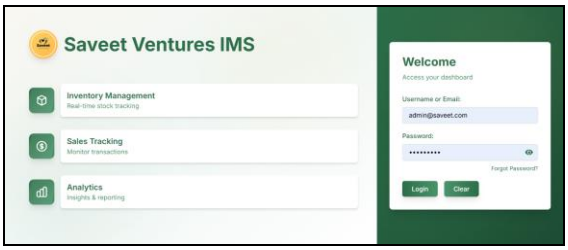
Fig. 8 to Fig. 10 show Sales, Notification, and Report interfaces with a consistent layout, enabling efficient sales tracking, customizable report viewing, and real-time alerts for timely user actions.

4. Results and Discussion

This section presents the results obtained from implementing the Saveet Ventures Inventory Management Web-Based System, supported by the relevant system interfaces. Each module's performance is discussed based on testing outcomes and its effectiveness in solving the problems identified during the analysis phase.

4.1 Interface Design

The interface design for the Saveet Ventures Inventory Management System emphasizes clarity, usability, and functionality for both Administrator and Staff users. The design follows standard web-based UI/UX principles to ensure a seamless and intuitive user experience.



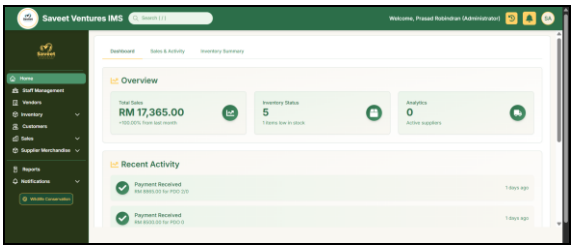


Fig. 11 *Login Page*

Fig. 12 *Administrator Dashboard Interface*

Fig.11 illustrates the login page of Saveet Ventures. It displays a clean login form that includes fields for user email and password. Fig.12 illustrates the dashboard interface upon successful user login. The central content area displays key sales metrics and quick insights

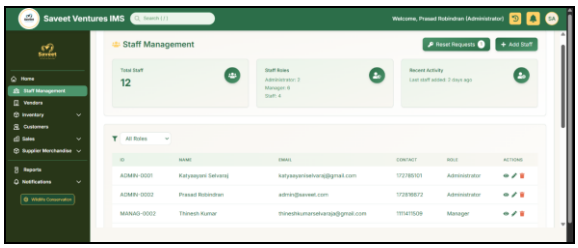


Fig. 13 *User Management Interface*

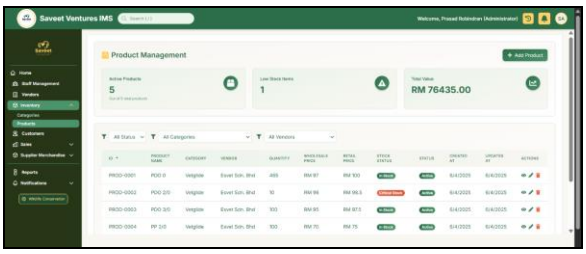


Fig. 14 *Inventory Management Interface*

Fig.13 illustrates the user management interface. This interface shows a summary of staff records. It supports viewing, editing, and managing staff efficiently via action buttons. Fig.14 illustrates inventory management interface. This interface facilitates inventory tracking and control with Key performance metrics.

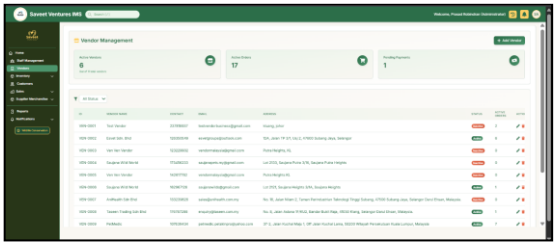


Fig. 15 *Vendor Management Interface*

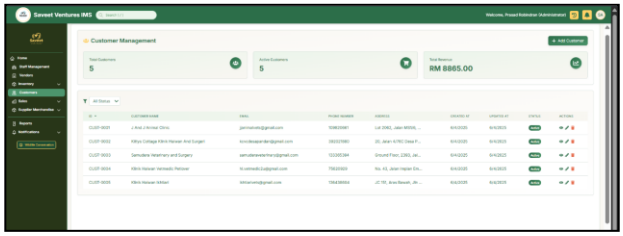


Fig. 16 *Customer Management interface*

Fig. 15 and Fig.16 illustrates interface of the Vendor Management and Customer Management, with a consistent and user-friendly layout. These interfaces display structured lists of vendors and customers with key details. Both feature action buttons for adding, editing, or deleting records.

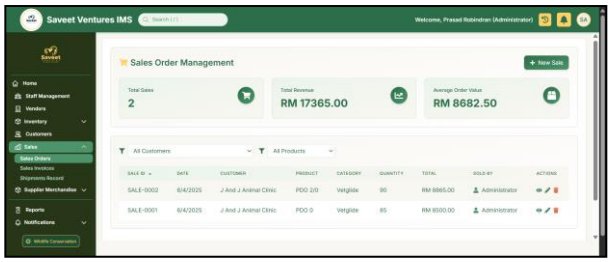


Fig. 17 *Sales Management Page*

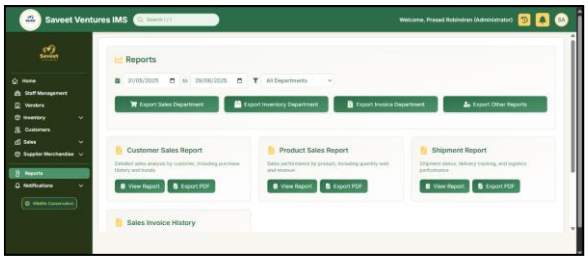


Fig. 18 *Report Generation Interface*

Fig.17 illustrates sales management interface. This page is designed with sub-modules, allowing users to perform end-to-end sales tracking from order creation to transaction completion. Fig.18 illustrates report generation interface with report list and filtering options, export buttons, and categorized report types. It enables viewing and exporting to PDF.

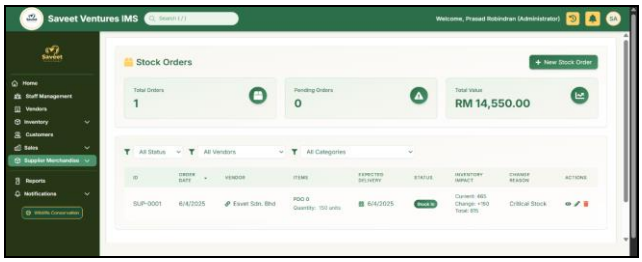


Fig. 19 *Supplier Merchandise Management Page*

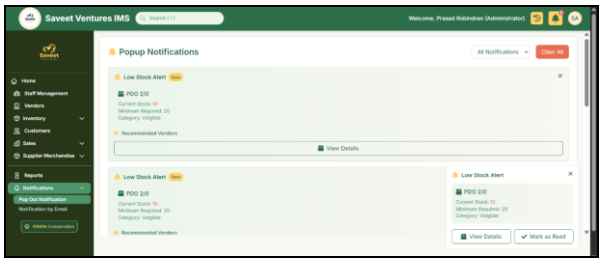


Fig. 20 *Notification Management Page*

Fig.19 illustrates the supplier merchandise management page by listing incoming stock orders with filters for vendors and categories, and shows total stock value. This page supports inventory restocking with records of supplier orders and stock availability. Fig.20 illustrates notification management interface with automatic alerts like low stock warnings in a popup and email format. This keeps users informed in real-time to enable timely actions.

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4.2 Functional Testing

Functional testing was conducted to ensure that the Saveet Ventures Inventory Management System performs according to its specified requirements. Each function was tested by providing valid and invalid inputs to confirm correct system behavior, accurate data processing, reliable outputs, and the results of these tests are presented in detailed tables.

Table 6 *Login and Registration Test Case*

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M1-1	Login with valid email and password.	User should log in successfully.	User logged in and dashboard was shown.	Pass
M1-2	Check if login fails with wrong credentials.	System should restrict login.	System blocked login with wrong credentials.	Pass
M1-3	Check if user password is stored securely.	Password should be hashed, not in plain text.	Password was hashed before saving.	Pass
M1-4	Check if "Forgot Password" allows reset request.	System should let user enter email and send reset request to admin.	System accepted email and sent reset request to admin.	Pass
M1-5	Check if system blocks "Forgot Password" for unregistered email.	System should show error if email is not found.	System showed error message for unregistered email.	Pass

Table 6 shows the results of testing the login features in the Saveet Ventures Inventory Management System. Each test checked if the system behaves as expected when users try to log in, enter wrong details, reset their password, or when the password is saved. These results confirm that the login and password functions work correctly and safely.

Table 7 *User Management Module Test Case*

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M2-1	Check if admin can view all users.	System should show all users.	System displayed the list of users.	Pass
M2-2	Check if admin can add a new user with complete details.	System should save the new user.	New user was added successfully.	Pass
M2-3	Check if system blocks user creation with missing details.	System should show error and not save.	System displayed error message and required the admin to complete all details before saving.	Pass
M2-4	Check if admin can update user info.	System should update the user data.	User data was updated.	Pass
M2-5	Check if admin can delete a user.	System should delete the selected user.	Selected user was deleted.	Pass
M2-6	Check if the filter function returns the correct results.	System should return matching results.	System returned accurate filtered result.	Pass
M2-7	Check if admin can manage password reset requests.	Admin should approve or deny requests.	Admin viewed and handled reset requests.	Pass

Table 7 shows the test results for the User Management Module in the Saveet Ventures Inventory Management System. It checks if the admin can manage users properly, including viewing, adding, updating, deleting users, and handling search and password reset requests. These results confirm that the user management features are working correctly and meet system requirements.

Table 8 *Vendor Management Module Test Case*

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M3-1	Check if user can view all vendors.	System should show all vendors.	Vendor list was displayed.	Pass
M3-2	Check if admin and manager can add a new vendor.	Vendor should be saved and shown in the list.	Vendor was added and shown in the list.	Pass
M3-3	Check if system blocks vendor with missing details.	System should show error and not save.	Error was shown and vendor was not saved.	Pass
M3-4	Check if user can update vendor info.	Updated info should be saved and shown.	Vendor details were updated.	Pass
M3-5	Check if user can delete a vendor.	Vendor should be removed from the list.	Vendor was deleted.	Pass
M3-6	Check if search returns correct vendors.	System should show matching results.	Accurate search results were shown.	Pass
M3-7	Check if duplicate vendor names are blocked.	System should show error for duplicates.	Duplicate was blocked and error was shown.	Pass

Table 8 shows test results for the Vendor Management Module in the Saveet Ventures Inventory Management System. It checks if users can manage vendor records properly, including viewing, adding, updating, deleting, searching, and avoiding duplicate entries. These results confirm that the vendor management features are working and meet system's functional requirement.

Table 9 *Inventory Management Module Test Case*

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M4-1	Check if user can view all categories.	All categories should be listed.	Category list was shown.	Pass
M4-2	Check if user can add a new category.	New category should be saved and shown.	Category was added and listed.	Pass
M4-3	Check if user can update category details.	Updated category should be saved and shown.	Category updated successfully.	Pass
M4-4	Check if user can delete a category.	Selected category should be removed.	Category was deleted.	Pass
M4-5	Check if users can view all products.	All products should be listed.	Product list was shown.	Pass
M4-6	Check if users can add a new product.	Product should be saved and listed.	Product was added and listed.	Pass
M4-7	Check if users can update product details.	Updated product should be saved and shown.	Product updated successfully.	Pass
M4-8	Check if admin can delete a product.	Selected product should be removed.	Product was deleted.	Pass
M4-9	Check if inactive products are hidden in table.	Inactive products should not appear in dropdown.	Inactive products were hidden in dropdown.	Pass
M4-10	Check if inventory increases when stock is received.	Quantity should increase.	Stock increased correctly.	Pass
M4-11	Check if inventory decreases after a sale.	Quantity should decrease.	Stock decreased correctly.	Pass

The test cases as shown in Table 9 verify whether the Category and Product management features in the

Saveet Ventures Inventory Management System work as intended. Both modules were tested for core functions such as viewing, adding, updating, deleting, real time visibility, filtering, and handling duplicates. All test cases passed, confirming the system's inventory modules are reliable, user-friendly, and meet expected requirements.

Table 10 *Customer Management Module Test Case*

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M5-1	Check if user can view all customers.	All customers should be listed.	Customer list was shown.	Pass
M5-2	Check if system saves new customer data.	New customer should be saved.	Customer was saved.	Pass
M5-3	Check if system blocks incomplete customer data.	Show error and don't save.	Error was shown and save was blocked.	Pass
M5-4	Check if user can edit customer details.	Changes should be saved and shown.	Updates were saved and displayed.	Pass
M5-5	Check if user can delete a customer.	Selected customer should be removed.	Customer was deleted successfully.	Pass

This module was tested to ensure the system correctly handles customer data operations. The tests focused on verifying the core functionalities such as adding, viewing, editing, deleting, and searching for customer records. All test cases passed successfully, indicating that the Customer Management module is functionally stable, user-friendly, and enforces proper data validation.

Table 11 *Sales Management Module Test Case*

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M6-1	Check if user can view all sales records.	Sales records should be listed in the system.	Sales list displayed correctly.	Pass
M6-2	Check if user can create a new sales record.	Sales data should be saved and shown in the list.	Sales record added successfully.	Pass
M6-3	Verify stock reduces after a sale.	Inventory should decrease based on sold quantity.	Stock was reduced accurately.	Pass
M6-4	Check automatic total price calculation.	Quantity should be auto-calculated.	Total was calculated correctly.	Pass
M6-5	Check if sales record can be edited.	Sales can be updated and inventory adjusted.	Edit allowed and inventory updated.	Pass
M6-6	Check if sales record can be deleted.	Deletion should restore the stock.	Sales deleted and stock restored.	Pass
M6-7	Check if invoice is auto-generated after sale.	Invoice should be created after confirming sale.	Invoice generated correctly.	Pass
M6-8	Check if a shipment record is auto-created after invoice generation.	A shipment record should be added when an invoice is finalized.	Shipment record was created automatically after invoice confirmation.	Pass

This module was tested to ensure smooth handling of sales transactions within the system. The system accurately handled sales creation, inventory updates, invoice generation, and shipment recording. Key features like validation, search, and PDF export worked as expected.

Table 12 *Report Management Module Test Case*

Test Case ID	Description	Expected Result	Actual	Pass/Fail

M7-1	Check if admin and manager can view product and inventory reports.	Manager and admin should see product and inventory reports.	Manager and admin viewed the reports successfully.	Pass
M7-2	Check if admin and manager can view sales report.	Manager and admin should see the sales report.	Manager and admin viewed the sales report.	Pass
M7-3	Check if reports show correct data for selected dates.	Reports should show only data within the chosen dates.	Report data matched selected dates.	Pass
M7-4	Check if manager and admin can export report as PDF.	Report should be downloadable as a PDF.	Report was successfully exported as PDF.	Pass

This module was tested to verify that the system accurately generates and displays various reports. The tests covered viewing product, inventory, and sales reports, filtering data by date, and exporting reports as PDF files. All test cases passed, confirming the module is reliable, accurate, and supports essential reporting needs.

Table 13 *Notification Management Module Test Case*

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M8-1	Check if low stock alerts appear when inventory is low.	System should show a low stock alert. Clicking it should display product summary.	Alert appeared in the list and showed product summary when clicked.	Pass
M8-2	Check if pop-up messages are displayed.	A pop-up should appear for important alerts.	Pop-up appeared with message and close option.	Pass
M8-4	Check if email alerts are sent for low stock to user's email.	System should send emails automatically.	Emails were sent for low stock and expiry.	Pass

The Notification module was tested to ensure it properly alerts users about low stock levels. It successfully displayed low stock alerts with clickable summaries, showed pop-up messages for urgent notifications, and sent automated email alerts. All test cases passed, confirming reliable and timely alert delivery.

4.3 Integration Testing

Integration testing was performed to verify that all modules within the Saveet Ventures Inventory Management System work together seamlessly. The focus was on data flow and interaction between components to ensure consistent performance and accurate functionality across the system. The results of these tests are presented in detailed tables.

Table 14 *Sales Management Module Integration Test Case*

Test Case ID	Integration Module	Test Objective	Expected Result	Pass/Fail
INV_INT_001	Sales	Check if product cost and quantity are shown.	Sales module shows correct stock and price.	Pass
INV_INT_001	Notification	Check if low stock alert is triggered.	Notification appears when stock is low.	Pass
INV_INT_001	Supplier Merchandise	Check if stock updates after merchandise entry.	Inventory updates based on stock-in/out.	Pass
INV_INT_001	Report	Check if inventory changes appear in reports.	Reports show accurate stock and sales data.	

The table 14 shows integration testing between the Sales module and other key modules. These tests confirm that integration between invoices and shipments are created smoothly, inventory updates correctly, customer data is accurate, and reports reflect the full sales process.

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Table 15 *Supplier Merchandise Module Integration Test Case*

Test Case ID	Integration Module	Test Objective	Expected Result	Pass/Fail
SUP_INT_001	Inventory	Check if stock updates correctly from supplier.	Inventory updates based on supplier actions.	Pass
SUP_INT_002		Check if product cost is fetched during new stock order.	Product cost is retrieved from inventory for new stock.	Pass

This table 15 shows integration testing between the Supplier Merchandise module and Inventory module. The tests confirm that inventory is correctly updated when stock is received or returned, and that product cost is accurately fetched from the inventory during new stock orders.

Table 16 *Notification Management Module Integration Test Case*

Test Case ID	Integration Module	Test Objective	Expected Result	Pass/Fail
NOTIF_INT_001	Inventory	Check if low stock triggers an alert.	Alert is sent when stock is low.	Pass
NOTIF_INT_001	User Management	Get user email for sending alerts.	User email is retrieved and used.	Pass
NOTIF_INT_001	Vendor	Suggest vendor in the alert.	Vendor info appears in the alert.	Pass

The table 16 shows integration tests for the Notification Module with inventory, user, and vendor modules. It confirms alerts are triggered correctly, sent to the right users, and include vendor suggestions for restocking.

4.4 User Acceptance Testing

User Acceptance Testing (UAT) is the final phase of testing conducted to ensure that the Saveet Ventures Inventory Management System (SVIMS) meets the business requirements and expectations of its end users, particularly the administrative, staff and inventory managers at Saveet Ventures. A total of 15 respondents were involved in this testing phase through Google Form.

Based on the results presented in Appendix E, the User Acceptance Testing (UAT) revealed that the Saveet Ventures Inventory Management System is highly effective, user-friendly, and meets the functional needs of its users. Section B showed that over 85% of users found the system highly user-friendly, with clear icons and intuitive navigation. Nearly 80% praised the interface design, and most users agreed it improved efficiency by reducing manual tasks. Section C confirmed that login and registration were simple and secure, with no negative feedback. Core modules like Inventory, Sales, Vendors, and Customers were rated “Very Easy” or “Easy” to use, and no tasks were reported as difficult. Integration across modules was also rated highly, indicating smooth automation and minimal manual effort. Lastly, 78.6% of users gave a full 5-star rating, and the rest gave 4 stars, proving the system is fast, reliable, and enhances productivity. These results validate that the system delivers on usability, efficiency, and overall satisfaction.

Several valuable suggestions were made by users for future works. Users highlighted key improvement areas in the Supplier Merchandise Module (69.2%) — mainly the need for invoice upload functionality. Shipment handling (30.8%) was another concern, with suggestions for real-time tracking features. Other areas like report generation, system speed, and invoice creation were also noted (around 23%). Despite these, users praised the system’s all-in-one design, clean UI, role-based access, and inventory tracking accuracy.

5. Conclusion

In conclusion, The Saveet Ventures Inventory Management System successfully addresses critical inefficiencies of manual inventory processes by offering real-time, centralized inventory visibility, standardized data input, and automated notifications for low stock levels. It enhances accuracy, streamlines operations, and supports faster customer service through improved data access, structured workflows, and role-based access control. However, current limitations include manual invoice entry, lack of shipment tracking integration, absence of automated stock reordering, limited mobile accessibility, and missing advanced analytics or AI-driven forecasting. Security is another area needing enhancement, particularly the lack of two-factor authentication. To future-proof the system, proposed enhancements include automated invoice processing, integration with logistics systems for real-time shipment tracking, real-time mobile notifications (e.g., SMS/WhatsApp), automated stock reordering based on predictive analysis, and AI-driven forecasting for demand planning. These

improvements will significantly boost operational efficiency, reduce human error, and improve customer satisfaction positioning Saveet Ventures for scalable growth and a stronger competitive edge in the veterinary supply industry.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of the paper.

Author Contribution

The author confirms sole responsibility for the following: ***study conception and design****: Katyaayani Selvaraj, Azizul Azhar Bin Ramli;* ***data collection****: Katyaayani Selvaraj, Azizul Azhar Bin Ramli;* ***analysis and interpretation of results****: Katyaayani Selvaraj, Azizul Azhar Bin Ramli;* ***draft manuscript preparation****: Katyaayani Selvaraj, Azizul Azhar Bin Ramli. All authors reviewed the results and approved the final version of the manuscript.*

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Appendix A: Context Diagram

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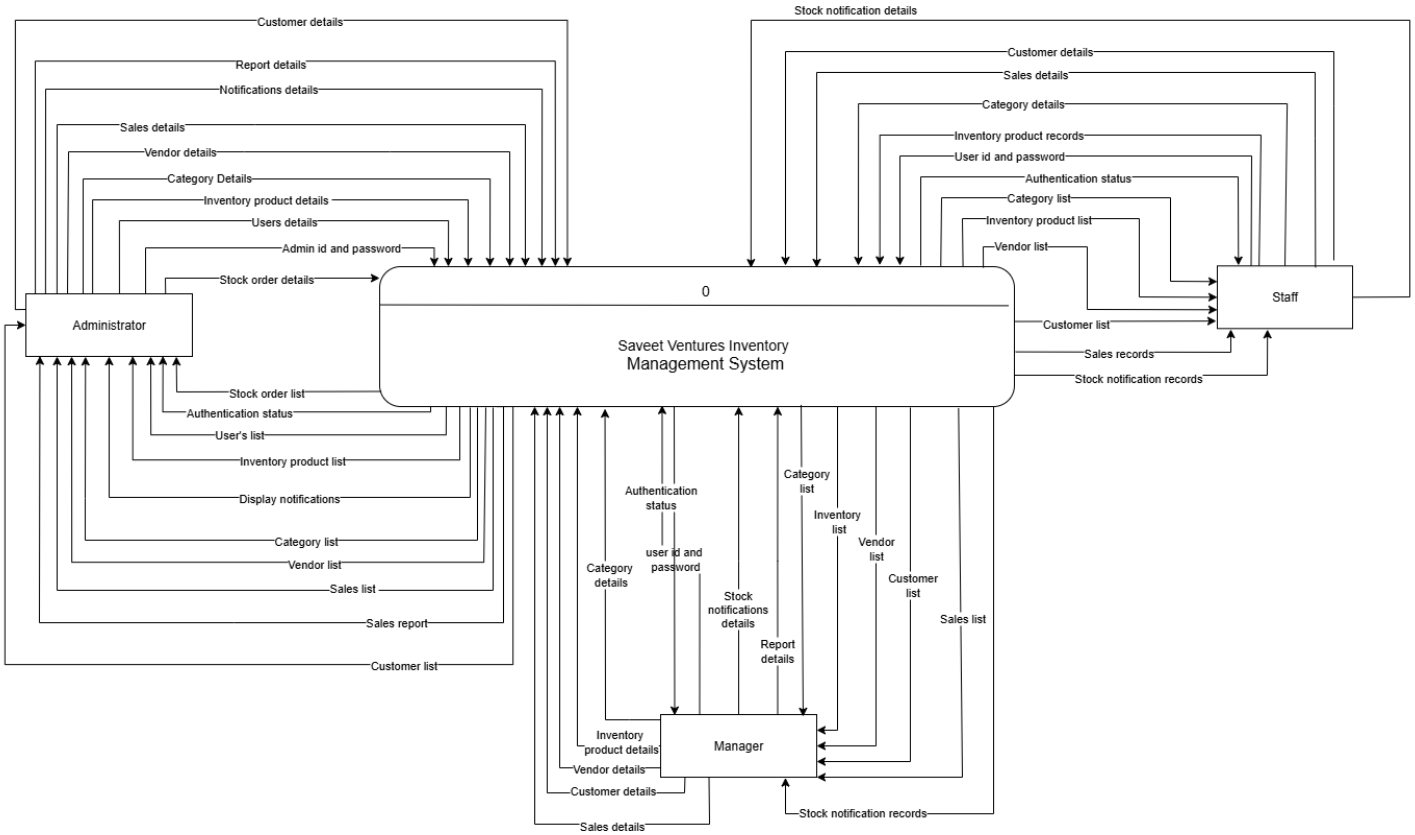
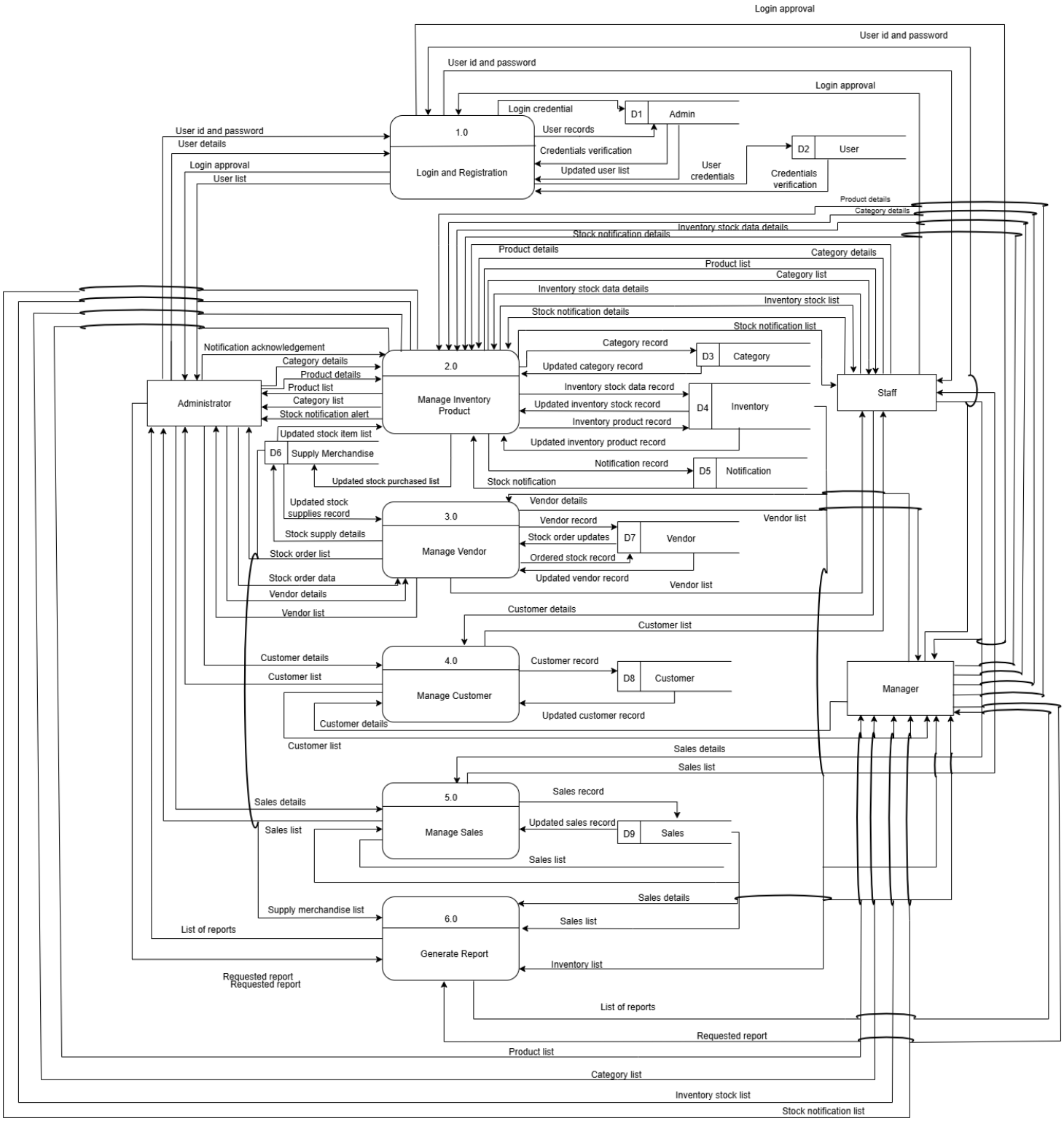


Appendix B: Data Flow Diagram



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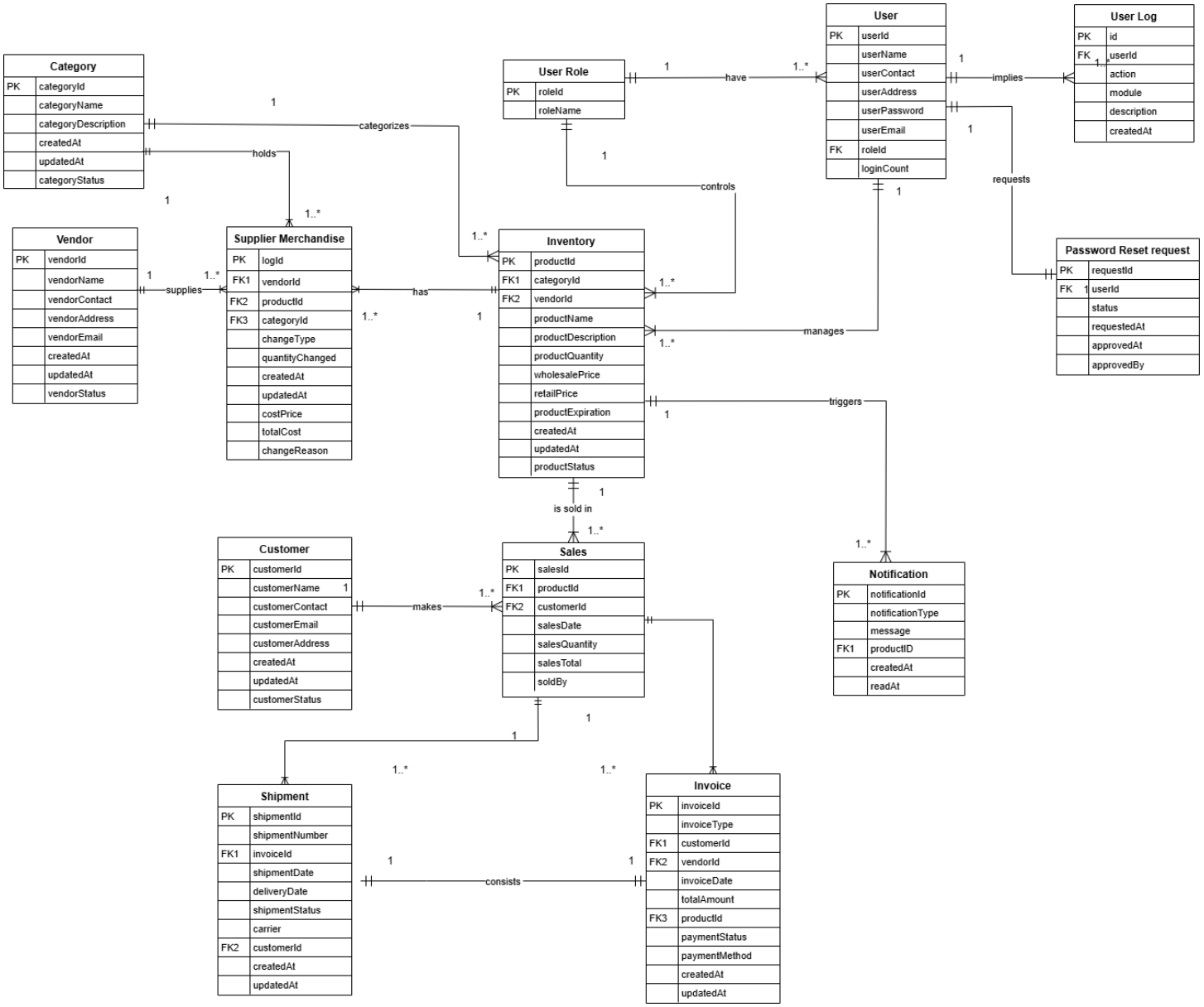
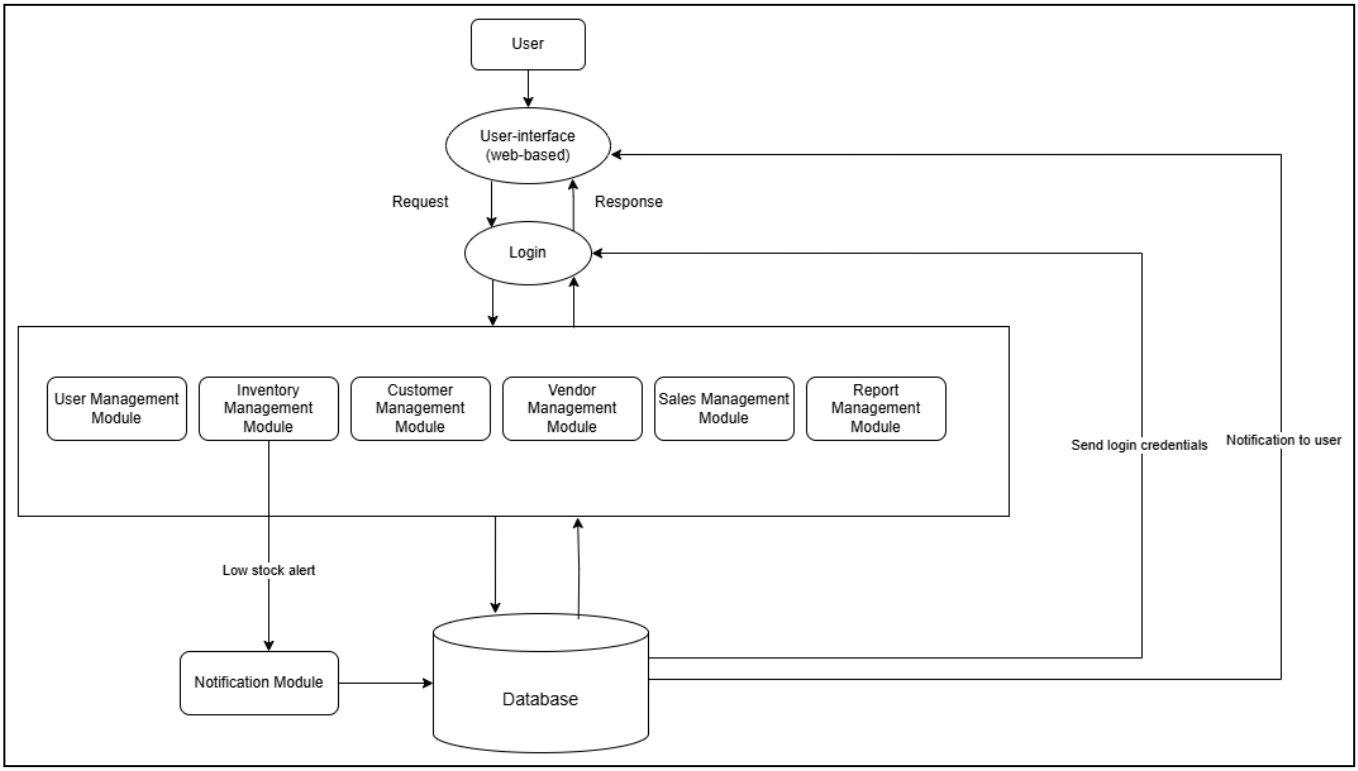
Appendix C: Entity Relationship Diagram



Appendix D: System Architecture



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Appendix E: UAT Google Form (Section B – Section C)