

VinUniversity

Smart Inventory & Procurement Management System

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COMP3030 - Databases and Database Systems
Repository: [Vinuni DB Inventory System The Fool](#)
Demo Video: [SIPMS Project Demo](#)

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Chapter 1

Executive Summary

1 Project Context and Motivation

Small retail stores and organizations operating across multiple sites (warehouses and stores) often struggle to maintain accurate, real-time visibility into inventory. Common operational issues include: (i) stockouts caused by delayed replenishment decisions, (ii) inconsistent stock records between locations, (iii) limited insight into which products are selling well over time, and (iv) manual processes that make auditing and accountability difficult.

To address these challenges, we implemented **SIPMS (Smart Inventory & Procurement Management System)**, a MySQL-backed information system with a web interface supporting inventory operations, procurement, sales, inter-location transfers, and reporting.

2 Objectives and Scope

The project objectives are:

- Provide robust **entity management** for Products, Categories, Suppliers, Locations, and Users.
- Support end-to-end **procurement workflow** via Purchase Orders (PO) and receiving operations.
- Support **sales workflow** via Sales Orders (SO) with validation and cancellation.
- Support **internal transfers** to move inventory between locations while preventing negative stock.
- Provide **analytics and reporting**, including low-stock monitoring, stock-by-location, top-selling products, and dashboard trend charts.
- Enforce **database-level integrity, security, and auditability** using constraints, triggers, procedures, views, indexes, and MySQL privilege configuration.

3 Deliverables

The submission includes:

- A complete MySQL implementation: tables, views, stored procedures, triggers, indexes, and security grants.
- A fully working web application demonstrating CRUD workflows, analytics, reporting, and authentication.
- Final report and slide deck PDFs, with screenshots and testing evidence.
- A public GitHub repository containing all source code and setup instructions: [Vinuni DB Inventory System The Fool](#).

4 Document Organization

This report is organized as follows:

- Chapter 2 summarizes the system overview, architecture, and access control.
- Chapter 3 demonstrates the implemented web interface modules with screenshots.
- Chapter 4 details the database schema and implemented database objects (views, procedures, triggers).
- Chapter 5 discusses performance optimizations and security configuration.
- Chapter 6 presents testing strategy, sample queries, and validation results.

Chapter 2

System Overview

1 High-Level Architecture

SIPMS follows a classic three-layer architecture:

- **Frontend (Web UI):** A single-page application that provides module pages for dashboard, entity management, orders, transfers, reports, and user administration.
- **Backend (Application Server):** Provides authenticated APIs and orchestrates business workflows (e.g., creating orders, receiving items, transferring stock, generating reports).
- **Database (MySQL):** Stores normalized transactional data and enforces integrity rules. The database also provides views, triggers, and stored procedures to support reporting and consistent inventory updates.

Technology Stack

- Database: MySQL 8.x
- Backend: Python 3.10+, Django, Django REST Framework, MySQL client, SimpleJWT
- Frontend: React 18 + Vite, React Router
- Tools: MySQL Workbench, Postman, VS Code

2 User Roles and Access Control

The system supports role-based access control aligned with operational responsibilities:

- **ADMIN:** full administrative control, including user management and privileged actions. The web UI also supports an administrative “*Login as*” function for testing or support scenarios (see Users module).
- **MANAGER:** operational management access for business entities and order workflows.
- **CLERK:** day-to-day usage for sales, viewing inventory, and basic operations depending on assigned permissions.

Feature	Admin	Manager	Clerk
CRUD Categories / Products	✓	✓	✗
CRUD Suppliers / Locations	✓	✓	✗
Create Purchase Order	✓	✓	✗
Approve / Cancel Purchase Order	✓	✓	✗
Receive Goods	✓	✓	✗
Create Sales Order	✓	✓	✓
Create Stock Transfer	✓	✓	✗
View Dashboard	✓	✓	✓
Manage Users / Roles	✓	✗	✗

Table 2.1: Role-Based Access Control Matrix

3 Core Data Concepts

SIPMS is built around these core concepts:

- Products are uniquely identified by SKU, optionally barcode, and belong to exactly one category.
- Inventory is tracked per (product, location) pair with an explicit quantity on hand.
- Purchase orders increase stock upon receiving; sales orders decrease stock upon confirmation; transfers move stock between locations.
- Sales orders reduce inventory when confirmed; in the web app this confirmation is performed automatically during the sales order workflow (rather than a separate manual step).
- In report, low stock is determined by comparing quantity on hand vs reorder level; top-selling products are computed from confirmed sales orders in the last 30 days.

Chapter 3

Web Interface and Features Demonstration

1 UI Layout and Navigation

The SIPMS web interface uses a consistent layout across modules:

- A left sidebar navigation with pages: Dashboard, Products, Suppliers, Locations, Categories, Purchase Orders, Sales Orders, Transfers, Reports, and Users. Visible pages and available actions vary by role (Admin/Manager/Clerk).
- A top header displaying the signed-in user and role, along with a Logout action.
- Each module page provides search/filter controls, data tables, and context-specific actions.

2 Dashboard Page

The Dashboard provides operational overview and analytics widgets designed for daily monitoring:

- **Role banner:** displays current signed-in role (e.g., Admin).
- **KPI cards:** summary counts for Products (active vs inactive), Purchase Orders (open vs closed), Sales Orders (confirmed vs cancelled), and an **estimated stock value**.
- **Time range selector:** a dropdown (e.g., “Last 30 days”) controls time-based analytics on the dashboard.
- **Orders trend chart:** visualizes purchase and sales order activity over time.
- **Sales revenue trend chart:** visualizes revenue fluctuations and highlights total revenue and peak values over the selected range.
- **Highlights:** (i) low stock highlights (with severity labels such as LOW and “Need +X”), and (ii) top selling highlights for quick attention, each linking to the Reports module.

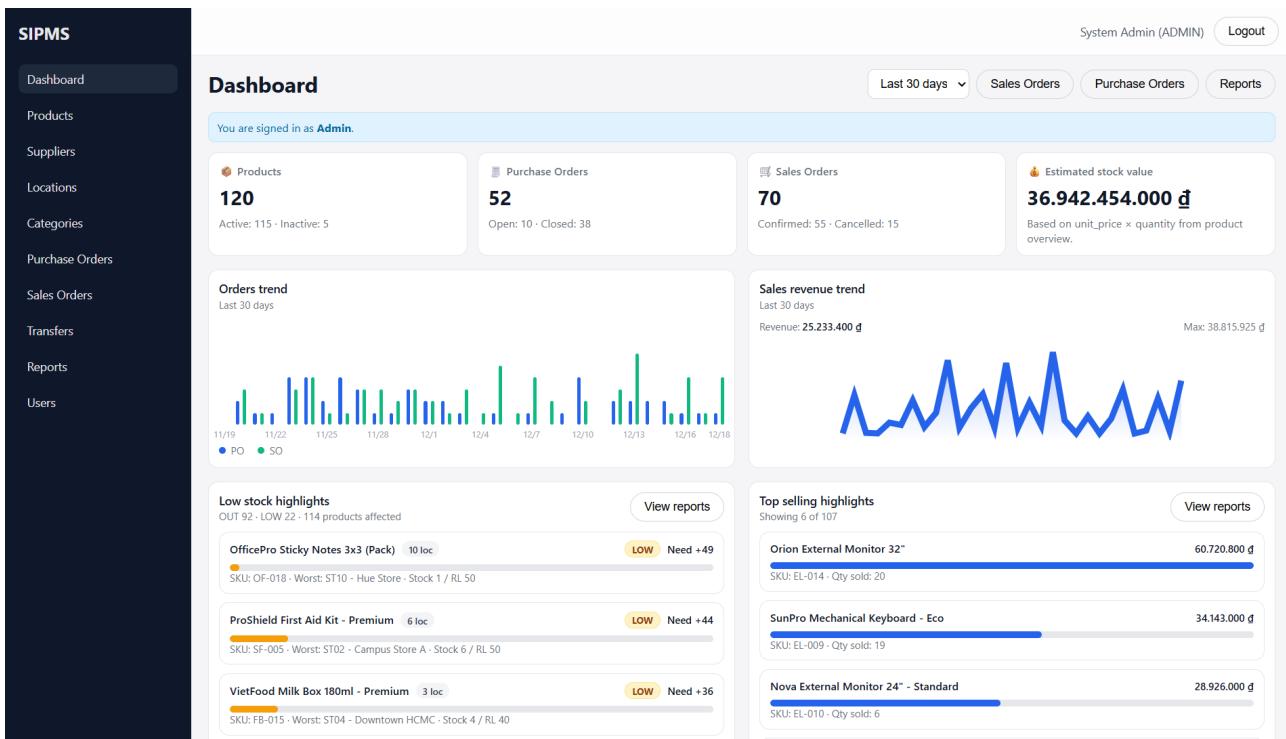


Figure 3.1: Dashboard Page Screenshot

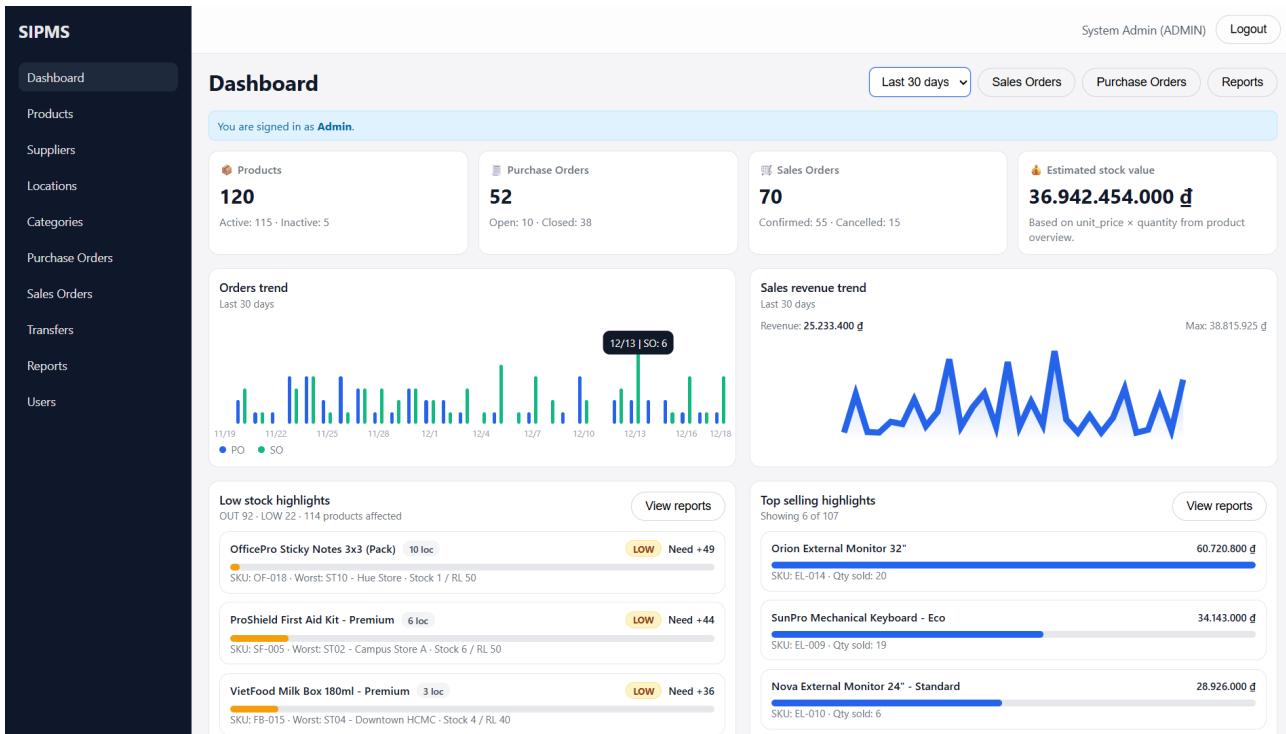


Figure 3.2: Interact with Chart

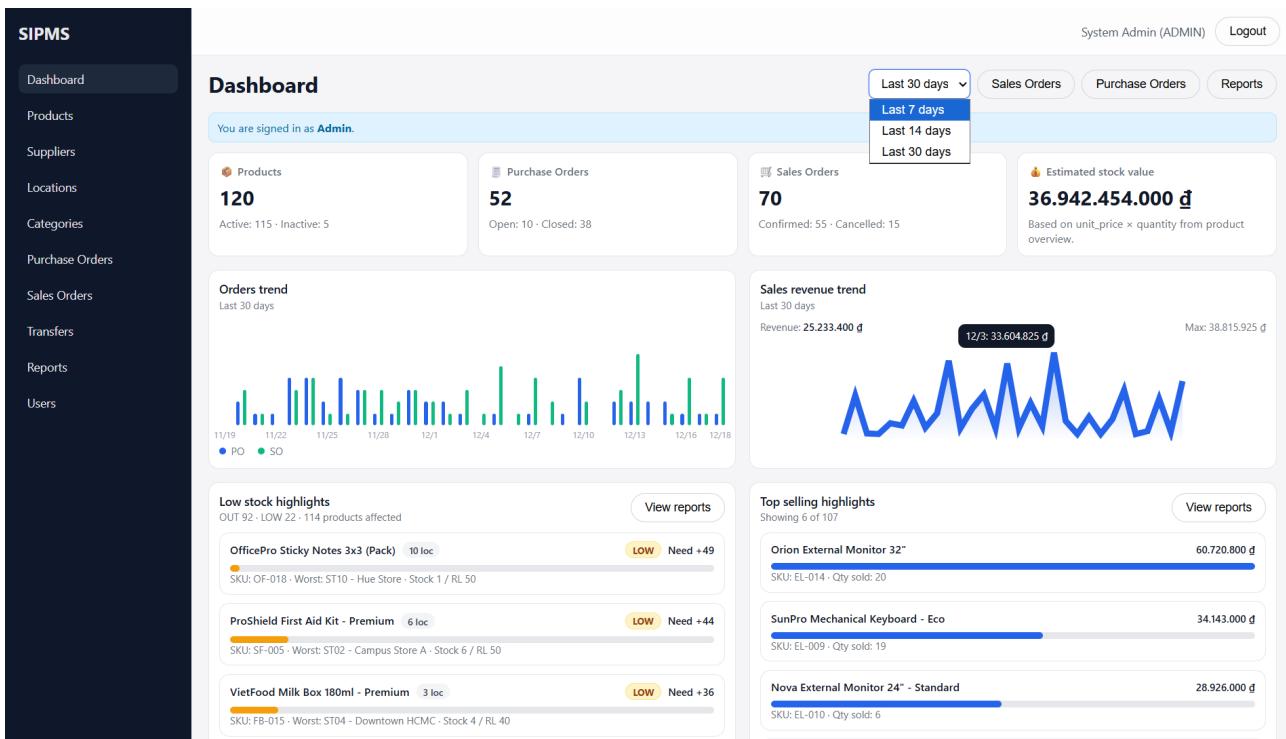


Figure 3.3: Interact with Chart and Option Selector for Time Range

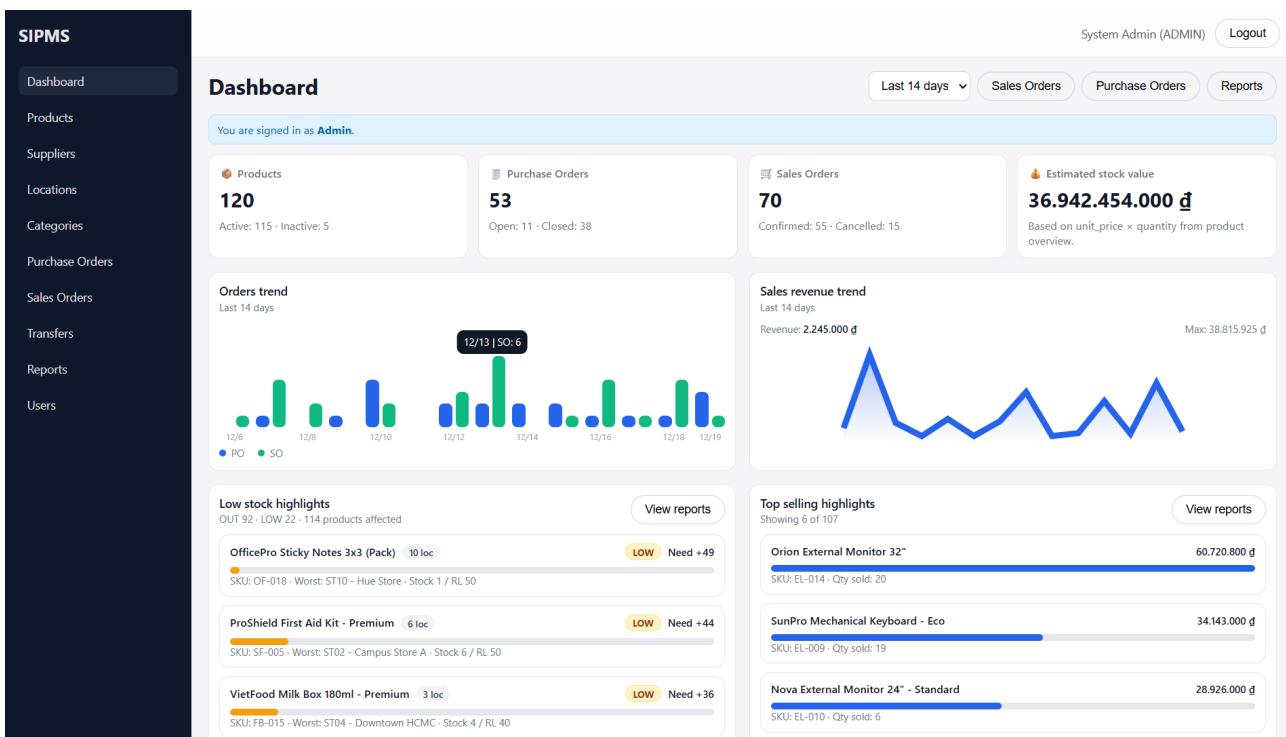


Figure 3.4: The Modification of Time Range Affects the Charts

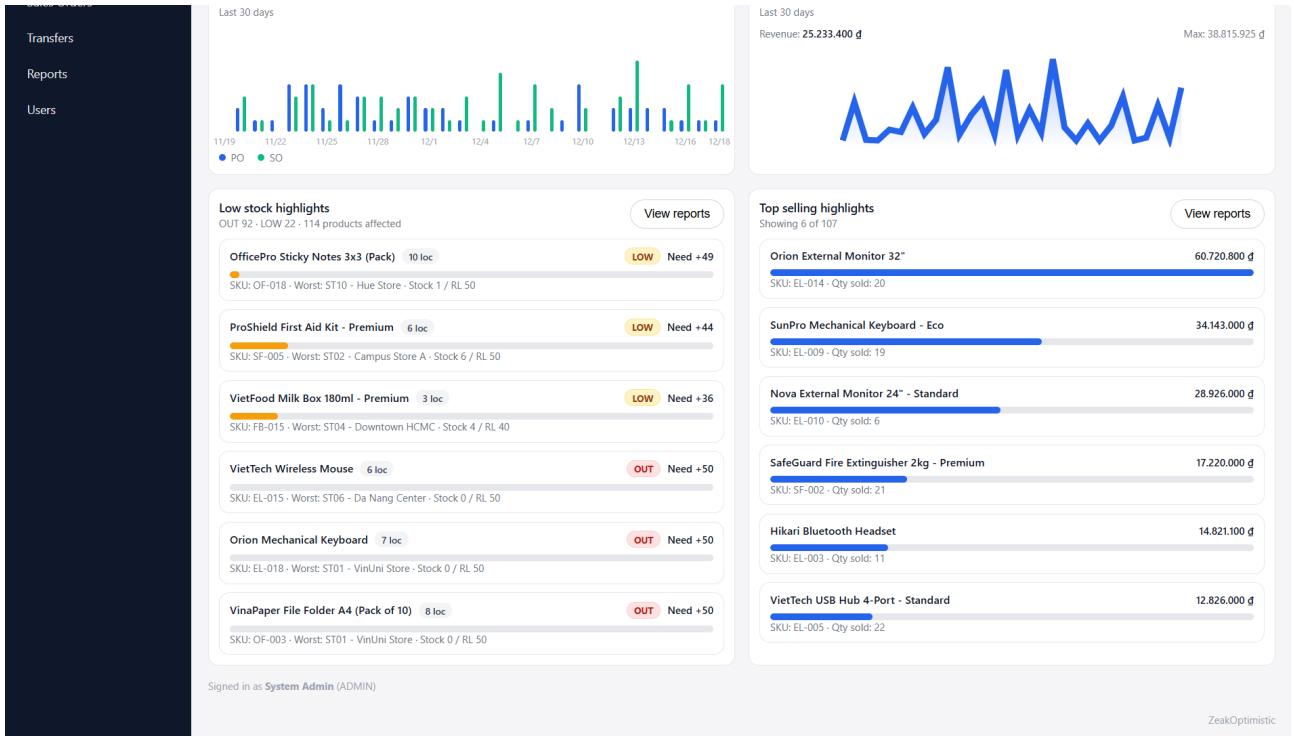


Figure 3.5: Low Stock and Top Selling Highlights

3 Products Page

The Products page supports full lifecycle management of the product catalog:

- Create new products via a form capturing: SKU, Name, Category, Unit Price, Unit, Reorder Level, and Status (Active/Inactive).
- Search by product name, SKU, or barcode.
- Sorting (e.g., by name A→Z).
- Tabular view including: SKU, Name, Category, Unit Price, Unit, Reorder Level, Status, Created At, and Actions.
- Actions include editing and status toggling (Activate/Deactivate).
- Pagination controls including a **page size selector** (e.g., 10 per page), and Previous/Next navigation.

The screenshot shows the SIPMS product management interface. On the left is a dark sidebar with navigation links: Dashboard, Products (selected), Suppliers, Locations, Categories, Purchase Orders, Sales Orders, Transfers, Reports, and Users. The main content area has a title 'Products' and a search bar with filters for 'Search by name, SKU, barcode', 'Sort by name (A→Z)', and a 'Search' button. Below is a table of products:

SKU	Name	Category	Unit Price	Unit	Reorder Level	Status	Created At	Actions
PK-004	Boxy Packing Tape 48mm (Roll)	Packaging	33000.00 ₦	roll	30	ACTIVE	11/24/2025, 1:18:57 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
PK-013	Boxy Shipping Label (Pack of 100) - Premium	Packaging	67000.00 ₦	pack	10	ACTIVE	11/25/2025, 1:15:24 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
PK-008	Boxy Stretch Film (Roll)	Packaging	155000.00 ₦	roll	30	ACTIVE	11/24/2025, 6:37:22 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
PK-001	Boxy Stretch Film (Roll) - Standard	Packaging	118000.00 ₦	roll	50	ACTIVE	11/24/2025, 9:20:08 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
MT-010	BrightLite Adjustable Wrench - Eco	Maintenance	217000.00 ₦	piece	40	ACTIVE	11/25/2025, 3:51:03 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
MT-004	BrightLite Cable Ties (Pack of 100)	Maintenance	39000.00 ₦	pack	10	ACTIVE	11/25/2025, 7:53:25 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
MT-014	BrightLite Cable Ties (Pack of 100) - Eco	Maintenance	35000.00 ₦	pack	20	ACTIVE	11/25/2025, 9:09:28 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
MT-013	BrightLite Extension Cord 2m	Maintenance	206000.00 ₦	piece	30	ACTIVE	11/25/2025, 7:49:52 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
CL-001	CleanMax Microfiber Cloth (Pack of 5)	Cleaning	109000.00 ₦	pack	20	INACTIVE	11/23/2025, 2:45:40 PM	<button>Edit</button> <button>Activate</button> <button>Delete</button>
CL-009	CleanMax Microfiber Cloth (Pack of 5) - Premium	Cleaning	63000.00 ₦	pack	50	ACTIVE	11/24/2025, 1:22:30 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>

Page 1 of 12 - 120 products 10/page Previous Next

ZealOptimistic

Figure 3.6: Product Page Screenshot

The screenshot shows the SIPMS product management interface with the 'Edit Product' form overlaid. The sidebar and main product list are visible in the background.

Edit Product

Category	Packaging
Name	Boxy Packing Tape 48mm (Roll)
SKU	Barcode
PK-004	567616418900
Description	
Packing Tape 48mm (Roll) for daily operations	
Unit price	Unit of measure
33000.00	roll
Reorder level	30
Status	
ACTIVE	

Cancel Save changes

Figure 3.7: Edit Existing Product Form

SIPMS

System Admin (ADMIN) Logout

New Product

Products

Search by name, SKU, barcode

Unit price (low--high)

Sort by name (A→Z)
Sort by name (Z→A)
Unit price (low--high)
Unit price (high--low)
Created (newest)
Created (oldest)

Search

SKU	Name	Category	Unit Price	Unit	Reorder Level	Status	Created At	Actions
FB-014	Lotus Bottled Water 500ml	Food & Beverage	6000.00 ₫	bottle	50	ACTIVE	11/23/2025, 8:07:38 AM	Edit Deactivate Delete
FB-008	Mekong Bottled Water 500ml	Food & Beverage	7000.00 ₫	bottle	40	ACTIVE	11/23/2025, 12:10:01 AM	Edit Deactivate Delete
FB-016	Lotus Green Tea Bag 200g - Premium	Food & Beverage	8000.00 ₫	bottle	50	ACTIVE	11/23/2025, 10:46:51 AM	Edit Deactivate Delete
FB-017	Sunrise Green Tea Bottle 450ml - Eco	Food & Beverage	8000.00 ₫	bottle	40	ACTIVE	11/23/2025, 12:06:27 PM	Edit Deactivate Delete
FB-004	Sunrise Chocolate Bar - Eco	Food & Beverage	10000.00 ₫	piece	25	ACTIVE	11/22/2025, 6:51:35 PM	Edit Deactivate Delete
FB-009	Sunrise Chocolate Bar - Eco	Food & Beverage	12000.00 ₫	piece	40	ACTIVE	11/23/2025, 1:29:37 AM	Edit Deactivate Delete
FB-007	VietFood Chocolate Bar	Food & Beverage	14000.00 ₫	piece	20	ACTIVE	11/22/2025, 10:50:24 PM	Edit Deactivate Delete
FB-013	Lotus Chocolate Bar	Food & Beverage	16000.00 ₫	piece	40	ACTIVE	11/23/2025, 6:48:02 AM	Edit Deactivate Delete
FB-010	VietFood Chocolate Bar	Food & Beverage	18000.00 ₫	piece	15	ACTIVE	11/23/2025, 2:49:13 AM	Edit Deactivate Delete
PK-009	VinaPack Carton Box Size 1 - Premium	Packaging	19000.00 ₫	piece	10	ACTIVE	11/24/2025, 7:56:58 PM	Edit Deactivate Delete

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10/page Previous Next

ZealOptimistic

Figure 3.8: Sorting Feature

SIPMS

System Admin (ADMIN) Logout

New Product

Products

lotus

Sort by name (A→Z)

Search

SKU	Name	Category	Unit Price	Unit	Reorder Level	Status	Created At	Actions
FB-014	Lotus Bottled Water 500ml	Food & Beverage	6000.00 ₫	bottle	50	ACTIVE	11/23/2025, 8:07:38 AM	Edit Deactivate Delete
FB-013	Lotus Chocolate Bar	Food & Beverage	16000.00 ₫	piece	40	ACTIVE	11/23/2025, 6:48:02 AM	Edit Deactivate Delete
FB-016	Lotus Green Tea Bag 200g - Premium	Food & Beverage	8000.00 ₫	bottle	50	ACTIVE	11/23/2025, 10:46:51 AM	Edit Deactivate Delete
OF-010	Lotus Printer Ink Cartridge - Standard	Office Supplies	305000.00 ₫	piece	40	ACTIVE	11/22/2025, 2:56:20 AM	Edit Deactivate Delete
FB-018	Lotus Snack Nuts 100g	Food & Beverage	61000.00 ₫	pack	30	ACTIVE	11/23/2025, 1:26:04 PM	Edit Deactivate Delete
CL-006	LotusCare Disinfectant Wipes (Pack) - Standard	Cleaning	113000.00 ₫	pack	30	ACTIVE	11/23/2025, 9:23:41 PM	Edit Deactivate Delete
CL-011	LotusCare Disinfectant Wipes (Pack) - Standard	Cleaning	53000.00 ₫	pack	40	ACTIVE	11/24/2025, 4:01:43 AM	Edit Deactivate Delete
CL-012	LotusCare Glass Cleaner Spray - Premium	Cleaning	38000.00 ₫	bottle	30	ACTIVE	11/24/2025, 5:21:19 AM	Edit Deactivate Delete
CL-013	LotusCare Glass Cleaner Spray - Premium	Cleaning	77000.00 ₫	bottle	30	ACTIVE	11/24/2025, 6:40:55 AM	Edit Deactivate Delete
CL-008	LotusCare Laundry Detergent 2kg - Premium	Cleaning	137000.00 ₫	bag	30	ACTIVE	11/24/2025, 12:02:54 AM	Edit Deactivate Delete

Page 1 of 2 - 11 products

10/page Previous Next

ZealOptimistic

Figure 3.9: Searching Feature

The screenshot shows a dark-themed web application interface for managing products. On the left, a sidebar lists navigation options: Suppliers, Locations, Categories, Purchase Orders, Sales Orders, Transfers, Reports, and Users. The main content area displays a table of products with the following columns: SKU, Name, Category, Unit Price, Unit, Reorder Level, Status, Created At, and Actions. The table contains 20 rows of product data. At the bottom of the page, there is a pagination bar with links for '20/page', 'Previous', and 'Next'. A footer note 'Page 1 of 6 - 120 products' is also visible.

	SKU	Name	Category	Unit Price	Unit	Reorder Level	Status	Created At	Actions
	PK-004	Boxy Packing Tape 48mm (Roll)	Packaging	33000.00 ₣	roll	30	ACTIVE	11/24/2025, 1:18:57 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	PK-013	Boxy Shipping Label (Pack of 100) - Premium	Packaging	67000.00 ₣	pack	10	ACTIVE	11/25/2025, 1:15:24 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	PK-008	Boxy Stretch Film (Roll)	Packaging	155000.00 ₣	roll	30	ACTIVE	11/24/2025, 6:37:22 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	PK-001	Boxy Stretch Film (Roll) - Standard	Packaging	118000.00 ₣	roll	50	ACTIVE	11/24/2025, 9:20:08 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	MT-010	BrightLite Adjustable Wrench - Eco	Maintenance	217000.00 ₣	piece	40	ACTIVE	11/25/2025, 3:51:03 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	MT-004	BrightLite Cable Ties (Pack of 100)	Maintenance	39000.00 ₣	pack	10	ACTIVE	11/25/2025, 7:53:25 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	MT-014	BrightLite Cable Ties (Pack of 100) - Eco	Maintenance	35000.00 ₣	pack	20	ACTIVE	11/25/2025, 9:09:28 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	MT-013	BrightLite Extension Cord 2m	Maintenance	206000.00 ₣	piece	30	ACTIVE	11/25/2025, 7:49:52 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	CL-001	CleanMax Microfiber Cloth (Pack of 5)	Cleaning	109000.00 ₣	pack	20	INACTIVE	11/23/2025, 2:45:40 PM	<button>Edit</button> <button>Activate</button> <button>Delete</button>
	CL-009	CleanMax Microfiber Cloth (Pack of 5) - Premium	Cleaning	63000.00 ₣	pack	50	ACTIVE	11/24/2025, 1:22:30 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	MT-011	Fixit AA Battery (Pack of 4)	Maintenance	30000.00 ₣	pack	15	ACTIVE	11/25/2025, 5:10:39 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	MT-003	Fixit Adjustable Wrench - Eco	Maintenance	75000.00 ₣	piece	20	ACTIVE	11/25/2025, 6:33:49 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	MT-001	Fixit Cable Ties (Pack of 100) - Premium	Maintenance	24000.00 ₣	pack	30	INACTIVE	11/25/2025, 3:54:36 AM	<button>Edit</button> <button>Activate</button> <button>Delete</button>
	MT-008	Fixit Duct Tape (Roll) - Eco	Maintenance	40000.00 ₣	roll	50	ACTIVE	11/25/2025, 1:11:50 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	CL-010	FreshPro Floor Cleaner 1L - Standard	Cleaning	103000.00 ₣	bottle	25	ACTIVE	11/24/2025, 2:42:07 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	EL-003	Hikari Bluetooth Headset	Electronics	1366000.00 ₣	piece	25	ACTIVE	11/20/2025, 5:46:12 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	EL-007	Hikari Power Adapter 65W - Premium	Electronics	296000.00 ₣	piece	40	ACTIVE	11/20/2025, 11:04:37 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	EL-017	Hikari USB-C Cable 1m - Eco	Electronics	78000.00 ₣	piece	10	ACTIVE	11/21/2025, 12:20:40 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	EL-006	Hikari USB-C Cable 5m	Electronics	105000.00 ₣	piece	20	ACTIVE	11/20/2025, 9:45:01 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
	FB-014	Lotus Bottled Water 500ml	Food & Beverage	6000.00 ₣	bottle	50	ACTIVE	11/23/2025, 8:07:38 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>

Figure 3.10: Pagination Feature

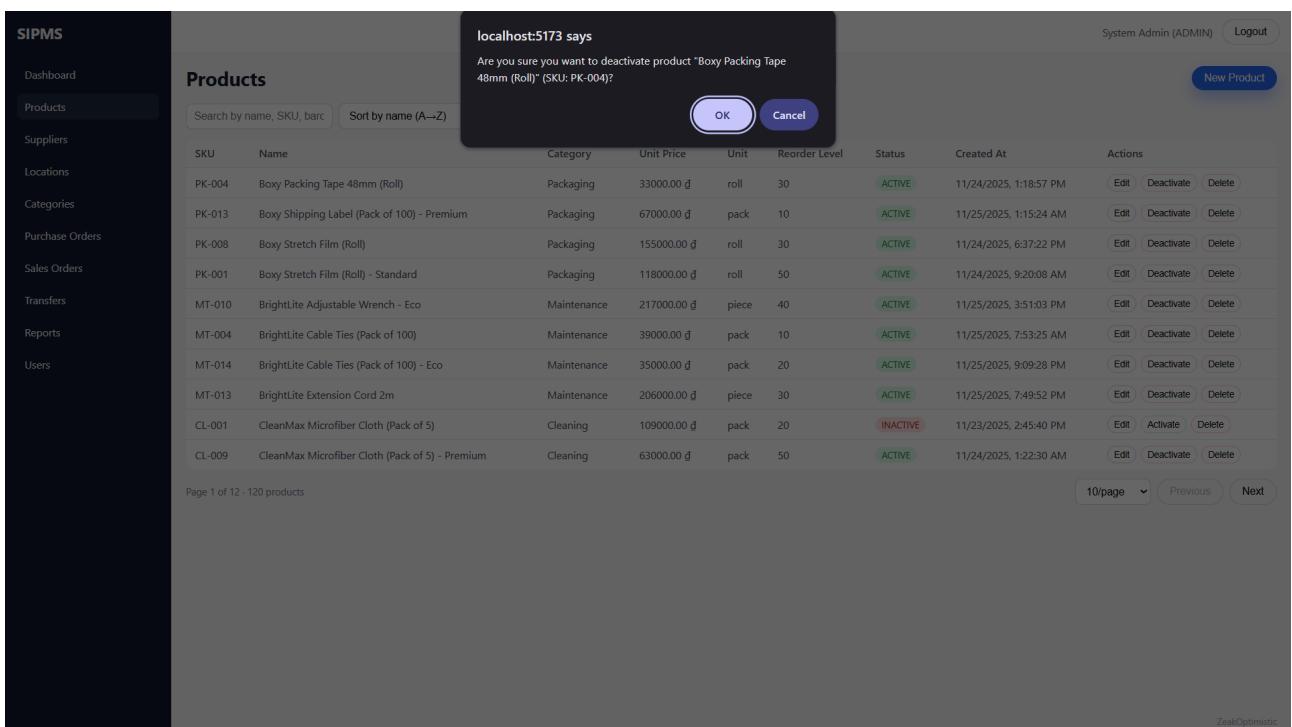


Figure 3.11: Notification Deactivate Product

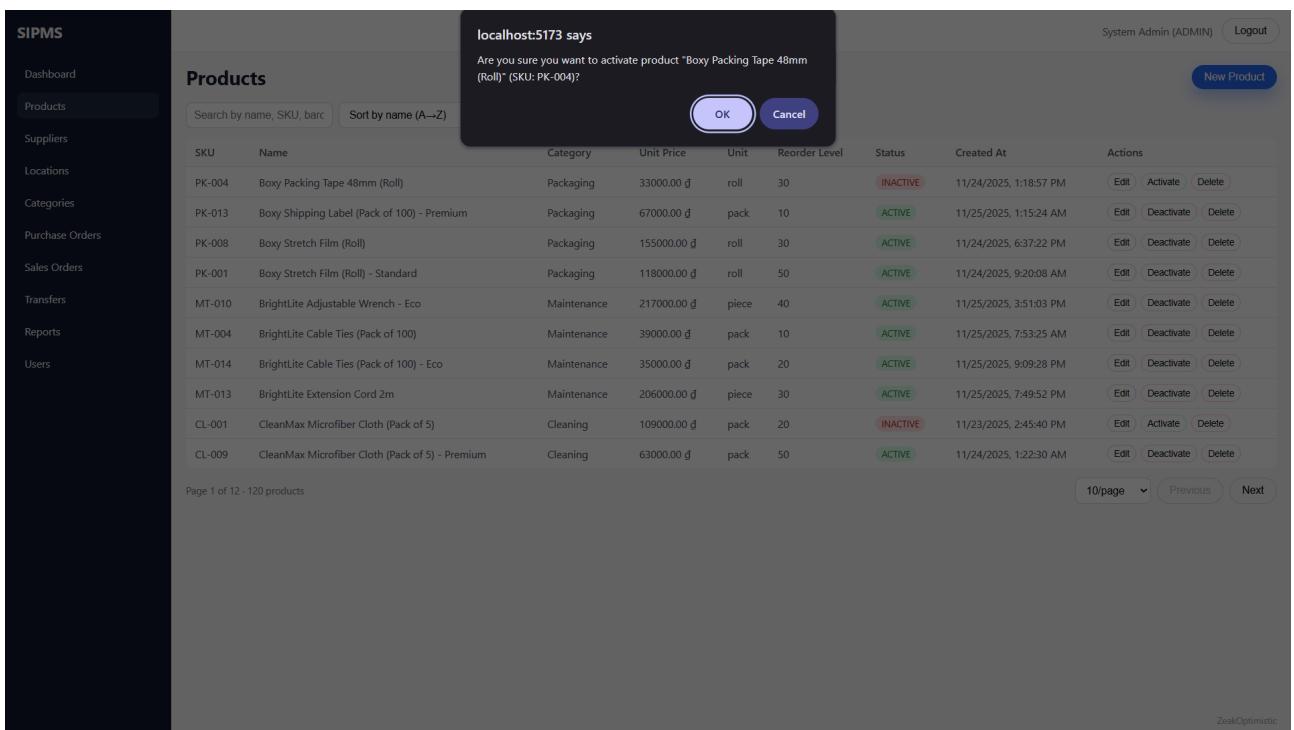


Figure 3.12: Notification Activate Product

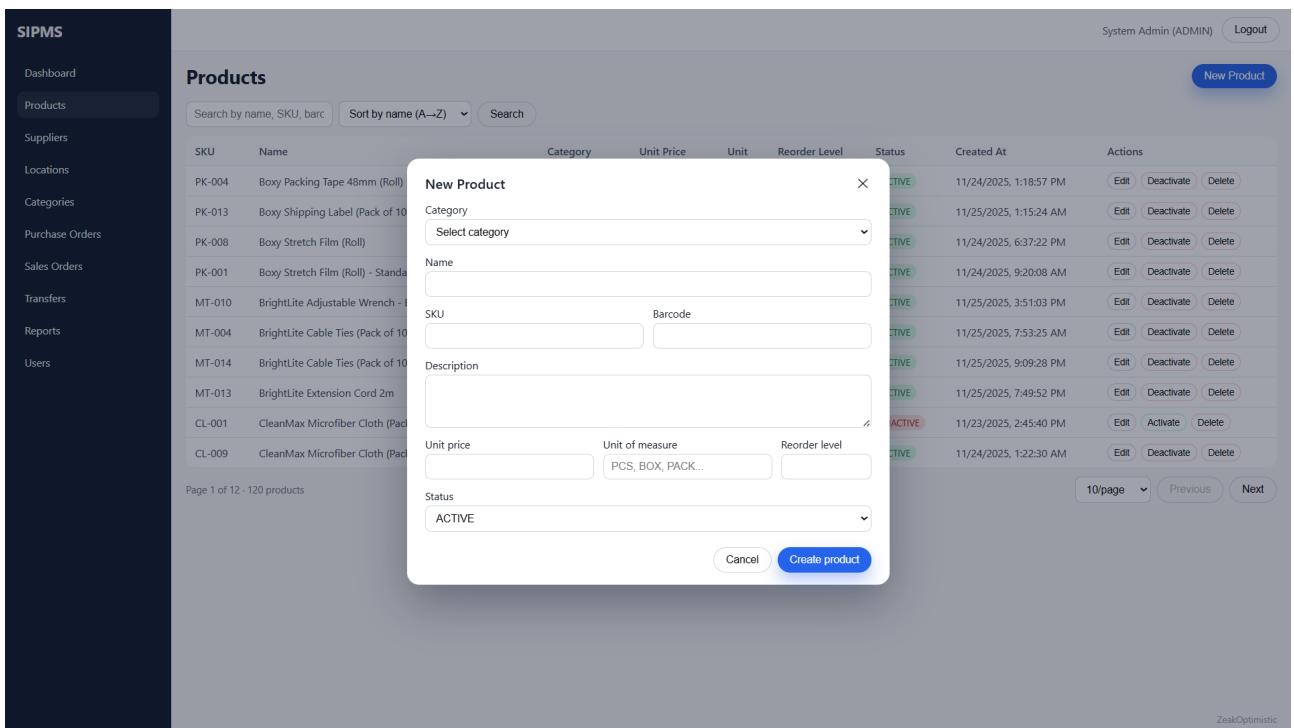


Figure 3.13: Create New Product Form

4 Suppliers Page

The Suppliers module manages vendor information required for procurement:

- Create new suppliers via a form capturing: Name, Contact Person, Phone, Email, Address, Payment Terms, and Status (Active/Inactive).
- Search by supplier name, phone, or email.
- Sorting (e.g., by name A→Z).
- Supplier table includes: Name, Contact, Phone, Email, Address, Payment Terms, Status, and Actions.
- Actions include Edit, Activate/Deactivate, and Delete.
- Pagination with page size selector.

The screenshot shows the SIPMS Suppliers page. The left sidebar has a dark theme with links for Dashboard, Products, Suppliers (selected), Locations, Categories, Purchase Orders, Sales Orders, Transfers, Reports, and Users. The main content area has a light background. At the top right are 'System Admin (ADMIN)', 'Logout', and a 'New Supplier' button. Below is a search bar with fields for 'Search by name, phone, or email', 'Sort by Name (A→Z)', and a 'Search' button. The main table lists 24 suppliers with the following data:

Name	Contact	Phone	Email	Address	Payment terms	Status	Actions
Alpha Supply	Tran Hoai Son	+84-95-541-3385	alphasupply.vn@gmail.com	Hai Phong, Vietnam	Net 7	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
An Phu Supplies	Hoang Quang Khoa	+84-94-917-3858	anphusupplies.vn@gmail.com	Ho Chi Minh City, Vietnam	Net 15	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Beta Trading	Huynh Thanh Ha	+84-91-724-7267	betatrading.vn@gmail.com	Quy Nhon, Vietnam	Net 30	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
BlueSky Wholesale	Vo Thi Son	+84-93-554-8285	blueskywholesale.vn@gmail.com	Hai Phong, Vietnam	Net 45	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Delta Goods	Huynh Minh Nhi	+84-95-701-5901	deltagoods.vn@gmail.com	Vung Tau, Vietnam	Net 45	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Epsilon Mart	Dang Duc Thai	+84-97-209-4886	epsilonmart.vn@gmail.com	Vung Tau, Vietnam	Net 7	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Gamma Wholesale	Hoang Anh Tien	+84-94-570-5183	gammawholesale.vn@gmail.com	Ha Noi, Vietnam	COD	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
GoldLeaf Goods	Do Tuan Bich	+84-96-382-4109	goldleafgoods.vn@gmail.com	Ho Chi Minh City, Vietnam	COD	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
GreenField Goods	Do Hong Long	+84-97-125-6374	greenfieldgoods.vn@gmail.com	Quy Nhon, Vietnam	Net 30	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Hanoi Trading	Hoang Minh Phong	+84-95-865-7807	hanoitrading.vn@gmail.com	Da Nang, Vietnam	Net 30	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>

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localhost:5173/purchase-orders

ZealOptimistic

Figure 3.14: Suppliers Page Screenshot

SIPMS

Dashboard Products Suppliers Locations Categories Purchase Orders Sales Orders Transfers Reports Users

Suppliers

Search by name, phone, or email Sort by Name (A→Z) Search

Name	Contact	Phone	Email	Address	Payment terms	Status	Actions
Alpha Supply	Tran Hoai Son	+84-95-541-3385	alphasupply.vn@gmail.com	Hai Phong, Vietnam	Net 7	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
An Phu Supplies	Hoang Quang Kho				Net 15	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Beta Trading	Huynh Thanh Ha				Net 30	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
BlueSky Wholesale	Vo Thi Son				Net 45	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Delta Goods	Huynh Minh Nhi				Net 45	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Epsilon Mart	Dang Duc Thai				Net 7	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Gamma Wholesale	Hoang Anh Tien				COD	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
GoldLeaf Goods	Do Tuan Bich				COD	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
GreenField Goods	Do Hong Long				Net 30	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Hanoi Trading	Hoang Minh Phong				Net 30	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>

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New Supplier

Edit Supplier X

Name: Alpha Supply

Contact name: Tran Hoai Son Phone: +84-95-541-3385

Email: alphasupply.vn@gmail.com

Address: Hai Phong, Vietnam

Payment terms: Net 7 Status: ACTIVE

Cancel Save changes

10/page Previous Next

ZealOptimistic

Figure 3.15: Edit Existing Supplier Form

SIPMS

Dashboard Products Suppliers Locations Categories Purchase Orders Sales Orders Transfers Reports Users

Suppliers

Search by name, phone, or email Contact name (A→Z) Search

Name	Contact	Phone	Email	Address	Payment terms	Status	Actions
Epsilon Mart	Dang Duc Thai	+84-95-541-3385	epsilonmart.vn@gmail.com	Vung Tau, Vietnam	Net 7	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Nova Imports	Dang Hoai Anh	+84-96-381-1132	novaimports.vn@gmail.com	Quy Nhon, Vietnam	Net 15	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Pacific Distributors	Dinh Hoai Long	+84-99-921-6772	pacificdistributors.vn@gmail.com	Hai Phong, Vietnam	Net 30	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
RedRiver Supply	Dinh Hong Dung	+84-93-650-3222	redriversupply.vn@gmail.com	Vung Tau, Vietnam	COD	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Minh Chau Wholesale	Do Anh Van	+84-95-116-3854	minhchauwholesale.vn@gmail.com	Can Tho, Vietnam	Net 15	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Mekong Wholesale	Do Gia Ha	+84-94-944-8894	mekongwholesale.vn@gmail.com	Can Tho, Vietnam	Net 45	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
GreenField Goods	Do Hong Long	+84-97-125-6374	greenfieldgoods.vn@gmail.com	Quy Nhon, Vietnam	Net 30	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
GoldLeaf Goods	Do Tuan Bich	+84-96-382-4109	goldleafgoods.vn@gmail.com	Ho Chi Minh City, Vietnam	COD	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Khanh Linh Distribution	Duong Hong Cuong	+84-97-559-6931	khanhlinhdistribution.vn@gmail.com	Hue, Vietnam	Net 7	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
Oceanic Trading	Duong Quang Nga	+84-91-953-9017	oceanictrading.vn@gmail.com	Quy Nhon, Vietnam	COD	ACTIVE	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>

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New Supplier

10/page Previous Next

ZealOptimistic

Figure 3.16: Sorting Feature

The screenshot shows the SIPMS application interface. On the left is a dark sidebar with navigation links: Dashboard, Products, Suppliers (selected), Locations, Categories, Purchase Orders, Sales Orders, Transfers, Reports, and Users. The main content area has a title "Suppliers" and a search bar with the placeholder "Search by name, phone, or email". A dropdown menu shows "Sort by Name (A-Z)" and a "Search" button. Below the search bar is a table with columns: Name, Contact, Phone, Email, Address, Payment terms, Status, and Actions. One row is visible for "Alpha Supply". At the bottom of the table are buttons for "10/page", "Previous", and "Next". In the top right corner, there are links for "System Admin (ADMIN)", "Logout", and a blue "New Supplier" button. A small watermark "ZeakOptimistic" is at the bottom right.

Figure 3.17: Searching Feature

This screenshot is similar to Figure 3.17 but includes a modal dialog box in the center. The dialog box has a header "localhost:5173 says" and a message "Are you sure you want to deactivate supplier 'Epsilon Mart'?". It contains two buttons: "OK" and "Cancel". The rest of the page is identical to Figure 3.17, including the sidebar, table, and footer.

Figure 3.18: Notification Deactivate Supplier

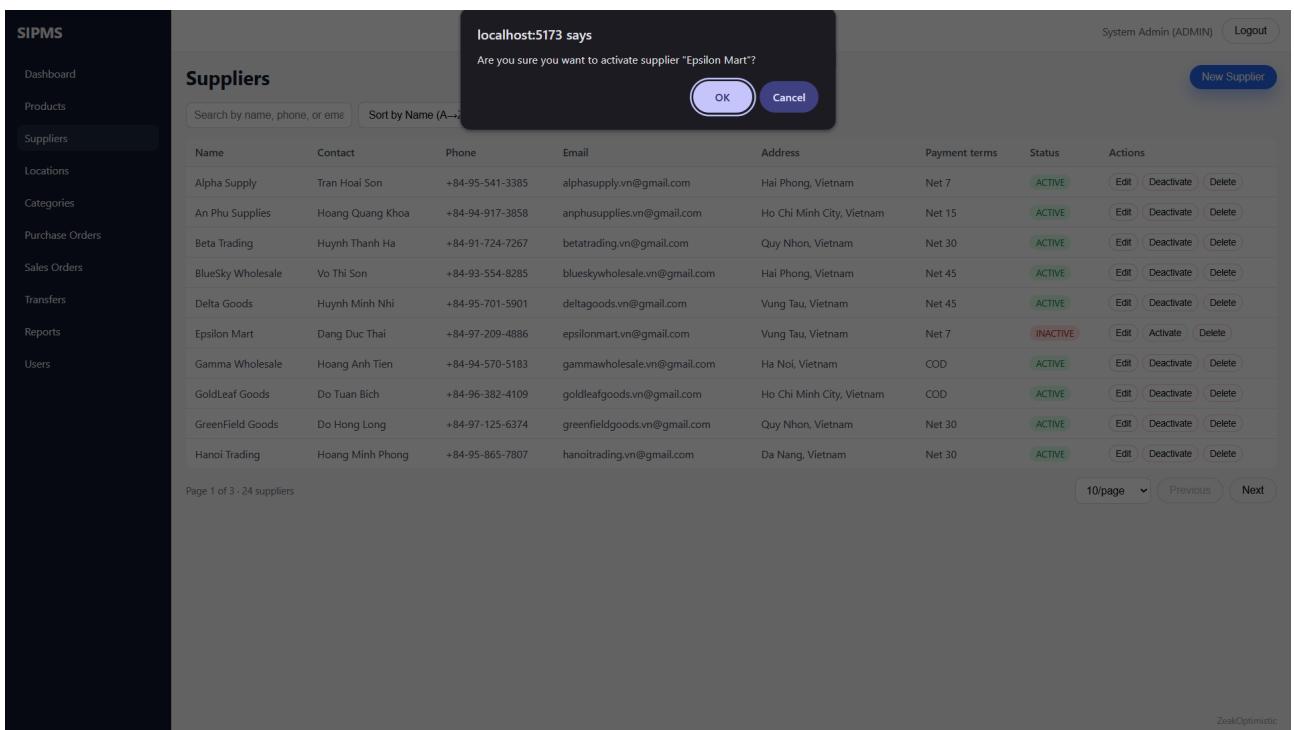


Figure 3.19: Notification Activate Supplier

Suppliers	Name	Contact	Phone	Email	Address	Payment terms	Status	Actions
Locations	Alpha Supply	Tran Hoai Son	+84-95-541-3385	alphasupply.vn@gmail.com	Hai Phong, Vietnam	Net 7	ACTIVE	Edit Deactivate Delete
Categories	An Phu Supplies	Hoang Quang Khoa	+84-94-917-3858	aphusupplies.vn@gmail.com	Ho Chi Minh City, Vietnam	Net 15	ACTIVE	Edit Deactivate Delete
Purchase Orders	Beta Trading	Huynh Thanh Ha	+84-91-724-7267	betatrading.vn@gmail.com	Quy Nhon, Vietnam	Net 30	ACTIVE	Edit Deactivate Delete
Sales Orders	BlueSky Wholesale	Vo Thi Son	+84-93-554-8285	blueskywholesale.vn@gmail.com	Hai Phong, Vietnam	Net 45	ACTIVE	Edit Deactivate Delete
Transfers	Delta Goods	Huynh Minh Nhi	+84-95-701-5901	deltagoods.vn@gmail.com	Vung Tau, Vietnam	Net 45	ACTIVE	Edit Deactivate Delete
Reports	Epsilon Mart	Dang Duc Thai	+84-97-209-4886	epsilonmart.vn@gmail.com	Vung Tau, Vietnam	Net 7	ACTIVE	Edit Deactivate Delete
Users	Gamma Wholesale	Hoang Anh Tien	+84-94-570-5183	gammawholesale.vn@gmail.com	Ha Noi, Vietnam	COD	ACTIVE	Edit Deactivate Delete
	GoldLeaf Goods	Do Tuan Bich	+84-96-382-4109	goldleafgoods.vn@gmail.com	Ho Chi Minh City, Vietnam	COD	ACTIVE	Edit Deactivate Delete
	GreenField Goods	Do Hong Long	+84-97-125-6374	greenfieldgoods.vn@gmail.com	Quy Nhon, Vietnam	Net 30	ACTIVE	Edit Deactivate Delete
	Hanoi Trading	Hoang Minh Phong	+84-95-865-7807	hanoitrading.vn@gmail.com	Da Nang, Vietnam	Net 30	ACTIVE	Edit Deactivate Delete
	Khanh Linh Distribution	Duong Hong Cuong	+84-97-559-6931	khanhlinhdistribution.vn@gmail.com	Hue, Vietnam	Net 7	ACTIVE	Edit Deactivate Delete
	Lotus Distribution	Ly Hoai Phuong	+84-96-219-3290	lotusdistribution.vn@gmail.com	Ha Noi, Vietnam	Net 15	ACTIVE	Edit Deactivate Delete
	Mekong Wholesale	Do Gia Ha	+84-94-944-8894	mekongwholesale.vn@gmail.com	Can Tho, Vietnam	Net 45	ACTIVE	Edit Deactivate Delete
	Minh Chau Wholesale	Do Anh Van	+84-95-116-3854	minhchauwholesale.vn@gmail.com	Can Tho, Vietnam	Net 15	ACTIVE	Edit Deactivate Delete
	Nova Imports	Dang Hoai Anh	+84-96-381-1132	novaimports.vn@gmail.com	Quy Nhon, Vietnam	Net 15	ACTIVE	Edit Deactivate Delete
	Oceanic Trading	Duong Quang Nga	+84-91-953-9017	oceanictrading.vn@gmail.com	Quy Nhon, Vietnam	COD	ACTIVE	Edit Deactivate Delete
	Pacific Distributors	Dinh Hoai Long	+84-99-921-6772	pacificdistributors.vn@gmail.com	Hai Phong, Vietnam	Net 30	ACTIVE	Edit Deactivate Delete
	RedRiver Supply	Dinh Hong Dung	+84-93-650-3222	redriversupply.vn@gmail.com	Vung Tau, Vietnam	COD	ACTIVE	Edit Deactivate Delete
	Saigon Supply	Hoang Hong Phuong	+84-90-416-8222	saigonsupply.vn@gmail.com	Ha Noi, Vietnam	Net 7	ACTIVE	Edit Deactivate Delete
	SilverLine Supply	Phan Van Binh	+84-95-349-3063	silverlinesupply.vn@gmail.com	Quy Nhon, Vietnam	Net 30	ACTIVE	Edit Deactivate Delete

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Figure 3.20: Pagination Feature

The screenshot shows the SIPMS application interface. On the left is a dark sidebar with navigation links: Dashboard, Products, Suppliers (which is selected), Locations, Categories, Purchase Orders, Sales Orders, Transfers, Reports, and Users. The main content area has a title "Suppliers" and a table of existing suppliers. A modal window titled "New Supplier" is open in the center. The modal contains fields for Name, Contact name, Phone, Email, Address, Payment terms, and Status. It also includes a "Cancel" button and a "Create supplier" button. The background table lists 24 suppliers with columns for Name, Contact, Phone, Email, Address, Payment terms, Status, and Actions. The status column shows "ACTIVE" for most entries, with some like "Net 45" and "Net 45" being "INACTIVE". The actions column includes Edit, Deactivate, and Delete buttons.

Figure 3.21: Create New Supplier Form

5 Locations Page

Locations represent warehouses and stores and are used for inventory tracking and transfers:

- Create new locations via a form capturing: Name, Type (STORE / WAREHOUSE), Address, and Status (Active/Inactive).
- Search by location name or address.
- Sorting by name.
- Location table includes: Name, Type (STORE / WAREHOUSE), Address, Status, Created At, and Actions.
- Actions include Edit, Activate/Deactivate, and Delete.
- Pagination with page size selector.

SIPMS

System Admin (ADMIN) Logout

Locations

New Location

Name	Type	Address	Status	Created At	Actions
ST01 - VinUni Store	STORE	VinUniversity, Ha Noi	ACTIVE	11/21/2025, 8:35:00 AM	Edit Deactivate Delete
ST02 - Campus Store A	STORE	Cau Giay, Ha Noi	ACTIVE	11/21/2025, 12:06:00 PM	Edit Deactivate Delete
ST03 - Campus Store B	STORE	Nam Tu Liem, Ha Noi	ACTIVE	11/21/2025, 3:37:00 PM	Edit Deactivate Delete
ST04 - Downtown HCMC	STORE	District 1, Ho Chi Minh City	ACTIVE	11/21/2025, 7:08:00 PM	Edit Deactivate Delete
ST05 - HCMC East	STORE	Thu Duc, Ho Chi Minh City	ACTIVE	11/21/2025, 10:39:00 PM	Edit Deactivate Delete
ST06 - Da Nang Center	STORE	Hai Chau, Da Nang	ACTIVE	11/22/2025, 2:10:00 AM	Edit Deactivate Delete
ST07 - Hai Phong Center	STORE	Hong Bang, Hai Phong	ACTIVE	11/22/2025, 5:41:00 AM	Edit Deactivate Delete
ST08 - Can Tho Center	STORE	Ninh Kieu, Can Tho	ACTIVE	11/22/2025, 9:12:00 AM	Edit Deactivate Delete
ST09 - Nha Trang Store	STORE	Nha Trang, Khanh Hoa	ACTIVE	11/22/2025, 12:43:00 PM	Edit Deactivate Delete
ST10 - Hue Store	STORE	Hue, Thua Thien Hue	ACTIVE	11/22/2025, 4:14:00 PM	Edit Deactivate Delete

Page 1 of 2 · 16 locations

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ZealOptimistic

Figure 3.22: Locations Page Screenshot

SIPMS

System Admin (ADMIN) Logout

Locations

New Location

Name	Type	Address	Status	Created At	Actions
ST01 - VinUni Store	STORE	VinUniversity, Ha Noi	ACTIVE	11/21/2025, 8:35:00 AM	Edit Deactivate Delete
ST02 - Campus Store A	STORE	Cau Giay, Ha Noi	ACTIVE	11/21/2025, 12:06:00 PM	Edit Deactivate Delete
ST03 - Campus Store B	STORE	Nam Tu Liem, Ha Noi	ACTIVE	11/21/2025, 3:37:00 PM	Edit Deactivate Delete
ST04 - Downtown HCMC	STORE	District 1, Ho Chi Minh City	ACTIVE	11/21/2025, 7:08:00 PM	Edit Deactivate Delete
ST05 - HCMC East	STORE	Thu Duc, Ho Chi Minh City	ACTIVE	11/21/2025, 10:39:00 PM	Edit Deactivate Delete
ST06 - Da Nang Center	STORE	Hai Chau, Da Nang	ACTIVE	11/22/2025, 2:10:00 AM	Edit Deactivate Delete
ST07 - Hai Phong Center	STORE	Hong Bang, Hai Phong	ACTIVE	11/22/2025, 5:41:00 AM	Edit Deactivate Delete
ST08 - Can Tho Center	STORE	Ninh Kieu, Can Tho	ACTIVE	11/22/2025, 9:12:00 AM	Edit Deactivate Delete
ST09 - Nha Trang Store	STORE	Nha Trang, Khanh Hoa	ACTIVE	11/22/2025, 12:43:00 PM	Edit Deactivate Delete
ST10 - Hue Store	STORE	Hue, Thua Thien Hue	ACTIVE	11/22/2025, 4:14:00 PM	Edit Deactivate Delete

Page 1 of 2 · 16 locations

10/page Previous Next

Cancel Save changes

Edit Location

Name: ST01 - VinUni Store

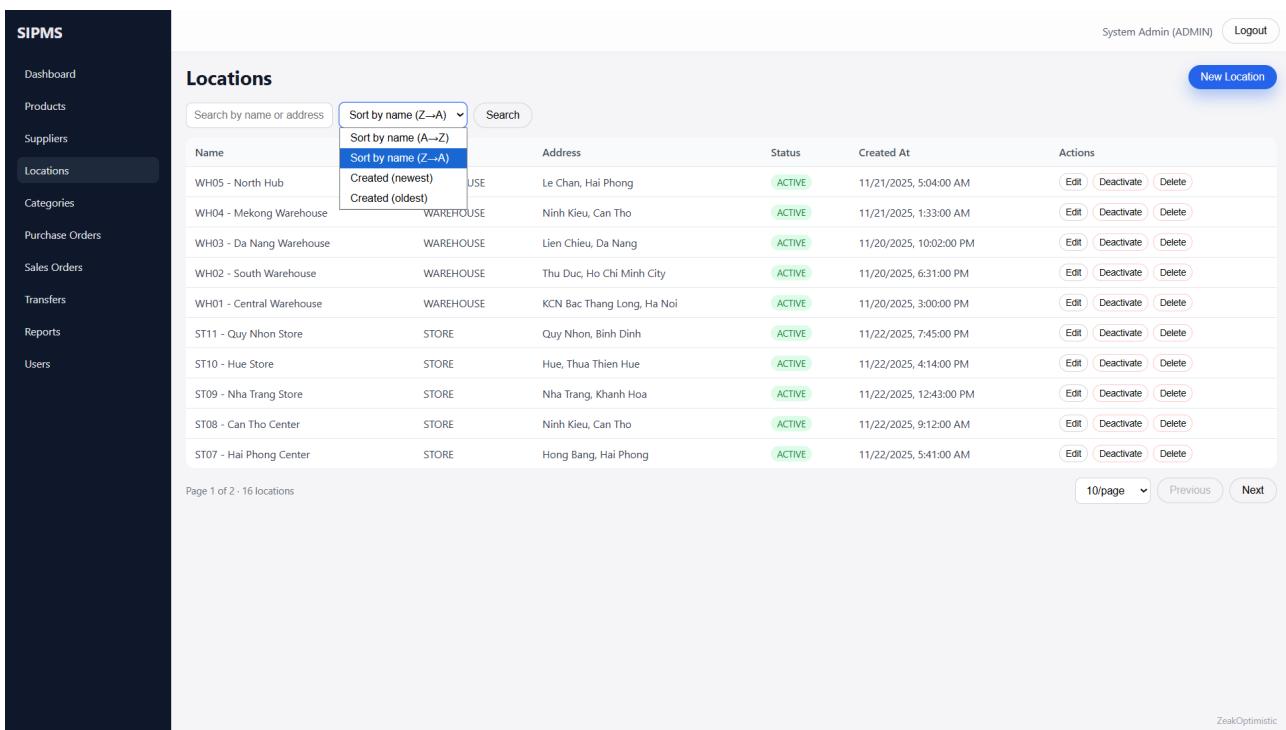
Type: STORE

Address: VinUniversity, Ha Noi

Status: ACTIVE

ZealOptimistic

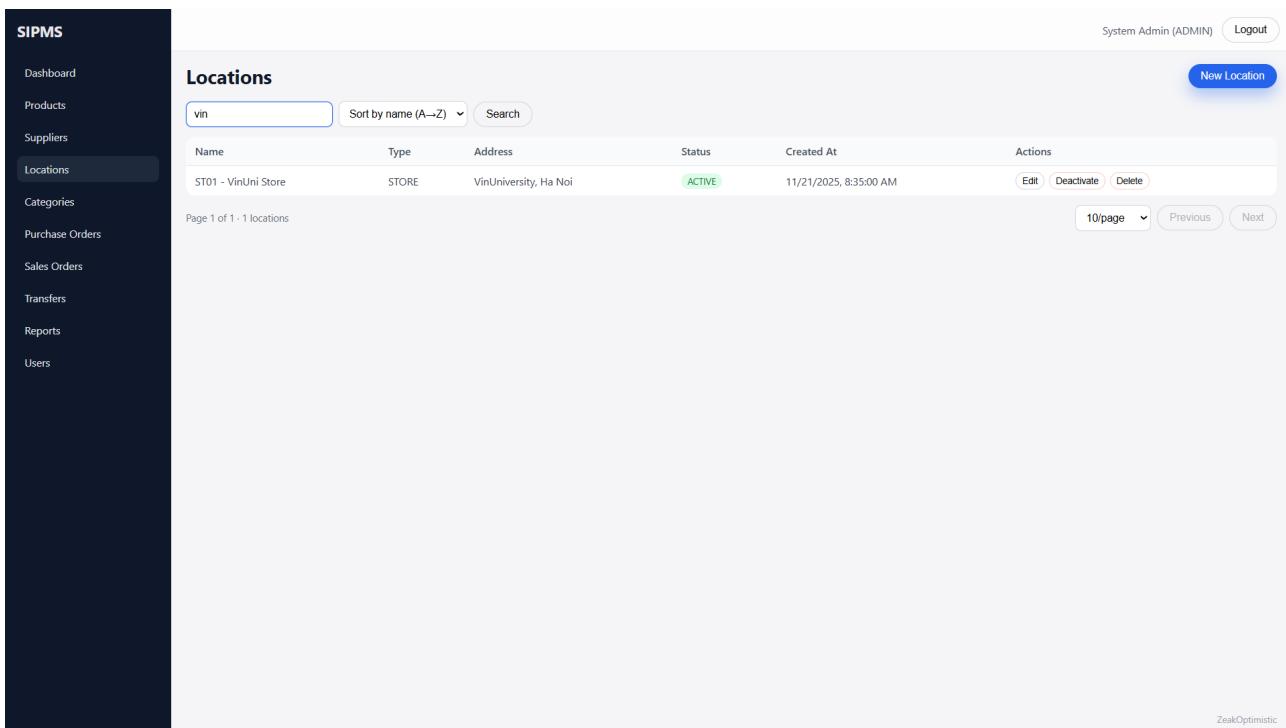
Figure 3.23: Edit Existing Location Form



The screenshot shows the SIPMS Locations page. On the left is a dark sidebar with navigation links: Dashboard, Products, Suppliers, Locations (which is selected), Categories, Purchase Orders, Sales Orders, Transfers, Reports, and Users. The main content area has a title 'Locations' and a search bar with dropdowns for 'Sort by name (Z→A)', 'Sort by name (A→Z)', and 'Search'. Below the search bar is a table with columns: Name, Type, Address, Status, Created At, and Actions. The table contains 16 rows of location data. A dropdown menu above the table allows sorting by name (Z→A), name (A→Z), or creation date (newest/oldest). At the bottom of the table are pagination controls: 'Page 1 of 2 - 16 locations', '10/page', 'Previous', and 'Next'. The footer of the page includes 'System Admin (ADMIN)', 'Logout', and 'ZealOptimistic'.

Name	Type	Address	Status	Created At	Actions
WH05 - North Hub	WAREHOUSE	Le Chan, Hai Phong	ACTIVE	11/21/2025, 5:04:00 AM	Edit Deactivate Delete
WH04 - Mekong Warehouse	WAREHOUSE	Ninh Kieu, Can Tho	ACTIVE	11/21/2025, 1:33:00 AM	Edit Deactivate Delete
WH03 - Da Nang Warehouse	WAREHOUSE	Lien Chieu, Da Nang	ACTIVE	11/20/2025, 10:02:00 PM	Edit Deactivate Delete
WH02 - South Warehouse	WAREHOUSE	Thu Duc, Ho Chi Minh City	ACTIVE	11/20/2025, 6:31:00 PM	Edit Deactivate Delete
WH01 - Central Warehouse	WAREHOUSE	KCN Bac Thang Long, Ha Noi	ACTIVE	11/20/2025, 3:00:00 PM	Edit Deactivate Delete
ST11 - Quy Nhon Store	STORE	Quy Nhon, Binh Dinh	ACTIVE	11/22/2025, 7:45:00 PM	Edit Deactivate Delete
ST10 - Hue Store	STORE	Hue, Thua Thien Hue	ACTIVE	11/22/2025, 4:14:00 PM	Edit Deactivate Delete
ST09 - Nha Trang Store	STORE	Nha Trang, Khanh Hoa	ACTIVE	11/22/2025, 12:43:00 PM	Edit Deactivate Delete
ST08 - Can Tho Center	STORE	Ninh Kieu, Can Tho	ACTIVE	11/22/2025, 9:12:00 AM	Edit Deactivate Delete
ST07 - Hai Phong Center	STORE	Hong Bang, Hai Phong	ACTIVE	11/22/2025, 5:41:00 AM	Edit Deactivate Delete

Figure 3.24: Sorting Feature



The screenshot shows the SIPMS Locations page. The sidebar and overall layout are identical to Figure 3.24. The main content area has a title 'Locations' and a search bar with a placeholder 'vin' and a dropdown for 'Sort by name (A→Z)'. Below the search bar is a table with columns: Name, Type, Address, Status, Created At, and Actions. The table contains 1 row of location data. A search input field at the top of the table also contains 'vin'. At the bottom of the table are pagination controls: 'Page 1 of 1 - 1 locations', '10/page', 'Previous', and 'Next'. The footer of the page includes 'System Admin (ADMIN)', 'Logout', and 'ZealOptimistic'.

Name	Type	Address	Status	Created At	Actions
ST01 - VinUni Store	STORE	VinUniversity, Ha Noi	ACTIVE	11/21/2025, 8:35:00 AM	Edit Deactivate Delete

Figure 3.25: Searching Feature

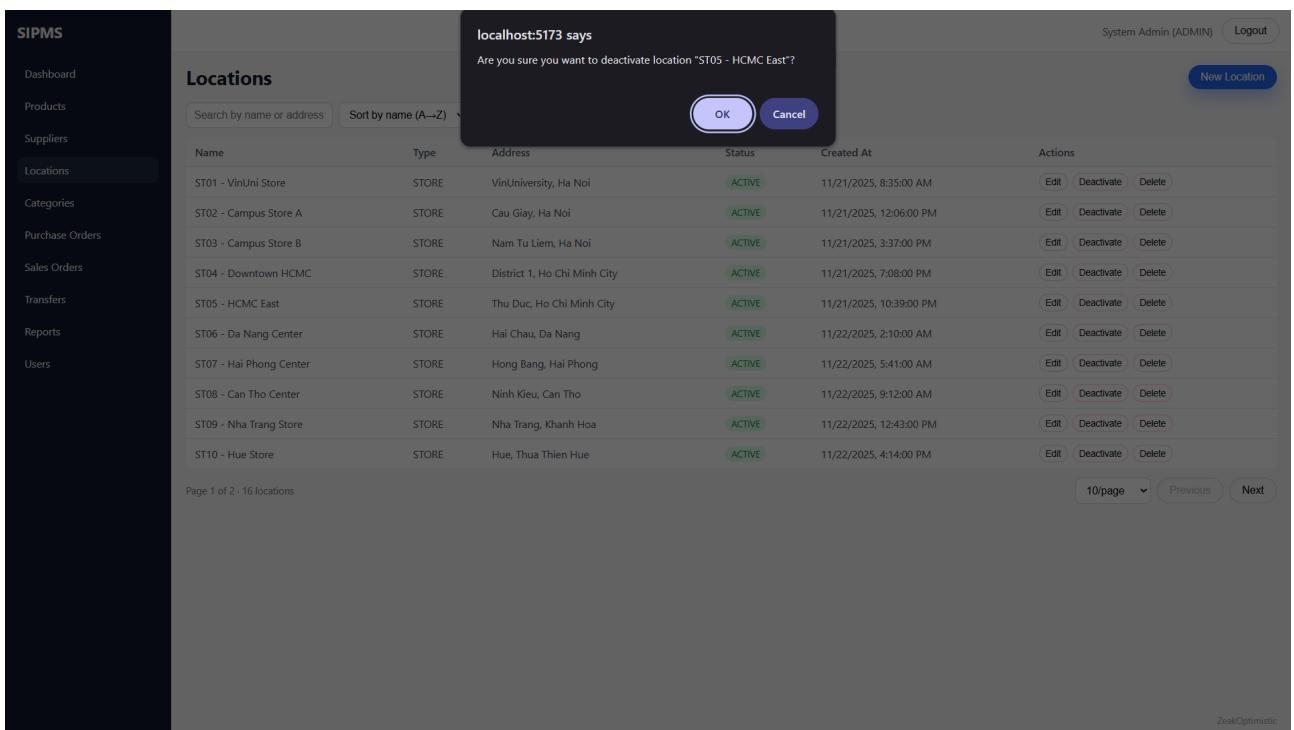


Figure 3.26: Notification Deactivate Location

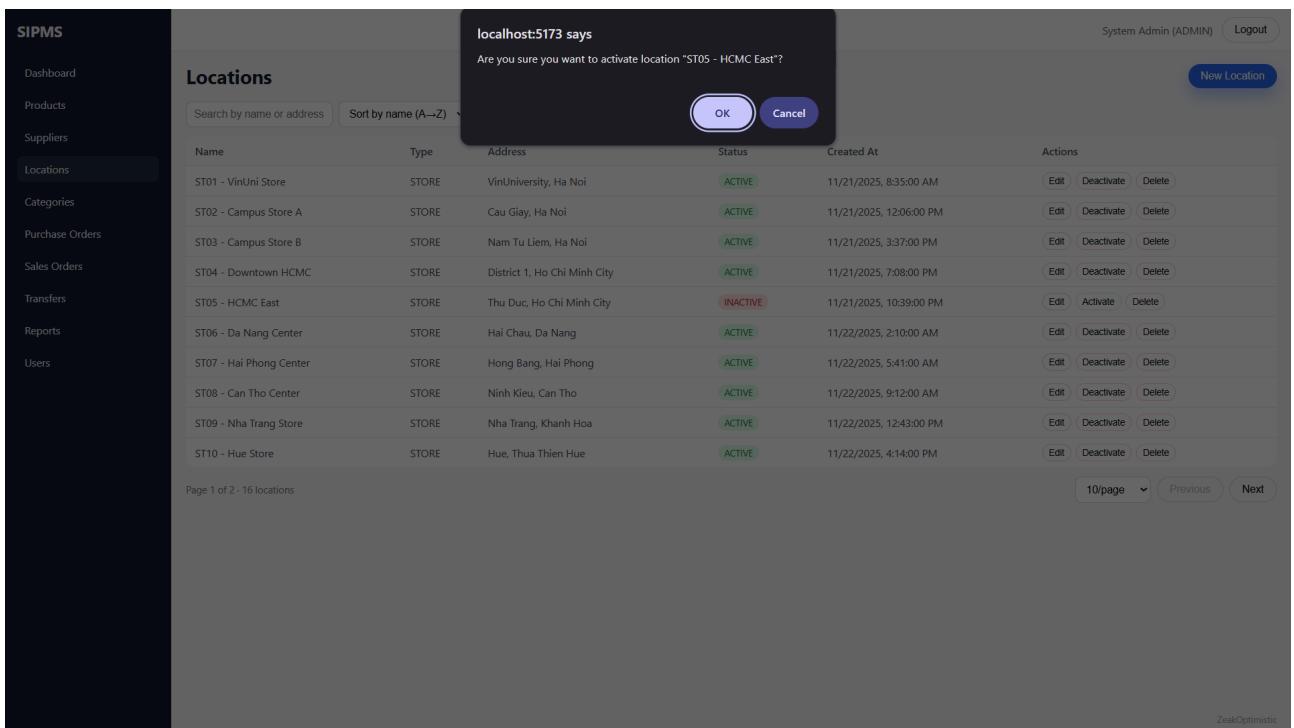


Figure 3.27: Notification Activate Location

The screenshot shows the SIPMS Locations page. On the left is a dark sidebar with navigation links: Dashboard, Products, Suppliers, Locations (which is selected), Categories, Purchase Orders, Sales Orders, Transfers, Reports, and Users. The main content area has a light background. At the top right are 'System Admin (ADMIN)', 'Logout', and a 'New Location' button. Below is a search bar with filters 'Search by name or address', 'Sort by name (A→Z)', and a 'Search' button. A table lists 16 locations with columns: Name, Type, Address, Status, Created At, and Actions (Edit, Deactivate, Delete). The last three rows of the table have dropdown menus for page size: '10/page', '20/page' (which is selected), '50/page', '100/page', and '200/page'. At the bottom are 'Page 1 of 1 - 16 locations', '20/page' dropdown, 'Previous', and 'Next' buttons.

Name	Type	Address	Status	Created At	Actions
ST01 - VinUni Store	STORE	VinUniversity, Ha Noi	ACTIVE	11/21/2025, 8:35:00 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST02 - Campus Store A	STORE	Cau Giay, Ha Noi	ACTIVE	11/21/2025, 12:06:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST03 - Campus Store B	STORE	Nam Tu Liem, Ha Noi	ACTIVE	11/21/2025, 3:37:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST04 - Downtown HCMC	STORE	District 1, Ho Chi Minh City	ACTIVE	11/21/2025, 7:08:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST05 - HCMC East	STORE	Thu Duc, Ho Chi Minh City	ACTIVE	11/21/2025, 10:39:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST06 - Da Nang Center	STORE	Hai Chau, Da Nang	ACTIVE	11/22/2025, 2:10:00 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST07 - Hai Phong Center	STORE	Hong Bang, Hai Phong	ACTIVE	11/22/2025, 5:41:00 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST08 - Can Tho Center	STORE	Ninh Kieu, Can Tho	ACTIVE	11/22/2025, 9:12:00 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST09 - Nha Trang Store	STORE	Nha Trang, Khanh Hoa	ACTIVE	11/22/2025, 12:43:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST10 - Hue Store	STORE	Hue, Thua Thien Hue	ACTIVE	11/22/2025, 4:14:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST11 - Quy Nhon Store	STORE	Quy Nhon, Binh Dinh	ACTIVE	11/22/2025, 7:45:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
WH01 - Central Warehouse	WAREHOUSE	KCN Bac Thang Long, Ha Noi	ACTIVE	11/20/2025, 3:00:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
WH02 - South Warehouse	WAREHOUSE	Thu Duc, Ho Chi Minh City	ACTIVE	11/20/2025, 6:31:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
WH03 - Da Nang Warehouse	WAREHOUSE	Lien Chieu, Da Nang	ACTIVE	11/20/2025, 10:02:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
WH04 - Mekong Warehouse	WAREHOUSE	Ninh Kieu, Can Tho	ACTIVE	11/21/2025, 1:33:00 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
WH05 - North Hub	WAREHOUSE	Le Chan, Hai Phong	ACTIVE	11/21/2025, 5:04:00 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>

Page 1 of 1 - 16 locations 20/page Previous Next ZealOptimistic

Figure 3.28: Pagination Feature

The screenshot shows the SIPMS Locations page with a modal dialog for creating a new location. The modal has a title 'New Location' and fields for Name, Type, Address, and Status. The 'Type' field is currently set to 'WAREHOUSE'. The 'Status' field is set to 'ACTIVE'. At the bottom of the modal are 'Cancel' and 'Create location' buttons. The main table below shows 16 existing locations. At the bottom are 'Page 1 of 1 - 16 locations', '20/page' dropdown, 'Previous', and 'Next' buttons.

Name	Type	Address	Status	Created At	Actions
ST01 - VinUni Store	STORE	VinUniversity, Ha Noi	ACTIVE	11/21/2025, 8:35:00 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST02 - Campus Store A	STORE	Cau Giay, Ha Noi	ACTIVE	11/21/2025, 12:06:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST03 - Campus Store B	STORE	Nam Tu Liem, Ha Noi	ACTIVE	11/21/2025, 3:37:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST04 - Downtown HCMC	STORE	District 1, Ho Chi Minh City	ACTIVE	11/21/2025, 7:08:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST05 - HCMC East	STORE	Thu Duc, Ho Chi Minh City	ACTIVE	11/21/2025, 10:39:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST06 - Da Nang Center	STORE	Hai Chau, Da Nang	ACTIVE	11/22/2025, 2:10:00 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST07 - Hai Phong Center	STORE	Hong Bang, Hai Phong	ACTIVE	11/22/2025, 5:41:00 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST08 - Can Tho Center	STORE	Ninh Kieu, Can Tho	ACTIVE	11/22/2025, 9:12:00 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST09 - Nha Trang Store	STORE	Nha Trang, Khanh Hoa	ACTIVE	11/22/2025, 12:43:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST10 - Hue Store	STORE	Hue, Thua Thien Hue	ACTIVE	11/22/2025, 4:14:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
ST11 - Quy Nhon Store	STORE	Quy Nhon, Binh Dinh	ACTIVE	11/22/2025, 7:45:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
WH01 - Central Warehouse	WAREHOUSE	KCN Bac Thang Long, Ha Noi	ACTIVE	11/20/2025, 3:00:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
WH02 - South Warehouse	WAREHOUSE	Thu Duc, Ho Chi Minh City	ACTIVE	11/20/2025, 6:31:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
WH03 - Da Nang Warehouse	WAREHOUSE	Lien Chieu, Da Nang	ACTIVE	11/20/2025, 10:02:00 PM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
WH04 - Mekong Warehouse	WAREHOUSE	Ninh Kieu, Can Tho	ACTIVE	11/21/2025, 1:33:00 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>
WH05 - North Hub	WAREHOUSE	Le Chan, Hai Phong	ACTIVE	11/21/2025, 5:04:00 AM	<button>Edit</button> <button>Deactivate</button> <button>Delete</button>

Page 1 of 1 - 16 locations 20/page Previous Next ZealOptimistic

Figure 3.29: Create New Supplier Form

6 Categories Page

Categories provide product classification and support filtering and reporting consistency:

- Create new categories via a form capturing: Name, Description, and Status (Active/Inactive).
- Sorting by name.
- Search by category name.
- Category table includes: Name, Description, Status, and Actions.
- Actions include Edit, Activate/Deactivate, and Delete.
- Pagination with page size selector.

The screenshot shows the SIPMS application interface. On the left is a dark sidebar with navigation links: Dashboard, Products, Suppliers, Locations, Categories (which is highlighted), Purchase Orders, Sales Orders, Transfers, Reports, and Users. The main content area has a light background. At the top right, it says "System Admin (ADMIN)" and "Logout". Below that is a "Categories" section header with a "New Category" button. Underneath is a table with the following data:

Name	Description	Status	Actions
Cleaning	Cleaning chemicals and tools	ACTIVE	Edit Deactivate Delete
Electronics	Computers, peripherals, and accessories	ACTIVE	Edit Deactivate Delete
Food & Beverage	Pantry items, drinks, and snacks	ACTIVE	Edit Deactivate Delete
Maintenance	Tools and maintenance supplies	ACTIVE	Edit Deactivate Delete
Office Supplies	Paper, writing tools, and office essentials	ACTIVE	Edit Deactivate Delete
Packaging	Boxes, tapes, and packing materials	ACTIVE	Edit Deactivate Delete
Safety	PPE and safety equipment	ACTIVE	Edit Deactivate Delete
Stationery	Notebooks, markers, and desk items	ACTIVE	Edit Deactivate Delete

At the bottom of the table, it says "Page 1 of 1 · 8 categories". To the right of the table are buttons for "10/page", "Previous", and "Next". In the bottom right corner of the main area, it says "ZeekOptimistic".

Figure 3.30: Categories Page Screenshot

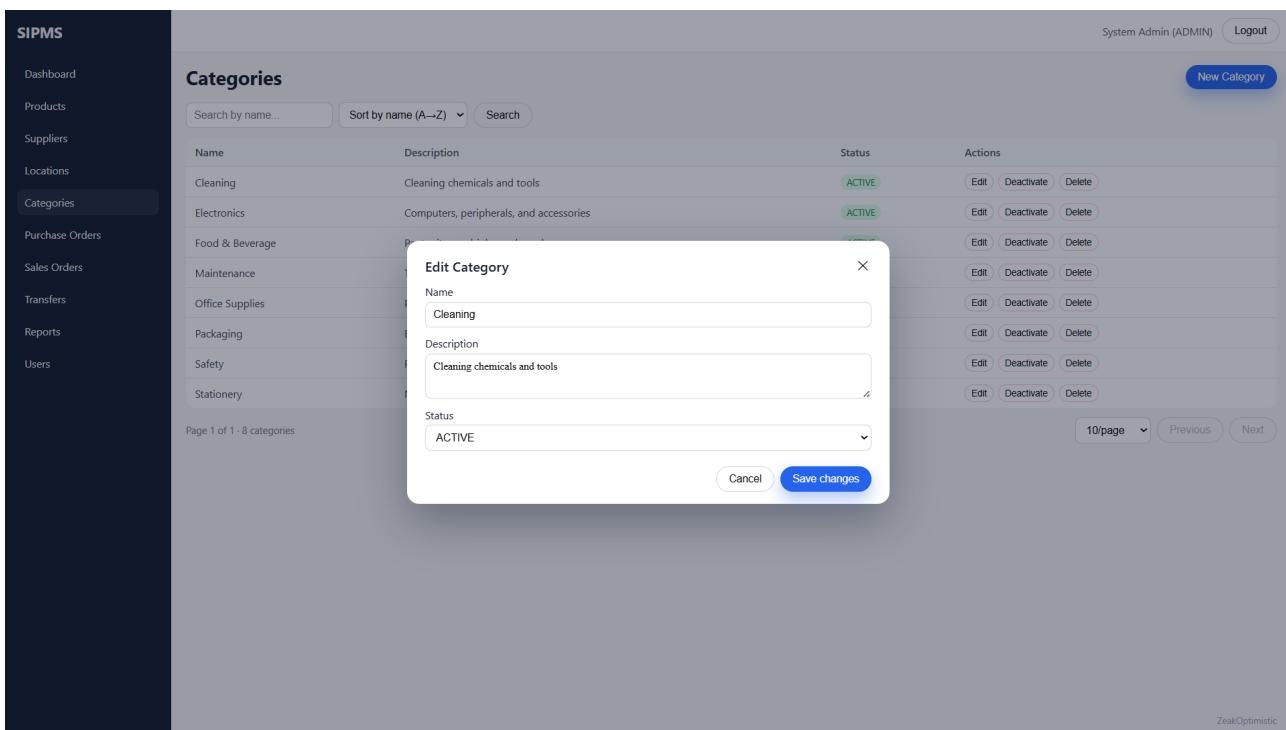


Figure 3.31: Edit Existing Category Form

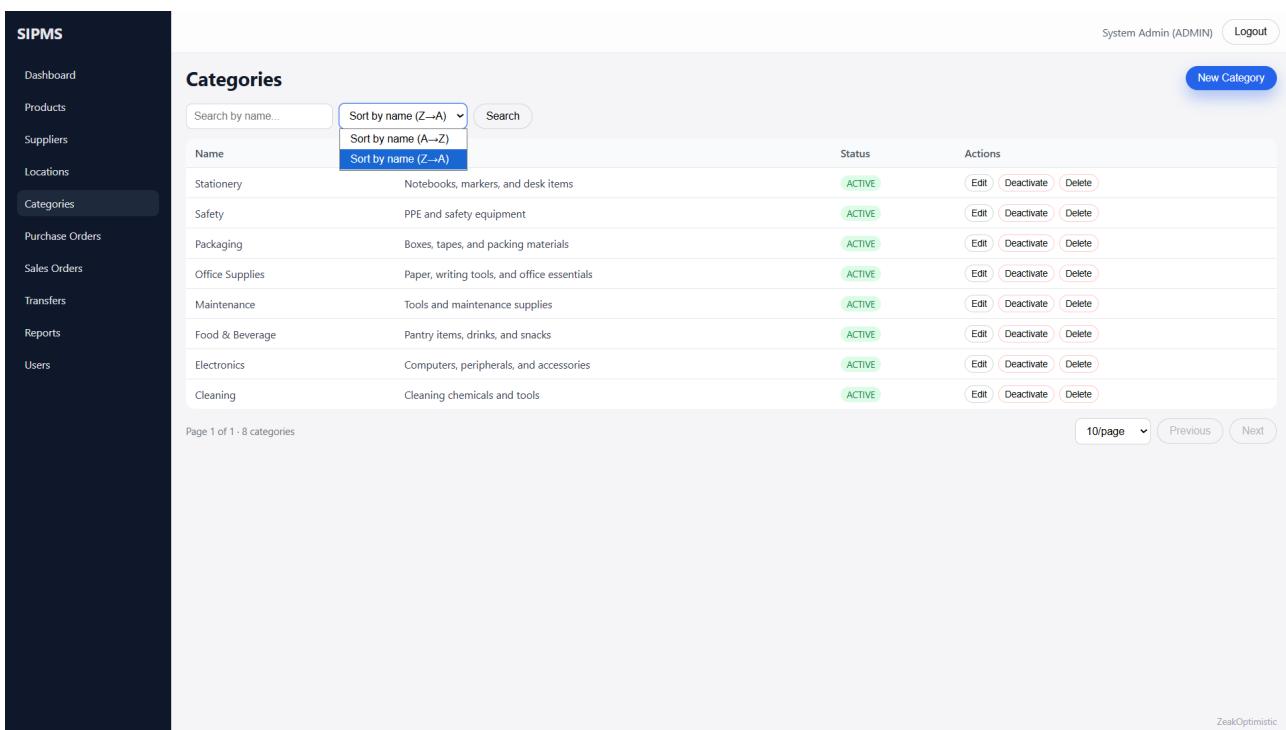


Figure 3.32: Sorting Feature

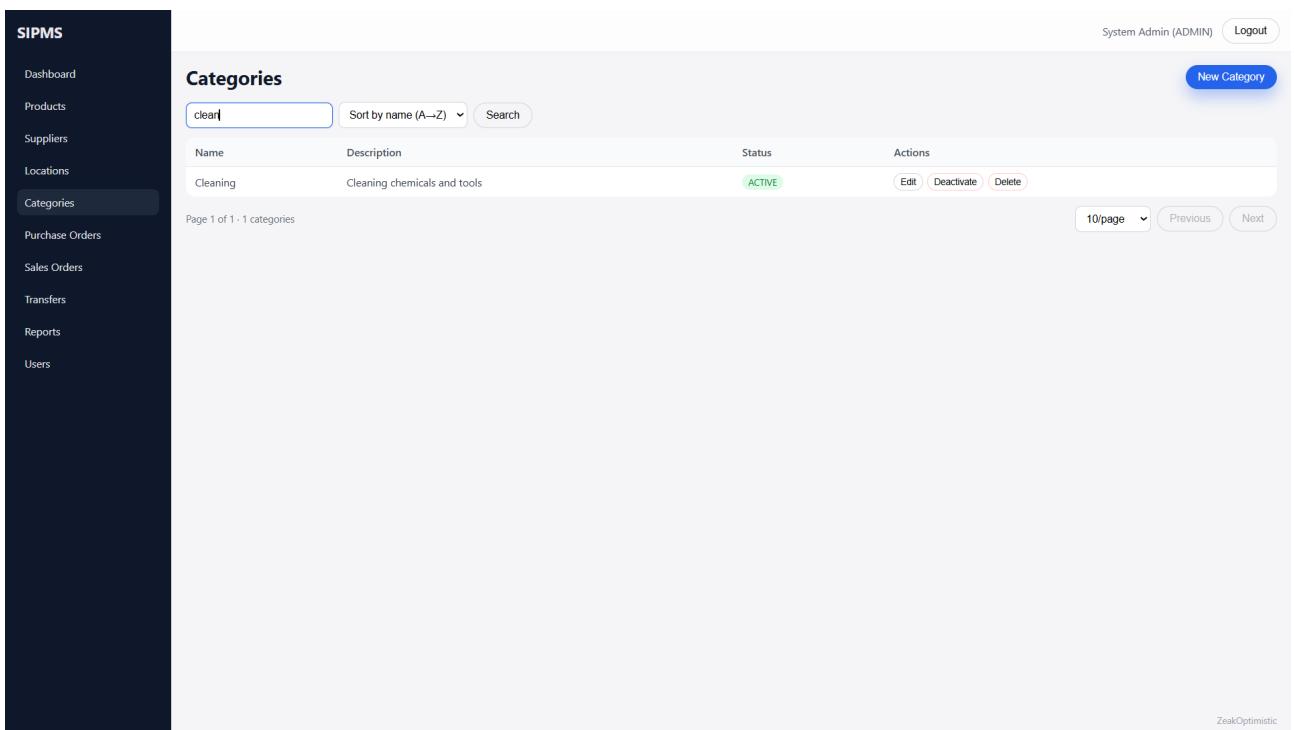


Figure 3.33: Searching Screenshot

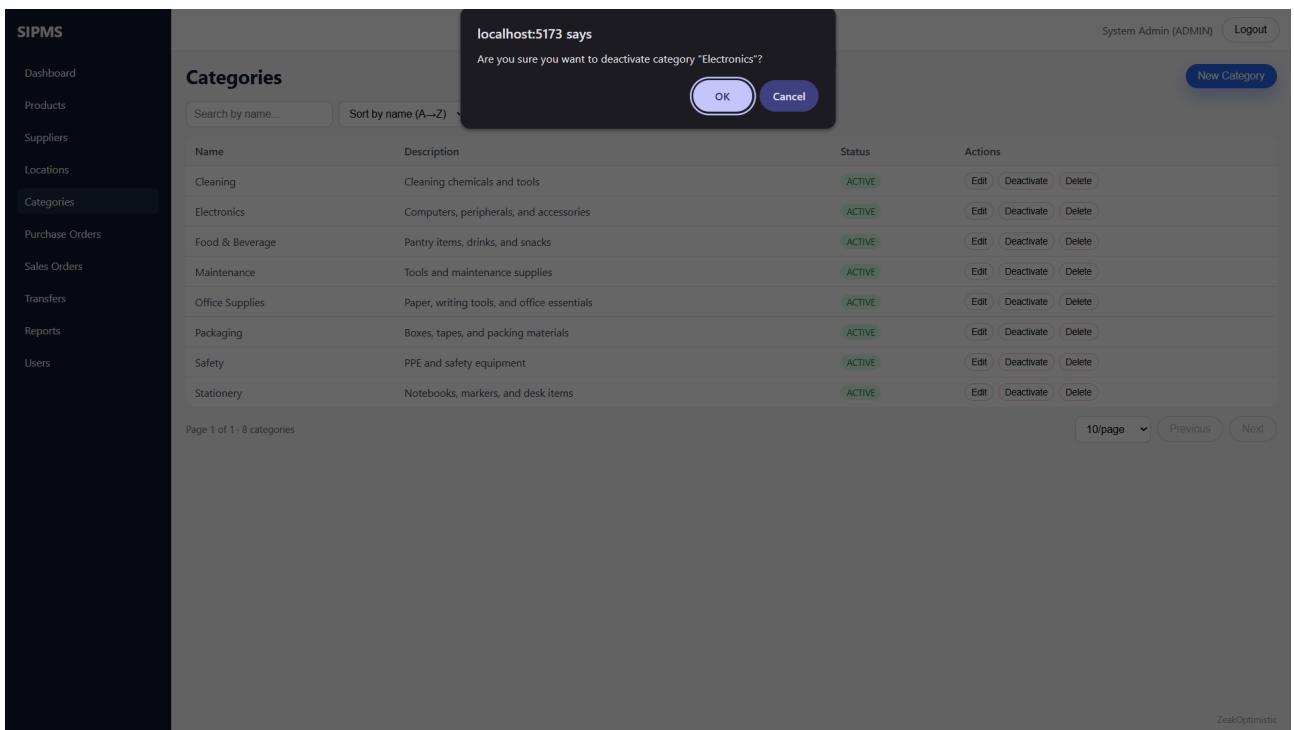


Figure 3.34: Notification Deactivate Category

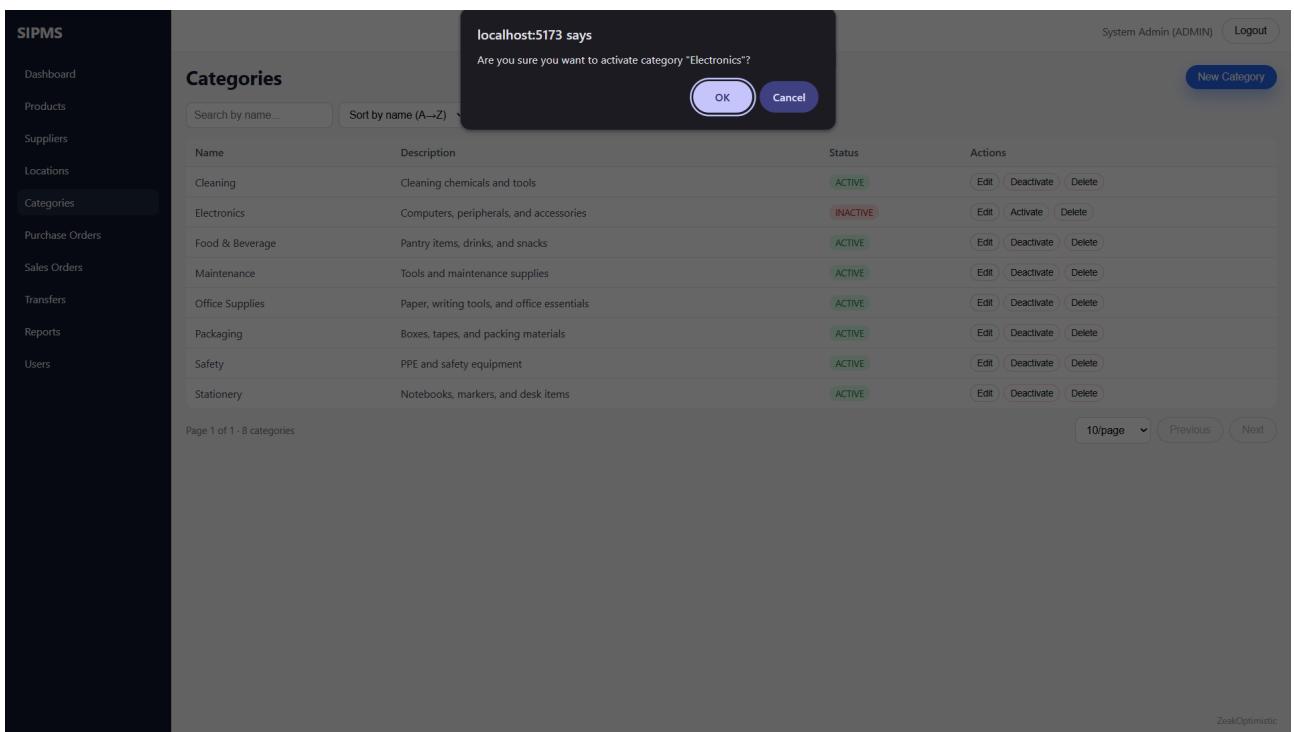


Figure 3.35: Notification Activate Category

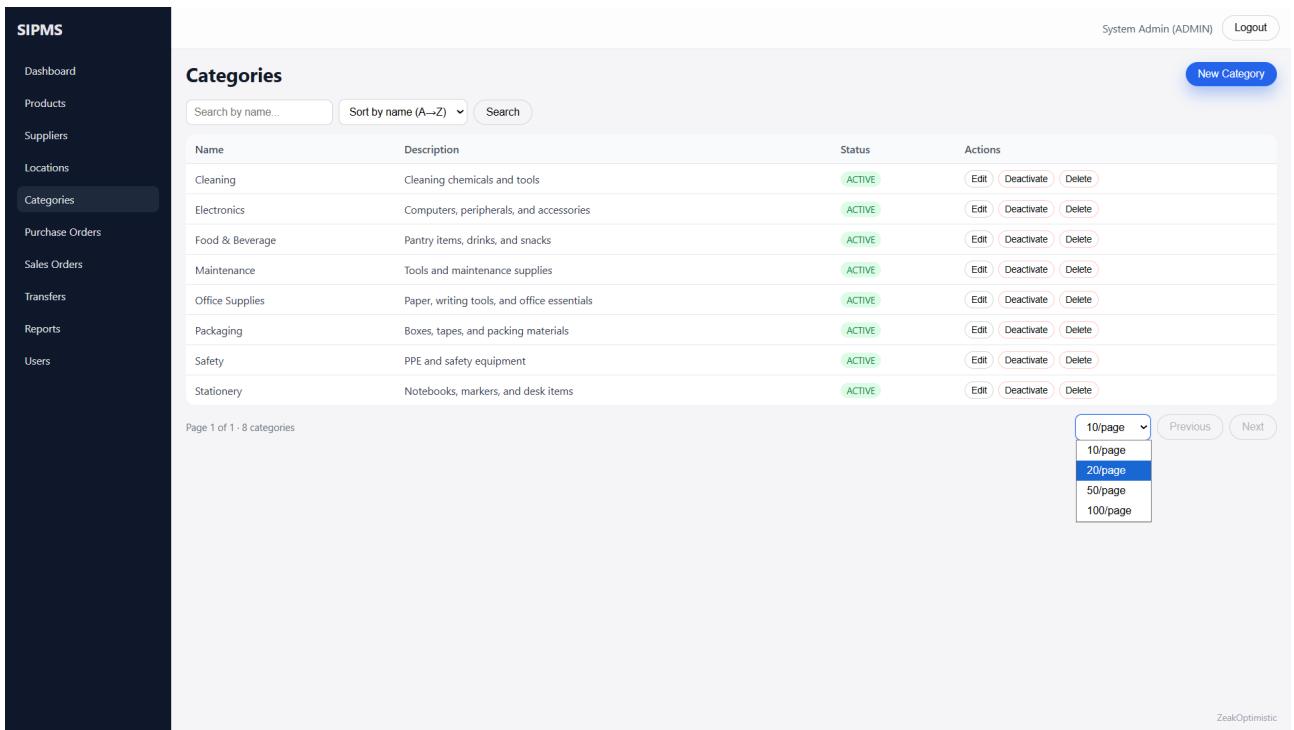


Figure 3.36: Pagination Feature

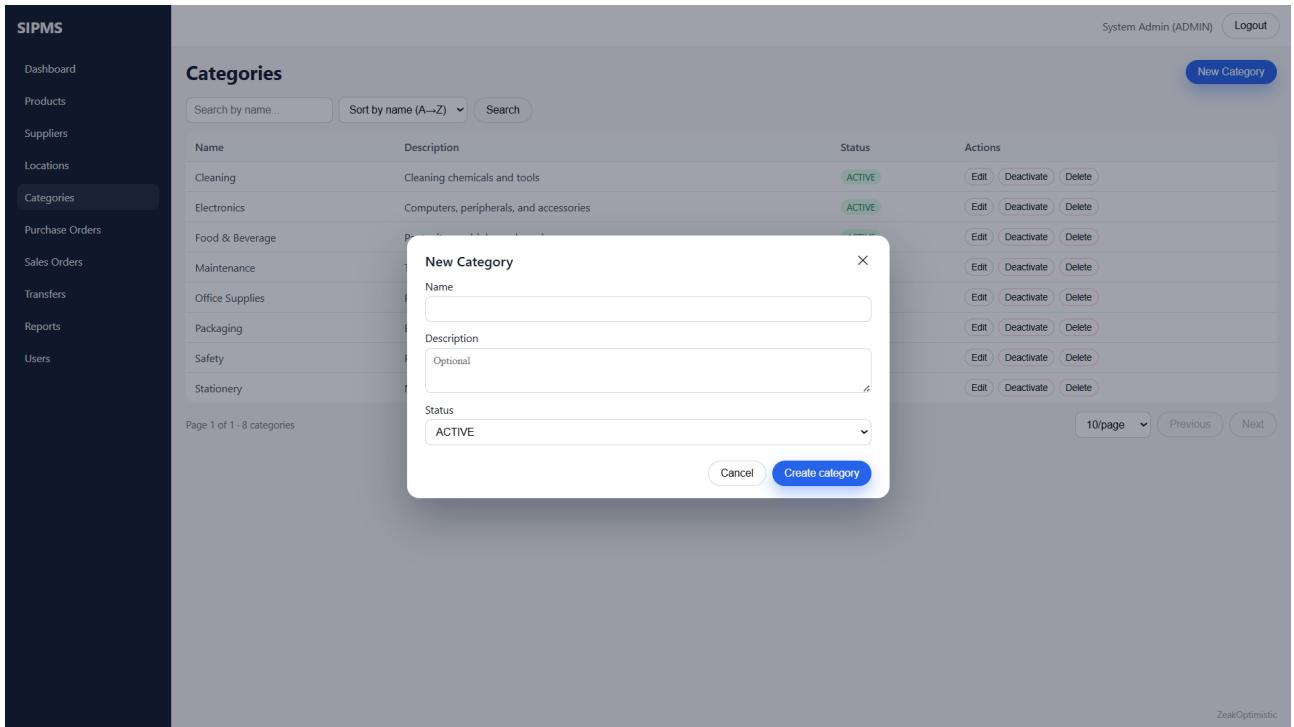


Figure 3.37: Create New Supplier Form

7 Purchase Orders Page

The Purchase Orders page supports procurement tracking and receiving operations:

- Filters include supplier filter, location filter, and status filter.
- Purchase order table includes: PO #, Supplier, Location, Status, Order Date, Total, Created At, Items, and Actions.
- “View items (N)” opens detailed line items for the selected PO.
- “Receive all” is available when the order is in a receivable state (e.g., Approved) and disabled when not applicable (e.g., Closed).
- Create/Receive actions are available to Admin/Manager; Clerk is view-only
- Pagination with page size selector.

The screenshot shows the SIPMS Purchase Orders page. The left sidebar has a dark theme with navigation links for Dashboard, Products, Suppliers, Locations, Categories, Purchase Orders (selected), Sales Orders, Transfers, Reports, and Users. The main content area has a light background. At the top right are 'System Admin (ADMIN)', 'Logout', and a 'New Purchase Order' button. Below is a table of purchase orders:

PO #	Supplier	Location	Status	Order Date	Total	Created At	Items	Actions
26	VietStar Supplies	WH05 - North Hub	Closed	2025-12-20	378996000.00	12/20/2025, 8:35:00 PM	View items (5)	Receive all
30	Saigon Supply	WH05 - North Hub	Closed	2025-12-19	282000000.00	12/19/2025, 9:19:00 PM	View items (5)	Receive all
4	GreenField Goods	WH02 - South Warehouse	Closed	2025-12-19	312000000.00	12/19/2025, 4:33:00 PM	View items (4)	Receive all
53	Lotus Distribution	WH02 - South Warehouse	Approved	2025-12-19	2905000.00	12/19/2025, 3:19:34 AM	View items (4)	Receive all
52	GoldLeaf Goods	ST09 - Nha Trang Store	Approved	2025-12-18	5250000.00	12/18/2025, 4:48:02 PM	View items (1)	Receive all
51	Delta Goods	ST10 - Hue Store	Approved	2025-12-17	132000.00	12/17/2025, 10:54:22 AM	View items (2)	Receive all
22	Pacific Distributors	WH04 - Mekong Warehouse	Closed	2025-12-16	561000000.00	12/16/2025, 7:51:00 PM	View items (8)	Receive all
38	Oceanic Trading	WH04 - Mekong Warehouse	Closed	2025-12-15	512000000.00	12/15/2025, 10:47:00 PM	View items (6)	Receive all
10	Pacific Distributors	WH05 - North Hub	Cancelled	2025-12-15	413000000.00	12/15/2025, 5:39:00 PM	View items (8)	Receive all
47	BlueSky Wholesale	WH02 - South Warehouse	Approved	2025-12-14	387000000.00	12/15/2025, 12:26:00 AM	View items (7)	Receive all

Page 1 of 6 · 53 orders 10/page Previous Next

ZealOptimistic

Figure 3.38: Purchase Orders Page Screenshot

The screenshot shows the 'New Purchase Order' dialog box over the main Purchase Orders page. The dialog has fields for Supplier (Beta Trading), Location (ST05 - HCMC East), Order date (12/19/2025), and Expected date (12/20/2025). The 'Items' section contains three product entries:

- Hikari Power Adapter 65W - Premium (EL-007) quantity 4, unit price 296000.00, line total 1184000.00 ₫
- Hikari USB-C Cable 5m (EL-006) quantity 4, unit price 105000.00, line total 420000.00 ₫
- Hikari USB-C Cable 1m - Eco (EL-017) quantity 3, unit price 78000.00, line total 234000.00 ₫

The estimated total is 1838000.00 ₫. At the bottom are 'Cancel' and 'Create PO' buttons.

Figure 3.39: Create New Purchase Order Form

SIPMS

System Admin (ADMIN) Logout

Purchase Orders

New Purchase Order

Filter by supplier... Filter by location... All statuses

PO #	Supplier	Location	Status	Order Date	Total	Created At	Items	Actions
54	Beta Trading	ST05 - HCMC East	Approved	2025-12-19	1838000.00	12/19/2025, 2:35:46 PM	Hide items	Receive all
Product								
Hikari USB-C Cable 5m			EL-006	4	0	105000.00	420000.00	
Hikari Power Adapter 65W - Premium			EL-007	4	0	296000.00	1184000.00	
Hikari USB-C Cable 1m - Eco			EL-017	3	0	78000.00	234000.00	
Total								
							1838000.00	
Page 1 of 6 - 54 orders								
10/page ▾ Previous Next								

ZeakOptimistic

Figure 3.40: Show Items of a Purchase Order

SIPMS

System Admin (ADMIN) Logout

Purchase Orders

New Purchase Order

Filter by supplier... Filter by location...

localhost:5173 says
Receive all remaining items for PO #54?

OK Cancel

PO #	Supplier	Location	Status	Order Date	Total	Created At	Items	Actions
54	Beta Trading	ST05 - HCMC East	Approved	2025-12-19	1838000.00	12/19/2025, 2:35:46 PM	Hide items	Receive all
Product								
Hikari USB-C Cable 5m			EL-006	4	0	105000.00	420000.00	
Hikari Power Adapter 65W - Premium			EL-007	4	0	296000.00	1184000.00	
Hikari USB-C Cable 1m - Eco			EL-017	3	0	78000.00	234000.00	
Total								
							1838000.00	
Page 1 of 6 - 54 orders								
10/page ▾ Previous Next								

ZeakOptimistic

Figure 3.41: Receive All Items from a Purchase Order

SIPMS

The screenshot shows the SIPMS Purchase Orders page. On the left is a dark sidebar with navigation links: Dashboard, Products, Suppliers, Locations, Categories, Purchase Orders (selected), Sales Orders, Transfers, Reports, and Users. The main content area has a title "Purchase Orders" and a "New Purchase Order" button. Below the title are two filter inputs: "Filter by supplier..." and "Filter by location...". A dropdown menu titled "All statuses" is open, showing options: All statuses (selected), Draft, Approved, Partially received, and Closed. The main table lists purchase orders with columns: PO #, Supplier, Location, Status, Order Date, Total, Created At, Items, and Actions. The table includes rows for various suppliers like Beta Trading, VietStar Supplies, and Saigon Supply, with details such as order dates (e.g., 2025-12-19, 2025-12-20) and totals (e.g., 1838000.00, 378996000.00). At the bottom, there are pagination controls: "Page 1 of 6 - 54 orders", "10/page" (selected), "20/page", "50/page", "100/page", "200/page", and buttons for "Previous" and "Next". A watermark "ZealOptimistic" is at the bottom right.

Figure 3.42: Filtering Status Feature

The screenshot shows the SIPMS Purchase Orders page. The sidebar and table structure are identical to Figure 3.42. The main table lists purchase orders with columns: PO #, Supplier, Location, Status, Order Date, Total, Created At, Items, and Actions. The table includes rows for various suppliers like Beta Trading, VietStar Supplies, and Saigon Supply, with details such as order dates (e.g., 2025-12-19, 2025-12-20) and totals (e.g., 1838000.00, 378996000.00). At the bottom, there are pagination controls: "Page 1 of 3 - 54 orders", a dropdown menu for "10/page" (selected), "20/page", "50/page", "100/page", and "200/page", and buttons for "Previous" and "Next". A watermark "ZealOptimistic" is at the bottom right.

Figure 3.43: Pagination Feature

The figure consists of two vertically stacked screenshots of the SIPMS Purchase Orders interface.

Screenshot 1 (Top):

- Left Sidebar:** Shows navigation links: Dashboard, Products, Suppliers, Locations, Categories, Purchase Orders (highlighted), Sales Orders, Transfers, Reports, and Users.
- Header:** Displays "System Admin (ADMIN)" and "Logout".
- Title:** "Purchase Orders".
- Search Bar:** Includes a "Filter by supplier..." input (containing "nha"), a "Filter by location..." input (containing "nhà"), and a dropdown menu set to "All statuses".
- Table Headers:** PO #, Supplier, Location, Status, Order Date, Total, Created At, Items, Actions.
- Table Data:**

PO #	Supplier	Location	Status	Order Date	Total	Created At	Items	Actions
52	GoldLeaf Goods	ST09 - Nha Trang Store	Approved	2025-12-18	5250000.00	12/18/2025, 4:48:02 PM	View items (1)	Receive all
- Pagination:** "Page 1 of 1 · 1 orders", "10/page" dropdown, "Previous", and "Next" buttons.
- Footer:** "ZealOptimistic" watermark.

Screenshot 2 (Bottom):

- Left Sidebar:** Same as Screenshot 1.
- Header:** Displays "System Admin (ADMIN)" and "Logout".
- Title:** "Purchase Orders".
- Search Bar:** Includes a "Filter by supplier..." input (containing "vi") and a "Filter by location..." input (containing "WH05"). The dropdown menu is still set to "All statuses".
- Table Headers:** PO #, Supplier, Location, Status, Order Date, Total, Created At, Items, Actions.
- Table Data:**

PO #	Supplier	Location	Status	Order Date	Total	Created At	Items	Actions
26	VietStar Supplies	WH05 - North Hub	Closed	2025-12-20	378996000.00	12/20/2025, 8:35:00 PM	View items (5)	Receive all
- Pagination:** "Page 1 of 1 · 1 orders", "10/page" dropdown, "Previous", and "Next" buttons.
- Footer:** "ZealOptimistic" watermark.

Figure 3.44: Searching Feature

8 Sales Orders Page

The Sales Orders page supports sales tracking and order cancellation:

- Filters include customer filter, location filter, and status filter.
- Sales order table includes: SO #, Customer, Location, Status, Order Date, Total, Created At, Items, and Actions.
- “View items (N)” opens detailed line items.
- “Cancel” action is provided for orders in a cancellable state; cancelled orders display status accordingly.
- On confirmation/creation, the system validates stock sufficiency to prevent negative inventory; insufficient stock returns an error.
- Pagination with page size selector.

SO #	Customer	Location	Status	Order date	Total	Created at	Items	Actions
68	Vingroup Office	ST07 - Hai Phong Center	CANCELLED	2025-12-20	2340200.00	12/21/2025, 3:03:00 AM	View items (7)	Cancelled
53	Retail Walk-in	ST03 - Campus Store B	CONFIRMED	2025-12-20	8376000.00	12/21/2025, 12:48:00 AM	View items (5)	Cancel
52	Student Union	ST11 - Quy Nhon Store	CONFIRMED	2025-12-20	4010000.00	12/21/2025, 12:39:00 AM	View items (3)	Cancel
34	CECS Lab	ST05 - HCMC East	CONFIRMED	2025-12-20	1571000.00	12/20/2025, 9:57:00 PM	View items (4)	Cancel
30	CECS Lab	ST07 - Hai Phong Center	CONFIRMED	2025-12-20	3746800.00	12/20/2025, 9:21:00 PM	View items (7)	Cancel
24	Partner Company	ST03 - Campus Store B	CONFIRMED	2025-12-19	2245000.00	12/19/2025, 8:27:00 PM	View items (4)	Cancel
62	Student Union	ST09 - Nha Trang Store	CONFIRMED	2025-12-18	3371000.00	12/19/2025, 2:09:00 AM	View items (3)	Cancel
44	Vingroup Office	ST01 - VinUni Store	CONFIRMED	2025-12-18	1848300.00	12/18/2025, 11:27:00 PM	View items (6)	Cancel
43	Partner Company	ST07 - Hai Phong Center	CONFIRMED	2025-12-18	7359000.00	12/18/2025, 11:18:00 PM	View items (6)	Cancel
9	Internal Customer	ST08 - Can Tho Center	CONFIRMED	2025-12-18	12655100.00	12/18/2025, 6:12:00 PM	View items (7)	Cancel

Figure 3.45: Sales Orders Page Screenshot

SIPMS

Dashboard Products Suppliers Locations Categories Purchase Orders Sales Orders Transfers Reports Users

Sales Orders

Filter by customer... Filter by location... All statuses

SO #	Customer	Location	Status	Order date	Total	Created at	Items	Actions
68	Vingroup Office	ST07 - Hai Phong Center	CANCELLED	2025-12-20	2340200.00	12/21/2025, 3:03:00 AM	View items (7)	Cancelled
53	Retail Walk-in	ST03 - Campus Store B	CONFIRMED	2025-12-20	8376000.00	12/21/2025, 12:48:00 AM	Hide items	Cancel
Total: 8376000.00								

Product: SunPro Mechanical Keyboard - Eco
OfficePro A4 Paper Ream 80gsm - Standard
Boxy Shipping Label (Pack of 100) - Premium
PowerMax LED Bulb 100W - Standard
NoteMate Paper Clips (Box)

Customer name: Tran Quang Khai

New Sales Order

Location: ST05 - HCMC East Order date: 12/19/2025

Customer name: Tran Quang Khai

Items

Add line

Product: Lotus Green Tea Bottle 450ml - Premium

Quantity: 4 Unit price: 8000.00

Line total: 32000.00 ₫ Remove

Product: Lotus Printer Ink Cartridge - Standard

Quantity: 3 Unit price: 30500.00

Line total: 91500.00 ₫ Remove

Estimated total: 947000.00 ₫

Cancel Create sales order

10/page Previous Next

Page 1 of 7 - 70 orders

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Figure 3.46: Create New Sales Order Form

SIPMS

Dashboard Products Suppliers Locations Categories Purchase Orders Sales Orders Transfers Reports Users

Sales Orders

Filter by customer... Filter by location... All statuses

SO #	Customer	Location	Status	Order date	Total	Created at	Items	Actions
68	Vingroup Office	ST07 - Hai Phong Center	CANCELLED	2025-12-20	2340200.00	12/21/2025, 3:03:00 AM	View items (7)	Cancelled
53	Retail Walk-in	ST03 - Campus Store B	CONFIRMED	2025-12-20	8376000.00	12/21/2025, 12:48:00 AM	Hide items	Cancel
Total: 8376000.00								

Product: SunPro Mechanical Keyboard - Eco
OfficePro A4 Paper Ream 80gsm - Standard
Boxy Shipping Label (Pack of 100) - Premium
PowerMax LED Bulb 100W - Standard
NoteMate Paper Clips (Box)

Customer name: Tran Quang Khai

New Sales Order

Location: ST05 - HCMC East Order date: 12/19/2025

Customer name: Tran Quang Khai

Items

Add line

Product: Lotus Green Tea Bottle 450ml - Premium

Quantity: 4 SKU: EL-009 Unit price: 1797000.00

Line total: 7188000.00

Product: Lotus Printer Ink Cartridge - Standard

Quantity: 3 SKU: OF-015 Unit price: 79000.00

Line total: 553000.00

Product: PowerMax LED Bulb 100W - Standard

Quantity: 2 SKU: PK-013 Unit price: 67000.00

Line total: 469000.00

Product: NoteMate Paper Clips (Box)

Quantity: 2 SKU: MT-002 Unit price: 55000.00

Line total: 110000.00

Product: Boxy Shipping Label (Pack of 100) - Premium

Quantity: 1 SKU: ST-002 Unit price: 28000.00

Line total: 56000.00

Estimated total: 947000.00 ₫

Cancel Create sales order

10/page Previous Next

Page 1 of 7 - 70 orders

ZealOptimistic

Figure 3.47: Show Items of a Sales Order

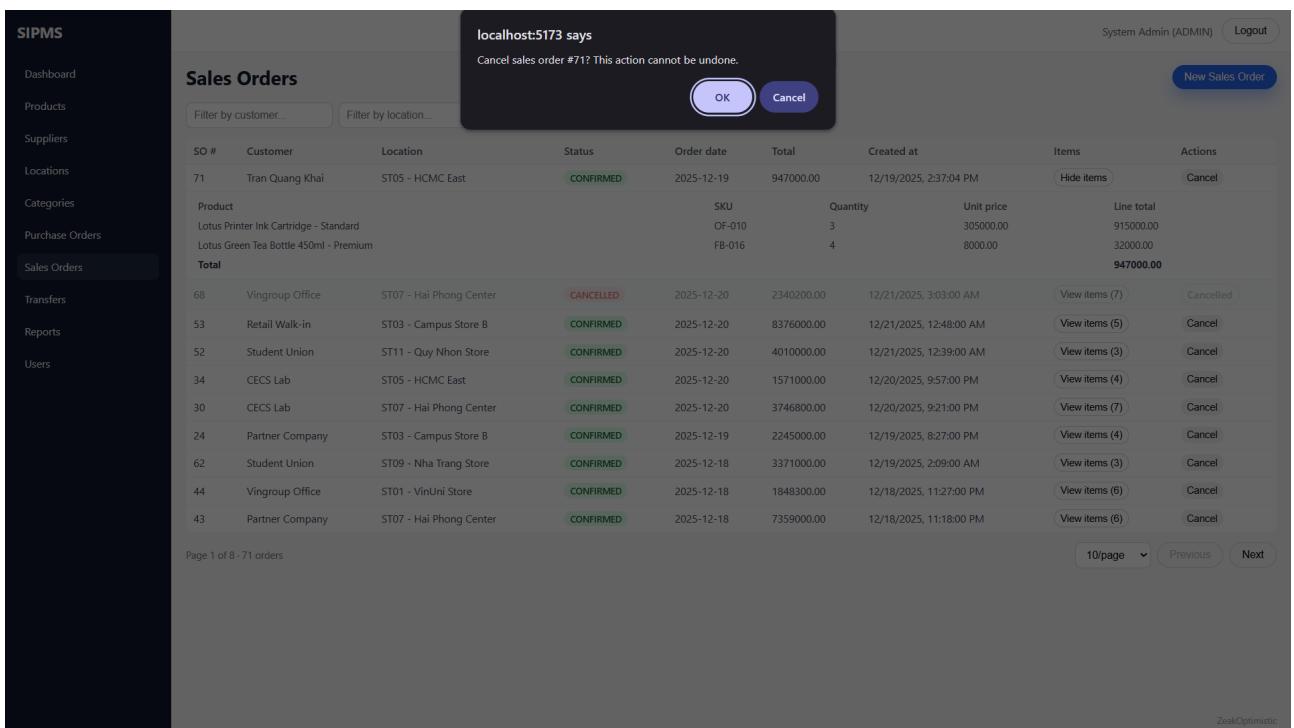


Figure 3.48: Notification Cancel a Sales Order

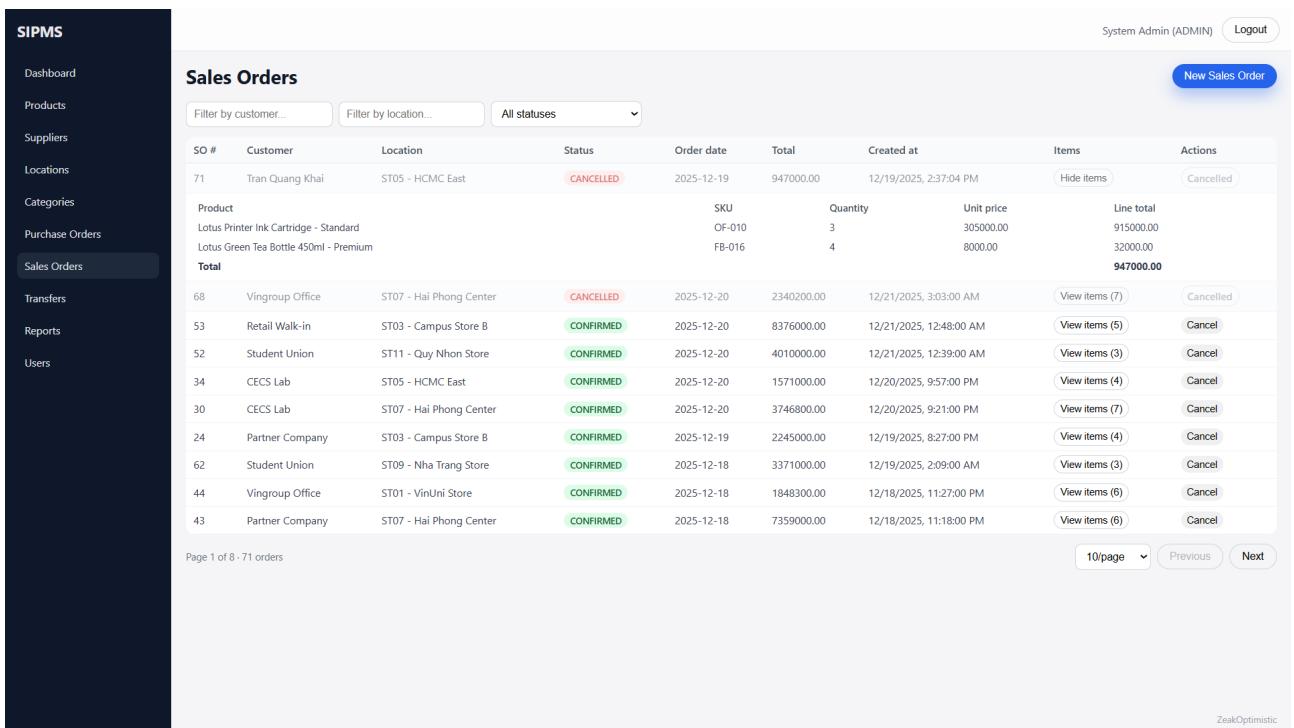


Figure 3.49: Status After Cancelling a Sales Order

This screenshot shows a table of sales orders with various filters and actions. The table includes columns for SO #, Customer, Location, Status, Order date, Total, Created at, Items, and Actions. A dropdown menu for 'All statuses' is open, showing options like 'All statuses', 'CONFIRMED', and 'CANCELLED'. At the bottom right, there are buttons for 'View items (4)', 'Cancel', and '20/page'.

Sales Orders								
Filter by customer...		Filter by location...		All statuses				
SO #	Customer	Location	Status	Order date	Total	Created at	Items	Actions
71	Tran Quang Khai	ST05 - HCMC East	CANCELLED	2025-12-19	947000.00	12/19/2025, 2:37:04 PM	View items (2)	Cancelled
68	Vingroup Office	ST07 - Hai Phong Center	CANCELLED	2025-12-20	2340200.00	12/21/2025, 3:03:00 AM	View items (7)	Cancelled
53	Retail Walk-in	ST03 - Campus Store B	CONFIRMED	2025-12-20	8376000.00	12/21/2025, 12:48:00 AM	View items (5)	Cancel
52	Student Union	ST11 - Quy Nhon Store	CONFIRMED	2025-12-20	4010000.00	12/21/2025, 12:39:00 AM	View items (3)	Cancel
34	CECS Lab	ST05 - HCMC East	CONFIRMED	2025-12-20	1571000.00	12/20/2025, 9:57:00 PM	View items (4)	Cancel
30	CECS Lab	ST07 - Hai Phong Center	CONFIRMED	2025-12-20	3746800.00	12/20/2025, 9:21:00 PM	View items (7)	Cancel
24	Partner Company	ST03 - Campus Store B	CONFIRMED	2025-12-19	2245000.00	12/19/2025, 8:27:00 PM	View items (4)	Cancel
62	Student Union	ST09 - Nha Trang Store	CONFIRMED	2025-12-18	3371000.00	12/19/2025, 2:09:00 AM	View items (3)	Cancel
44	Vingroup Office	ST01 - VinUni Store	CONFIRMED	2025-12-18	1848300.00	12/18/2025, 11:27:00 PM	View items (6)	Cancel
43	Partner Company	ST07 - Hai Phong Center	CONFIRMED	2025-12-18	7359000.00	12/18/2025, 11:18:00 PM	View items (6)	Cancel
9	Internal Customer	ST08 - Can Tho Center	CONFIRMED	2025-12-18	12655100.00	12/18/2025, 6:12:00 PM	View items (7)	Cancel
7	Internal Customer	ST05 - HCMC East	CONFIRMED	2025-12-17	1097000.00	12/17/2025, 5:54:00 PM	View items (7)	Cancel
51	VinUni Faculty	ST07 - Hai Phong Center	CONFIRMED	2025-12-16	381700.00	12/17/2025, 12:30:00 AM	View items (4)	Cancel
50	Event Organizer	ST08 - Can Tho Center	CONFIRMED	2025-12-16	2861000.00	12/17/2025, 12:21:00 AM	View items (3)	Cancel
35	Partner Company	ST02 - Campus Store A	CONFIRMED	2025-12-16	9713000.00	12/16/2025, 10:06:00 PM	View items (4)	Cancel
22	Retail Walk-in	ST04 - Downtown HCMC	CANCELLED	2025-12-16	3752650.00	12/16/2025, 8:09:00 PM	View items (7)	Cancelled
33	Vingroup Office	ST11 - Quy Nhon Store	CONFIRMED	2025-12-15	1357850.00	12/15/2025, 9:48:00 PM	View items (4)	Cancel
70	Campus Cafe	ST06 - Da Nang Center	CONFIRMED	2025-12-13	7871650.00	12/14/2025, 3:21:00 AM	View items (6)	Cancel
48	Retail Walk-in	ST05 - HCMC East	CANCELLED	2025-12-13	1319000.00	12/14/2025, 12:03:00 AM	View items (4)	Cancelled
45	Student Union	ST07 - Hai Phong Center	CONFIRMED	2025-12-13	4327000.00	12/13/2025, 11:36:00 PM	View items (5)	Cancel

Page 1 of 4 · 71 orders

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Figure 3.50: Pagination Feature

This screenshot shows a table of sales orders with a dropdown menu for 'All statuses' containing 'All statuses', 'CONFIRMED', and 'CANCELLED'. The table structure is identical to Figure 3.50, showing various sales details and actions.

Sales Orders								
Filter by customer...		Filter by location...		All statuses				
SO #	Customer	Location	Status	Order date	Total	Created at	Items	Actions
71	Tran Quang Khai	ST05 - HCMC East	CANCELLED	2025-12-19	947000.00	12/19/2025, 2:37:04 PM	View items (2)	Cancelled
68	Vingroup Office	ST07 - Hai Phong Center	CANCELLED	2025-12-20	2340200.00	12/21/2025, 3:03:00 AM	View items (7)	Cancelled
53	Retail Walk-in	ST03 - Campus Store B	CONFIRMED	2025-12-20	8376000.00	12/21/2025, 12:48:00 AM	View items (5)	Cancel
52	Student Union	ST11 - Quy Nhon Store	CONFIRMED	2025-12-20	4010000.00	12/21/2025, 12:39:00 AM	View items (3)	Cancel
34	CECS Lab	ST05 - HCMC East	CONFIRMED	2025-12-20	1571000.00	12/20/2025, 9:57:00 PM	View items (4)	Cancel
30	CECS Lab	ST07 - Hai Phong Center	CONFIRMED	2025-12-20	3746800.00	12/20/2025, 9:21:00 PM	View items (7)	Cancel
24	Partner Company	ST03 - Campus Store B	CONFIRMED	2025-12-19	2245000.00	12/19/2025, 8:27:00 PM	View items (4)	Cancel
62	Student Union	ST09 - Nha Trang Store	CONFIRMED	2025-12-18	3371000.00	12/19/2025, 2:09:00 AM	View items (3)	Cancel
44	Vingroup Office	ST01 - VinUni Store	CONFIRMED	2025-12-18	1848300.00	12/18/2025, 11:27:00 PM	View items (6)	Cancel
43	Partner Company	ST07 - Hai Phong Center	CONFIRMED	2025-12-18	7359000.00	12/18/2025, 11:18:00 PM	View items (6)	Cancel
9	Internal Customer	ST08 - Can Tho Center	CONFIRMED	2025-12-18	12655100.00	12/18/2025, 6:12:00 PM	View items (7)	Cancel
7	Internal Customer	ST05 - HCMC East	CONFIRMED	2025-12-17	1097000.00	12/17/2025, 5:54:00 PM	View items (7)	Cancel
51	VinUni Faculty	ST07 - Hai Phong Center	CONFIRMED	2025-12-16	381700.00	12/17/2025, 12:30:00 AM	View items (4)	Cancel
50	Event Organizer	ST08 - Can Tho Center	CONFIRMED	2025-12-16	2861000.00	12/17/2025, 12:21:00 AM	View items (3)	Cancel
35	Partner Company	ST02 - Campus Store A	CONFIRMED	2025-12-16	9713000.00	12/16/2025, 10:06:00 PM	View items (4)	Cancel
22	Retail Walk-in	ST04 - Downtown HCMC	CANCELLED	2025-12-16	3752650.00	12/16/2025, 8:09:00 PM	View items (7)	Cancelled
33	Vingroup Office	ST11 - Quy Nhon Store	CONFIRMED	2025-12-15	1357850.00	12/15/2025, 9:48:00 PM	View items (4)	Cancel
70	Campus Cafe	ST06 - Da Nang Center	CONFIRMED	2025-12-13	7871650.00	12/14/2025, 3:21:00 AM	View items (6)	Cancel
48	Retail Walk-in	ST05 - HCMC East	CANCELLED	2025-12-13	1319000.00	12/14/2025, 12:03:00 AM	View items (4)	Cancelled
45	Student Union	ST07 - Hai Phong Center	CONFIRMED	2025-12-13	4327000.00	12/13/2025, 11:36:00 PM	View items (5)	Cancel

Figure 3.51: Filtering Status Feature

The screenshot shows the SIPMS Sales Orders page. On the left is a dark sidebar with navigation links: Dashboard, Products, Suppliers, Locations, Categories, Purchase Orders, Sales Orders (which is selected), Transfers, Reports, and Users. At the top right are 'System Admin (ADMIN)' and 'Logout' buttons. Below the sidebar is a search bar with 'Filter by customer...' dropdown, a search input field containing 'vin', and a 'All statuses' dropdown. To the right of the search bar is a blue 'New Sales Order' button. The main area displays a table of sales orders with the following data:

SO #	Customer	Location	Status	Order date	Total	Created at	Items	Actions
44	Vingroup Office	ST01 - VinUni Store	CONFIRMED	2025-12-18	1848300.00	12/18/2025, 11:27:00 PM	View items (6)	Cancel
38	Event Organizer	ST01 - VinUni Store	CONFIRMED	2025-12-13	4126950.00	12/13/2025, 10:33:00 PM	View items (5)	Cancel
2	Internal Customer	ST01 - VinUni Store	CANCELLED	2025-12-12	1808000.00	12/12/2025, 5:09:00 PM	View items (3)	Cancelled
3	Event Organizer	ST01 - VinUni Store	CONFIRMED	2025-12-05	3412000.00	12/5/2025, 5:18:00 PM	View items (6)	Cancel
14	Partner Company	ST01 - VinUni Store	CONFIRMED	2025-11-30	8281400.00	11/30/2025, 6:57:00 PM	View items (7)	Cancel
42	Student Union	ST01 - VinUni Store	CONFIRMED	2025-11-28	26188700.00	11/28/2025, 11:09:00 PM	View items (7)	Cancel
67	CECS Lab	ST01 - VinUni Store	CONFIRMED	2025-11-24	529450.00	11/25/2025, 2:54:00 AM	View items (3)	Cancel

Page 1 of 1 · 7 orders

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ZealOptimistic

Figure 3.52: Searching Feature

9 Transfers Page

The Transfers module supports internal movement of stock across locations:

- A transfer form includes: Product selection, Quantity input, From Location, and To Location.
- A “Transfer stock” action executes the transfer.
- A recent transfers table provides operational traceability, including: Transfer #, Product, From, To, Quantity, From qty after, and To qty after.
- Pagination with page size selector for transfer history.

The screenshot shows the SIPMS Transfers page. On the left is a dark sidebar with navigation links: Dashboard, Products, Suppliers, Locations, Categories, Purchase Orders, Sales Orders, Transfers (which is selected and highlighted in blue), Reports, and Users. At the top right, there are 'System Admin (ADMIN)' and 'Logout' buttons. The main content area has a title 'Transfers' and a sub-section 'New stock transfer between locations'. It includes fields for 'Product' (a dropdown menu with 'Select product...'), 'From location' (dropdown with 'Select source location...'), 'To location' (dropdown with 'Select destination location...'), 'Quantity' (input field), and a 'Transfer stock' button. Below this is a table titled 'Recent transfers' with columns: Transfer #, Product, From, To, Quantity, From qty after, and To qty after. The table lists 14 recent transfers. At the bottom, there are pagination controls for '10/page', 'Previous', and 'Next', and a 'ZealOptimistic' footer link.

Figure 3.53: Transfers Page Screenshot

This screenshot is similar to Figure 3.53 but focuses on the 'Select product...' dropdown in the 'New stock transfer between locations' section. The dropdown is open, displaying a list of products: Boxy Packing Tape 48mm (Roll) (PK-004), Boxy Shipping Label (Pack of 100) - Premium (PK-013), Boxy Stretch Film (Roll) (PK-008), Boxy Stretch Film (Roll) - Standard (PK-001), BrightLite Adjustable Wrench - Eco (MT-010), BrightLite Cable Ties (Pack of 100) (MT-004), BrightLite Cable Ties (Pack of 100) - Eco (MT-014), BrightLite Extension Cord 2m (MT-013), CleanMax Microfiber Cloth (Pack of 5) - Premium (CL-009), FixIt AA Battery (Pack of 4) (MT-011), FixIt Adjustable Wrench - Eco (MT-003), FixIt Duct Tape (Roll) - Eco (MT-008), FreshPro Floor Cleaner 1L - Standard (CL-010), Hikari Bluetooth Headset (EL-003), Hikari Power Adapter 65W - Premium (EL-007), Hikari USB-C Cable 1m - Eco (EL-017), Hikari USB-C Cable 5m (EL-006), Lotus Bottled Water 500ml (FB-014), and Lotus Chocolate Bar (FB-013). The rest of the page layout is identical to Figure 3.53, including the 'Recent transfers' table and pagination controls.

Figure 3.54: Filtering Product Feature

The screenshot shows the SIPMS Transfers page. On the left is a dark sidebar with navigation links: Dashboard, Products, Suppliers, Locations, Categories, Purchase Orders, Sales Orders, Transfers (which is selected), Reports, and Users. At the top right are 'System Admin (ADMIN)' and 'Logout' buttons. The main content area has a title 'Transfers' and a sub-section 'New stock transfer between locations'. It includes fields for 'Product' (dropdown menu), 'From location' (dropdown menu with a list of locations), 'Quantity' (input field), and 'To location' (dropdown menu). Below these is a table of transfers with columns: To, Quantity, From qty after, and To qty after. At the bottom are pagination controls ('10/page', 'Previous', 'Next') and a ZealOptimistic watermark.

Figure 3.55: Filtering From Location Feature

This screenshot shows the same SIPMS Transfers page as Figure 3.55, but with a different focus. The 'From location' dropdown is now highlighted, and its dropdown menu is open, showing the same list of locations as before. The 'To location' dropdown is also visible. The main content area displays a table of recent transfers, which includes columns for Transfer #, Product, and From. The 'Transfer stock' button from Figure 3.55 is also present here. The rest of the interface, including the sidebar, top buttons, and footer, is identical to Figure 3.55.

Figure 3.56: Filtering To Location Feature

The screenshot shows the SIPMS Transfers page. On the left is a dark sidebar with navigation links: Dashboard, Products, Suppliers, Locations, Categories, Purchase Orders, Sales Orders, Transfers (which is selected and highlighted in blue), Reports, and Users. The main content area has a light gray background. At the top, it says "Transfers". Below that is a section titled "New stock transfer between locations" with fields for "Product" (ProShield Safety Helmet - Standard (SF-006)), "Quantity" (160), "From location" (WH01 - Central Warehouse), and "To location" (ST11 - Quy Nhon Store). A green message at the bottom of this section states: "Transferred 160 units of 'ProShield Safety Helmet - Standard' from 'WH01 - Central Warehouse' to 'ST11 - Quy Nhon Store'." Below this is a "Transfer stock" button. Underneath is a table titled "Recent transfers" with columns: Transfer #, Product, From, To, Quantity, From qty after, and To qty after. The table lists several recent transfers. At the bottom of the page are pagination controls: "Page 1 of 32 - 316 transfers", "10/page", "Previous", and "Next". In the bottom right corner, there is a small watermark-like text: "ZealOptimistic".

Figure 3.57: Notification Successful Stock Transfer

This screenshot is identical to Figure 3.57, showing the SIPMS Transfers page. The sidebar and overall layout are the same. The "New stock transfer between locations" section is filled out with the same values: Product (ProShield Safety Helmet - Standard (SF-006)), Quantity (10), From location (WH01 - Central Warehouse), and To location (ST11 - Quy Nhon Store). However, a red error message at the bottom of this section says: "Not enough stock in source location." Below this message is a "Transfer stock" button. The "Recent transfers" table is identical to the one in Figure 3.57. The bottom of the page includes the same pagination controls and the "ZealOptimistic" watermark.

Figure 3.58: Notification Failed Stock Transfer due to Insufficient Stock

Transfer #	Product	From	To	Quantity	From qty after	To qty after
2408	ProShield Safety Helmet - Standard	WH01 - Central Warehouse	ST11 - Quy Nhon Store	12	0	267
2406	StudyPro Scissors	WH01 - Central Warehouse	ST11 - Quy Nhon Store	25	117	267
2454	OfficePro Sticky Notes 3x3 (Pack) - Premium	WH01 - Central Warehouse	ST05 - HCMC East	34	81	76
2404	VinaPaper Sticky Notes 3x3 (Pack) - Eco	WH01 - Central Warehouse	ST11 - Quy Nhon Store	6	108	267
2452	SunPro Mechanical Keyboard - Eco	WH01 - Central Warehouse	ST05 - HCMC East	19	100	76
2450	OfficePro Stapler Heavy Duty	WH01 - Central Warehouse	ST05 - HCMC East	12	237	76
2448	VinaPack Bubble Wrap 2m - Eco	WH01 - Central Warehouse	ST05 - HCMC East	18	428	76
2446	PowerMax Adjustable Wrench - Premium	WH01 - Central Warehouse	ST05 - HCMC East	7	111	76
2502	OfficePro Sticky Notes 3x3 (Pack) - Premium	WH03 - Da Nang Warehouse	ST02 - Campus Store A	17	256	27
2500	PowerMax LED Bulb 100W - Standard	WH03 - Da Nang Warehouse	ST02 - Campus Store A	9	181	27
2498	SafeGuard Safety Helmet - Eco	WH03 - Da Nang Warehouse	ST02 - Campus Store A	15	187	27
2760	PowerMax Adjustable Wrench - Premium	WH04 - Mekong Warehouse	ST03 - Campus Store B	13	102	70
2758	SafeGuard Safety Vest Reflective	WH04 - Mekong Warehouse	ST03 - Campus Store B	18	301	70
2320	VinaPack Packing Tape 48mm (Roll) - Eco	WH05 - North Hub	ST04 - Downtown HCMC	20	103	46
2318	FixIt Duct Tape (Roll) - Eco	WH05 - North Hub	ST04 - Downtown HCMC	18	151	46
2316	Sunrise Chocolate Bar - Eco	WH05 - North Hub	ST04 - Downtown HCMC	15	189	46
2314	LotusCare Microfiber Cloth (Pack of 5)	WH05 - North Hub	ST04 - Downtown HCMC	12	144	46
2312	Sunrise Green Tea Bottle 450ml - Eco	WH05 - North Hub	ST04 - Downtown HCMC	12	197	46
2802	WriteOn Eraser for Whiteboard - Standard	WH04 - Mekong Warehouse	ST07 - Hai Phong Center	31	70	72
2800	Boxy Shipping Label (Pack of 100) - Premium	WH04 - Mekong Warehouse	ST07 - Hai Phong Center	30	201	72

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Figure 3.59: Pagination Feature

10 Reports Page

The Reports module provides three main reporting modes using tab navigation:

- **Low stock:** lists product-location pairs where quantity on hand is below reorder level.
- **Stock per location:** shows inventory distribution across locations.
- **Top selling (30 days):** ranks products by quantity sold and/or revenue (based on confirmed sales orders in the last 30 days).

Common controls include:

- Search by product name or SKU.
- Location filter (e.g., “All locations”).
- Paginated tables with page size selector.

Figure 3.60: Low Stock Tab

Figure 3.61: Pagination Feature

The screenshot shows the SIPMS software interface. On the left is a dark sidebar with navigation links: Dashboard, Products, Suppliers, Locations, Categories, Purchase Orders, Sales Orders, Transfers, Reports (which is selected), and Users. The main area has a light background and displays a 'Reports' section. At the top of this section are three buttons: 'Low stock', 'Stock per location', and 'Top selling (30 days)'. Below these buttons is a search bar labeled 'Search by product name or SKU' and a dropdown menu labeled 'All locations' which is currently set to 'All locations'. A table follows, showing 'Low stock products' with columns for SKU, Location, On hand, Reorder level, and Stock value. The table includes rows for various products like 'Boxy Shipping Label (Pack of 100)' and 'Boxy Stretch Film (Roll)'. At the bottom of the table are buttons for '10/page', 'Previous', and 'Next'. In the bottom right corner of the main area, there is a small watermark-like text 'ZeakOptimistic'.

Figure 3.62: Filtering Locations Feature

This screenshot is similar to Figure 3.62 but demonstrates the search feature. The sidebar and report structure are identical. The search bar now contains the text 'boxy'. The dropdown menu 'All locations' is still visible. The table below shows the same 'Low stock products' as Figure 3.62, but the results are more numerous and include items like 'Boxy Packing Tape 48mm (Roll)' and 'Boxy Stretch Film (Roll) - Standard'. The table includes a column for 'Stock value' showing monetary amounts like '1.298.000 ₫'. At the bottom, the page number 'Page 1 of 1 - 18 products' is shown along with the '10/page' button, 'Previous' button, and 'Next' button. The 'ZeakOptimistic' watermark is also present.

Figure 3.63: Searching Feature

The screenshot shows the SIPMS application interface. On the left is a dark sidebar with navigation links: Dashboard, Products, Suppliers, Locations, Categories, Purchase Orders, Sales Orders, Transfers, Reports (which is selected and highlighted in grey), and Users. The main content area has a light background and displays the 'Reports' section. At the top of this section are three buttons: 'Low stock', 'Stock per location' (which is currently selected and highlighted in blue), and 'Top selling (30 days)'. Below these buttons is a search bar with the placeholder 'Search by product name or SKU' and a dropdown menu set to 'All locations'. The main content area is titled 'Top selling products (last 30 days)' and contains a table with the following data:

Product	SKU	Total quantity sold	Total revenue
Orion External Monitor 32"	EL-014	20	60,720,800 ₫
SunPro Mechanical Keyboard - Eco	EL-009	19	34,143,000 ₫
Nova External Monitor 24" - Standard	EL-010	6	28,926,000 ₫
SafeGuard Fire Extinguisher 2kg - Premium	SF-002	21	17,220,000 ₫
Hikari Bluetooth Headset	EL-003	11	14,821,100 ₫
VietTech USB Hub 4-Port - Standard	EL-005	22	12,826,000 ₫
Orion Power Adapter 20W - Standard	EL-016	14	7,098,000 ₫
Lotus Printer Ink Cartridge - Standard	OF-010	21	6,344,000 ₫
VietTech Power Adapter 65W - Premium	EL-004	10	5,860,400 ₫
SecureMax First Aid Kit - Eco	SF-003	9	5,454,000 ₫

At the bottom of the table area, it says 'Page 1 of 11 · 107 products'. To the right of the table are buttons for '10/page' (with a dropdown arrow), 'Previous', and 'Next'. In the bottom right corner of the main content area, there is a small watermark-like text 'ZealOptimistic'.

Figure 3.64: Top Selling Tab

The screenshot shows the SIPMS application interface, similar to Figure 3.64 but with a different tab selected. The sidebar on the left is identical. The main content area displays the 'Reports' section with the 'Stock per location' tab selected (highlighted in blue). The interface includes the same top buttons ('Low stock', 'Stock per location', 'Top selling (30 days)'), search bar, and dropdown menu. The main content area is titled 'Stock per location' and contains a table with the following data:

Product	SKU	Location	On hand	Reorder level	Stock value
Boxy Packing Tape 48mm (Roll)	PK-004	ST01 - VinUni Store	43	30	1,419,000 ₫
Boxy Packing Tape 48mm (Roll)	PK-004	ST02 - Campus Store A	67	30	2,211,000 ₫
Boxy Packing Tape 48mm (Roll)	PK-004	ST03 - Campus Store B	70	30	2,310,000 ₫
Boxy Packing Tape 48mm (Roll)	PK-004	ST04 - Downtown HCMC	56	30	1,848,000 ₫
Boxy Packing Tape 48mm (Roll)	PK-004	ST05 - HCMC East	26	30	858,000 ₫
Boxy Packing Tape 48mm (Roll)	PK-004	ST06 - Da Nang Center	19	30	627,000 ₫
Boxy Packing Tape 48mm (Roll)	PK-004	ST07 - Hai Phong Center	78	30	2,574,000 ₫
Boxy Packing Tape 48mm (Roll)	PK-004	ST08 - Can Tho Center	13	30	429,000 ₫
Boxy Packing Tape 48mm (Roll)	PK-004	ST09 - Nha Trang Store	31	30	1,023,000 ₫
Boxy Packing Tape 48mm (Roll)	PK-004	ST10 - Hue Store	15	30	495,000 ₫

At the bottom of the table area, it says 'Page 1 of 192 · 1920 records'. To the right of the table are buttons for '10/page' (with a dropdown arrow), 'Previous', and 'Next'. In the bottom right corner of the main content area, there is a small watermark-like text 'ZealOptimistic'.

Figure 3.65: Stock per Location Tab

SIPMS

System Admin (ADMIN) Logout

Reports

Low stock Stock per location Top selling (30 days)

SKU	Location	On hand	Reorder level	Stock value
PK-004	ST01 - VinUni Store	43	30	1.419.000 ₫
PK-004	ST02 - Campus Store A	67	30	2.211.000 ₫
PK-004	ST03 - Campus Store B	70	30	2.310.000 ₫
PK-004	ST04 - Downtown HCMC	56	30	1.848.000 ₫
PK-004	ST05 - HCMC East	26	30	858.000 ₫
PK-004	ST06 - Da Nang Center	19	30	627.000 ₫
PK-004	ST07 - Hai Phong Center	78	30	2.574.000 ₫
PK-004	ST08 - Can Tho Center	13	30	429.000 ₫
PK-004	ST09 - Nha Trang Store	31	30	1.023.000 ₫
PK-004	ST10 - Hue Store	15	30	495.000 ₫

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Figure 3.66: Searching and Filtering Locations Feature

SIPMS

System Admin (ADMIN) Logout

Reports

Low stock Stock per location Top selling (30 days)

Product	SKU	Total quantity sold	Total revenue
Boxy Stretch Film (Roll)	PK-008	14	2.084.750 ₫
Boxy Stretch Film (Roll) - Standard	PK-001	9	982.350 ₫
Boxy Shipping Label (Pack of 100) - Premium	PK-013	10	670.000 ₫
Boxy Packing Tape 48mm (Roll)	PK-004	9	297.000 ₫

Page 1 of 1 - 4 products

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ZeakOptimistic

Figure 3.67: Searching Feature

11 Users Page

The Users module provides administrative management of application accounts:

- Search by username, name, or email; and sorting (e.g., “Newest”).
- Table fields include: Username, Full name, Email, Role, Status, and Actions.
- Actions include: Edit, **Login as**, Activate/Deactivate, and Delete.
- The “Login as” capability supports testing and support by allowing an admin to switch context to another user account.

The screenshot shows the SIPMS application interface. On the left is a dark sidebar menu with the following items: Dashboard, Products, Suppliers, Locations, Categories, Purchase Orders, Sales Orders, Transfers, Reports, and **Users**. The **Users** item is highlighted with a blue background. The main content area has a white background and is titled "Users". It features a search bar with a placeholder "Search username, name, email..." and a dropdown menu set to "Newest". A "Search" button is located to the right of the search bar. Below the search area is a table with the following columns: Username, Full name, Email, Role, Status, and Actions. The table contains 10 rows of user data. At the bottom of the table, there is a message "Page 1 of 4 - 35 users" and a navigation bar with buttons for "10/page", "Previous", and "Next". In the top right corner of the main content area, there are links for "System Admin (ADMIN)", "Logout", and a "New User" button. The status column includes "ACTIVE" and "INACTIVE" status indicators. The Actions column contains buttons for "Edit", "Login as", "Deactivate", and "Delete".

Username	Full name	Email	Role	Status	Actions
zeak	ZeakOptimistic	zeak@gmail	ADMIN	ACTIVE	Edit Login as Deactivate Delete
clerk034	Dang Van Binh	dang.van.binh44@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
clerk033	Pham Hong Nhi	pham.hong.nhi43@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
clerk032	Dang Anh Cuong	dang.anh.cuong42@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
clerk031	Le Anh Phuong	le.anh.phuong41@gmail.com	MANAGER	ACTIVE	Edit Login as Deactivate Delete
clerk030	Bui Bao Khoa	bui.bao.khoa40@gmail.com	CLERK	INACTIVE	Edit Login as Activate Delete
clerk029	Le Khanh Trang	le.khanh.trang39@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
clerk028	Vo Khanh Nhat	vo.khanh.nhat38@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
clerk027	Hoang Minh Quyen	hoang.minh.quyen37@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
clerk026	Ly Van Hieu	ly.van.hieu36@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete

Figure 3.68: Users Page Screenshot

SIPMS

System Admin (ADMIN) Logout

Users

Search username, name, email... Newest Search

Username	Full name	Email	Role	Status	Actions
zeak	ZeakOptimistic	zeak@gmail	ADMIN	ACTIVE	Edit Login as Deactivate Delete
clerk034	Dang Van Binh				Edit Login as Deactivate Delete
clerk033	Pham Hong Nhi				Edit Login as Deactivate Delete
clerk032	Dang Anh Cuong				Edit Login as Deactivate Delete
clerk031	Le Anh Phuong				Edit Login as Deactivate Delete
clerk030	Bui Bao Khoa				Edit Login as Activate Delete
clerk029	Le Khanh Trang				Edit Login as Deactivate Delete
clerk028	Vo Khanh Nhat				Edit Login as Deactivate Delete
clerk027	Hoang Minh Quyen				Edit Login as Deactivate Delete
clerk026	Ly Van Hieu				Edit Login as Deactivate Delete

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Figure 3.69: Edit Existing User Form

SIPMS

System Admin (ADMIN) Logout

Users

Search username, name, email... Newest

Username	Full name	Email	Role	Status	Actions
zeak	ZeakOptimistic	zeak@gmail	ADMIN	ACTIVE	Edit Login as Deactivate Delete
clerk034	Dang Van Binh	dang.van.binh44@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
clerk033	Pham Hong Nhi	pham.hong.nhi43@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
clerk032	Dang Anh Cuong	dang.anh.cuong42@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
clerk031	Le Anh Phuong	le.anh.phuong41@gmail.com	MANAGER	ACTIVE	Edit Login as Deactivate Delete
clerk030	Bui Bao Khoa	bui.bao.khoa40@gmail.com	CLERK	INACTIVE	Edit Login as Activate Delete
clerk029	Le Khanh Trang	le.khanh.trang39@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
clerk028	Vo Khanh Nhat	vo.khanh.nhat38@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
clerk027	Hoang Minh Quyen	hoang.minh.quyen37@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
clerk026	Ly Van Hieu	ly.van.hieu36@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete

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ZeakOptimistic

Figure 3.70: Notification Deactivate User

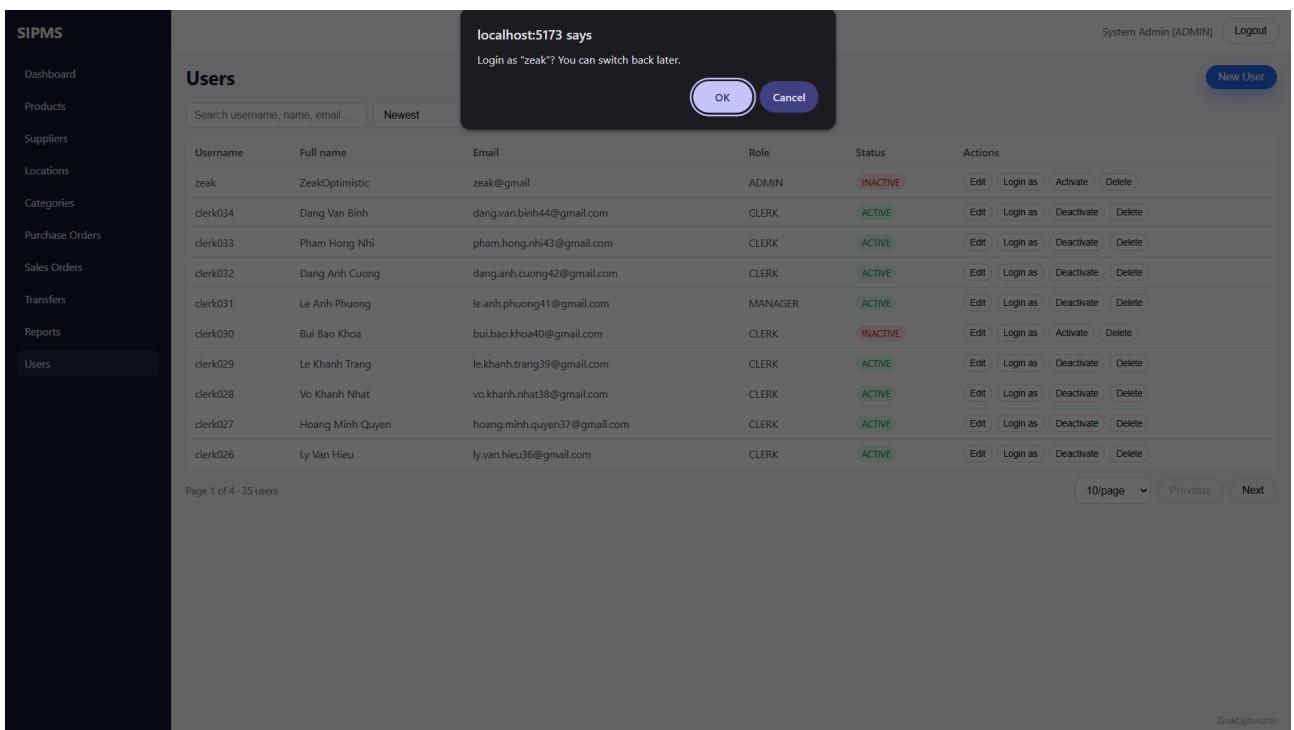


Figure 3.71: Login As Feature Without Password if Admin Role

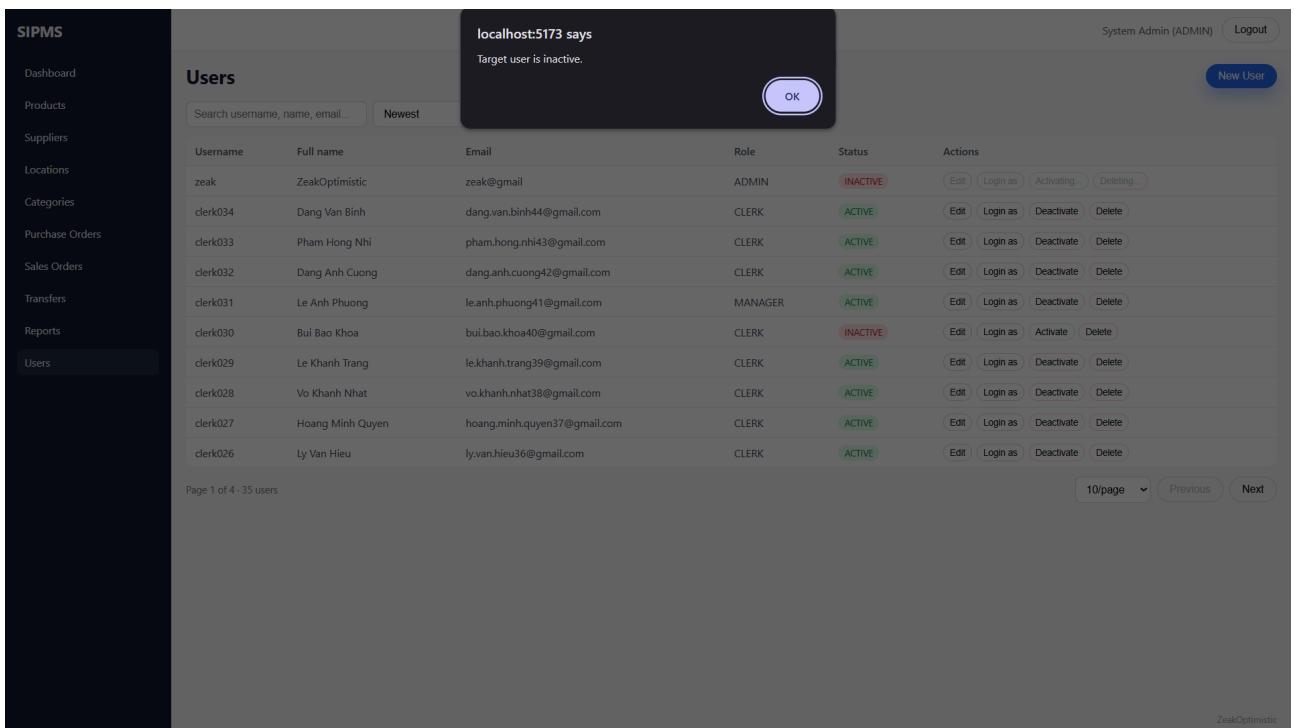


Figure 3.72: Notification Failed to Login As if User is Inactive

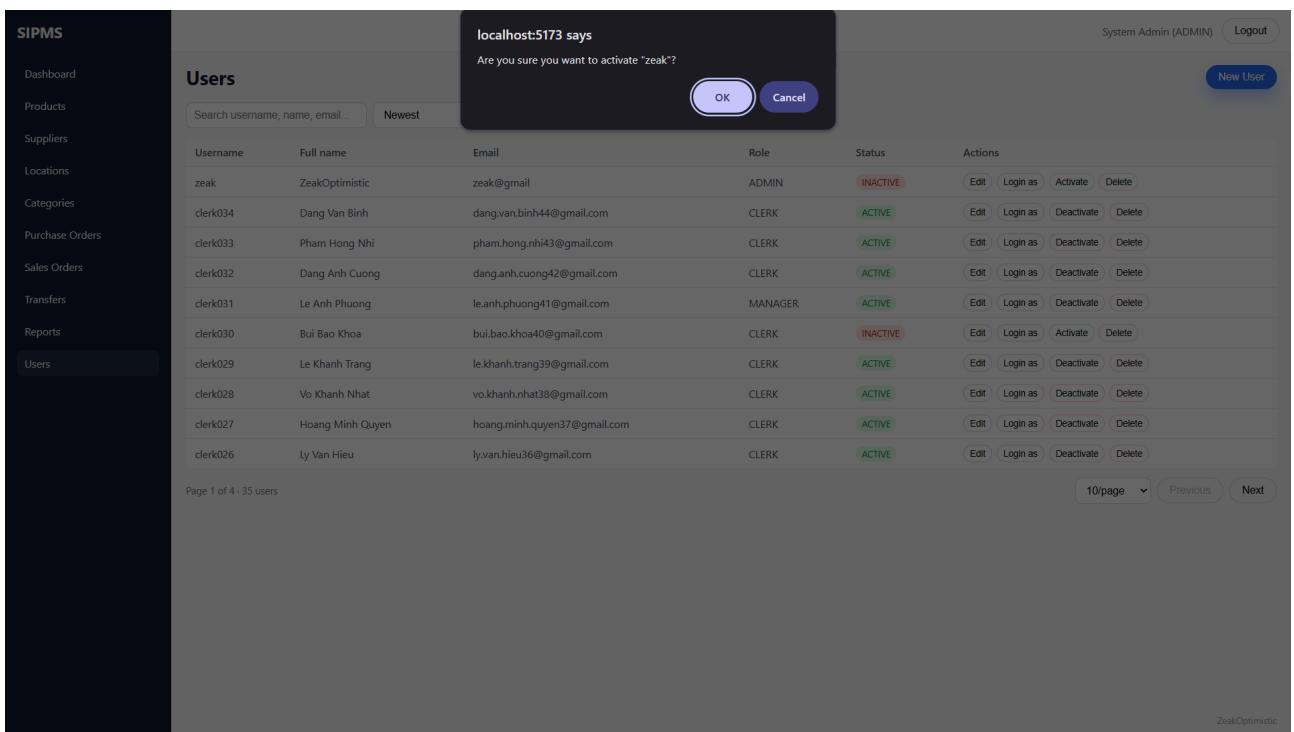
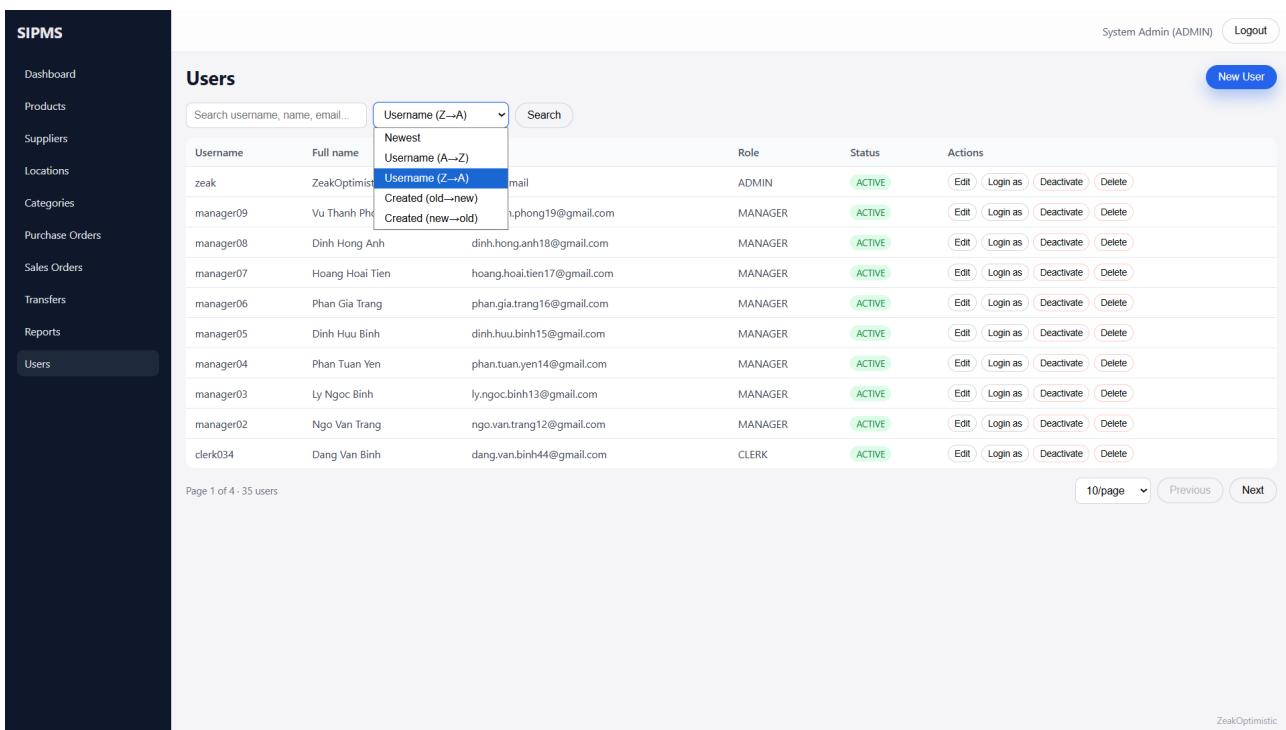


Figure 3.73: Notification Activate User

Suppliers	Username	Full name	Email	Role	Status	Actions
Locations	zeak	ZeakOptimistic	zeak@gmail	ADMIN	ACTIVE	Edit Login as Deactivate Delete
Categories	clerk034	Dang Van Binh	dang.van.binh44@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
Purchase Orders	clerk033	Pham Hong Nhi	pham.hong.nhi43@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
Sales Orders	clerk032	Dang Anh Cuong	dang.anh.cuong42@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
Transfers	clerk031	Le Anh Phuong	le.anh.phuong41@gmail.com	MANAGER	ACTIVE	Edit Login as Deactivate Delete
Reports	clerk030	Bui Bao Khoa	bui.bao.khoa40@gmail.com	CLERK	INACTIVE	Edit Login as Activate Delete
Users	clerk029	Le Khanh Trang	le.khanh.trang39@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
	clerk028	Vo Khanh Nhat	vo.khanh.nhat38@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
	clerk027	Hoang Minh Quyen	hoang.minh.quyen37@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
	clerk026	Ly Van Hieu	ly.van.hieu36@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
	clerk025	Bui Hong Nhi	bui.hong.nhi35@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
	clerk024	Dinh Thi Hieu	dinh.thi.hieu34@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
	clerk023	Ngo Phuong Phuong	ngo.phuong.phuong33@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
	clerk022	Duong Thi Quan	duong.thi.quan32@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
	clerk021	Vu Phuong Hoa	vu.phuong.hoa31@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
	clerk020	Ngo Huu Quan	ngo.huu.quan30@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
	clerk019	Do Khanh Trang	do.khanh.trang29@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
	clerk018	Dinh Quang Tien	dinh.quang.tien28@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
	clerk017	Nguyen Hoai Lan	nguyen.hoai.lan27@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete
	clerk016	Duong Khanh Yen	duong.khanh.yen26@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete

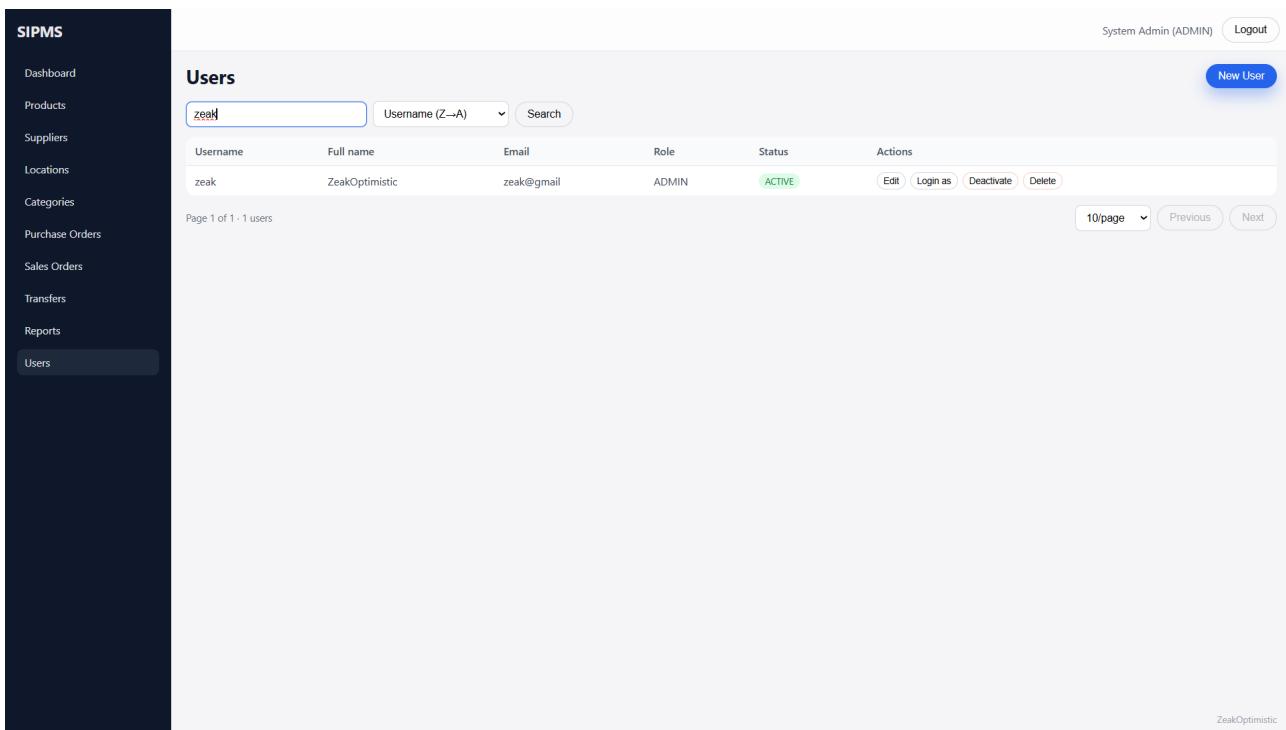
Figure 3.74: Pagination Feature



The screenshot shows the SIPMS application's User management interface. On the left is a dark sidebar with navigation links: Dashboard, Products, Suppliers, Locations, Categories, Purchase Orders, Sales Orders, Transfers, Reports, and Users (which is currently selected). The main content area has a light background and displays a table of users. At the top of the table is a search bar with placeholder text "Search username, name, email..." and a dropdown menu showing sorting options: "Username (Z→A)", "Newest", "Username (A→Z)", "Created (old→new)", and "Created (new→old)". A "Search" button is to the right of the dropdown. The table has columns for Username, Full name, Email, Role, Status, and Actions. The data includes 13 user entries, each with a status indicator (e.g., ACTIVE), edit, login-as, deactivate, and delete buttons. At the bottom of the table are pagination controls: "Page 1 of 4 · 35 users", "10/page", "Previous", and "Next". The footer of the page shows the text "ZeakOptimistic".

Username	Full name	Email	Role	Status	Actions
zeak	ZeakOptimistic	zeak@gmail	ADMIN	ACTIVE	Edit Login as Deactivate Delete
manager09	Vu Thanh Phu	vuthanhphu19@gmail.com	MANAGER	ACTIVE	Edit Login as Deactivate Delete
manager08	Dinh Hong Anh	dinh.hong.anh18@gmail.com	MANAGER	ACTIVE	Edit Login as Deactivate Delete
manager07	Hoang Hoai Tien	hoang.hoai.tien17@gmail.com	MANAGER	ACTIVE	Edit Login as Deactivate Delete
manager06	Phan Gia Trang	phan.gia.trang16@gmail.com	MANAGER	ACTIVE	Edit Login as Deactivate Delete
manager05	Dinh Huu Binh	dinh.huu.binh15@gmail.com	MANAGER	ACTIVE	Edit Login as Deactivate Delete
manager04	Phan Tuan Yen	phan.tuan.yen14@gmail.com	MANAGER	ACTIVE	Edit Login as Deactivate Delete
manager03	Ly Ngoc Binh	ly.ngoc.binh13@gmail.com	MANAGER	ACTIVE	Edit Login as Deactivate Delete
manager02	Ngo Van Trang	ngo.van.trang12@gmail.com	MANAGER	ACTIVE	Edit Login as Deactivate Delete
clerk034	Dang Van Binh	dang.van.binh44@gmail.com	CLERK	ACTIVE	Edit Login as Deactivate Delete

Figure 3.75: Sorting Feature



The screenshot shows the SIPMS application's User management interface. The sidebar and overall layout are identical to Figure 3.75. In the main content area, the search bar now contains the text "zeak". The dropdown menu above the table is still visible, showing the same sorting options. The table data is now filtered to show only one user entry: "zeak" (Full name: ZeakOptimistic, Email: zeak@gmail, Role: ADMIN, Status: ACTIVE). The bottom pagination and footer text ("ZeakOptimistic") are also present.

Username	Full name	Email	Role	Status	Actions
zeak	ZeakOptimistic	zeak@gmail	ADMIN	ACTIVE	Edit Login as Deactivate Delete

Figure 3.76: Searching Feature

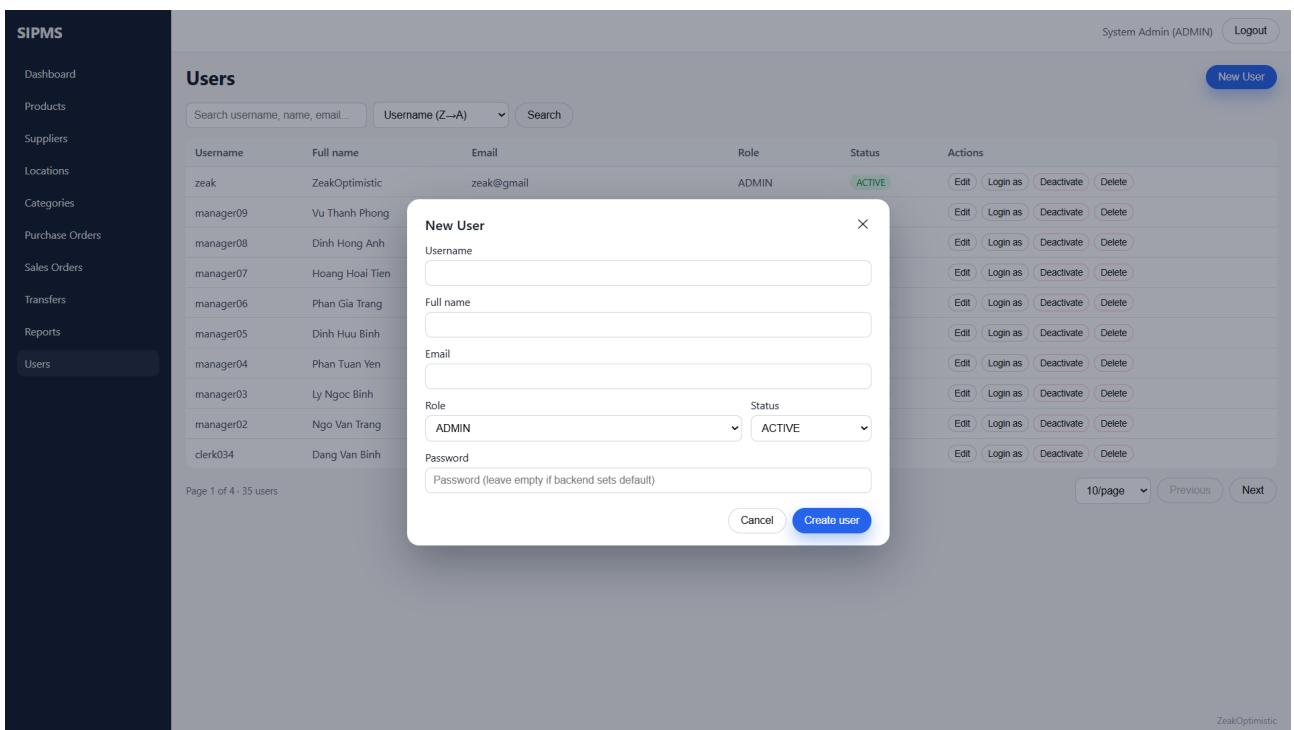


Figure 3.77: Create New User Form

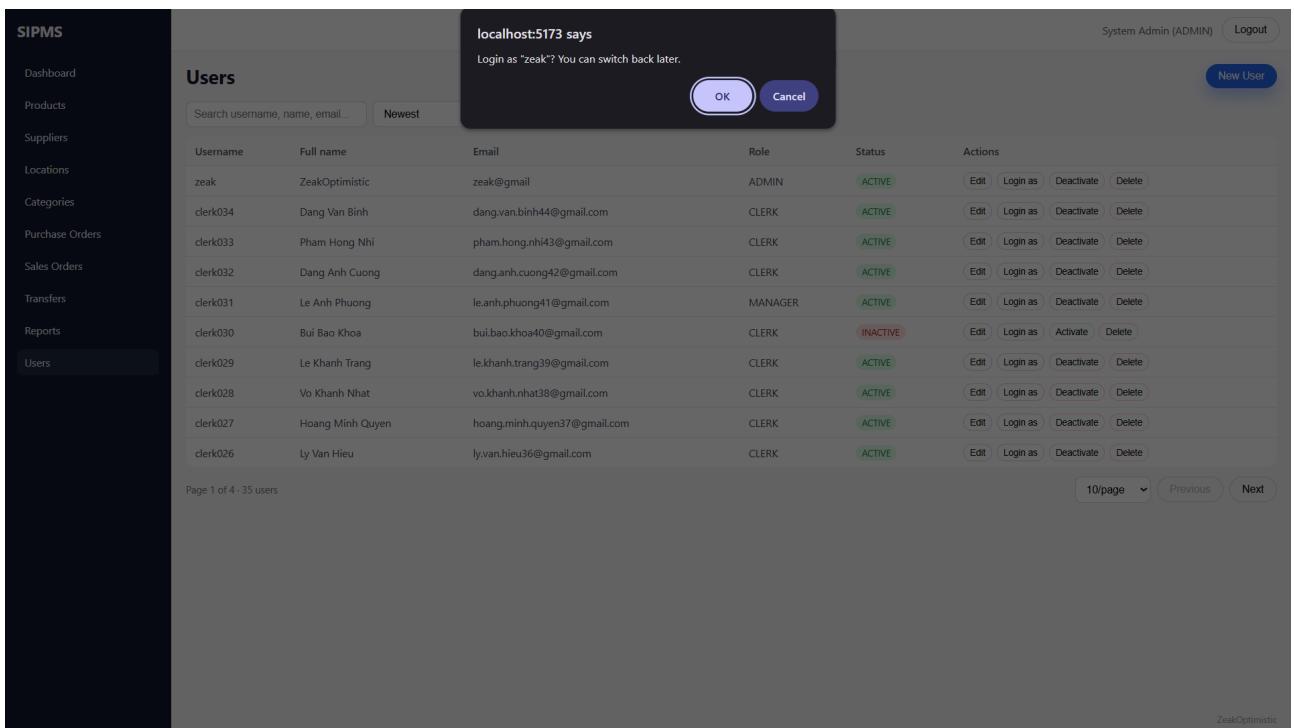


Figure 3.78: Login As Feature with Active User

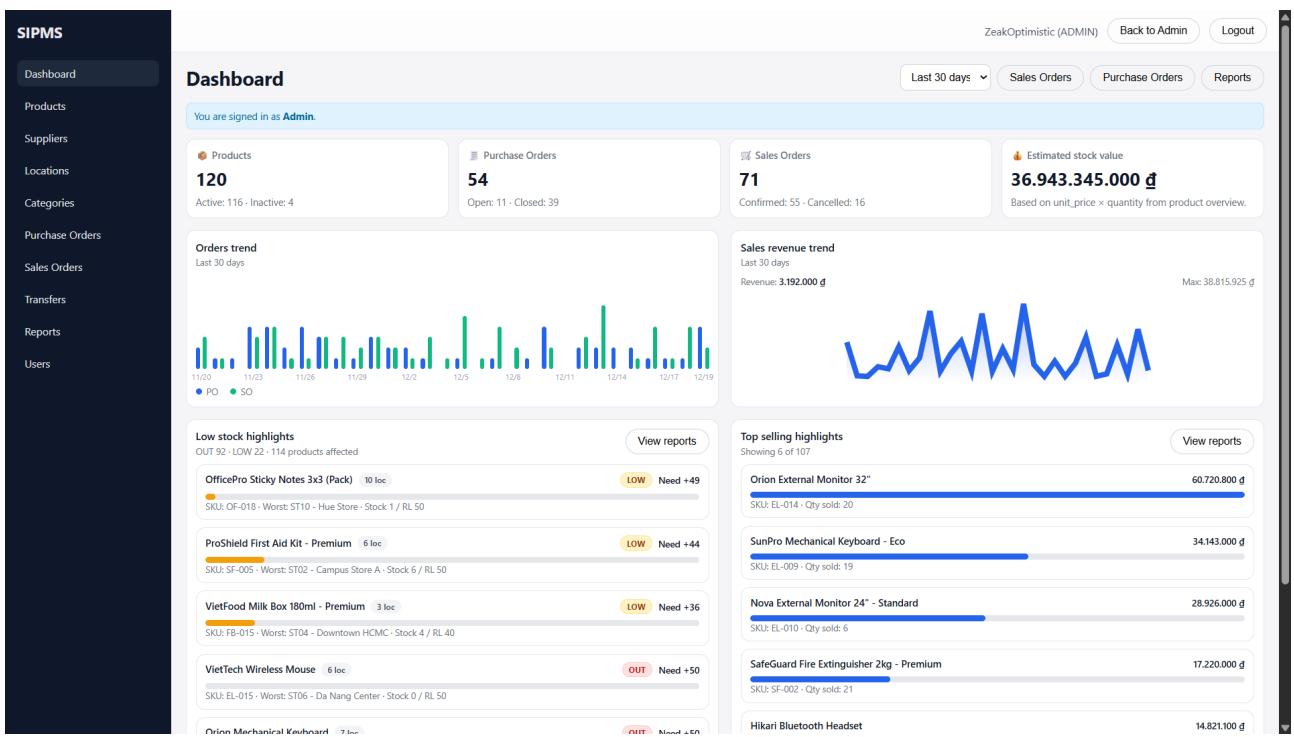


Figure 3.79: Screenshot After Using Login As Feature with Admin Role and Full Access

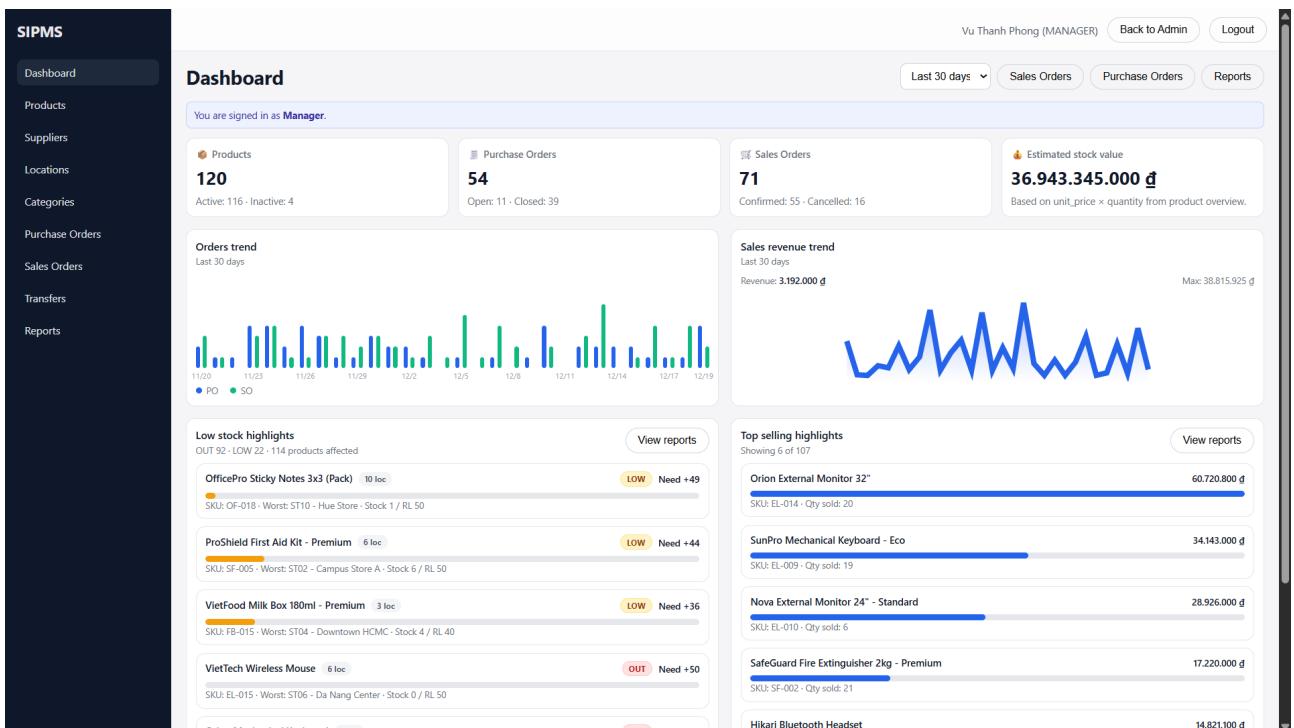


Figure 3.80: Screenshot After Using Login As Feature with Manager Role and Limited Access

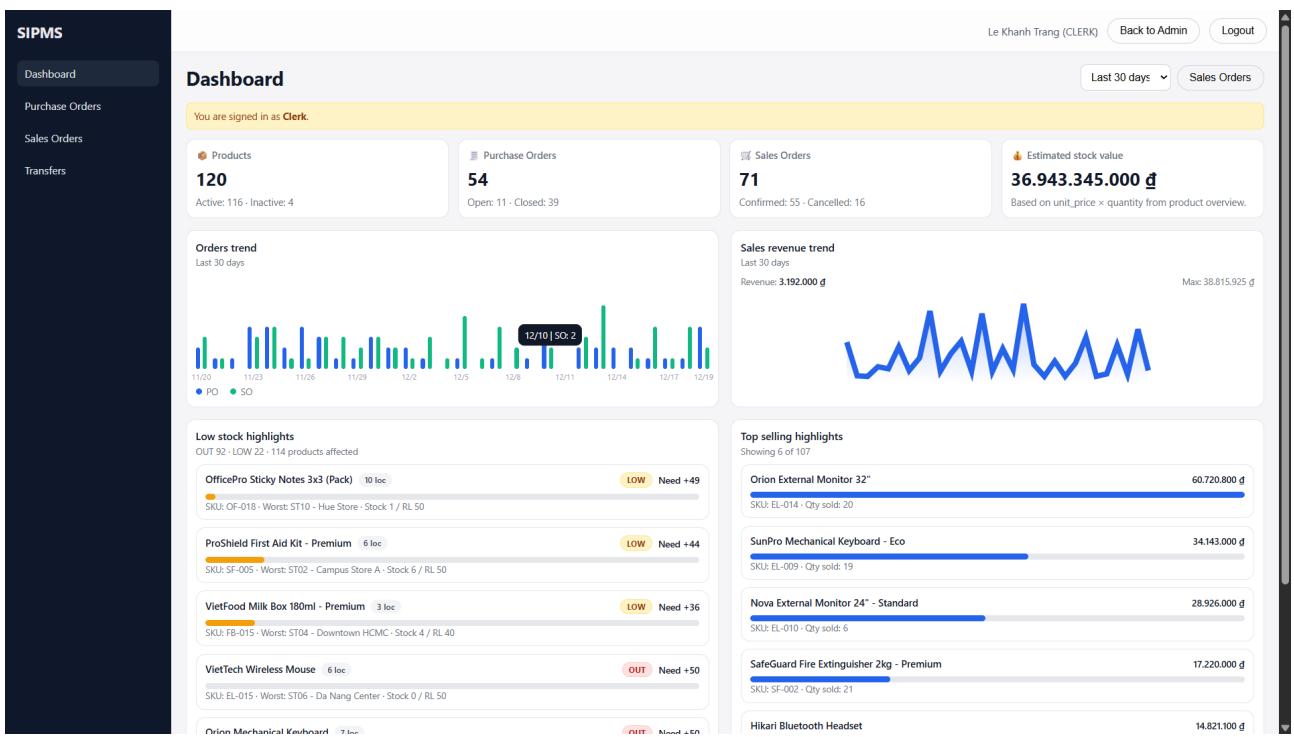


Figure 3.81: Screenshot After Using Login As Feature with Clerk Role and Very Limited Access

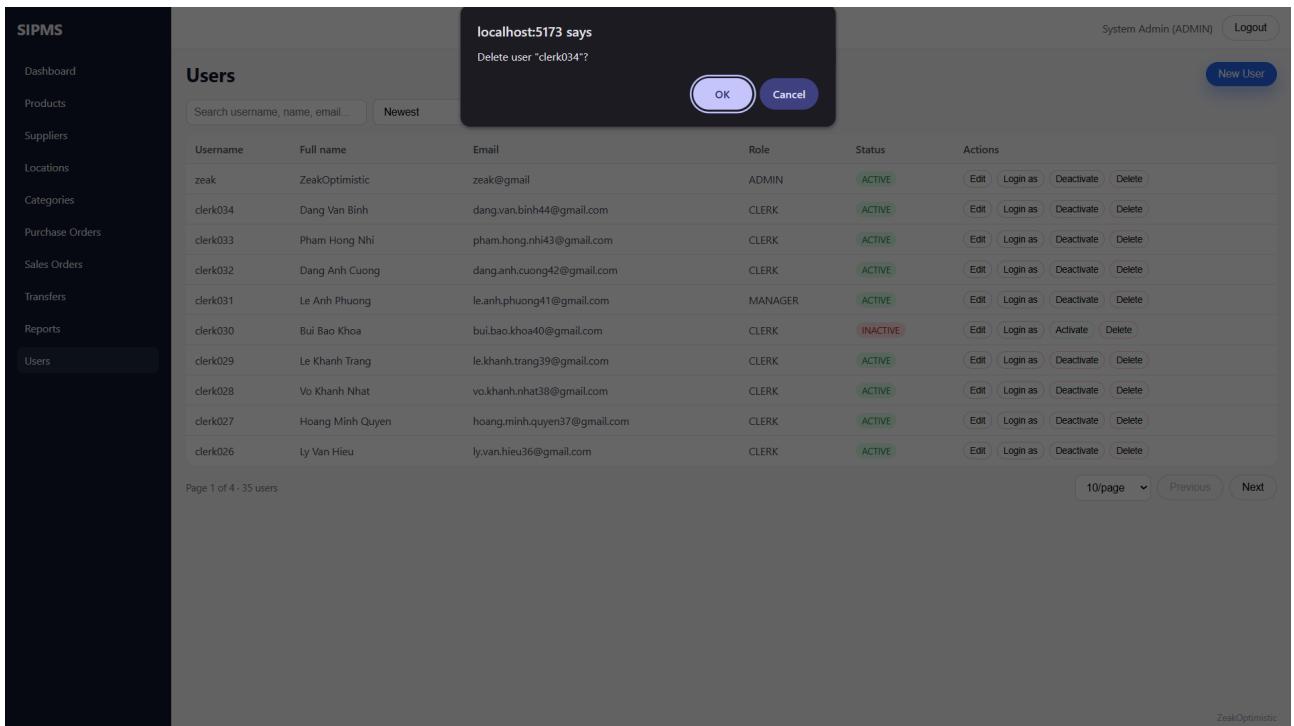


Figure 3.82: Notification Delete User

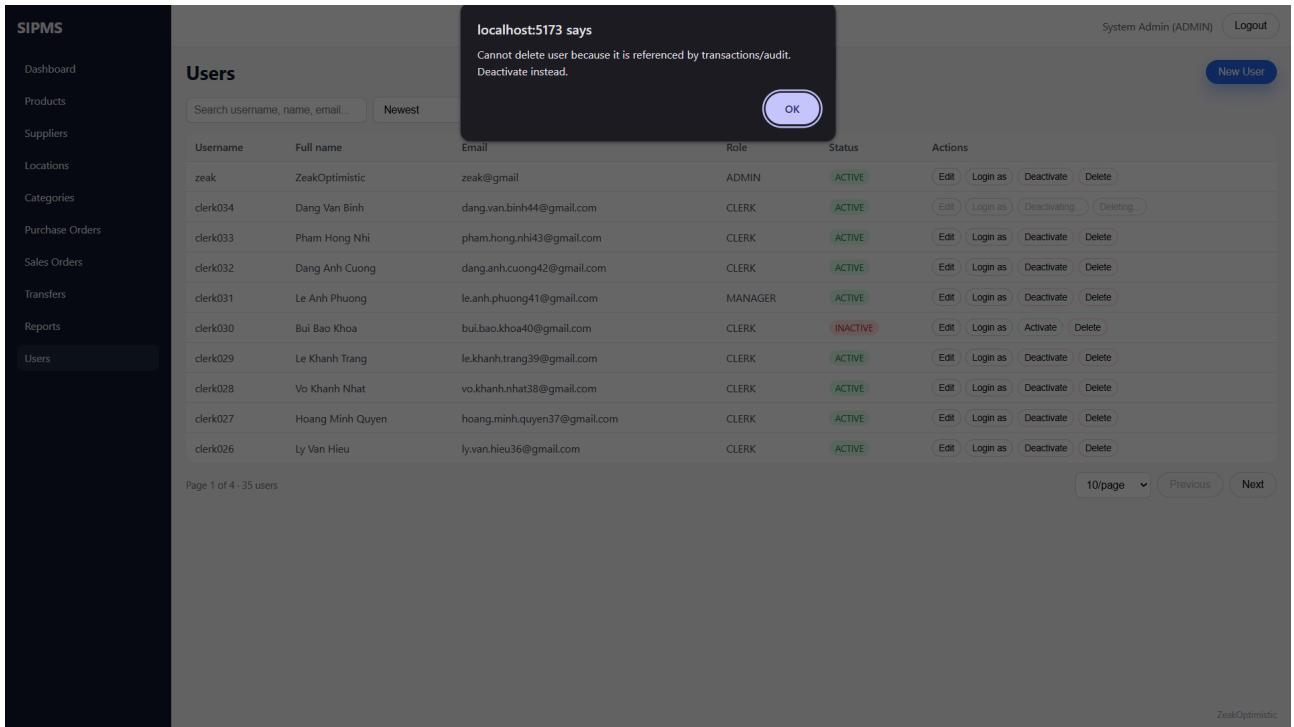


Figure 3.83: Notification Failed to Delete User if User is referring to Existing Records

12 Authentication

SIPMS enforces authentication before a user can access any business module (Dashboard, Products, Purchase Orders, Sales Orders, Reports, and User Management). This design prevents unauthorized access to inventory and purchasing data, and it ensures that every action is associated with a specific user account and role.

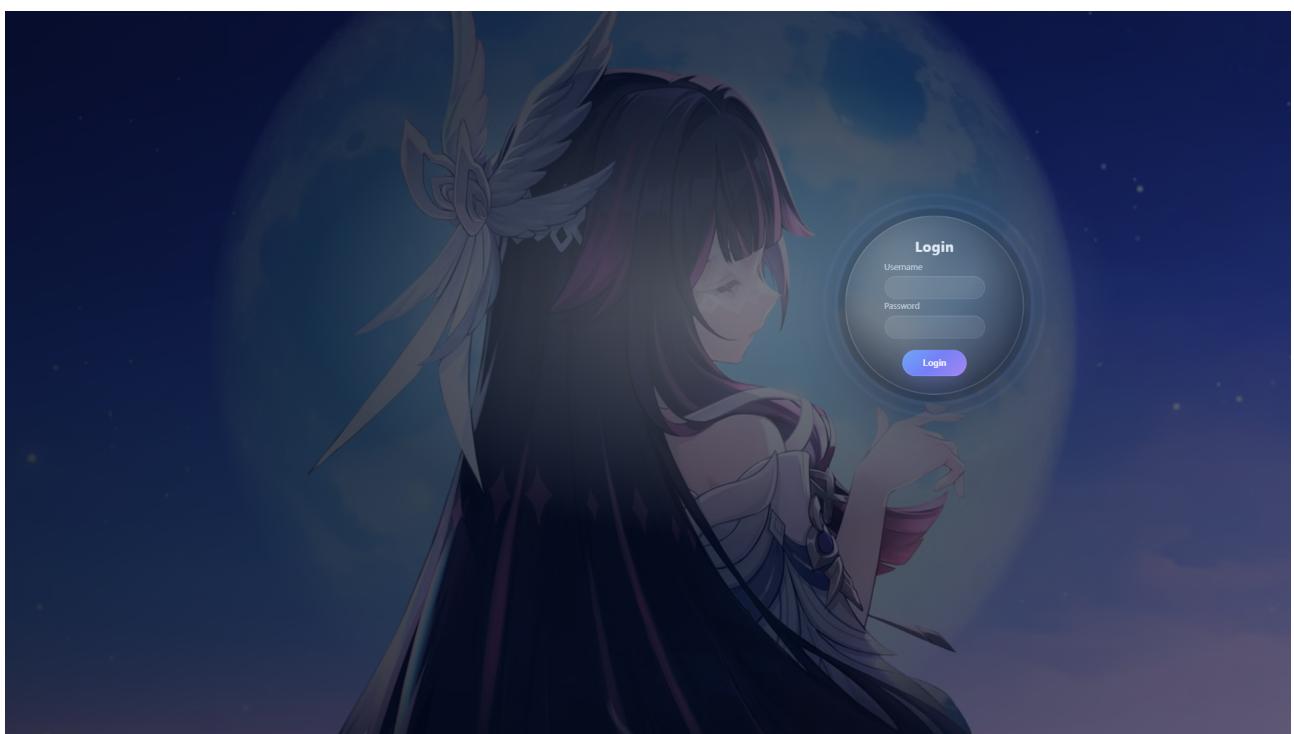


Figure 3.84: Login Page Screenshot

Chapter 4

Database Implementation

This chapter documents the database layer of SIPMS, including the implemented schema, constraints, views, stored procedures, triggers, indexes, and security configuration. All database artifacts are provided as SQL scripts in the project repository. In this report, we focus on what was implemented and why, and we include the key SQL scripts as listings for completeness.

1 Implementation Artifacts and Execution Order

1.1 SQL scripts

The database implementation is organized into the following scripts:

- `schema.sql`: core schema (database creation, tables, keys, constraints) and a small set of baseline indexes.
- `seed_data.sql`: demo dataset (users/products/locations/orders) used for testing.
- `views.sql`: reporting/analytics views used by dashboard and reports.
- `procedures.sql`: stored procedures for critical workflows (purchase order creation and sales confirmation).
- `triggers.sql`: triggers enforcing inventory consistency and preventing invalid stock movements.
- `indexes.sql`: additional indexes for performance and common query patterns.
- `security.sql`: database users and privilege configuration (least privilege).

1.2 Recommended execution order

A typical setup sequence is:

1. Run `schema.sql` to create the database (`sipms`), tables, and constraints.
2. Run `seed_data.sql` to load demo/testing records.
3. Run `views.sql` to create reporting views.
4. Run `procedures.sql` to create stored procedures.

5. Run `triggers.sql` to activate automatic inventory enforcement.
6. Run `indexes.sql` to add performance indexes.
7. Run `security.sql` to create database users and grant privileges.

Database engine and encoding. The schema is designed for MySQL and initializes the database with `utf8mb4` to support Unicode content (e.g., product names, supplier information) consistently.

2 Logical Data Model Summary

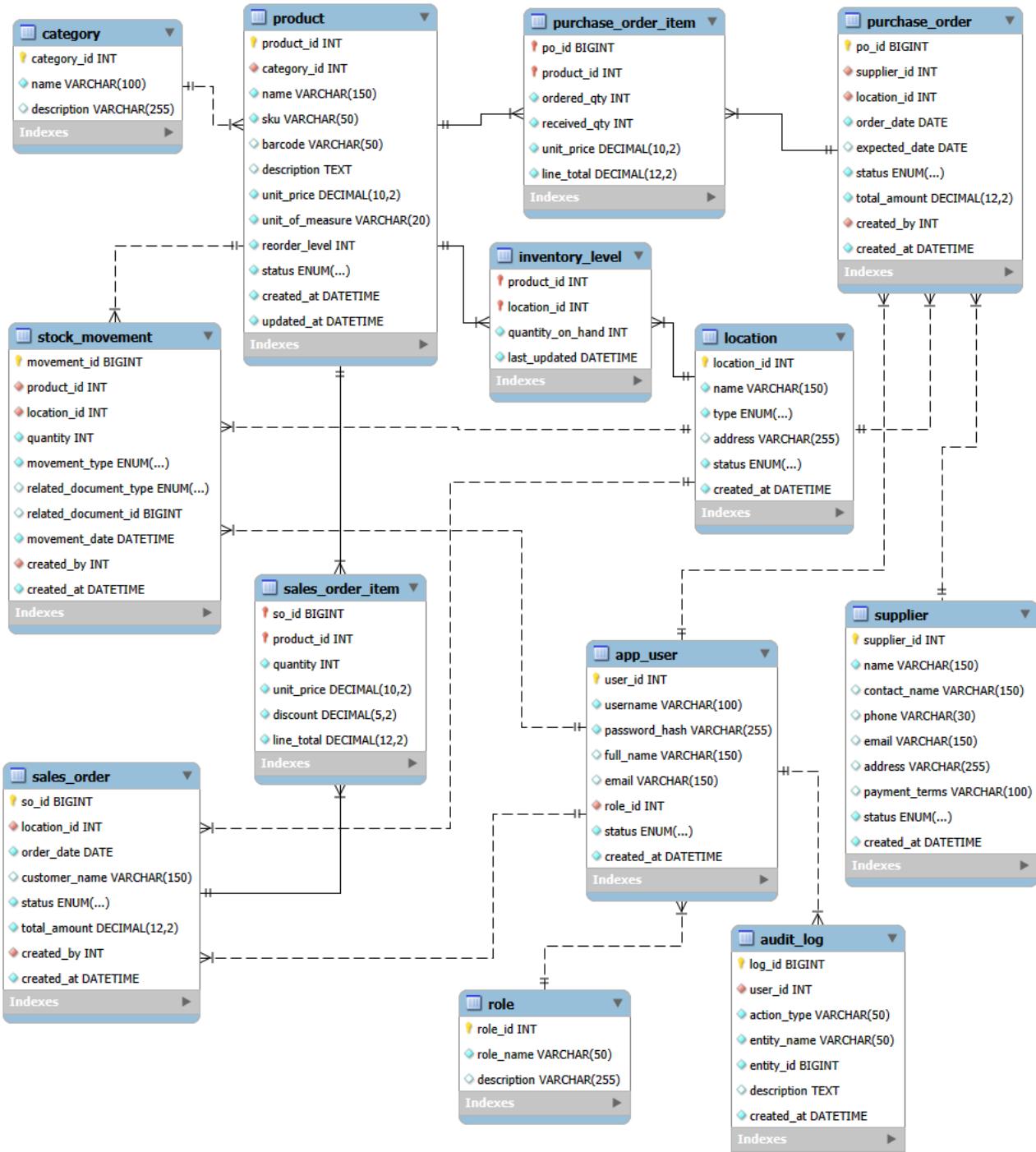


Figure 2 illustrates the main entities and relationships used in SIPMS.

2.1 ER diagram and relationships

The SIPMS database follows a relational design separating: (i) master data (products, suppliers, locations), (ii) transactional documents (purchase orders, sales orders), and (iii) inventory state and auditability (inventory level, stock movement, audit log).

2.2 Core tables by domain

Identity and roles.

- `role`: role definitions (e.g., ADMIN, MANAGER, CLERK).
- `app_user`: application users, linked to `role` via foreign key.

Master data.

- `category`: product categories.
- `product`: product master (SKU, barcode, pricing, reorder level), linked to `category`.
- `supplier`: supplier master data used in procurement.
- `location`: physical locations (warehouse/store) where inventory is tracked.

Procurement and sales documents.

- `purchase_order` and `purchase_order_item`: purchase orders and their line items.
- `sales_order` and `sales_order_item`: sales orders and their line items.

Inventory and audit trail.

- `stock_movement`: immutable event log of stock changes (receipts, sales issues, transfers, adjustments).
- `inventory_level`: current on-hand quantity per (`product`, `location`) pair.
- `audit_log`: optional audit entries that can record user actions and descriptions.

3 Constraints and Integrity Rules

SIPMS enforces data integrity at the database layer to avoid inconsistent inventory states and to preserve referential correctness between entities.

3.1 Keys and relationships

- Primary keys are used for all master and document header tables (e.g., `product_id`, `po_id`, `so_id`).
- Composite primary keys are used for weak entities: `inventory_level(product_id, location_id)`, `purchase_order_item(po_id, product_id)`, `sales_order_item(so_id, product_id)`.
- Foreign keys enforce valid references (e.g., order headers reference existing suppliers/locations/users; order items reference existing products).

3.2 Domain constraints and statuses

Several attributes use constrained domains to ensure predictable application behavior:

- Status fields (e.g., purchase order status, sales order status) are restricted to predefined values.
- Quantities are constrained to valid ranges (e.g., order quantities must be positive; received quantity must be non-negative).

3.3 Non-negative inventory invariant

A critical business rule is that inventory on-hand must not become negative. SIPMS enforces this invariant directly in the database using triggers on `stock_movement` (described in Section 7), so that any process inserting movements (API or other tools) cannot reduce inventory below zero.

4 Inventory Consistency Design

4.1 Stock movement as the system of record

SIPMS records each inventory change as a row in `stock_movement`. This provides:

- a complete audit trail of what changed, when, where, and by whom,
- a unified model for multiple operations (purchase receipt, sales issue, transfer, adjustment),
- a reliable base for reporting and troubleshooting.

4.2 Current inventory snapshot

The table `inventory_level` stores the current on-hand quantity for each (`product`, `location`) pair. Instead of updating inventory levels from many places, SIPMS updates `inventory_level` automatically whenever a new stock movement is inserted. This reduces duplicated logic and helps keep the snapshot consistent with the movement ledger.

5 Database Views for Reporting

To simplify reporting queries and reduce repeated joins in the application layer, SIPMS implements views focused on common dashboard/reporting needs.

5.1 Implemented views

- `view_stock_per_location`: inventory per product per location, including reorder-level flags and stock value.
- `view_low_stock_products`: subset of products below reorder level (supports “Low Stock” dashboard/report).
- `view_top_selling_products_last_30_days`: aggregated sales quantities and revenue for confirmed sales in the last 30 days.

5.2 Benefits

Using views improves maintainability and consistency:

- Reporting logic (joins and filters) is centralized in the database.
- The frontend/backend can query a stable interface for analytics needs.
- Performance is improved when combined with appropriate indexes (Section 1.2).

5.3 SQL Listing: `views.sql`

```
1 -- 03_views.sql
2 USE sipms;
3
4 -- Delete if exists
5 DROP VIEW IF EXISTS view_stock_per_location;
6 DROP VIEW IF EXISTS view_low_stock_products;
7 DROP VIEW IF EXISTS view_top_selling_products_last_30_days;
8
9 -- 1. Inventory levels per product per location
10 CREATE VIEW view_stock_per_location AS
11 SELECT
12     il.product_id,
13     p.name          AS product_name,
14     p.sku,
15     il.location_id,
16     l.name          AS location_name,
17     il.quantity_on_hand,
18     p.reorder_level,
19     p.unit_price,
20     (COALESCE(il.quantity_on_hand, 0) * COALESCE(p.unit_price, 0)) AS
21         stock_value,
22     (il.quantity_on_hand < p.reorder_level) AS is_below_reorder_level
23 FROM inventory_level AS il
```

```

23 JOIN product AS p ON p.product_id = il.product_id
24 JOIN location AS l ON l.location_id = il.location_id;
25
26 -- 2. Lacking stock products (below reorder level)
27 CREATE VIEW view_low_stock_products AS
28 SELECT *
29 FROM view_stock_per_location
30 WHERE quantity_on_hand < reorder_level;
31
32 -- 3. Top selling products in the last 30 days
33 CREATE VIEW view_top_selling_products_last_30_days AS
34 SELECT
35     si.product_id,
36     p.name AS product_name,
37     p.sku,
38     SUM(si.quantity) AS total_qty_sold,
39     SUM(si.line_total) AS total_revenue
40 FROM sales_order_item AS si
41 JOIN sales_order AS so ON so.so_id = si.so_id
42 JOIN product AS p ON p.product_id = si.product_id
43 WHERE so.order_date >= (CURRENT_DATE - INTERVAL 30 DAY)
44     -- Modified to match the defined enum values in schema.sql
45     AND so.status = 'CONFIRMED'
46 GROUP BY si.product_id, p.name, p.sku
47 ORDER BY total_qty_sold DESC;

```

6 Stored Procedures for Critical Workflows

Stored procedures are used to centralize multi-step operations that must follow strict business rules and validation.

6.1 sp_create_purchase_order

This procedure creates a new purchase order header with an initial status and total amount. Centralizing purchase order creation reduces duplicated logic across the application and provides a consistent initial state for newly created purchase orders. The procedure also returns the newly created purchase order identifier to the caller, enabling the application to attach line items or continue the workflow.

6.2 sp_confirm_sales_order

Confirming a sales order must ensure inventory sufficiency before reducing stock. This procedure enforces the workflow:

- Load and lock the sales order context (location information).
- Check inventory availability for each sales line item at the sales location.
- If any item is insufficient, reject the confirmation by raising a database error.

- Otherwise, update the sales order status to CONFIRMED.
- Insert `stock_movement` rows (e.g., `SALES_ISSUE`) for each order line item so that inventory is reduced consistently.

Error handling. The procedure signals clear validation failures (e.g., missing sales order or insufficient stock). These errors are propagated to the API layer and displayed as user-facing validation messages.

6.3 SQL Listing: `procedures.sql`

```

1  -- 04_procedures.sql
2  USE sipms;
3
4  DROP PROCEDURE IF EXISTS sp_create_purchase_order;
5  DROP PROCEDURE IF EXISTS sp_confirm_sales_order;
6
7  -- 1. Create new purchase order
8  DELIMITER $$

9
10 CREATE PROCEDURE sp_create_purchase_order (
11     IN p_supplier_id    INT,
12     IN p_location_id   INT,
13     IN p_order_date     DATE,
14     IN p_expected_date  DATE,
15     IN p_total_amount   DECIMAL(12,2),
16     IN p_created_by     INT
17 )
18 BEGIN
19     INSERT INTO purchase_order(
20         supplier_id,
21         location_id,
22         order_date,
23         expected_date,
24         status,
25         total_amount,
26         created_by,
27         created_at
28     )
29     VALUES (
30         p_supplier_id,
31         p_location_id,
32         p_order_date,
33         p_expected_date,
34         'APPROVED',           -- modify if enum values differ: DRAFT /
35                                         APPROVED / PARTIALLY_RECEIVED / CLOSED / CANCELLED
36         p_total_amount,
37         p_created_by,
38         NOW()
39     );

```

```

40      -- return the newly created po_id
41      SELECT LAST_INSERT_ID() AS po_id;
42 END$$
43
44 -- 2. Confirm sales order: check inventory + create stock movements
45 CREATE PROCEDURE sp_confirm_sales_order (
46     IN p_so_id      BIGINT,
47     IN p_user_id    INT
48 )
49 BEGIN
50     DECLARE v_location_id INT;
51     DECLARE v_not_enough_stock INT DEFAULT 0;
52
53     -- get the location of the sales order
54     SELECT location_id INTO v_location_id
55     FROM sales_order
56     WHERE so_id = p_so_id
57     FOR UPDATE;
58
59     IF v_location_id IS NULL THEN
60         SIGNAL SQLSTATE '45000'
61             SET MESSAGE_TEXT = 'Sales order not found';
62     END IF;
63
64     -- check stock for each item
65     SELECT COUNT(*) INTO v_not_enough_stock
66     FROM sales_order_item si
67     LEFT JOIN inventory_level il
68         ON il.product_id = si.product_id
69         AND il.location_id = v_location_id
70     WHERE si.so_id = p_so_id
71         AND (il.quantity_on_hand IS NULL
72             OR il.quantity_on_hand < si.quantity);
73
74     IF v_not_enough_stock > 0 THEN
75         SIGNAL SQLSTATE '45000'
76             SET MESSAGE_TEXT = 'Not enough stock to confirm sales
77             order';
78     END IF;
79
80     -- update status SO
81     UPDATE sales_order
82     SET status = 'CONFIRMED' -- modify if enum values differ
83     WHERE so_id = p_so_id;
84
85     -- insert stock movements (each line for each item)
86     INSERT INTO stock_movement (
87         product_id,
88         location_id,
89         quantity,
         movement_type,

```

```

90     related_document_type ,
91     related_document_id ,
92     movement_date ,
93     created_by ,
94     created_at
95   )
96   SELECT
97     si.product_id ,
98     v_location_id ,
99     si.quantity ,
100    'SALES_ISSUE' , -- modified to correct enum
101    movement_type
102    'SALES_ORDER' ,
103    p_so_id ,
104    NOW() ,
105    p_user_id ,
106    NOW()
107   FROM sales_order_item si
108   WHERE si.so_id = p_so_id;
109 END$$
110
111 DELIMITER ;

```

7 Triggers Enforcing Inventory Rules

Database triggers are used to enforce inventory correctness regardless of which component inserts stock movement rows.

7.1 Validation trigger: quantity must be positive

A BEFORE INSERT trigger ensures that a stock movement quantity is strictly positive. This prevents invalid movements from entering the system and simplifies downstream logic (because movement direction is determined by movement type, not by negative quantities).

7.2 Consistency trigger: update inventory level and prevent negative stock

An AFTER INSERT trigger updates `inventory_level` based on the inserted movement:

- The movement type determines whether the inventory delta is positive (e.g., purchase receipt) or negative (e.g., sales issue).
- The trigger locks the current inventory row for the affected (`product`, `location`) pair to avoid race conditions under concurrent updates.
- If the new computed quantity would be negative, the trigger rejects the insert operation by raising an error.
- Otherwise, the trigger inserts or updates the corresponding `inventory_level` row.

This design ensures that the inventory snapshot cannot silently diverge from the movement ledger, and that negative inventory is prevented at the database layer.

7.3 SQL Listing: triggers.sql

```
1 -- 05_triggers.sql
2 USE sipms;
3
4 DROP TRIGGER IF EXISTS before_insert_stock_movement;
5 DROP TRIGGER IF EXISTS after_insert_stock_movement;
6
7 DELIMITER $$

8
9 CREATE TRIGGER before_insert_stock_movement
10 BEFORE INSERT ON stock_movement
11 FOR EACH ROW
12 BEGIN
13     IF NEW.quantity <= 0 THEN
14         SIGNAL SQLSTATE '45000'
15             SET MESSAGE_TEXT = 'Quantity in stock_movement must be > 0
16             ';
17     END IF;
18 END$$

19
20 CREATE TRIGGER after_insert_stock_movement
21 AFTER INSERT ON stock_movement
22 FOR EACH ROW
23 BEGIN
24     DECLARE v_current_qty INT;
25     DECLARE v_new_qty INT;
26     DECLARE v_delta INT;
27
28     -- determine delta based on movement_type (match enum)
29     CASE NEW.movement_type
30         WHEN 'PURCHASE_RECEIPT' THEN SET v_delta = NEW.quantity;
31         WHEN 'SALES_ISSUE' THEN SET v_delta = -NEW.quantity;
32         WHEN 'TRANSFER_IN' THEN SET v_delta = NEW.quantity;
33         WHEN 'TRANSFER_OUT' THEN SET v_delta = -NEW.quantity;
34         WHEN 'ADJUSTMENT' THEN SET v_delta = NEW.quantity;
35         ELSE SET v_delta = 0;
36     END CASE;
37
38     SELECT quantity_on_hand
39         INTO v_current_qty
40         FROM inventory_level
41         WHERE product_id = NEW.product_id
42             AND location_id = NEW.location_id
43         FOR UPDATE;
44
45     IF v_current_qty IS NULL THEN
```

```

46      SET v_current_qty = 0;
47  END IF;
48
49  SET v_new_qty = v_current_qty + v_delta;
50
51  IF v_new_qty < 0 THEN
52      SIGNAL SQLSTATE '45000'
53          SET MESSAGE_TEXT = 'Inventory would become negative';
54  ELSE
55      INSERT INTO inventory_level(product_id, location_id,
56          quantity_on_hand, last_updated)
57      VALUES (NEW.product_id, NEW.location_id, v_new_qty, NOW())
58      ON DUPLICATE KEY UPDATE
59          quantity_on_hand = v_new_qty,
60          last_updated      = NOW();
61  END IF;
62
63 DELIMITER ;

```

8 Deployment Notes and Verification Checklist

8.1 Setup checklist

After executing the scripts in the recommended order, the following checks confirm correct deployment:

- All core tables exist and foreign keys are created successfully.
- Views are queryable and return expected columns.
- Stored procedures are callable and return expected results/errors.
- Stock movement insertion updates `inventory_level` automatically.
- Negative inventory and invalid quantities are rejected by triggers.

8.2 Integration with the application

The backend uses the database as the source of truth for inventory and leverages:

- views for fast reporting queries,
- stored procedures for critical workflow validation,
- triggers for automatic and consistent inventory snapshot updates.

9 Limitations and Future Improvements

While the current database implementation satisfies the core project requirements, the following improvements are natural next steps:

- Strengthen transactional atomicity for complex workflows by ensuring multi-step status updates and stock movement inserts commit as a single unit in all execution paths.
- Extend auditing by writing `audit_log` entries for key operations (e.g., confirm sales, receive goods, transfers) either in procedures/triggers or consistently at the API service layer.
- Add additional analytical views (e.g., inventory valuation over time, supplier performance, gross margin by product).

Chapter 5

Performance Optimization and Security Configuration

This chapter describes the main performance considerations and the security model of SIPMS. While Chapter 4 focuses on database objects (schema, views, procedures, triggers), here we explain why specific indexes and privilege configurations were introduced, and how they support the web application’s workload.

1 Performance Optimization

1.1 Workload characteristics and query patterns

SIPMS is an operational system accessed through a web interface. The most frequent query patterns come from typical UI interactions:

- **Search and filtering:** products searched by SKU/name; orders filtered by date/status; reports filtered by location and keyword.
- **Pagination and recent-first listing:** module tables frequently load “latest N ” records (e.g., newest orders, most recent transfers/movements).
- **Analytics aggregates:** dashboard and reports require grouped aggregations such as low-stock lists and top-selling products over a time window (e.g., last 30 days).
- **Join-heavy reads:** UI pages often join transactional tables with master data (product, location, supplier) to render readable names and derived values.

Because these patterns are repeated across modules, we focus on reducing full table scans, improving join performance, and supporting fast time-window filtering for analytics.

1.2 Indexing strategy

Indexes are selected based on the most common access paths:

- **Product lookup and search.** SKU-based search is a primary workflow in inventory systems, so an index on `product(sku)` accelerates filtering and exact lookup. If you also support frequent name search/sort at scale, an additional index on `product(name)` can be considered.

- **Inventory snapshots by location.** Inventory is stored per (`product_id`, `location_id`) and typically uses a composite primary key on these columns, which already supports many join patterns. If the workload frequently filters by location first, an additional index (e.g., (`location_id`, `product_id`)) can further improve location-centric queries.
- **Movement history and audit trails.** Operational traceability requires reading movements by time range and by product/location. A composite index on `stock_movement` (`movement_date`, `product_id`) improves recent-history queries and time-window reporting.
- **Dashboard time-series queries.** Dashboard charts commonly filter orders by date and status. Composite indexes on `sales_order` (`order_date`, `status`) and `purchase_order` (`order_date`, `status`) improve these time-based scans and avoid unnecessary table reads.

1.3 SQL Listing: `indexes.sql`

```

1 -- 07_indexes.sql
2 USE sipms;
3
4 -- Index for product lookup by SKU
5 ALTER TABLE product
6   ADD INDEX idx_product_sku (sku);
7
8 -- Index for inventory_level by (product_id, location_id)
9 ALTER TABLE inventory_level
10  ADD INDEX idx_inventory_product_location (product_id, location_id);
11
12 -- Index for stock_movement by (movement_date, product_id)
13 ALTER TABLE stock_movement
14   ADD INDEX idx_stock_movement_date_product (movement_date, product_id
15 );
16
17 -- Index for sales_order filtering by date/status (dashboard charts)
18 ALTER TABLE sales_order
19   ADD INDEX idx_sales_order_order_date_status (order_date, status);
20
21 -- Index for purchase_order filtering by date/status (dashboard charts
22 )
23 ALTER TABLE purchase_order
24   ADD INDEX idx_purchase_order_order_date_status (order_date, status);

```

1.4 Query design optimizations at the application layer

Besides database indexes, SIPMS applies several practical query-level optimizations:

- **Pagination / limits:** API endpoints cap returned records (e.g., “last N ” orders or transfers) to reduce response size and keep UI interactions responsive.
- **Efficient joins:** frequently used foreign-key relations are retrieved with ORM join helpers (e.g., `select_related`) to reduce the number of round trips.

- **Pre-validation to reduce failures:** for operations like transfers and confirmations, the application performs basic checks early (e.g., locations must differ, current stock sufficiency), while still relying on database enforcement for correctness.

1.5 Use of views for reporting performance

Reporting pages are powered by database views that predefine joins and derived attributes (e.g., stock value, below-reorder flag). This design has two benefits:

- **Consistency:** report calculations are standardized in SQL rather than duplicated across endpoints.
- **Performance:** the database optimizer can reuse indexes and execute a well-defined plan for repeated reporting queries.

1.6 Performance verification (recommended evidence)

To strengthen this chapter, include 1–2 examples of evidence (you can add screenshots):

- **EXPLAIN plans** for key queries (product lookup, low-stock report, top-selling aggregate).
- **Observed response time** or before/after comparison when indexes are enabled.

2 Security Configuration

Security in SIPMS is implemented as a layered model: (1) application authentication and authorization, and (2) database least-privilege access.

2.1 Application authentication

SIPMS requires users to authenticate before accessing protected modules. The backend issues a signed access token after validating credentials against the `app_user` table (passwords are stored as hashes). The frontend stores the session token on the client side and attaches it to subsequent API requests.

Session lifecycle. Typical flow:

1. User submits username/password on the login page.
2. Backend validates credentials and returns an access token and basic user profile (user id, name, role).
3. Frontend stores the token and user context, enabling authenticated navigation.
4. Logout clears stored session data and returns the UI to the login screen.

2.2 Role-based authorization (RBAC) at the API layer

After authentication, authorization is enforced using role-based permissions aligned with the RBAC matrix (ADMIN / MANAGER / CLERK). At the API layer:

- **IsAuthenticated:** required for most endpoints.
- **Privileged actions:** operations such as purchase order creation/receiving, cancellations, and transfers are restricted to ADMIN/MANAGER.
- **Clerk restrictions:** clerk users are typically limited to read-only access on master data and can create sales orders but cannot perform administrative or high-impact inventory actions.

This approach keeps business rules close to the workflow endpoints and prevents accidental exposure of privileged operations.

2.3 Database security and least-privilege access

In addition to application RBAC, SIPMS configures database users with least privilege to provide defense in depth. The script `security.sql` creates three privilege tiers:

- **sipms_admin:** full privileges on the `sipms` schema (schema management and full access).
- **sipms_manager:** CRUD privileges on core business tables and permission to execute critical stored procedures.
- **sipms_staff:** restricted privileges (read access to master data and limited inserts for sales order workflows; execute permission for sales confirmation procedure where applicable).

2.4 SQL Listing: `security.sql`

```
1 -- 06_security.sql
2 USE sipms;
3
4 -- NOTE: change the passwords before running, and DO NOT commit real
5 -- passwords to Git
6
7 CREATE USER IF NOT EXISTS 'sipms_admin'@'localhost'
8   IDENTIFIED BY '<admin_password>';
9
10 CREATE USER IF NOT EXISTS 'sipms_manager'@'localhost'
11   IDENTIFIED BY '<manager_password>';
12
13 CREATE USER IF NOT EXISTS 'sipms_staff'@'localhost'
14   IDENTIFIED BY '<staff_password>';
15
16 -- Admin: full privileges on sipms schema
17 GRANT ALL PRIVILEGES ON sipms.* TO 'sipms_admin'@'localhost';
```

```

18 -- Manager: CRUD on business tables + EXECUTE procedures
19 GRANT SELECT, INSERT, UPDATE, DELETE
20 ON sipms.product          TO 'sipms_manager'@'localhost';
21 GRANT SELECT, INSERT, UPDATE, DELETE
22 ON sipms.category         TO 'sipms_manager'@'localhost';
23 GRANT SELECT, INSERT, UPDATE, DELETE
24 ON sipms.supplier         TO 'sipms_manager'@'localhost';
25 GRANT SELECT, INSERT, UPDATE, DELETE
26 ON sipms.location         TO 'sipms_manager'@'localhost';
27 GRANT SELECT, INSERT, UPDATE, DELETE
28 ON sipms.inventory_level   TO 'sipms_manager'@'localhost';
29 GRANT SELECT, INSERT, UPDATE, DELETE
30 ON sipms.purchase_order    TO 'sipms_manager'@'localhost';
31 GRANT SELECT, INSERT, UPDATE, DELETE
32 ON sipms.purchase_order_item TO 'sipms_manager'@'localhost';
33 GRANT SELECT, INSERT, UPDATE, DELETE
34 ON sipms.sales_order       TO 'sipms_manager'@'localhost';
35 GRANT SELECT, INSERT, UPDATE, DELETE
36 ON sipms.sales_order_item  TO 'sipms_manager'@'localhost';
37 GRANT SELECT, INSERT, UPDATE, DELETE
38 ON sipms.stock_movement    TO 'sipms_manager'@'localhost';

39
40 GRANT EXECUTE ON PROCEDURE sipms.sp_create_purchase_order
41     TO 'sipms_manager'@'localhost';
42 GRANT EXECUTE ON PROCEDURE sipms.sp_confirm_sales_order
43     TO 'sipms_manager'@'localhost';

44
45 -- Staff: view data + create sales order, use confirm procedure
46 GRANT SELECT
47 ON sipms.product          TO 'sipms_staff'@'localhost';
48 GRANT SELECT
49 ON sipms.inventory_level   TO 'sipms_staff'@'localhost';
50 GRANT SELECT
51 ON sipms.location          TO 'sipms_staff'@'localhost';
52 GRANT SELECT
53 ON sipms.supplier          TO 'sipms_staff'@'localhost';

54
55 GRANT SELECT, INSERT
56 ON sipms.sales_order       TO 'sipms_staff'@'localhost';
57 GRANT SELECT, INSERT
58 ON sipms.sales_order_item  TO 'sipms_staff'@'localhost';

59
60 GRANT EXECUTE ON PROCEDURE sipms.sp_confirm_sales_order
61     TO 'sipms_staff'@'localhost';

62
63 FLUSH PRIVILEGES;

```

2.5 Operational notes and recommended hardening

The repository uses placeholder passwords in SQL scripts; real credentials should be provided via deployment configuration (environment variables/secrets). Additional practical hard-

ening steps include:

- rotate credentials regularly and restrict database access by host/network;
- avoid using admin DB users for the application runtime connection;
- enable audit logging for sensitive actions (either at application layer or database layer);
- ensure backups and recovery procedures are tested.

Chapter 6

Testing and Validation

This chapter presents the testing approach and validation evidence for SIPMS. Because Chapter 3 already demonstrates the implemented UI features, this chapter focuses on correctness and database enforcement using Postman API tests and MySQL Workbench verification queries (constraints, triggers, procedures, and views).

1 Test Environment and Tools

We validate SIPMS using a black-box integration approach across three layers:

- **Web UI (React)**: sanity checks for key workflows and role-based restrictions.
- **Postman**: API-level testing for request/response validation, authentication, and RBAC.
- **MySQL Workbench**: database-level verification (tables, procedures, triggers, views) and integrity tests.

Dataset. A reproducible demo dataset is loaded using `seed_data.sql`. This provides sample users (ADMIN/MANAGER/CLERK), products, locations, and baseline records to support repeatable testing.

2 Deployment and Test Setup Procedure

2.1 Database deployment

The database is deployed by executing SQL scripts in the following order:

1. `schema.sql` (create database `sipms`, tables, constraints)
2. `seed_data.sql` (demo/testing dataset)
3. `views.sql` (analytics/reporting views)
4. `procedures.sql` (stored procedures)
5. `triggers.sql` (inventory enforcement triggers)
6. `indexes.sql` (performance indexes)
7. `security.sql` (optional, DB user grants; passwords replaced before execution)

2.2 API and UI setup

The backend service is started and connected to the deployed MySQL schema. The frontend is started and configured to send authenticated requests to the backend.

2.3 Postman environment

A Postman environment is configured with: `base_url`, and tokens for three test users (ADMIN/MANAGER/CLERK). Login is performed via `/api/auth/login/` and the issued token is attached to subsequent requests.

3 Test Strategy

Testing targets three categories:

- **Authentication and RBAC:** verify login and role-based endpoint restrictions.
- **Workflow correctness:** validate purchase receiving and sales order processing (inventory sufficiency and automatic confirmation).
- **Database integrity enforcement:** validate triggers/procedures prevent invalid states (quantity > 0, non-negative inventory) and reporting views return consistent results.

4 Test Cases and Results

4.1 Authentication and Role-Based Access Control

- **Login (ADMIN/MANAGER/CLERK):** token is issued and stored on the client.
- **RBAC negative test:** CLERK is forbidden from privileged operations such as creating purchase orders.
- **RBAC positive test:** MANAGER/ADMIN can execute privileged operations successfully.

The screenshot shows the Postman interface with a successful API call to 'http://localhost:8000/api/auth/login'. The request method is POST, and the response status is 200 OK. The response body is a JSON object containing user information and an access token.

```
1 {  
2   "access": "eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ1c2VyX2lkIjoxLCjyb2xIijo1QUlNSU4iLCjpxXQiojE3NjYzNzQ1NzQsImV4cCI6MTc2NjQ2MDk3NHE.  
3   "user": {  
4     "id": 1,  
5     "username": "admin",  
6     "full_name": "admin",  
7     "role": "ADMIN"  
8   }  
9 }
```

The screenshot shows the Postman interface with a successful API call to 'http://localhost:8000/api/auth/login'. The request method is POST, and the response status is 200 OK. The response body is a JSON object containing user information and an access token.

```
1 {  
2   "access": "eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ1c2VyX2lkIjoyLCjyb2xIijo1TUFOQdFu1isImhdCi6MTc2NjM3NDYyMywiZkhwIjoxNzY2NDYxMDIzfQ.  
3   "user": {  
4     "id": 2,  
5     "username": "manager",  
6     "full_name": "Manager",  
7     "role": "MANAGER"  
8   }  
9 }
```

The screenshot shows the Postman interface with a 'Database Project' selected. A 'POST' request is made to `http://localhost:8000/api/auth/login` with the following JSON body:

```

1 {
2   "username": "clerk",
3   "password": "clerk123"
4 }

```

The response status is **200 OK** with a duration of 936 ms and a size of 567 B. The response body contains a JSON object with user information and an access token.

Figure 6.1: Postman login tests: access token issued for ADMIN, MANAGER, and CLERK users.

The screenshot shows the Postman interface with a 'Database Project' selected. A 'POST' request is made to `http://localhost:8000/api/purchase-orders/` with the following Authorization header:

Auth Type: Bearer Token
Token: `{{token_clerk}}`

The response status is **403 Forbidden** with a duration of 11 ms and a size of 465 B. The response body is a JSON object with a single key 'detail':

```

1 {
2   "detail": "Only ADMIN or MANAGER users are allowed to perform this action."
3 }

```

Figure 6.2: RBAC negative test: CLERK user is denied when attempting to create a Purchase Order (HTTP 403).

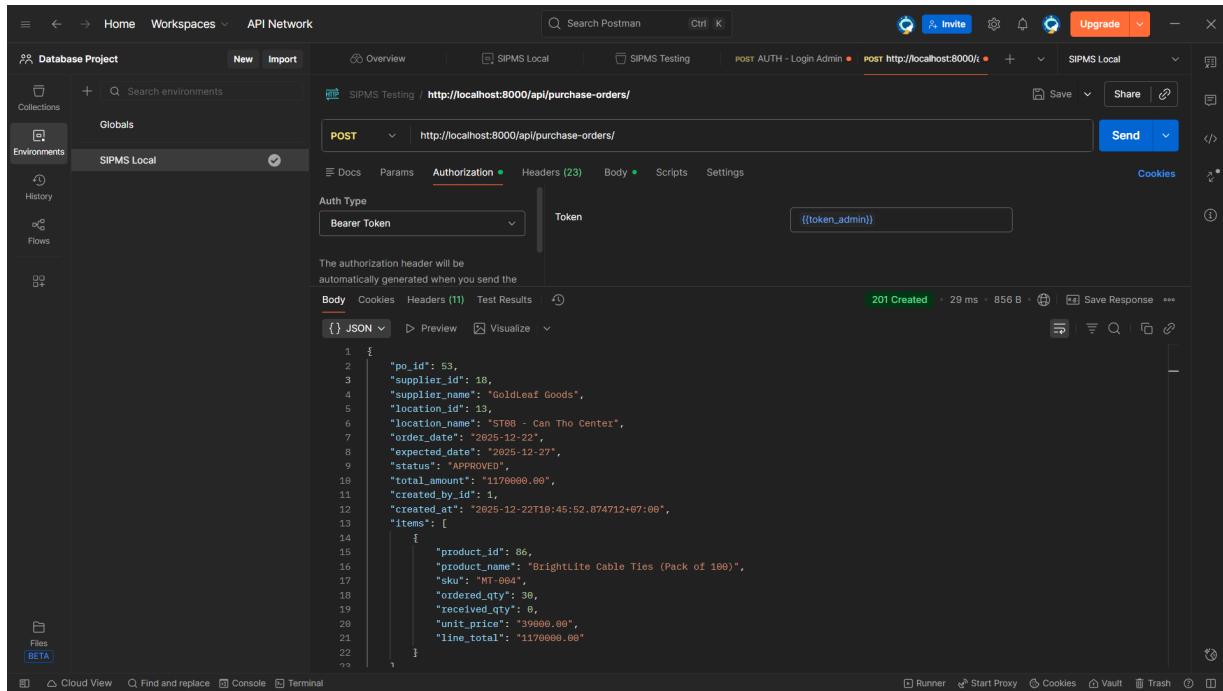


Figure 6.3: RBAC positive test: ADMIN/MANAGER can create a Purchase Order successfully (HTTP 201).

4.2 Purchase Receiving and Inventory Increase

This test validates that receiving goods records stock movements and automatically updates `inventory_level` via the `AFTER INSERT` trigger on `stock_movement`.

- Create a Purchase Order (MANAGER/ADMIN).
- Execute `/api/purchase-orders/<po_id>/receive-all/`.
- Verify a `PURCHASE_RECEIPT` movement is inserted and inventory increases at the destination location.

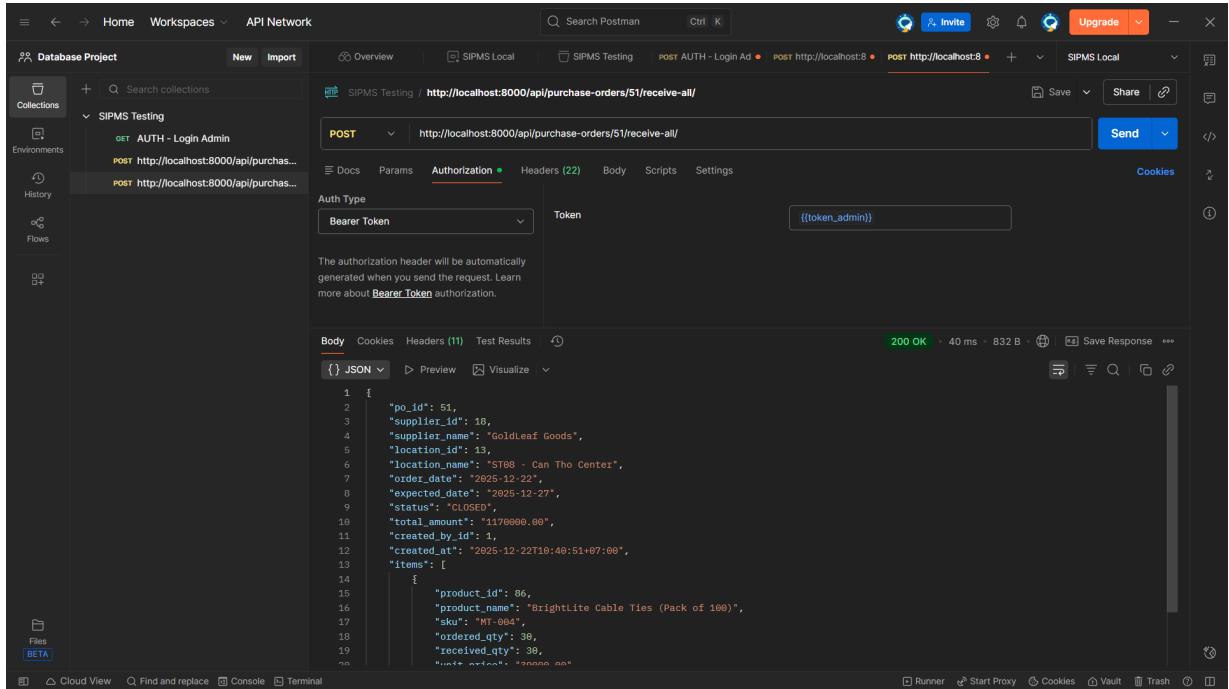


Figure 6.4: Receive-all workflow: stock receipt succeeds and PO status is updated.

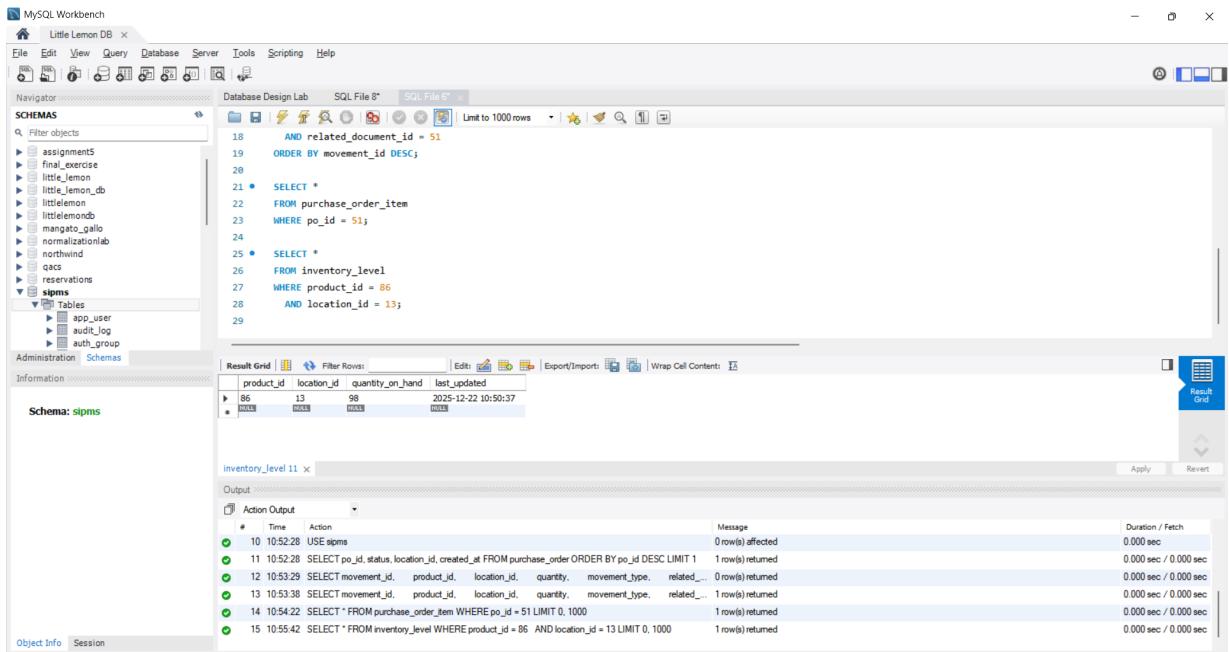


Figure 6.5: Workbench verification: inventory level increases after PURCHASE_RECEIPT movement insert.

4.3 Sales Order Validation and Automatic Confirmation

In SIPMS, sales orders are validated and confirmed at creation time. The backend calls the stored procedure `sp_confirm_sales_order` as part of the sales order creation workflow: it checks inventory sufficiency before inserting `SALES_ISSUE` movements and updating `inventory_level` through triggers. Therefore, insufficient stock is observed as a *create-time rejection* (HTTP 400)

rather than a separate “confirm later” step.

PASS case (sufficient stock). Action: create a sales order via `POST /api/sales-orders/` with requested quantities within available stock.

Expected: the sales order is created in `CONFIRMED` status, `SALES_ISSUE` movements are inserted, and inventory decreases automatically.

The screenshot shows the Postman application interface. On the left, there's a sidebar with 'Database Project' and 'Collections'. Under 'Collections', 'SIPMS Testing' is expanded, showing several API endpoints: 'GET AUTH - Login Admin', 'POST http://localhost:8000/api/purchas...', 'POST http://localhost:8000/api/purchas...', and 'POST http://localhost:8000/api/sales-or...'. The main area shows a 'SIPMS Testing / http://localhost:8000/api/sales-orders/' collection. A 'POST' request is selected with the URL 'http://localhost:8000/api/sales-orders/'. The 'Authorization' tab is active, set to 'Bearer Token' with a placeholder 'Token' and a variable '({{token_admin}})'. Below the request, the 'Body' tab is open, showing a JSON response with a status code of '201 Created'. The response body contains a detailed JSON object representing the created sales order, including fields like 'so_id', 'location_id', 'customer_name', 'status', 'total_amount', 'created_by_id', 'created_at', and a list of items with their respective product details. At the bottom of the interface, there are tabs for 'Runner', 'Start Proxy', 'Cookies', 'Vault', and 'Trash'.

Figure 6.6: Sales order PASS case: creation succeeds and the order is `CONFIRMED`; inventory is reduced accordingly.

FAIL case (insufficient stock). Action: attempt to create a sales order where at least one line item exceeds on-hand quantity.

Expected: the request is rejected (HTTP 400) with a database validation error (e.g., `ERROR 1644`), no sales order is created, and inventory remains unchanged.

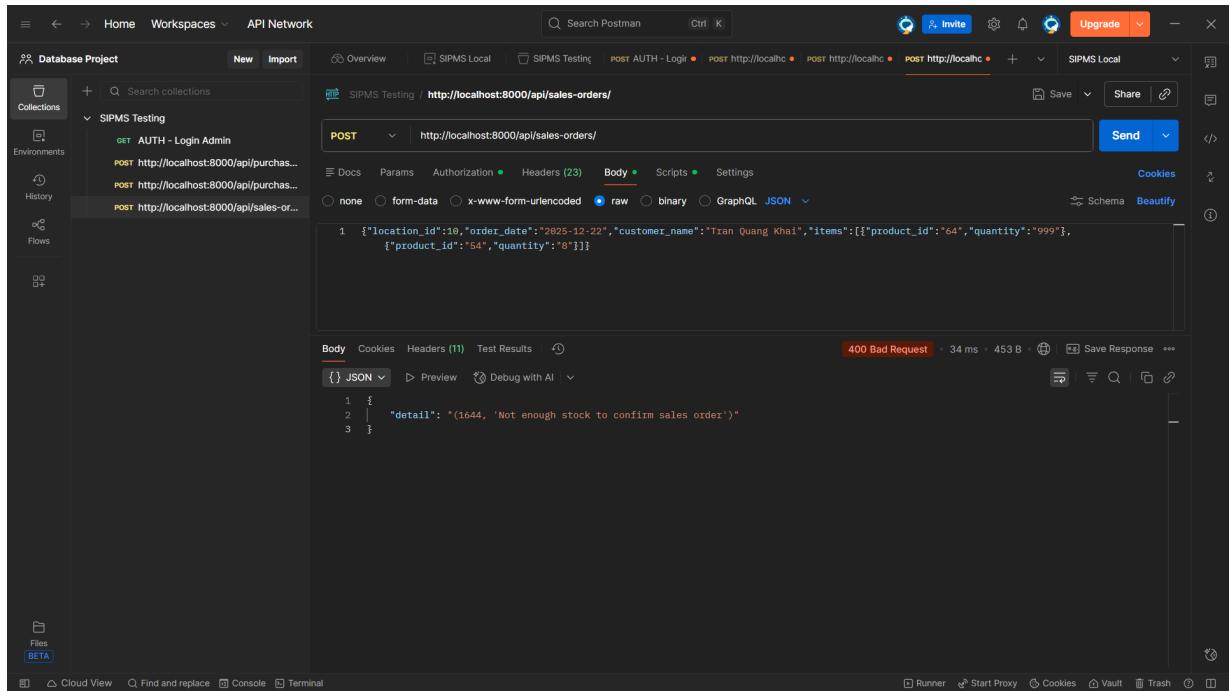


Figure 6.7: Sales order FAIL case: creation is rejected due to insufficient stock (HTTP 400 with DB error).

4.4 Direct Trigger Validation

To demonstrate defense-in-depth, we validate database triggers directly in MySQL Workbench by inserting into `stock_movement` (bypassing the API layer).

Two critical invariants are enforced directly in the database:

- **Quantity must be > 0 :** invalid movements are blocked by a `BEFORE INSERT` trigger.
- **Non-negative inventory:** movements that would result in negative stock are rejected by the `AFTER INSERT` trigger.

The screenshot shows the MySQL Workbench interface with the 'Little Lemon DB' database selected. In the 'SQL File 6*' tab, the following SQL code is displayed:

```

35 •   SELECT product_id, location_id, quantity_on_hand
36   FROM inventory_level
37   WHERE product_id = 54
38     AND location_id = 10;
39
40
41 •   INSERT INTO inventory_level(product_id, location_id, quantity_on_hand)
42     VALUES (86, 13, 0)
43   ON DUPLICATE KEY UPDATE quantity_on_hand = quantity_on_hand;
44
45 •   INSERT INTO stock_movement(
46     product_id, location_id, quantity, movement_type,
47     related_document_type, related_document_id, created_by
48   )
49   VALUES (
50     86, 13, 0, 'ADJUSTMENT',
51     'ADJUSTMENT', 999,
52     1
53   );
54

```

In the 'Output' pane, the execution log shows the following entries:

#	Time	Action	Message	Duration / Fetch
14	10:54:22	SELECT * FROM purchase_order_item WHERE po_id = 51 LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
15	10:55:42	SELECT * FROM inventory_level WHERE product_id = 86 AND location_id = 13 LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
16	11:18:48	SELECT so_id, status FROM sales_order WHERE so_id = 73 LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
17	11:19:51	SELECT product_id, location_id, quantity_on_hand FROM inventory_level WHERE product_id = 54 AND location_id = 10 LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
18	11:25:54	INSERT INTO inventory_level(product_id, location_id, quantity_on_hand) VALUES (86, 13, 0) ON DUPL... 0 row(s) affected		0.000 sec
19	11:26:06	INSERT INTO stock_movement(product_id, location_id, quantity, movement_type, related_document_id, created_by) VALUES (86, 13, 0, 'ADJUSTMENT', 999, 1)	Error Code: 1644. Quantity in stock_movement must be > 0	0.016 sec

Figure 6.8: Trigger validation: `stock_movement.quantity` must be strictly positive.

The screenshot shows the MySQL Workbench interface with the 'Little Lemon DB' database selected. In the 'SQL File 6*' tab, the following SQL code is displayed:

```

45 •   INSERT INTO stock_movement(
46   product_id, location_id, quantity, movement_type,
47   related_document_type, related_document_id, created_by
48 )
49   VALUES (
50   86, 13, 0, 'ADJUSTMENT',
51   'ADJUSTMENT', 999,
52   1
53 );
54
55 •   INSERT INTO stock_movement(
56   product_id, location_id, quantity, movement_type,
57   related_document_type, related_document_id, created_by
58 )
59   VALUES (
60   86, 13, 999999, 'TRANSFER_OUT',
61   'TRANSFER', 999,
62   1
63 );
64

```

In the 'Output' pane, the execution log shows the following entries:

#	Time	Action	Message	Duration / Fetch
15	10:55:42	SELECT * FROM inventory_level WHERE product_id = 86 AND location_id = 13 LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
16	11:18:48	SELECT so_id, status FROM sales_order WHERE so_id = 73 LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
17	11:19:51	SELECT product_id, location_id, quantity_on_hand FROM inventory_level WHERE product_id = 54 AND location_id = 10 LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
18	11:25:54	INSERT INTO inventory_level(product_id, location_id, quantity_on_hand) VALUES (86, 13, 0) ON DUPL... 0 row(s) affected		0.000 sec
19	11:26:06	INSERT INTO stock_movement(product_id, location_id, quantity, movement_type, related_document_id, created_by) VALUES (86, 13, 999999, 'TRANSFER_OUT', 999, 1)	Error Code: 1644. Inventory would become negative	0.016 sec
20	11:26:45	INSERT INTO stock_movement(product_id, location_id, quantity, movement_type, related_document_id, created_by) VALUES (86, 13, 999999, 'TRANSFER', 999, 1)	Error Code: 1644. Inventory would become negative	0.000 sec

Figure 6.9: Trigger validation: movements that would cause negative inventory are rejected.

4.5 Reporting Views Validation

Reporting views are validated by executing read queries and comparing results with the reporting pages in the web interface (without duplicating UI screenshots from Chapter 3).

```

INSERT INTO stock_movement(
    product_id, location_id, quantity, movement_type,
    related_document_type, related_document_id, created_by
)
VALUES (
    86, 13, 999999, 'TRANSFER_OUT',
    'TRANSFER', 999,
    1
);
SELECT * FROM view_top_selling_products_last_30_days LIMIT 10;

```

product_id	product_name	sku	total_qty_sold	total_revenue
54	Lotus Snack Nuts 100g	FB-018	34	2074000.00
27	OfficePro Notebook 200 pages - Standard	OF-009	31	744000.00
83	FixIt Cable Ties (Pack of 100) - Premium	MT-001	24	576000.00
34	SmartDesk Sticky Notes 3x3 (Pack) - Premium	OF-016	24	749600.00
66	LotusCare Glass Cleaner Spray - Premium	CL-012	22	822700.00

Action Output

#	Time	Action	Message	Duration / Fetch
16	11:18:48	SELECT so_id, status FROM sales_order WHERE so_id = 73 LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
17	11:19:51	SELECT product_id, location_id, quantity_on_hand FROM inventory_level WHERE product_id = 54 AND location_id = 13	1 row(s) returned	0.000 sec / 0.000 sec
18	11:25:54	INSERT INTO inventory_level(product_id, location_id, quantity_on_hand) VALUES (86, 13, 0) ON DUPL...	0 rows(affected)	0.000 sec
19	11:26:06	INSERT INTO stock_movement(`product_id`, `location_id`, `quantity`, `movement_type`, `related_document_type`, `related_document_id`, `created_by`)	Error Code: 1644. Quantity in stock_movement must be > 0	0.016 sec
20	11:26:45	INSERT INTO stock_movement(`product_id`, `location_id`, `quantity`, `movement_type`, `related_document_type`, `related_document_id`, `created_by`)	Error Code: 1644. Inventory would become negative	0.000 sec
21	11:27:15	SELECT * FROM view_top_selling_products_last_30_days LIMIT 10	10 row(s) returned	0.000 sec / 0.000 sec

Figure 6.10: Workbench validation: `view_low_stock_products` returns products below reorder level.

5 Summary

Overall, SIPMS testing confirms: (i) role-based access restrictions are enforced at the API layer, (ii) business workflows correctly generate stock movements and update inventory, and (iii) database triggers/procedures prevent invalid inventory states (negative stock, invalid quantities), while views support consistent reporting.