


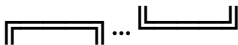
System Design Document

WholeScaler B2B Wholesale Portal – Web Application

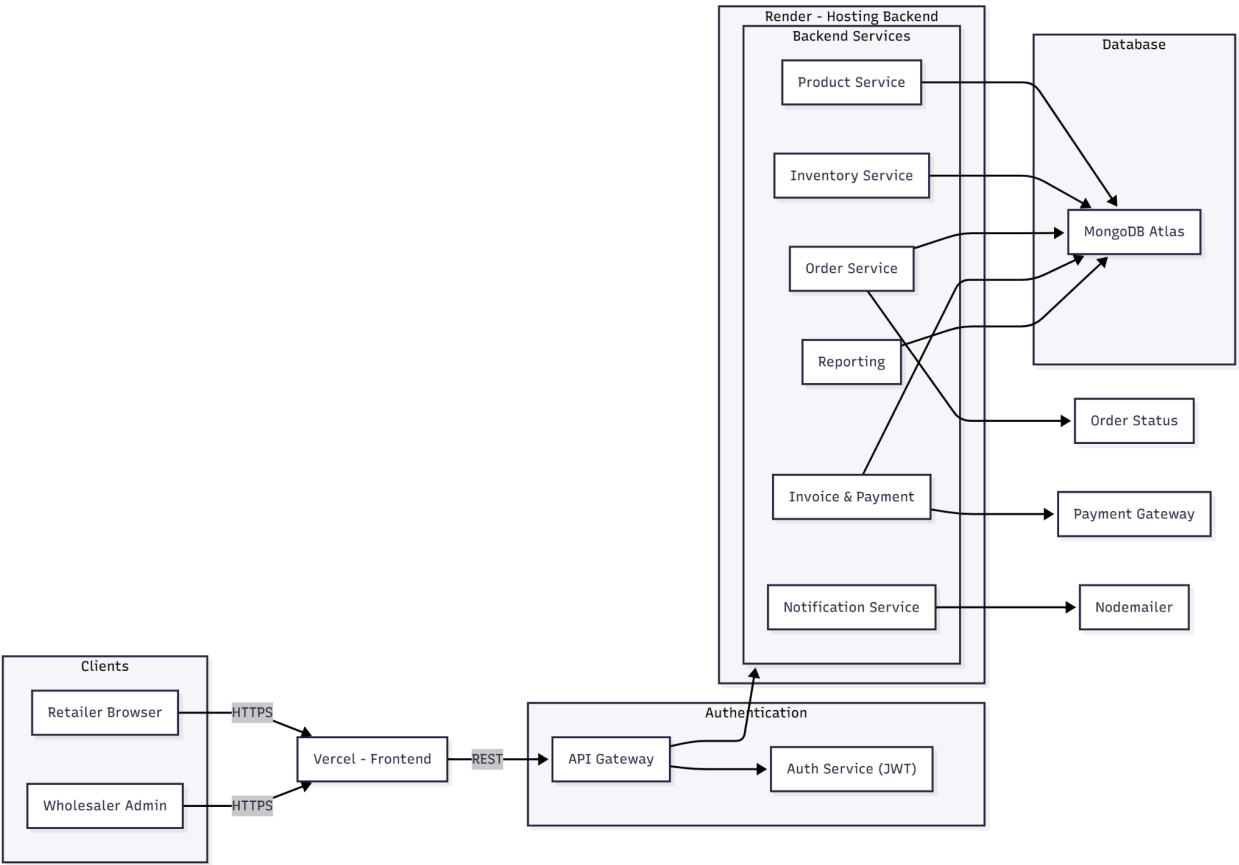
Architecture Diagram

The architecture of the B2B Wholesale Portal System serves as the master plan that illustrates how all the various digital components of our marketplace interact. We crafted this framework to enable seamless business transactions between retailers and wholesalers—similar to a perfectly synchronized dance. It’s designed to prioritize security (ensuring everyone’s data is protected), scalability (so it doesn’t crash when a surge of retailers log in), and efficiency (allowing for smooth order processing and inventory updates). In summary, it’s the strong, underlying framework that ensures a fast, dependable, and seamless online experience for all participants.

Notations:

Notation Name	Sign	Meaning / Representation
Component/ Service		Represents a system component or microservice, such as <i>Product Service</i> , <i>Inventory Service</i> , <i>API Gateway</i> , etc.
Container / Group /Hosting Boundary		Represents a logical or deployment boundary grouping related components (e.g., <i>Render - Hosting Backend</i> , <i>Clients</i> , <i>DB</i>).

DataFlow/ Communication	→	Unidirectional data or request flow (sender → receiver).
Bidirectional Communication	↔	Two-way communication or data synchronization between components.
Label on Arrow	"REST", "HTTPS" etc.	Indicates the protocol, data type, or process used in communication between components.



Layers of Architecture Diagram

1. Client Layer (User Interfaces)

The Client Layer comprises distinct web portals designed for specific user roles, accessible via secure HTTPS connections.

- **Retailer Portal:** A comprehensive interface enabling retailers to execute core functions, including catalog browsing, bulk order placement, transaction management, and invoice retrieval.
- **Wholesaler Admin Panel:** A dedicated management interface facilitating critical back-office operations such as inventory administration, product lifecycle management (PLM), and real-time order status tracking.

2. Delivery Layer

This layer is optimized for global content delivery, ensuring low-latency access and high throughput for all end-users.

- **Frontend (Vercel):** The hosting platform for the modern, framework-based web application (e.g., React Js), responsible for managing the User Experience (UX) and routing authenticated API requests to the appropriate backend endpoints.

3. API & Security Layer

The API & Security Layer serves as the controlled entry point, enforcing security policies and managing service access.

- **API Gateway:** An aggregation point that exposes documented REST endpoints, facilitating request routing and centralized management.

- **Auth Service (JWT):** Implements authentication and authorization logic, validating JSON Web Tokens (JWTs) and enforcing role-based access control across distinct user profiles (Retailer and Wholesaler).

4. Backend Services (Render Cloud)

The core business logic is encapsulated within a set of independent, containerized microservices, deployed on Render Cloud to ensure modularity and decoupled scalability.

- **Product Service:** Dedicated to Product Data Management, handling CRUD operations for product catalogs.
- **Inventory Service:** Maintains transactional integrity for real-time stock levels, managing inventory adjustments and issuing automated low-stock alerts.
- **Order Service:** Demonstrates the complex workflows related to order creation, status transitions, fulfillment, and communication with dependent services.
- **Invoicing & Payment Service:** Manages financial processes, including invoice generation, payment status reconciliation, and integration with third-party payment processors.
- **Reporting Service:** Provides detailed analysis to indicate performance on dashboard.
- **Notification Service:** Manages communications, responsible for the reliable delivery of automated alerts and transaction-based messages.

5. Data Persistence Layer

The data layer is a hybrid structure optimized for persistence, high-speed retrieval, and asset management.

- **MongoDB Atlas:** The primary NoSQL database leveraged for storage of high-volume, dynamic transactional data, including orders, user profiles, and invoices.

6. External System Integrations







The platform utilizes external APIs to handle non-core logistics and communication functions.

- **Email (Nodemailer):** Integration with established SMTP services to ensure reliable delivery.
- **Payment Gateway :** Secure API integration for tokenization and processing of financial transactions.

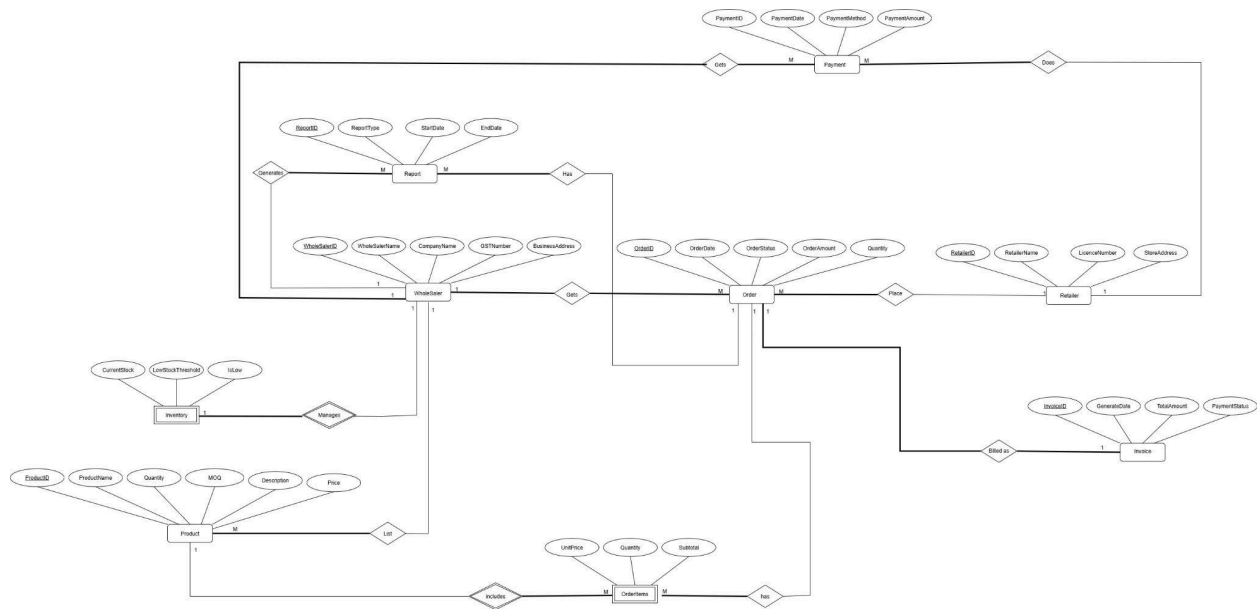
ER Diagram

An ER diagram visually represents entities, their attributes, and relationships within a database. For my system, it defines how wholesalers, retailers, products, orders, and payments are connected, helping structure data flow efficiently and ensuring accurate management of inventory, transactions, and reports across the entire business process.

Notations:

Figures	Symbols	Represents
Rectangle		Entities in ER Model
Ellipse		Attributes in ER Model
Diamond		Relationships among Entities
Line		Attributes to Entities and Entity Sets with Other Relationship Types
Double Ellipse		Multi-Valued Attributes
Double Rectangle		Weak Entity

Diagram



Main Entities

Wholesaler:

The central entity responsible for managing products, maintaining inventory, processing orders, and handling payments. Each wholesaler supplies multiple products and interacts directly with retailers through orders and invoices.

Retailer:

Represents businesses or customers who purchase products from wholesalers. Retailers place orders, receive invoices, and make payments for their purchases.

Product:

Contains details such as product name, type, price, and stock quantity. Products are supplied by wholesalers and requested by retailers through

orders.

Inventory (Weak Entity):

Depending on the **Wholesaler** entity, it tracks the quantity and availability of products in stock. Without a wholesaler, an inventory record cannot exist.

Order:

The core entity that connects wholesalers and retailers. It stores details like order ID, date, status, and total amount. Every order is made by a retailer and processed by a wholesaler.

OrderItem (Weak Entity):

Dependent on both **Order** and **Product**, it specifies which products are included in a particular order and in what quantity. It cannot exist independently.

Invoice:

Generated for each order, the invoice contains billing and transaction details, confirming the sale between wholesaler and retailer.

Payment:

Records the financial transactions made by wholesalers and retailers. It includes payment mode, date, and amount, ensuring proper tracking of financial flows.

Report:

Represents summarized data on orders, sales, payments, and performance. Reports help wholesalers analyze trends, track sales performance, and monitor operations.

Key Relationships and Their Meaning

Wholesaler–Product:

A wholesaler can list many products, but each product belongs to one wholesaler (1–M relationship).

Wholesaler–Inventory:

A weak relationship showing total participation of inventory – every inventory record depends on a wholesaler.

Wholesaler–Order:

A wholesaler processes multiple orders from retailers.

Wholesaler–Payment:

Tracks payments made or received by wholesalers.

Wholesaler–Report:

Each wholesaler can generate multiple reports for monitoring business performance.

Retailer–Order:

A retailer can place multiple orders, but each order belongs to one retailer (1–M relationship).

Retailer–Payment:

A retailer can make multiple payments, each tied to an invoice or order.

Order–Invoice:

Each order generates exactly one invoice (1–1 relationship).

Order–OrderItem:

An order can include multiple order items (1–M relationship), and order items cannot exist without an order.

Product–OrderItem:

Each product can appear in many order items, but every order item corresponds to one product (1–M relationship).

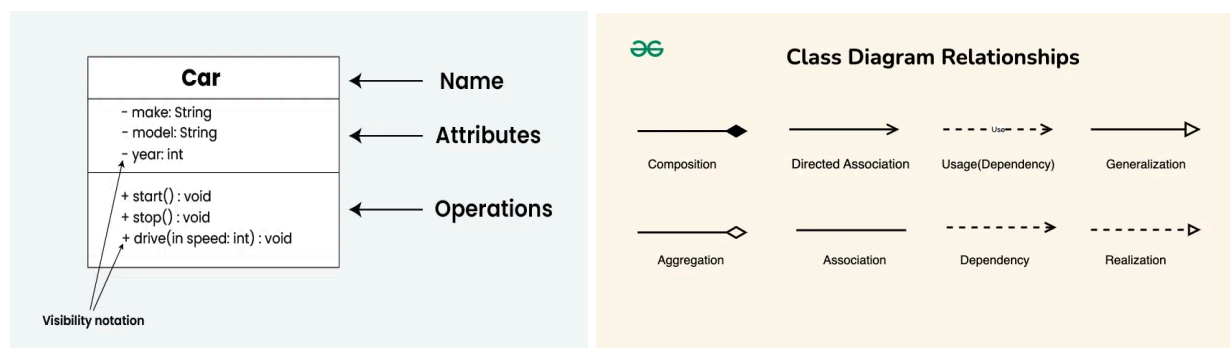
Order–Report:

Each order may produce a corresponding report for record-keeping and analysis.

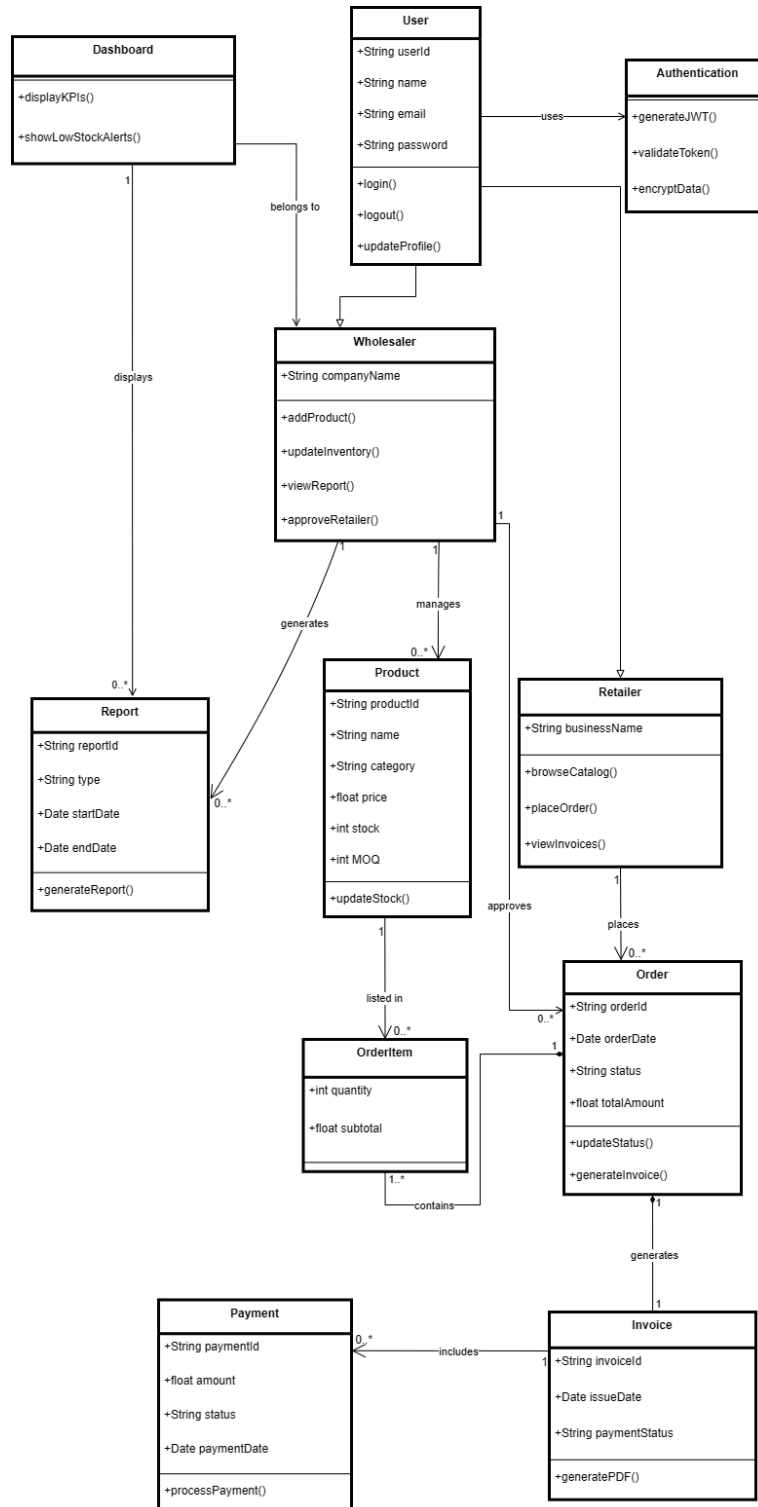
Class Diagram

The Class Diagram shows the object-oriented structure of the wholesaler–retailer system. It defines classes, their attributes, and methods to represent real-world entities. Relationships like association, aggregation, and composition link these classes. It visualizes how data and operations interact within the system. Overall, it simplifies understanding and designing system behavior.

Notations:



Diagram



Main Classes

The Class Diagram defines the core components of the system as objects.

Below are the primary classes, their attributes, and their functions.

- **User:** This is a **base class** that holds common information for all users. It includes fundamental operations like logging in, logging out, and updating a profile. Both Wholesaler and Retailer inherit from this class.
- **Wholesaler:** A specialization of the User class, representing the seller. This class is responsible for managing the product catalog (addProduct, updateInventory) and monitoring business performance (viewReport).
- **Retailer:** Another specialization of the User class, representing the buyer. This class handles actions like browsing products (browseCatalog), making purchases (placeOrder), and viewing transaction histories (viewInvoices).
- **Authentication:** A service class that manages system security. It is responsible for creating and validating user sessions (generateJWT, validateToken) and securing data (encryptData).
- **Dashboard:** This class provides a high-level overview of business metrics for the wholesaler. It's used to display Key Performance Indicators (KPIs) and send important notifications, such as low stock alerts.
- **Product:** Represents an item available for sale. It contains details like ID, name, price, and stock levels. It also includes a method to update stock quantities.
- **Order:** This class captures a transaction initiated by a Retailer. It stores essential details like the order ID, date, status, and total amount. It includes operations to update its status and generate an associated invoice.

- **OrderItem:** This class represents a single line item within an Order. It links a specific Product to an Order and defines the quantity and subtotal for that item. An OrderItem cannot exist without an Order.
- **Invoice:** A financial document generated from an Order. It contains the invoice ID, issue date, and payment status, and can generate a PDF version for the user.
- **Payment:** This class records the financial details of a transaction. It tracks the payment amount, status, and date, and includes a method to process the payment.
- **Report:** This class is used to generate summaries of business activity. It can create different types of reports based on a specified date range to help wholesalers analyze performance.

Key Relationships and Their Meaning

The relationships in the Class Diagram illustrate how the different objects interact to form a cohesive system.

- **User <|-- Wholesaler / Retailer (Generalization):** Both Wholesaler and Retailer are specialized types of User. They inherit common attributes and operations from the User class but also have their own unique functionalities.
- **Wholesaler -- manages --> Product (Association):** A Wholesaler is responsible for managing multiple Product objects. This is a one-to-many relationship where one wholesaler can have many products.
- **Retailer -- places --> Order (Association):** A Retailer can place multiple Orders. This is a one-to-many relationship.
- **Wholesaler -- generates --> Report (Association):** A Wholesaler can generate multiple Reports to track sales and inventory.

- **Order -- contains --> OrderItem (Composition):** An Order is composed of one or more OrderItems. The OrderItem is entirely dependent on the Order for its existence; if an Order is deleted, its OrderItems are also deleted.
- **Order -- generates --> Invoice (Association):** Each Order generates one corresponding Invoice. This represents a one-to-one relationship.
- **Invoice -- includes --> Payment (Association):** An Invoice can have one or more Payments associated with it until it is fully paid.
- **User --> Authentication (Dependency):** The User class depends on the Authentication class to handle login and security functions. The Authentication class provides a service to the User but is not directly part of it.

REST API contracts (Swagger/OpenAPI) :

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Wholesalers (B2B Wholesale Portal API) 2.0.0 OAS 3.0

REST API Contract for B2B Wholesale Portal (Wholesaler & Retailer Web Application)

Servers

<https://api.b2bportal.com/v1> [Authorize](#)

Authentication

- POST** [/auth/register](#) Register new user (wholesaler or retailer)
- POST** [/auth/login](#) Login user
- POST** [/auth/logout](#) Logout user
- GET** [/auth/me](#) Get current logged-in user

Wholesaler Dashboard

- GET** [/dashboard/overview](#) Get overview of sales, stock, orders summary



Wholesaler Dashboard

GET

/dashboard/overview Get overview of sales, stock, orders summary



Retailer Dashboard

GET

/retailerDashboard/overview Get retailer dashboard data (orders, invoices summary)



Products

GET

/products Get all products (wholesaler view)



POST

/products Add new product



GET

/products/{id} Get product by ID



PUT

/products/{id} Update product details



DELETE

/products/{id} Delete a product



Orders

GET

/orders Get all orders (wholesaler view)



POST

/orders Create new order (manual by wholesaler)



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Swagger Editor

File Edit Insert Generate Server Generate Client About

Sign In to API HubTry API Hub

Orders

GET/ordersGet all orders (wholesaler view)

POST/ordersCreate new order (manual by wholesaler)

GET/orders/{id}Get single order by ID

PUT/orders/{id}Update order status (approve/reject/shipped)

GET/order-historyGet retailer's past orders

Customers

GET/customersGet all retailer profiles

GET/customers/{id}Get specific retailer by ID

Invoices

GET/invoicesGet all invoices (wholesaler view)

POST/invoicesGenerate invoice for order

GET/invoices/{id}Get invoice by ID

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Swagger Editor

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Sign In to API HubTry API Hub

Reports

GET/reports/salesGet sales report

GET/reports/inventoryGet inventory report

GET/reports/customersGet customer purchase report

Settings

GET/settings/profileGet profile details

PUT/settings/profileUpdate user profile

PUT/settings/passwordChange password

Catalog

GET/catalogGet available product catalog for retailers

GET/catalog/{id}Get single product details for retailer

Cart & Checkout

Swagger Editor has evolved! Codegen, save, and export features are now part of Swagger Pro.
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Swagger Editor

File Edit Insert Generate Server Generate Client About

Sign in to API Hub Try API Hub

GET /reports/customers Get customer purchase report

Settings

GET /settings/profile Get profile details

PUT /settings/profile Update user profile

PUT /settings/password Change password

Catalog

GET /catalog Get available product catalog for retailers

GET /catalog/{id} Get single product details for retailer

Cart & Checkout

GET /cart Get retailer's cart


POST /cart Add item to cart

DELETE /cart/{itemId} Remove item from cart

POST /checkout Checkout and create an order

Wireframe

Registration and Login Page




WMS

Wholesaler Management System

Create Account

Sign up for your wholesaler account

 Sign up with Google

Or continue with

First Name
John

Last Name
Doe

Email
john@company.com

Company Name
Your Company Ltd.

Password

Create Account

Already have an account? [Sign in](#)




WMS

Wholesaler Management System

Welcome Back

Sign in to your account

 Continue with Google

Or continue with

Login As

Select your role



Email


admin@wms.com

Password

Sign In

Don't have an account? [Sign up](#)

Products Page

**WMS**

Wholesaler Management

Main Navigation

Dashboard

Products

Orders

Customers

Invoices

Reports

Settings

Logout

A

Admin User

admin@wms.com


Products

Manage your product inventory

+ Add Product

Search products...

Filter



Premium Basmati Rice

25kg

Grains

₹2,450


per unit

In Stock

Stock Level

150 units

Edit



Wheat Flour 10kg

Flour

₹420


per unit

Low Stock

Stock Level

8 units

Edit



Refined Sugar 50kg

Sugar

₹2,100


per unit

Critical

Stock Level

3 units

Edit



Cooking Oil 15L

Oil

₹1,850


per unit

In Stock

Stock Level

45 units

Edit



Red Lentils 25kg

Pulses

₹1,650


per unit

In Stock

Stock Level

32 units

Edit



Black Pepper 1kg

Spices

₹650

per unit

Out of Stock

Stock Level

0 units

Edit

6

Total Products


2

Low Stock Items

1

Out of Stock

Orders Page

**WMS**

Wholesaler Management

Main Navigation

Dashboard

Products

Orders

Customers

Invoices

Reports

Settings

1

Pending Orders

1

Processing

1

Shipped

1

Delivered

Search orders by ID or customer...

Filter

All Orders

Order ID	Customer	Date	Items	Total	Priority	Status	Actions
ORD-001	Retail Plus Store	2024-01-15	5 items	₹25,400	High	Pending	<div><div></div><div></div></div>
ORD-002	Metro Supermarket	2024-01-14	12 items	₹18,900	Medium	Processing	<div><div></div><div></div></div>
ORD-003	Quick Mart	2024-01-14	8 items	₹32,100	Low	Shipped	<div><div></div><div></div></div>
ORD-004	City Grocers	2024-01-13	15 items	₹45,600	Medium	Delivered	<div><div></div><div></div></div>
ORD-005	Corner Store	2024-01-12	6 items	₹12,300	High	Packed	<div><div></div><div></div></div>
ORD-006	Fresh Mart	2024-01-11	20 items	₹67,800	Low	Cancelled	<div><div></div><div></div></div>

Logout

A

Admin User

admin@wms.com

Customers Page

WMS

Wholesaler Management

Logout

Admin User
admin@wms.com

Main Navigation

Dashboard

Products

Orders

Customers

Invoices

Reports

Settings

Customers

Manage your retailer relationships

+ Add Customer

3

Total Customers

2

Active Customers

1

Premium Customers

Retail Plus Store

Active

contact@retailplus.com

+91 98765 43210

Mumbai, Maharashtra

Total Orders

24

Total Spent

₹4,58,900

View Details

Metro Supermarket

Active

orders@metrosuper.com

+91 87654 32109

Delhi, NCR

Total Orders

18

Total Spent

₹3,21,450

View Details

Quick Mart

Premium

info@quickmart.in

+91 76543 21098

Bangalore, Karnataka

Total Orders


31

Total Spent

₹6,75,200


View Details


Invoices Page


**WMS**


Wholesaler Management


Main Navigation


 Dashboard


 Products

 Orders

 Customers

 Invoices

 Reports

 Settings

Invoices

Track payments and generate invoices

+ Create Invoice

1

Paid Invoices







1

Pending Payment

1


Overdue

Recent Invoices

Invoice ID	Customer	Date	Due Date	Amount	Status	Actions
INV-001	Retail Plus Store	2024-01-15	2024-02-14	₹25,400	Paid	<div></div>
INV-002	Metro Supermarket	2024-01-14	2024-02-13	₹18,900	Pending	<div></div>
INV-003	Quick Mart	2024-01-12	2024-01-27	₹32,100	Overdue	<div></div>


Retailer Portal


Home/Dashboard Page


**Retailer Portal**
Wholesale Shopping

Navigation

- Dashboard
- Product Catalog
- Shopping Cart
- Order History
- Invoices

 Cart

 Logout

 **R** Retailer User
retailer@company.com

Dashboard

Welcome back! Here's what's happening with your orders.

Total Orders

247

+12% from last month

Total Spent

₹2,43,567

+8% from last month

Pending Orders

8

2 processing, 6 in transit

Available Products

156

Across all categories

Recent Orders

ORD-001

1/15/2024

Delivered

₹1687.50

ORD-002

1/20/2024

In Transit

₹892.25

ORD-003

1/22/2024

Processing

₹2340.75

Featured Products

Premium Coffee Beans

₹24.99 per unit

In Stock

View

Organic Tea Leaves

₹18.5 per unit

Low Stock

View


Artisan Chocolate

₹32.75 per unit

In Stock


View


Product Catalog


**Retailer Portal**
Wholesale Shopping

Navigation

- Dashboard
- Product Catalog
- Shopping Cart
- Order History
- Invoices


 Cart


 Logout


 Retailer User


retailer@company.com

Product Catalog

 All








Premium Coffee Beans
High-quality arabica coffee beans

In Stock

Min: 10 kg

₹24.99/kg

View Details




Organic Tea Leaves
Premium organic tea leaves

In Stock

Min: 5 kg

₹18.5/kg

View Details



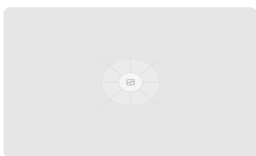
Artisan Chocolate
Handcrafted premium chocolate

Out of Stock

Min: 2 kg

₹32.75/kg

View Details



Organic Honey
Pure organic wildflower honey


In Stock

Min: 3 kg

₹45/kg


View Details


Shopping Cart


**Retailer Portal**
Wholesale Shopping

Navigation

- Dashboard
- Product Catalog
- Shopping Cart
- Order History
- Invoices


 Cart


 Logout

 Retailer User

retailer@company.com

Shopping Cart

 Continue Shopping



Premium Coffee Beans
₹24.99 per kg


-


50

+

kg

₹1249.50





Organic Tea Leaves
₹18.5 per kg


-

25

+

kg

₹462.50



Order Summary

Subtotal

₹1712.00

Tax (8%)


₹136.96

Total

₹1848.96


Proceed to Checkout


Order History


 **Retailer Portal**
Wholesale Shopping

Navigation

- Dashboard
- Product Catalog
- Shopping Cart
- Order History**
- Invoices

 Cart

 Logout

 **R**

Retailer User
retailer@company.com

Order History

Export Orders

Search by order ID or tracking number...

All Status

ORD-001

Delivered

Order Date: 1/15/2024
Items: 3
Tracking: TRK123456789

View Details

Invoice

₹1687.50

ORD-002

In Transit

Order Date: 1/20/2024
Items: 2
Tracking: TRK987654321

View Details

Invoice

₹892.25

ORD-003

Processing

Order Date: 1/22/2024
Items: 5

View Details

Invoice

₹2340.75

ORD-004

Pending

Order Date: 1/25/2024
Items: 1


View Details

Invoice

₹445.00

Your order is on the way! Track your package: TRK987654321

Invoices Page

Retailer Portal

Wholesale Shopping

Navigation

Dashboard

Product Catalog

Shopping Cart

Order History

Invoices

Cart

Logout

R

Retailer User

retailer@company.com

Invoices

Export All

Total Outstanding

₹3491.64

This Month

₹5794.74

Total Invoices

4

Search by invoice ID or order ID...

All Status

INV-2024-001

Paid

Invoice Date: 1/16/2024

Due Date: 2/15/2024

Order: ORD-001

Amount: ₹1687.50

Tax: ₹135.00

Total: ₹1822.50

View

Download PDF

INV-2024-002

Pending

Invoice Date: 1/21/2024

Due Date: 2/20/2024

Order: ORD-002

Amount: ₹892.25

Tax: ₹71.38

Total: ₹963.63

View

Download PDF

INV-2024-003

Overdue

Invoice Date: 1/23/2024

Due Date: 2/22/2024

Order: ORD-003

Amount: ₹2340.75

Tax: ₹187.26

Total: ₹2528.01

View

Download PDF

This invoice is overdue. Please make payment to avoid any service interruptions.

INV-2024-004

Draft

Invoice Date: 1/26/2024

Due Date: 2/25/2024

Order: ORD-004

Amount: ₹445.00

Tax: ₹35.60

Total: ₹480.60

View

Download PDF