Master of Science (IT) SEM – 10

Lok Jagruti Kendra University
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LJ Institute of Computer Applications

RetailIQ - Smart Retail Operations & Analytics Platform

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This is to certify that **Arnold Macwan** of MSc. IT, Semester 10, Roll no. B28 has satisfactorily completed his project with the title of **"RetailIQ - Smart Retail Operations & Analytics Platform"** under the supervision of guide.

Internal Guide: HOD:

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This is to certify that **Manthan Parmar** of MSc. IT, Semester 10, Roll no. B41 has satisfactorily completed his project with the title of **"RetailIQ - Smart Retail Operations & Analytics Platform"** under the supervision of guide.

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To whom so ever it may concern I/We, confirm that Project (document/PPT or Code) is my own work, is not copied from any other person's work (published or unpublished or generated using CHATGPT/AI, and has not previously submitted for assessment either at University or elsewhere. We confirm that we have read and understood the rules regulations on plagiarism in LJ University.

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Commitment Form

I/we assure that following are the components on which we worked in the said project titled **RetailIQ - Smart Retail Operations & Analytics Platform**. Further we confirm that, we have read and understood the rules and regulations of UFM in LJU.

Student 1.

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Name: Arnold Macwan

Sr.	Component	Sr.	Component

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Student 2.

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Name: Manthan Parmar

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Semester 9.

Project title: RetailIQ - Smart Retail Operations & Analytics Platform

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1. Introduction

The retail sector is undergoing in a massive **digital transformation** driven by the increasing need for efficiency, intelligent decision making and **data-driven operations**. Meanwhile the large organization leverage sophisticated use of AI-powered tools and automation techniques, but the small-medium size enterprises often rely manual processes and operations and traditional **POS – point of sale** systems.

RetailIQ is designed to bridge this technological gap by providing a smart and unified platform which combines all the management and processes with advanced analytics. The system empowers local shops, supermarkets, and fashion stores to manage inventory, track sales, monitor supplier performance, and understand purchase patterns — all in a centralized ecosystem.

1.1. Existing System

In the current retail environment, most small and medium-sized stores rely on traditional **Point-of-Sale** (POS) software or manual methods to manage their operations. These existing systems primarily focus on **basic functionalities** such as billing, inventory updates, and transaction recording. While effective for routine tasks, they **lack intelligent decision-support** capabilities. Retailers must manually analyse sales data, estimate future demand, and track stock levels, which often leads to *inaccuracies* and *inefficiencies*.

Overall, the existing system is **transactional** rather than analytical. It records data but does not help retailers interpret it for **strategic decisions**. As a result, retail operations become reactive, inefficient, and less competitive in the modern digital market.

1.2. Need for new system

With increasing competition and rapidly changing consumer behavior, retailers require more than just POS software—they need an **intelligent platform** that can transform raw data into actionable insights. This necessity creates a strong demand for a system like RetailIQ, which integrates **conventional** retail management with advanced analytics and AI-driven predictions.

The system is needed to:

- Enhance decision making
- Prevent stock-out
- Understand customer behavior
- Streamline business management
- Reduce human error

The **need for the system** arises from the growing demand for smart, analytical retail operations that can support better decision-making, reduce costs, and increase competitiveness.

1.3. Objective

The main objective of RetailIQ is to develop an intelligent, integrated platform that enhances retail operations through advanced data analytics and AI-powered decision support. The specific objectives include:

- Automate & optimize inventory management
- Advanced sales & profit analysis
- Data-driven decision making
- Enhance customer relations
- Improve accuracy
- Scalable and unified platform

Build an AI-driven, analytics-focused system that enhances decisions, optimizes inventory, improves sales strategies, and empowers retailers with insights previously accessible only to large enterprises.

1.4. Problem statement

Retail businesses, especially small and mid-sized stores, generate large volumes of transactional data through daily sales, purchases, and inventory movements. However, most retailers lack the tools and expertise to analyze this data effectively. These limitations prevent retailers from operating efficiently, understanding their customers, or forecasting future business needs. Therefore, the problem is the absence of a unified, smart retail management system that not only handles operations but also provides predictive analytics, actionable insights, and intelligent decision support for modern retail environments.

1.5. Scope of the project

The scope of RetailIQ encompasses the design, development, implementation, and evaluation of an intelligent retail management and analytics platform aimed at empowering small and mid-sized retail businesses. The project covers functional, non-functional, analytical, and technological aspects as described below.

I. Operational scope
   a. Inventory management
   b. Sales & Billing integration
   c. Supplier & purchase management

II. Analytical scope
   a. Demand forecasting
   b. Market basket analysis
   c. Stock prediction
   d. Interactive dashboards

III. User Scope

The system is intended for:

a. Local shop owners
b. Vendors, mini-markets
c. Retails stores

IV. Technical scope

a. Frontend interface
b. Backend services
c. API services
d. Database systems
e. Machine learning pipelines

V. Out of scope

a. Multi-store management
b. Real-time or barcode hardware systems
c. Integration with third part e-commerce systems

The project will deliver a functional, scalable platform capable of transforming traditional retail data into meaningful business intelligence.

1.6. Project profile

Project Name	RetailIQ
Frontend	HTML, CSS, JavaScript, ReactJS
Backend	ExpressJS, NodeJS
Database	MongoDB
ML Services	Python, FastAPI
Tools	VS Code, MS-Office

1.7. Core Components

Admin	Supplier	Customer	Store manager
• Login • Manage suppliers • Manage stores • Manage permissions • Analytics & monitoring • Pricing & Discounts • Reports • Logout	• Login • Manage purchases • Products & pricing • Communication • Profile management • Order analytics • Logout	• Login • Registration • Profile management • Past purchases • Feedbacks • Orders & Wishlist • Logout	• Login • Profile Management • Inventory management • Sales & Billing • Manage supplies • Sales dashboard • Store level Analytics • Logout

1.8. Assumptions & Constraints

➢ Assumptions

- Uploaded datasets will not contain malicious or corrupted files that break the system.
- Users will provide timely feedback during each iteration for improvements.
- The system will operate in an environment with stable internet connectivity, as it relies on external services/APIs.
- Users will have basic digital literacy to operate the dashboard, upload files, and understand analytical insights.
- Retailers will provide accurate sales, inventory, and purchase data, either through POS exports or manual uploads.
- Other historic data will be used for training model for stock/sales analysis and prediction if retailer does not have sufficient data.

➢ Constraints

- Computational resources (RAM, CPU) may restrict training of large ML models.
- Retailers unfamiliar with technology may require training to fully utilize analytics features.
- Lack of sufficient historical data may reduce forecasting performance.
- System performance may depend on server capabilities (processing time for large datasets).
- Web browser compatibility may limit advanced visualizations.
- The ML model accuracy may vary based on dataset size, seasonal variations, and store type.

1.9. Advantages & Limitations

➢ Advantages

- Data-driven decision making
- Improved inventory management
- Enhanced profitability
- Better customer segmentation and understanding
- Enhanced stock management

➢ Limitation

- Accuracy depends on data quality
- Can’t capture external market factors for model training
- Limited real-time analytics
- Lack of back-up service
- Multilingual support
- Low maintenance

2. Requirement determination & Analysis

Requirement determination and analysis is the process of gathering, studying, and validating the needs of users, stakeholders, and the system itself. This phase ensures that the project's objectives align with real-world retail operations and that the final system is both technically feasible and user-oriented.

For RetailIQ, requirement analysis focuses on understanding how retailers currently manage operations, what limitations they face, and what features are essential to build an effective, intelligent retail analytics platform.

2.1. Requirement determination

Requirement determination and gathering has been done through several methods and techniques such as:

- Interviews
- Observations of existing system
- Case studies
- Surveys/Feedbacks
- Industry research

2.2. Requirement analysis

After gathering information from different sources, the requirements are analyzed and broken into categories:

I. Functional requirement

a. Inventory management

- Add, Read, Update or Delete products
- Track stock levels automatically
- Identifying slow moving stocks
- Low-High stock alerts

b. Sales management
   - Upload and handle sales data
   - Generate reports
   - Identify sales trends
   - Billing and sales integration

c. Supplier management
   - Register suppliers
   - Manage purchase history
   - Track supplies

d. AI-ML module
   - Demand forecast
   - Market basket analysis
   - Stock/sales/profit prediction

e. Dashboard & Reporting
   - Interactive visuals & charts
   - KPI insights

f. User management
   - Login, Register authentication
   - Role based access control
   - Purchases
   - Interests

II. Non-functional requirement

a. Performance requirement
b. Reliability
c. Usability
d. Security
e. Scalability

III. User requirement

a. Easy product/inventory management
b. Sales analytics
c. Recommendation
d. Reports
e. Accessible

IV. System requirement

a. Standard PC with windows 10+ and stable internet connection
b. Python installed if needed in local PC
c. Cloude storage or other storage devices to store sales data

2.3. Targeted Users

The system primarily targets users who manage retail activities but lack access to advanced analytics or enterprise-level retail solutions.

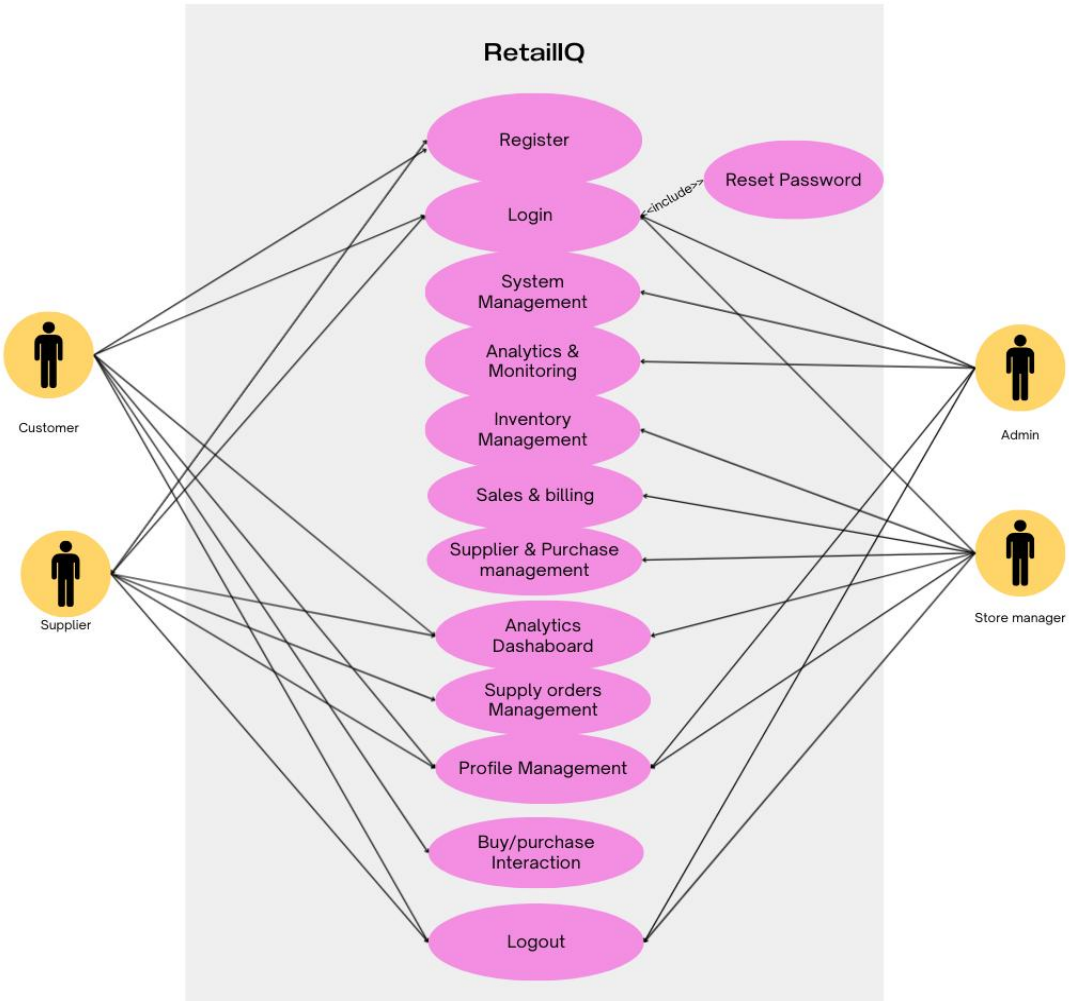
- Retail shop owners
- Supermarket store managers
- Retail data analyst
- Store managers & operational staff
- Suppliers & vendors (passive users)

With context of login or role-based users the system allows following users:

- Admin
- Customer
- Store Manager/staff
- Supplier

3. System Design

3.1. Use Case Diagram



3.2. Class Diagram