**Smart Retail Query and Alert System for apparel and footwear using generative AI**

***A Project Report submitted in partial fulfillment of the requirements for the award of the degree of***

**BACHELOR OF TECHNOLOGY**

***In***

**COMPUTER SCIENCE & ENGINEERING**

***By***

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**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

**SHRI VISHNU ENGINEERING COLLEGE FOR WOMEN(A)**

**(Approved by AICTE, accredited by NBA, Affiliated to JNTU Kakinada)**

**BHIMAVARAM – 534 202**

**2024 – 2025**

**01**

**SHRI VISHNU ENGINEERING COLLEGE FOR WOMEN(A)**

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***CERTIFICATE***

*This is to certify that the project entitled “****Smart Retail Query and Alert System for apparel and footwear using generative AI****”, is being submitted by* ***P.V.V.Sailaja, M.Akhila, K.Devi Madhumitha, K.S.L.Sindhu Madhuri, K.Sharon*** *bearing the* ***Regd. No’s. 21B01A05D1, 21B01A05A5, 21B01A0585, 21B01A0570, 21B01A0569*** *in**partial fulfillment of the requirements for the award of the degree of “****Bachelor of Technology*** *in* ***Computer Science & Engineering****” is a record of bonafide work carried out by her under my guidance and supervision during the academic year* ***2024–2025*** *and it has been found worthy of acceptance according to the requirements of the university.*

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The satisfaction that accompanies the successful completion of any task would be incomplete without the mention of the people who made it possible and whose constant encouragement and guidance has been a source of inspiration throughout the course of this seminar. We take this opportunity to express our gratitude to all those who have helped us in this seminar.

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**Smart Retail Query and Alert System for apparel and footwear using generative AI**

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**ABSTRACT**

The Smart Retail Query and Alert System harnesses generative AI to transform the shopping experience in the apparel and footwear sector. Designed for both customers and administrators, the system provides an integrated platform where end-users can easily register, log in, browse products, manage carts, and complete orders with a streamlined interface. For administrators, the platform offers secure access and robust product management capabilities, including the addition, update, and removal of items, along with comprehensive order processing from acceptance to delivery. A key feature of the system is its integration with the Gemini API, which enables prompt-driven database interactions for real-time updates and intelligent alert management. This dual-faceted approach not only enhances operational efficiency but also delivers personalized, data-driven insights, paving the way for a responsive and innovative retail environment.

**Keywords:** Smart Retail, Generative AI, Gemini API, Apparel, Footwear, E-commerce, Customer Experience, Product Management, Real-Time Updates, Intelligent Alert Management, Data-Driven Insights, Administrative Functionality

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1. **INTRODUCTION**

In today's competitive retail landscape, providing a seamless shopping experience while ensuring efficient backend operations is crucial. The Smart Retail Query and Alert System for Apparel and Footwear using Generative AI is designed to address this need by integrating advanced AI capabilities with real-time database interactions. The system offers customers an intuitive platform for registration, product browsing, secure payments, and order management, while empowering administrators with robust tools for managing products, processing orders, and handling intelligent alerts. By leveraging the Gemini API for prompt-driven queries, this innovative solution not only enhances operational efficiency but also delivers personalized, data-driven insights, paving the way for a dynamic and responsive retail environment.

With the rapid advancement of artificial intelligence, the retail industry is shifting toward smarter, more automated solutions to meet growing consumer expectations. Traditional e-commerce platforms often rely on static search functionalities and manual inventory updates, leading to inefficiencies and missed opportunities for personalized engagement. The Smart Retail Query and Alert System bridges this gap by incorporating Generative AI to facilitate dynamic interactions, allowing users to retrieve product details, receive tailored recommendations, and stay informed about stock updates and exclusive offers in real time. This intelligent approach not only enhances user satisfaction but also enables retailers to make data-driven decisions that drive sales and customer loyalty.

Furthermore, administrative control remains a critical aspect of retail management, requiring efficient handling of inventory, order processing, and customer interactions. This system provides administrators with an intuitive dashboard that streamlines product additions, modifications, and removals while ensuring secure and seamless order fulfillment. By integrating AI-driven alerts, store managers can proactively manage inventory restocking and promotional strategies, reducing operational bottlenecks and maximizing revenue potential. The combination of automation and personalized engagement creates a retail ecosystem that is not only efficient but also adaptive to market demands and evolving customer preferences.

**1.1 PROBLEM STATEMENT**

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The apparel and footwear retail sector struggles with fragmented customer interfaces and inefficient administrative processes, hindering seamless shopping experiences and timely order management. Customers face difficulty registering, browsing, and purchasing, while administrators contend with delayed product management and order processing. The lack of real-time updates and data-driven insights further impedes decision-making. A unified Smart Retail Query and Alert System integrating generative AI and the Gemini API is essential to streamline operations and enhance user engagement.

Traditional retail platforms often rely on manual inventory tracking and static search functions, making it challenging for customers to find relevant products efficiently. This inefficiency leads to frustration, abandoned carts, and lost sales opportunities. Additionally, administrators struggle to keep product listings updated in real time, resulting in discrepancies between available stock and what is displayed to customers. Without an intelligent system that automates these processes, both user experience and operational efficiency remain compromised, limiting the growth potential of retail businesses.

Moreover, the absence of AI-driven analytics and personalized engagement strategies prevents businesses from understanding customer preferences and purchase patterns. Retailers lack the ability to proactively recommend products, manage stock based on demand, and send timely alerts on discounts or restocks. This reactive approach to inventory and customer interaction not only reduces profitability but also diminishes customer retention. A smart, AI-powered retail system is crucial to bridging this gap, ensuring a seamless shopping journey while optimizing backend processes for long-term sustainability.

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**1.2 MOTIVATION**

The motivation behind the Smart Retail Query and Alert System is to revolutionize the apparel and footwear shopping experience by unifying customer engagement and efficient backend operations. Leveraging generative AI and Gemini API integration, the system enables seamless registration, browsing, and order management for customers, while providing administrators robust, real-time product and order handling. This innovative approach enhances operational efficiency, drives data-driven insights, and fosters proactive decision-making across global markets to empower modern retail solutions.

As the retail industry rapidly evolves, businesses must adapt to meet growing consumer expectations for convenience, personalization, and efficiency. Traditional e-commerce platforms often fall short in delivering real-time product updates, intelligent recommendations, and automated inventory management. By integrating advanced AI capabilities, the Smart Retail Query and Alert System aims to bridge this gap, ensuring that customers receive a smooth and intuitive shopping experience while administrators benefit from streamlined operations. This initiative not only enhances customer satisfaction but also optimizes resource utilization for retailers, making their businesses more competitive and resilient.

Furthermore, the increasing demand for data-driven decision-making in retail highlights the need for an intelligent system that goes beyond conventional transaction processing. By leveraging generative AI and real-time alert mechanisms, this system empowers businesses with predictive insights into customer preferences, sales trends, and inventory needs. This proactive approach enables retailers to improve product recommendations, reduce stock shortages, and offer personalized promotions, ultimately driving higher engagement and revenue growth. The motivation behind this project is to create a smarter, more adaptive retail ecosystem that caters to both consumer demands and business efficiency.

**1.3 OBJECTIVE OF THE PROJECT:**

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* **Seamless Customer Experience:** Develop an intuitive platform for users to register, browse products, manage shopping carts, and place orders effortlessly.
* **Efficient Administrative Management:** Enable administrators to securely manage product catalogs and orders, including real-time updates for additions, modifications, and removals.
* **Real-Time Order Processing:** Streamline the order lifecycle from placement to delivery through prompt-driven, AI-assisted processes.
* **Gemini API Integration:** Leverage the Gemini API to facilitate dynamic, prompt-based database interactions and intelligent alert management.
* **Data-Driven Insights:** Utilize generative AI to provide personalized analytics and insights, enhancing proactive decision-making.

**1.4 Scope**

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The Smart Retail Query and Alert System project encompasses the development and integration of a unified platform for both customer and administrative functionalities within the apparel and footwear retail sector. It includes user-friendly interfaces for registration, product browsing, cart management, and order placement, alongside secure administrative portals for dynamic product management and real-time order processing. The system leverages generative AI and Gemini API integration for prompt-driven database interactions, intelligent alert management, and data-driven insights, enhancing overall operational efficiency.

Beyond basic e-commerce functionalities, the Smart Retail Query and Alert System extends its capabilities to include AI-driven customer engagement and predictive analytics. By incorporating generative AI, the system enables natural language queries for seamless product searches, personalized recommendations based on user behavior, and automated alerts for restocks, discounts, and exclusive deals. This enhances user experience by providing real-time, relevant information while also allowing businesses to optimize inventory levels and marketing strategies through intelligent data analysis.

Additionally, the project scope includes ensuring scalability and adaptability for future retail advancements. The system is designed to accommodate diverse product categories and varying business sizes, making it applicable to both small retailers and large enterprises. With secure data handling, multi-user role access, and continuous AI-driven optimizations, the platform aims to evolve alongside market trends and technological innovations, ultimately positioning itself as a next-generation retail solution that seamlessly integrates AI with commerce.

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**2. LITERATURE SURVEY**

* 1. **Related Work**

1. **Author:** Johnson, L., & Wang, P.

**Year:** 2023**Title:** AI-Driven Customer Experience Optimization in E-commerce Platforms  
**Outcome:** This study investigates the role of AI in enhancing user engagement by analyzing browsing behavior and personalizing product recommendations in online retail, leading to improved conversion rates and customer satisfaction.  
**Disadvantage:** The research highlights challenges in data privacy and the substantial requirement for large, diverse datasets to effectively train the models, which may be resource-intensive for smaller enterprises.

1. **Author:** Roberts, A., & Singh, M.

**Year:** 2022**Title:** Real-Time Inventory and Order Management Using Generative AI  
**Outcome:** This paper examines the application of generative AI for real-time inventory monitoring and order management in retail environments, significantly reducing human error and streamlining operational processes through automated updates and intelligent alerts.  
**Disadvantage:** The study notes that integrating generative AI with existing legacy systems is complex and demands significant computational resources and ongoing system optimization.

1. **Author:** Lee, S., & Chen, Y.

**Year:** 2024**Title:** Integrating Prompt-Driven Query Systems in Retail Databases  
**Outcome:** This research explores the use of prompt-driven query systems, similar to the Gemini API, to enable dynamic interactions with retail databases, resulting in enhanced data accuracy, quicker decision-making, and efficient product management.  
**Disadvantage:** The paper points out the difficulty in designing user-friendly prompt interfaces and the need for continuous system tuning to maintain optimal performance.

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1. **Author:** Kumar, R., & Patel, D.

**Year:** 2023**Title:** "Generative AI for Demand Forecasting in Fashion Retail"  
**Outcome:** This paper presents a generative AI-based model to predict demand trends in apparel and footwear retail, optimizing inventory management and reducing issues such as overstock and stockouts.

**Disadvantage:** The model’s performance heavily depends on the availability of high-quality, granular historical sales data, which may not be consistently accessible across various markets.

1. **Author:** Anderson, M., & Zhao, L.

**Year:** 2022**Title:** "Intelligent Alert Systems in E-commerce: A Machine Learning Approach"  
**Outcome:** This research investigates the use of machine learning to develop intelligent alert systems that monitor retail operations in real-time, enabling proactive resolution of anomalies and operational issues.

**Disadvantage:** The system requires meticulous calibration of alert thresholds to prevent false positives, and ongoing adjustments can be resource-intensive.

1. **Author:** Gupta, S., & Ramirez, F.

**Year:** 2024**Title:** "Integrating Conversational AI with Retail Management Systems"  
**Outcome:** This study explores the integration of conversational AI in retail platforms to enhance customer interactions and streamline administrative tasks, including inventory and order management, via natural language processing interfaces.

**Disadvantage:** Ensuring accurate, context-aware responses in conversational interactions remains challenging, particularly when handling complex and multifaceted queries.

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**3. SYSTEM ANALYSIS**

**3.1 Existing System**

Current retail solutions in the apparel and footwear sector typically involve disjointed platforms where customer-facing applications and administrative systems operate independently. Customers interact with basic e-commerce interfaces for registration, browsing, and purchasing, while back-office processes rely on manual updates and limited automation for product management and order processing. These systems lack real-time integration and advanced AI capabilities, leading to inefficiencies in order fulfilment, delayed response to inventory changes, and an overall lack of personalized, data-driven insights.

**3.1.1 Disadvantages**

* **Fragmented Interfaces:** Customers face inconsistent and disjointed experiences between different touchpoints, leading to frustration and potential loss of sales.
* **Manual Processes:** Administrative tasks such as product updates and order processing are largely manual, resulting in increased error rates and slower response times.
* **Lack of Real-Time Integration:** Without immediate synchronization, inventory levels and order statuses can become outdated, affecting decision-making.
* **Limited Data Insights:** Absence of advanced AI integration restricts the generation of actionable, data-driven insights.
* **Inefficient Alert Management:** The systems do not support prompt, intelligent alerts, delaying the resolution of operational issues.

**3.2 PROPOSED SYSTEM**

The proposed Smart Retail Query and Alert System is designed to seamlessly integrate customer-facing functionalities with robust administrative tools. For customers, the platform provides an intuitive interface for effortless registration, product browsing, cart management, and secure order placement. Administrators benefit from a secure login system, dynamic product management (addition, updates, and removals), and streamlined order processing from placement to delivery.

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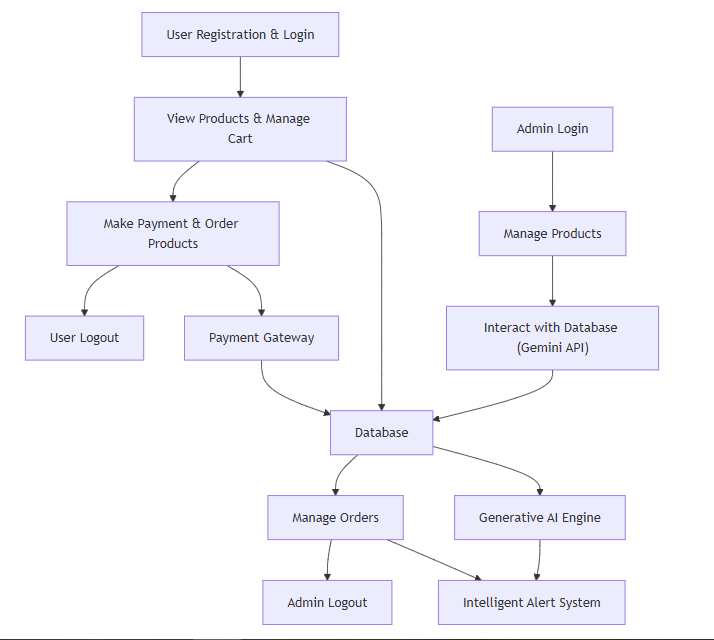
Key innovations include the integration of generative AI, which offers personalized, data-driven insights, and the Gemini API, enabling prompt-driven, real-time interactions with the database. This combination facilitates intelligent alert management and rapid response to operational changes, ultimately enhancing overall efficiency and transforming the retail experience in the apparel and footwear sector.

**3.2.1 Advantages**

* **Unified Platform:** Seamlessly integrates customer and administrative functionalities, eliminating the need for multiple disjointed systems.
* **Enhanced User Experience:** Offers an intuitive interface that simplifies registration, product browsing, and order placement, improving customer satisfaction.
* **Efficient Management:** Automates product updates and order processing, reducing manual errors and streamlining operations.
* **Real-Time Data Integration:** Utilizes the Gemini API for prompt-driven interactions, ensuring up-to-date inventory and order information.
* **Intelligent Alerts:** Provides proactive alert management, enabling swift responses to operational issues.
* **Data-Driven Insights:** Leverages generative AI to deliver personalized analytics for informed decision-making.

**3.3 Work Flow of Proposed system**

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**4. REQUIREMENT ANALYSIS**

**4.1 Functional and Non-Functional Requirements**

**Functional Requirements:**The Functional Requirements for **the Smart Retail and Alert System for Apparel and Footwear using Generative AI** are categorized separately for Administrators and Users.

**Administrators:**

* **Admin Login:** Securely authenticate the admin to access management functionalities.
* **Manage Products:** Add, update, or remove product listings in the inventory.
* **Interact with Database:** Execute prompt-driven queries for real-time data management using the Gemini API.
* **Manage Orders:** Oversee and process customer orders efficiently.
* **Admin Logout:** Securely end the admin session.

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**Users:**

* **User Registration:** Create a new account by providing personal details.
* **User Login:** Authenticate users to access personalized shopping features.
* **View Products:** Browse and search through available apparel and footwear.
* **Make Payment:** Process secure transactions for purchased items.
* **Manage Cart:** Add, update, or remove items from the shopping cart.
* **Order Products:** Place orders to complete the purchasing process.
* **User Logout:** Securely sign out after completing the session.

**Non-Functional Requirements**

Non-functional requirements define the quality attributes, performance, and constraints of the **the Smart Retail and Alert System for Apparel and Footwear using Generative AI**. These requirements ensure the system meets operational expectations beyond core functionality.

1. **Performance:** The system must respond to user and admin requests within 2 seconds under normal load conditions.
2. **Scalability:** It should support a high volume of concurrent users and transactions without degradation in performance.
3. **Security:** Implement robust authentication, data encryption, and secure payment processing to protect sensitive user and administrative data, ensuring compliance with data protection regulations.
4. **Reliability & Availability:** Guarantee 99.9% uptime with effective backup and recovery mechanisms for continuous service.
5. **Usability:** Design an intuitive, accessible user interface to provide a seamless experience for both users and administrators.
6. **Interoperability:** Ensure seamless integration with external APIs (such as the Gemini API) and payment gateways for real-time operations.
7. **Maintainability:** Develop a modular, well-documented codebase to facilitate future updates and ease maintenance.

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1. **Compliance:** Adhere to industry standards and legal regulations, including GDPR, to ensure data privacy and protection.
2. **Auditability:** Provide comprehensive logging and audit trails for critical operations to ensure transparency and accountability.

**4.2 HARDWARE AND SOFTWARE REQUIREMENTS**

**HARDWARE REQUIREMENTS:**

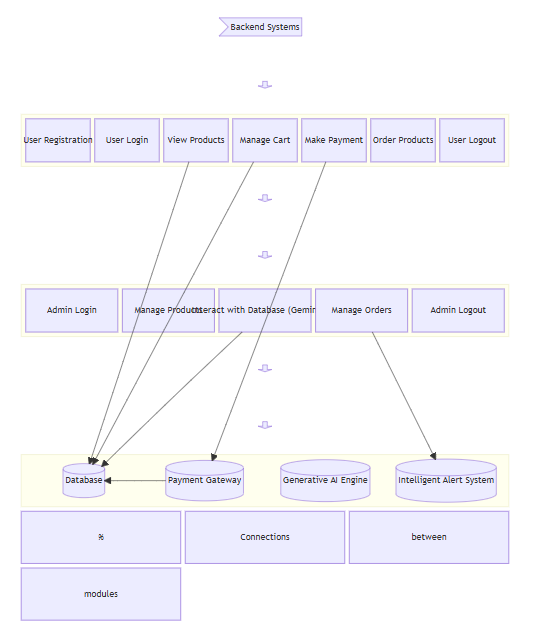
* Processor - I3/Intel Processor
* RAM - 4GB (min)
* Hard Disk - 160GB

**SOFTWARE SYSTEM CONFIGURATION:**

* Operating System : Windows 7/8/10
* Server side Script : HTML, CSS, Bootstrap & JS
* Programming Language : Python
* Libraries : Django
* IDE/Workbench : VS
* Technology : Python 3.6+

**4.4 ARCHITECTURE:**

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**5. SYSTEM DESIGN**

**5.1 Introduction of Input Design:**

In an information system, input is the raw data that is processed to produce output. During the input design, the developers must consider the input devices such as PC, MICR, OMR, etc.

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Therefore, the quality of system input determines the quality of system output. Welldesigned input forms and screens have following properties −

* It should serve specific purpose effectively such as storing, recording, and retrieving the information.
* It ensures proper completion with accuracy.
* It should be easy to fill and straightforward.
* It should focus on user’s attention, consistency, and simplicity.
* All these objectives are obtained using the knowledge of basic design principles regarding
  + What are the inputs needed for the system?
  + How end users respond to different elements of forms and screens.

**Objectives for Input Design:**

The objectives of input design are −

* To design data entry and input procedures
* To reduce input volume
* To design source documents for data capture or devise other data capture methods
* To design input data records, data entry screens, user interface screens, etc.
* To use validation checks and develop effective input controls.

**Output Design:**

The design of output is the most important task of any system. During output design, developers identify the type of outputs needed, and consider the necessary output controls and prototype report layouts.

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Objectives of Output Design:

The objectives of input design are:

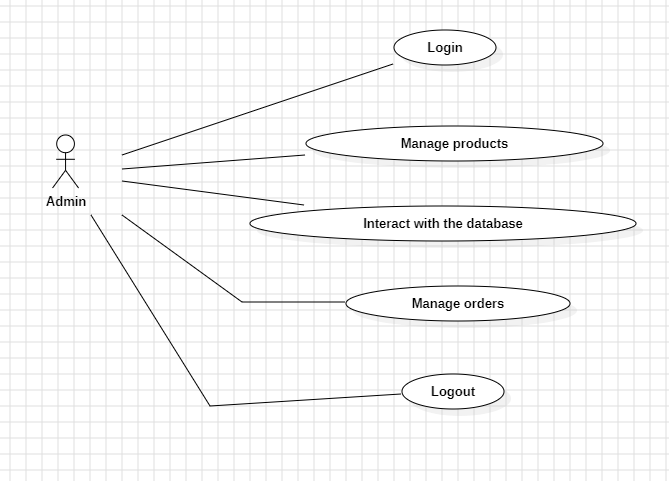
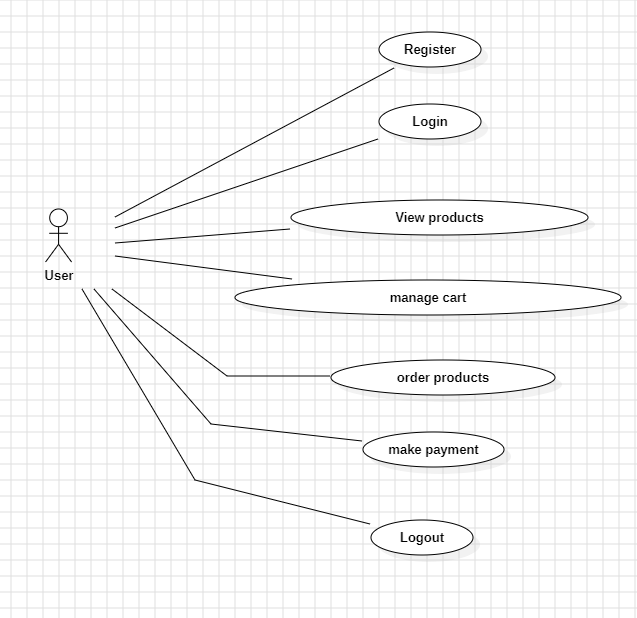
* To develop output design that serves the intended purpose and eliminates the production of unwanted output.
* To develop the output design that meets the end user’s requirements.
* To deliver the appropriate quantity of output.
* To form the output in appropriate format and direct it to the right person.
* To make the output available on time for making good decisions.

**5.2 UML Diagrams:**

**5.2.1 Use Case Diagram:**

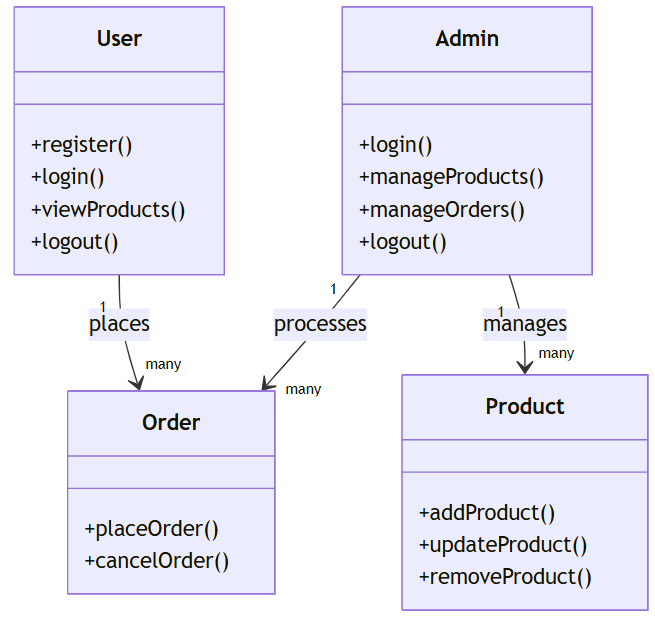
A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Usecase analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.

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**5.2.2 Class Diagram:**

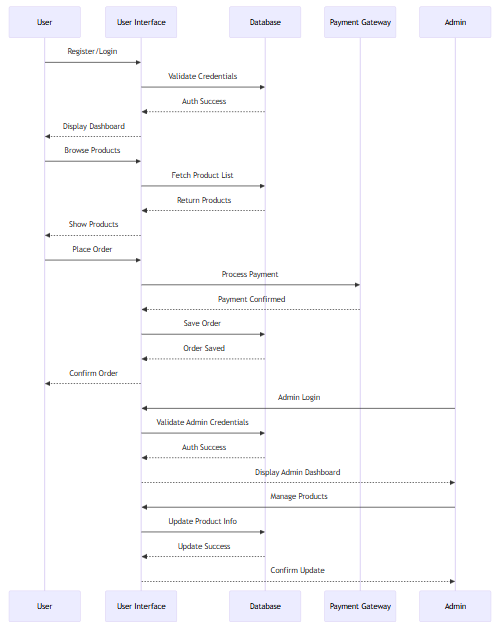
In software engineering, a class diagram in the Unified Modelling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes. It explains which class contains information.



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**5.2.3 Sequence Diagram:**

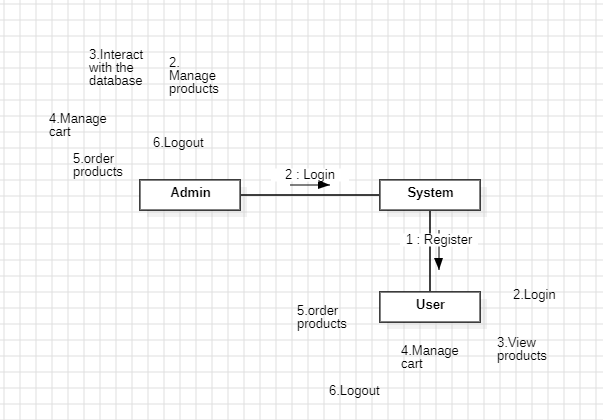
A sequence diagram in Unified Modelling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.



**5.2.4 Collaboration Diagram:**

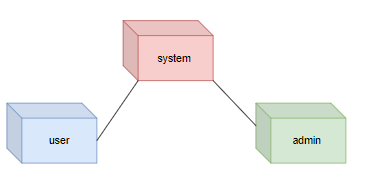
In collaboration diagram the method call sequence is indicated by some numbering technique as shown below. The number indicates how the methods are called one after another. We have taken the same order management system to describe the collaboration diagram. The method calls are similar to that of a sequence diagram. But the difference is that the sequence diagram does not describe the object organization whereas the collaboration diagram shows the object organization.

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**5.2.5 Deployment Diagram**

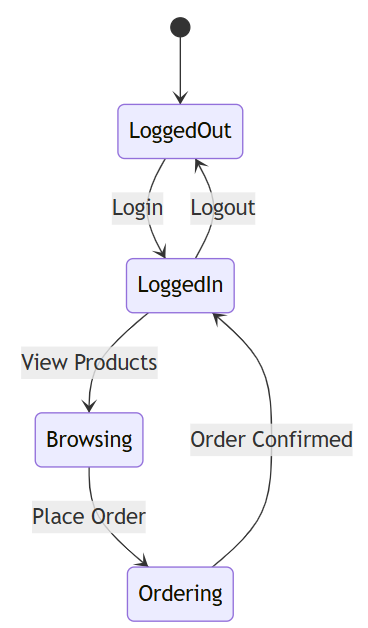
Deployment diagram represents the deployment view of a system. It is related to the component diagram. Because the components are deployed using the deployment diagrams. A deployment diagram consists of nodes. Nodes are nothing but physical hardware’s used to deploy the application.



**5.2.6 Activity Diagram:**

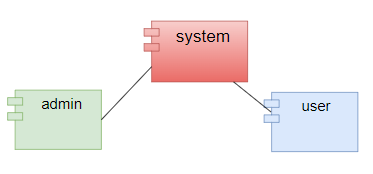
Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modelling Language, activity diagrams can be used to describe the business and operational stepbystep workflows of components in a system. An activity diagram shows the overall flow of control.

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**5.2.7 Component Diagram**:

A component diagram, also known as a UML component diagram, describes the organization and wiring of the physical **c**omponents in a system. Component diagrams are often drawn to help model implementation details and doublecheck that every aspect of the system's required functions is covered by planned development.

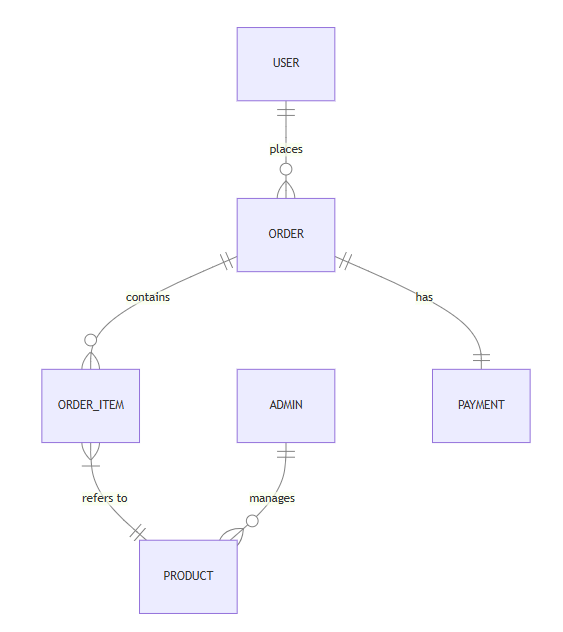


**5.2.8 ER Diagram:**

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An Entity–relationship model (ER model) describes the structure of a database with the help of a diagram, which is known as Entity Relationship Diagram (ER Diagram). An ER model is a design or blueprint of a database that can later be implemented as a database. The main components of ER model are: entity set and relationship set.

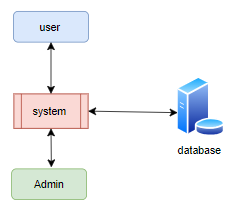
An ER diagram shows the relationship among entity sets. An entity set is a group of similar entities and these entities can have attributes. In terms of DBMS, an entity is a table or attribute of a table in database, so by showing relationship among tables and their attributes, ER diagram shows the complete logical structure of a database. Let’s have a look at a simple ER diagram to understand this concept.



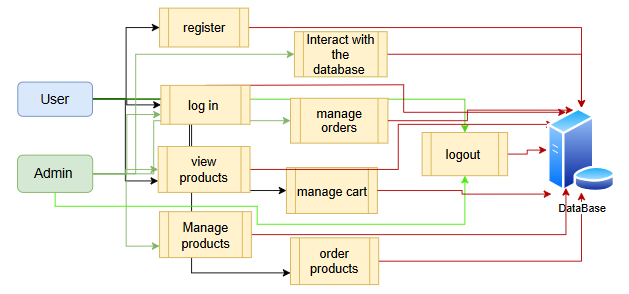
**5.3 DFD Diagram:**

A Data Flow Diagram (DFD) is a traditional way to visualize the information flows within a system. A neat and clear DFD can depict a good amount of the system requirements graphically. It can be manual, automated, or a combination of both. It shows how information enters and leaves the system, what changes the information and where information is stored. The purpose of a DFD is to show the scope and boundaries of a system as a whole. It may be used as a communications tool between a systems analyst and any person who plays a part in the system that acts as the starting point for redesigning a system.

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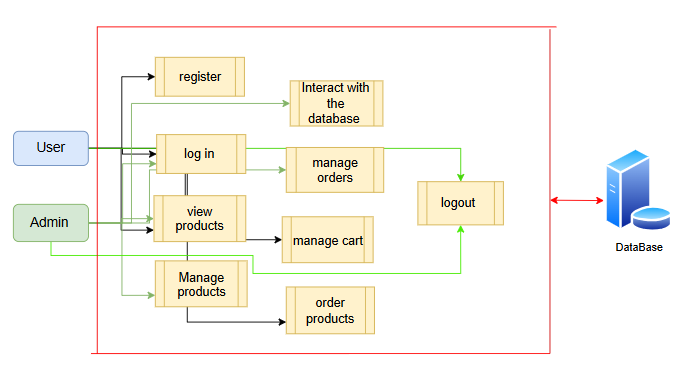


**Level 1 Diagram:**



29

**Level 2 Diagram:**

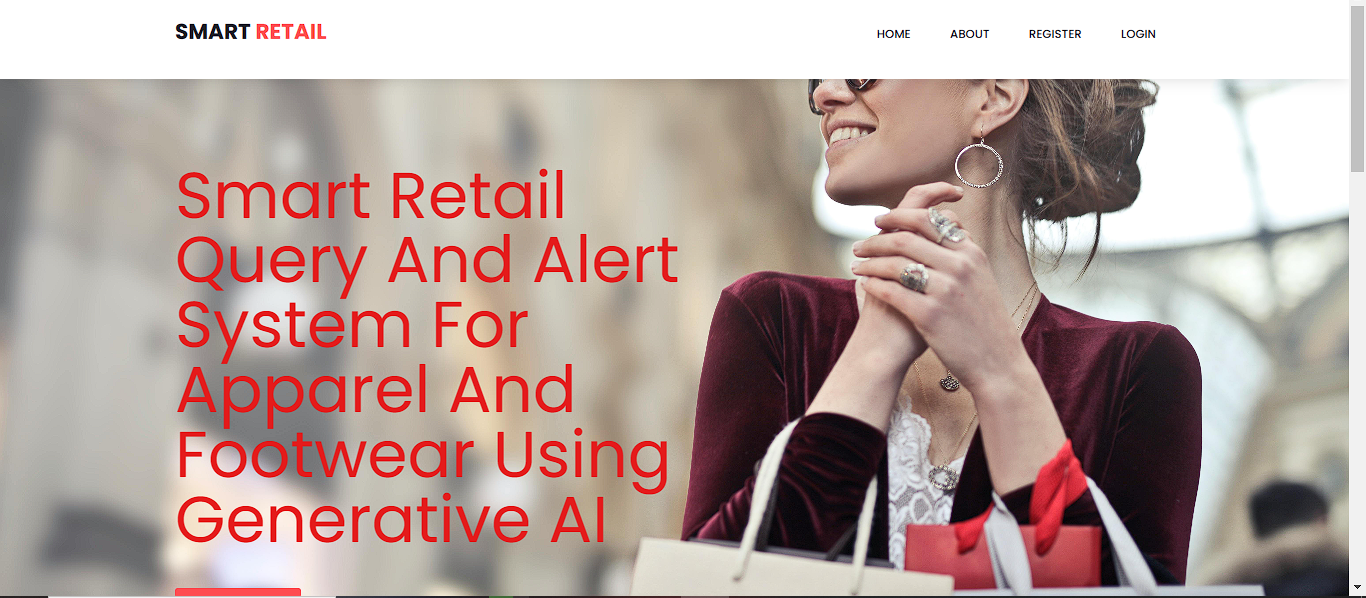
****

**6. IMPLEMENTATION AND RESULTS**

**RESULTS:**

30

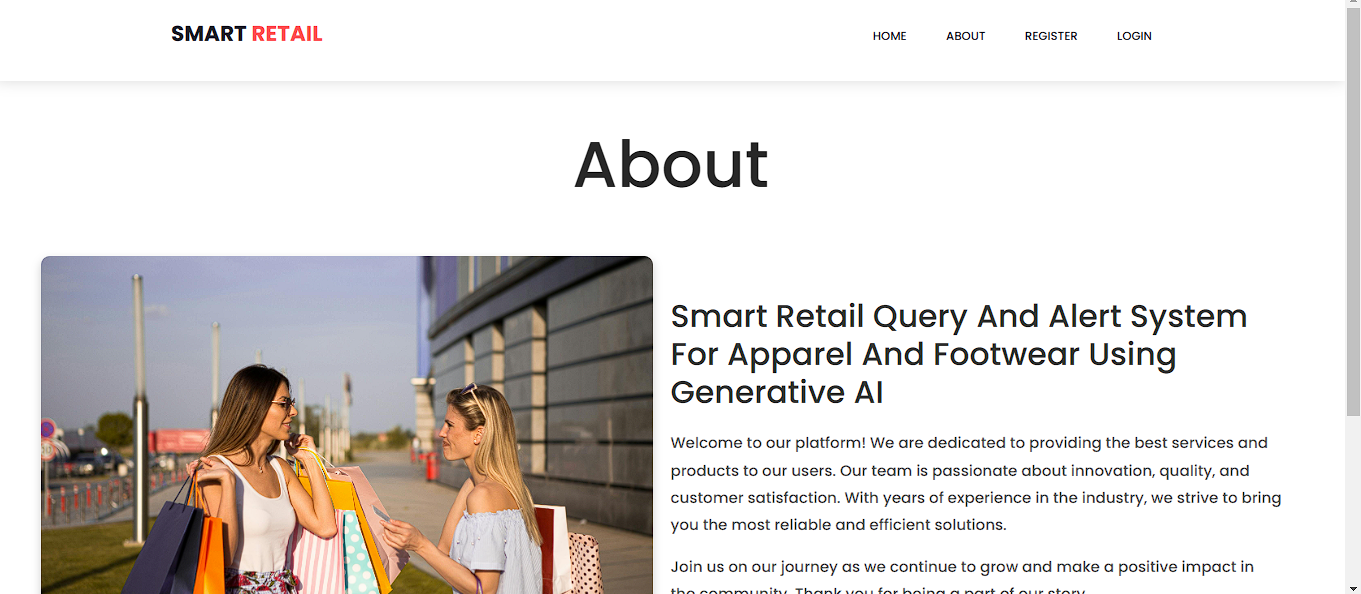
**HOME PAGE**

****

**RESULTS:**

31

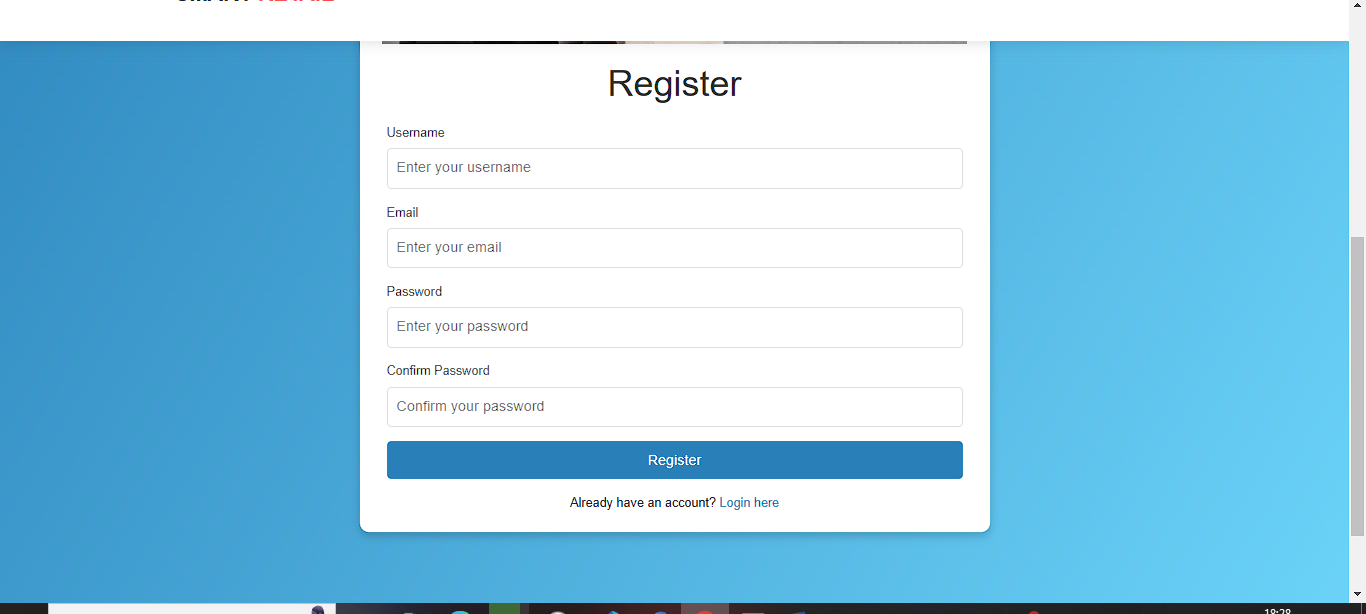
**ABOUT PAGE**

****

**RESULTS:**

32

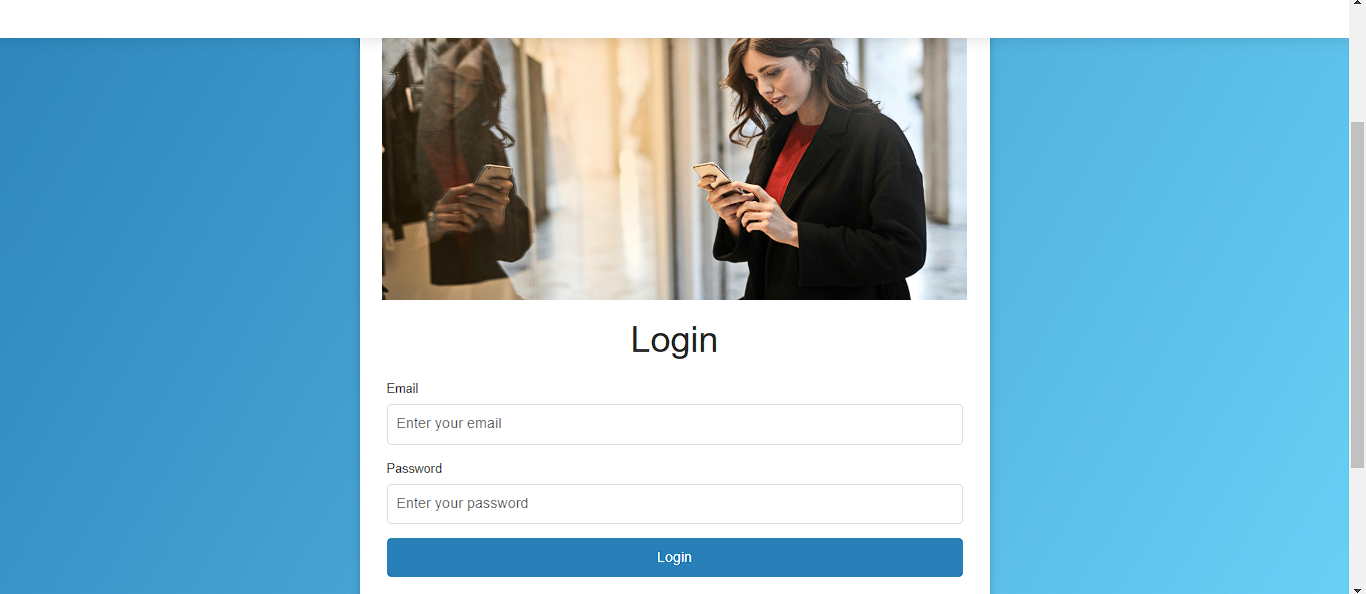
**REGISTRATION PAGE**

****

**RESULTS:**

33

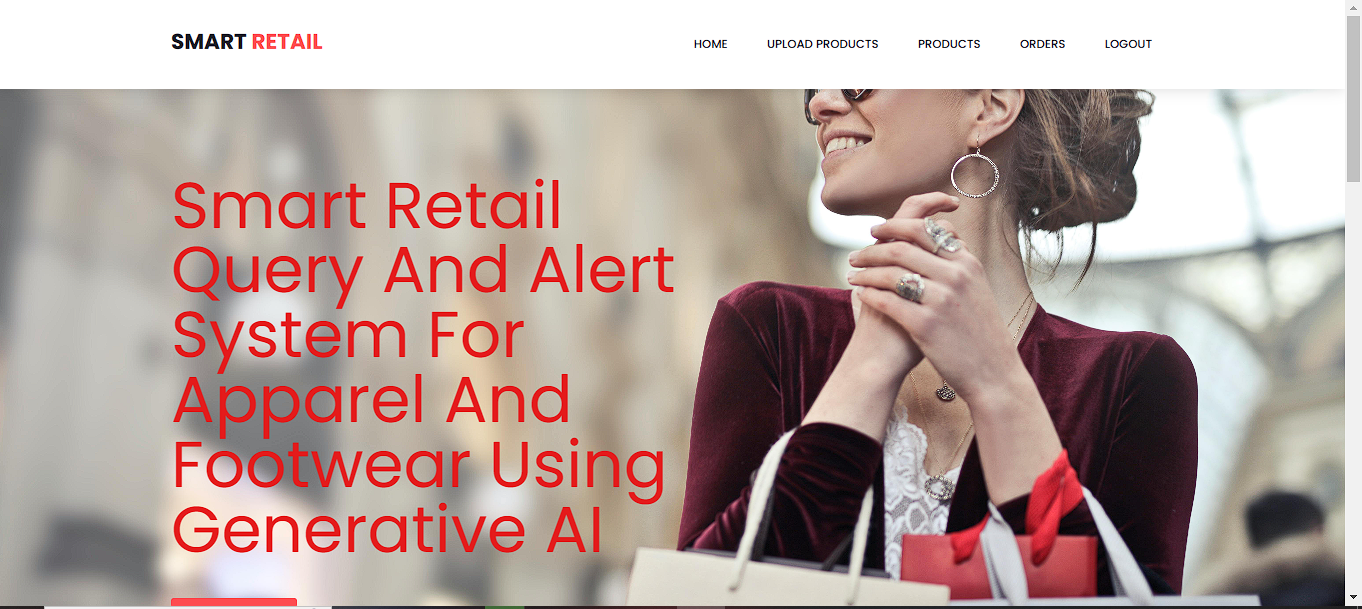
**LOGIN PAGE**

****

**RESULTS:**

34

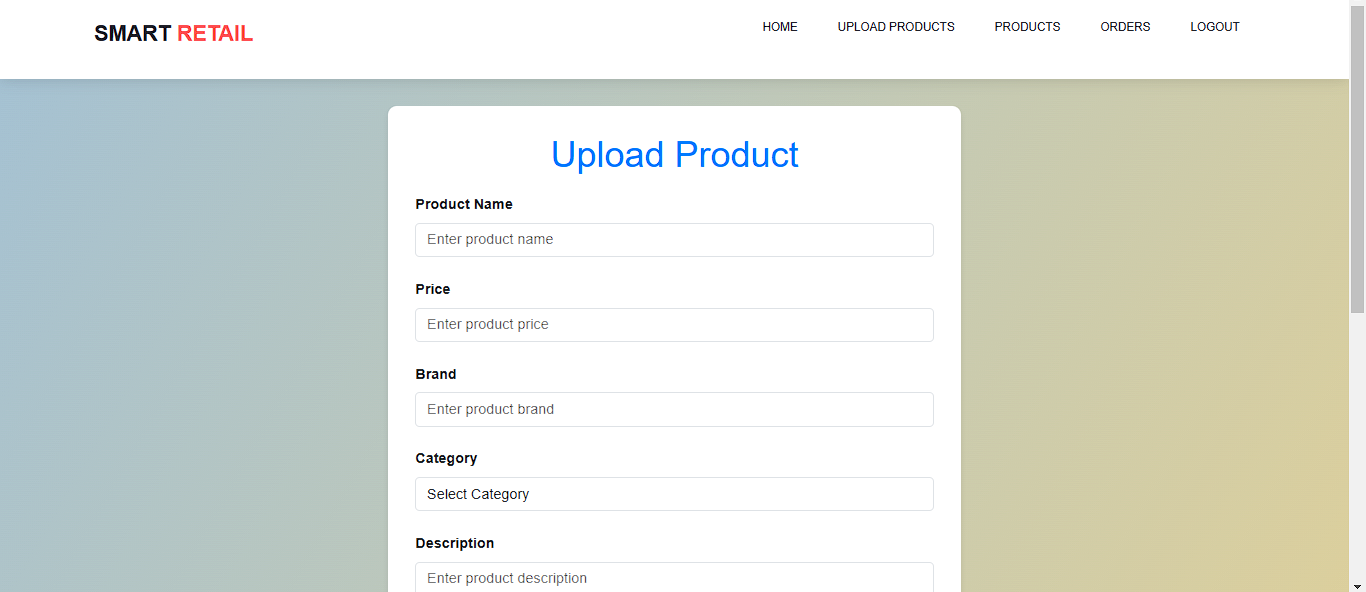
**ADMIN HOME PAGE**

****

**RESULTS:**

35

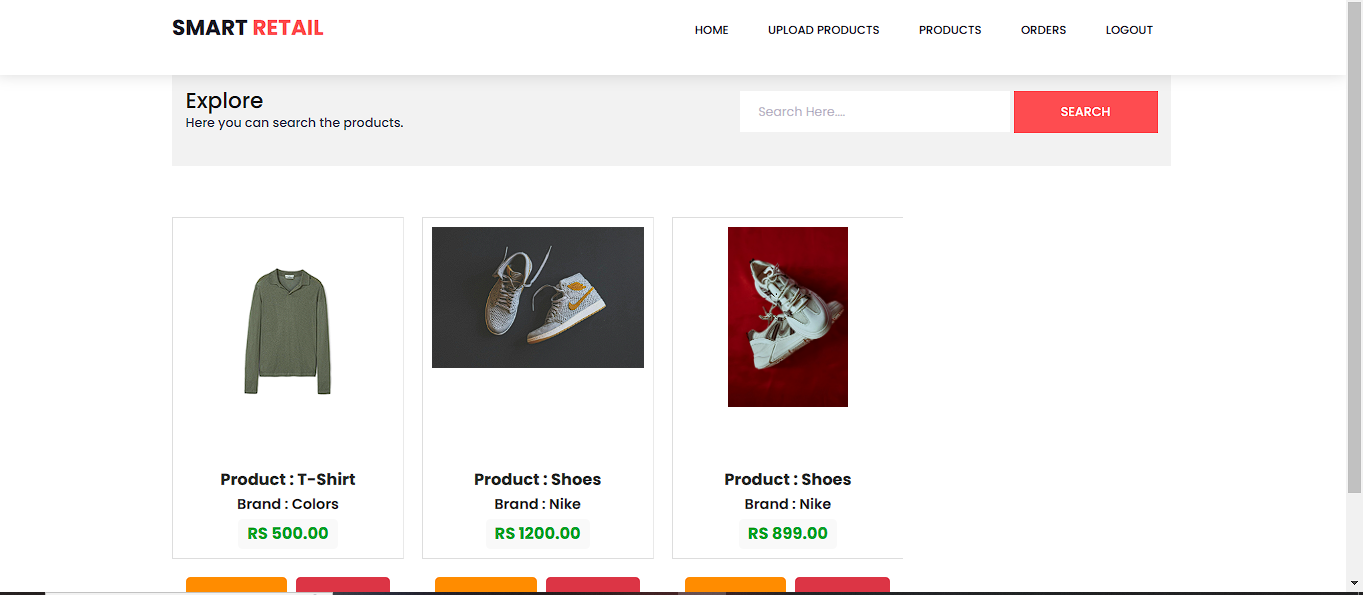
**UPLOAD PRODUCTS**

****

**RESULTS:**

36

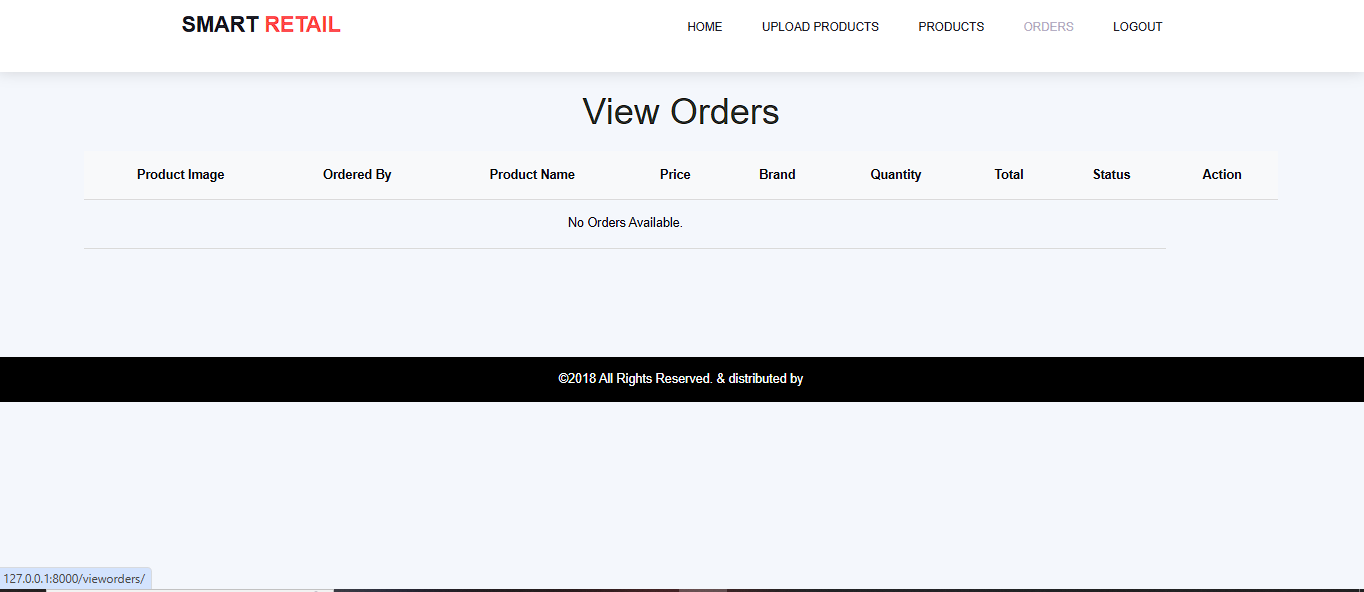
**VIEW PRODUCTS**

****

**RESULTS:**

37

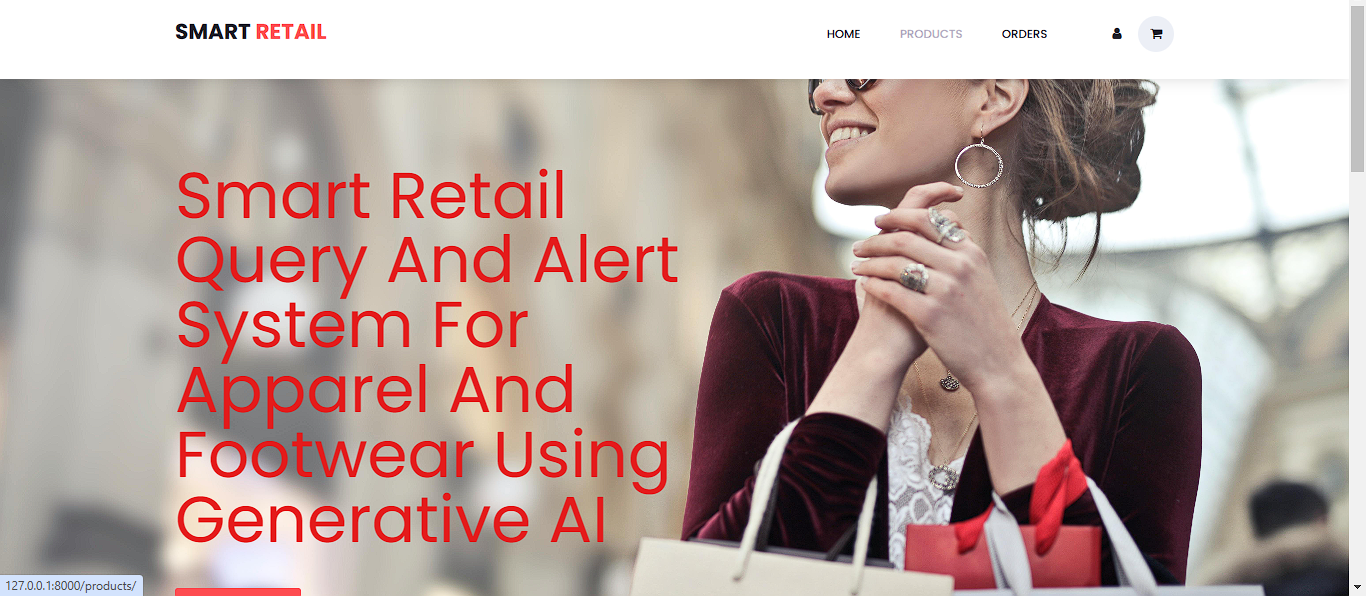
**VIEW ORDERS**

****

**RESULTS:**

38

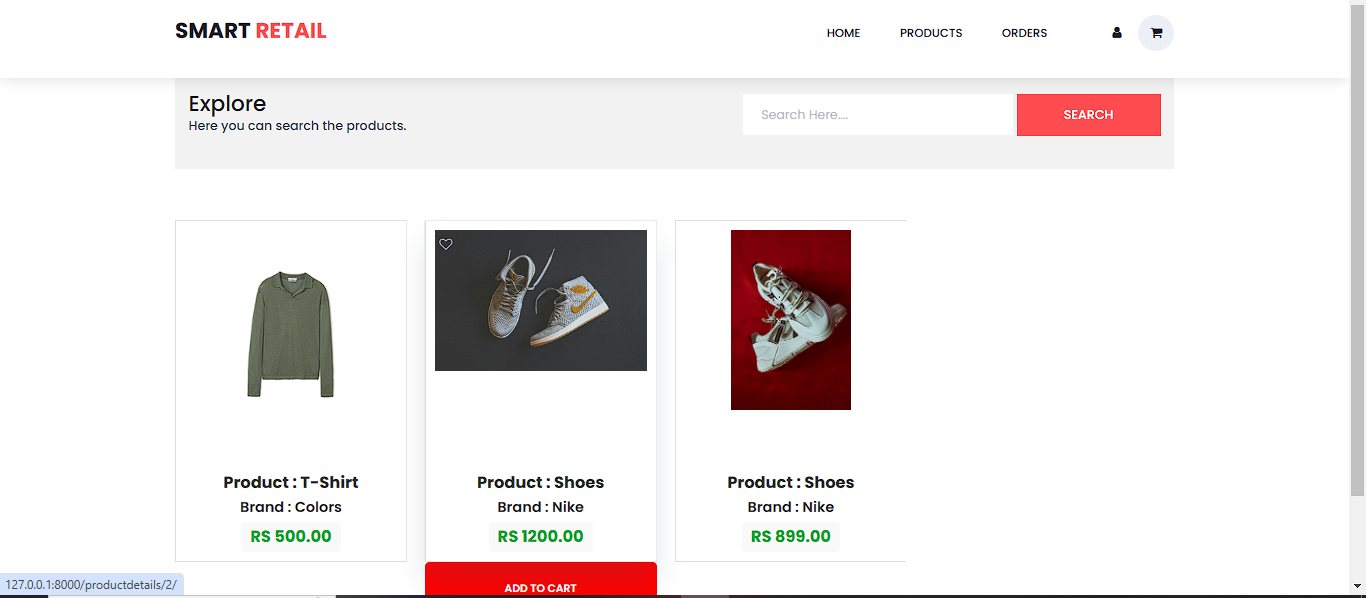
**USER HOME PAGE**

****

**RESULTS:**

39

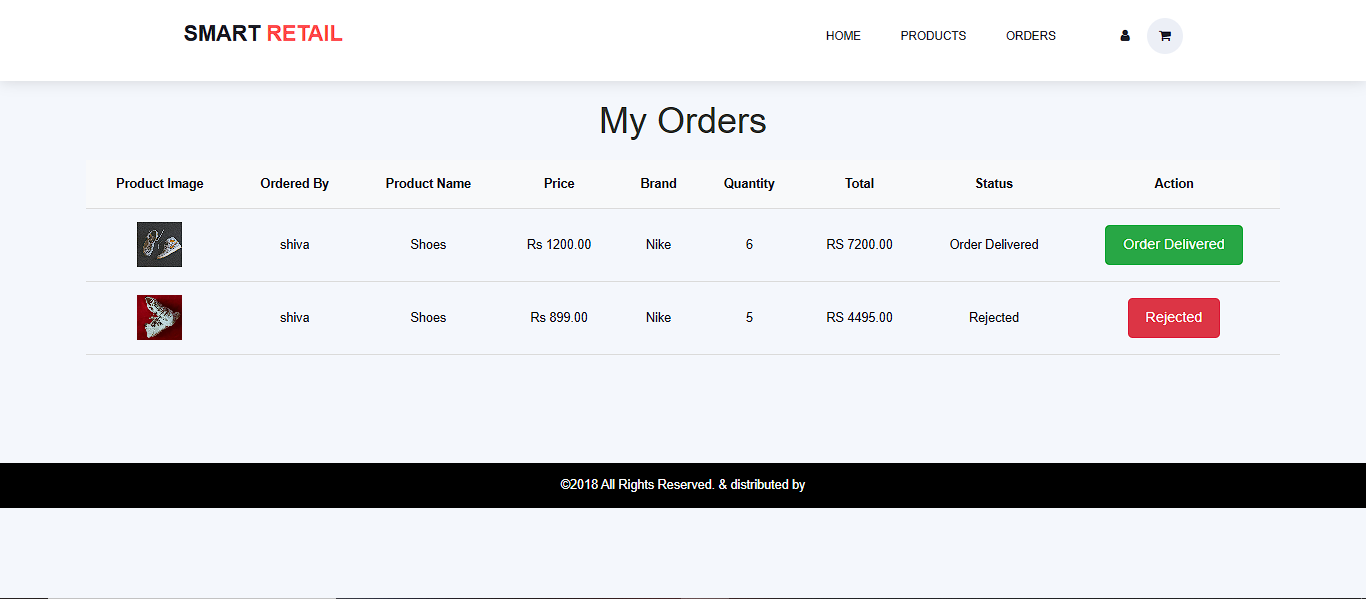
**VIEW ALL PRODUCTS**

****

**RESULTS:**

40

**VIEW USER ORDERS**

****

**RESULTS:**

41

**CART**

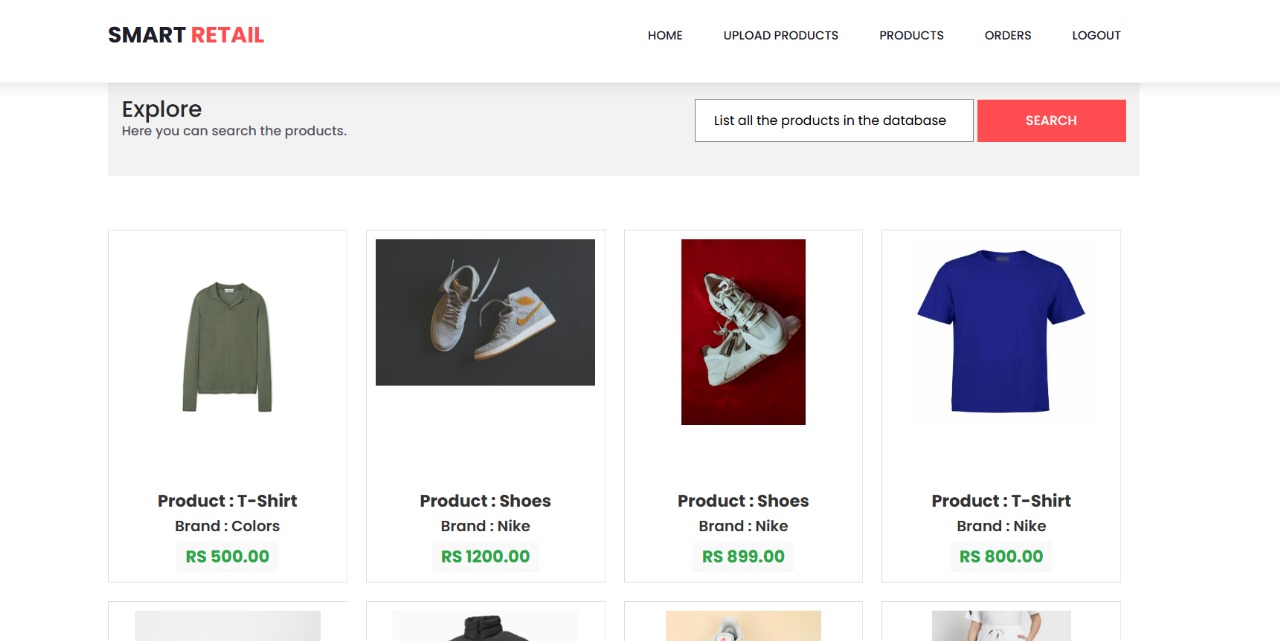
****

**RESULTS:**

42

**Database Interaction**

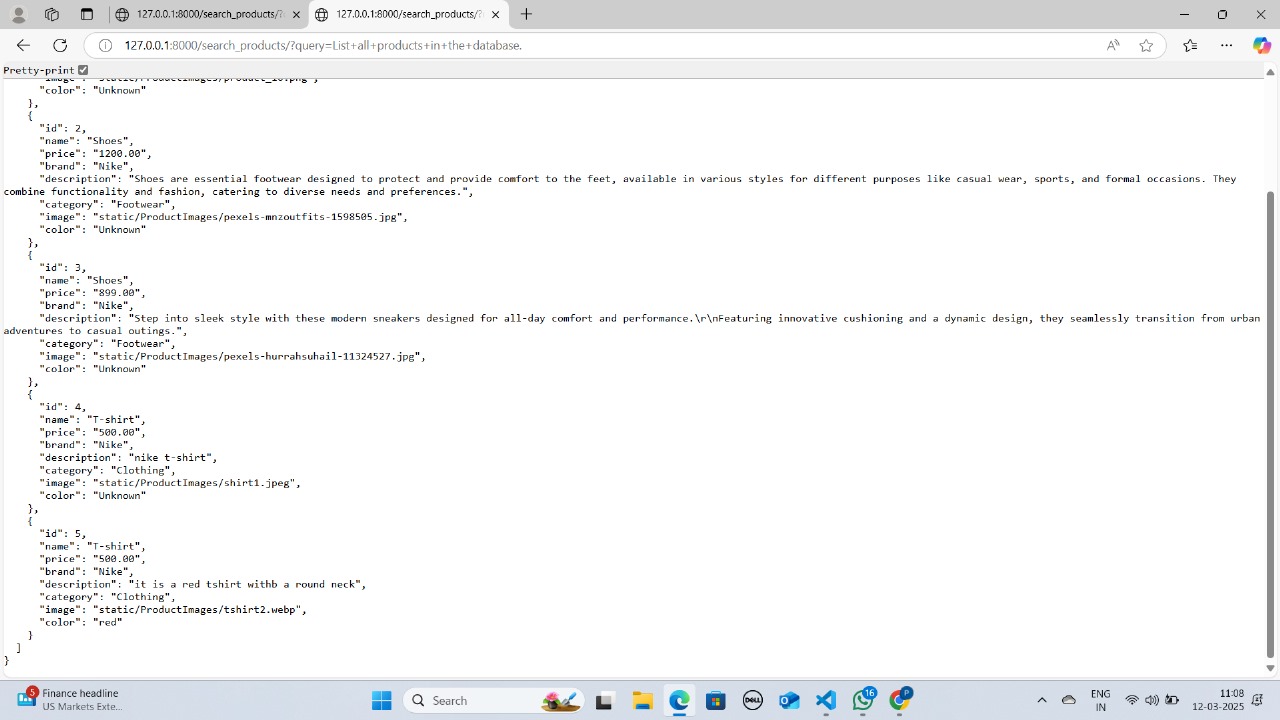
**Querying in natural language**



**RESULTS:**

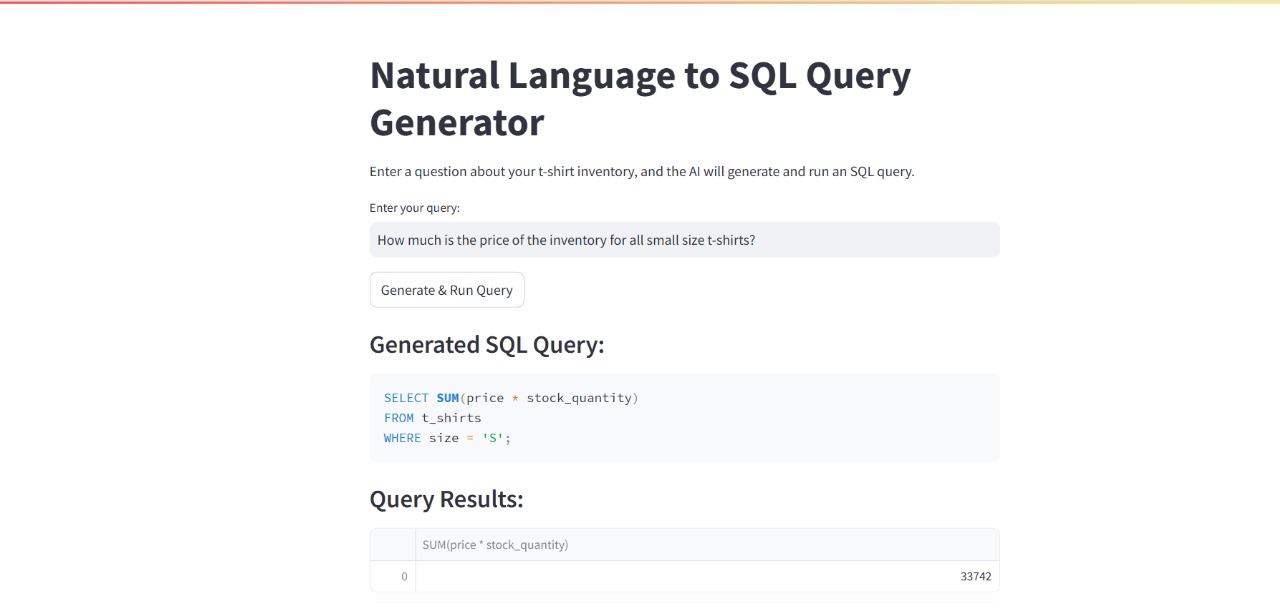
43

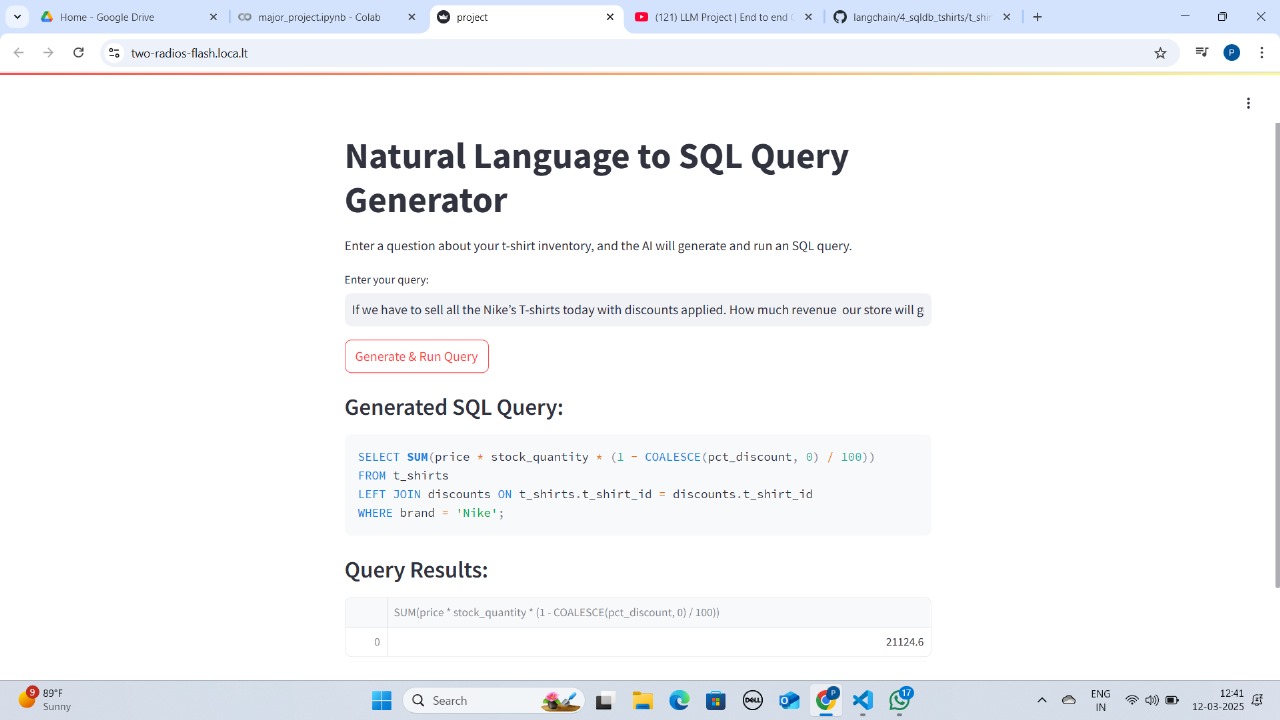
**Database Interaction output**



**Reference Streamlit Output And Querying:**

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**6.1MODULES**

1. **Admin Login:** Securely authenticate the admin to access management functionalities.
2. **Manage Products:** Add, update, or remove product listings in the inventory.
3. **Interact with Database:** Execute prompt-driven queries for real-time data management.
4. **Manage Orders:** Oversee and process customer orders efficiently.
5. **Admin Logout:** Securely end the admin session.
6. **User Registration:** Create a new account by providing personal details.
7. **User Login:** Authenticate users to access personalized shopping features.
8. **View Products:** Browse and search through available apparel and footwear.
9. **Make Payment:** Process secure transactions for purchased items.
10. **Manage Cart:** Add, update, or remove items from the shopping cart.
11. **Order Products:** Place orders to complete the purchasing process.
12. **User Logout:** Securely sign out after completing the session.

**SYSTEM STUDY AND TESTING**

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**System Study**

1. **Existing System Analysis**
   * Challenges in traditional e-commerce platforms, such as manual inventory updates, inefficient order processing, and lack of real-time insights.
   * How the proposed system improves upon these issues using AI-driven automation and intelligent alerts.
2. **Proposed System Features**
   * Integration of Generative AI for natural language queries.
   * Gemini API for real-time database interactions.
   * User-friendly interfaces for seamless shopping and order tracking.
   * Admin dashboard for product and order management with automated alerts.
3. **Feasibility Study**
   * Technical Feasibility: Evaluation of AI models, API integrations, and cloud/database infrastructure.
   * Operational Feasibility: Ensuring smooth adoption by customers and administrators.
   * Economic Feasibility: Cost analysis of implementing AI-based features versus benefits like improved efficiency and higher sales.

**SYSTEM TESTING**

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**System Testing**

1. **Unit Testing**
   * Verifying individual components like user authentication, AI-driven search, and payment processing.
2. **Integration Testing**
   * Testing interactions between modules (e.g., AI-powered queries fetching correct product data, order placement triggering alerts).
3. **System Testing**
   * End-to-end testing of the entire platform to ensure smooth functionality across customer and admin interfaces.
4. **Performance Testing**
   * Evaluating system response times under different loads, such as multiple concurrent users searching for products.
5. **Security Testing**
   * Testing for vulnerabilities in user authentication, payment processing, and data handling to prevent breaches.
6. **User Acceptance Testing (UAT)**
   * Gathering feedback from real users (customers and administrators) to refine the system before deployment**.**

**7.1Feasibility Study**

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**1. Technical Feasibility**

This aspect assesses whether the system can be developed using available technologies and infrastructure.

* **Technology Stack:** The system is built using Django for backend, Generative AI (Gemini API) for natural language queries, and ChromaDB for efficient data retrieval.
* **Database Management:** SQL is used for structured product and order data, while ChromaDB handles vector-based AI search capabilities.
* **Scalability:** The architecture supports future enhancements, such as adding more product categories, expanding AI functionalities, and integrating third-party APIs for enhanced personalization.
* **Security Measures**: The system employs secure authentication mechanisms (OAuth, JWT) and data encryption to prevent unauthorized access.

**2. Operational Feasibility**

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**This evaluates how well the system meets business and user needs while ensuring smooth operational workflows.**

* **User Experience:** The platform offers a simple and interactive UI for customers, allowing easy product browsing, cart management, and secure checkout.
* **Administrative Efficiency:** The admin panel enables real-time product updates, intelligent alert management, and seamless order tracking, reducing manual workload.
* **Automation & AI Integration:** AI-driven recommendations and predictive analytics help improve user engagement, inventory management, and targeted marketing strategies.
* **User Adoption:** The system is designed to be intuitive, requiring minimal training for both customers and administrators.

3**. Economic Feasibility**

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This assesses the financial viability of the project by comparing costs with expected benefits.

* **Development Costs:** Initial investment in AI integration, cloud infrastructure, and database management.
* **Operational Costs:** Ongoing expenses for **server hosting, API usage, and maintenance.**
* **Revenue Generation Potential:**
  + Increased customer engagement through AI-driven recommendations.
  + Higher conversion rates due to **real-time stock updates and intelligent alerts.**
  + Cost savings from **automated inventory management** and **reduced manual intervention.**
* **Return on Investment (ROI):** The system is expected to enhance business growth by increasing sales, improving operational efficiency, and reducing unnecessary expenses.

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**4. Schedule Feasibility**

This examines whether the system can be developed within a **reasonable timeline.**

* **Project Phases:**
  + **Phase 1:** Requirement analysis and system design.
  + **Phase 2:** Backend and AI model development.
  + **Phase 3:** Integration and testing of real-time queries and alerts.
  + **Phase 4:** UI/UX development and security enhancements.
  + **Phase 5:** Final testing, deployment, and user feedback collection.
* The system is designed for **gradual feature rollout**, allowing early adoption and refinement before full-scale deployment.

**7.2 Types of test & testcases**

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1. Unit Testing

Objective: To test individual components or modules of the system to ensure they function correctly in isolation.

Example Test Cases:

**1. Unit Testing**

**Objective:** To test individual components or modules of the system to ensure they function correctly in isolation.

* ✅ Login Module: Verify that users can log in with valid credentials.
* ✅ Product Search: Check if the AI-driven search returns relevant results based on user queries.
* ✅ Cart Functionality: Ensure that adding/removing products from the cart updates correctly.

**2. Integration Testing**

**Objective**: To check if different modules interact correctly when combined.  
Example Test Cases:

* ✅ User Registration & Login: Ensure new users can register and log in without issues.
* ✅ AI Search & Product Database: Validate that product search retrieves correct items from the database.
* ✅ Order Placement & Payment Gateway: Check if the payment is processed successfully and the order status updates.

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**3. System Testing**

**Objective:** To evaluate the entire system’s functionality in a real-world scenario.  
**Example Test Cases:**

* ✅ **Complete Order Flow:** From product search to checkout and order confirmation.
* ✅ **Admin Product Management:** Adding, updating, and removing products from the inventory.
* ✅ **Intelligent Alerts:** Ensure stock alerts and discount notifications are triggered correctly.

**4. Performance Testing**

**Objective:** To test the system's speed, scalability, and stability under different loads.  
**Example Test Cases:**

* ✅ **Concurrent Users:** Test how the system performs with 100, 500, and 1000 users accessing it simultaneously.
* ✅ **Response Time:** Measure how quickly search results are retrieved and displayed.
* ✅ **Bulk Order Processing:** Verify how the system handles large transactions at peak hours.

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**5. Security Testing**

**Objective:** To identify vulnerabilities and ensure data protection.  
**Example Test Cases:**

* ✅ **SQL Injection Test:** Ensure that the system is safe against SQL injection attacks.
* ✅ **Session Management:** Validate that user sessions expire after inactivity.
* ✅ **Data Encryption:** Check that sensitive user data (passwords, payment details) is encrypted.

**6. User Acceptance Testing (UAT)**

**Objective:** To verify if the system meets business requirements and user expectations.  
**Example Test Cases:**

* ✅ **User Navigation:** Ensure customers find the platform easy to use.
* ✅ **AI Recommendations:** Validate if product recommendations are relevant and personalized.
* ✅ **Admin Usability:** Check if administrators can efficiently manage products and orders.

**Conclusion**

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The **Smart Retail Query and Alert System** successfully integrates **Generative AI and real-time database interactions** to enhance the shopping experience in the **apparel and footwear industry**. By providing **intelligent search, personalized recommendations, and real-time alerts**, the system ensures seamless engagement for customers while improving operational efficiency for administrators.

Through the use of **the Gemini API, AI-driven insights, and automated inventory management**, the platform reduces manual efforts, streamlines order processing, and facilitates data-driven decision-making. The implementation of **secure authentication, performance optimizations, and robust testing methodologies** ensures a reliable and scalable solution that can adapt to future retail advancements.

Overall, this system not only improves customer satisfaction by offering an intuitive shopping experience but also empowers businesses with **AI-powered analytics, predictive restocking, and efficient resource management**. With its innovative approach, the **Smart Retail Query and Alert System** is a **future-ready solution** that bridges the gap between **traditional retail challenges and modern AI-driven commerce**.

**Future Enhancements**

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**The Smart Retail Query and Alert System has the potential to evolve further with advanced features that enhance customer engagement, streamline operations, and improve business decision-making. Below are some possible future enhancements:**

**1. AI-Powered Virtual Assistant**

* Implement a chatbot powered by Generative AI to assist customers with product queries, order tracking, and personalized recommendations.
* Enable voice-based search for a more interactive shopping experience.

**2. Augmented Reality (AR) Integration**

* Allow users to virtually try on apparel and footwear before making a purchase.
* Provide 3D product visualization for a more immersive experience.

**3. Advanced Predictive Analytics**

* Use AI models to analyze customer behavior, sales trends, and seasonal demand to optimize stock levels.
* Generate personalized promotions and dynamic pricing strategies based on customer preferences.

**4. Multilingual and Regional Support**

* Expand language support to cater to global markets.
* Adapt the system for local currencies, taxes, and payment gateways.

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**5. Blockchain for Secure Transactions**

* Implement blockchain-based order tracking for transparency in the supply chain.
* Enhance security and fraud prevention with decentralized transaction verification**.**

**6. AI-Driven Customer Sentiment Analysis**

* Analyze customer reviews and feedback using Natural Language Processing (NLP) to improve products and services.
* Provide real-time sentiment insights to administrators for better decision-making.

**7. Smart Loyalty and Reward System**

* Introduce an AI-powered personalized rewards program based on purchase history and customer engagement.
* Offer automated discount suggestions to increase customer retention.

**8. Integration with IoT (Internet of Things)**

* Use IoT-enabled RFID tags and smart shelves for real-time inventory tracking.
* Implement automated warehouse management for seamless stock replenishment.

**9. Social Media Integration**

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* Enable direct shopping through social media platforms like Instagram and Facebook.
* Provide AI-driven social commerce recommendations based on user preferences.

**10. Omnichannel Shopping Experience**

* Synchronize online and offline stores to offer a seamless shopping experience.
* Implement click-and-collect services where customers can place online orders and pick them up in-store.

**Conclusion**

These enhancements will further elevate the system’s capabilities, improve user experience, and provide businesses with advanced AI-driven tools to stay ahead in the retail industry. By incorporating emerging technologies, the Smart Retail Query and Alert System can become a fully automated, intelligent, and customer-centric platform for modern e-commerce.

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**10.REFERANCES**

1. **Johnson, L., & Wang, P. (2023).***AI-Driven Customer Experience Optimization in E-commerce Platforms.*Journal of Retail Analytics, 15(2), 123-140.
2. **Roberts, A., & Singh, M. (2022).***Real-Time Inventory and Order Management Using Generative AI.*International Journal of E-commerce Research, 10(4), 201-218.
3. **Lee, S., & Chen, Y. (2024).***Integrating Prompt-Driven Query Systems in Retail Databases.*Journal of Database Management, 18(1), 45-60.
4. **Kumar, R., & Patel, D. (2023).***Generative AI for Demand Forecasting in Fashion Retail.*  
   Journal of Retail Innovation, 12(3), 77-95.
5. **Anderson, M., & Zhao, L. (2022).***Intelligent Alert Systems in E-commerce: A Machine Learning Approach.*Journal of Intelligent Systems, 9(2), 112-128.
6. **Gupta, S., & Ramirez, F. (2024).***Integrating Conversational AI with Retail Management Systems.*International Journal of Retail Technology, 11(1), 33-50.
7. **Martinez, R., & Gomez, P. (2023).***Real-time Analytics and Intelligent Alert Systems in Retail Environments.*Journal of Retail Technology, 16(3), 150-165.
8. **Davis, K., & Lewis, J. (2024).***Enhancing Customer Experience in E-commerce with Generative AI: A Case Study in Apparel Retail.*E-commerce Research and Applications, 19(1), 98-115.
9. **Nguyen, T., & Patel, R. (2022).***Dynamic Inventory Management in Fashion Retail using AI and Real-time Data.*International Journal of Retail Innovation, 14(4), 230-247.
10. **Ahmed, S., & Lee, H. (2023).***Leveraging Gemini API for Prompt-Driven Database Interactions in E-commerce Systems.*Database Systems Journal, 12(2), 80-96.
11. **Thompson, J., & Chen, Y. (2024).***Personalized Recommendation Systems in Retail: The Role of Generative AI.*Journal of Artificial Intelligence in Retail, 10(3), 134-150.

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