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Smart Ration System Using Application Development

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ABSTRACT

The Smart Ration System is a web-based application designed to modernize and streamline the public distribution system by integrating digital technologies to serve ration card holders. With a focus on efficiency, transparency, and accessibility, the system introduces a virtual queuing mechanism that allows users to book slots remotely, reducing crowd congestion and minimizing waiting time at ration centers. The platform facilitates the distribution of essential commodities such as rice, wheat, and sugar while also supporting the use of ration cards for official documentation purposes. Through role-based access for users, dealers, and administrators, the system enables seamless slot booking, approval workflows, commodity management, and reporting. This project aims to enhance the delivery of public services by ensuring fair distribution and improving the user experience through a centralized, accessible digital interface. It leverages structured data handling and digital communication to support real-time interaction between stakeholders and ensure accountability within the distribution system.

1. INTRODUCTION

The main idea of this project is to develop a web application for ration card holders that brings efficiency, transparency, and convenience to the public distribution system.

The Smart Ration System introduces a virtual queuing mechanism, allowing users to wait remotely instead of standing in physical lines at ration centers. This reduces crowding and saves time for both users and staff.

The system aims to digitally manage the customer journey, providing users with access to essential services without being tied to a physical location or long queues.

This application not only helps consumers purchase essential commodities like sugar, rice, wheat, etc., but also supports the use of ration cards as address proof for various official purposes.

Existing System:

The existing ration system is largely manual and paper-based, involving long queues, physical verification, and limited digital infrastructure. Users must visit ration shops in person, often spending several hours waiting, regardless of stock availability or request status. Physical ration cards are used as identity proof, which can be damaged or misused, and the authentication process is weak.

Proposed System:

The proposed system is a web-based Smart Ration System designed to digitize and streamline the traditional public distribution process. It offers a centralized platform for ration card holders, store dealers, and administrators to interact efficiently. Users can log in securely to check item availability, request ration items online, and wait in a virtual queue instead of standing in line at ration centers. They can also track request status, view ration history, and receive real-time notifications about approvals and stock availability. Dealers manage inventory, approve or reject ration requests, and send alerts to users through the same system. Administrators oversee user registrations, manage dealers and monitor system-wide activity using reports and analytics. The system ensures transparency, reduces manual errors and delays, prevents misuse of resources, and enhances the overall user experience by making ration services more accessible, accountable, and user-friendly

2.RELATED WORK

2.1Survey:

While various digital solutions have been implemented to improve public distribution and e-governance, only a few have focused on fully integrated platforms that combine **virtual queuing**, **real-time notifications**, and **centralized management** for ration card services. Sharma and Kumar [1] proposed an Android-based ration distribution system that replaced manual processes with fingerprint authentication and QR code scanning. Although it improved user authentication, the lack of remote queuing limited its efficiency during peak hours.In a separate study, Mehta et al. [2] used a web-based interface integrated with an SMS notification system for informing users about ration availability. However, the system only supported basic inventory updates and lacked advanced features like virtual queueing or request tracking.Patel and Sinha [3] introduced a smart card–based ration distribution mechanism using RFID technology. While their hardware integration improved fraud prevention and ensured accurate identification, it required significant infrastructure costs and offered limited accessibility in rural areas with weak internet connectivity.. [4], who used decision trees to identify anomalous user behavior in ration usage data. Their model achieved 88.3%

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accuracy in predicting irregularities. Although effective for fraud detection, the study did not focus on improving user experience or remote access.In terms of queuing solutions, Iyer and Thomas [5] explored a virtual queuing system for healthcare appointment booking. The concept of remote queuing proved successful in reducing wait times and physical crowding, which aligns with the goals of the Smart Ration System. However, this was not applied in the context of ration services.Das et al. [6] implemented a multi-role web portal for agricultural subsidies, offering layered access for users, dealers, and administrators. Their modular structure inspired similar role-based access design for Smart Ration Systems. However, they lacked real-time notifications and deep analytics.A recent cloud-based distribution model by Fernandes and Rao [7] included dashboards for administrators and analytics-driven inventory forecasting..These studies highlight the growing interest in digital PDS modernization but also underline the **gap in fully integrated, user-centric platforms**. The **Smart Ration System** aims to fill this gap by combining virtual queuing, real-time updates, inventory control, and role-based access in a single web-based solution.its high memory requirements, the model was expensive.

3. REQUIREMENT ANALYSIS

Functional Requirements:

Users, Dealers, and Admins must be able to register and log in using unique credentials.Users can view their ration card information including family members. Users can view available stock at their assigned ration center and request available ration items (e.g., rice, wheat, sugar) within monthly limits.Users should be placed in a virtual queue upon request submission and receive updates accordingly. Dealers can view, add, update, and monitor inventory stock for different items.

The system should send notifications to users via in-app alerts.

Admins can manage user registrations, assign dealers to stores, and handle store details.

3.2 Non-Functional Requirements:

Data should be preprocessed before use—meaning all null values, inconsistencies, and outliers should be removed—prior to training or analysis. This ensures accuracy and consistency in service delivery and predictions.. While writing the code for the Smart Ration System, the software's performance, scalability, reliability, and security are key considerations to ensure that the platform remains robust and user-friendly under real-world conditions..

3.3.1 Software Requirements:

Database server : Mysql
Platform : VS Code
Client Side Technologies : Html, CSS, Java Script
Server side script : PHP
Operating System : Windows

3.3.2 Hardware Requirements:

Processor : I3 / Intel Processor
Ram : GB.
Hard Disk : 1TB

4.DESIGN

4.1.1System Architecture:

It describes the structure and behavior of technology infrastructure of an enterprise, solution or system. In other words, System architecture can be described as the flow of application which is represented below in the pictorial form. He purpose of system architecture activities is to define a comprehensive solution based on principles, concepts, and properties logically related to and consistent with each other. The solution architecture has features, properties, and characteristics which satisfy, as far as possible, the problem or opportunity expressed by a set of system requirements (traceable to mission/business and stake holders requirements).

System architecture is abstract, conceptualization-oriented, global, and focused to achieve the mission and life cycle concepts of the system. It also focuses on high-level structure in systems and system elements. It addresses the architectural principles, concepts, properties, and characteristics of the system-of-interest. It may also applied to more than one system, in some cases forming the common structure, pattern, and set of requirements for classes or families of similar or related systems.

The SEBoK considers systems engineering to cover all aspects of the creation of a system, including system architecture.

The majority of interpretations of system architecture are based on the fairly intangible notion of structure (i.e relationships between elements). Some authors limit the types of structure considered to be architectural: for example, restricting themselves to functional and physical structure. Recent practice has extended consideration to include behavioral, temporal and other dimensions of structure.

ISO/IEC/IEEE 42010 Systems and Software Engineering – Architecture Description (ISO 2011) provides a useful description of the architecture considering the stakeholder concerns, architecture

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viewpoints, architecture views, architecture models, architecture descriptions, and architecting throughout the life cycle.

A discussion of the features of systems architectures can be found in(Maier and Rechtin 2009). An attempt to develop and apply a systematic approach to characterizing architecture belief systems in systems engineering has been described by the INCOSE UK Architecture Working Group.

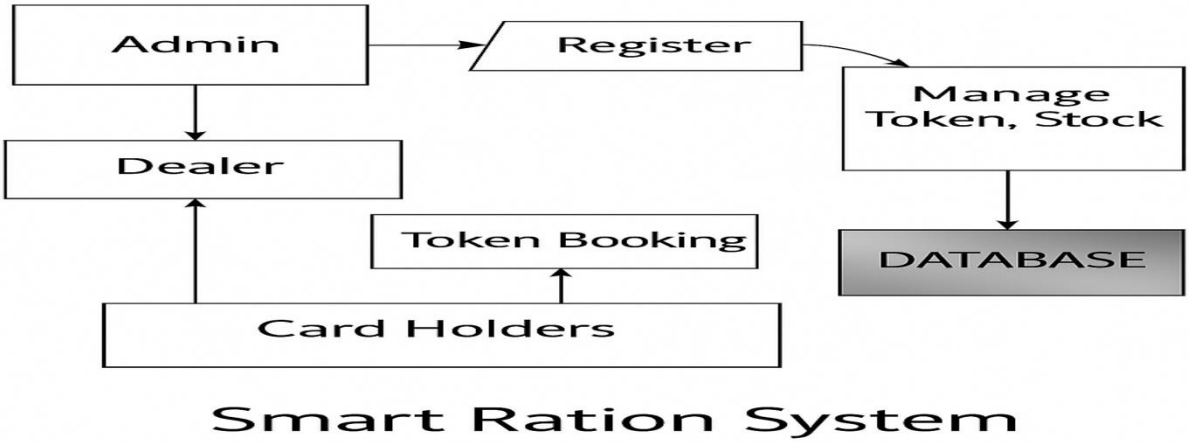

Fig 4.1.1.1 System Architecture

4.1.2Technical Architecture:

Technical Architecture refers to the structural process of designing and building system's architecture with focus on the users and sponsors view of the environment. Technology architecture associates application components from application architecture with technology components representing software and hardware components. Its components are generally acquired in the market place and can be assembled and configured to constitute the enterprise's technological infrastructure. A technical architecture diagram provide a bird's eye view of the infrastructure of our project. The diagram illustrates how components in a system interact with one another in the large scale of things. Technical Architecture (TA) is a form of IT architecture that ids used to design computer system. It involves the development of a technical blueprint with regard to the arrangement, interaction, and interdependence of all elements so that system-relevant requirements are met.

Throughout the past decade, architecture has become a broadly used term in the context of information technology. This doesn't come as a surprise considering how most companies had to redesign their IT landscape to adopt digital trends like cloud computing software as service (SaaS). This digital transition required not only skilled developing teams but first and foremost IT architects. In their roles as IT strategists and planners, they map out a target architecture and make sure that all IT decisions align with business goals and requirements.

But IT architecture encompasses a variety o different roles and disciplines that are sometimes difficult to tell apart. This is largely due to highly dynamic nature of IT, its widespread adoption throughout all industries and business that have developed their own practices. In general, there's differentiation between enterprise architecture, solution architecture and technology architecture. In order to understand what technology architecture means, it's helpful to examine the term architecture on its own.

At its core, the term architecture describes the formation of a structure by strategically assembling single components. In this process of assembling, the architect has to adhere to certain rules or requirements like legal constraints, financial constraints or scientific laws. In the world technology architecture design, the focus lies on technology limitations, meaning that a technology architect makes sure that a new application is compatible with the existing technology at a company by specifying things like the communications network or hardware that it uses.

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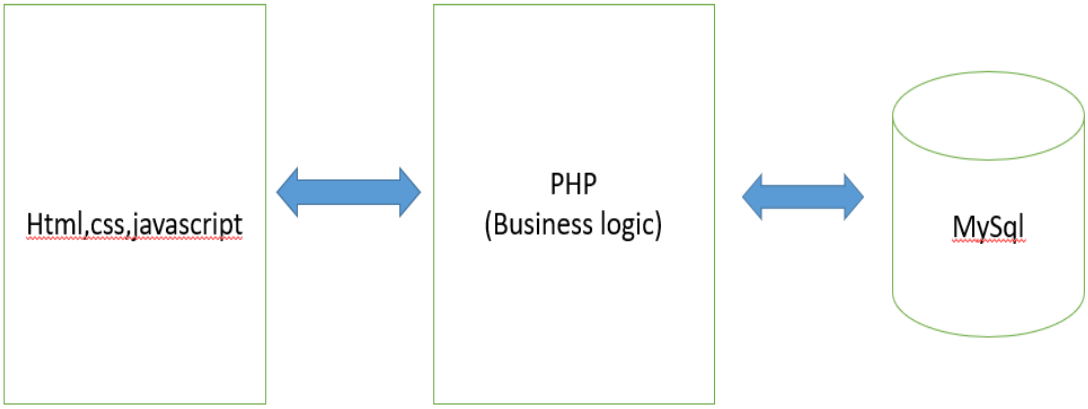

Fig. 4.1.2.1 Technical Architecture

5. IMPLEMENTATION

5.1 Libraries

- PHP:

PHP (Hypertext Preprocessor) is a widely-used open source general-purpose scripting language that is especially suited for web development. In this project, PHP is used for building the server-side logic, handling form data, database operations, session management, and routing users across pages based on authentication and authorization.

- *MySQLi:*

MySQLi (MySQL Improved) is the database driver used in this project for interacting with a MySQL database. It enables operations such as creating and executing SQL queries, prepared statements for secure data handling, and managing database connections. MySQLi provides object-oriented and procedural interfaces and supports advanced features like transactions.

- *HTML & CSS:*

HTML (HyperText Markup Language) is used for creating the structure of web pages, while CSS (Cascading Style Sheets) is used to style them. Basic layouts, forms, and tables are defined using HTML tags, and visual styling is done using CSS classes and properties.

- *JavaScript:*

JavaScript is used for adding interactivity and client-side validation in the application. It is used for tasks like dynamically updating the DOM, form validations, user confirmation prompts (e.g., before deleting a record), and real-time changes in UI without page reloads.

- *Bootstrap:*

Bootstrap is a popular front-end framework that simplifies the development of responsive and mobile-first websites. Many classes like form-control, btn, and table in the HTML suggest the usage of Bootstrap for layout, form design, and responsive styling.

- *Font Awesome:*

Font Awesome provides scalable vector icons that can be customized with CSS. It is commonly used to improve the visual appeal of UI elements, such as buttons, navigation menus, and dashboards. Icon classes like fa-user, fa-sign-out-alt, and fa-tachometer-alt indicate its use.

- **jQuery:**

Some dynamic client-side scripts (like manipulating DOM elements) suggest the possibility of jQuery being used to simplify JavaScript coding, especially for AJAX calls, event handling, and UI interactions.

- **XAMPP / LAMP Stack:**

XAMPP (or a similar local server environment like LAMP or WAMP) is used during development and testing. It provides a package that includes Apache (web server), MySQL (database server), and PHP (scripting language) — making it easier to run the full application locally without separate configurations

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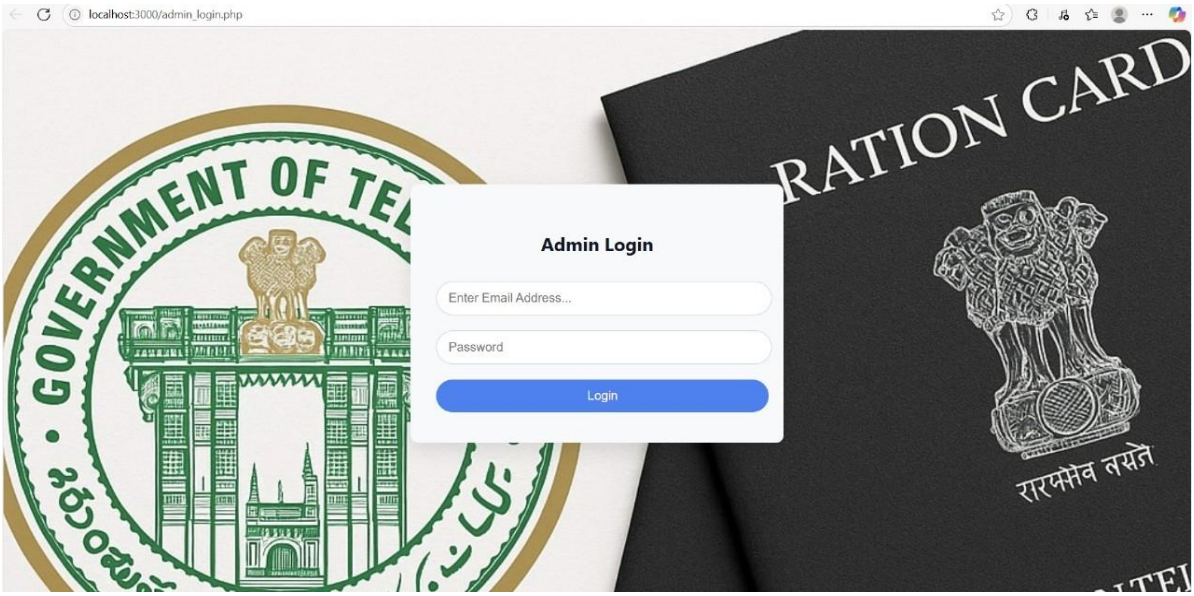
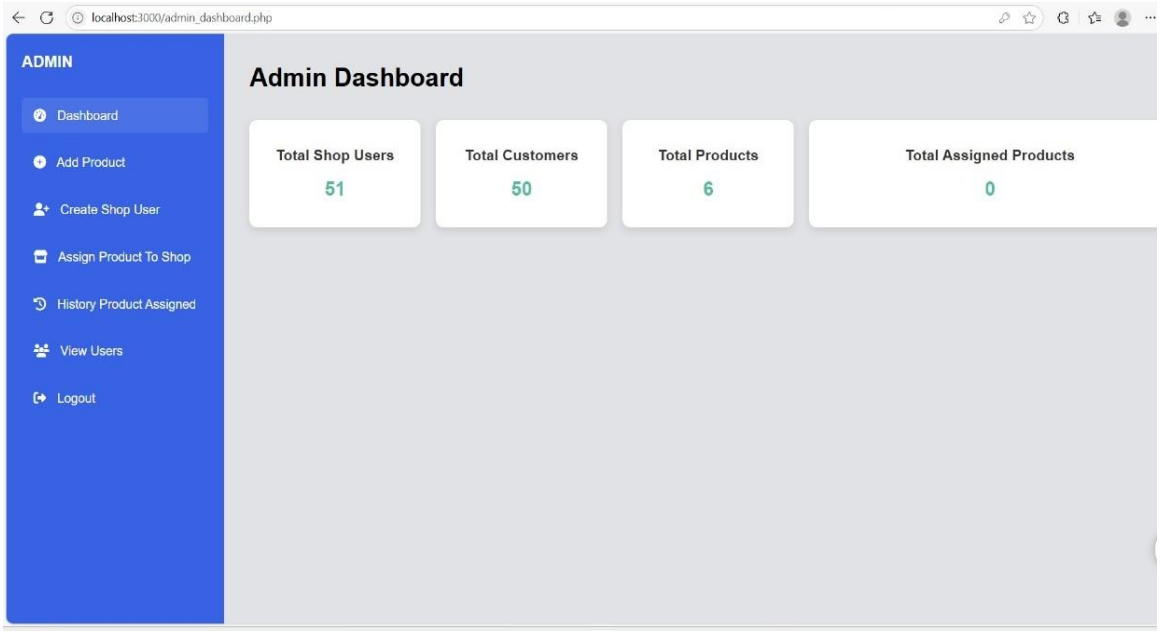
6.SCREENSHOTS



Screenshot 6.1 Admin Login



Screenshot 6.2 Admin Dashboard

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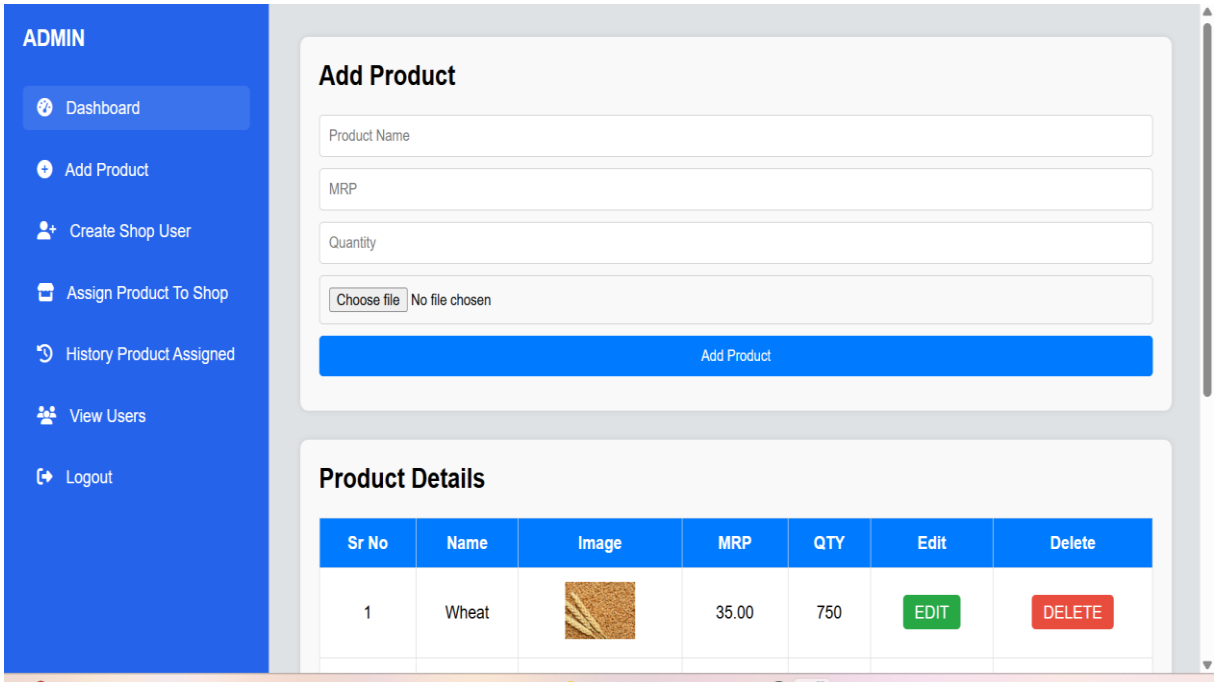
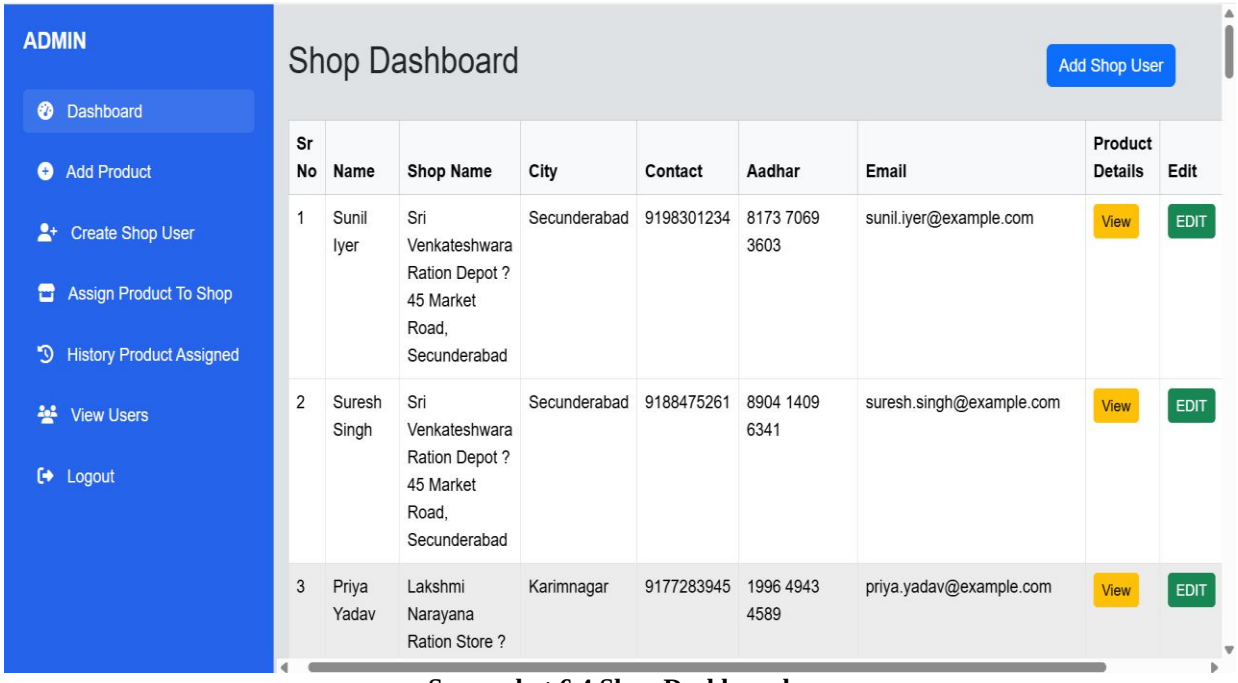


Screenshot 6.3 Add Product



Screenshot 6.4 Shop Dashboard

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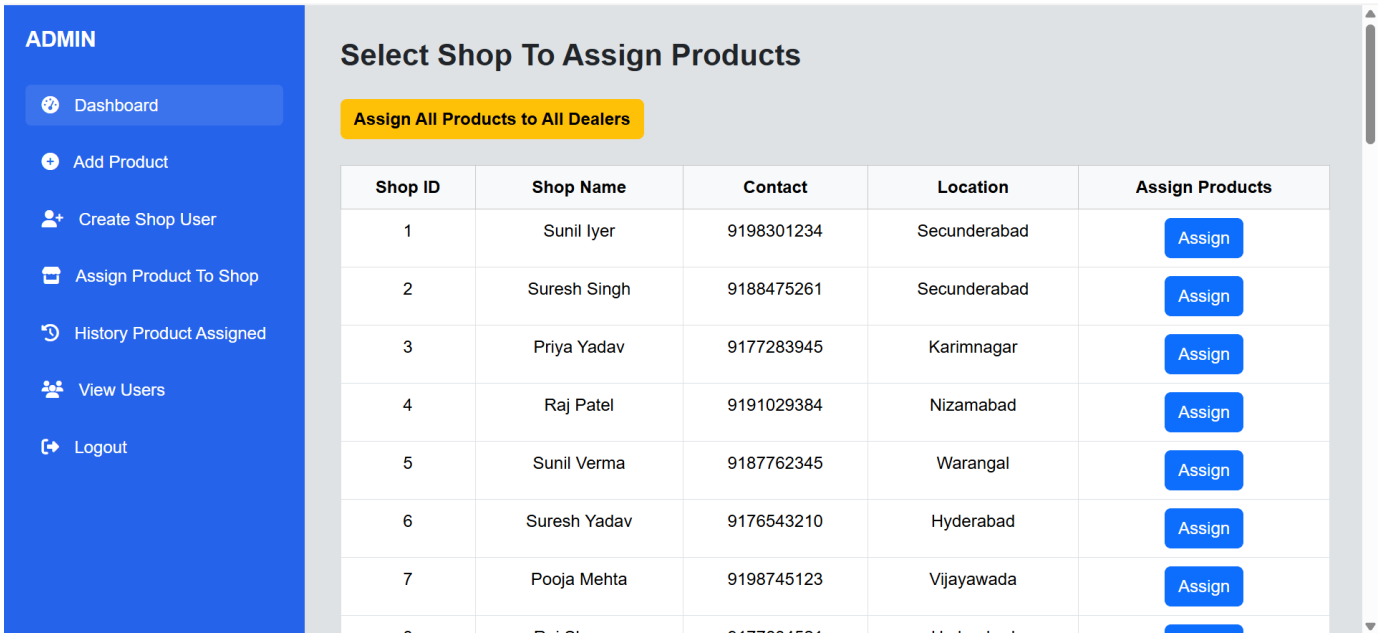
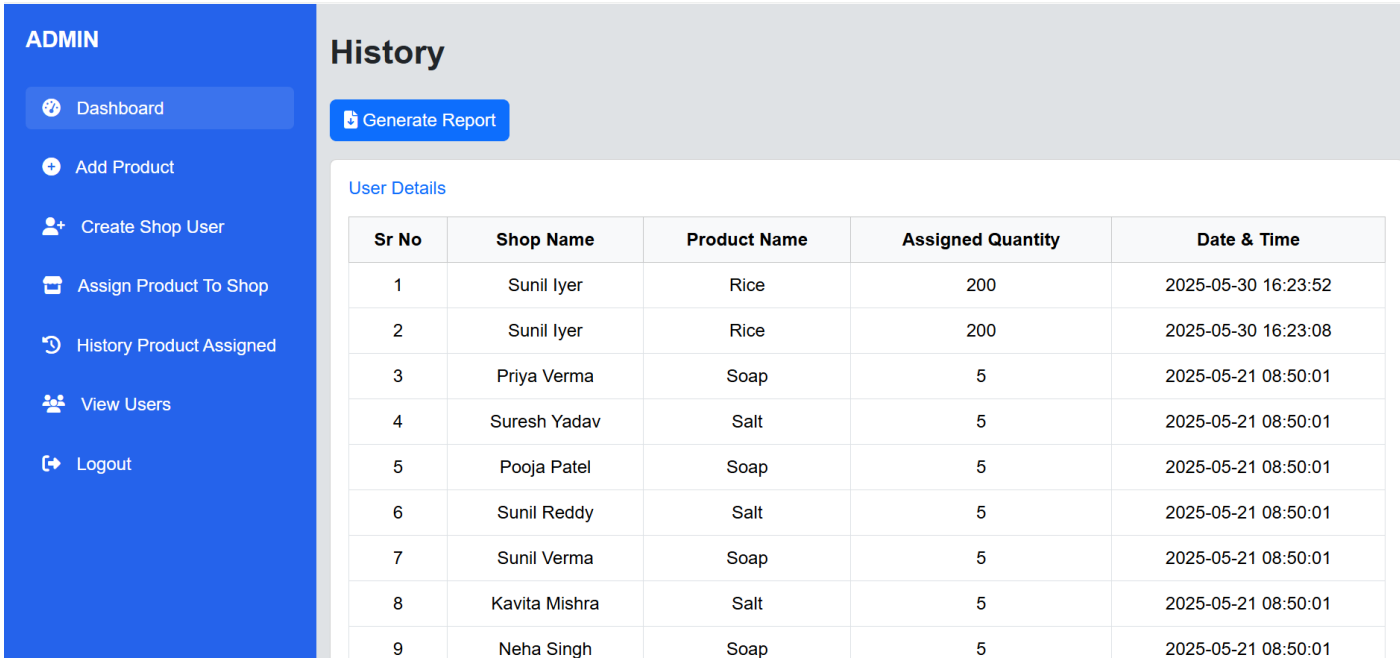


Screenshot 6.5 Assign Products



Screenshot 6.6 History

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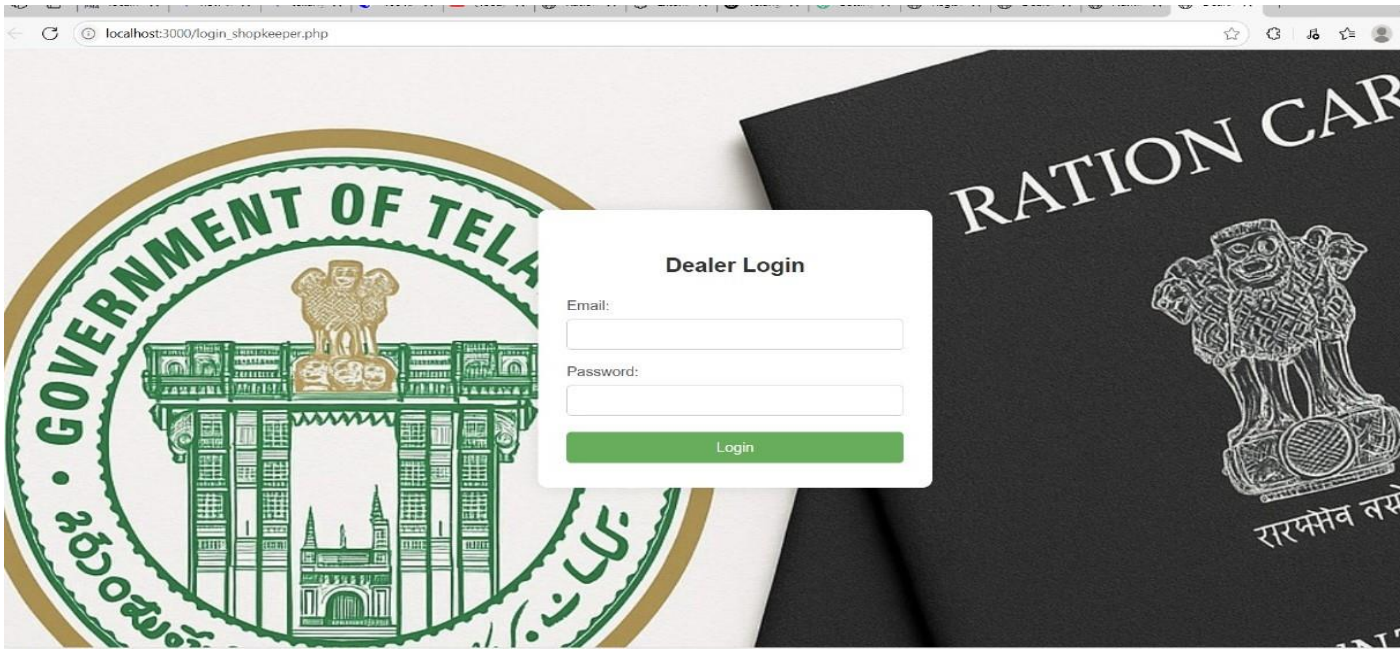

Screenshot 6.7 Dealer Login

7. CONCLUSION

Using The Smart Ration System represents a significant step toward modernizing the public distribution system by integrating digital solutions into everyday services for ration card holders. Through its virtual queuing mechanism and user-friendly web interface, the system reduces physical congestion, minimizes wait times, and enhances overall service efficiency. By enabling remote access to essential commodities and supporting the use of ration cards for official identification purposes, the application ensures greater transparency, convenience, and accessibility. Ultimately, this project contributes to building a more accountable and citizen-centric distribution network, aligning with the broader goals of digital governance and inclusive public service delivery. The admin panel empowers authorities to monitor inventory, track usage patterns, and address shortages proactively. By reducing manual processes, the platform minimizes paperwork and errors while promoting environmental sustainability. Looking ahead, the system can be expanded with multilingual support, mobile app integration, and AI-driven analytics for demand forecasting.

REFERENCES

[1] A. Sharma and R. Verma, "Design and Development of an Online Public Distribution System
using Cloud Computing," International Journal of Computer Applications, vol. 122, no. 3, pp. 25–29, 2015.

[2] M. K. Raghavendra and M. V. Priya, "Smart Rationing System using IoT and RFID Technology," in Proc. 2021 5th International Conference on Computing Methodologies and Communication (ICCMC), pp. 524–528, doi: 10.1109/ICCMC51019.2021.9418323.

[3] P. R. Shinde and S. A. Ghone, "Automation of Rationing System using Embedded System," International Journal of Engineering Research and Applications (IJERA), vol. 5, no. 4, pp. 18–21, 2015.

[4] K. B. Anusha and R. Aravind, "Smart Ration Card using IoT to Prevent Malpractices in PDS," International Journal of Advanced Research in Computer and Communication Engineering, vol. 7, no. 3, pp. 134–137, 2018.

[5] S. R. Yadav, S. P. Deshmukh, and A. M. Bhagat, "Digital Ration Card System Using GSM and RFID Technology," in Proc. 2017 International Conference on Big Data, IoT and Data Science (BID), pp. 25–28, doi: 10.1109/BID.2017.8336572.