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Q-Slot: Streamlining Public Distribution with Virtual Queuing and SMS Notifications

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Abstract: Public Distribution System (PDS) plays a crucial role in providing basic commodities such as wheat, rice, sugar, and kerosene to the underprivileged at affordable prices. However, traditional Fair Price Shops (FPS) often face significant challenges, including irregular operating hours, long queues, and delays in supply, requiring citizens to visit frequently to check availability. In light of the COVID-19 pandemic, social distancing guidelines further complicate the situation. To address these issues, this project proposes a modernization of the PDS by implementing a virtual queuing system utilizing the Q-Learning algorithm. This innovative solution aims to replace physical queues with automated slot allocation, ensuring ration cardholders receive SMS notifications for their designated time slots to collect goods. With the addition of two re-slot allocations, users have flexibility in case of missed appointments, minimizing unnecessary trips. The system also enables users to view product details online, saving time and improving accessibility. By leveraging Q-Learning, a reinforcement learning algorithm, this approach offers a more efficient, transparent, and socially distanced method of distribution. This project not only enhances the efficiency of the PDS but also serves as a model for using technology to improve the delivery of government services, especially in times of crisis.

I. INTRODUCTION

- Public distribution system (PDS) is food security and food distribution system formed by the Government of India for providing food grains at affordable rates to poor section of population in the country.
- The system is jointly managed by central and state government.
- PDS intend to provide the basic food grains i.e. wheat, rice, sugar and kerosene oil to beneficiaries at subsidized rates.
- The Public Distribution System faces severe criticism on several grounds.
- The operational responsibilities including allocation within the State, identification of eligible families, issue of Ration Cards and supervision of the functioning of Fair Price Shops (FPSs) etc.,

II. SOFTWARE ANALYSIS

- Server Side : Python 3.7.4(64-bit) or (32-bit)
- Client Side : HTML, CSS, Bootstrap
- IDE : Flask 1.1.1
- Back end : MySQL 5.
- Server : Wampserver 2i

III. EXISTING SYSTEM

- **Standard Linear Queues:** This form of queuing represents the normal or standard queue system where each service desk or cashier has a separate line.

- **Single Line Queues:** Also referred to as a Call Forward System, a single line groups customers and then feeds them to multiple cashiers or service areas. Often, Individual service stations are allocated to different service personnel part of one long counter or desk.
- **Dispersed or "Digital" Queues:** This type of queue management disperses waiting lines by offering a ticketing management system.
- **First Come, First Served (FCFS):** this mode is commonly applied real-world situations, such as tellers in a bank.
- **Priority Discipline (PD):** Under this discipline, customers are classified into categories, then each category is given different priorities.

PROPOSED SYSTEM

The proposed project to modernize the Public Distribution System (PDS) in India by implementing a virtual queuing system through the Q-Learning algorithm is a forward-thinking approach to address the challenges faced by Fair Price Shops.

- **Virtual Queuing System:** The implementation of a virtual queuing system using Q-Learning algorithm is a significant step towards reducing the physical queues at Fair Price Shops. This approach leverages technology to streamline the distribution process.
- **Slot Allocations through SMS Notifications:** Ration cardholders would receive SMS notifications specifying the date and time for product collection. This helps in organizing and optimizing the distribution process, allowing beneficiaries to plan their visits accordingly and eliminating the need for daily visits.

IV. MODULES

1. DS Ration Distribution Web App
2. Access Control Module
3. Disperse Slot Generator
4. End User Module
4.1. Super Admin
4.2. Shop Admin
4.3. Citizen
5. Auto Notification Engine
6. Reports

ARCHITECTURE DIAGRAM

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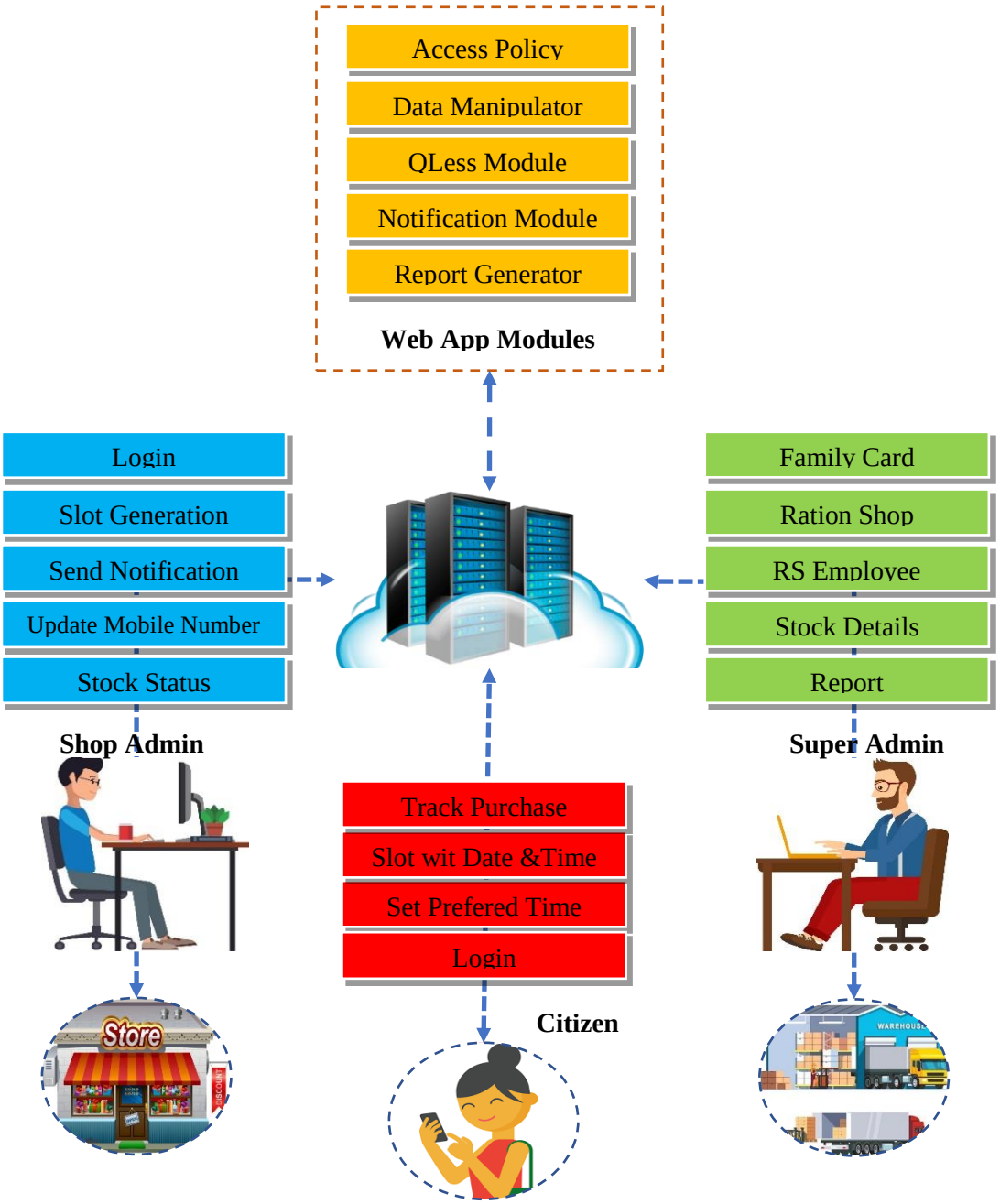

V. RESULT

Virtual queuing is a system where people can "reserve" a place in a queue remotely, often through an app or SMS, without physically waiting in line. For a Public Distribution System (PDS), this could help manage long queues and reduce overcrowding at ration shops, especially during peak times. Reduces the waiting time for beneficiaries, minimizes crowding, and ensures a more efficient distribution of food and essential goods. It can be implemented via mobile apps, SMS, or USSD codes, which are especially useful in rural areas where smartphones might not be widespread.

SMS notifications can be used to alert beneficiaries about their turn in the queue, available stock, or upcoming distribution schedules. This helps in better planning and improves the user experience. Informs recipients about their distribution dates, enabling them to avoid unnecessary trips or long waits. It also provides transparency about availability and changes in schedules. SMS notifications can enhance the convenience for beneficiaries, particularly those in remote areas with limited internet access, helping to bridge the digital divide.

VI. CONCLUSION

Physically queueing is a reality on many industries that provide services or sell goods. Waiting in a queue can be stressful and exhausting for the clients because of the enforced idle time, and may lead to decreased customer satisfaction. In conclusion, the modernization of the public distribution system represents a significant step towards improving efficiency, transparency, and user experience. Through the integration of online payment options, a dedicated mobile application, and a real-time analytics dashboard, the system aims to streamline transactions, enhance accessibility, and empower administrators with valuable insights. These enhancements not only align with digital trends but also cater to the evolving needs of beneficiaries and stakeholders. Moving forward, continued efforts in innovation and refinement will further strengthen the system's impact, ensuring equitable access to essential commodities for all. Presented QLess using Deep Q-Learning based web application that allows FPS admin to create a virtual queue, and notify the citizen. Disperse Slot System for ration centre website is developed to overcome the uncertainties in ration centres. This system will avoid the corruption in ration system to a larger extent by providing transparency to users at each level. This system will be helpful to save time and efforts of standing in long waiting queues, the application will also be helpful for organizations to serve better to the customers without making them wait in queues this in turn can boost profit and increase the quality of Service. This system can be successfully implemented in environment where crowd management is difficult and thus help in the elimination of physical lines and waiting time all over the country in service-based institutions and organizations.

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