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SHOPNEST E-COMMERSE WEBSITE

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ABSTRACT

The increasing adoption of online grocery shopping has created a need for secure, efficient, and user-friendly e-commerce platforms. While many existing systems support product browsing and online payments, they often lack secure delivery verification and delivery partner management. This paper presents **ShopNest**, a MERN stack-based e-commerce platform for grocery delivery that integrates product ordering, payment processing, OTP-based delivery confirmation, and automated earnings tracking.

The proposed system enables customers to browse products, manage carts, apply discounts, and place orders using Razorpay or Cash on Delivery (COD). Administrators can manage products, inventory, and orders, while delivery partners can select shifts, verify OTPs, and monitor earnings. The application is developed using React.js, Node.js, Express.js, MongoDB Atlas, and Razorpay APIs.

Experimental testing confirms that the system performs reliably in user authentication, payment integration, order processing, and delivery verification. ShopNest provides a scalable and practical solution for modern grocery e-commerce operations.

Keywords: E-commerce, MERN Stack, Grocery Delivery, Razorpay, OTP Verification, Delivery Management.

1. INTRODUCTION

Online grocery shopping has become an essential part of modern retail, driven by increasing internet penetration, busy lifestyles, and the growing preference for doorstep delivery. Customers expect a convenient platform where they can browse products, place orders, make secure payments, and receive deliveries without visiting physical stores.

Although many e-commerce applications provide basic shopping functionality, they often focus only on product ordering and payment processing. Features such as secure delivery verification, automated discount handling, and delivery partner management are either limited or absent in many academic and small-scale implementations.

ShopNest addresses these limitations by integrating customer shopping, administrative control, and delivery operations into a single web-based platform. The system enables users to browse products, manage carts, apply discounts, and place orders using Razorpay or Cash on Delivery (COD). To ensure secure order handover, each order is verified through a One-Time Password (OTP). The platform also includes dedicated modules for delivery partner registration, shift selection, and automated earnings tracking.

By combining modern web technologies with operational automation, ShopNest provides a scalable and practical solution for efficient and secure grocery e-commerce services.

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2. OBJECTIVES OF THE PROJECT

The principal objectives of the proposed ShopNest system are:

1. To develop a secure and user-friendly online grocery shopping platform.
2. To enable customers to browse products, search items, and manage shopping carts efficiently.
3. To provide secure user registration and authentication mechanisms.
4. To integrate multiple payment options, including Razorpay and Cash on Delivery (COD).
5. To implement automated discount and coupon application for eligible orders.
6. To generate and verify OTPs for secure order delivery confirmation.
7. To maintain order history and payment transaction records.
8. To provide a dedicated admin dashboard for product, inventory, and order management.
9. To support delivery partner registration, shift selection, and earnings tracking.
10. To build a scalable platform that can be extended with advanced features in the future.

3. LITERATURE SURVEY

A considerable amount of research has been devoted to the design and development of web-based e-commerce applications. Most existing systems provide fundamental functionalities such as product browsing, shopping cart management, online payment, and order tracking.

Several commercial platforms, including Amazon, JioMart, Blinkit, and BigBasket, have demonstrated the effectiveness of digital grocery delivery solutions. These platforms emphasize convenience, extensive product catalogs, and fast delivery services.

In academic research, numerous studies have explored the use of the MERN stack for building scalable and responsive e-commerce systems. Recent works have highlighted the benefits of integrating secure payment gateways, cloud-based databases, and modular architectures to improve system performance and maintainability. Other studies have focused on OTP-based delivery confirmation and logistics management to enhance delivery security and operational transparency.

The literature indicates that while most systems successfully implement online shopping and payment features, relatively few combine automated discount processing, OTP-based delivery verification, delivery partner shift management, and earnings tracking within a single integrated platform.

These observations motivated the development of ShopNest, a comprehensive e-commerce solution that unifies customer shopping, administrative control, and delivery workforce management in one scalable and secure web application.

4. EXISTING SYSTEM

Several online grocery platforms have been developed to simplify product ordering and home delivery. Popular platforms such as Amazon, JioMart, Blinkit, and BigBasket provide features such as product browsing, shopping cart management, digital payments, and order tracking.

These systems are typically implemented using a three-tier architecture consisting of a frontend interface, backend server, and database. The frontend allows users to register, search for products, and place orders. The backend processes business logic, payment requests, and order updates, while the database stores customer information, product details, and transaction records.

Most existing systems support online payments and doorstep delivery, but they often exhibit certain limitations. Secure delivery verification is not always implemented, which may lead to disputes regarding successful order handover. Delivery partner management, including shift selection and automated earnings tracking, is generally absent in many small-scale applications. In addition,

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discount and coupon processing may require manual configuration.

Another limitation is the lack of a unified platform that efficiently connects customers, administrators, and delivery partners. Many academic projects focus primarily on customer ordering features and provide limited support for operational management and logistics automation.

These shortcomings highlight the need for a more comprehensive and secure e-commerce solution. Shopnest addresses these limitations by integrating online shopping, secure payment processing, OTP-based delivery verification, discount automation, and delivery workforce management within a single scalable platform.

5. PROPOSED SYSTEM

ShopNest is a smart web-based e-commerce platform designed to simplify online grocery shopping and delivery management. The system integrates customers, administrators, and delivery partners into a single platform to ensure efficient product ordering, secure payments, and reliable doorstep delivery.

The application begins with a secure registration and login process for customers, administrators, and delivery partners. Customers can browse products by category, search for specific items, add products to the cart, and place orders conveniently.

During checkout, the system automatically applies eligible discounts and allows users to choose between online payment through Razorpay or Cash on Delivery (COD). Once an order is confirmed, a unique One-Time Password (OTP) is generated and stored with the order details.

The OTP must be verified by the delivery partner at the time of delivery to ensure that the order is handed over to the correct customer. Delivery partners can register, select preferred shifts and service locations, accept assigned orders, and track their earnings automatically based on completed deliveries.

The administrative dashboard enables centralized management of products, inventory, customer orders, discounts, and delivery operations. The system also maintains complete order history, payment records, and delivery logs for future reference and analysis.

Key Features of ShopNest

- Secure user registration and authentication
- Product browsing, search, and categorization
- Shopping cart and checkout management
- Automatic discount and coupon application
- Online payment through Razorpay and COD
- OTP-based delivery verification
- Delivery partner registration and shift selection
- Automated earnings calculation
- Order history and transaction records
- Comprehensive admin dashboard

By combining secure transactions, automated delivery verification, and workforce management, ShopNest provides a scalable and practical solution for modern grocery e-commerce operations.

6. SYSTEM REQUIREMENTS

6.1 Hardware Requirements

- Intel Core i3 processor or higher
- 4 GB RAM or above
- 500 GB hard disk or SSD
- Stable internet connection
- Smartphone or computer for testing

6.2 Software Requirements

- Operating System: Windows, Linux, or macOS
- Frontend: React.js, Tailwind CSS, JavaScript
- Backend: Node.js, Express.js
- Database: MongoDB Atlas
- Payment Gateway: Razorpay
- Development Tool: Visual Studio Code
- API Testing Tool: Postman
- Version Control: GitHub

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- Browser: Google Chrome or Microsoft Edge

7. SYSTEM ARCHITECTURE

ShopNest is designed using a modular three-tier architecture that ensures efficient communication between the user interface, business logic, and database. The architecture is structured to provide scalability, maintainability, and secure handling of customer, product, and order data.

The system architecture consists of the following major modules:

- Frontend Module
- Backend Module
- Authentication Module
- Product Management Module
- Cart and Order Module
- Payment Module
- OTP Verification Module
- Delivery Management Module
- Database Module
- Admin Module

The Frontend Module is developed using React.js and Tailwind CSS. It provides responsive interfaces for customers, administrators, and delivery partners. Customers can browse products, add items to the cart, apply discounts, and place orders. Delivery partners can view assigned orders and earnings, while administrators can manage products, orders, and analytics.

The Backend Module, implemented using Node.js and Express.js, handles all server-side operations. It processes API requests, executes business logic, manages user authentication, and coordinates communication between the frontend and the database.

The Authentication Module secures the platform using JSON Web Tokens (JWT) and encrypted passwords. It manages registration, login, and role-based access for customers, administrators, and delivery partners.

The Product Management Module maintains product details such as name, category, description, price, stock quantity, and images. Administrators can add, update, and remove products through the dashboard.

The Cart and Order Module manages shopping cart operations, calculates totals, applies discounts, and creates orders. It also tracks order status from placement to successful delivery.

The Payment Module integrates with Razorpay and supports Cash on Delivery (COD). It verifies transaction status and stores payment records securely.

The OTP Verification Module generates a unique six-digit OTP for each order. Delivery partners must verify this OTP at the time of delivery to confirm successful handover.

The Delivery Management Module handles partner registration, shift and location preferences, order assignment, and automated earnings calculation based on completed deliveries.

The Database Module uses MongoDB Atlas to store user profiles, product information, order records, coupons, payment details, and delivery partner data.

The Admin Module provides a centralized dashboard for monitoring inventory, managing orders, assigning delivery partners, and analyzing business performance.

Overall, the system architecture of ShopNest provides a secure and scalable framework for online grocery commerce by integrating shopping, payment, delivery verification, and operational management within a single platform.

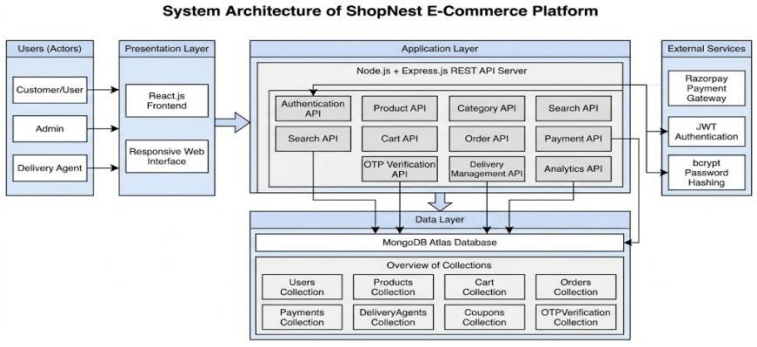

Fig 1: System Architecture Diagram

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8. DATA FLOW DIAGRAM

The Data Flow Diagram (DFD) illustrates how information moves through ShopNest from product selection to order delivery. It shows how customer requests are processed by different modules and stored in the database.

The main entities involved in the system are the Customer, Administrator, Delivery Partner, Payment Gateway, and Database.

The data flow begins when a customer registers and logs into the platform. The customer browses products, adds items to the cart, and proceeds to checkout. During checkout, the system calculates the total amount, applies eligible discounts, and processes payment through Razorpay or Cash on Delivery (COD).

After successful payment or order confirmation, the Order Module creates a new order and generates a unique OTP. The order details, payment information, and OTP are stored in the database.

The administrator can view incoming orders, update product inventory, and assign delivery partners. Delivery partners receive assigned orders, deliver them to customers, and verify the OTP to confirm successful handover.

Once the OTP is validated, the order status is updated to Delivered, and the delivery partner's earnings are calculated automatically. All activities, including user details, product records, orders, payments, and delivery logs, are maintained in MongoDB Atlas.

The Data Flow Diagram demonstrates how ShopNest integrates customer shopping, payment processing, order management, and delivery verification into a secure and efficient e-commerce workflow.

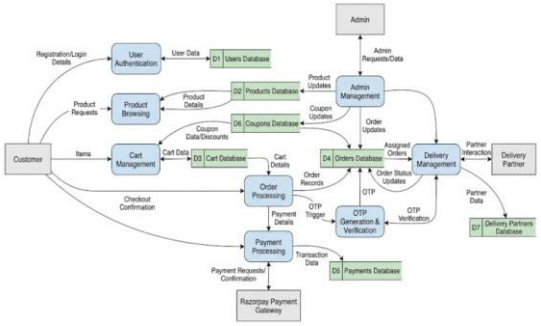

Fig 2: Data Flow Diagram

9. DATABASE DESIGN

The database design of ShopNest is responsible for storing and managing all information related to customers, products, orders, payments, coupons, and delivery partners. A well-structured database ensures data consistency, fast retrieval, and secure storage of transactional records.

The system uses MongoDB Atlas, a cloud-based NoSQL database, to provide scalability and flexible data management. Each collection stores specific information required by the application.

The User Collection stores customer and administrator details, including name, email, password, phone number, and delivery address.

The Product Collection maintains product information such as product name, category, description, price, stock quantity, and image URL.

The Cart Collection stores products selected by customers before order confirmation.

The Order Collection contains ordered items, total amount, payment status, order status, and the delivery OTP.

The Payment Collection records transaction details for online payments processed through Razorpay.

The Coupon Collection stores discount codes, percentage values, and validity information.

The Delivery Partner Collection maintains partner details, shift preferences, assigned orders, completed deliveries, and earnings.

All collections are linked using unique identifiers to maintain relationships between customers, orders, and delivery records. Passwords are stored in encrypted form, and access to sensitive data is

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protected through authentication and authorization mechanisms.

Overall, the database design of ShopNest provides a secure, scalable, and efficient foundation for managing all core e-commerce operations.

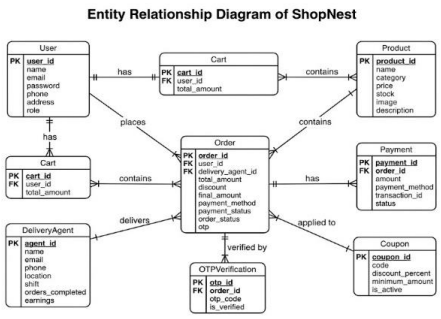

Fig 3: Database Structure

10. MODULE DESCRIPTION

10.1 User Module

This module allows customers to register, log in, manage their profiles, browse products, add items to the cart, and place orders. It also enables users to view order history and track order status.

10.2 Product and Cart Module

This module manages product listings, categories, search functionality, and shopping cart operations. It calculates totals, applies discounts, and prepares the final order summary during checkout.

10.3 Payment and OTP Verification Module

This module processes payments through Razorpay and supports Cash on Delivery (COD). After order confirmation, it generates a unique OTP that is verified during delivery to ensure secure order handover.

10.4 Delivery Management Module

This module handles delivery partner registration, shift selection, order assignment, OTP verification, and automated earnings calculation based on completed deliveries.

10.5 Admin Module

This module provides administrators with tools to manage products, inventory, customer orders, discounts, and delivery operations. It also offers dashboards for monitoring sales and overall system performance.

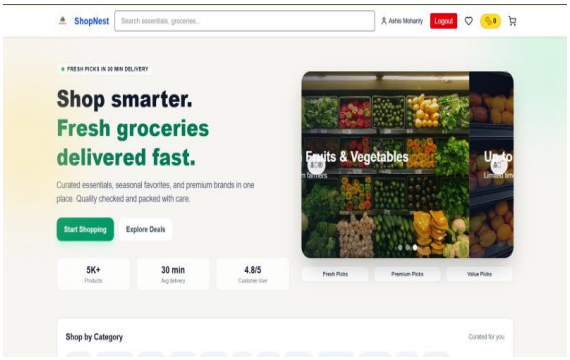

Fig 4: User Registration Interface

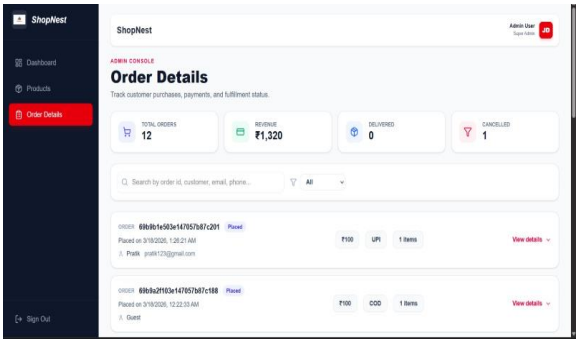

Fig 5: Emergency SOS Alert Page

11. IMPLEMENTATION

The implementation of ShopNest is carried out using the MERN stack, which includes MongoDB Atlas, Express.js, React.js, and Node.js. The platform provides separate interfaces for customers, administrators, and delivery partners.

Customers can register, browse products, add items to the cart, apply discounts, and place orders using Razorpay or Cash on Delivery (COD). After order confirmation, the system generates a unique OTP for delivery verification.

Administrators can manage products, inventory, orders, and discounts through a dedicated dashboard. Delivery partners can view assigned orders, verify OTPs at delivery, and monitor their earnings.

The backend handles authentication, payment verification, order processing, and database

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operations, while MongoDB Atlas securely stores all application data.

12. ALGORITHMS USED

12.1 Discount Calculation Algorithm

This algorithm checks whether the order amount is eligible for a discount. If the cart value exceeds ₹399, a discount of 10% to 15% is applied automatically; otherwise, the original total is retained.

12.2 OTP Generation and Verification Algorithm

After an order is placed, the system generates a random six-digit OTP and stores it with the order details. During delivery, the entered OTP is matched with the stored value to confirm successful handover.

12.3 Delivery Earnings Calculation Algorithm

The earnings of each delivery partner are calculated automatically based on the number of completed deliveries using the formula:

Earnings=Completed Orders×40

This ensures accurate and transparent payout management.

13. RESULTS AND DISCUSSION

The implementation of ShopNest was tested under various scenarios to evaluate the performance of product browsing, cart management, payment processing, and delivery verification. The results confirm that all major modules function correctly and provide a smooth user experience.

Customers were able to register successfully, browse products, apply discounts, and place orders using both Razorpay and Cash on Delivery (COD). The OTP verification mechanism accurately validated deliveries, ensuring secure order handover. Delivery partners were able to view assigned orders and track earnings, while administrators successfully managed products, inventory, and order status.

The system demonstrated stable performance, accurate calculations, and reliable data storage, indicating that ShopNest is suitable for practical grocery e-commerce operations.

14. ADVANTAGES OF THE SYSTEM

1. Provides a simple and user-friendly online grocery shopping experience.
2. Supports secure payments through Razorpay and Cash on Delivery.
3. Ensures safe delivery using OTP-based verification.
4. Applies discounts and coupons automatically.
5. Automates delivery partner earnings calculation.
6. Offers dedicated dashboards for customers, admins, and delivery partners.
7. Reduces manual effort in order and inventory management.
8. Maintains complete order and transaction history.
9. Uses a scalable cloud-based database architecture.
10. Supports future feature enhancements.

These enhancements will improve system scalability, usability, and security.

15. FUTURE ENHANCEMENTS

Future improvements to ShopNest may include:

1. AI-based product recommendation system.
2. Real-time GPS tracking of delivery orders.
3. Mobile applications for Android and iOS.
4. Multilingual user interfaces.
5. Voice-based product search.
6. Predictive inventory and demand forecasting.
7. Integration with additional payment gateways.
8. Customer review and rating system.

These enhancements will further improve the usability, scalability, and commercial potential of the platform.

16. CONCLUSION

ShopNest is a MERN stack-based e-commerce platform developed to streamline online grocery shopping and delivery management. The system integrates product browsing, cart management, discount processing, secure payments, OTP-based delivery verification, and delivery partner earnings tracking within a unified platform.

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The project demonstrates that modern web technologies can be effectively used to build scalable, secure, and user-friendly e-commerce applications. Experimental results confirm that the system performs reliably across all core modules and significantly reduces manual effort in managing orders and deliveries.

Overall, ShopNest provides a practical and extensible solution for modern grocery e-commerce services and offers a strong foundation for future enhancements.

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