Full Stack Development with MERN

1. Introduction

- **Project Title**: ShopEZ: E-commerce Application
- **Team Members**:
    - **Jensing Samuel A S**
    - **Jose Saranish D**
    - **Santhosh Kumar L**
    - **Santheep Saran K**

2. Project Overview

- **Purpose**: ShopEZ aims to provide a seamless, user-friendly e-commerce experience for shoppers and sellers alike. Users can explore products, make informed purchasing decisions, and complete transactions smoothly, while sellers can efficiently manage their products and orders through a comprehensive dashboard.
- **Features**:
    - User Dashboard: Secure account management, personalized shopping experience, comprehensive product catalog, seamless checkout process.
    - Seller Dashboard: Product and order management, customer activity monitoring, analytics for business insights.
    - ER Diagram Overview: Depicts the relationship between users, products, cart, and orders within the application.

3. Architecture

- **Frontend**: Built with React for a dynamic, responsive user interface. Users can easily navigate through products, access detailed product information, and make purchases with minimal effort.
- **Backend**: Utilizes Node.js with Express.js to handle server-side requests, manage API endpoints, and connect with the database. Routes and controllers manage user interactions and ensure efficient data handling.

- **Database**: MongoDB stores all essential data including user information, products, orders, and cart details. The database schema comprises collections like User, Product, Order, Cart, and Admin, each supporting CRUD operations.

4. Setup Instructions

- **Prerequisites**:
  - Node.js
  - MongoDB
  - Git: Version control

- **Installation**:

1. Clone the repository from GitHub.
2. Run npm install in both frontend and backend directories to install dependencies.
3. Set up environment variables for database and port configuration.

5. Folder Structure

- **Client (Frontend):**
  - **Components**: For reusable UI elements.
  - **Pages:** Contains views for products, cart, order details, etc.
  - **Styles:** Includes CSS and styling files.
- **Server (Backend):**
  - **Models:** Defines Mongoose schemas for User, Product, Order, Cart, and Admin.
  - **Routes:** Manages endpoints for users, orders, authentication, and admin operations.
  - **Controllers:** Contains logic for handling requests and responses.

6. Running the Application

- **Frontend**: Run npm start in the client directory to start the React frontend.
- **Backend**: Run npm start in the server directory to start the Node.js backend server.

7. API Documentation

The API endpoints in ShopEZ facilitate seamless interaction between the frontend and backend, supporting a wide array of functionalities for both users and sellers.

User APIs

- **User Registration**: POST /api/users/register
  - **Description**: Registers a new user.
  - **Parameters**: {username, email, password}
  - **Response**: Returns a confirmation message and user details upon successful registration.

- **User Login**: POST /api/users/login
  - **Description**: Authenticates a user and issues a JWT token.
  - **Parameters**: {email, password}
  - **Response**: JWT token for session management.
- **View Products**: GET /api/products
  - **Description**: Retrieves the catalog of products available for purchase.
  - **Parameters**: None
  - **Response**: A list of products with details like name, price, description, and available discounts.

- **Add to Cart**: POST /api/cart/add
  - **Description**: Adds a product to the user’s cart.
  - **Parameters**: {productId, quantity}
  - **Response**: Updated cart details.
- **Place Order**: POST /api/orders/place
  - **Description**: Completes the checkout process and places an order.
  - **Parameters**: {cartId, shippingAddress, paymentDetails}
  - **Response**: Order confirmation with order ID and details.

Seller APIs

- **Add Product**: POST /api/seller/products/add
  - **Description**: Allows sellers to add a new product to their inventory.
  - **Parameters**: {name, description, price, category, stock}
  - **Response**: Success message and product ID.
- **View Order History**: GET /api/seller/orders
  - **Description**: Provides a history of orders received by the seller.
  - **Parameters**: {sellerId}
  - **Response**: List of all orders including product details and customer information.
- **Manage Inventory**: PUT /api/seller/products/update
  - **Description**: Enables sellers to update product information.
  - **Parameters**: {productId, updatedFields}
  - **Response**: Updated product details.

8. Authentication

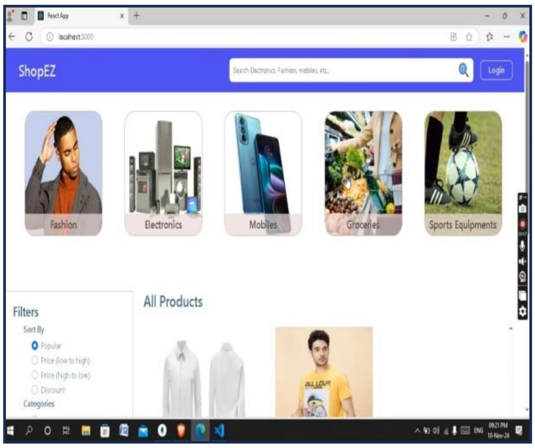
Authentication & Authorization:

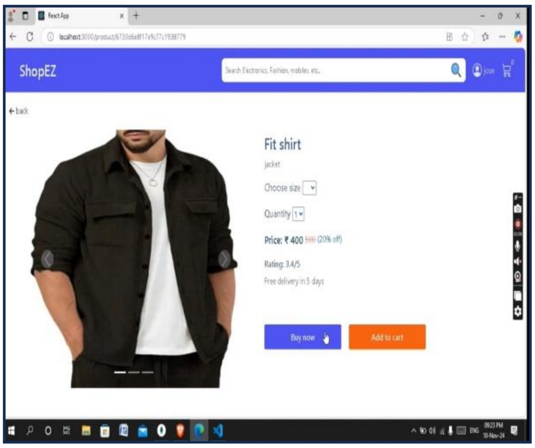
- **JWT Tokens**: ShopEZ uses JSON Web Tokens (JWT) to manage user and seller sessions securely. Tokens are generated upon login and included in the headers for protected routes.

- **Middleware for Authorization**: Role-based middleware is implemented to differentiate between user and admin functionalities. Routes that modify seller information, manage inventory, or access sensitive customer data are restricted to authorized sellers and admins.
- **Password Security**: Passwords are hashed using bcrypt to ensure secure storage and prevent unauthorized access.

9. User Interface

Screenshots & Feature Highlights:




React App
localhost:3000/product/6730d6e8f17e9c77c1938779
ShopEZ
Search Electronics, Fashion, mobiles, etc.
jose
← back
Buy now
Add to cart
09:23 PM
10-Nov-24

Fit shirt

jacket

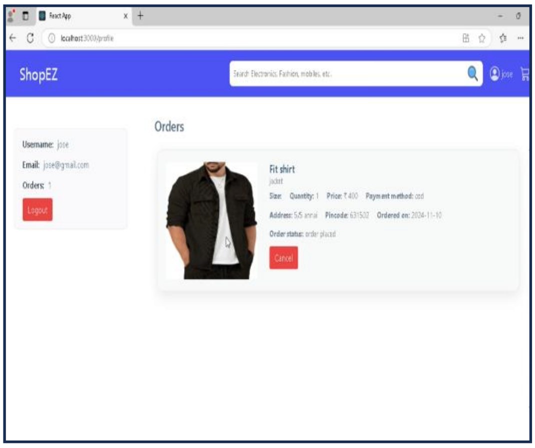
Choose size

Quantity 1

Price: ₹ 400 ~~500~~ (20% off)

Rating: 3.4/5

Free delivery in 5 days



Username: jose

Email: jose@gmail.com

Orders: 1

Orders

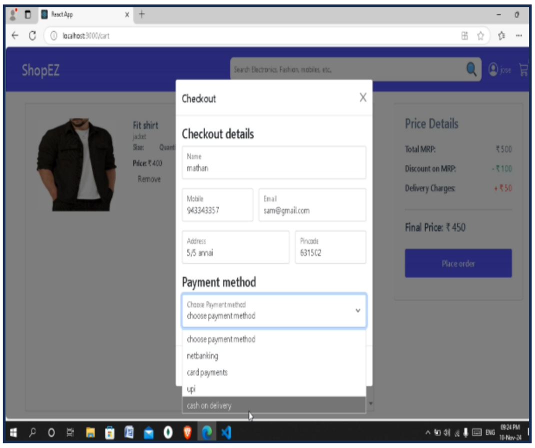
Fit shirt

jacket

Size: Quantity: 1 Price: ₹ 400 Payment method: cod

Address: 5/5 annai Pincode: 631502 Ordered on: 2024-11-10

Order status: order placed



Fit shirt

jacket

Size: Quant

Price: ₹ 400

Checkout

Checkout details

Name: mathan

Mobile: 943343357

Email: sam@gmail.com

Address: 5/5 annai

Pincode: 631502

Payment method

Choose Payment method: choose payment method

- choose payment method
- netbanking
- card payments
- upi
- cash on delivery

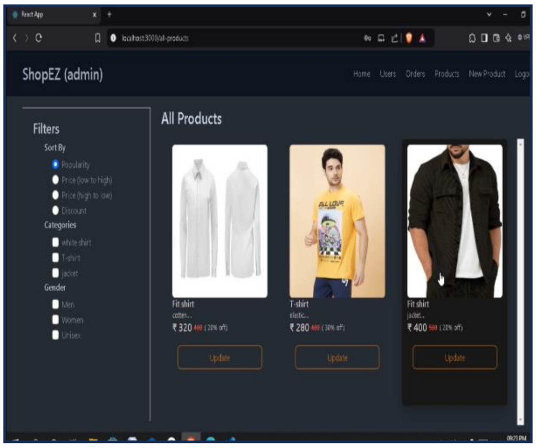
Price Details

Total MRP: ₹ 500

Discount on MRP: - ₹ 100

Delivery Charges: + ₹ 50

Final Price: ₹ 450



All Products

Fit shirt
cotten...
₹ 320 ~~400~~ (20% off)

T-shirt
elastic...
₹ 280 ~~400~~ (30% off)

Fit shirt
jacket...
₹ 400 ~~500~~ (20% off)

1. **Product Catalog**: Displays a grid of available products with filters for categories, price range, and search functionality.
2. **Product Details Page**: Showcases selected product information, including images, description, price, reviews, and an "Add to Cart" button.
3. **Shopping Cart**: Users can view selected items, adjust quantities, and proceed to checkout.
4. **Checkout Process**: A multi-step form for entering shipping details, selecting a payment method, and reviewing order details before purchase.
5. **Seller Dashboard**: Displays seller-specific information, including order history, sales analytics, and inventory management.

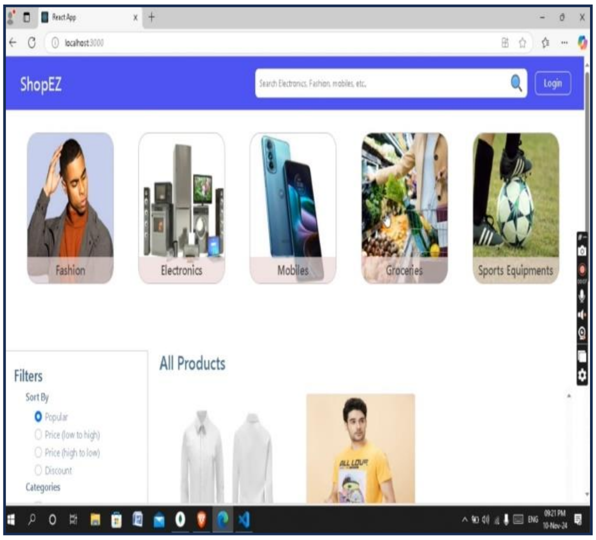
10. Testing

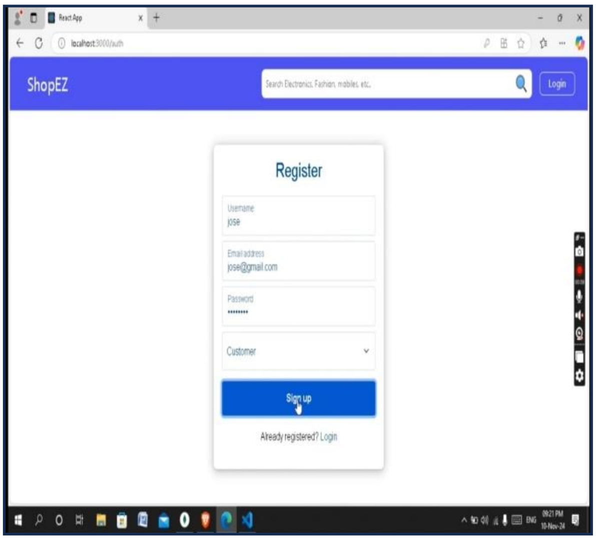
Testing Strategy:

- **Unit Testing**: Conducted on isolated components and functions using Jest for frontend elements (React components) and Mocha for backend modules.
- **Integration Testing**: Tests the interaction between frontend and backend through API endpoints. Postman collections are used for verifying request-response flows.
- **End-to-End Testing**: Simulates the full user journey from account creation, product browsing, and checkout to order confirmation, utilizing Cypress to ensure a bug-free experience across multiple user roles.
- **Tools**:
  - **Frontend**: Jest, Enzyme
  - **Backend**: Mocha, Chai, Supertest
  - **End-to-End**: Cypress

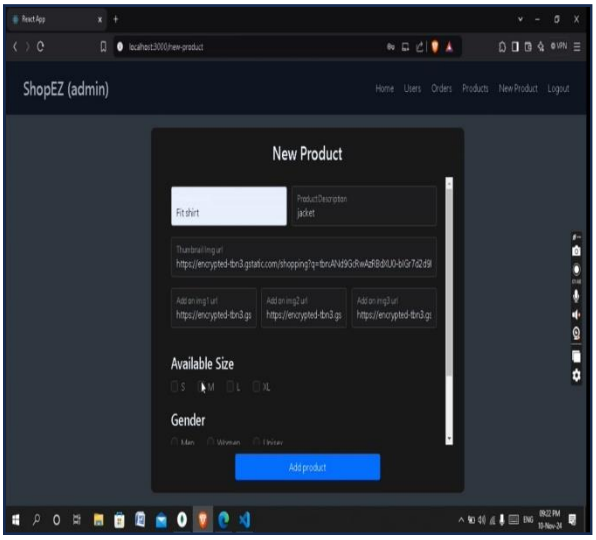
11. Screenshots or Demo

- **Screenshots**:




React App
localhost:3000/auth
ShopEZ
Search Electronics, Fashion, mobiles, etc.
Login
Register
Sign up
Already registered? Login

Username: jose
Email address: jose@gmail.com
Password: ••••••••
Customer



Fit shirt

ProductDescription: jacket

Thumbnail Img url: https://encrypted-tbn3.gstatic.com/shopping?q=tbn:ANd9GcRwAzRBdXU0-bIGr7d2d9I

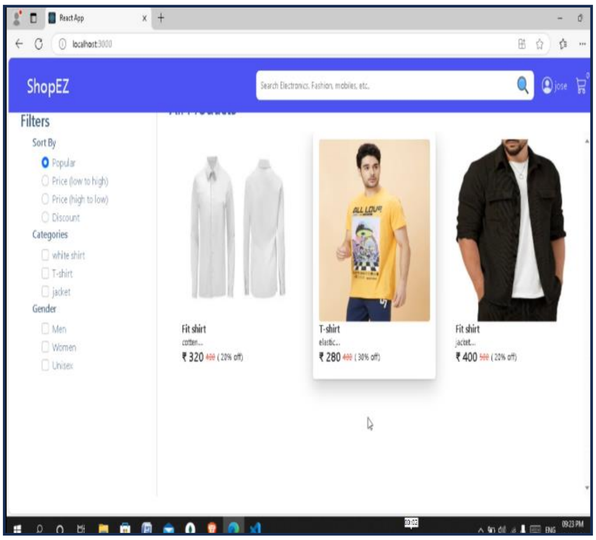
Add on img1 url: https://encrypted-tbn3.gs

Add on img2 url: https://encrypted-tbn3.gs

Add on img3 url: https://encrypted-tbn3.gs

□ S □ M □ L □ XL

○ Men ○ Women ○ Unisex



Fit shirt
cotten...
₹ 320 ~~400~~ (20% off)

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Fit shirt
jacket...
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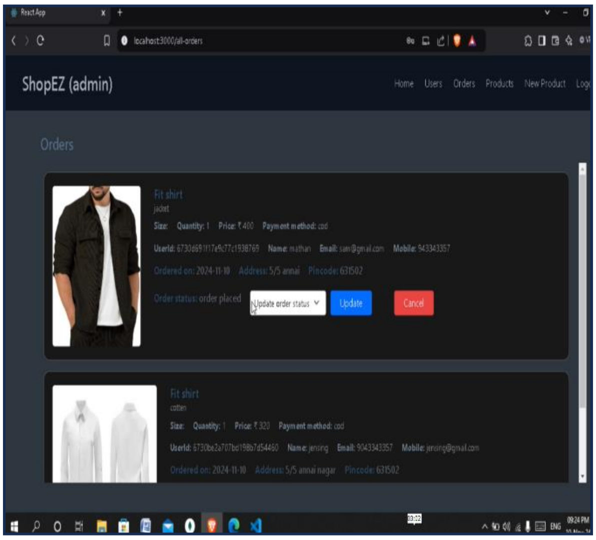

Fit shirt
jacket
Size: Quantity: 1 Price: ₹ 400 Payment method: cod
UserId: 6730d691f17e9c77c1938769 Name: mathan Email: sam@gmail.com Mobile: 943343357
Ordered on: 2024-11-10 Address: 5/5 annai Pincode: 631502
Order status: order placed

Fit shirt
cotten
Size: Quantity: 1 Price: ₹ 320 Payment method: cod
UserId: 6730be2a707bd198b7d54460 Name: jensing Email: 9043343357 Mobile: jensing@gmail.com
Ordered on: 2024-11-10 Address: 5/5 annai nagar Pincode: 631502

  - **Homepage**: Highlights the product catalog with categories and featured items.
  - **Login Detail**: Its an authentication process to verify the user.
  - **Creating new Product**: Showcases the streamlined new product process.
  - **Seller Dashboard**: Demonstrates the seller's inventory and analytics.
  - **Admin Panel**: Overview of user management, order tracking, and system settings.
- **Demo Link**: https://drive.google.com/file/d/1BqLOpC5Qm3XFV-CIRq2YqdOBeeETi5jr/view?usp=drivesdk

12. Known Issues

Current Issues:

- **Loading Time on High Traffic**: Slight delays in rendering product catalog under heavy traffic. Optimization is planned with caching and content delivery network (CDN) integration.
- **Seller Dashboard Analytics**: Occasional lag in generating reports; a refactor for improved data handling is in progress.
- **Browser Compatibility**: Minor layout discrepancies observed in older versions of Internet Explorer.

Resolved Issues:

- **Checkout Process**: Improved speed and security after a recent API optimization.
- **Product Search Function**: Enhanced search algorithm accuracy to refine results for user queries.

13. Future Enhancements

Planned Features and Improvements:

1. **AI-Powered Product Recommendations**: Leveraging machine learning to provide personalized product recommendations based on user preferences and browsing history.

2. **Multi-language and Currency Support**: To cater to a global user base, localization options for language and currency adjustments will be implemented.
3. **Mobile App Integration**: Expanding ShopEZ to a mobile application for iOS and Android, offering users a versatile and accessible shopping experience.
4. **Enhanced Analytics for Sellers**: Introducing more in-depth reporting tools and visualizations for sellers to monitor sales trends, stock levels, and customer engagement.
5. **Loyalty Program**: Implementing a reward system to incentivize frequent shoppers and increase user retention.