Your Digital Grocery Store Experience

1.INTRODUCTION

INTERNSHIP REPORT ON:

ShopSmart: Your Digital Grocery Store Experience

BY

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Abstract:

The project "ShopSmart" is a full-stack grocery web application developed using HTML, CSS, JavaScript, Bootstrap, Node.js, MongoDB, Angular, and other essential database technologies. It is designed to provide a seamless and user-friendly online shopping experience for customers.

This platform allows users to browse a wide range of products, view detailed information, add items to their cart, and securely complete their purchase. Whether you are a tech enthusiast, fashionista, or homemaker, ShopSmart offers something for everyone by delivering convenience and functionality in one place.

With intuitive navigation and responsive design, the app ensures a smooth and hassle-free user experience. The backend is equipped with powerful features that enable sellers and administrators to manage their products efficiently and handle customer operations with ease.

2.Project Overview

Purpose:

The purpose of the ShopSmart project is to develop a user-friendly online grocery shopping platform that offers a seamless experience for both customers and administrators. The goal is to make online shopping for daily essentials easy, fast, and secure, while also giving admins complete control over managing products, users, and orders.

This web app bridges the gap between customers and grocery retailers through a smooth interface, role-based access, and well-structured architecture using modern web technologies.

Key Goals:

To simplify grocery shopping with a digital platform.

To allow customers to browse, add to cart, and place orders efficiently.

To provide admins with tools to manage the store backend, track orders, and update products.

To ensure a secure and scalable system using full-stack technologies.

Features and Functionalities:

1. 🛍️ User Features:

Browse products by categories.

View product details and availability.

Add items to cart and place orders.

Track bookings and manage order history.

Manage cart items before checkout.

2. 🧑‍💼 Admin Features:

Add, edit, or delete products.

View and manage all bookings.

Manage user accounts and roles.

Generate reports and analytics on bookings and sales.

3. 🔒 Authentication & Role-Based Access:

Separate access for Admin and User.

Each role has specific permissions (as per your flowcharts).

4. 🔗 Technical Stack Integration:

Developed using HTML, CSS, JavaScript, Bootstrap, Angular, Node.js, MongoDB.

Backend includes API Gateway, Authentication, Cart, and User Services.

Third-party integration like Payment Gateway and Shipping Services.

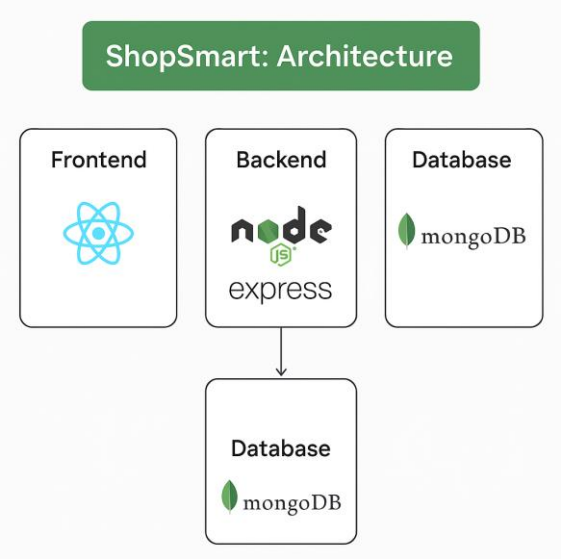
5. 📊 Architecture:

Clearly structured microservices architecture.

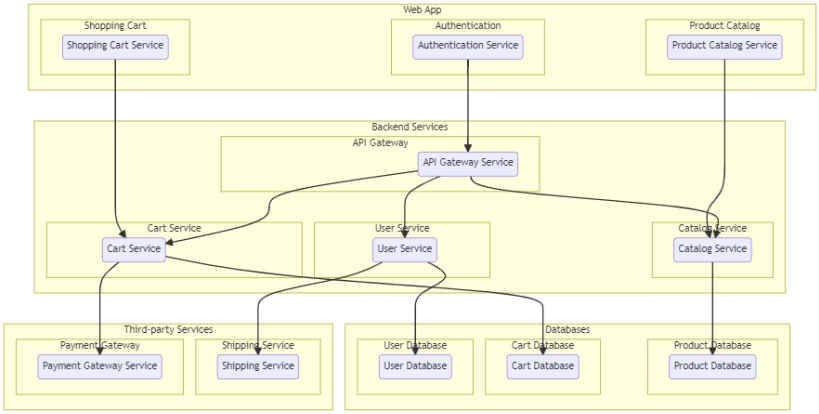
Backend services interact smoothly via API gateway.

Databases linked with respective services for high performance.

3.Architecture



Technical Architecture:



The technical architecture of an flower and gift delivery app typically involves a client-server model, where the frontend represents the client and the backend serves as the server. The frontend is responsible for user interface, interaction, and presentation, while the backend handles data storage, business logic, and integration with external services like payment gateways and databases. Communication between the frontend and backend is typically facilitated through APIs, enabling seamless data exchange and functionality.

Frontend(using React)

ShopSmart: Your Digital Grocery Store Experience, based on the sections under **Frontend Development** from your UI.

Frontend Architecture – ShopSmart: Your Digital Grocery Store Experience

The frontend of *ShopSmart* is designed using **React.js**, a powerful JavaScript library for building modern user interfaces with reusable and efficient components. The architecture emphasizes modularity, scalability, responsiveness, and smooth user experience.

1. User Interface (UI) Design

The UI of ShopSmart is structured into distinct components, each responsible for a specific section of the application. Key components include:

- **Header & Navigation Bar**: Includes links to major sections like Home, Products, Cart, Login/Register, and User Profile.
- **ProductCard Component**: Displays product images, names, prices, and "Add to Cart" buttons.
- **Modal Components**: Used for pop-ups like login forms, order confirmation, etc.
- **Forms**: Controlled components are used for handling user input in authentication, address, and payment steps.

Design principles include:

- Consistent layout using CSS Grid or Flexbox.
- Component reusability for scalability and maintainability.
- Clean and minimal design using a CSS framework like **Bootstrap** or **TailwindCSS**.

2. Responsive Design

ShopSmart is built with **responsive design** to ensure full functionality and an optimal user experience across desktops, tablets, and mobile devices. Key features include:

- Use of **media queries** and **relative units** (%, rem, em).
- Responsive UI libraries or frameworks (e.g., Bootstrap Grid or Tailwind's responsive classes).
- Mobile-first design strategy: all components are designed to degrade gracefully on smaller screens.
- Hamburger menus and collapsible sections for better navigation on mobile devices.

3. Product Catalog

The product catalog is a key feature of the application. It includes:

- **Dynamic rendering** of product listings using .map() over fetched product data from the backend API.

- **Search and filtering options** to allow users to find products quickly based on name, category, or price range.
- **Pagination or infinite scrolling** for large catalogs.
- **Lazy loading** of images to enhance performance.

Each product is linked to a **product details page**, which displays full descriptions, availability, and options to add the item to the cart.

4. Shopping Cart and Checkout Process

The shopping cart is a **stateful component** that handles:

- Adding/removing items
- Adjusting quantity
- Viewing total price
- Displaying tax and delivery estimates

Checkout includes:

- **Multi-step forms**: address, payment method, order summary
- **Form validation**: real-time feedback for incorrect or missing fields
- Integration with **React Router** for navigation across steps
- Final order confirmation with status tracking

Cart state is typically maintained in **localStorage**, **Context API**, or **Redux**, ensuring persistence even on page refresh.

5. User Authentication and Account Management

This section handles user registration, login, logout, and account features.

- **Login/Register Forms**: built using controlled components
- **JWT Token Handling**: token stored in localStorage and sent with each protected API request
- **Conditional Rendering**: Navbar and certain pages update based on auth state (e.g., Admin Panel access only visible to admins)
- **Protected Routes**: React Router with route guards to restrict access to authenticated users only

User profile page allows:

- Updating personal details
- Viewing past orders
- Changing passwords

6. Payment Integration

The frontend interacts with a payment gateway (like Razorpay, Stripe, or PayPal). This involves:

- A **secure form** for entering payment details
- A **confirmation step** before finalizing payment
- Integration with a **payment SDK** or API (frontend sends token to backend for processing)
- Handling payment success/failure and redirecting to the appropriate status page

Sensitive information is not stored on the frontend. All data transmission is handled securely over HTTPS.

Backend Architecture (Node.js + Express.js)

Based on your **Set Up Backend** section and diagram:

Structure:

- **API Gateway Service**: Central entry point to route API calls to appropriate microservices.
- **Microservices**:
    - User Service: Handles registration, login, user info.
    - Cart Service: Manages shopping cart data.
    - Catalog Service: Manages product details.
    - Authentication Service: Verifies tokens/sessions.
- **Third-party Integrations**:
    - Payment Gateway Service: Stripe/COD handling.
    - Shipping Service: Integration with external shipping APIs.

Backend Stack:

- Express.js handles routes and middleware.
- Mongoose for database operations.
- JWT for authentication.
- Middleware: body-parser, cors, express-validator.

Typical API Endpoints:

- /api/users/register
- /api/users/login

- /api/products
- /api/cart
- /api/orders
- /api/payment

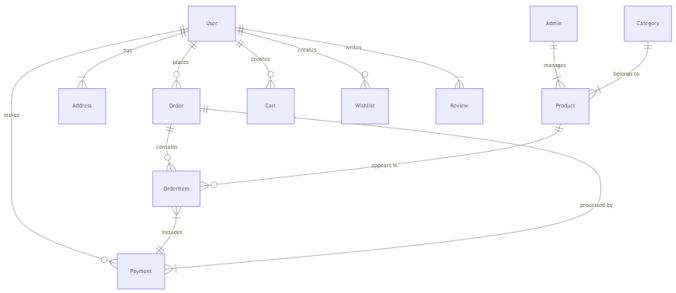
Diagram Connection Flow:

Frontend → API Gateway → Service (e.g., Cart Service) → Database

```
const mongoose = require("mongoose");

const db= 'mongodb://127.0.0.1:27017/grocery'
// Connect to MongoDB using the connection string

mongoose.connect(db, {
  useNewUrlParser: true,
  useUnifiedTopology: true,
}).then(() => {
  console.log(`Connection successful`);
}).catch((e) => {
  console.log(`No connection: ${e}`);
});
```



ER Diagram: The Entity-Relationship (ER) diagram for an flower and gift delivery app visually represents the relationships between different entities involved in the system, such as users, products, orders, and reviews. It illustrates how these entities are related to each other and helps in understanding the overall database structure and data flow within the application.

Database Architecture (MongoDB with Mongoose)

Schema Design (MongoDB):

- User: name, email, password (hashed), address[]
- Product: name, price, category, inventory count
- Cart: userId, items[]
- Order: userId, orderItems[], totalAmount, status

- Payment: orderId, method, status
- Review/Wishlist: userId, productId, etc.

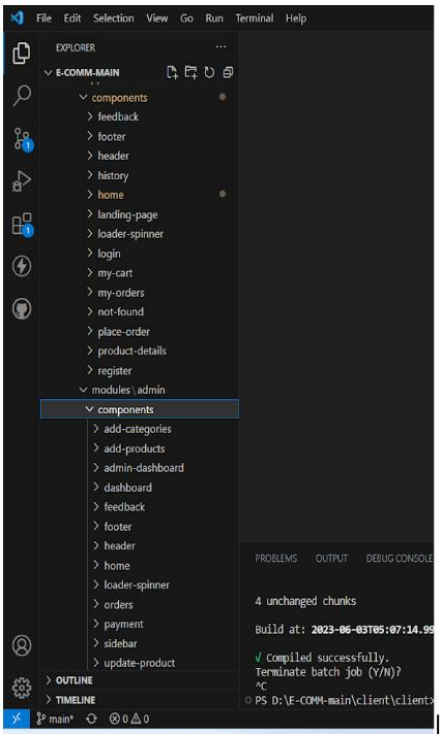
Relationships (based on the second diagram):

- User ⟶ has ⟶ Address, Wishlist, Cart
- User ⟶ places ⟶ Order ⟶ contains ⟶ OrderItems
- Admin ⟶ manages ⟶ Product
- Product ⟶ belongs to ⟶ Category

MongoDB Integration (from code):

```
mongoose.connect('mongodb://127.0.0.1:27017/grocery', {
 useNewUrlParser: true,
 useUnifiedTopology: true
});
```

4.Setup Instructions



This structure assumes an Angular app and follows a modular approach. Here's a brief explanation of the main directories and files:

- src/app/components: Contains components related to the customer app, such as register, login, home, products, my-cart, my-orders, placeorder, history, feedback, product-details, and more.

- src/app/modules: Contains modules for different sections of the app. In this case, the admin module is included with its own set of components like add-category, add-product, dashboard, feedback, home, orders, payment, update-product, users, and more.
- src/app/app-routing.module.ts: Defines the routing configuration for the app, specifying which components should be loaded for each route.
- src/app/app.component.ts, src/app/app.component.html, `src.

Pre-requisites

To develop a full-stack Grocery web app using AngularJS, Node.js, and MongoDB, there are several prerequisites you should consider. Here are the key prerequisites for developing such an application:

Node.js and npm: Install Node.js, which includes npm (Node Package Manager), on your development machine. Node.js is required to run JavaScript on the server side.

- Download: https://nodejs.org/en/download/
- Installation instructions: https://nodejs.org/en/download/package-manager/

MongoDB: Set up a MongoDB database to store hotel and booking information. Install MongoDB locally or use a cloud-based MongoDB service.

- Download: https://www.mongodb.com/try/download/community
- Installation instructions: https://docs.mongodb.com/manual/installation/

Express.js: Express.js is a web application framework for Node.js. Install Express.js to handle server-side routing, middleware, and API development.

- Installation: Open your command prompt or terminal and run the following command: npm install express

Angular: Angular is a JavaScript framework for building client-side applications. Install Angular CLI (Command Line Interface) globally to create and manage your Angular project.

Install Angular CLI:

- Angular provides a command-line interface (CLI) tool that helps with project setup and development.
- Install the Angular CLI globally by running the following command:

npm install -g @angular/cli
Verify the Angular CLI installation:

- Run the following command to verify that the Angular CLI is installed correctly: ng version

You should see the version of the Angular CLI printed in the terminal if the installation was successful.

Create a new Angular project:

- Choose or create a directory where you want to set up your Angular project.
- Open your terminal or command prompt.

- Navigate to the selected directory using the cd command.
- Create a new Angular project by running the following command: ng new client Wait for the project to be created:
- The Angular CLI will generate the basic project structure and install the necessary dependencies

Navigate into the project directory:

- After the project creation is complete, navigate into the project directory by running the following command: cd client

Start the development server:

- To launch the development server and see your Angular app in the browser, run the following command: ng serve / npm start
- The Angular CLI will compile your app and start the development server.
- Open your web browser and navigate to http://localhost:4200 to see your Angular app running.
- You have successfully set up Angular on your machine and created a new An- gular project. You can now start building your app by modifying the generated project files in the src directory.

Please note that these instructions provide a basic setup for Angular. You can explore more ad- vanced configurations and features by referring to the official Angular documentation: https://angular.io

HTML, CSS, and JavaScript: Basic knowledge of HTML for creating the structure of your app, CSS for styling, and JavaScript for client-side interactivity is essential.

Database Connectivity: Use a MongoDB driver or an Object-Document Mapping (ODM) library like Mongoose to connect your Node.js server with the MongoDB database and perform CRUD (Create, Read, Update, Delete) operations.

Front-end Framework: Utilize Angular to build the user-facing part of the application, including products listings, booking forms, and user interfaces for the admin dashboard.

Version Control: Use Git for version control, enabling collaboration and tracking changes throughout the development process. Platforms like GitHub or Bitbucket can host your repository.

- Git: Download and installation instructions can be found at: https://git-scm.com/downloads

Development Environment: Choose a code editor or Integrated Development Environment (IDE) that suits your preferences, such as Visual Studio Code, Sublime Text, or WebStorm.

- Visual Studio Code: Download from https://code.visualstudio.com/download
- Sublime Text: Download from https://www.sublimetext.com/download
- WebStorm: Download from https://www.jetbrains.com/webstorm/download

To Connect the Database with Node JS go through the below provided link:

• Link: https://www.section.io/engineering-education/nodejs- mongoosejs-mongodb/

Git Repository Cloning

git clone: https://github.com/lalli7263/G-mart

5.Folder Structure

Client: Describe the Structure of the React Frontend

The React frontend of the online shopping web application is designed to provide a responsive and dynamic user interface for both **Admins** and **Users**.

1. Component-Based Architecture

React follows a modular structure with reusable components for improved maintainability. Major components include

- **Navbar/Header**: Displays navigation links based on user role (Admin/User).
- **Product Catalog**: Shows all available products with filtering and search options.
- **Cart Component**: Allows users to view, add, or remove items from their cart.
- **Booking/Order Page**: Enables users to complete orders and track booking details.
- **Admin Dashboard**: Displays analytics, sales reports, and user/product management options for admins.
- **Login/Register**: Provides authentication forms for both roles.

2. Role-Based UI Rendering

- **Admin Interface**: Admins get access to product management, user management, and reporting tools.
- **User Interface**: Users see product listings, cart, bookings, and order tracking options.

3. State Management

State is managed using React's built-in hooks or libraries like Redux/Context API for global state (e.g., cart contents, user session).

4. API Integration

React communicates with the backend using Axios or Fetch API to retrieve or update data such as product listings, cart updates, and bookings.

Server: Explain the Organization of the Node.js Backend

The Node.js backend is built using **Express.js** and follows a RESTful API architecture to support frontend operations and manage application logic securely and efficiently.

1. Modular Structure

- **Routes**: Separate route files for users, admins, products, cart, and bookings.
- **Controllers**: Handle business logic for each module (e.g., productController.js, userController.js).
- **Models**: Mongoose schemas define data structures for MongoDB (e.g., User, Product, Order, Cart).

2. Role-Based Access Control (RBAC)

- **Admin Role**:
    - Can add/edit/delete products and manage shop data.
    - Manage all bookings, including cancellations and modifications.
    - Full access to manage users and assign roles.
    - Generate reports on product bookings, sales, and users.
- **User Role**:
    - Can view products and add items to the cart.
    - Book products and complete order processing.
    - Modify or cancel their own bookings.
    - Manage their personal cart and track order status.

3. Authentication and Authorization

Implemented using **JWT (JSON Web Token)**:

- Tokens are issued upon login and verified on protected routes.
- Middleware functions ensure only users with appropriate roles can access certain endpoints.

4. Database Integration

- Connected to MongoDB using **Mongoose**.
- Collections include Users, Products, Orders, Bookings, and Payments.
- CRUD operations are performed through Mongoose models.

5. Third-Party Integrations

- **Payment Gateway**: Integrated via APIs like Stripe or Razorpay for secure transactions.
- **Shipping Service**: API integration for tracking and delivery status (if required).

6.Running the Application

To run the application locally, both the frontend and backend servers need to be started independently in their respective directories.

Frontend (React)

To start the React frontend server:

```
cd client
npm install   # Install dependencies (only needed once)
npm start     # Start the frontend server
```

This will start the frontend on http://localhost:3000 by default.

Backend (Node.js + Express)

To start the Node.js backend server:

```
cd server
npm install   # Install dependencies (only needed once)
```

npm start # Start the backend server

This will start the backend server on http://localhost:5000 (or the port configured in your .env file).

Here is a well-structured **API Documentation** section that you can **paste into your Word document**. It covers typical endpoints for a grocery web app, including request methods, parameters, and example responses:

7.API Documentation

The backend exposes a set of RESTful API endpoints to handle users, products, bookings, and authentication.

Base URL

http://localhost:5000/api

1. User Authentication

POST /auth/register

Registers a new user.

- **Request Body (JSON):**

```
{
 "name": "lalli",
 "email": "lalli@gmail.com",
 "password": "123456"
}
```

- **Response (201 Created):**

```
{
 "message": "User registered successfully",
 "user": {
  "id": "64a1bfa233",
  "email": "lalli@gmail.com"
 }
}
```

POST /auth/login

Logs in a user and returns a JWT token.

- **Request Body (JSON):**

```
{
 "email": "lalli@gmail.com",
 "password": "123456"
}
```

- **Response (200 OK):**

```
{
 "token": "eyJhbGciOiJIUzI1NiIsInR5cCI6...",
 "user": {
  "id": "64a1bfa233",
  "role": "user"
 }
}
```

2. Products

GET /products

Fetches all available products.

- **Response (200 OK):**

```
[
 {
  "id": "1",
  "name": "Fresh Carrots",
  "price": 2.5,
  "category": "Vegetables"
 },
 {
  "id": "2",
  "name": "Broccoli",
  "price": 3.0,
  "category": "Vegetables"
 }
]
```

POST /products *(Admin only)*

Adds a new product.

- **Request Body (JSON):**

```
{
 "name": "Tomatoes",
 "price": 2.0,
 "category": "Vegetables"
}
```

- **Response (201 Created):**

```
{
 "message": "Product added successfully",
 "product": {
  "id": "3",
  "name": "Tomatoes"
 }
}
```

3. Bookings / Orders

POST /orders

Create a product booking (order).

- **Request Body (JSON):**

```
{
 "userId": "64a1bfa233",
 "items": [
  { "productId": "1", "quantity": 2 },
  { "productId": "2", "quantity": 1 }
 ],
 "total": 8.0
}
```

- **Response (201 Created):**

```
{
 "message": "Order placed successfully",
```

"orderId": "order123"
}

GET /orders/:userId

Fetch all orders made by a specific user.

- **Response (200 OK):**

[
{
"orderId": "order123",
"items": [...],
"total": 8.0,
"status": "Pending"
}
]

4. Admin Reports

GET /admin/reports/sales

Returns sales analytics (Admin only).

- **Response (200 OK):**

{
"totalOrders": 150,
"totalRevenue": 1200.50,
"topProducts": ["Apples", "Bananas"]
}.

8.Authentication

Authentication and authorization in this project are implemented using **JWT (JSON Web Token)**. This approach ensures secure communication between the client and server, and enforces access control based on user roles (e.g., Admin and User).

Authentication Flow

1. **User Registration (/auth/register)**
   Users provide their name, email, and password. The password is hashed using a secure algorithm (e.g., bcrypt) before being stored in the database.
2. **User Login (/auth/login)**
   - The user submits their email and password.
   - If the credentials are valid, the server generates a **JWT** containing user-specific data such as the user ID and role (admin or user).
   - This token is returned to the client.
3. **Token Structure**
   - The JWT includes:
   - {
   - "userId": "64a1bfa233",
   - "role": "admin",
   - "iat": 1719500000,
   - "exp": 1719503600
   - }
   - It is signed with a secret key and typically has an expiration time (e.g., 1 hour).

Authorization

- The token must be included in the Authorization header of all protected API requests:
- Authorization: Bearer <token>
- Middleware on the backend verifies the token:
    - If valid, the request proceeds.
    - If invalid or expired, the server responds with a 401 Unauthorized.

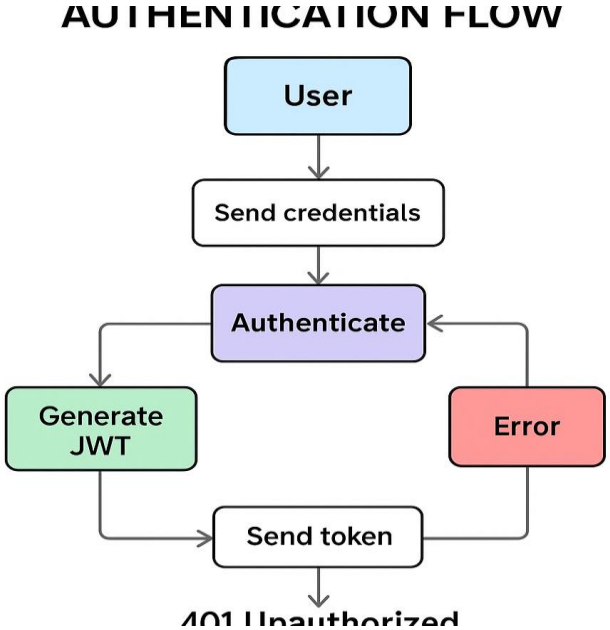
Role-Based Access Control

- **Users** can:
    - View products.
    - Book items.
    - View and manage their own orders and cart.
- **Admins** can:
    - Add, edit, and delete products.
    - View and manage all orders and users.
    - Generate reports and analytics.

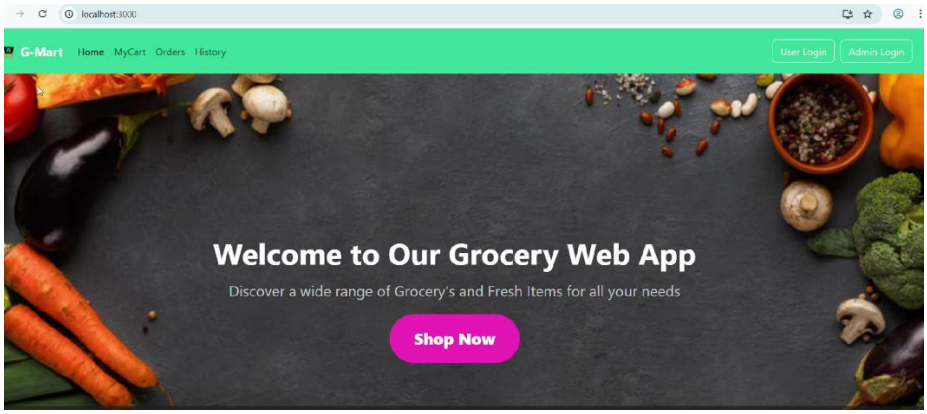
Routes are protected based on user roles using authorization middleware.

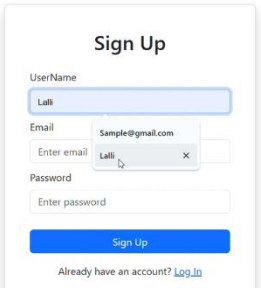
Security Best Practices Used

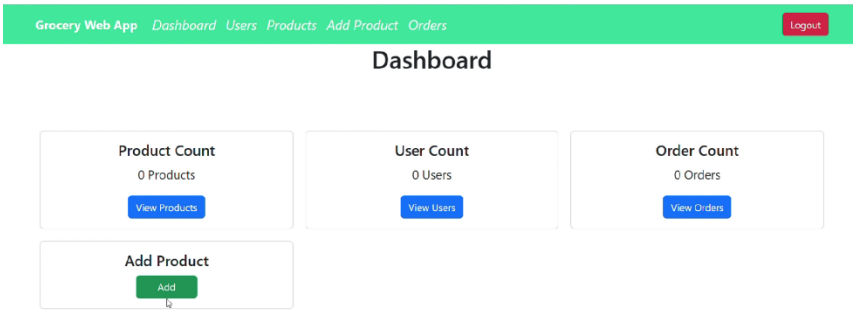
- Passwords are hashed with bcrypt.
- Tokens are stored on the client side (usually in localStorage).
- Tokens have expiration times and are validated on each request.
-
    - Sensitive routes are guarded with middleware that checks user roles.

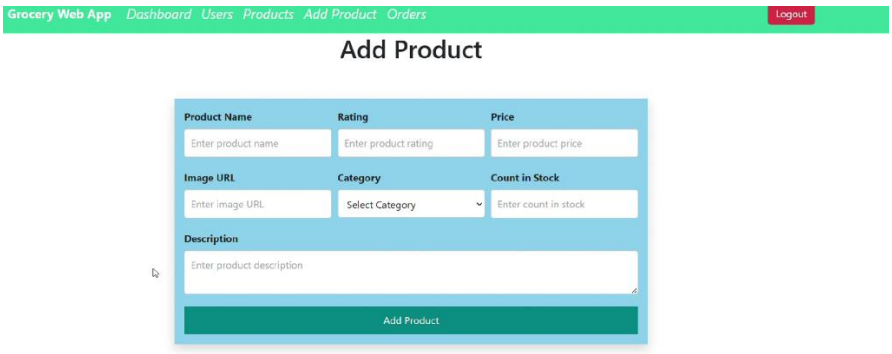


9.User Interface









10.Testing

Testing Strategy

To ensure the functionality, stability, and usability of the application, the following testing strategies were followed:

1. Manual Testing
   All major features (login, product booking, cart management, admin controls) were manually tested through user interactions in the browser.
2. Functional Testing
   Each individual feature was tested to verify correct behavior under normal and edge-case scenarios.
3. Integration Testing
   Verified that the frontend and backend are integrated correctly and API responses are handled as expected.
4. Role-Based Testing
   Separate test cases were executed for Admin and User roles to confirm that access controls and UI components behave accordingly.

Test Case	Role	Input/Action	Expected Result
Login with valid credentials	User	Enter valid email and password	Redirect to home/dashboard page
Login with invalid credentials	User	Enter wrong email or password	Display "Invalid login" error message
Add product to cart	User	Click "Add to Cart" on a product	Product appears in cart
Place an order	User	Proceed to checkout and confirm booking	Order stored in database; success message shown
Cancel a product booking	User	Click cancel on an existing booking	Booking removed and user notified
Edit cart quantity	User	Change quantity in cart page	Cart updates total price accordingly
Generate reports	Admin	Click on "Generate Report" in admin panel	Report data is fetched and displayed
Manage product list	Admin	Add, edit, or delete a product	Product list updates accordingly
Manage users	Admin	Delete a user account	User is removed from system
Unauthorized page access attempt	Guest	Try to access /orders or /admin directly via URL	Redirect to login or show access denied

11.Demo link

https://adityagroup-my.sharepoint.com/:v:/g/personal/22p31a05k2_acet_ac_in/EdMWSouBBvRMu9TbelE03QkBhUugZzAaHPHqy-BO7nxLNg?nav=eyJyZWZlcnJhbEluZm8iOnsicmVmZXJyYWxBcHAiOiJPbmVEcml2ZUZvckJ1c2luZXNzIiwicmVmZXJyYWxBcHBQbGF0Zm9ybSI6IldlYiIsInJlZmVycmFsTW9kZSI6InZpZXciLCJyZWZlcnJhbFZpZXciOiJNeUZpbGVzTGlua0NvcHkifX0&e=FJcLUL

12.Known Issues

Below are some known bugs or limitations in the current version of the application. These should be addressed in future releases

Issue ID	Description	Impact Level	Workaround Available?
KI-01	**No input validation on some admin forms** (e.g., product name/price)	Medium	Input manually with caution until validation is added
KI-02	**Error messages not shown clearly on failed login**	Low	Use browser dev tools to check failed response code
KI-03	**Page does not auto-refresh after product addition or deletion by admin**	Low	Refresh the page manually to see changes
KI-04	**Cart state may reset on full-page reload**	Medium	Avoid reloading cart page until session persistence is improved
KI-05	**No pagination for product listings**	Medium	Manually scroll, can become slow with many products
KI-06	**Booking history loads slowly with large data**	High	Consider breaking into pages or filtering by date
KI-07	**Admin cannot undo deleted user/product**	Medium	Confirm before deleting, no undo available

13. 🚀 Future Enhancements

The following are proposed features and improvements that could enhance the functionality, usability, and scalability of the Grocery Web App

Issue ID	Description	Impact Level	Workaround Available?
KI-01	**No input validation on some admin forms** (e.g., product name/price)	Medium	Input manually with caution until validation is added
KI-02	**Error messages not shown clearly on failed login**	Low	Use browser dev tools to check failed response code
KI-03	**Page does not auto-refresh after product addition or deletion by admin**	Low	Refresh the page manually to see changes
KI-04	**Cart state may reset on full-page reload**	Medium	Avoid reloading cart page until session persistence is improved
KI-05	**No pagination for product listings**	Medium	Manually scroll, can become slow with many products
KI-06	**Booking history loads slowly with large data**	High	Consider breaking into pages or filtering by date

Issue ID	Description	Impact Level	Workaround Available?
KI-07	**Admin cannot undo deleted user/product**	Medium	Confirm before deleting, no undo available

☑ Conclusion

The ShopSmart: Digital Grocery Store Experience project successfully demonstrates the development of a full-stack web application that offers users a convenient platform to browse, book, and manage grocery products online. Leveraging modern technologies such as React for the frontend, Node.js and Express.js for the backend, and MongoDB for the database, the system delivers a responsive, dynamic, and user-friendly experience.

The project supports essential functionalities like user authentication, product catalog management, shopping cart operations, and role-based access control (Admin and User). Admins are equipped with tools to manage inventory, view bookings, and generate reports, while users can explore products, manage their cart, and track orders.

Key components such as API integration, data persistence, security measures, and testing strategies were implemented to ensure reliability and scalability. The modular architecture and clearly defined roles lay the groundwork for future enhancements such as payment integration, advanced analytics, and mobile optimization.

In conclusion, ShopSmart provides a strong foundation for a real-world e-commerce grocery application, aligning technical execution with practical user needs, and offering ample scope for continued development and innovation