MERN STACK POWERED BY MONGODB

GROCERY WEBAPP

A PROJECT REPORT

Submitted by

ALAGANENI SUMI	**113321104003**
PARVATHAREDDY CHARMILA	**113321104070**
DUVVURU BHAVANA REDDY	**113321104022**
KUNCHALA SRIHEMA	**113321104049**

BACHELOR OF ENGINEERING

COMPUTER SCIENCE AND ENGINEERING

VELAMMAL INSTITUTE OF TECHNOLOGY

CHENNAI 601 204

ANNA UNIVERSITY: CHENNAI 600 025

ANNA UNIVERSITY CHENNAI: 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"GROCERY WEB APP"** is the Bonafide work of **"ALAGANENI SUMI - 113321104003, PARVATHAREDDY CHARMILA - 113321104070, DUVVURU BHAVANA REDDY - 113321104022, KUNCHALA SRIHEMA - 113321104049"** who carried out the project work under my supervision.

SIGNATURE

Dr.V.P.Gladis Pushparathi

PROFESSOR,

HEAD OF THE DEPARTMENT,

Computer Science and Engineering,
Velammal Institute of Technology,
Velammal Gardens, Panchetti,
Chennai-601 204.

SIGNATURE

Mrs.Pratheeba R S

ASSISSTANT PROFESSOR ,

NM COORDINATOR ,

Computer Science and Engineering,
Velammal Institute of Technology,
Velammal Gardens, Panchetti,
Chennai-601 204

ACKNOWLEDGEMENT

We are personally indebted to many who had helped us during the course of this project work. Our deepest gratitude to the **God Almighty.**

We are greatly and profoundly thankful to our beloved Chairman **Thiru.M.V.Muthuramalingam** for facilitating us with this opportunity. Our sincere thanks to our respected Director **Thiru.M.V.M Sasi Kumar** for his consent to take up this project work and make it a great success.

We are also thankful to our Advisors **Shri.K.Razak**, **Shri.M.Vaasu**, our Principal **Dr.N.Balaji** and our Vice Principal **Dr.S.Soundararajan** for their never ending encouragement that drives ustowards innovation.

We are extremely thankful to our Head of the Department **Dr.V.P.Gladis Pushparathi** and NaanMudhalvan Coordinator **Mrs.Pratheeba R S**, for their valuable teachings and suggestions.

The Acknowledgment would be incomplete if we would not mention word of thanks to our Parents.Teaching and Non-Teaching Staffs, Administrative Staffs and Friends for their motivation and support throughout the project.

Finally,we thank all those who directly or indirectly contributed to the successful completion of this project .Your contributions have been a vital part of our success

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

The **Grocery-Web App** is a comprehensive online platform designed to redefine the shopping experience for both customers and sellers. This project aims to deliver a user-friendly, secure, and efficient solution for purchasing and managing grocery and other essential products online. Whether catering to the needs of tech enthusiasts, homemakers, or fashion-forward individuals, the app encompasses a diverse range of offerings, ensuring inclusivity and convenience for all users.

The app's customer-centric features include an intuitive interface that facilitates seamless navigation through various product categories, enabling users to explore product details, manage their shopping carts, and complete transactions effortlessly through a secure checkout process. Designed to prioritize user satisfaction, the app ensures a hassle-free and enjoyable shopping journey.

For sellers and administrators, the app incorporates powerful backend functionalities. Sellers can manage product listings, inventory, and order processing with ease, while administrators are equipped with tools to handle customer interactions, oversee payment processing, and monitor app performance for continuous improvement.

With a strong emphasis on security and privacy, the Grocery-Web App integrates advanced measures to safeguard customer data, ensure secure transactions, and protect personal information. By fostering trust and reliability, the app aspires to create a safe and dependable platform for online shopping.

This project demonstrates a blend of technical proficiency and user-centered design, aiming to deliver a superior e-commerce experience while catering to the needs of a dynamic and diverse user base. Through this Grocery-Web App, we aim to contribute to the growing digital marketplace, offering convenience, security, and satisfaction to all stakeholders involved.

Scalability and regular updates make the app future-ready, accommodating an expanding user base while introducing new features and improvements. Exclusive discounts, loyalty programs, and seamless integration of secure transaction protocols further enhance the user experience. By bridging the gap between local sellers and digital consumers, the Grocery-Web App not only empowers small businesses but also fosters community growth. This platform embodies the perfect blend of innovation, trust, and convenience, setting a benchmark for online shopping solutions.

Additionally, the app supports eco-conscious practices, including digital invoicing and sustainable packaging initiatives, promoting an environmentally responsible approach. Localization through multilingual support and accessibility features ensures inclusivity for diverse user groups. Scalability and regular software updates future-proof the app, allowing it to evolve alongside customer expectations and market trends. By empowering local businesses and fostering digital engagement, the Grocery-Web App bridges the gap between traditional commerce and modern e-commerce, creating a platform that is both innovative and impactful.

CHAPTER 2

PROJECT OVERVIEW

Our basic grocery-web app! Our app is designed to provide a seamless online shopping experience for customers, making it convenient for them to explore and purchase a wide range of products. Whether you are a tech enthusiast, a fashionista, or a homemaker looking for everyday essentials, our app has something for everyone.

PURPOSE AND GOALS

The Grocery Web App is designed to transform the traditional grocery shopping process into a seamless, efficient, and convenient online experience. The project aims to address common challenges such as time-consuming in-store shopping, limited visibility into deals and stock availability, and the need for better grocery management tools. By leveraging technology, the app empowers users to browse a wide range of products, add items to their cart, and complete secure transactions, all from the comfort of their home.

The app's primary goal is to enhance user satisfaction through a highly intuitive interface that simplifies navigation and ensures a smooth shopping journey. Features like real-time stock updates, personalized promotions, and order tracking are integrated to provide a dynamic shopping experience. Additionally, the app enables users to maintain an order history, aiding in better grocery planning and reordering convenience.

On the backend, the app serves as a robust management tool for sellers and administrators. It allows them to efficiently oversee inventory, process orders, and monitor sales performance. These functionalities not only streamline operations but also foster better customer service through timely updates and efficient stock management.

Security and data privacy are central to the app's design. With secure checkout options and stringent data protection measures, the app ensures user trust and compliance with privacy standards.

In summary, the Grocery Web App aims to bridge the gap between traditional and digital grocery shopping by offering a feature-rich platform that benefits both

customers and sellers. Its ultimate goal is to create a sustainable and convenient ecosystem that saves time, enhances shopping experiences, and empowers users with better control over their grocery needs.

FEATURES

1. **User Registration and Authentication**:
    - Secure sign-up and login process using JWT authentication.
    - Social media login options for faster onboarding.
2. **Product Browsing and Search**:
    - Explore grocery items by category, such as Fruits, Vegetables, Beverages, and more.
    - Advanced search functionality with filters for price range, ratings, and brands.
3. **Cart and Wishlist**:
    - Add items to the shopping cart for immediate purchase.
    - Save favorite items to the wishlist for future purchases.
4. **Checkout and Payments**:
    - Multiple payment options, including credit/debit cards, UPI, and digital wallets.
    - Integration with payment gateways like PayPal and Razorpay for secure transactions.
5. **Order Management**:
    - Real-time order tracking from placement to delivery.
    - Notifications for order status updates.
6. **Admin Dashboard**:
    - Tools for adding, updating, or removing products.
    - Monitor user activity and manage orders effectively.
7. **Data Analytics**:
    - Visual insights for admins, including sales trends, inventory usage, and customer preferences.
8. **Mobile Responsiveness**:
    - Fully responsive design, ensuring seamless usability across desktops, tablets, and smartphones.

Unique Selling Points:

- **Personalized Experience**: AI-based recommendation engine for suggesting products based on user behavior.
- **User-Friendly Interface**: Intuitive design with easy navigation for all age groups.
- **Efficiency**: Swift loading times and minimal latency to enhance user experience.
- **Security**: End-to-end encryption for secure user data handling and payment processing**.**

Target Audience:

- Busy professionals seeking convenience in grocery shopping.
- Retail grocery stores aiming to digitize their business operations. Customers in urban and semi-urban areas with internet access and mobile devices

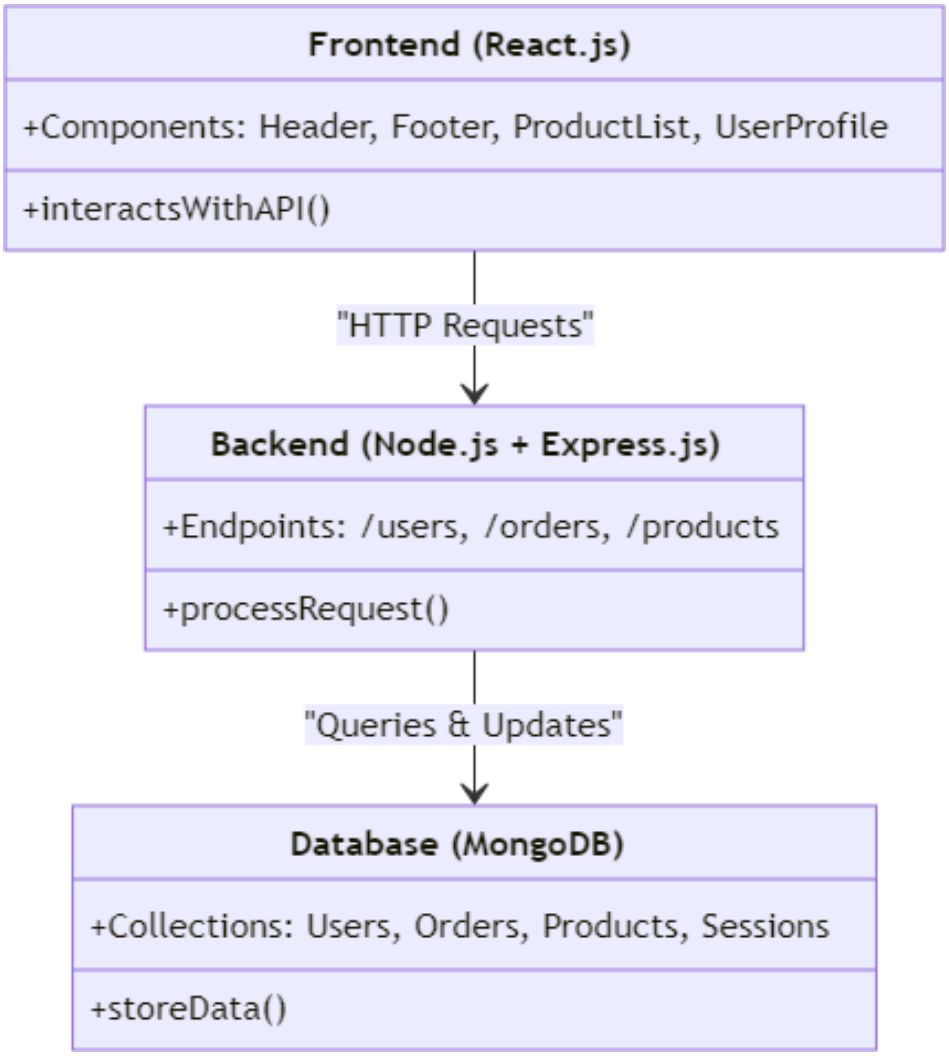
Business Benefits:

- Expanded market reach for grocery stores.
- Improved inventory and order management through centralized dashboards.
- Enhanced customer satisfaction leading to repeat business.

CHAPTER 3

ARCHITECTURE

The architecture of the Grocery Web App is designed to be scalable, efficient, and user-friendly. It follows a **MERN (MongoDB, Express.js, React.js, Node.js)** stack to create a full-stack application with a focus on modularity and performance. The architecture is divided into three main components: **Frontend**, **Backend**, and **Database**, with seamless communication between them.

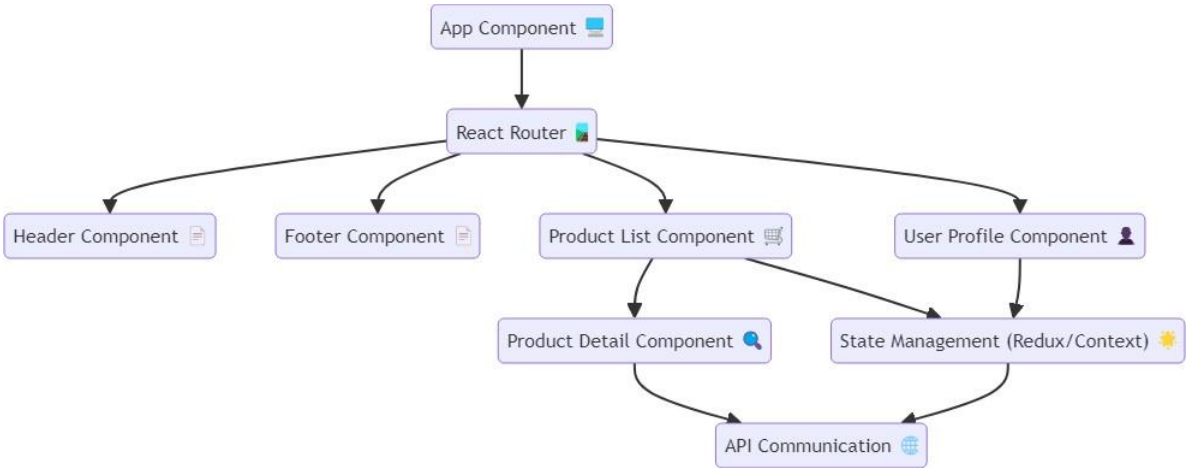


FRONT END

The frontend is built using **React.js**, a JavaScript library known for its high performance and reusable components. The design emphasizes a responsive and intuitive user interface for easy navigation

Key Features:

- **Component-Based Design**:
  Each UI element, such as the product list, shopping cart, and user profile, is implemented as an independent, reusable component.
    - Example Components:
        - ProductCard for displaying individual products.
        - Cart for managing items added by users.
        - Navbar for seamless navigation across pages.
- **State Management**:
    - **Redux** or React Context API is used to manage global states, such as user authentication, cart data, and order status.
    - Ensures smooth data flow across components without redundancy.
- **Routing**:
    - **React Router** is used for efficient navigation between pages (e.g., Home, Product Details, Checkout).
    - Implements dynamic routes for viewing individual product details.
- **Styling and Responsiveness**:
    - CSS frameworks like **Bootstrap** and custom SCSS are used for styling.
    - Ensures mobile-first design for optimal performance across devices.



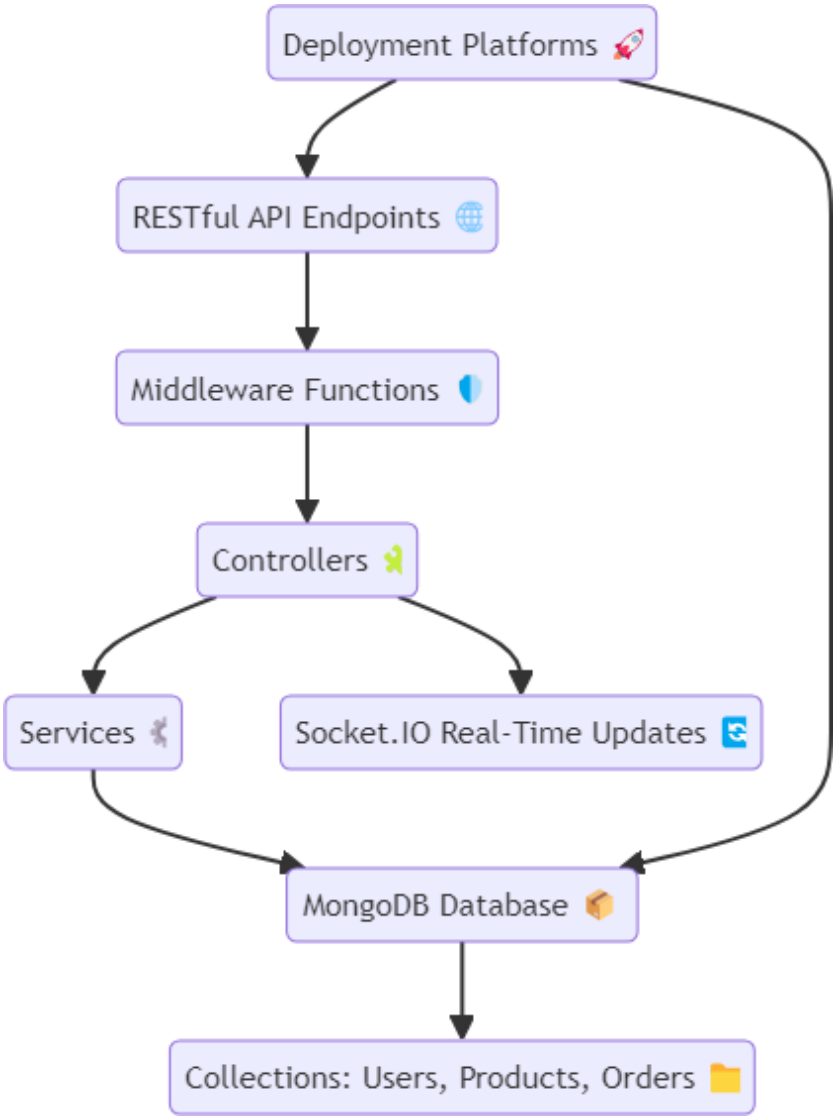
BACK END

The backend is powered by **Node.js** and **Express.js**, providing a robust server-side framework to handle business logic, data management, and communication with the frontend.

Key Features:

- **API-Driven Design**:
  RESTful APIs are designed for each functionality, enabling seamless interaction between the frontend and backend.
    - Example Endpoints:
        - POST /api/register for user registration.
        - GET /api/products for fetching all products.
        - POST /api/orders for placing an order.
- **Middleware**:
    - Middleware functions are used to handle tasks like authentication, request validation, and error handling.
    - Example: A JWT-based middleware ensures that only authenticated users can access protected routes.
- **Scalability**:
    - Modular structure with separate folders for routes, controllers, and services.
    - This separation of concerns makes it easy to scale the application by adding new features.

- **Real-Time Updates**:
    - Integrates **Socket.IO** for real-time notifications, such as order status changes or inventory updates



DATABASE

The database layer uses **MongoDB**, a NoSQL database known for its flexibility and scalability, to store and manage application data.

Key Features:

- **Schema Design**:
  MongoDB's flexible schema design allows for quick adjustments as new requirements emerge. The main collections include:
  - **Users**: Stores user profiles, authentication details, and order history.
  - **Products**: Stores product details, stock levels, and pricing.
  - **Orders**: Tracks order placement, status, and payment information.
- **Relationships**:
  - Logical relationships between collections (e.g., linking orders to users and products using ObjectIDs).
- **Indexing**:
  Indexes are created on fields like productName and category to optimize search queries.
- **Scalability**:
  - MongoDB's sharding feature can be leveraged to handle large datasets and concurrent users.

Integration and Communication

- **Frontend-Backend Communication**:
  - The frontend communicates with the backend through RESTful APIs.
  - Asynchronous requests are handled using **Axios** or **Fetch API**, ensuring non-blocking operations.
- **Backend-Database Communication**:
  - The backend uses **Mongoose**, an Object Data Modeling (ODM) library for MongoDB, to interact with the database.
  - Mongoose schemas enforce data consistency and validation at the application level.

Security

Security measures are implemented at every layer of the architecture to ensure the safety of user data and transactions:

- **Frontend**:
  - Input validation using React hooks and libraries like Formik or Yup.
- **Backend**:
  - JWT-based authentication and role-based access control.
  - Rate-limiting middleware to prevent brute force attacks.
- **Database**:
  - Data encryption for sensitive fields like passwords (hashed using bcrypt).

Deployment

The architecture supports smooth deployment to cloud platforms like **AWS**, **Heroku**, or **Vercel**. Key components:

- **Frontend**: Deployed on **Netlify** or **Vercel**.
- **Backend**: Deployed on **AWS EC2** or **Heroku**.
  Database: Hosted on **MongoDB Atlas**, a fully managed cloud database service

Technology Stack:

Layer	Technology
Frontend	React.js, Redux, Bootstrap
Backend	Node.js, Express.js
Database	MongoDB, Mongoose

State Management	Redux or Context API
Authentication	JWT
Deployment	AWS, Heroku, MongoDB Atlas

CHAPTER 4

SETUP INSTRUCTIONS

The following detailed setup instructions will guide you through the process of installing and running the Grocery Web App locally on your system.

PREREQUISITIES

1. **Node.js** (v14 or later):
    - Download and install from Node.js Official Website.
    - Verify installation by running:

      ```
      node -v
      ```

      ```
      npm -v
      ```

2. **MongoDB** (v4.4 or later):
    - Download and install MongoDB from MongoDB Official Website.
    - Start MongoDB service:

      ```
      mongodb
      ```

3. **Git**:
    - Download and install Git from Git Official Website.
    - Verify installation by running:

      ```
      git --version
      ```

4. **Code Editor**:
    - Use a code editor such as **Visual Studio Code** (recommended).

5. **Browser**:
    - A modern browser like Google Chrome or Mozilla Firefox.

Cloning the Repository

1. Open a terminal and navigate to the directory where you want to clone the project.
2. Clone the repository:

   git clone https://github.com/Alaganenisumi/NM-projects-grocery-webapp

3. Navigate to the project directory:

   cd grocery-webapp

Environment Variables

1. Create a .env file in both the **backend** and **frontend** directories.
2. Add the following environment variables in the respective .env files:

Backend (/backend/.env):

MongoURI=mongodb+srv://alaganenisumi:mongodbpass@cluster0

Frontend (/frontend/.env):

PORT=5000

LOCAL_HOST= http://localhost:5173/

INSTALLATION

Install the required dependencies for both the client (frontend) and server (backend).

1. **Frontend**:

Navigate to the client directory:

```
cd frontend
```

Install dependencies using npm:

```
npm install
```

2. **Backend**:

Navigate to the server directory:

```
cd ../backend
```

Install dependencies using npm:

```
npm install
```

CHAPTER 5

RUNNING THE APPLICATION

1. Start the MongoDB Service:

- Ensure the MongoDB service is running before starting the application.

```
mongodb
```

2. Start the Backend Server:

Navigate to the backend directory:

```
Cd backend
```

Start the backend server:

```
npm run start
```

- The backend server will run at http://localhost:5173.

3. Start the Frontend Server:

Open a new terminal and navigate to the client directory:

```
cd frontend
```

Start the frontend development server:

```
npm run dev
```

- The frontend will run at http://localhost:5173.

Verify the Setup

1. Open a browser and navigate to http://localhost:5173 to access the frontend of the Grocery Web App.
2. Test key functionalities:
   - User registration and login.
   - Product browsing and adding items to the cart.

Admin functionalities if applicable .

ADDITIONAL NOTES :

Data Seeding:
If the application requires initial data for products or users, run a seed script (if provided) in the backend directory:

```
npm run seed
```

1. **Using External APIs**:
   If the project integrates external APIs (e.g., payment gateways), ensure their keys are added to the .env file.
2. **Debugging**:
   - Use the terminal to monitor logs from the frontend and backend for troubleshooting errors.

Use browser developer tools for inspecting frontend issues

1. **Product Catalog:** Pre-load a diverse range of grocery products, categorized by type (e.g., fruits, vegetables, dairy, etc.), along with essential attributes like product name, description, price, SKU, and stock status. This ensures users have a rich selection when they first interact with the app.
2. **User Accounts:** Seed sample user data for testing purposes, including user profiles, account details, and order history. This helps ensure that user authentication and account management features are functioning correctly.
3. **Promotions and Offers:** Include default promotional offers, discounts, and loyalty points information so users can access deals immediately upon signup. This is essential for testing notification systems and discount applications.
4. **Categories and Subcategories:** Populate predefined categories (e.g., fruits, vegetables, snacks) with relevant products. This allows users to filter and search effectively from day one.
5. **Stock Levels and Availability:** Seed data reflecting initial stock levels for products, enabling real-time updates for users and testing the stock tracking and notification system.
6. **Payment Methods:** Configure a set of sample payment methods and payment gateway test data for the initial stages of development and testing.

CHAPTER 6

API DOCUMENTATION

This document outlines the key API endpoints for the **Grocery Web App**, which allows users to browse products, manage their cart, place orders, and track delivery. The API is RESTful, with JSON responses.

Base URL

arduino
https://api.groceryapp.com/v1

Authentication

All requests require an authentication token. The token is provided upon successful login and should be included in the Authorization header for every request.

Authorization Header

makefile
Authorization: Bearer <access_token>

Endpoints

1. User Authentication

POST /auth/signup

- **Description:** Create a new user account.
- **Request Body:**

  json
  {
    "email": "user@example.com",
    "password": "securepassword",
    "name": "Charmi"

```
}
```

- **Response:**

```
json
{
  "message": "User created successfully",
  "user_id": "2730",
  "token": "<access_token>"
}
```

POST /auth/login

- **Description:** Login and retrieve authentication token.
- **Request Body:**

```
json
{
  "email": "user@example.com",
  "password": "securepassword"
}
```

- **Response:**

```
json
{
  "message": "Login successful",
  "token": "<access_token>"
}
```

POST /auth/logout

- **Description:** Logout the current user.
- **Response:**

```
json
{
  "message": "Logout successful"
}
```

2. Product Management

GET /products

- **Description:** Retrieve a list of all products.
- **Query Parameters:**
  - category (optional) – Filter products by category.
  - search (optional) – Search products by name or description.
- **Response:**

```
json
 [
  {
   "id": "101",
   "name": "Apple",
   "category": "Fruits",
   "price": 1.99,
   "stock": 50,
   "image_url": "https://example.com/apple.jpg"
  },
  {
   "id": "102",
   "name": "Banana",
   "category": "Fruits",
   "price": 1.49,
   "stock": 20,
   "image_url": "https://example.com/banana.jpg"
  }
]
```

GET /products/{id}

- **Description:** Get details of a specific product.
- **Response:**

```
json
{
  "id": "101",
  "name": "Apple",
  "category": "Fruits",
  "price": 1.99,
```

```
  "stock": 50,
  "description": "Fresh red apples from local farms.",
  "image_url": "https://example.com/apple.jpg"
}
```

GET /categories

- **Description:** Retrieve all product categories.
- **Response:**

```
json
 [
  "Fruits",
  "Vegetables",
  "Dairy",
  "Snacks",
  "Beverages"
]
```

3. Shopping Cart

GET /cart

- **Description:** Retrieve the current user's shopping cart.
- **Response:**

```
json

{
  "items": [
    {
      "product_id": "101",
      "name": "Apple",
      "quantity": 3,
      "price": 1.99
    },
    {
      "product_id": "102",
      "name": "Banana",
      "quantity": 2,
```

```
      "price": 1.49
    }
  ],
  "total_price": 9.94
}
```

POST /cart

- **Description:** Add a product to the cart.
- **Request Body:**

  ```
  json
  {
    "product_id": "101",
    "quantity": 2
  }
  ```

- **Response:**

  ```
  json
  {
    "message": "Product added to cart",
    "cart": {
      "items": [
        {
          "product_id": "101",
          "name": "Apple",
          "quantity": 2,
          "price": 1.99
        }
      ],
      "total_price": 3.98
    }
  }
  ```

DELETE /cart/{product_id}

- **Description:** Remove a product from the cart.
- **Response:**

  ```
  json
  ```

```
{
  "message": "Product removed from cart",
  "cart": {
    "items": [
      {
        "product_id": "102",
        "name": "Banana",
        "quantity": 2,
        "price": 1.49
      }
    ],
    "total_price": 2.98
  }
}
```

4. Order Management

POST /orders

- **Description:** Place a new order.
- **Request Body:**

  json
  ```
  {
    "address": "123 Main St, City, Country",
    "payment_method": "credit_card",
    "cart_id": "abc123"
  }
  ```

- **Response:**

  json
  ```
  {
    "message": "Order placed successfully",
    "order_id": "order123",
    "status": "pending"
  }
  ```

GET /orders/{order_id}

- **Description:** Retrieve order details.
- **Response:**

  json
  ```
  {
    "order_id": "order123",
    "status": "pending",
    "items": [
      {
        "product_id": "101",
        "name": "Apple",
        "quantity": 3,
        "price": 1.99
      }
    ],
    "total_price": 5.97,
    "shipping_address": "123 Main St, City, Country"
  }
  ```

GET /orders

- **Description:** Retrieve all orders for the authenticated user.
- **Response:**

  json
  ```
  [
    {
      "order_id": "order123",
      "status": "shipped",
      "total_price": 9.94,
      "date": "2024-11-24T14:30:00Z"
    }
  ]
  ```

5. Stock and Notification System

GET /stock/{product_id}

- **Description:** Get real-time stock availability for a product.
- **Response:**

  json
  {
    "product_id": "101",
    "stock": 50
  }

POST /notifications

- **Description:** Subscribe to notifications for deals, promotions, or stock updates.
- **Request Body:**

  json
  {
    "product_id": "101",
    "notification_type": "stock_update"
  }

- **Response:**

  json
  {
    "message": "Subscribed to stock updates",
    "subscription_id": "sub123"
  }

Error Handling

All API responses include an error code and message in the event of a failure.

Example Error Response:
json
{

```
  "error": {
    "code": "400",
    "message": "Product not found"
  }
}
```

Rate Limiting

- API requests are rate-limited to prevent abuse. The limits are as follows:
    - **500 requests per minute** per user
    - If exceeded, you will receive a 429 Too Many Requests error.

CHAPTER 7

AUTHENTICATION & AUTHORIZATION

Authentication is a critical feature in the Grocery Web App as it ensures secure and personalized access to the platform. Here's a detailed breakdown of the authentication process:

1. **User Registration (Sign-Up):**
    - Users are required to create an account with personal details such as name, email, phone number, and a secure password.
    - Validation checks should be in place to ensure the email is unique and the password meets security requirements (e.g., minimum length, special characters).
    - An email verification process can be implemented to ensure the legitimacy of the user's email address.
2. **Login:**
    - Users can log in using their registered email and password.
    - A "Remember Me" feature can be added for a more convenient login experience on returning visits.
    - Multi-Factor Authentication (MFA) can be integrated for enhanced security, prompting users for an additional verification step (e.g., SMS code or email link).
3. **Password Recovery:**
    - A "Forgot Password" option allows users to reset their password through a secure process, typically involving sending a password reset link to the registered email.
    - Security questions or additional identity verification can be added to ensure the user is the rightful account holder.
4. **Session Management:**
    - After successful login, users are assigned a session token, stored securely (e.g., in cookies or local storage), allowing them to remain logged in while browsing the site.
    - Session expiry should be managed to automatically log out inactive users, improving security.
5. **Profile Management:**
    - Users can update their personal details, such as name, address, phone number, and payment information through their account settings.

- Password changes can also be handled through this section with re-authentication for security.

6. **Role-Based Authentication:**
   - Different user roles, such as **Admin**, **Customer**, or **Seller**, can be defined with varying levels of access.
     - **Admins** manage the backend, approve listings, handle inventory, and monitor orders.
     - **Customers** can browse products, place orders, and view order history.
     - **Sellers** can add products, track orders, and manage their inventory.
7. **Social Media Login:**
   - Integrating options like Google, Facebook, or other OAuth-based login methods can provide an easier and faster authentication process for users.
8. **Security Measures:**
   - Use encryption protocols like HTTPS to ensure the security of user credentials and sensitive information.
   - Implement rate limiting, CAPTCHA, and other mechanisms to prevent brute-force attacks and unauthorized access.

CHAPTER 8

TESTING

1. Unit Testing with Jest (for Cart Functionality)

cart.js (Functionality)

```
// cart.js

let cart = [];


const addToCart = (product) => {

  cart.push(product);

};


const getTotalPrice = () => {

  return cart.reduce((total, item) => total + item.price, 0);

};


const getCart = () => cart;


module.exports = { addToCart, getTotalPrice, getCart };
```

Running Unit Tests with Jest

1.Install jest

```
npm install --save-dev jest
```

2.Run the test

```
npm test
```

2. End-to-End Testing with Cypress (for Checkout Process)

```
// checkout.spec.js

describe('Grocery Web App - Checkout Flow', () => {
  beforeEach(() => {
    cy.visit('http://localhost:5173');  // Make sure the app is running locally
  });

  it('should allow a user to add an item to the cart and proceed to checkout', () => {
    // Add an item to the cart
    cy.get('.product').first().click(); // Assume the first product on the list
    cy.get('.add-to-cart').click();  // Button to add to cart

    // Verify that the cart shows the added product
    cy.get('.cart').should('contain', 'Apple'); // Example product name

    // Proceed to checkout
    cy.get('.checkout-button').click();  // Checkout button click

    // Fill in checkout details (mock data)
    cy.get('.checkout-form input[name="name"]').type('John Doe');
    cy.get('.checkout-form input[name="address"]').type('123 Main St');
    cy.get('.checkout-form input[name="payment"]').type('4111111111111111'); //
Test credit card number
```

```
    // Submit checkout form
    cy.get('.checkout-form    button[type="submit"]').click();

    // Verify the order confirmation page
    cy.url().should('include', '/order-confirmation');
    cy.get('.order-summary').should('contain', 'Thank you for your purchase');
  });
});
```

3. Security Testing: Checking for SQL Injection Vulnerability

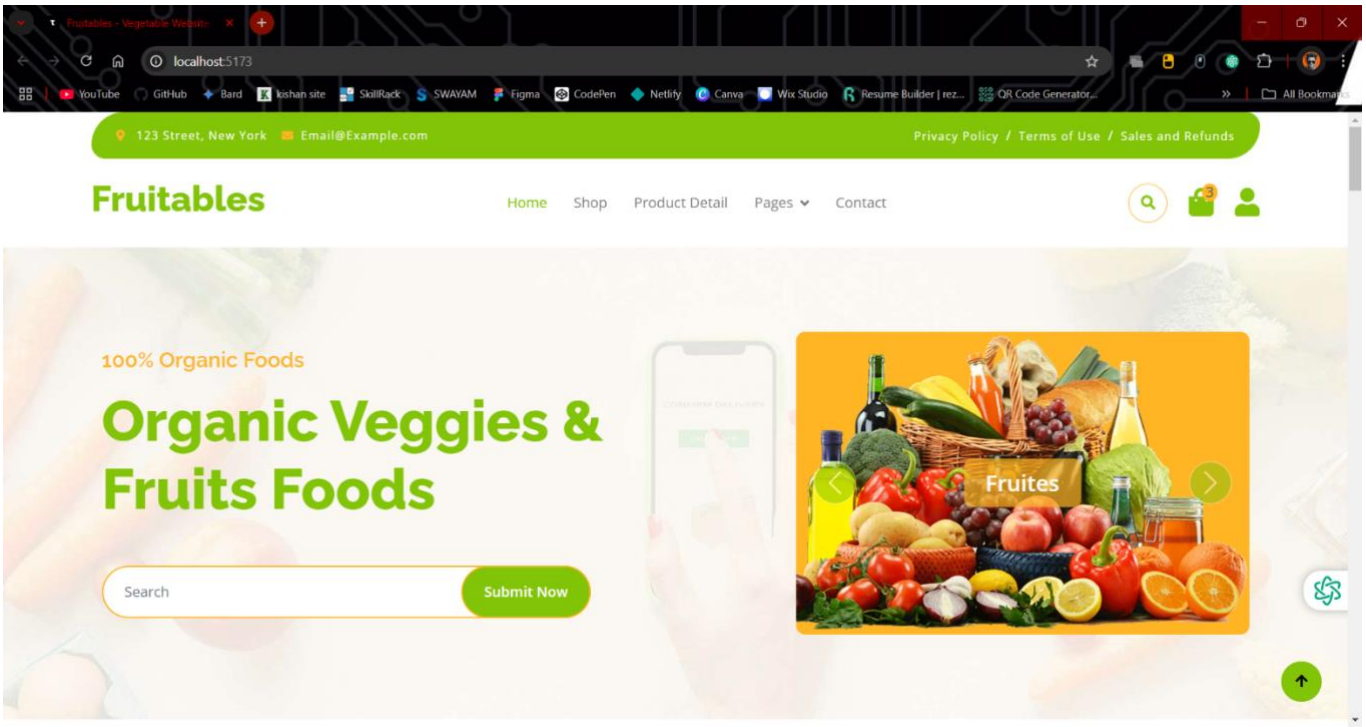
```
const { queryDatabase } = require('./db');  // Simulate a database query function

test('should not allow SQL injection in queries', async () => {
  const maliciousInput = "1 OR 1=1";  // SQL Injection attempt
  const result = await queryDatabase(`SELECT * FROM products WHERE id = '${maliciousInput}'`);
  expect(result).toBeNull();  // Ensure no results or proper handling of malicious input
});
```

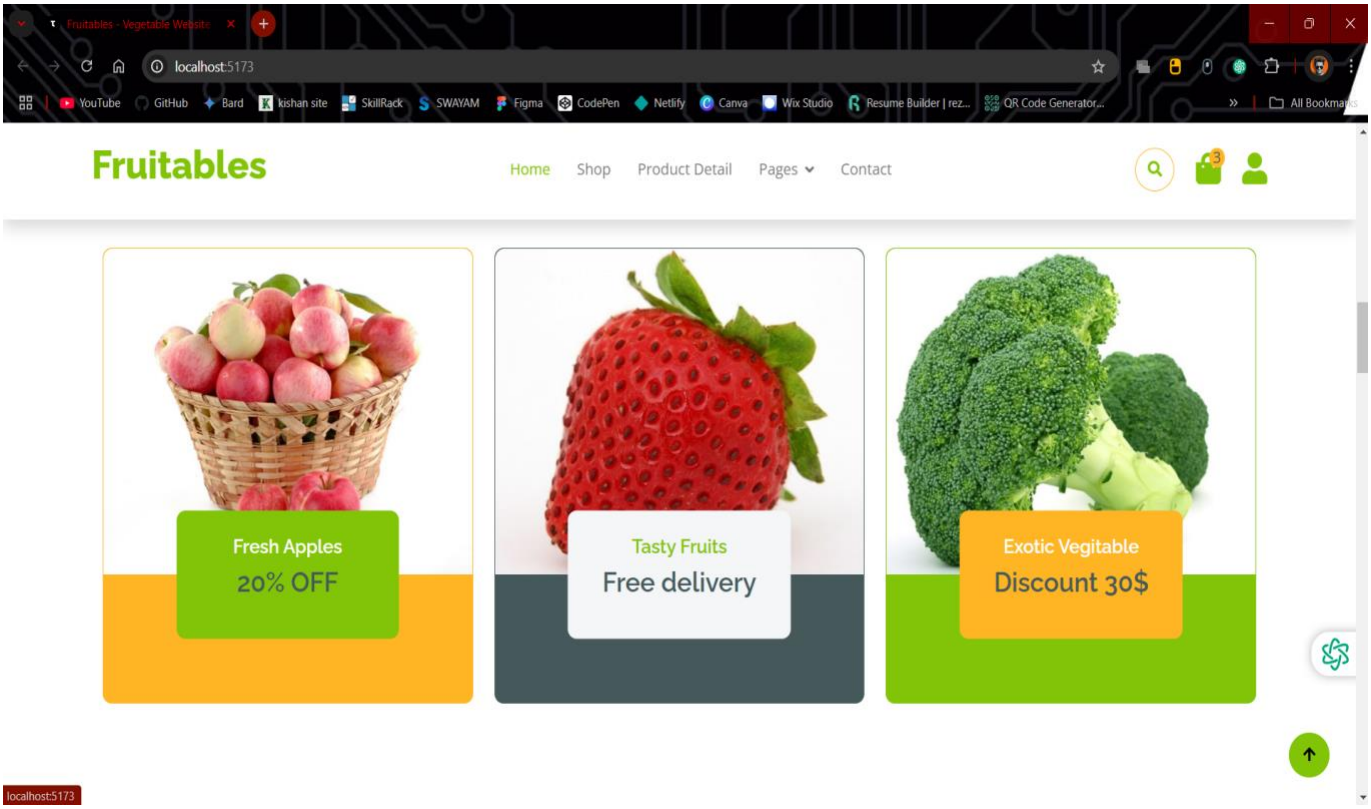
4. Performance Testing with Lighthouse (CLI)

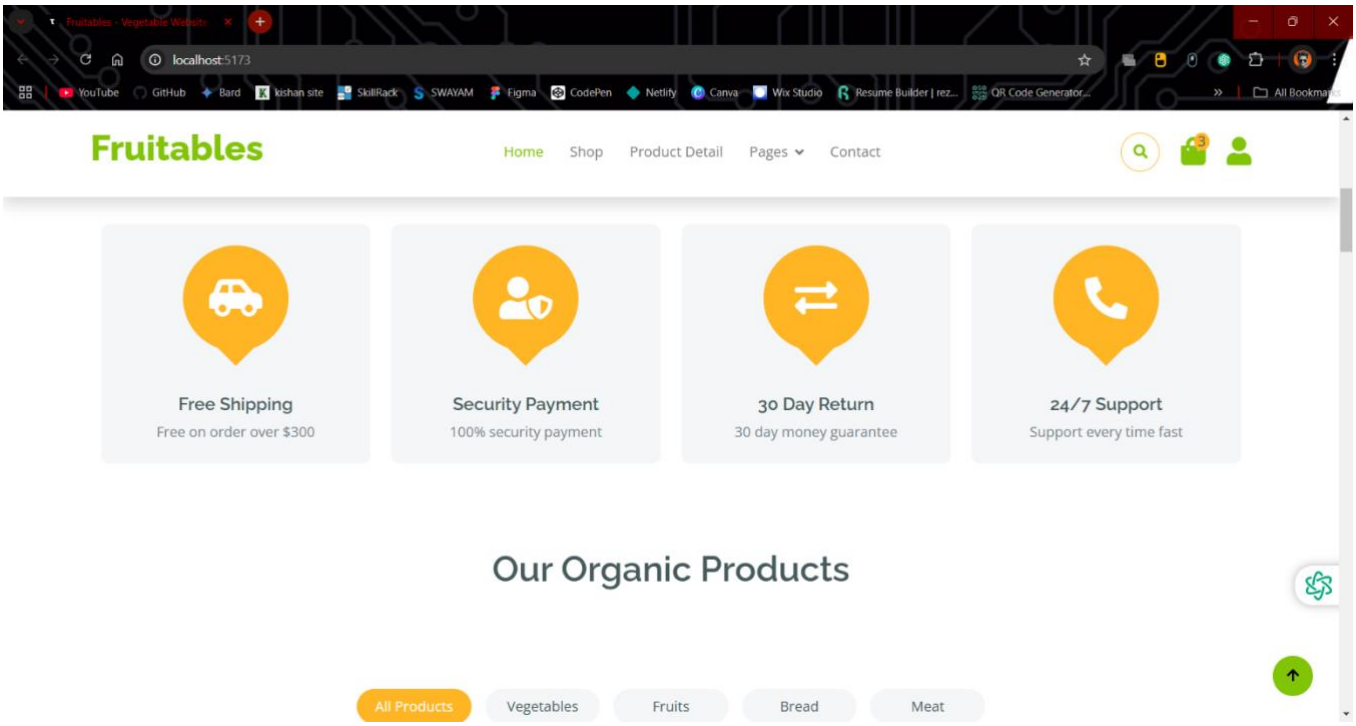
```
npx lighthouse http://localhost:5173 --output html --output-path ./lighthouse-report.html
```

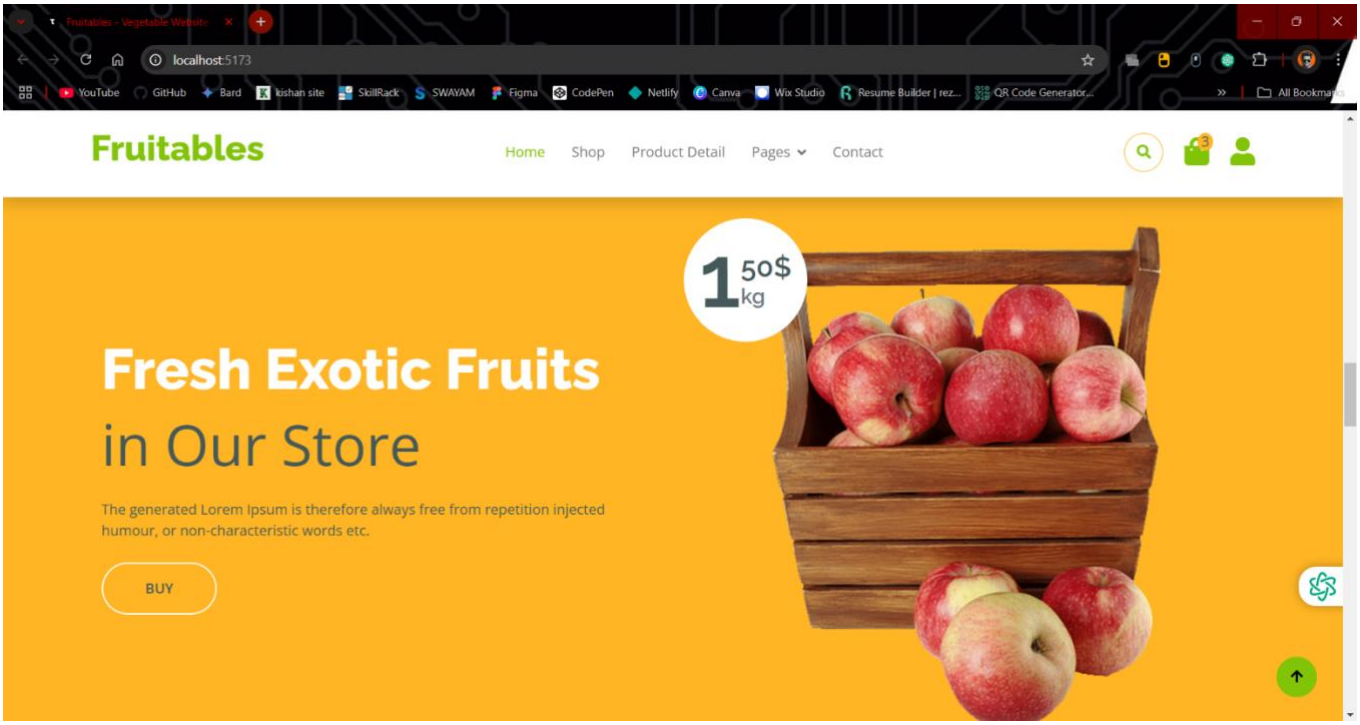
CHAPTER 9

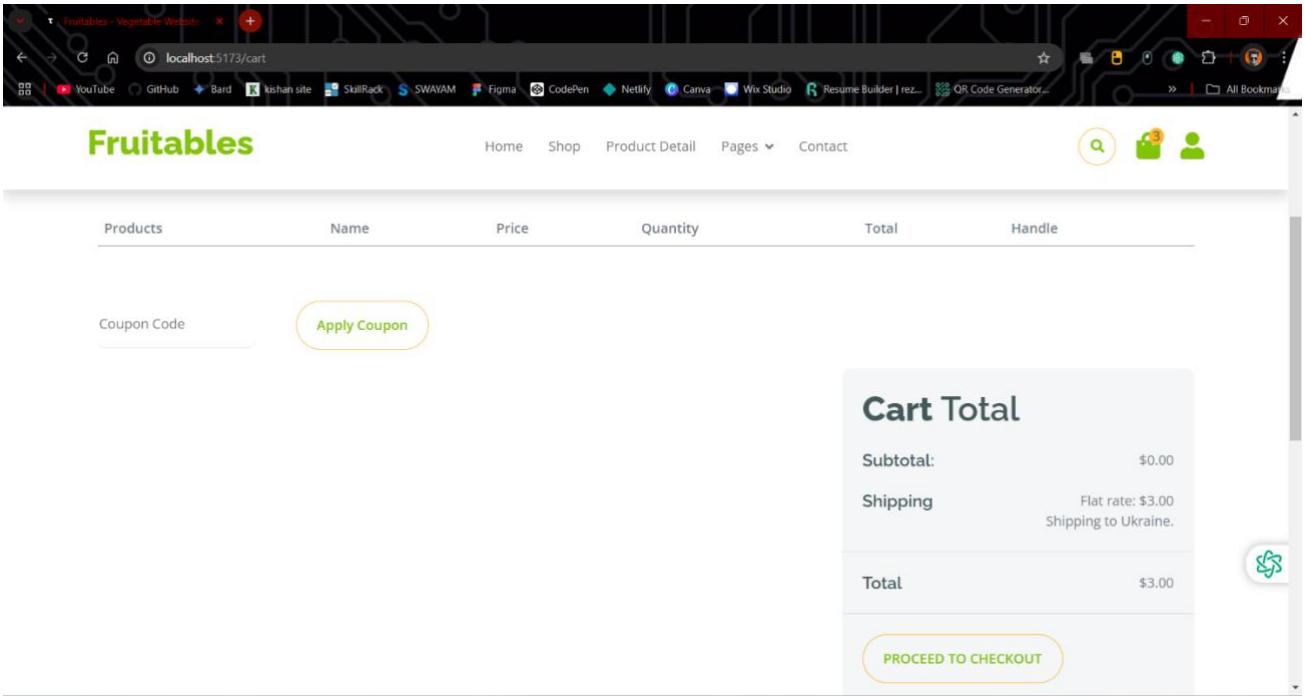
SCREENSHOTS

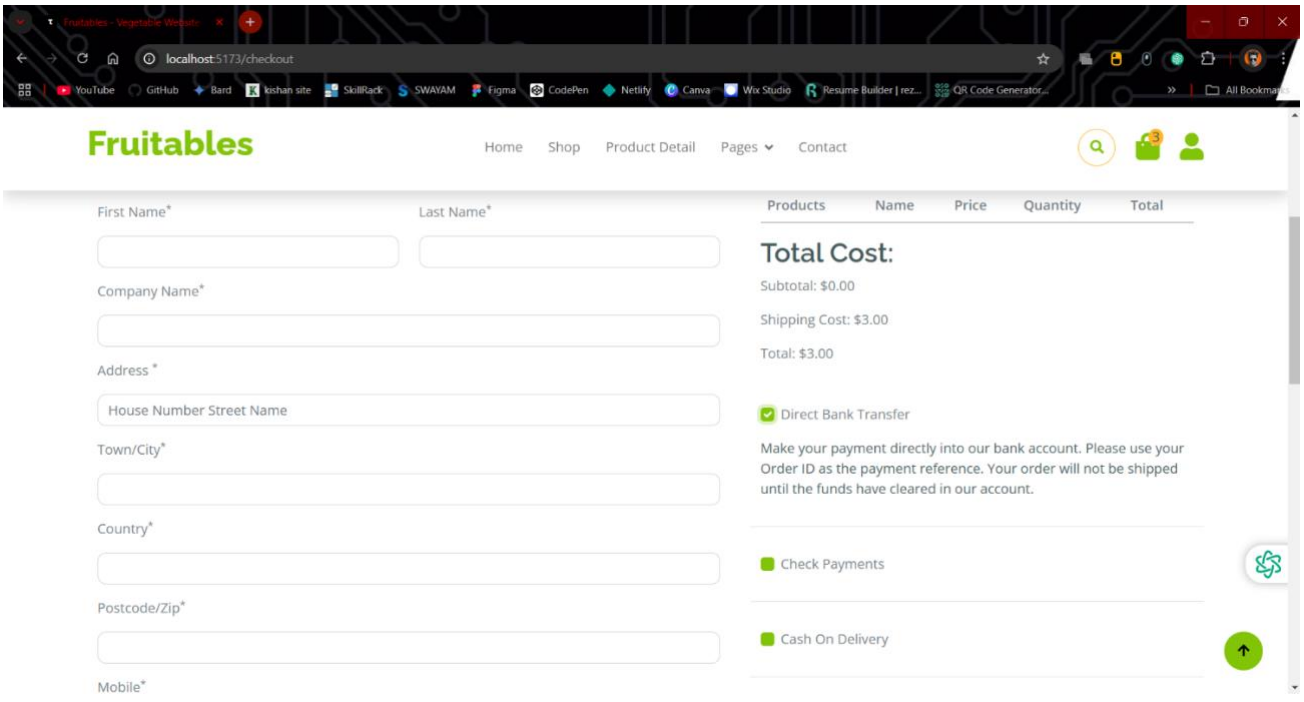





localhost:5173
Fruitables
Home
Shop
Product Detail
Pages
Contact
Free Shipping
Free on order over $300
Security Payment
100% security payment
30 Day Return
30 day money guarantee
24/7 Support
Support every time fast
Our Organic Products
All Products
Vegetables
Fruits
Bread
Meat


localhost:5173
Fruitables
Home
Shop
Product Detail
Pages
Contact
150$
kg
Fresh Exotic Fruits
in Our Store
The generated Lorem Ipsum is therefore always free from repetition injected humour, or non-characteristic words etc.
BUY





DEMO:

https://drive.google.com/file/d/1srzIL5T8MyQi660eVji9Ijc2lmolALbs/view?usp=sharing

CHAPTER 10

KNOWN ISSUES

While developing the Grocery Web App, there are several potential or known issues that might arise. These can range from UI glitches to functionality problems. Below are common issues and challenges that may need to be addressed during development, testing, or post-launch.

1. Slow Page Load Times

- **Issue:** The web app may experience slow loading times due to heavy images, inefficient JavaScript, or unoptimized assets.
- **Possible Causes:**
  - Large image sizes or uncompressed assets.
  - JavaScript that is not optimized for performance.
  - Lack of lazy loading for images or asynchronous loading for resources.
- **Solution:**
  - Use image compression and optimize assets for the web.
  - Implement lazy loading for images and resources.
  - Leverage browser caching and content delivery networks (CDNs).

2. Authentication Errors

- **Issue:** Users may face login or sign-up issues, especially if credentials are not correctly validated or there is a session timeout issue.
- **Possible Causes:**
  - Improper session management or token expiration.
  - Errors in the login API or user authentication flow.
- **Solution:**
  - Ensure session tokens are securely stored and have appropriate expiration times.
  - Implement multi-factor authentication (MFA) if necessary.
  - Provide clear error messages for login failures and password resets.

3. Cart Synchronization Across Devices

- **Issue:** The cart may not be synced correctly across different devices or browsers.

- **Possible Causes:**
  - Lack of real-time data sync or improper session management.
  - Cart data is not saved in the cloud or is stored locally only.
- **Solution:**
  - Use cloud storage (e.g., Firebase, AWS) to save cart data and sync it across devices.
  - Implement WebSockets or other real-time synchronization methods to keep the cart updated across sessions.

4. Payment Gateway Failures

- **Issue:** Users may face errors during checkout, such as failed payment transactions or incorrect billing details.
- **Possible Causes:**
  - Misconfigured payment gateway API.
  - Invalid data being sent (e.g., incorrect card details or expired token).
- **Solution:**
  - Test payment APIs thoroughly in sandbox mode before production.
  - Handle errors gracefully with user-friendly messages and fallback options (e.g., alternative payment methods).

5. Order Status Updates Delay

- **Issue:** There might be delays in order status updates (e.g., "Shipped" or "Delivered").
- **Possible Causes:**
  - Backend services might not update the status immediately after processing.
  - Integration issues between the front-end and backend systems.
- **Solution:**
  - Set up real-time updates for order statuses.
  - Implement background jobs to track order status and send notifications.

6. Stock Availability Issues

- **Issue:** The app may show incorrect stock availability, leading to errors when users attempt to purchase out-of-stock items.
- **Possible Causes:**

    - Incorrect stock data in the database or errors in syncing between the frontend and backend.
    - Lack of proper inventory management.
- **Solution:**
    - Implement real-time stock checks and update inventory status frequently.
    - Show accurate product availability on the product page, and notify users if stock runs low.

7. Broken Links or Navigation Issues

- **Issue:** Some links or navigation buttons may not work, leading to dead ends or broken pages.
- **Possible Causes:**
    - Incorrect URL routing or outdated links.
    - Missing pages or resources on the server.
- **Solution:**
    - Use proper URL routing with a framework like React Router or Vue Router.
    - Implement 404 pages with helpful navigation suggestions when users hit broken links.

8. User Interface (UI) Bugs

- **Issue:** The UI might not be responsive, with elements overlapping or misaligned, particularly on mobile devices.
- **Possible Causes:**
    - Inconsistent CSS styles or media queries not covering all screen sizes.
    - Overuse of fixed-width elements or poorly implemented responsive design.
- **Solution:**
    - Use CSS frameworks like Bootstrap or Tailwind CSS for better responsiveness.
    - Test the app across various devices and screen sizes to identify and fix layout issues.

CHAPTER 11

FUTURE ENHANCEMENT

1. Personalized Recommendations

- **Enhancement:** Implement a recommendation engine that suggests products based on user behavior, preferences, or purchase history.
- **Benefit:** Increases customer engagement by providing tailored product suggestions, boosting sales and user satisfaction.
- **Technology:** Machine learning algorithms, collaborative filtering, and recommendation systems.

2. Subscription and Auto-Replenishment Service

- **Enhancement:** Allow users to subscribe to regular deliveries for frequently purchased items (e.g., milk, bread).
- **Benefit:** Encourages repeat business and improves convenience for users who need regular restocks.
- **Technology:** Subscription management system, recurring billing, and automated notifications.

3. Advanced Search Functionality

- **Enhancement:** Implement an advanced search with filters like price range, brand, dietary preferences (e.g., gluten-free), and delivery time slots.
- **Benefit:** Enhances user experience by making it easier to find specific products, improving overall shopping efficiency.
- **Technology:** ElasticSearch or Algolia for fast and customizable search.

4. Mobile App Development

- **Enhancement:** Launch a mobile app for iOS and Android to provide a more optimized, native experience for users.
- **Benefit:** Mobile apps offer a faster, more responsive interface, and are more accessible for on-the-go users.
- **Technology:** React Native or Flutter for cross-platform mobile app development.

5. **Voice Command Integration**

- **Enhancement:** Integrate voice recognition for hands-free shopping. Users can add items to their cart or search for products via voice commands.
- **Benefit:** Improves accessibility, convenience, and user experience, particularly for visually impaired users.
- **Technology:** Voice assistants like Google Assistant, Amazon Alexa, or built-in speech-to-text APIs.

6. **AI-Powered Customer Support (Chatbot)**

- **Enhancement:** Implement an AI-driven chatbot to assist customers in real-time with order tracking, product information, and general inquiries.
- **Benefit:** Provides 24/7 support and reduces the load on human customer service representatives.
- **Technology:** Natural Language Processing (NLP) with tools like Dialogflow, Microsoft Bot Framework, or IBM Watson.

7. **Dynamic Pricing and Discounts**

- **Enhancement:** Implement dynamic pricing where prices change based on demand, stock levels, or promotional periods (e.g., flash sales).
- **Benefit:** Maximizes revenue by adjusting prices based on real-time market conditions and customer demand.
- **Technology:** Pricing algorithms and integration with backend systems for real-time price updates.

8. **Augmented Reality (AR) for Product Visualization**

- **Enhancement:** Integrate AR technology to allow customers to visualize certain products (e.g., kitchen items, or grocery packaging) in their own environment.
- **Benefit:** Helps users make better purchase decisions by seeing how products will look in real life before buying.
- **Technology:** AR libraries such as ARKit (iOS), ARCore (Android), or WebXR for web-based AR.

9. Delivery Scheduling and Real-Time Tracking

- **Enhancement:** Allow users to schedule deliveries at their preferred time slots and provide real-time tracking for deliveries.
- **Benefit:** Increases customer satisfaction by offering more control over delivery timing and improving transparency.
- **Technology:** GPS and real-time tracking systems integrated with a delivery management platform.

10. Blockchain for Transparent Supply Chain

- **Enhancement:** Utilize blockchain to track the entire supply chain of products (from farm to table), providing transparency to customers about the origin and quality of the products.
- **Benefit:** Builds trust with customers, especially those concerned about product sourcing, sustainability, and ethical practices.
- **Technology:** Blockchain platforms like Ethereum or Hyperledger for supply chain management.