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Hardware Store E-Commerce Web Application

In partial fulfilment of the requirements for the degree of

Bachelor of Science in Information Technology

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C e r t i f i c a t e

We accept the work contained in the report titled
"Hardware Store E-commerce Web Application"
written by
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as a confirmation to the required standard for the partial fulfilment of the degree of Bachelor of Science in Information Technology.

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January 05, 2025

DECLARATION

We hereby declare that this project report is based on our original work except for citations and quotations which have been duly acknowledged. We also declare that it has not been previously and concurrently submitted for any other degree or award at Bahria University or other institutions.

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Specially dedicated to
my beloved grandmother, mother and father
Hassan Ali Karamat
my beloved grandmother, mother and father
Roha Mubeen

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Hardware Store E-commerce Web Application

ABSTRACT

Hardware industry has noticeably grown in the world of e-commerce in the last ten years. Moreover, even hardware e-commerce stores that use manual processes such as inventory management, order processing and customer inquiries are still prevalent. This manual dependency not only results in inefficiencies, but it also increases the probability of errors and late deliveries that may not meet the expectations of customers. The competition is becoming fiercer and customers' expectations keep on rising; hence, the hardware e-commerce stores have to automate their systems, or they will be left behind and the shopping experience would not be seamless. The significance of automating the hardware e-commerce store from the manual tasks to an efficient system is that it makes the operations efficient, enhances the customer experience, enables scalability, guarantees accurate inventory management, saves money, creates a competitive advantage, facilitates data-driven decision-making and allows for adaptation to the market changes. Such a change is crucial for the long term survival and sustainability of hardware ecommerce businesses in the digital market of today.

The development of a hardware based e-commerce website requires a combination of frontend and back-end technologies. Implementation of artificial intelligence technologies boosts functionality that results in personalized recommendations and automated customer support. Also we're simplifying how customers pay with a straightforward payment system that's easy and secure. This means quick and hassle-free checkouts. Second, we're upgrading our product recommendations by using machine learning-based that provides personalized product recommendations to customer and feedback from what customers like and buy to suggest other items and complete delivery detail they might enjoy. This way, shopping becomes more personalized and finding the right tools and hardware gets easier than ever.

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CHAPTER 1

INTRODUCTION

1.1 Background

The hardware store enable customers to browse, search and buy the hardware products offered online, effectively. It can also help the company to provide relevant information regarding the company's products, advertising and other relevant information to customers. To visit on stores we find it very hard to schedule time within our busy schedules. Customers can have product information requirements to be met before visiting the physical store. These challenges stress the need to develop and launch a web app that is more suitable for the purpose of going and buying the product.

Using a format of subscribers, hardware store gives a friendly interface or offer discounts for the user or get points for the purchase. Perfect and comfortable to use shopping cart for dealing with selected products. Offer up stock management and availability of products in relation to the proper management of the inventory.

Consequently, hardware store will make sure that users see product in the house and pick many of them. This web application will also provide valuable resources, support and engagement to customers and improve their experience.

1.2 Problem Statements

1. Regularly updating inventory levels requires significant time and effort. Manual entry increases the likelihood of errors, leading to inaccurate stock information.
2. Without data analytics, it's challenging to suggest complementary products. Difficult to target marketing efforts due to lack of insights into customer demographics and buying patterns.
3. Difficult in managing multiple communication channels (phone, email and in-person) may overwhelm staff.

1.3 Aims and Objectives

i. Create a user-friendly web application with a simple navigation flow.
ii. Improve inventory information to avoid stock-outs and overstocking.
iii. Ensure secure and efficient handling of payments.
iv. Implement a user-friendly feedback system for customers to share their experiences and suggestions.

1.4 Scope of Project

Hardware e-commerce store focus to automate manual operations to enhance efficiency, productivity and customer satisfaction. Automate inventory tracking to ensure consistent and reliable stock data and implement system for automatic stock level verification. Develop efficient workflows for order confirmation, payment processing and shipping method. Respond to customer inquiries automatically and provide real-time order status updates. Utilize customer data for product suggestions based on browsing history or purchase behavior. Ensure transparency in delivery options and timelines for customers.

CHAPTER 2

LITERATURE REVIEW

2.1 System Literature Review

Year	Paper Title	Authors	Objectives	Methodology	Contribution	Future Gap
2007[1]	An associative classification-based recommendation system for personalization in B2C e-commerce application	Yiyang Zhang, Jianxin (Roger) Jiao	Provide personalization by helping customers to find the products they would like to purchase among overwhelmed information	Based on classification method	Improve efficiency and effectiveness of B2C e-commerce	More convenient to customers because Web page log in credentials
2010[2]	A strategic framework for website	Wen-Chih Chiou, Chin-Chao Lin,	To understand and improve website evaluation through the	Framework involve analysis of web strategy and a hybrid approach that	A hierarchical structure is constructed to delineate the relationship between goal,	Domain experts have a better understanding of the target

	evaluation	Chyuan Perng	analysis by classifying them into marketing and combined-approaches	include evaluation during transaction phases	objectives and criteria	website's strategies and evaluate the site according to these
2012[3]	Active Web Service Recommendation Based on Usage History	Guosheng Kang,*, Jianxun Liu, Mingdong Tang, Xiaoqing (Frank) Liu, Buqing Cao, Yu Xu	To extract user interests and preferences from the user's historical usage of Web services	TF/IDF is applied to calculate the similarity between the user functional interests and Web services	Provide more accurate and relevant recommendations	Conduct data mining in dataset to achieve optimized performance
2018[4]	Consumer Behaviour and Order Fulfilment in Online Retailing	Dung H. Nguyen, Sander de Leeuw and Wout E.H. Dullaert	To understand the relationship between order-fulfilment performance and consumer behaviour	An integrative framework of order fulfilment and consumer behaviour in online retailing	Provide potential interaction between marketing and operations in order to provide opportunities to devise instruments that will influence consumer behaviour	Comprehensive review of online consumer behaviour that takes aspects of order-fulfilment operations

2017[5]	Securing electronic transactions via payment gateways	Rashidah Funke Olanrewaju, Burhan Ul Islam Khan, Mohd. Mueen Ul Islam Mattoo, Farhat Anwar, Anis Nurashikin Bt. Nordin and Roohie Naaz Mir	E-payment services provide a helpful and effective approach to perform the budgetary exchanges.	Payment gateway method are used to perform on criteria such as security, cost and customer support	Enable clients to purchase products from anywhere throughout the world.	To enhance the adoptability of electronic payment systems thereby ensure better customer satisfaction and understanding
2018[6]	A Survey on Chatbot Implementation in Customer Service Industry through Deep Neural Networks	Mohammad Nuruzzaman, Omar Khadeer Hussain	Providing a flexible chat interface for question answering	Using deep learning to extract meaning from the input and to generate an output from that input	Train chatbot's well to generate appropriate responses	Convenient for customers to get response faster and need more data to respond accurately.
2019[7]	A systematic review: machine learning based recomme	Shristi Shakya Khanal & P.W.C. Prasad & Abeer Alsadoon	Implement adaptive learning environment to solve the	Using machine learning techniques	Provide a taxonomy of recommender system along with machine	Evaluation metrics applied along insights on

	ndation systems for e-learning	& Angelika Maag	issue of information overload for users		learning algorithms	challenges and issues
2019[8]	Design and Implementation of Electronic Payment Gateway for Secure Online Payment System	Kyaw Zay Oo	Not to send a customer's payment information to an online merchant at all because it create the possibilities of security breach and information leaks from the merchant's side	Implementation of RSA algorithm that performs high level of security at a low cost	Customer's financial information is sent directly to a Payment Gateway instead of sending it through an online merchant.	Implement some method to secure a customer's payment that depends on the customer's personal information like address
2020[9]	Design implementation of an online inventory management	Ibrahim-Imam, Sulihat	To develop a web portal and an android application	Agile methodology is used to ensure efficient development, user involvement and for iterative improvement	To improve customer service, cost savings and strategic decision-making	Automation will improve accuracy, reduce manual errors and reduce cost
2021[10]	Design and Implementation of an AI Chatbot for	Aditya Harbola Asst. Professor	To provide efficient and effective customer service	The architecture and framework were built on AI techniques, machine	The need of 24 hours available to help the	Help businesses to improve their operations, reduce costs and faster

	Customer Service			learning methods and NLP will be utilized to provide the appropriate answers to user's queries	customer and give solutions	response time
2022[11]	Digitising Hardware Shop Management to Enhance Business Operation	Ong Jian Yao1, Dr. Yana Mazwin Mohmad Hassim	To develop inventory management system can manage stocks	Waterfall model is used because requirements from user are well defined and no drastic change is needed	Identified the need of inventory management from manually storing records to automate the system	A barcode scanning system should be integrated to the system to improve the daily business operation
2022[12]	Understanding the user experience of customer service chatbots	Isabel Kathleen Fornell Haugeland, Asbjørn Følstad,* , Cameron Taylor, Cato Alexander Bjørkli	Approach to design the chatbot more interactive like humans	Conducted through questionnaires and semi-structured interviews	Chatbot human likeness may not depend on free text interaction, it depends on button interaction	Need to facilitate more engaging and pleasant interactions to improve user experience
2024[13]	Enhancing the shopping experience in e-commerce: a path to improvement – buy the best	Provide users with an intuitive and efficient online shopping experience, save time and effort`	Provide users with an intuitive and efficient online shopping experience, save time and effort	Identify specific website items, retrieving product names, pricing and organize the extracted data in a structured format	By the addressing the inconvenience of navigating multiple brand websites and offering a centralized platform	Optimizing the platform's features and expanding its capabilities to cater to evolving user needs

Table 2.1 Systematic Literature Review

2.2 Systematic Literature Review Summary

The concept of personalized e-commence was studied in 2007[1] , by Yiyang Zhang and Jianxin Jiao who implemented an associative classification-based recommendation system so as to assist the clients to locate their preferred products. This study helped to improve the existing B2C platforms but pointed out what could be done to make them even better by adding such user convenient items as web login credentials. In their study carried out in 2010[14], Wen-Chih Chiou et al have also suggested a strategic framework of the website evaluation and support them with the hierarchy of objectives and assessment criteria in order to facilitate the activities of professional evaluation of the website strategies while indicating a need for the development of more effective means of the assessment.

The authors Guosheng Kang et al., in 2012[3], established active web service recommendations from archival user information and the calculation of TF/IDF to search for similarity and provided future outlook in which more precise information was anticipated through the utilization of better data mining. In 2016[4], Dung H. Nguyen et al. examined the relationship between consumer behavior and order fulfillment in online retailing by presenting a theoretical framework integrating the marketing and operation functions but the authors called for a more extensive review of order fulfillment operations.

Other developments in security transactions were highlighted in 2018[5], by Rashidah Funke Olanrewaju et al. where payment gateway systems were used to increase global e-payment security and the next studies aimed at the increasing system usability. The year, Mohammad Nuruzzaman & Omar Khadeer Hussain also pointed out the analysis of the customer service with reference to chatbots and presence of deep neural networks for the innovation of the flexible and faster response but in this case the authors suggested that more data should be trained for the chatbots to be accurate.

Shristi Shakya Khanal et al. systematically review Machine Learning based Recommendation System in e-learning proposing Taxonomy and discussed about evaluation challenges in 2019[7]. Kyaw Zay Oo also participated by providing and applying the use of RSA algorithms for online credit card transactions, to protect any financial information and make recommendations to investigate the use of personal information based security.

Some of the recent works include a work done by Sulihat Ibrahim-Imam in year 2020[9] on online inventory management system using agile development life cycle approach to minimize mistakes in the inventory system. In a similar 2021[10] study by Aditya Harbola, it was found that AI and NLP frameworks can improve the efficiency of the customer service, yet the requirement to be available 24/7. Ong Jian Yao et al. Still, in 2022[11], implemented new systems of hardware shop management using a waterfall model and found that the implementation of barcodes for the better functioning was proposed. Moreover, Isabel Kathleen Haugeland et al. revealed the specific preferences of the users and pointed out the key aspect of human-like interaction with the chatbots, which is the button-based interface rather than the free-text dialog; thus, making a call for an enhanced chatbots design.

Last, in 2024[13] improvement of e-commerce shopping experiences, which concerned organizing several websites in a centralized and comprehensive manner as the gap in adapting the features for changing consumers' preferences was discovered.

2.3 Functional Requirements

Functional requirements for a hardware store website outline the specific behaviors and features that the application must support. The main functional requirements of our project are:

- **User Registration and Authentication**

  On the website users should be able to register with a unique username and password. The purpose should be that users are registered should be able to log in and get to their own personalized account.

- **Product Catalog**

  A complete catalog of products with name, description, price and images should appear on the website. User navigation should be easy and products should be easy to find by categorizing and making them easy to search.

- **Shipping cart and Checkout**

  The users should be able to add products to his/her shopping cart, review cart contents and proceed on to checkout. In the checkout process, the users should supply such information as shipping and billing addresses and a payment method.

- **Order Management**

  Users should be able to view order history and see where your current orders are. Admins should be able to handle and process orders; change their status; and generate invoices.

- **Payment Gateway Integration**

  Online transactions should be processed with a secure payment gateway the website should integrate. It will be a payment option that allows users to upload their money in the easy way possible, from credit/debit cards, PayPal or any other relevant payment methods available.

- **Customer Reviews and Ratings**

  Users should be able to add products to their shopping cart and review cart contents before proceeding to checkout. During the checkout

process, users should provide shipping and billing information and choose a payment method.

- **Product Recommendations**

  The website should present the most personal product recommendations according to user traffic and purchase history. On the homepage or on product page, recommended products should be present.

- **Wish list and Favorites**

  Users have the ability to add products to their wish list or favorites list for future reference. They should be easily managed and shareable as items on a wish list.

- **Inventory Management**

  Product inventory and availablity to the users should be tracked on the website. A user will be notified when a product is out of stock or in low quantity.

- **Order Confirmation and Email Notifications**

  Able to add products to their shopping cart and review cart contents before proceeding to checkout. During the checkout process, users should provide shipping and billing information and choose a payment method.

➢ Customer/Buyer:

- **Account Manage**
  - Sign Up
  - Login/Logout

        - Manage profile
    - **Search**
        - Product categories
        - Apply filters and sort products
    - **Product Detail**
        - View product
        - Check availability
        - Read reviews
    - **Cart Manage**
        - Add to cart
        - View cart
        - Remove items
        - Save for future purchase
    - **Checkout Process**
        - Billing information
        - Shipping information
        - Apply discounts
        - Order summary
        - Payment
    - **Order Manage**
        - Order Track
        - Order History
        - Order Modify
    - **Customer Support**
        - Chat support
        - Help center
    - **Feedback**

- **Admin:**
    - **User Management**
        - Monitor user activities
        - Manage user accounts
    - **Inventory Management**

        - Stock manage
        - Low stock alert
    - **Product Management**
        - Add new products
        - Update existing product
    - **Site Maintenance**
        - Updating software
        - Installing plugins
        - Monitor site performance
    - **Order Management**
        - Order status
        - Manage payments
        - Shipping management
    - **Customer Support Management**
        - Monitor live chat
        - Help center for customer queries
    - **Promotions & Discounts**
        - Create & manage offers
        - Loyalty program

2.4 Non-functional Requirements

Non-functional requirements are those requirements that are not necessary for the working of a software but they enhance user trust and satisfaction. Main non-functional requirements in our project are:

- **Performance**

  The website should also load as fast as it could, that is, spend as less time as possible on loading pages. The great thing is, we should be able

to run it with a large number of users and not suffer too much degradation in performance.

- Response time
- Concurrent users

- **Security**

User data, including personal information and payment details, should be encrypted and stored securely. The website should be protected against common security threats, such as SQL injection and cross-site scripting (XSS) attacks.

- Data encryption
- Authentication & Authorization

- **Usability**

- Ease of use
- Accessibility
- Documentation & help

- **Compatibility**

- Cross-Browser Compatibility
- Device Compatibility

- **Reliability & Availability**

It should have high uptime, it should always be available to use, no downtimes for maintenance on the website.

- Error handling
- Backup & recovery

- **Scalability**

The system should fit future growth and increased traffic. As your product catalog and user base get larger, your solution should be scalable without cutting any corners in terms of performance.

- Load handling

- **Modifiability**

  - Adaptability to changes

- **Accessibility**

  The website is to be accessible by users with disabilities, according to WCAG (Web Content Accessibility Guidelines). Screen readable, keyboard navigable and has other standard generic Web accessibility features.

- **User Friendly Interface**

  The most important part is user experience from the website's user interface; it should give a good intuition and easy to navigate, and finally the experience should be positive.

- **Compliance**

  The website should meet the industry standards, data protection laws (like GDPR) and legislation.

- **Backup and Recovery**

  You should regularly backup your data to protect your data from losing due to system failure. We will face a serious problem if we don't have a strong data recovery mechanism in place to recover the website in case of some unexpected issue.

- **Monitoring**

  There should be tracking of user behavior, bottlenecks need to be identified and insights for improvement continuously need to be gathered from the performance monitoring tools present on the website.

2.5 Use Case Diagrams

It is a technique to give summarize details of a system and users of a system. It is generally depicted in the form of an illustration of communication that takes place between the various entities in a given network.

2.5.1 Use Case for Customer sign-up

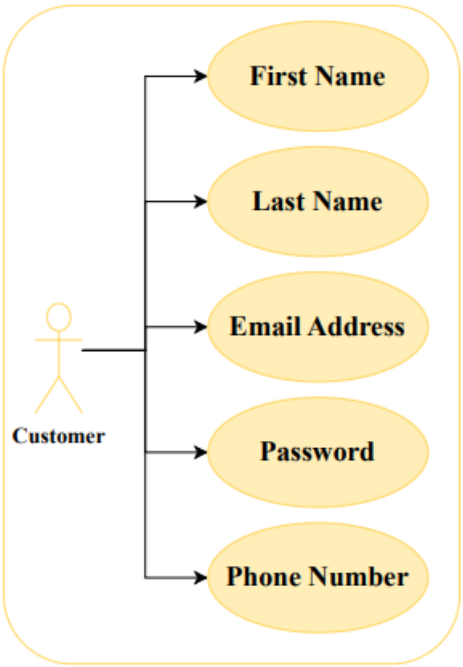


Figure 1: Customer Sign-up

2.5.2 Use Case for Admin sign-up

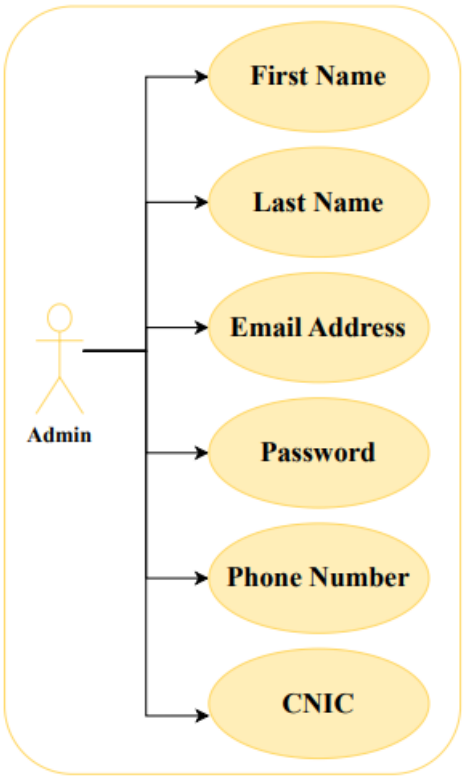


Figure 2: Admin Sign-up

2.5.3 Use Case for Customer/Admin login

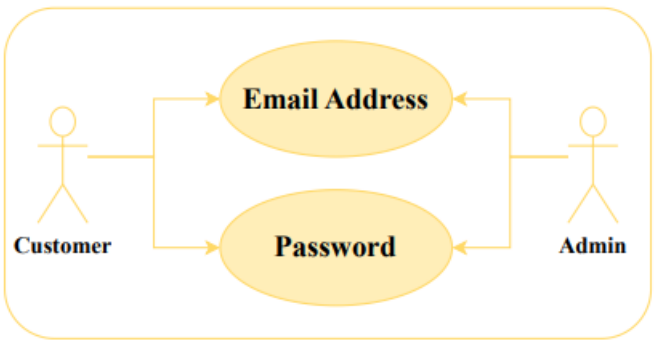


Figure 3: Customer/Admin Login

2.5.4 Use Case for Customer to edit credentials

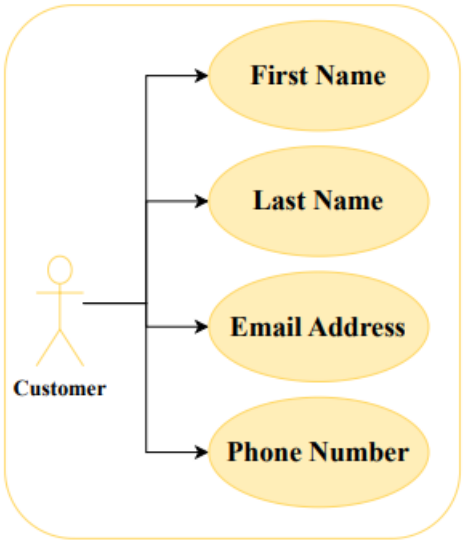


Figure 4: Admin Editing Credentials

2.5.5 Use Case for Customer to use Home Page

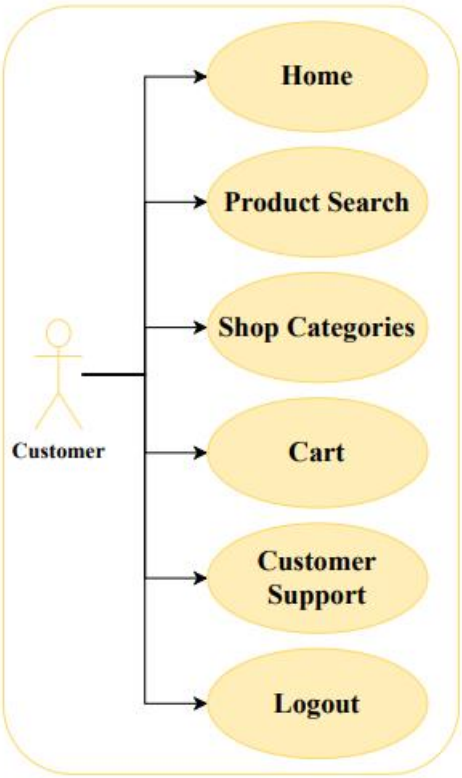


Figure 5: Customer Home Page

2.5.6 Use Case for Customer to use Order Page

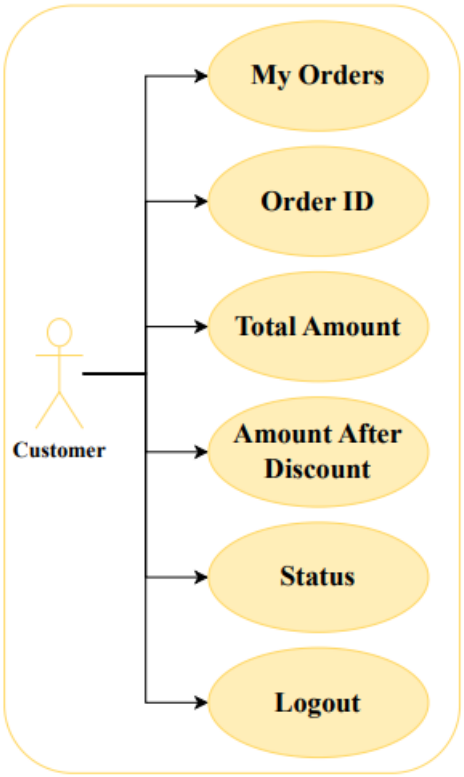


Figure 6: Customer Order Page

2.5.7 Use Case for Cart Page

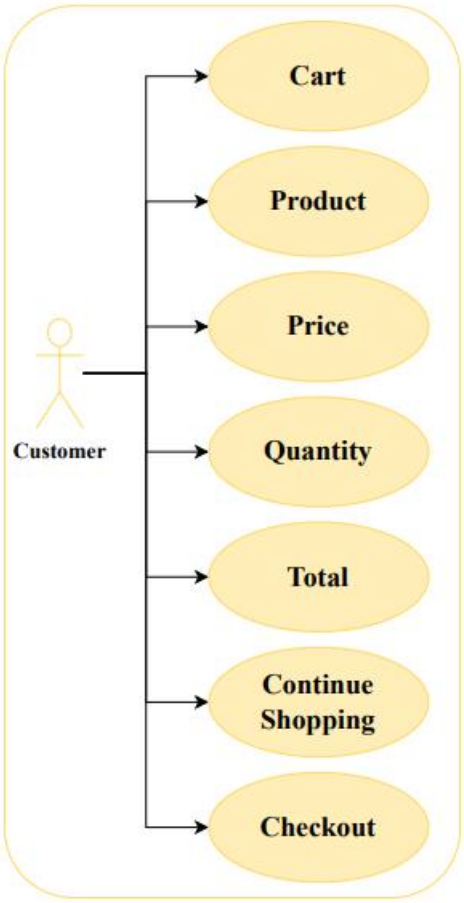


Figure 7: Cart Page

2.5.8 Use Case for Admin to use Dashboard

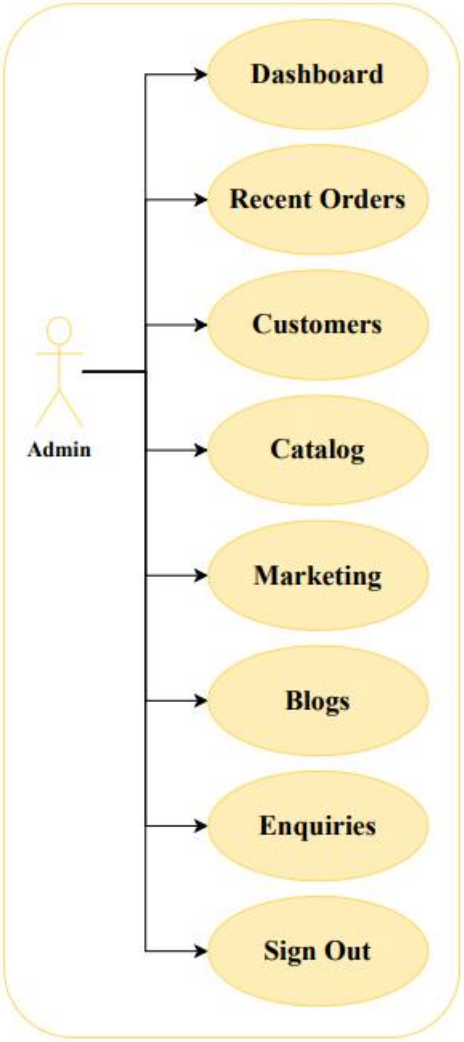


Figure 8: Admin Dashboard

2.5.9 Use Case for Admin to use Order Page

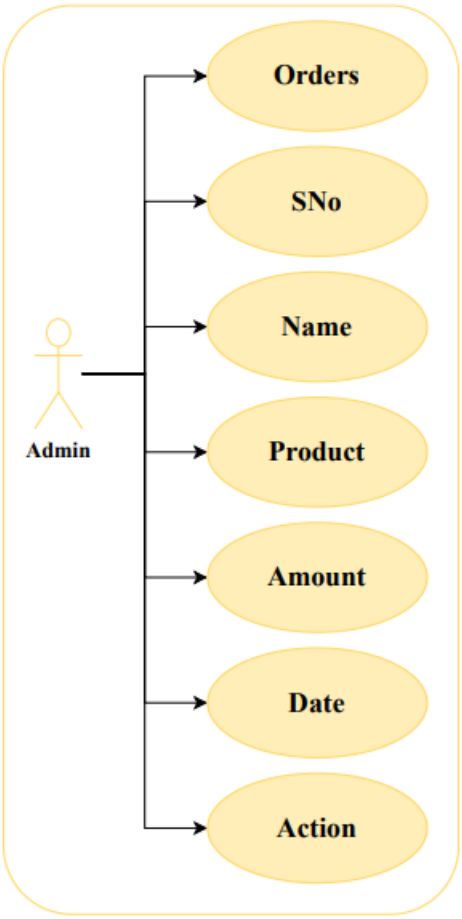


Figure 9: Admin Order Page

2.6 Usage Scenarios

2.6.1 Customer Sign-up

This table explains the sign-up scenario for customer to make an account for Hardware Store.

Use Case Title	Customer sign-up
Use Case ID	01
Actor	Customer
Description:	
On this page, the customer sign-up and make an account on Hardware Store	
Pre-Conditions: Customer wants to make an account	
Task Sequence:	
1. Each customer will login through unique email id and password	
2. Customer will provide personal data for instance: • First Name • Last Name • Email Address • Password • Phone Number	
3. System will accept information.	
4. Check all the information that provided by customer.	
5. Customer can change the password when they want.	
Expectation:	
Password must be in case-sensitive and should contain numbers or symbols	
Authors: Roha Mubeen, Hassan Ali Karamat	

Table 2.2: Customer Sign-up

2.6.2 Admin Sign-up

This table explains the sign-up scenario for admin to make an account for Hardware Store.

Use Case Title	Customer sign-up
Use Case ID	02
Actor	Admin
Description:	
On this page, the admin sign-up and make an account on Hardware Store	
Pre-Conditions: Admin wants to make an account	
Task Sequence:	
1. Each admin will login through unique email id and password	
2. Admin will provide personal data for instance: • First Name • Last Name • Email Address • Password • Phone Number • CNIC	
3. System will accept information.	
4. Check all the information that provided by the admin.	
5. Admin can change the password when they want.	
Expectation:	
Password must be in case-sensitive and should contain numbers or symbols	
Authors: Roha Mubeen, Hassan Ali Karamat	

Table 2.3: Admin Sign-up

2.6.3 Customer/Admin Login

This table explain the login scenario for admin or customer to access their account in Hardware Store.

Use Case Title	Customer/Admin login
Use Case ID	03
Actor	Customer/Admin
Description:	
On this page, the admin/customer can login into their accounts on Hardware Store	
Pre-Conditions: Admin/Customer already has an account	
Task Sequence:	
1. Admin/Customer must have account.	
2. Admin/Customer will provide following data such as: • Email Address • Password	
3. System will check & accept information.	
4. After verifying email address and password of existing account, the admin or customer will redirected to their home pages.	
5. The admin/customer can utilize their pages as they need.	
Expectation:	
1. Provided email address must be registered.	
2. Password must be correct for signing to account.	
Authors: Roha Mubeen, Hassan Ali Karamat	

Table 2.4: Customer/Admin Login

2.6.4 Admin Editing Credentials

This table explain the scenario when admin needs to edit the credentials then they can.

Use Case Title	Admin editing credentials
Use Case ID	04
Actor	Admin
Description:	
On this page, the admin can edit their credentials	
Pre-Conditions: Admin must already have an account	
Task Sequence:	
1. Admin must have an account.	
2. Admin can edit following credentials: • First Name • Last Name • Email Address • Phone Number	
3. System will accept the information.	
4. Check all the information given by admin.	
5. If new credentials are valid then they are changed.	
Expectation:	
1. The admin should have already account.	
Authors: Roha Mubeen, Hassan Ali Karamat	

Table 2.5: Admin editing credentials

2.6.5 Customer Home Page

This table explain that how a customer access their home page and perform various actions.

Use Case Title	Customer Home Page
Use Case ID	05
Actor	Customer
Description:	
On this page, the customer can view their home page and can perform various actions.	
Pre-Conditions: Customer has an account and logged in.	
Task Sequence:	
1. Customer has made an account.	
2. Customer will login to their account.	
3. On logging in, the customer will be directed to home page.	
4. Then customer can perform various actions they want.	
Expectation:	
1. The customer must know how to use a web application.	
Authors: Roha Mubeen, Hassan Ali Karamat	

Table 2.6: Customer Home Page

2.6.6 Customer Order Page

This table explain that how a customer can view the order that they have placed.

Use Case Title	Customer Order Page
Use Case ID	06
Actor	Customer
Description:	
On this page, the customer can view their orders.	
Pre-Conditions: Customer has placed an order.	
Task Sequence:	
1. Customer login to their account.	
2. Customer can place an order.	
3. Customer view that placed orders on their order page and can check their status.	
Expectation:	
1) The customer must know how to use a web application.	
Authors: Roha Mubeen, Hassan Ali Karamat	

Table 2.7: Customer Order Page

2.6.7 Customer Cart Page

This table explain that how cart page is used and perform various actions.

Use Case Title	Cart Page
Use Case ID	07
Actor	Customer
Description:	
On this page, the customer can add the items that they select into their cart so they can place order later.	
Pre-Conditions: Customer need to place an order.	
Task Sequence:	
1. Customer login to their account.	
2. Customer can view and select the items.	
3. Then customer clicks on add to cart button.	
4. Customer is directed towards Add to cart page where they check their selected items.	
5. Further they can remove or add the item.	
Expectation:	
1. The customer must know how to use a web application.	
Authors: Roha Mubeen, Hassan Ali Karamat	

Table 2.8: Customer Cart Page

2.6.8 Admin Home Page

This table explains how admin access their home page and perform various actions.

Use Case Title	Admin Home Page
Use Case ID	08
Actor	Admin
Description:	
On this page, the admin can view their home page and can perform various actions.	
Pre-Conditions: Admin has an account and logged in.	
Task Sequence:	
1. Admin has made an account.	
2. Admin will login to their account.	
3. On logging in, the admin will be directed to home page.	
4. Then admin can perform various actions they want.	
Expectation:	
1. The customer must know how to use a web application.	
Authors: Roha Mubeen, Hassan Ali Karamat	

Table 2.9: Admin Home Page

2.6.9 Admin Order Page

This table explain that how admin can view the orders.

Use Case Title	Admin Order Page
Use Case ID	09
Actor	Admin
Description:	
On this page, the admin can view the orders.	
Pre-Conditions: Admin has requested an order from the supplier.	
Task Sequence:	
1. Admin login to their account.	
2. On logging in, the admin will be directed to home page.	
3. Then they click on orders button which will direct on orders page.	
4. Admin can view placed orders by customers on order page, check their status and can accept or reject any order.	
Expectation:	
1. The customer must know how to use a web application.	
Authors: Roha Mubeen, Hassan Ali Karamat	

Table 2.10: Admin Order Page

CHAPTER 3

DESIGN AND METHODOLOGY

3.1 Methodology

In order to design and develop the Hardware store, we are adopting an agile approach which means that we will have repetitive cycles of work divided into stages and requiring the collaboration of different professionals. Upgrade efficiency, flexibility and oriented to clients. Splitting this project into key parts will allow for continuous integration and a constant cycle of feedback to respond to current pressures and tendencies.

3.2 Frontend

For frontend development, we will use React.js, a popular JavaScript library for building user interfaces fast and interactive. React allows developers to break the UI into reusable components, making the code modular and easier to maintain. Furthermore, react and bootstrap UI components will help to create responsive and mobile-ready interfaces. React Router DOM is a library that enable developers to create and manage multiple pages or view within a single-page application.

3.3 Backend

For backend development, we will be using Node.js, a popular tool which enhances performance, scalability and flexibility in web applications. We will also use firebase as database which provide scalable platform that reduces the complexity of building and managing backend infrastructure.

3.4 Recommendation System

For recommendation system, we will provide product suggestions based on browsing history and preferences by utilizing customer data[15]. In this way, the customers can view most on demand product.

3.5 ERD Diagram

The Entity Relation Diagram (ERD) is a visual representation of the entities and their relationships. It serves as a blueprint for database to structure data.

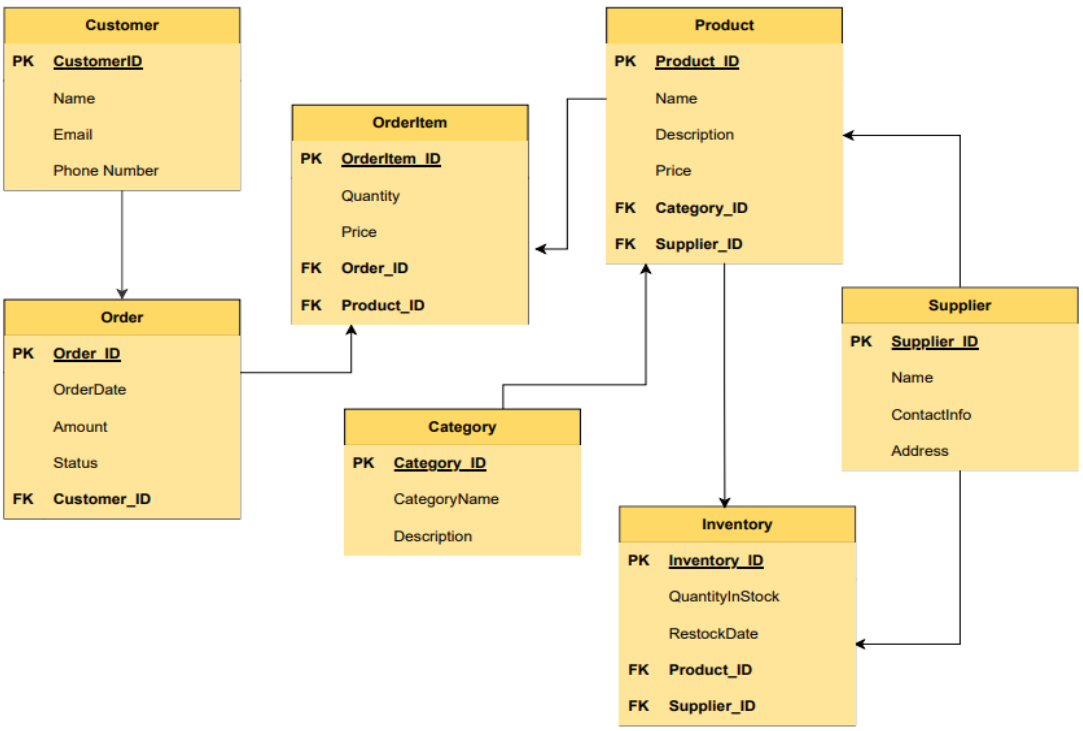


Figure 10: Entity Relation Diagram

CHAPTER 4

DATA AND EXPERIMENTS

4.1 Visual Studio Code

Visual studio work as a software solution that allow developers to work on projects that involve multiple programming languages, powerful debugging tools, run commands, and execute scripts in a single application. The Live Server extension in VS Code provides instant previews of changes to HTML, CSS and JavaScript files. This feature enhances integration between front-end and back-end components by allowing developers to see updates in real time.

4.2 GitHub

GitHub is a platform for collaboration using Git. It enables developers to track code changes, collaborate on projects through branching and merging and manage issues. Repositories enable teams to work together efficiently and maintain high-quality codebases.

4.3 MERN Stack

For ecommerce website we have chosen MERN stack, i.e. MongoDB, Express.js, React.js and Node.js. This technology stack allows us to create a powerful and friendly

web application driven by front end and back end technologies. Time to discuss each component in detail.

4.3.1 MongoDB

We store product information, user data and order details in MongoDB, a NoSQL database. Its ability to handle different kinds of data and highly scalable form make it perfect for use.

4.3.2 Express.js

We use Express.js, a minimalist web application framework for Node.js to build the server side application and to handle requests coming into our API.

4.3.3 React.js

On the front end, we use React.js for that and on the back end. It lets us write reusable UI component to handle UI layer of the application. The reason React virtual DOM is used is that it helps in a smooth user experience if the updates are rendered as efficiently as possible (ideally).

4.3.4 Node.js

On various Windows, Linux etc. Node.js is supported. It allows developers to run JavaScript code on the server side and we can make efficient and scalable websites and applications. A server side development and data processing backend.

4.3.5 Safety Requirements

List which requirements about the use of the product must be met in case of loss, damage or harm. Talk about what to do to protect something, or to prevent something from happening. It relates to talk about external policies or regulations relating to safety, about product design or how it is used. Tell about which would require a certification from a safety point of view.

4.3.6 Backend Development (Node.js & Express.js)

The incoming HTTP requests and responses are handled by a Node.js server which we set up with Express.js. Middleware in express.js takes care of handling the requests and then route them to the desired API endpoints. For user authentication, product management, shopping cart and order processing, we implement RESTful APIs. With that communication, these APIs make it all very easy for the front end and backend to communicate together, creating a responsive user experience.

4.3.7 Frontend Development (React.js)

We build a well structured React.js project using Create React App or similar tools. It achieves a scalable, maintainable front end codebase. We create a user friendly and responsive user interface for ecommerce website. Reusable React components let you improve code reusability and modularity. It helps us manage client side routing and navigation in the application.

4.3.8 User Authentication (Passport.js or JWT)

We use either Passport.js for session based and JWT for stateless authentication for user authentication. User registration form and validation, as well as user login form and validation are implemented. In order to protect routes that need user authentication, we set authentication middleware to protect the routes.

4.3.9 Product Management and Database (MongoDB)

And, we design the MongoDB schema that will store product information such as name, description, price, images and inventory status. The Express.js APIs for product management have implemented CRUD operations (Create, Read, Update and Delete). The privilege of adding, editing and removing products from the database is given to admin users and so, product management remains flawless.

4.3.10 Shopping Cart And Checkout

This is shopping cart functionality that allows adding products, changing the quantity and removing them. Order summary, shipping info, secure payment integration with a third party payment gateway, like Stripe or PayPal, is part of the checkout process. It makes for a nice and safe checkout process for users.

4.3.11 Third-party Integrations

Third Party APIs are integrated to provide better user experience services, such as payment gateways, shipping providers and geolocation services. Users of these integrations have multiple payment options, real time shipping information and location based services.

4.3.12 State Management (Redux or Context API)

We use Redux or Reacts Context API for doing state management for application level data handling efficiently. We centralize shopping cart, user authentication and other components of interest to provide a consistent and synchronized user experience across the application.

4.3.13 Frontend Testing (Jest and React Testing Library)

With Jest and React Testing Library we write the tests for the React components and we always write them in such a way so that they are complete. Such testing of code approach approaches user interaction, API calls and state changes in validating the code maintains and makes it reliable.

4.3.14 Bootstrap

Using markup languages, Bootstrap provides a way for developers and designers to quickly build fully responsive websites.

CHAPTER 5

RESULTS AND DISCUSSIONS

5.1 Landing Page

A user, for instance can look at our landing page when they visit our web application. Here, we mention about ourselves what our web application is all about including our services, about us, support etc. There are only couple of buttons on the top presented by shop categories, home, our store, my orders, blog and contact. When the home button is clicked by any user can proceed to our home page where they can be able to view our deals, discounts or products. However, they can only place an order after creating an account with a profile by clicking on the sign-up button. If a user is already registered, he can just click on the login to use the profile that he has created.

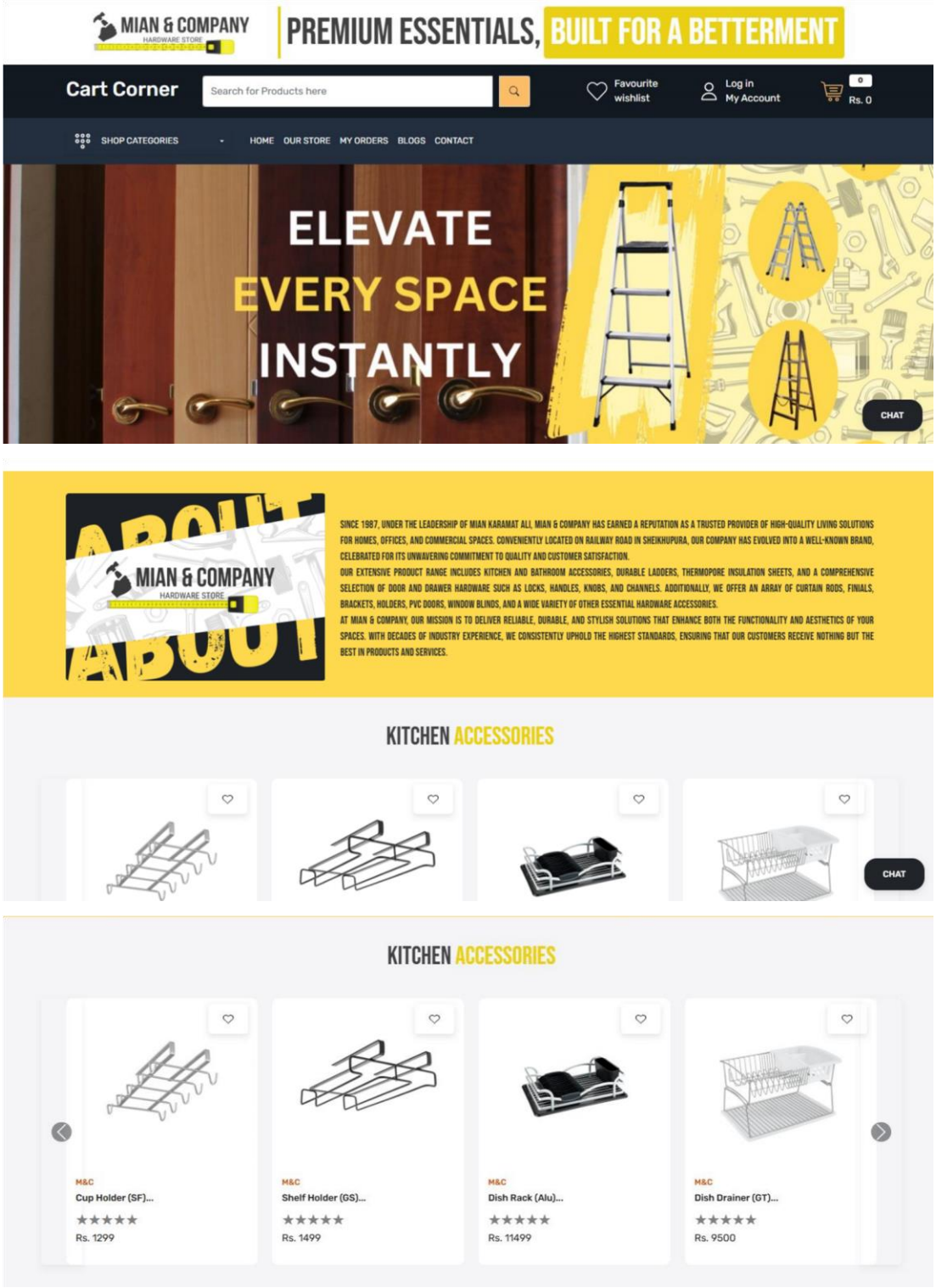
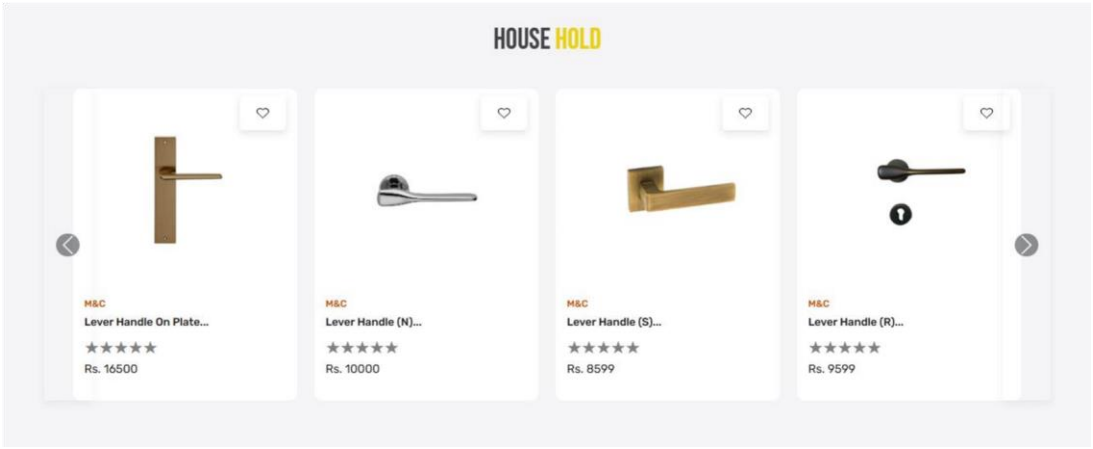
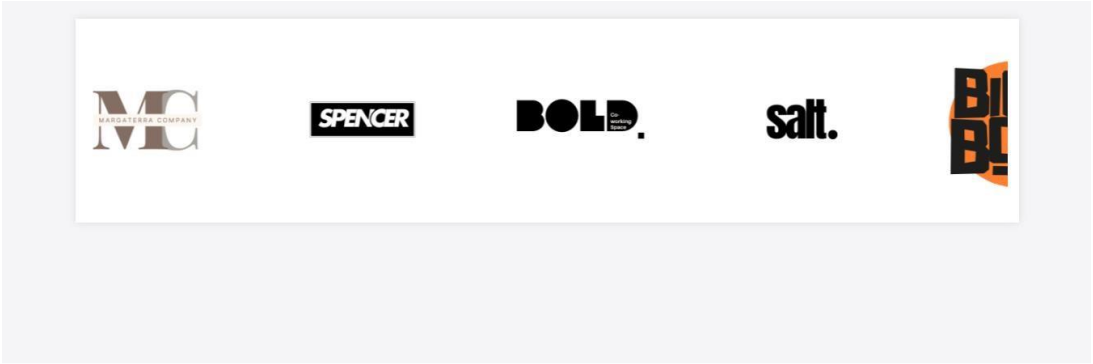


Figure 11: Landing Page





99%
Trust Our Products

100%
Customers Love Their Experience

95%
Traffic Visits Top Ranked

5.2 Sign-up Page

To access their accounts or to register as a customers would have to make an account with Hardware Store. They need to provide the required credentials for signing up.

For Customers:

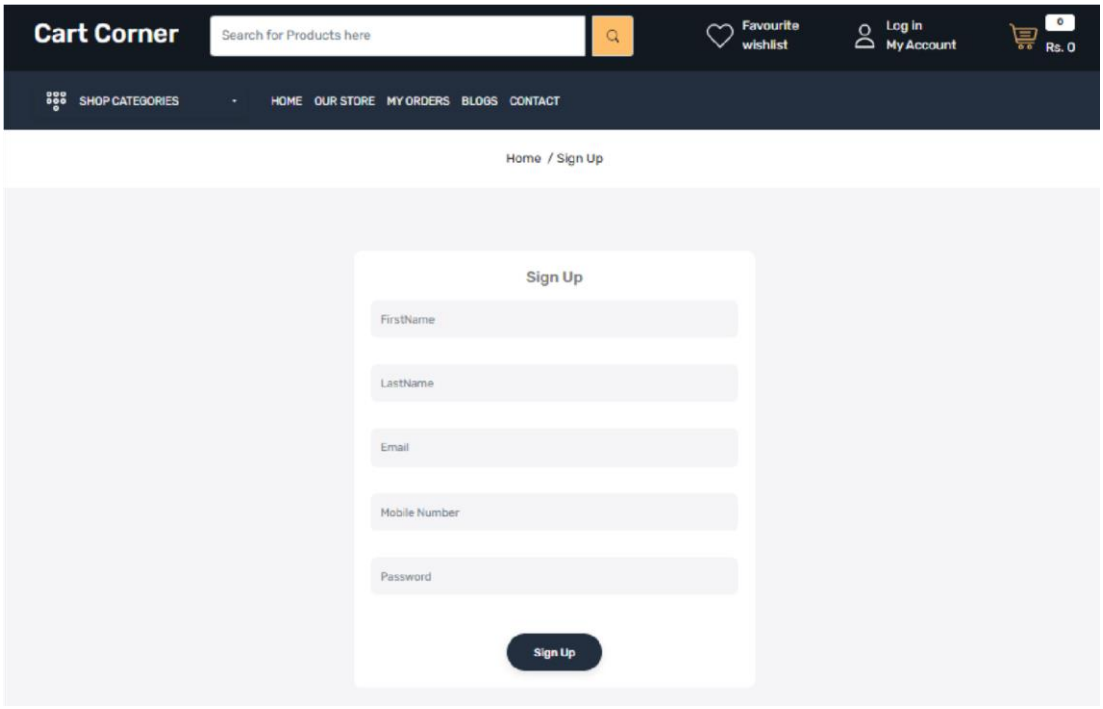


Figure 12: Customer Sign-up Page

5.3 Login Page

For Customers:

Customers need to log in to their accounts for placing an order or to get deals. They need to log in on Hardware Store with their email address and password.

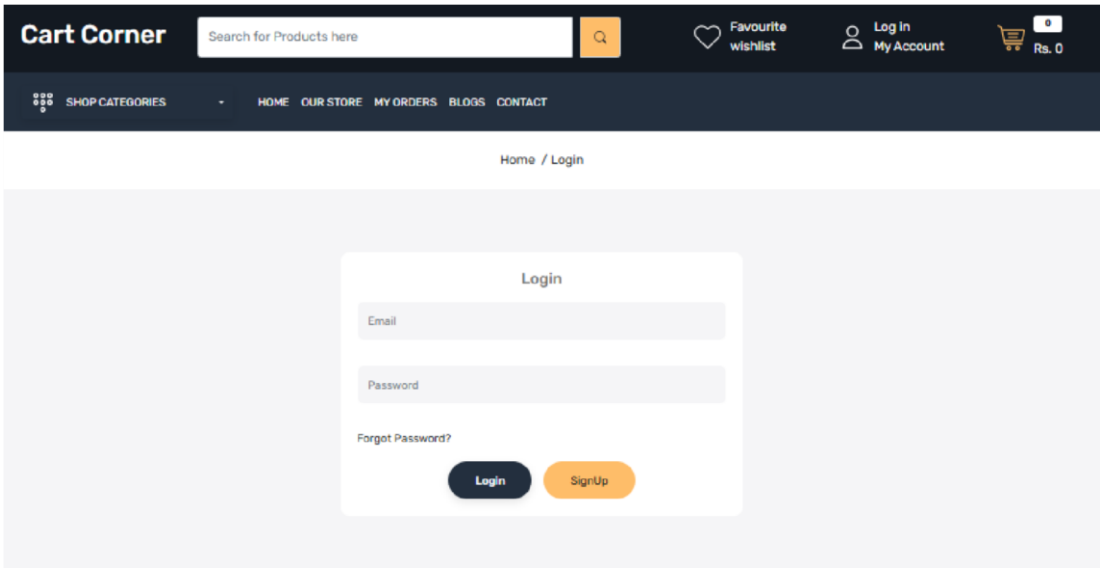


Figure 13:Customer Login Page

For Admins:

Admins need to log in to their accounts for resolving issues of the customer, to see further progress, stock availability etc.

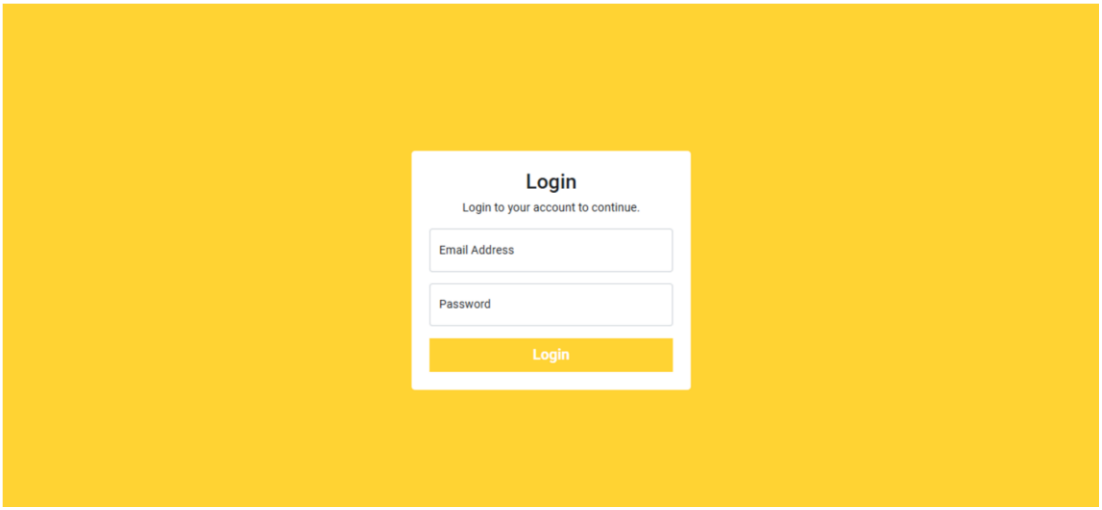


Figure 14: Admin Login Page

5.4 Customer Home Page

After the customers have logged into their accounts they are taken to their home page where they can be able to view their cart. Home page after encountering the ‘orders’ page, and a button to log out. The customer can see his/her name in the upper right corner and if he/she clicks on the initial it is possible to edit the profile. In the search bar, customers can search for a specific product and even its description.

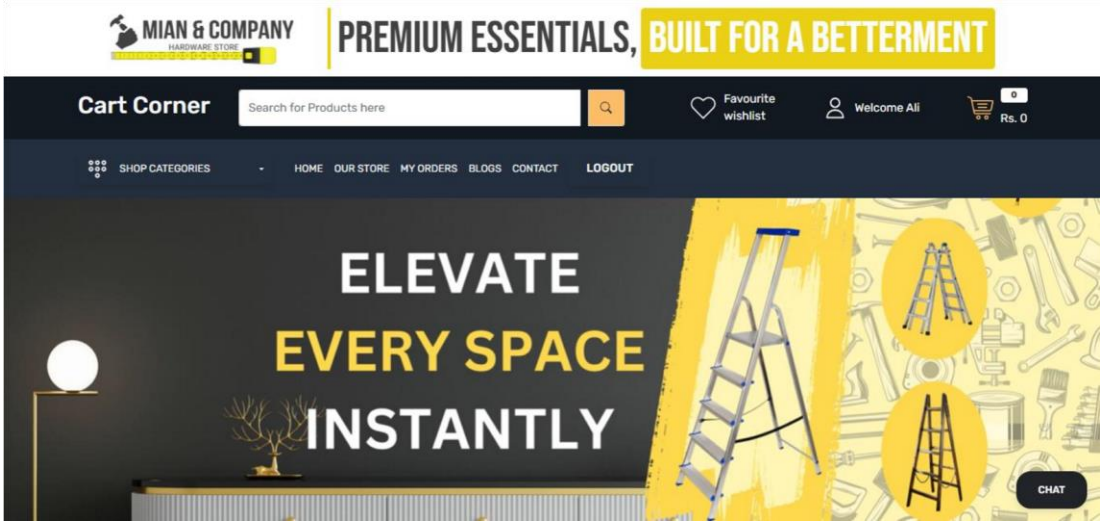


Figure 15: Customer Home Page

5.5 Add to Cart Page

When a customer want to select products they want to buy or clicks on add to card button to view their selected products. It also enables customers to select a suitable product by choosing attributes such as size, color, type or model before placing the item in the shopping cart. Customers can alter the quantity of a product or even delete an item from the cart instantly. The information presented has a button to allow customers move from the cart page to the checkout page and complete the purchase.

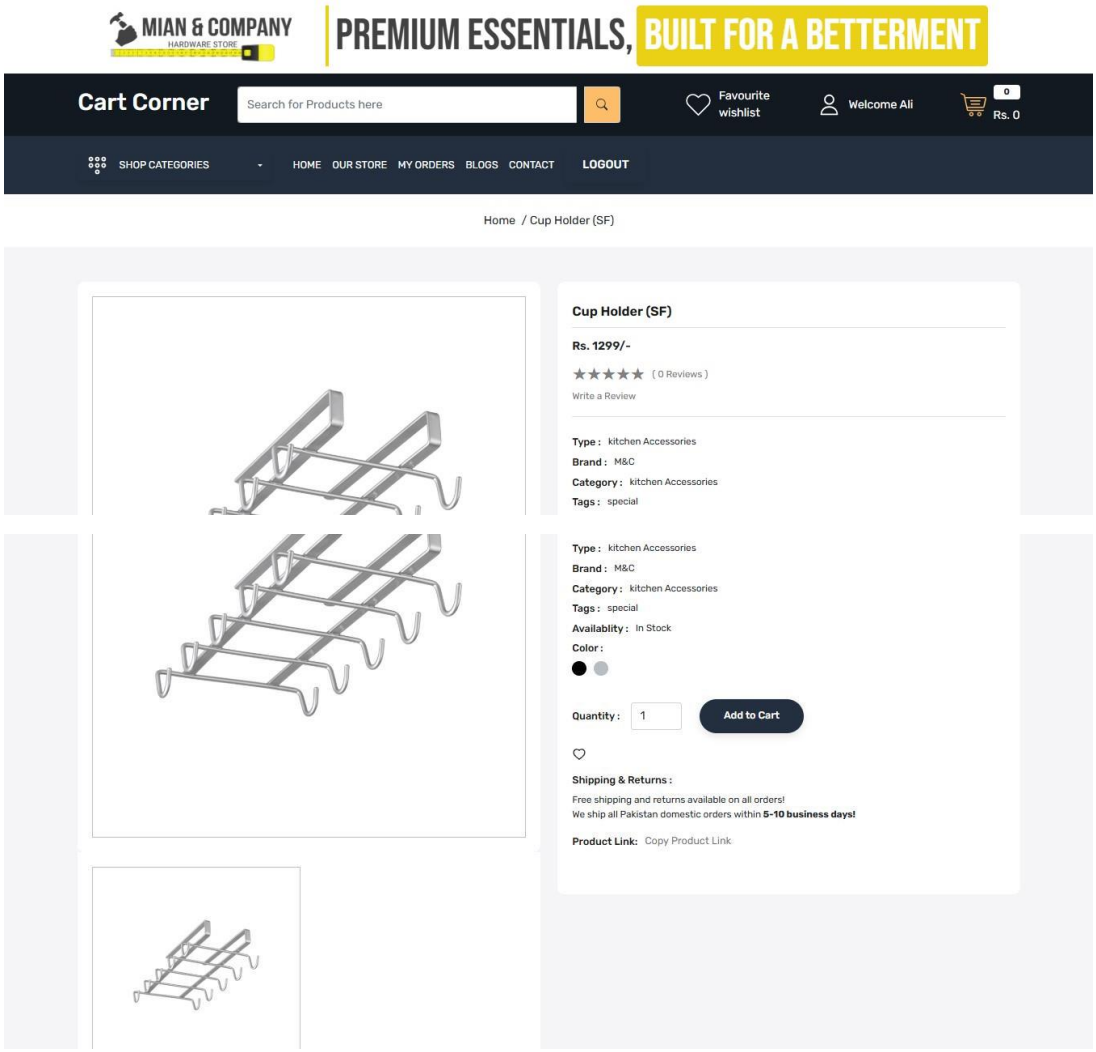


Figure 16: Add to Cart Process

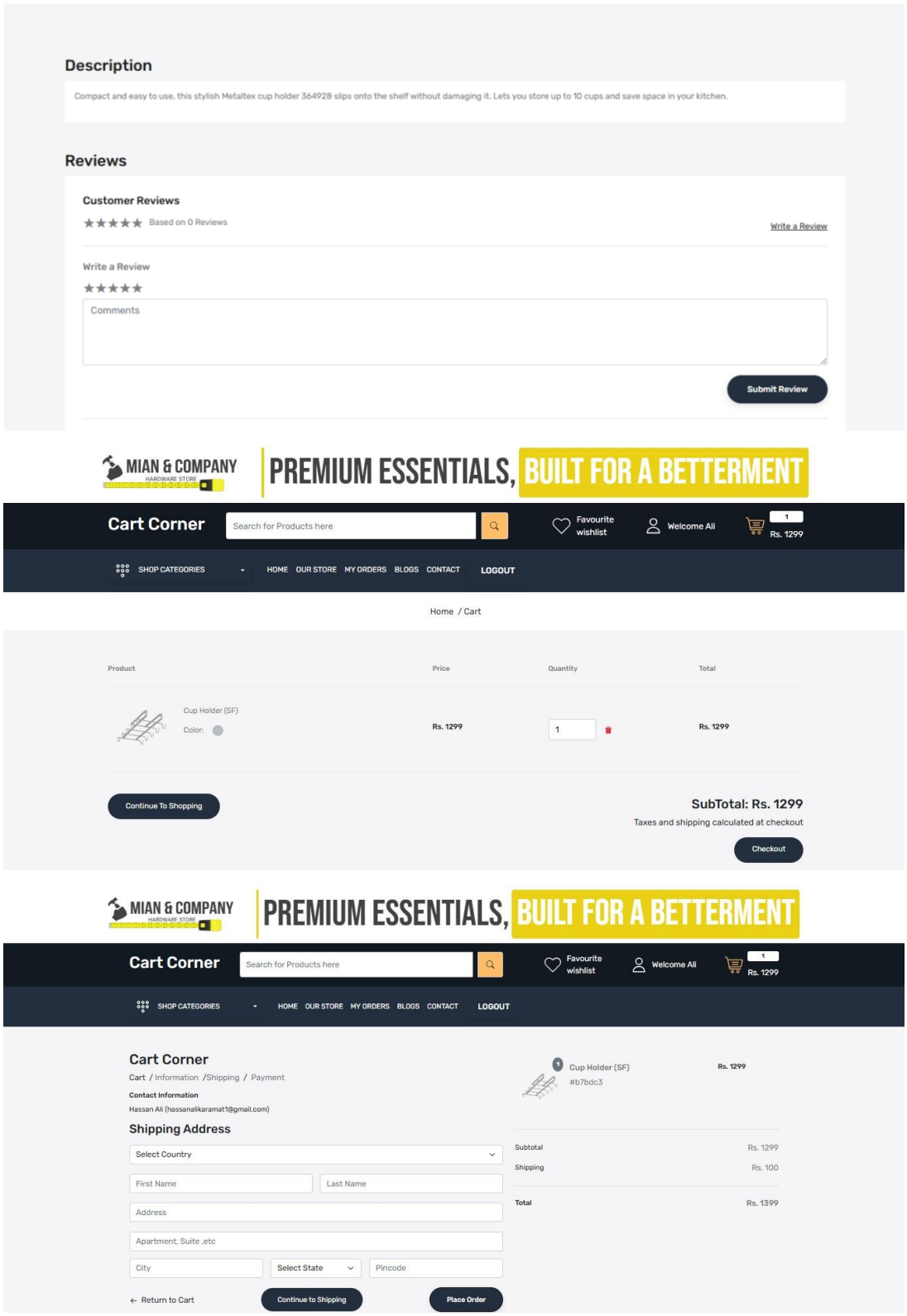


Figure 17: Add to Cart

5.6 Customer Order Page

If the customer click the ‘orders’ button on the home page, the next page which opens allows the customer to see current order they have placed. Provide a summary of the order at the top of the page where the order details such as order id, total amount, total amount after discount and status of the order. Include tracking numbers and the link to the shipping carrier so that the shipment can be tracked in real-time. Try to include the customer’s contact information just in case for future references. Make it possible for customers to cancel their order if it has not been processed for preparation.

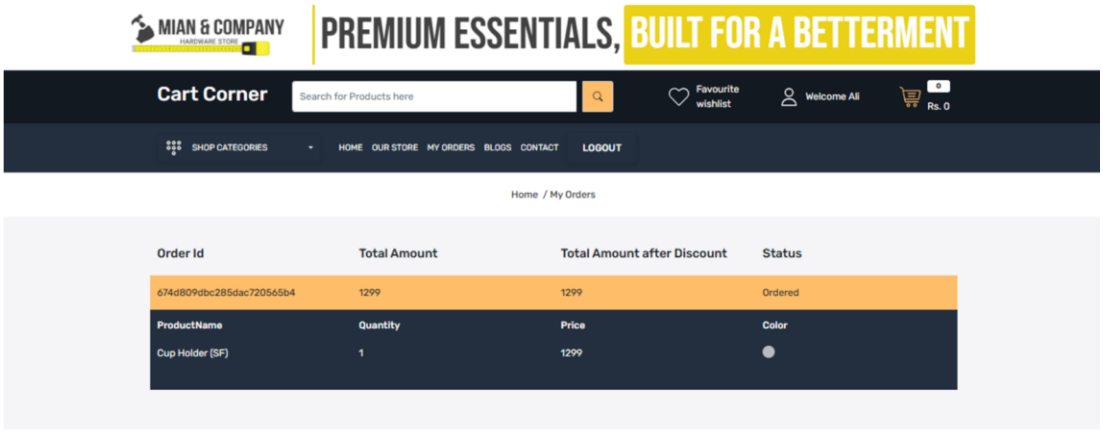


Figure 18: Customer Order Page

5.7 Customer Contact Us Page

The customer click the ‘Contact’ button on the home page, the next page which provide Hardware store location on maps. You can contact them by providing personal information to them and click on ‘Submit’ button to contact you later to provide latest sales or discounts by email or phone number.

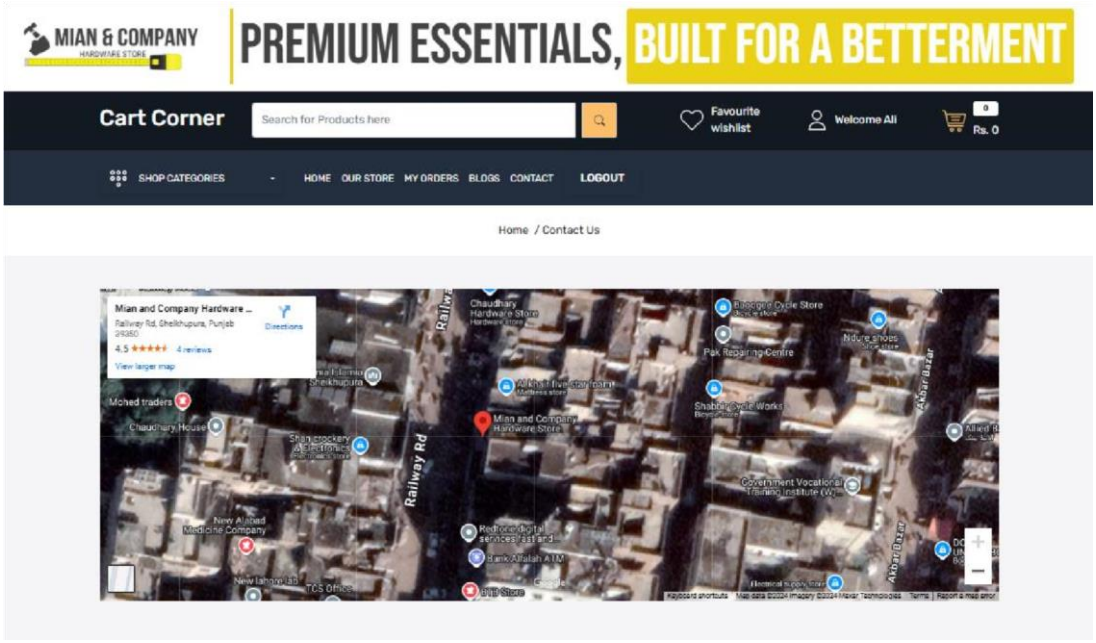


Figure 19: Store Location on Maps

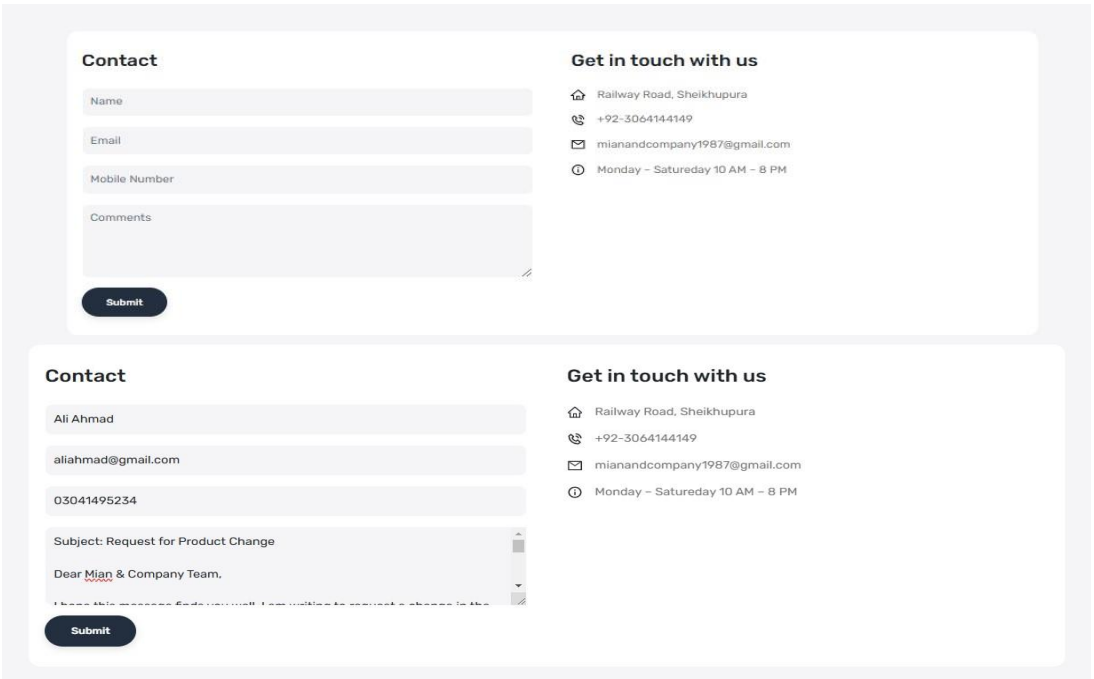


Figure 20: Customer Contact Page

5.8 Customer Feedback Page

The customers give reviews and comments on the products that they have order. Customer can select products by seeing reviews on the products this will help them to easily select the items.

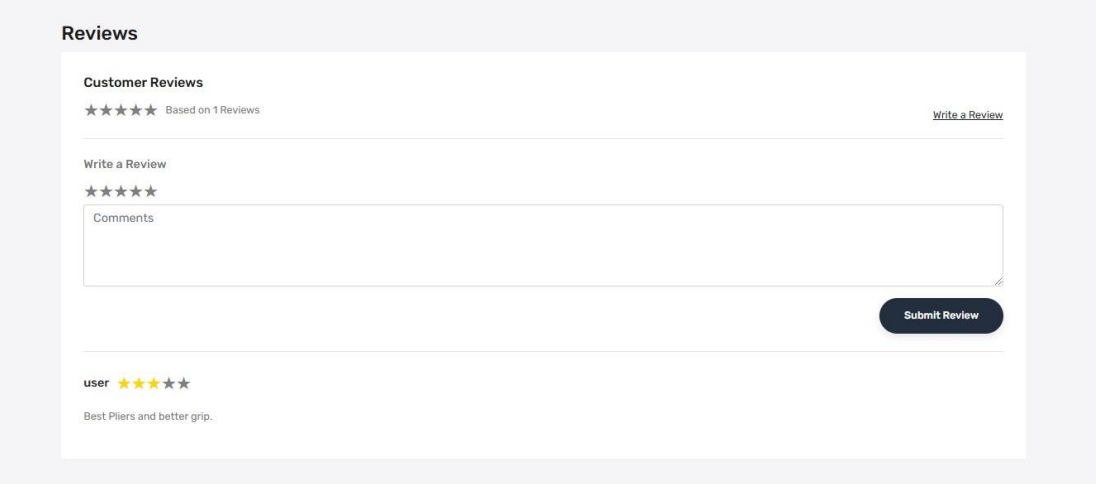


Figure 21: Customer Feedback Page

5.9 Customer Support Chatbot

The customer click the ‘Chat’ button on the home page, the prompt appear asking customer queries and resolve them according to Hardware store data.

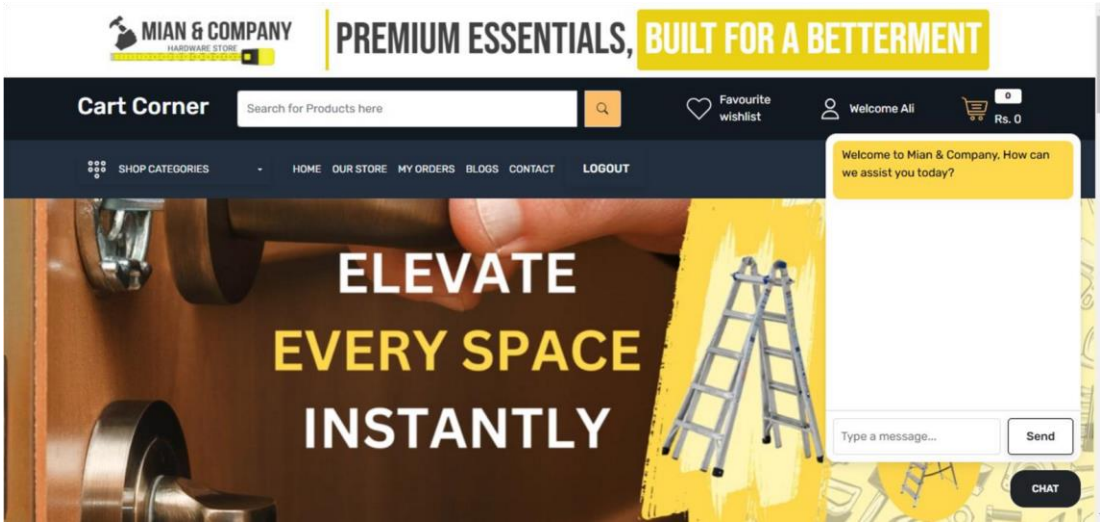


Figure 22: Chatbot For Customer Support

5.10 Admin Dashboard

When the admin successfully login to their account, they are directed to their home page where they can view recent orders status and product list. There are several buttons that perform various actions such as a button for viewing customers profiles, a button where products can be added of different brands in different category list,a button that open up the page where all pending and completed orders are displayed, a button for giving customers coupons as reward, a button for viewing and resolving customers enquiries and a button for signing out from admin profile.

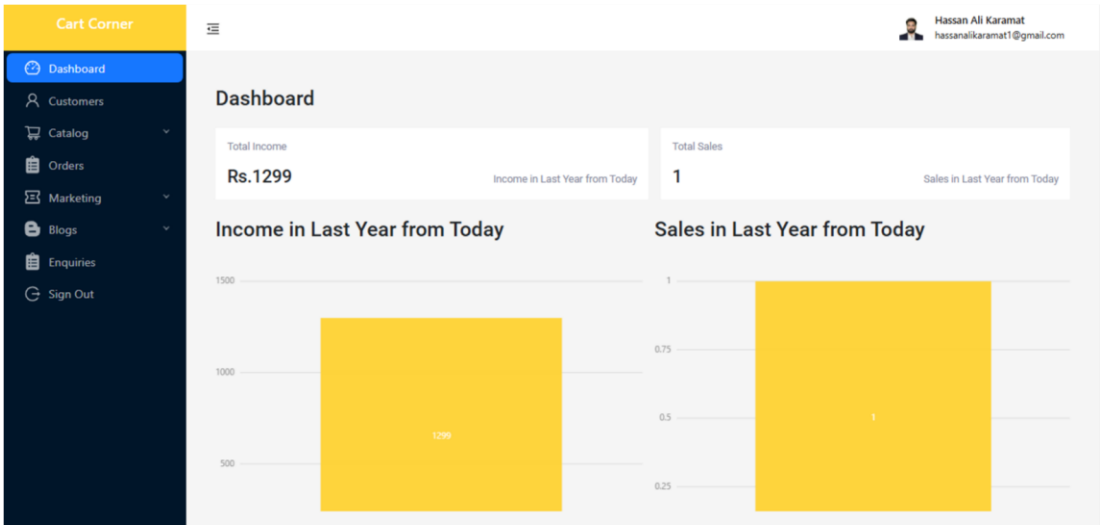


Figure 23: Admin Dashboard

5.11 Admin Daily Closing Report

When an admin click on the dashboard button, all daily purchasing of the products are shown there along with quantity. Only admin can view daily closing report.

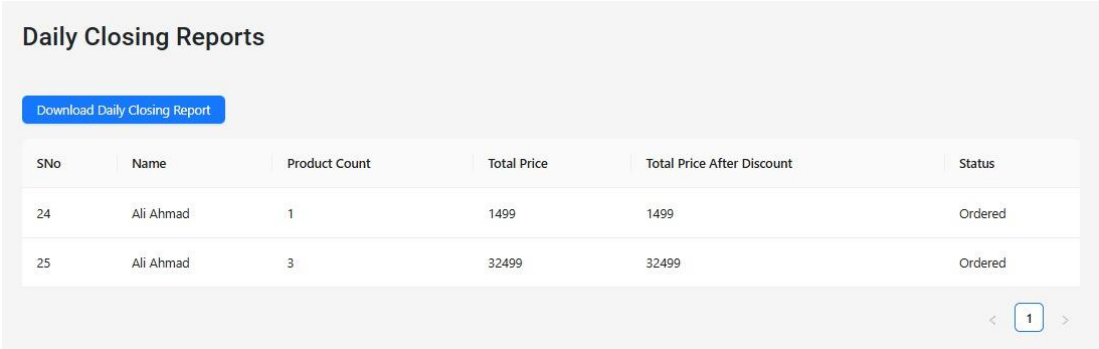


Figure 24: Admin Daily Closing Report

All data of daily closing report will be stored in excel sheet by clicking on downloading daily closing report, the report will be downloaded in the form of excel sheet for admin record.

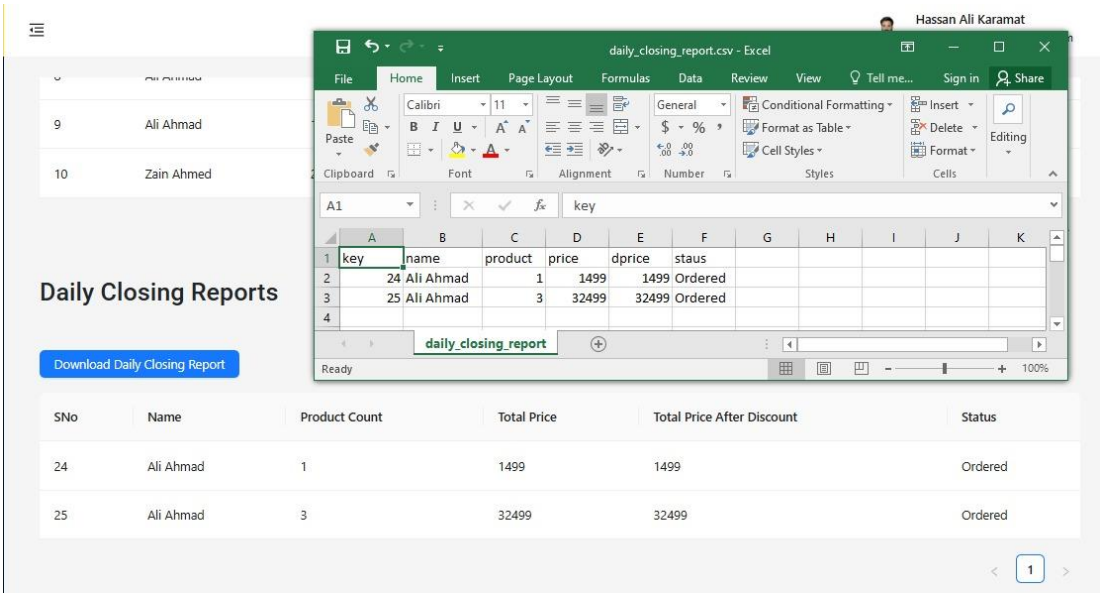


Figure 25: Daily Closing Record on Excel

5.12 Admin Customers Page

When an admin click on the customers button on the dashboard, all register customers are shown there. Only admin can view all customers sensitive information that provided by the customer on creating their accounts.

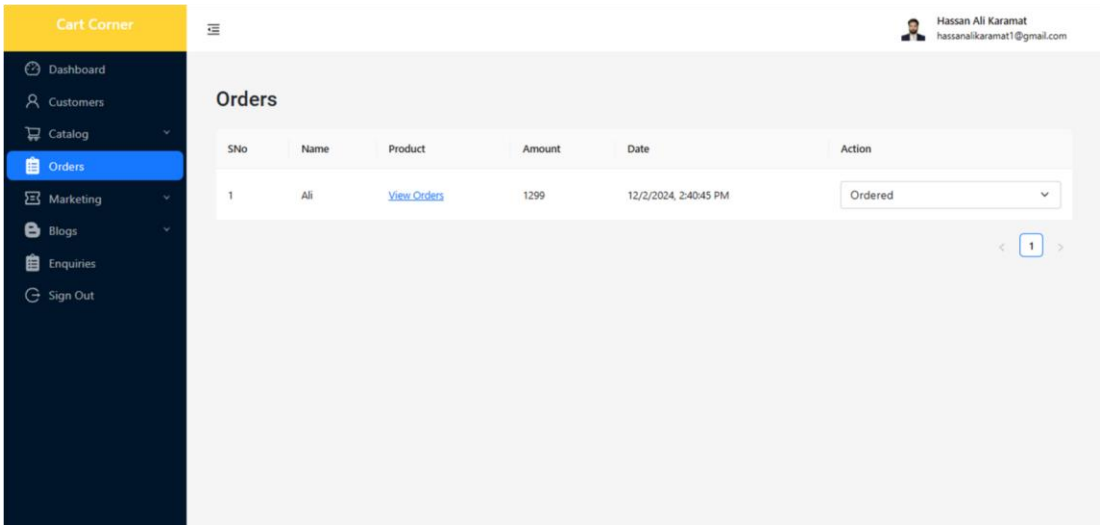


Figure 26: Admin Customers Page

5.13 Admin Catalog Page

When an admin click on the catalog button on the dashboard, a drop down appear with several more buttons. Here we can add the products and can see product list, can add our company brand to product, can add product in different categories and can select color scheme.

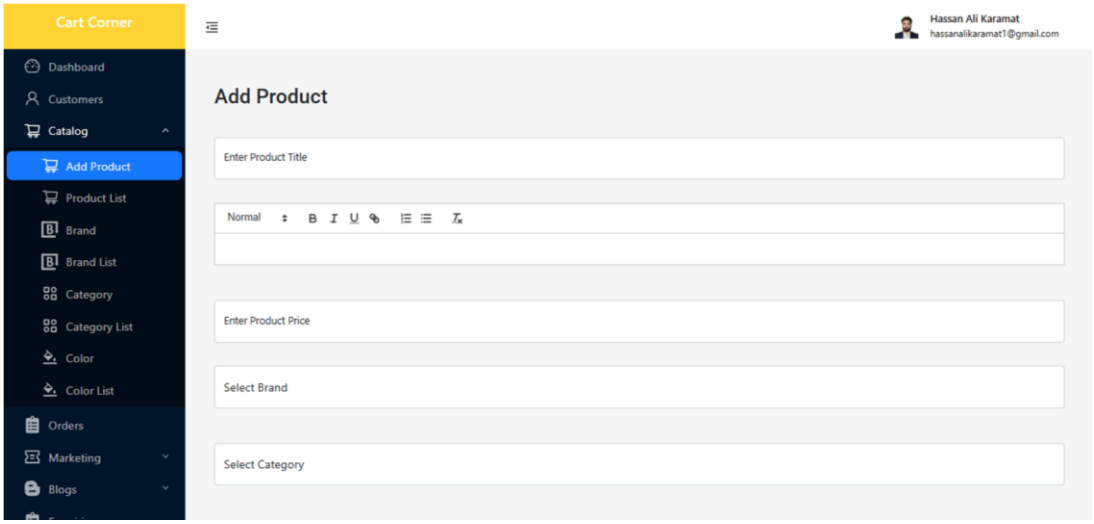


Figure 27: Admin Adds Product

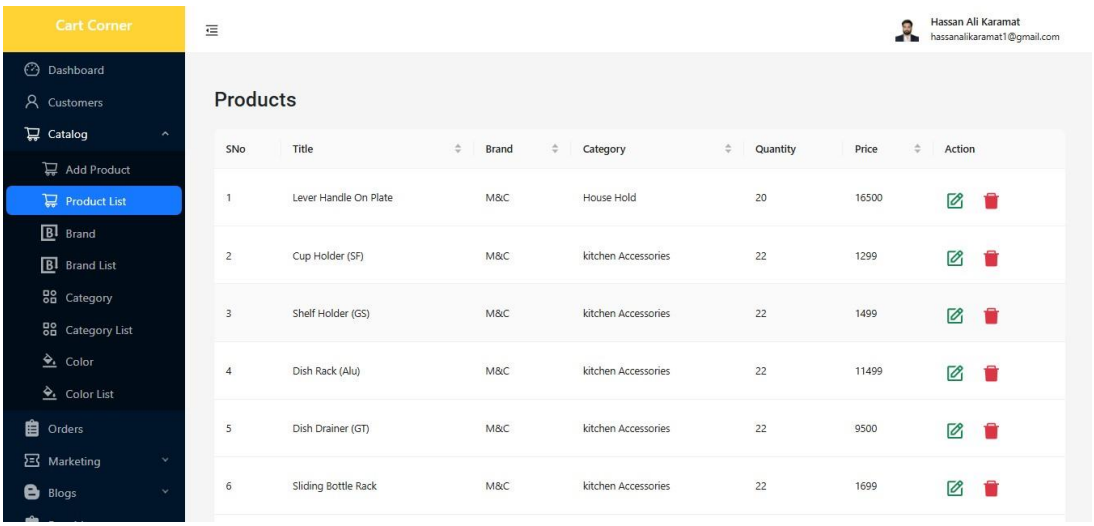


Figure 28: Admin Edit Products List

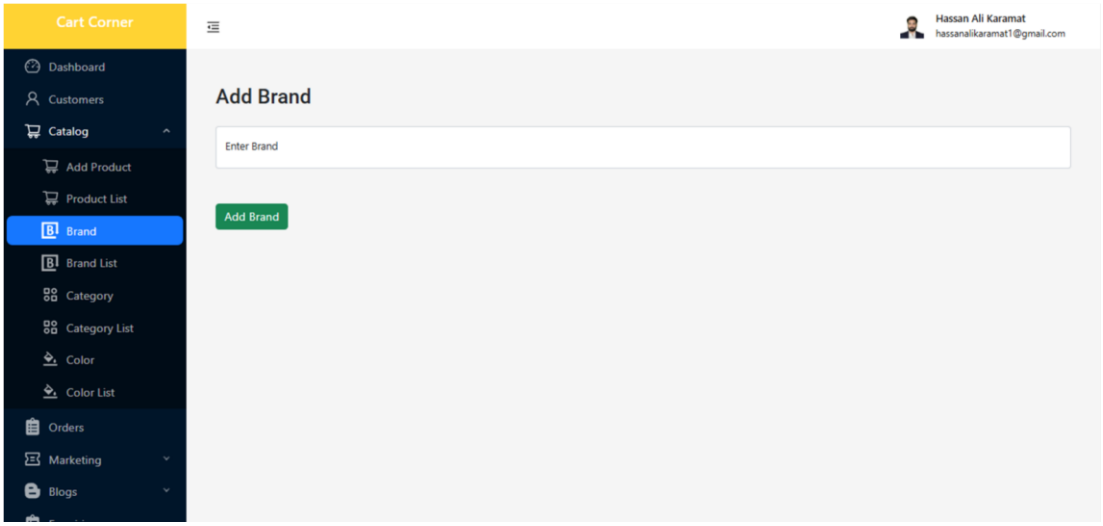


Figure 29: Admin Add Brand Name

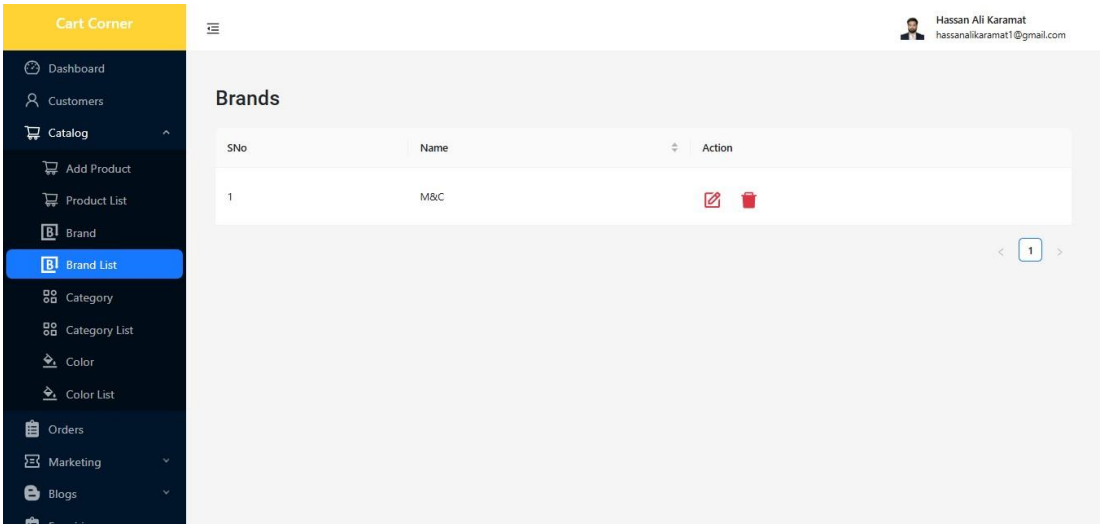


Figure 30: Admin Edit Brands List

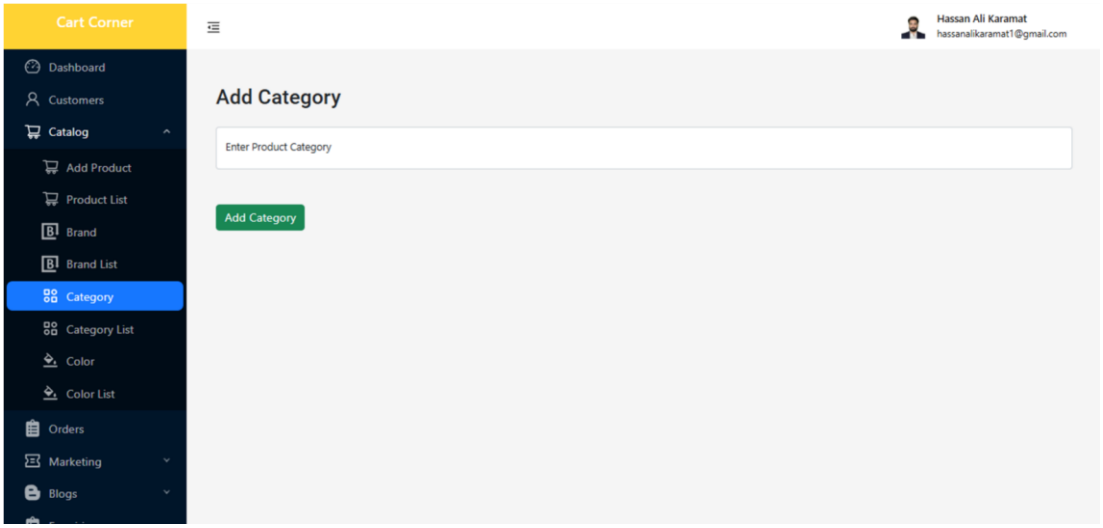


Figure 31: Admin Add Product Category

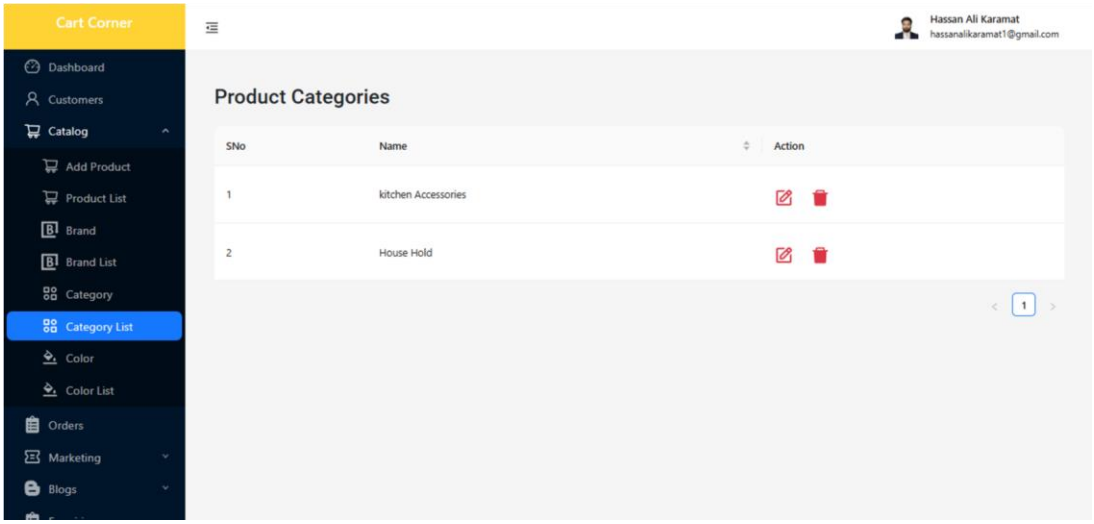


Figure 32: Admin Edit Product Categories

Figure 33: Admin Add Color Scheme

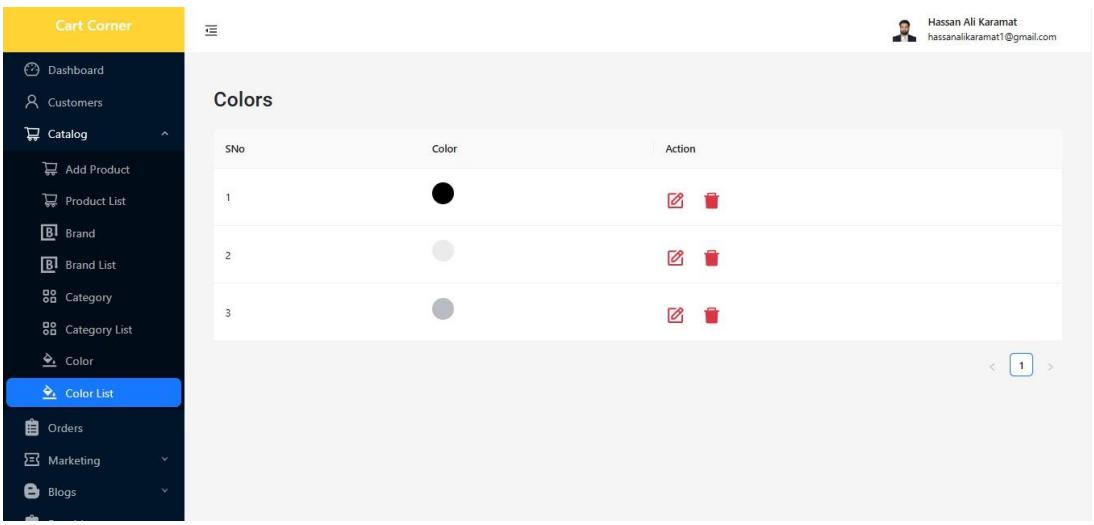


Figure 34: Admin Edit Color Scheme

5.14 Admin Order Page

When an admin click on the order button on the dashboard, all orders are displayed. Admin can approve or cancel any order at any point. If the admin click on approve, the action will show the Active status of that order. When an order is completed and sent to the customer.

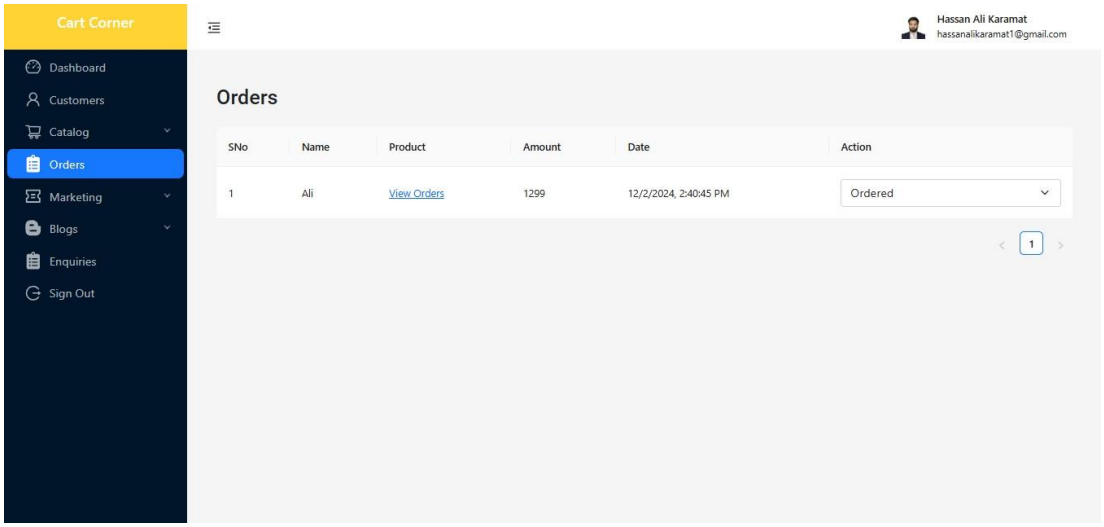


Figure 35: Admin Order Page

5.15 Admin Enquiries Page

When an admin click on the marketing button on the dashboard, customer register their queries and concerns regarding to their interested product or by their purchase defects. Admin view the enquiries and resolve the enquiry as soon as possible.

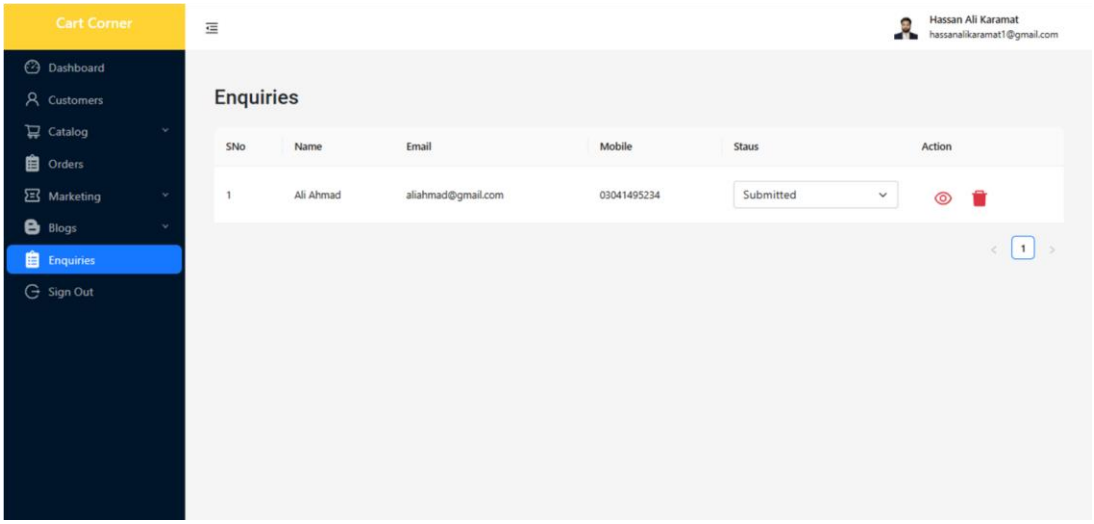


Figure 36: Enquiry Page

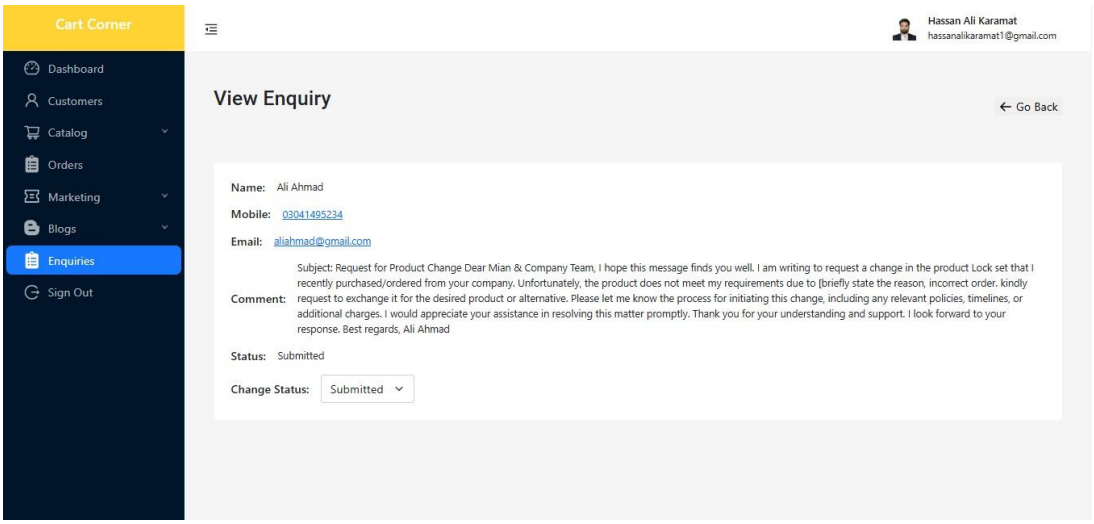


Figure 37: Admin View Enquiry Page

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Hardware store is a web-based application for customers to make their profiles to purchase and view the products that are needed. Every product provide detail description with reasonable prices. Prices vary as product design vary from each other.

Hardware store saves a lot of time for customers to find a better and desired product online and no need to go on store physically to place order. It benefit the admin too as without this application, only near one from that area customer come at shop but from this application customers can view and place order from anywhere in the world.

6.2 Recommendation

The future work regarding Hardware store project can encompass several enhancements and expansion to improve its functionality, user experience and market reach. Here are some directions:

6.2.1 Enhanced Mobile Application

Improve Mobile Experience: Augmented reality should be included with mobile application to facilitate virtual testing.
Push Notifications: Remind you of promotional offers or seasonal sales. You may use push notifications that sent via your phone alerts.

6.2.2 Global Expansion and Localization

Multi-Language Support: Provide adequate service to consumers who come from a wide range o countries. Vital to offer support for many languages.
Localization of Services: Technique of adjusting the platform to respond to individual wants and preferences of users who placed in various areas.

6.2.3 Marketing and Brand Awareness

Influencer Collaboration: To actively engage influencers in promoting the platform and increase its visibility to wide audience.
Targeted Advertising Campaigns: Market strategies to optimize efficiency.

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APPENDICE

APPENDIX A: Codes

- **Website Home Page**

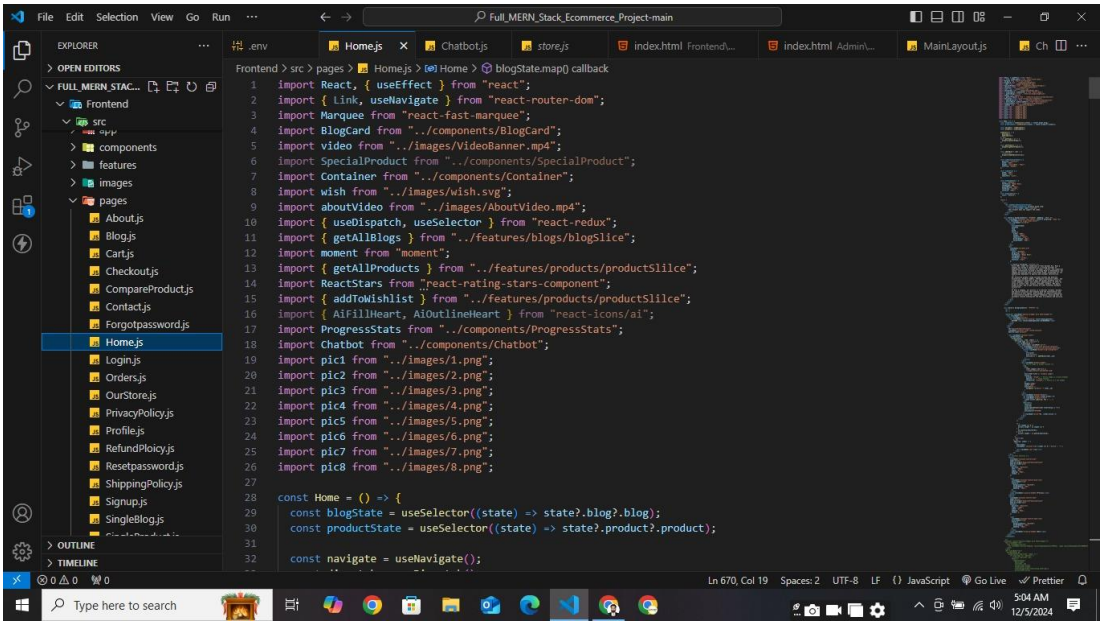


Figure 38: Website Home Page Code(1)

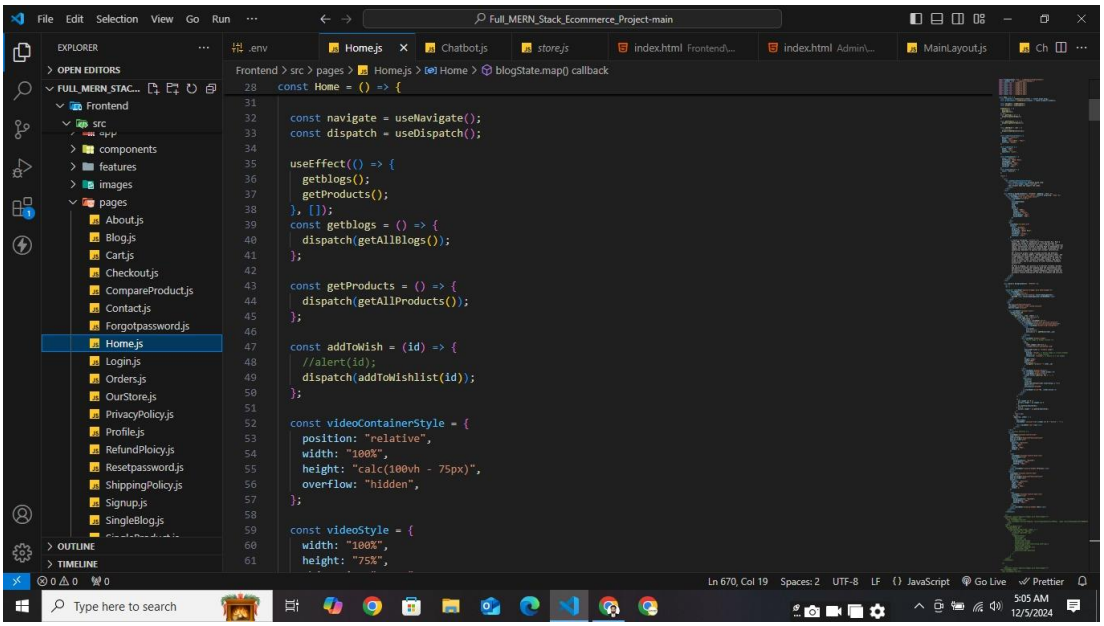


Figure 39: Website Home Page Code(2)

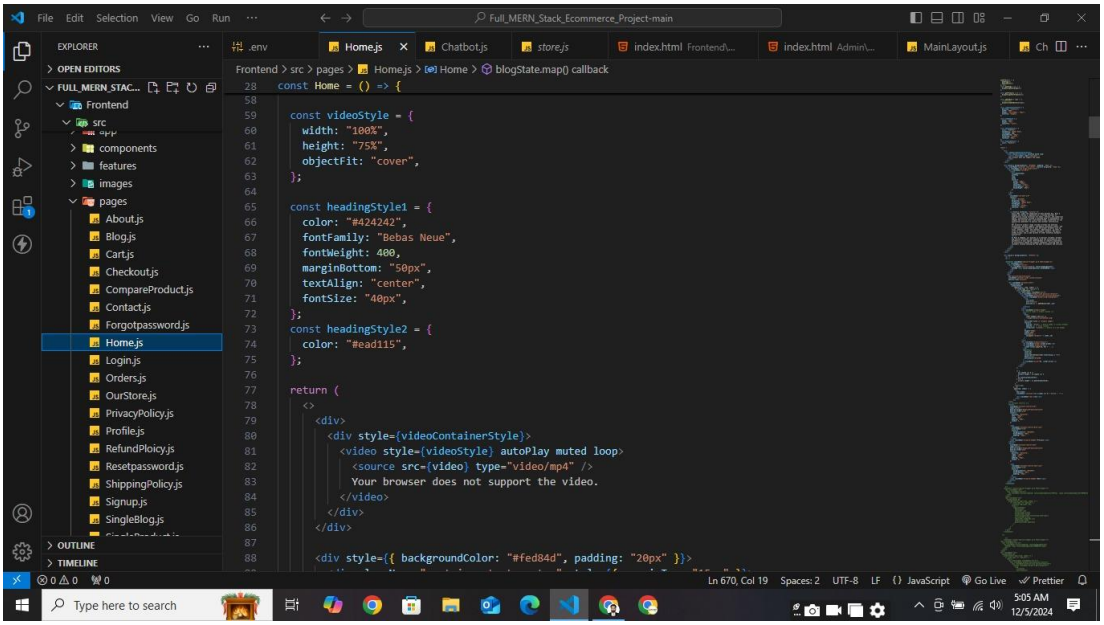


Figure 40: Website Home Page Code(3)

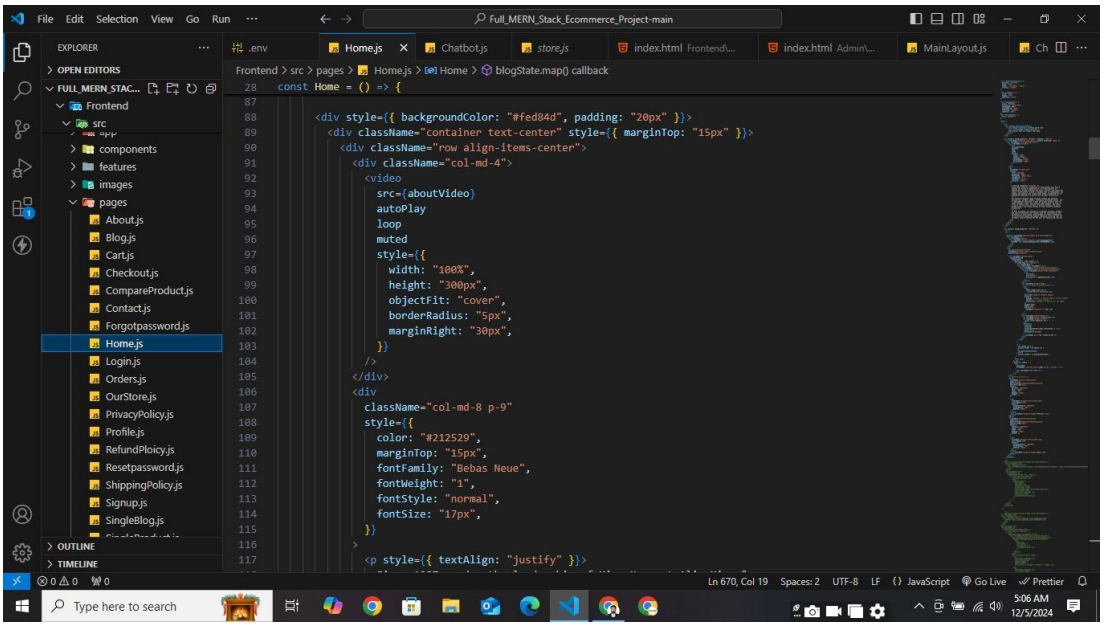


Figure 41: Website Home Page Code(4)

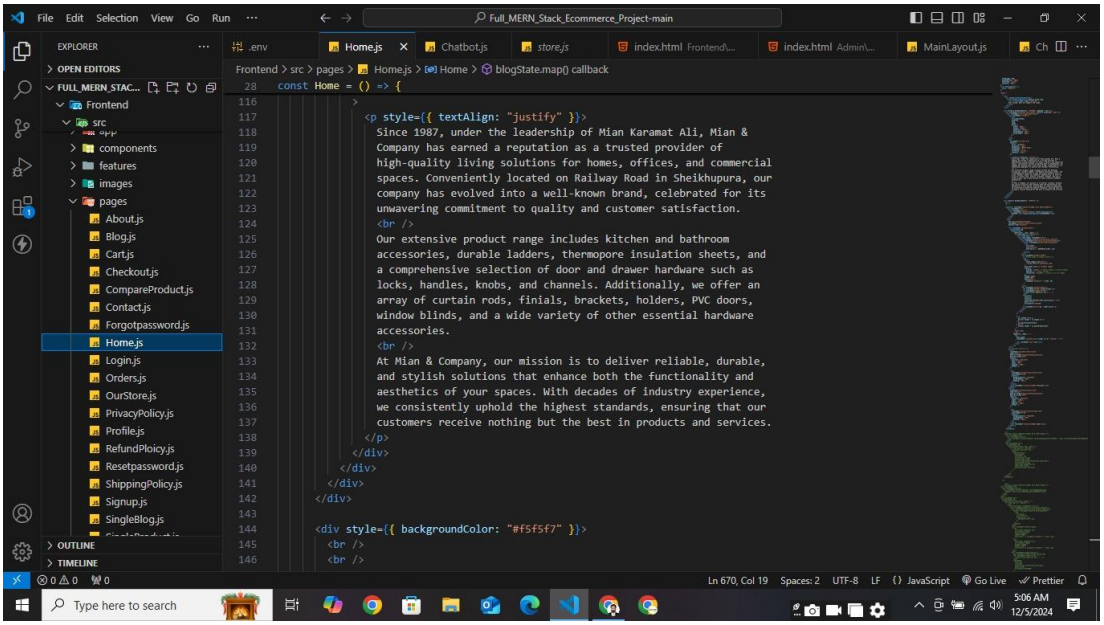


Figure 42: Website Home Page Code(5)

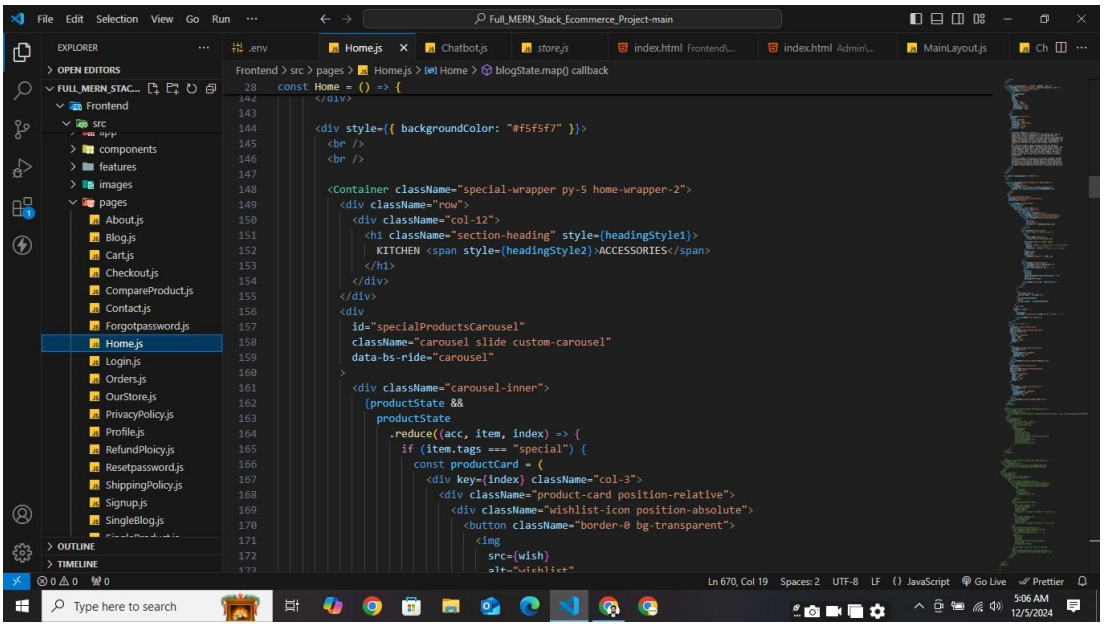


Figure 43: Website Home Page Code(6)

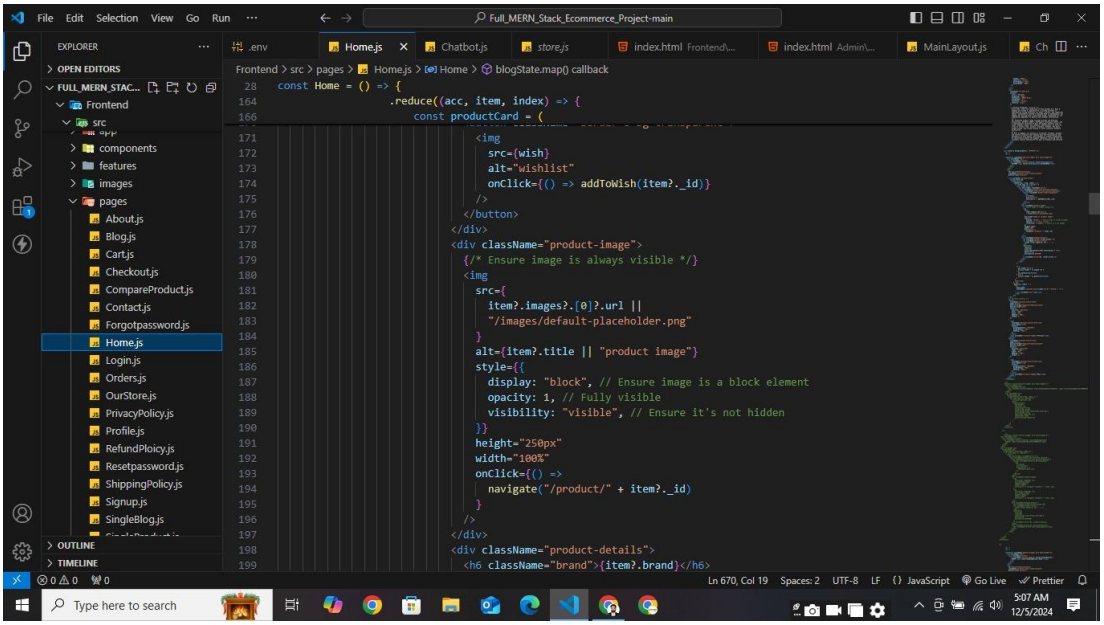


Figure 44: Website Home Page Code(7)

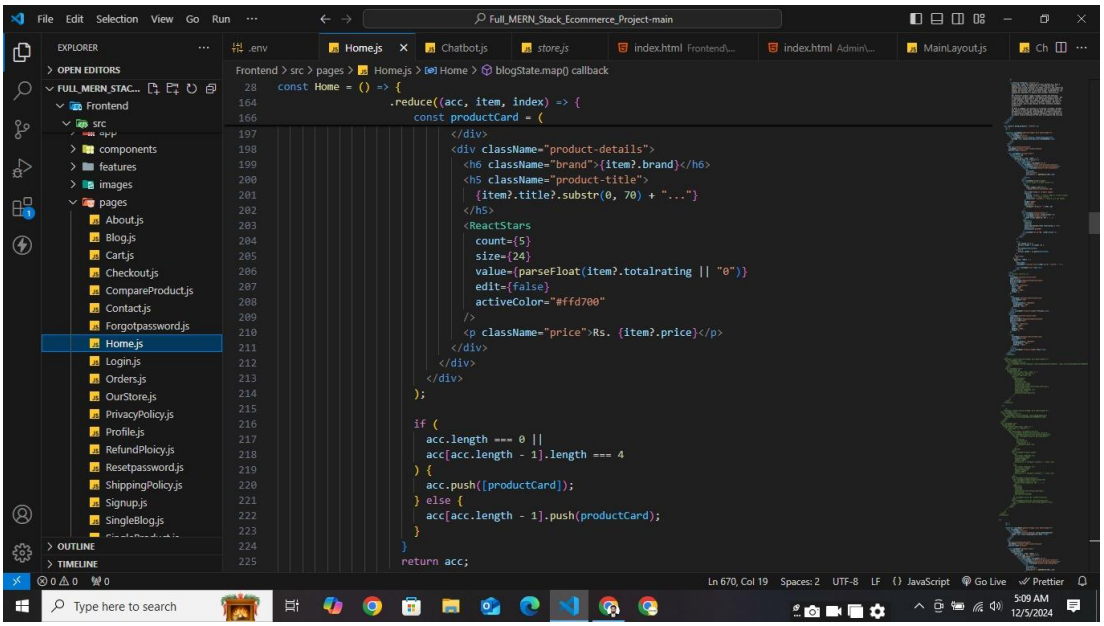


Figure 45: Website Home Page Code(8)

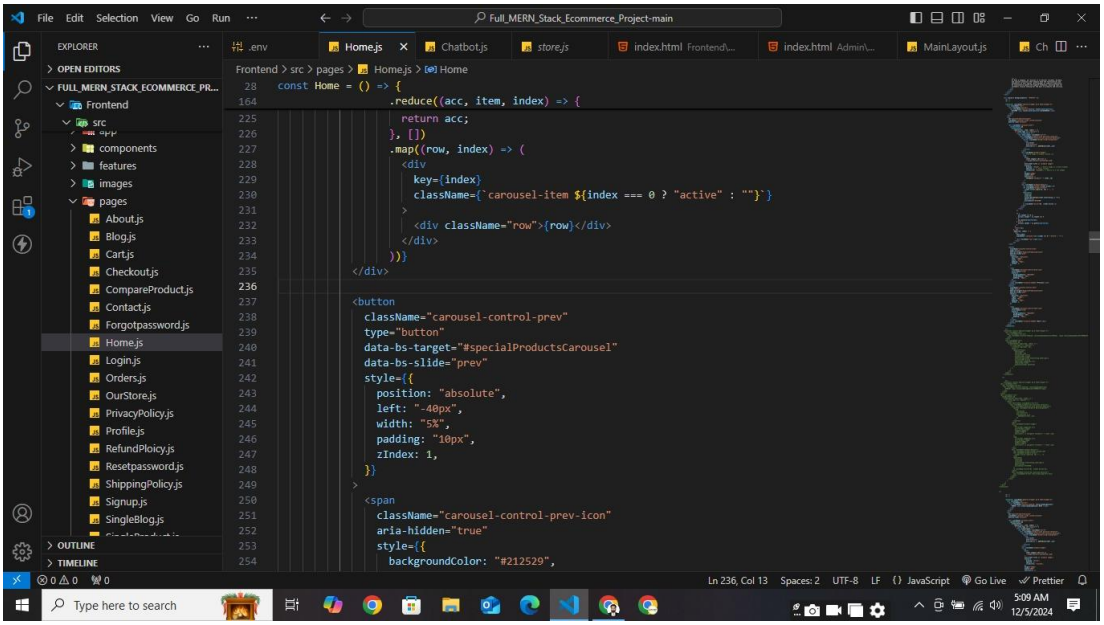
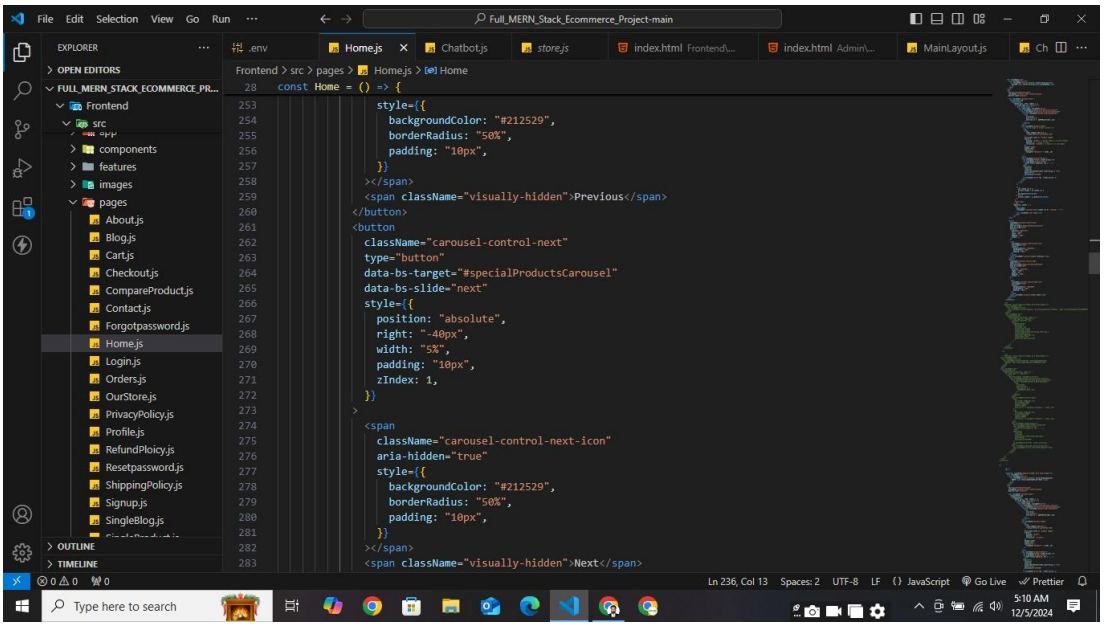


Figure 46: Website Home Page Code(9)



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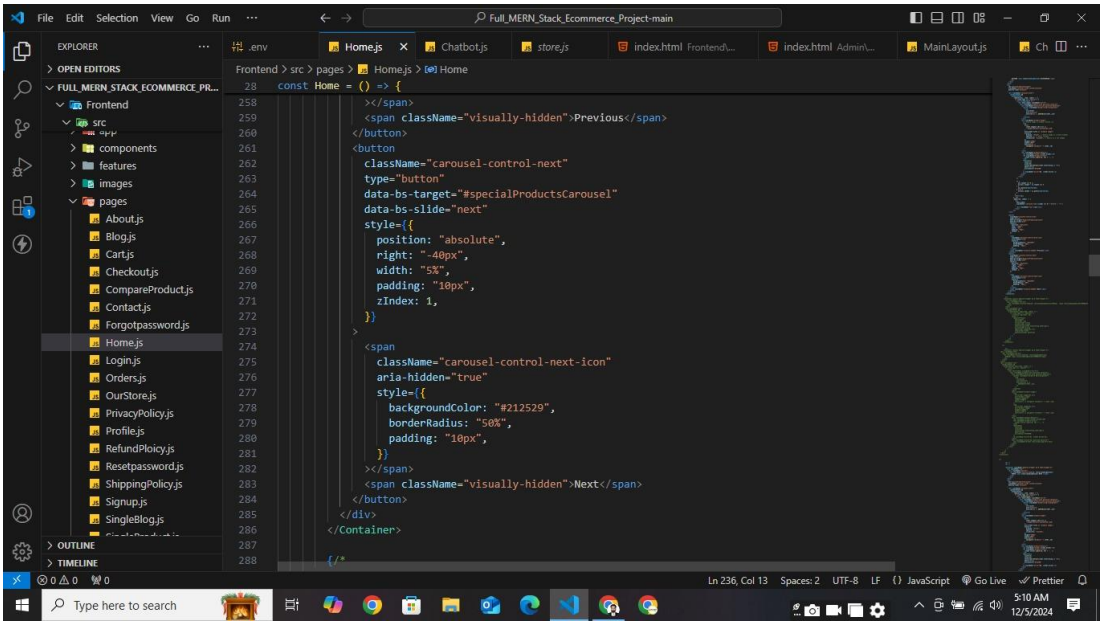


Figure 48: Website Home Page Code(11)

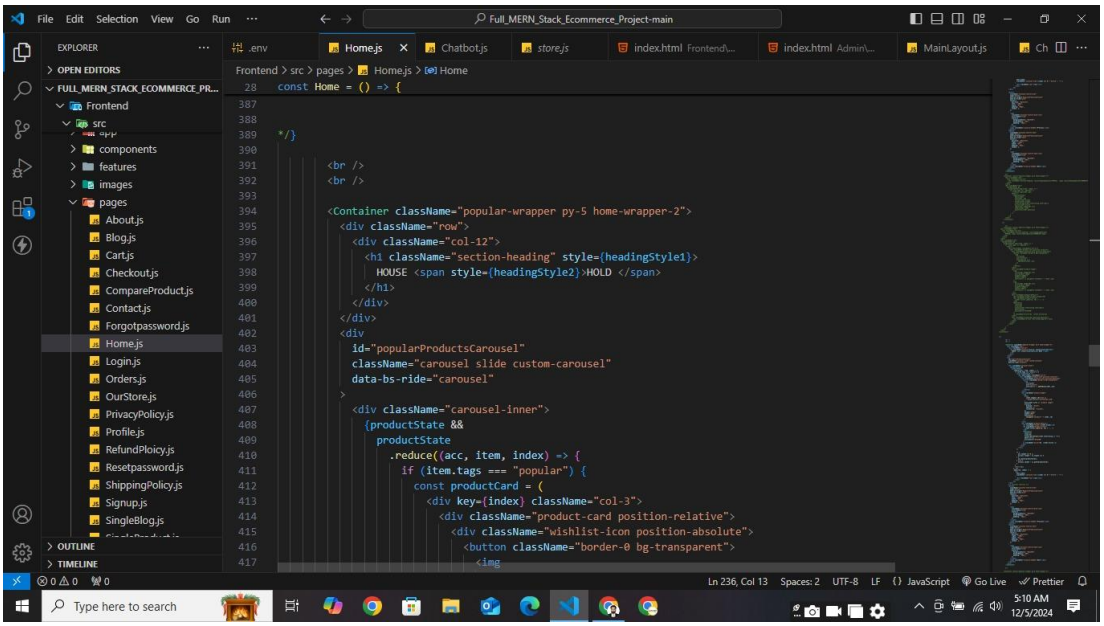


Figure 49: Website Home Page Code(12)

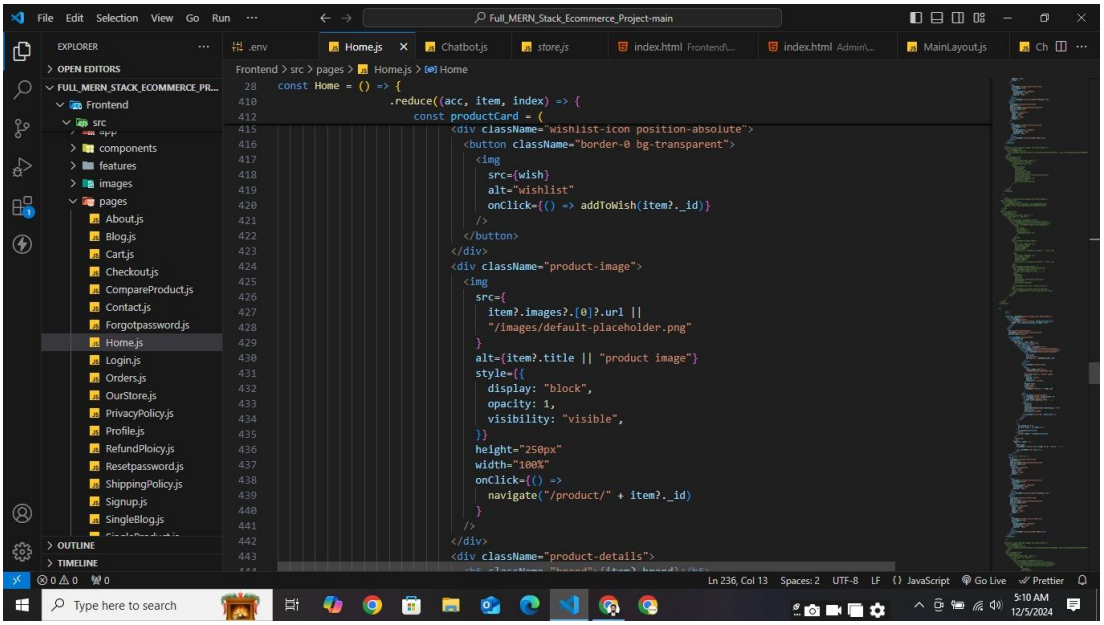


Figure 50: Website Home Page Code(13)

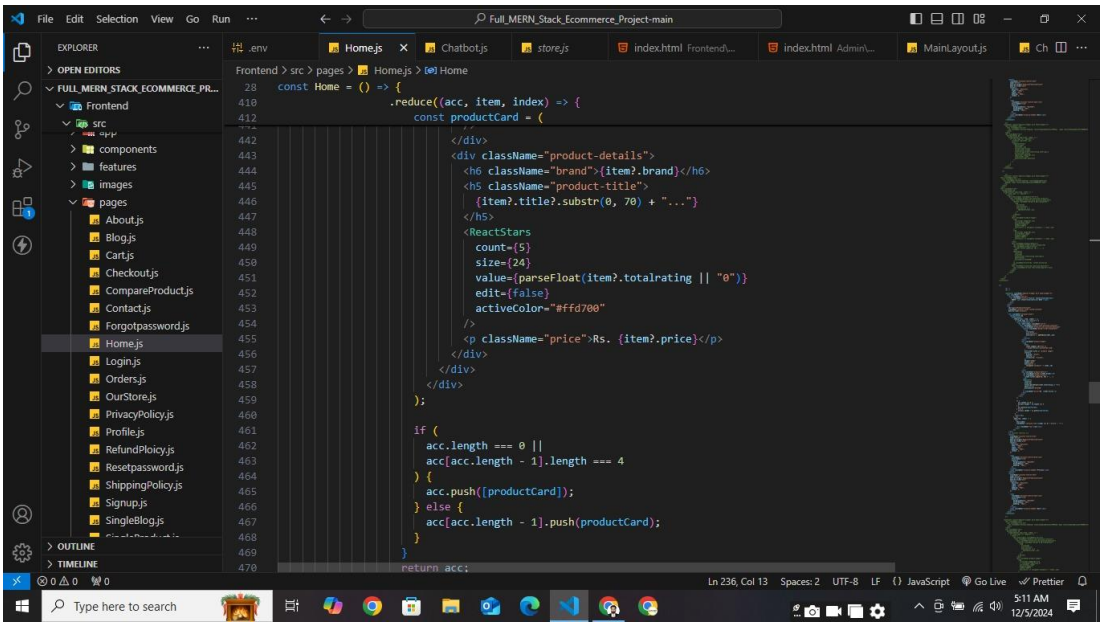


Figure 51: Website Home Page Code(14)

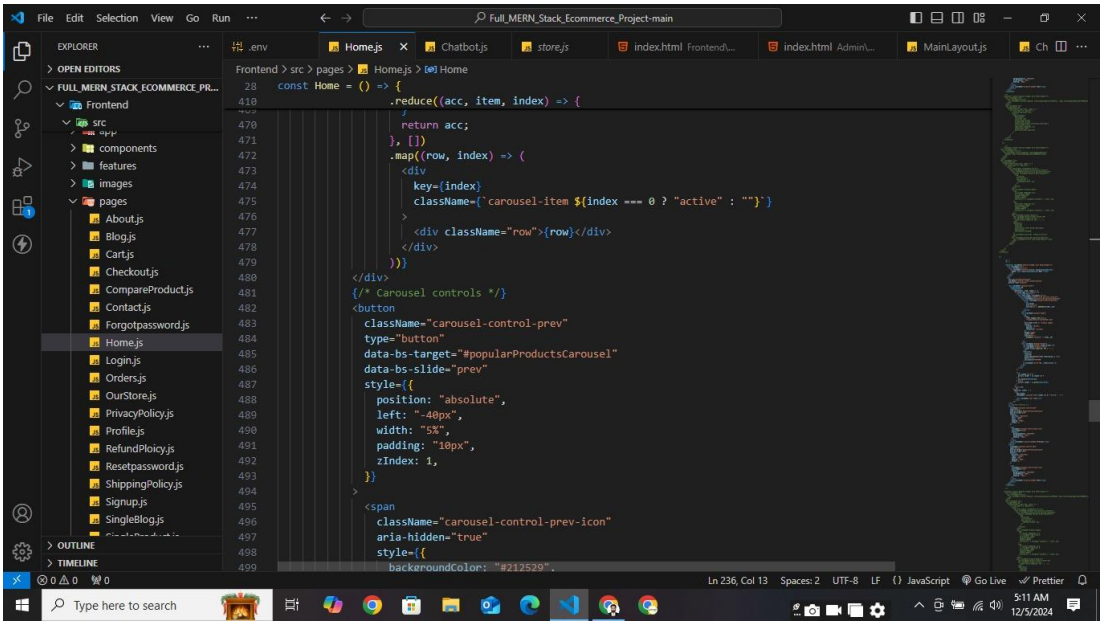


Figure 52: Website Home Page Code(15)

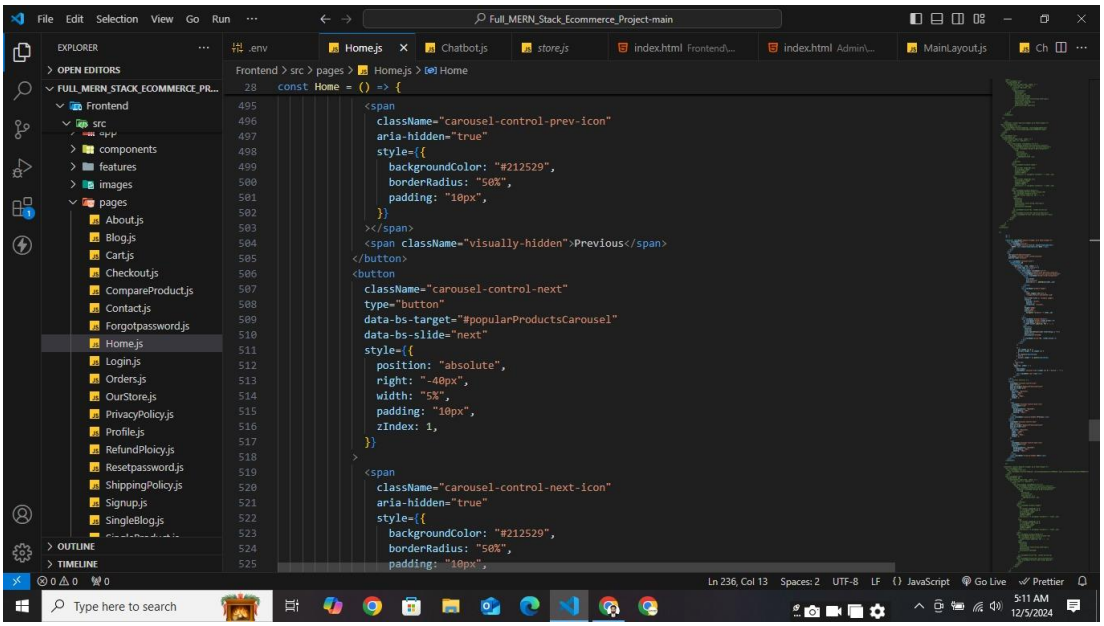


Figure 53: Website Home Page Code(16)

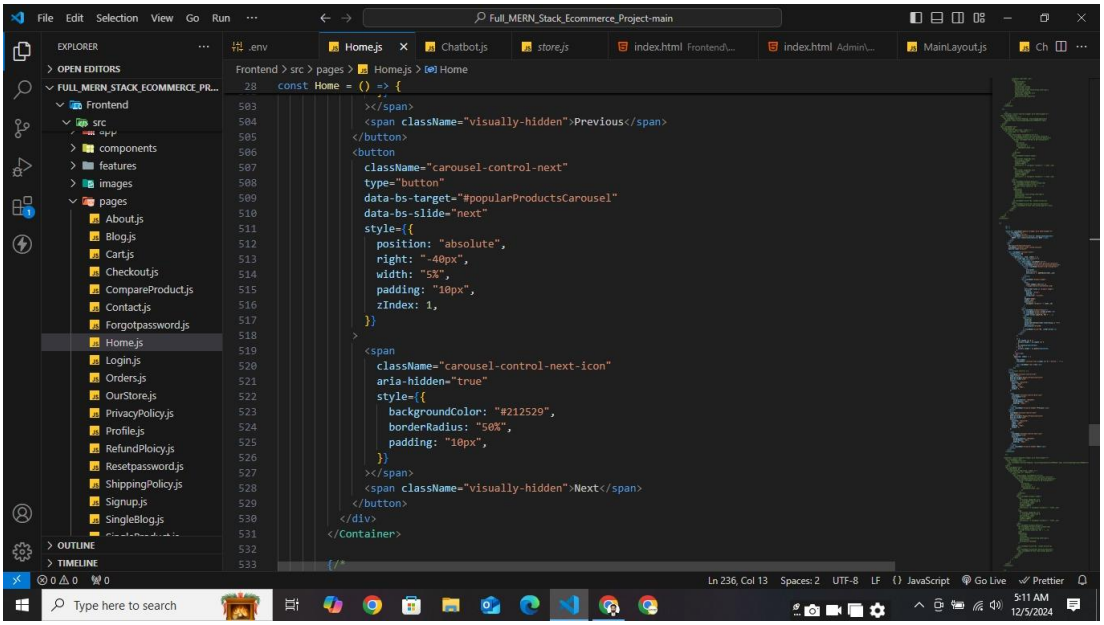


Figure 54: Website Home Page Code(17)

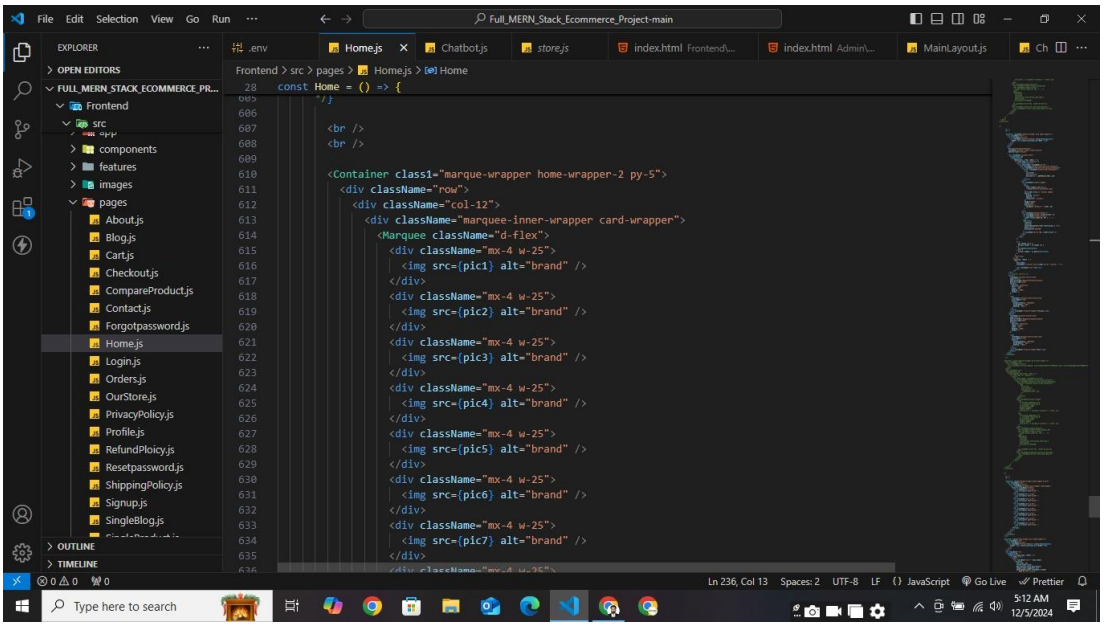


Figure 55: Website Home Page Code(18)

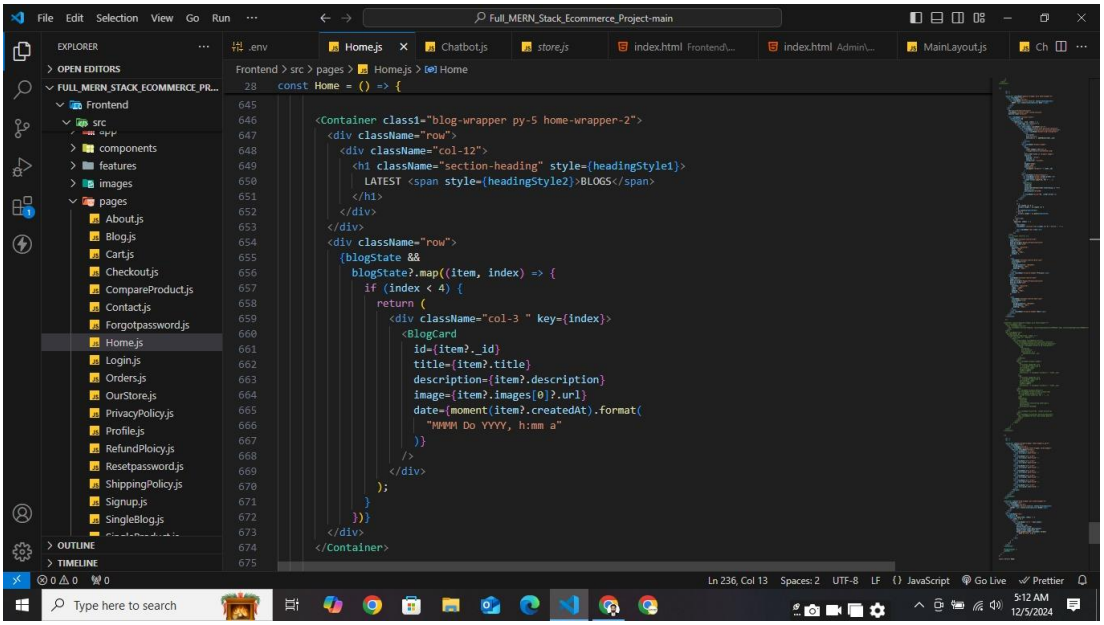


Figure 56: Website Home Page Code(19)

- **Log in Page**

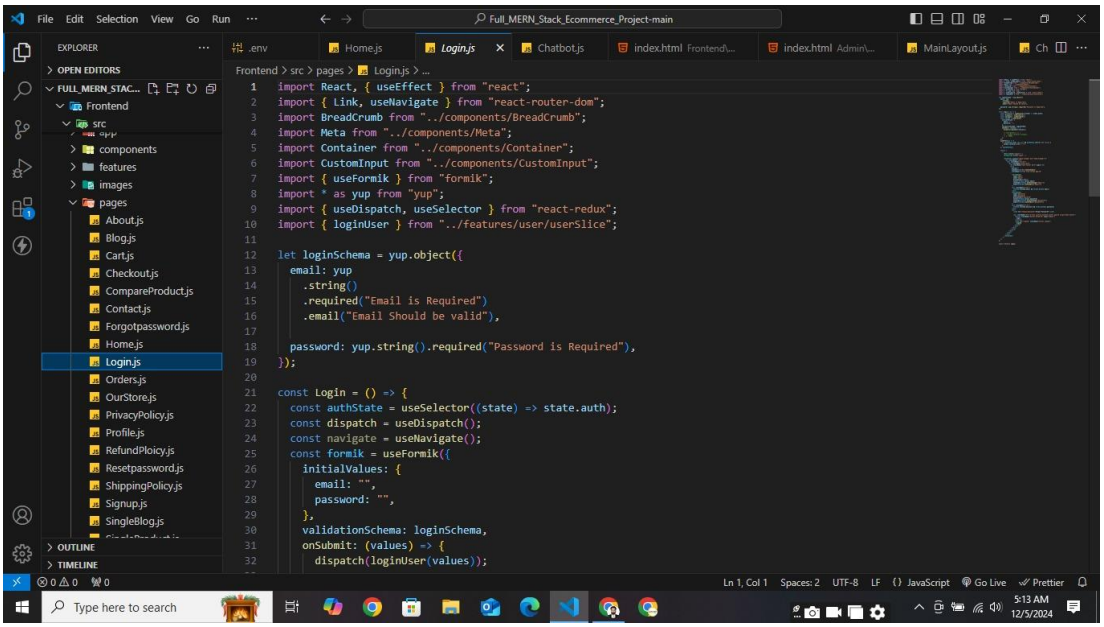


Figure 57: Login Page Code(1)

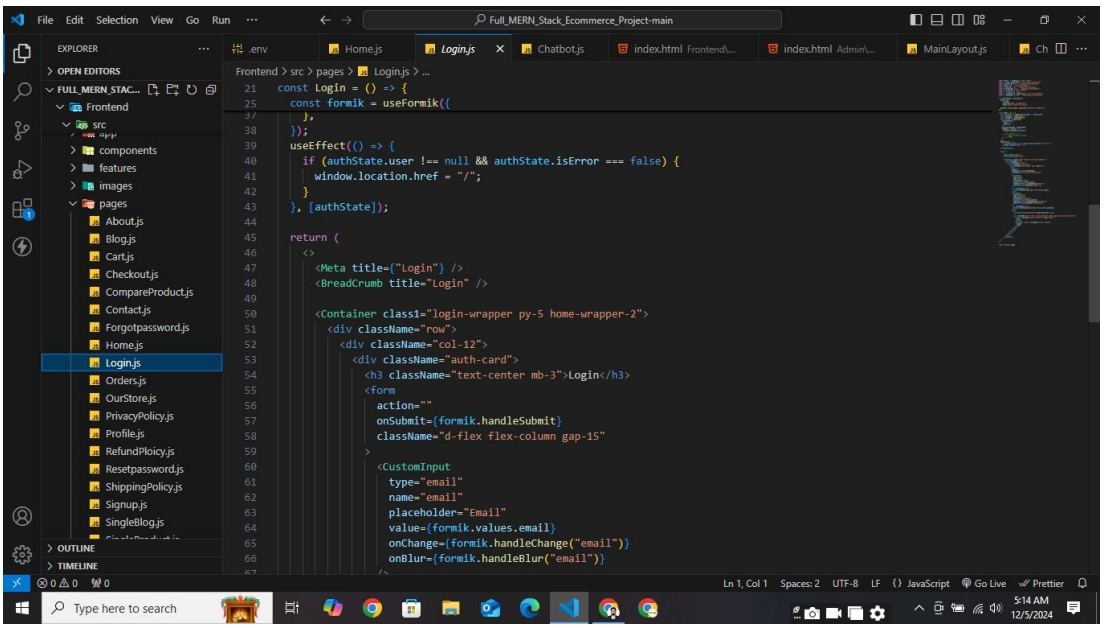


Figure 58: Login Page Code(2)

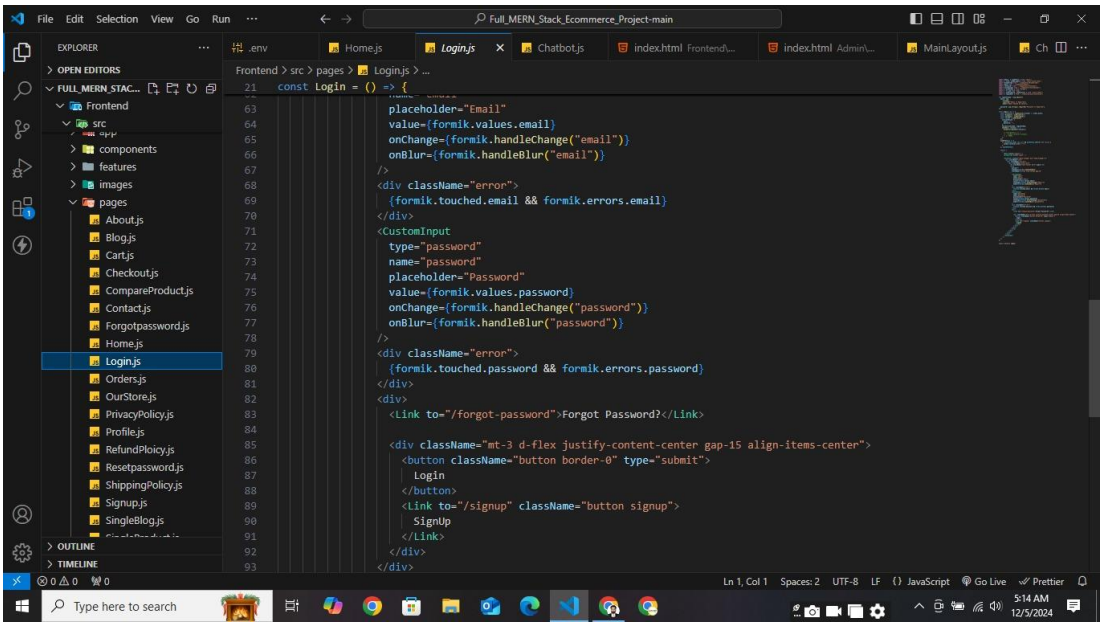


Figure 59: Login Page Code(3)

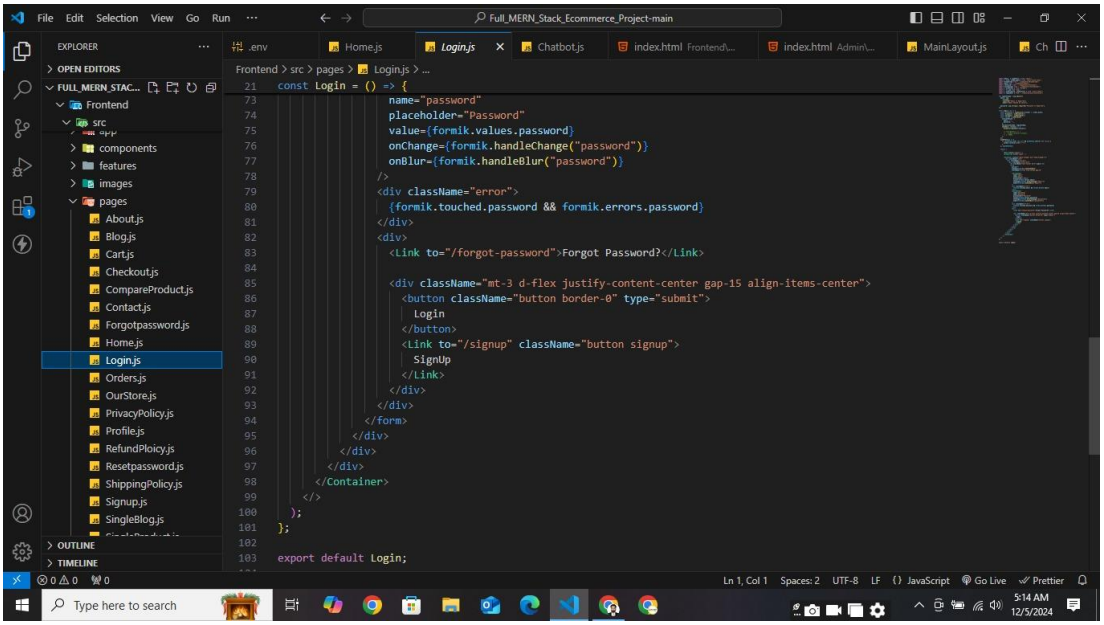


Figure 60: Login Page Code(4)

- **Sign-up Page**

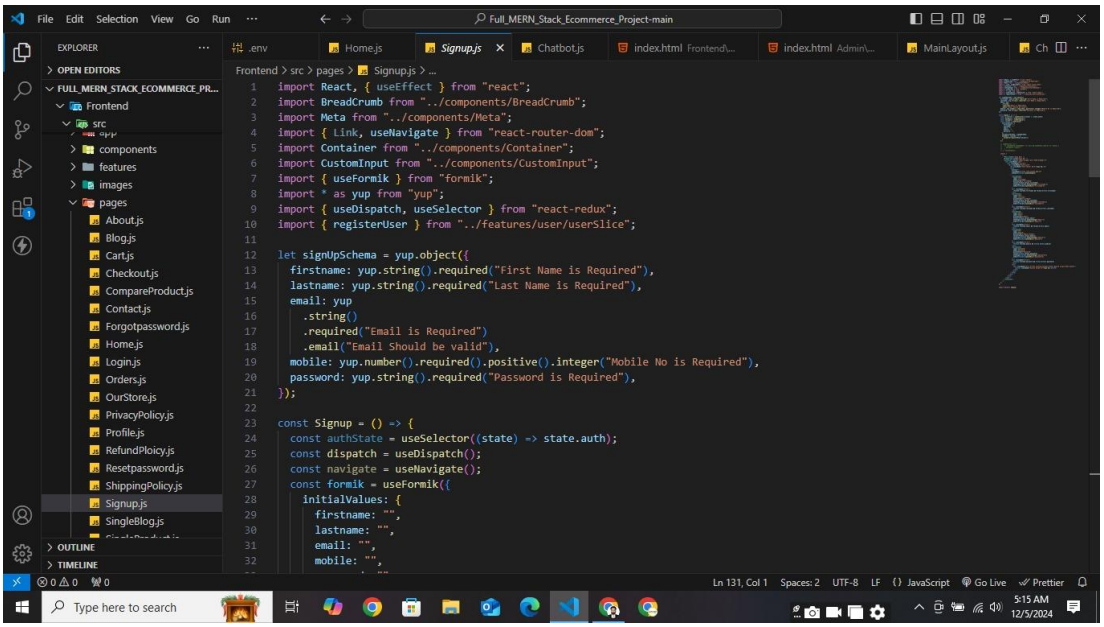


Figure 61: Sign-up Page Code(1)

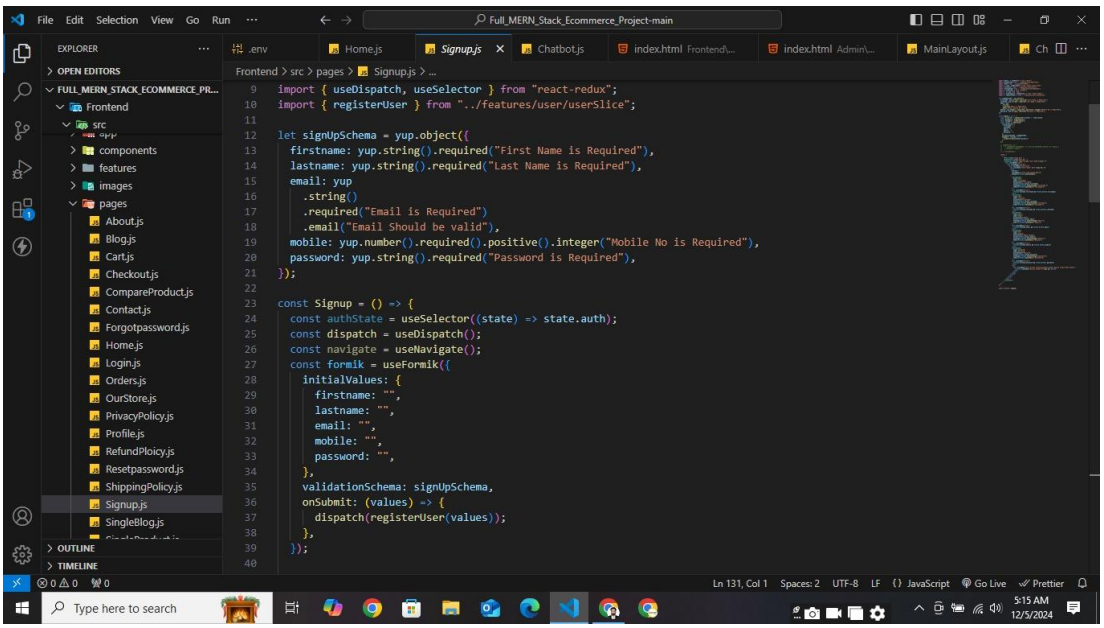
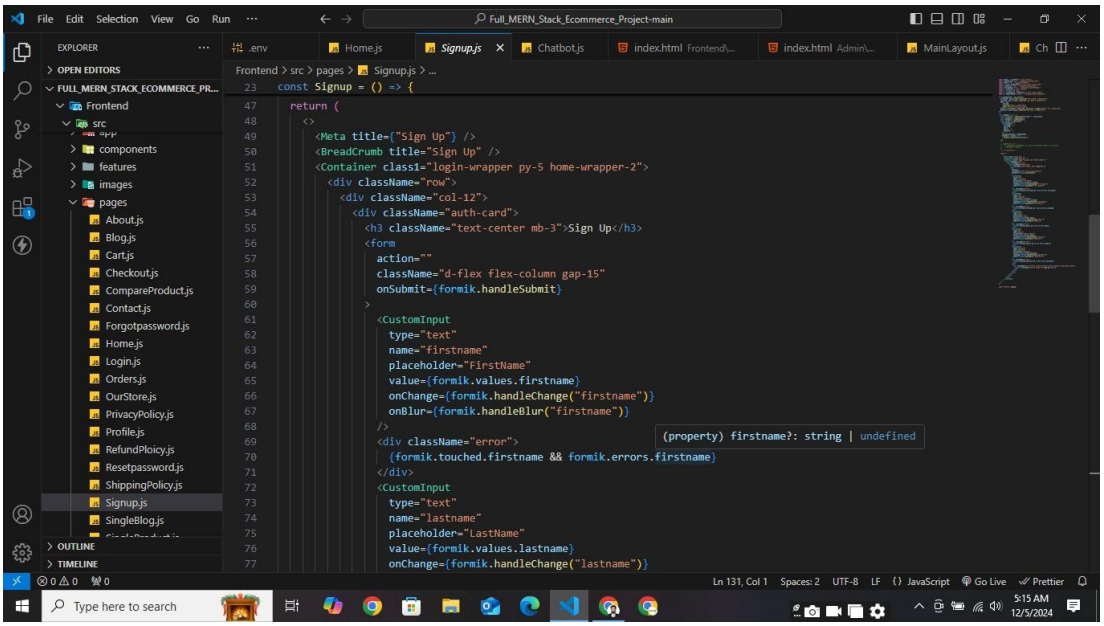


Figure 62: Sign-up Page Code(2)



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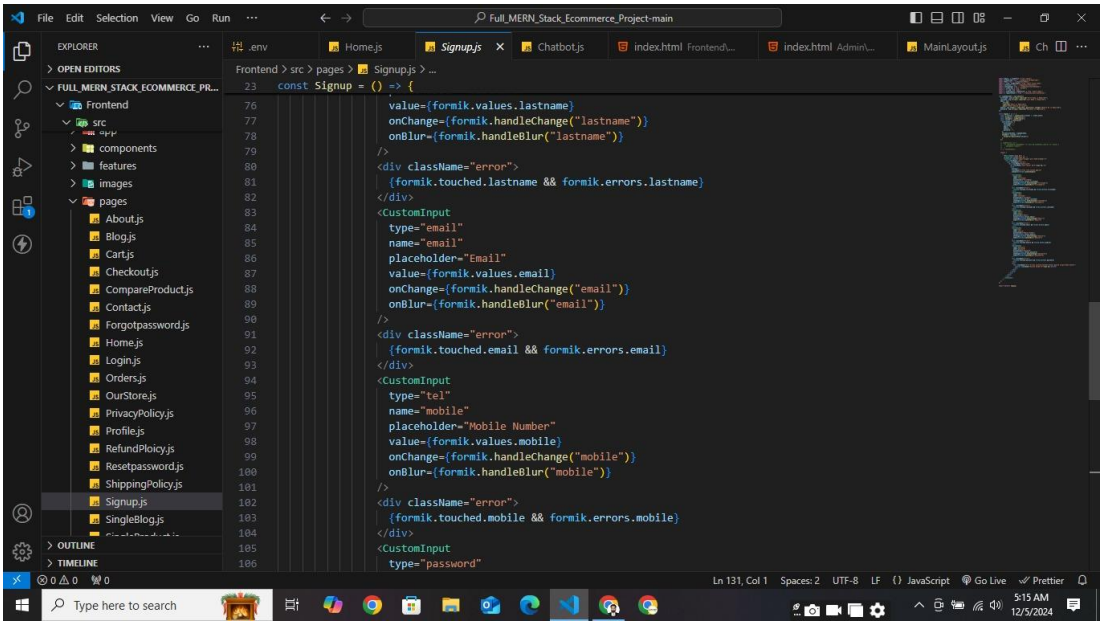


Figure 64: Sign-up Page Code(4)

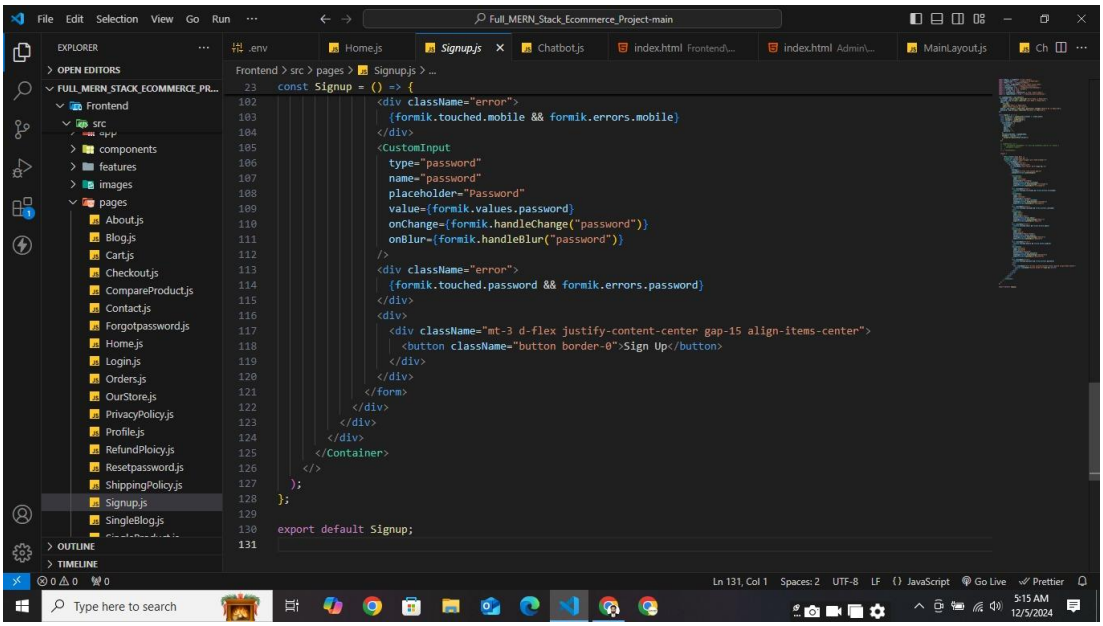


Figure 65: Sign-up Page Code(5)

- **Cart Page**

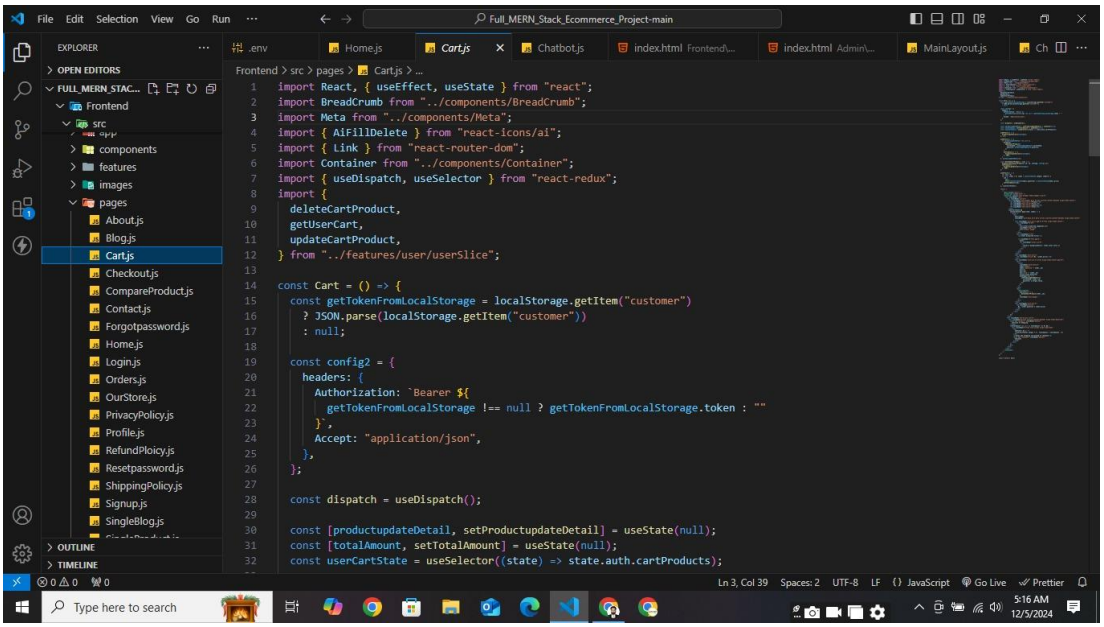
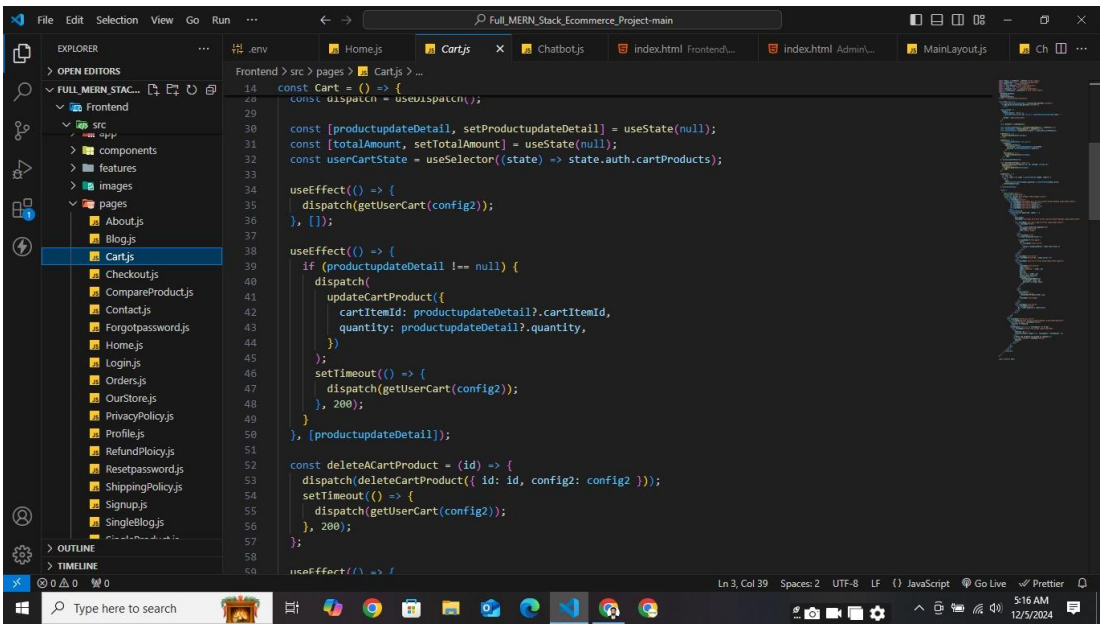


Figure 66: Cart Page Code(1)



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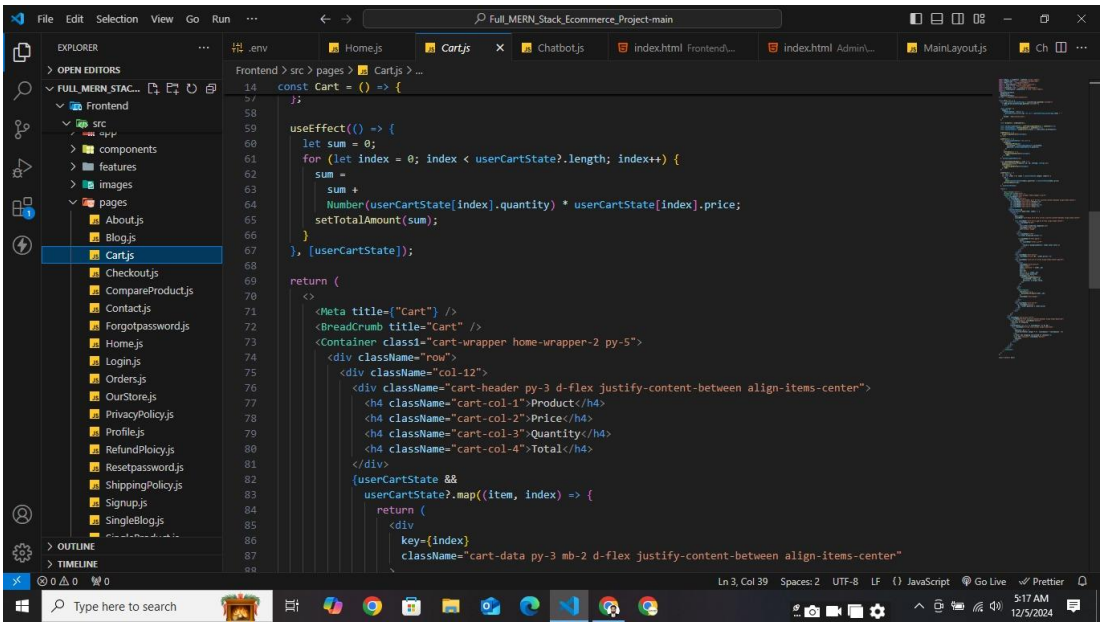
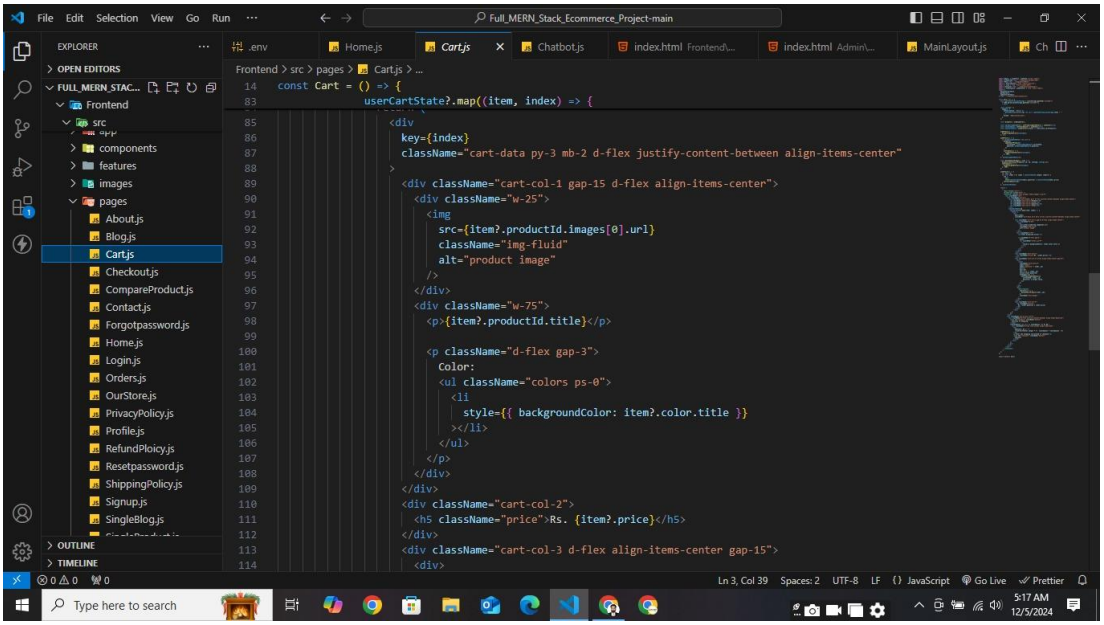


Figure 68: Cart Page Code(3)



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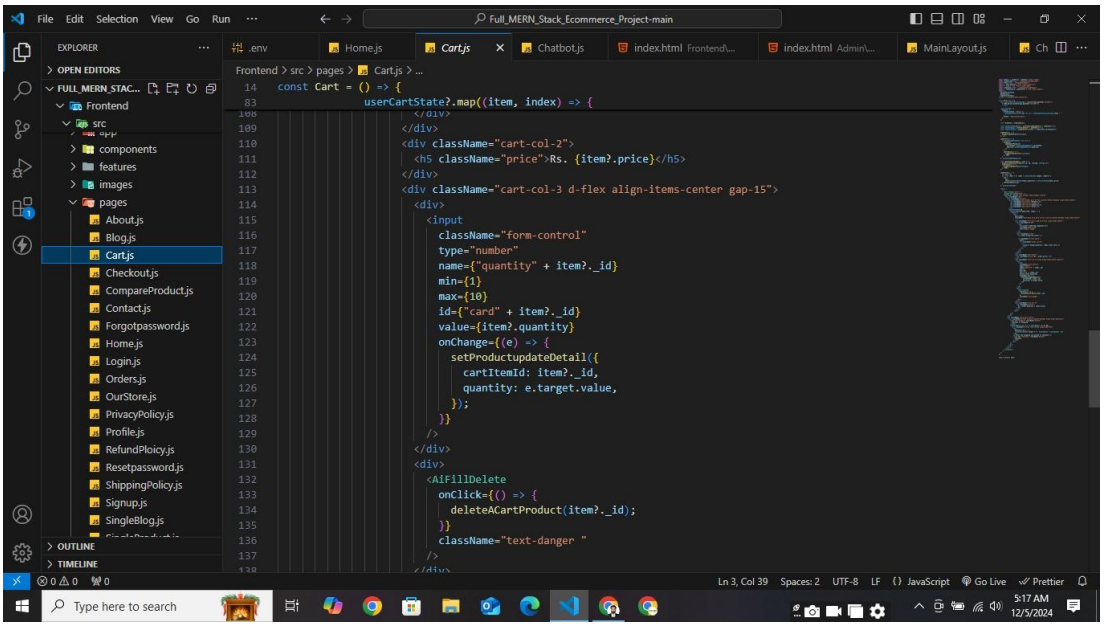

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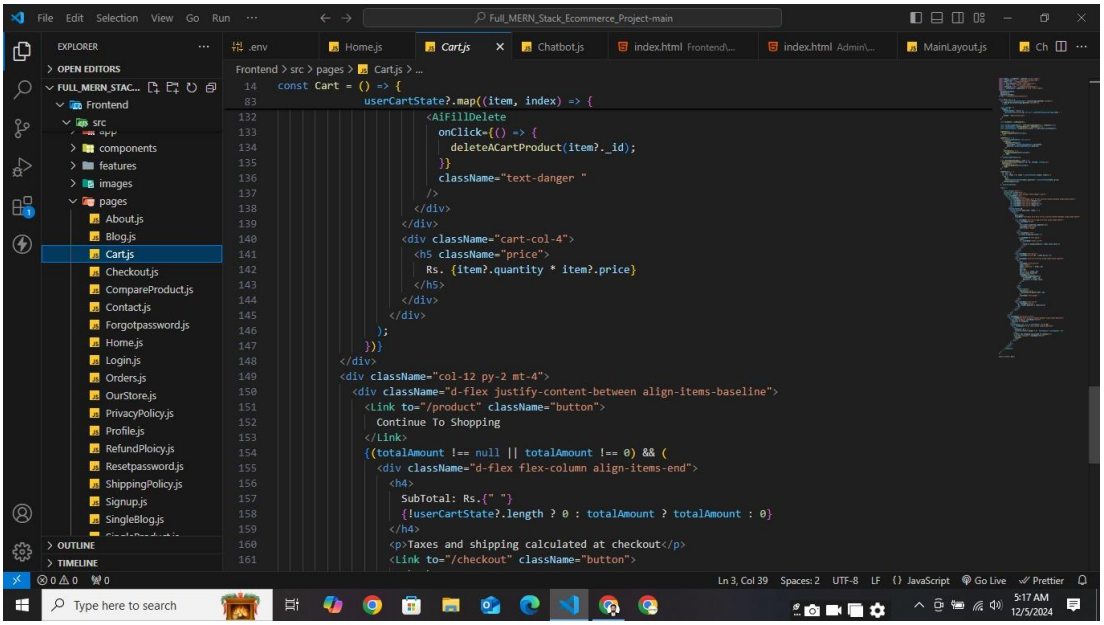


Figure 71: Cart Page Code(6)

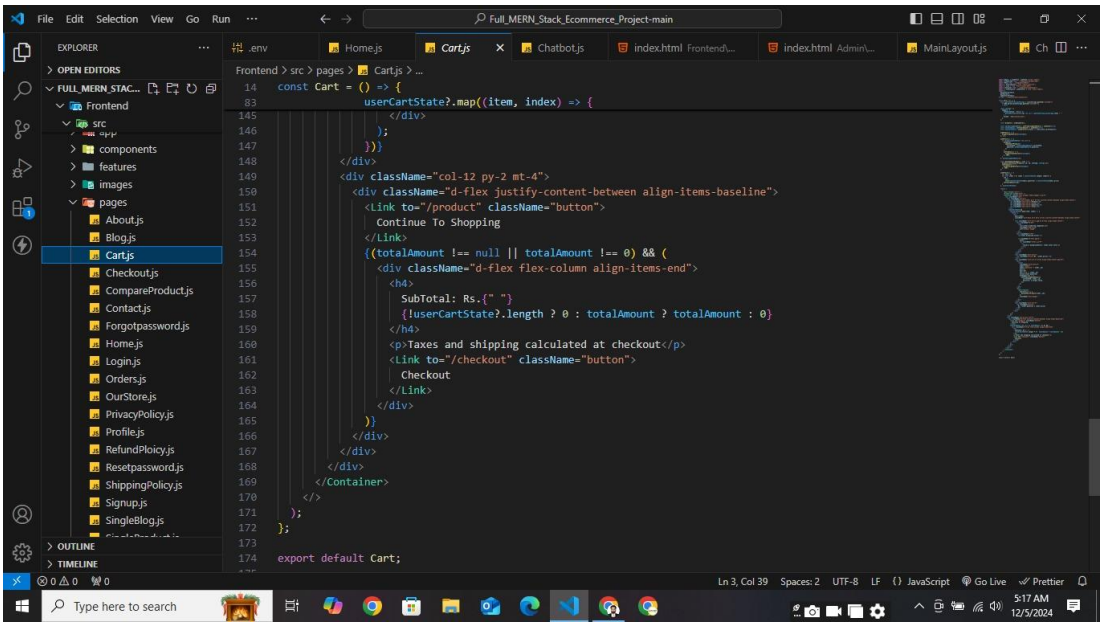


Figure 72: Cart Page Code(7)

- **Order Page**

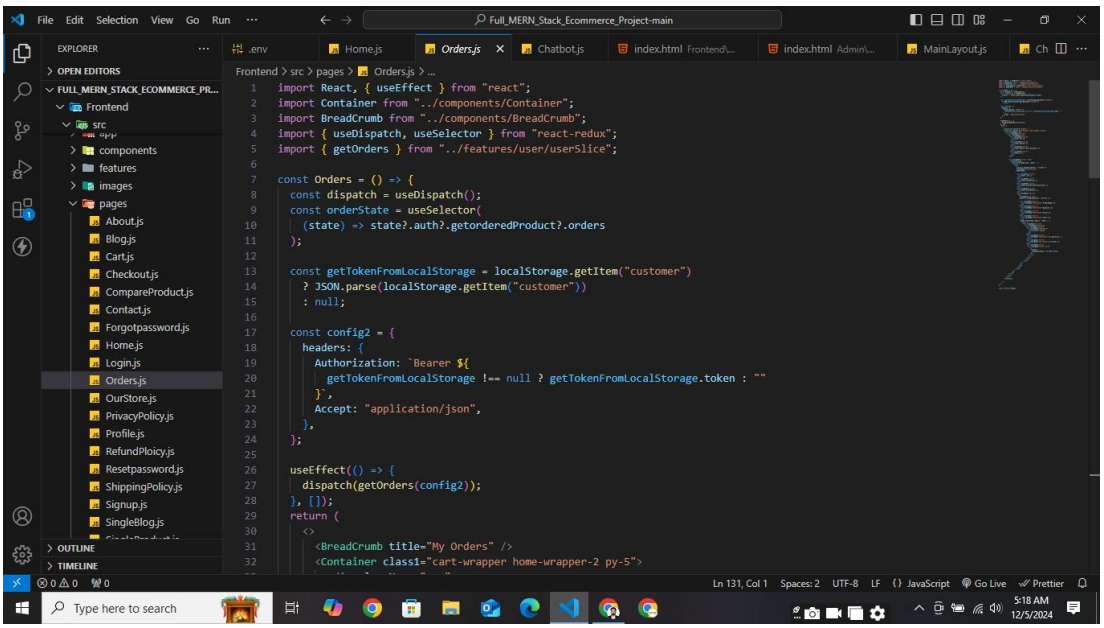


Figure 73: Order Page Code(1)

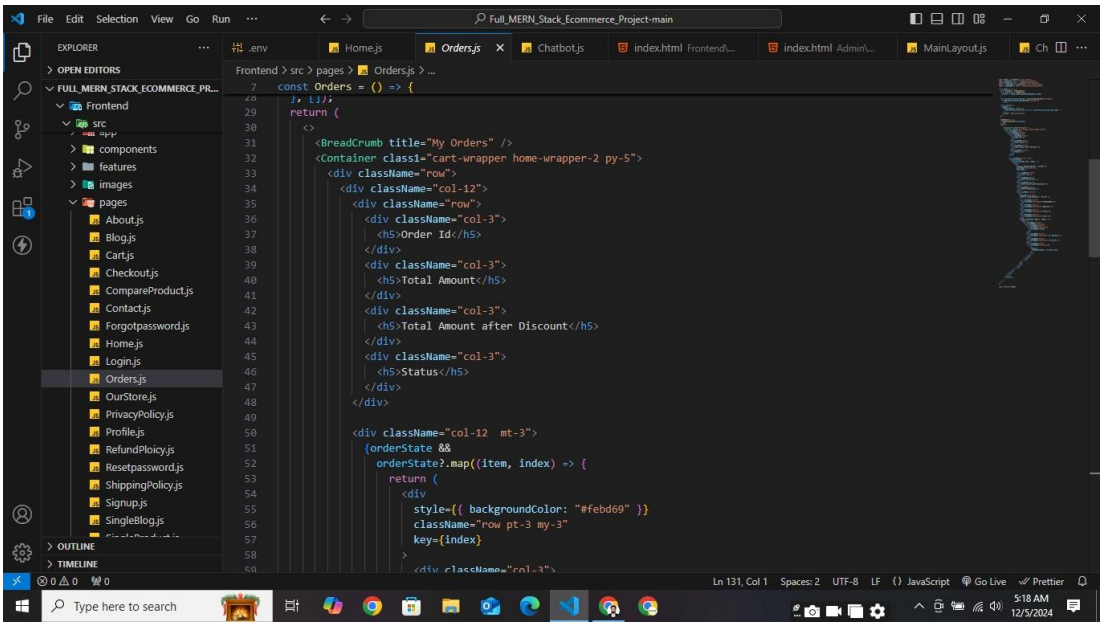
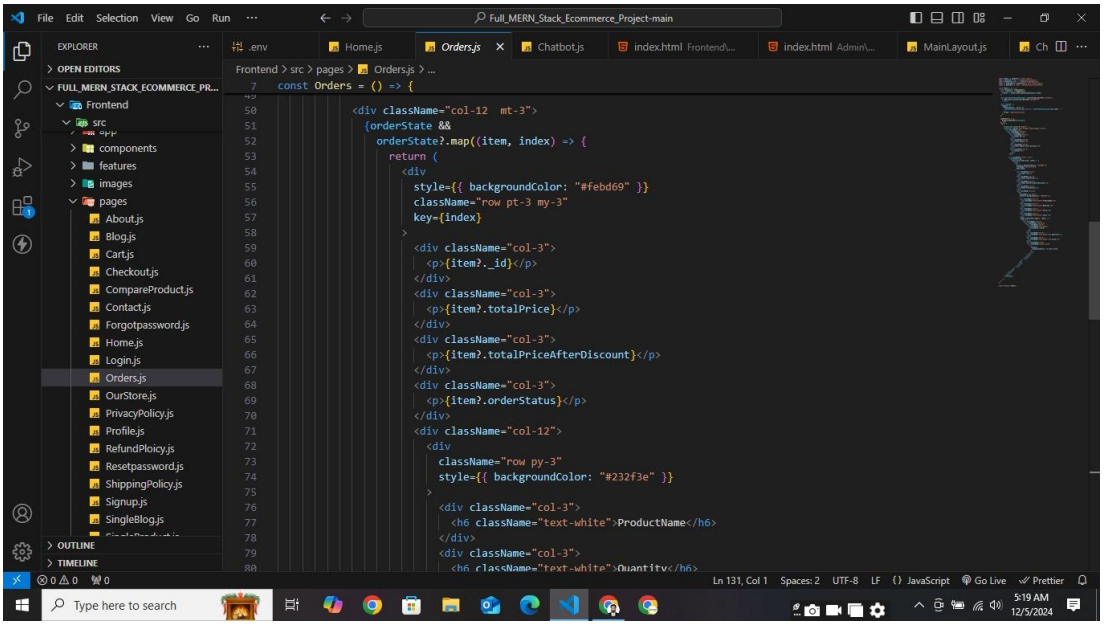


Figure 74: Order Page Code(2)



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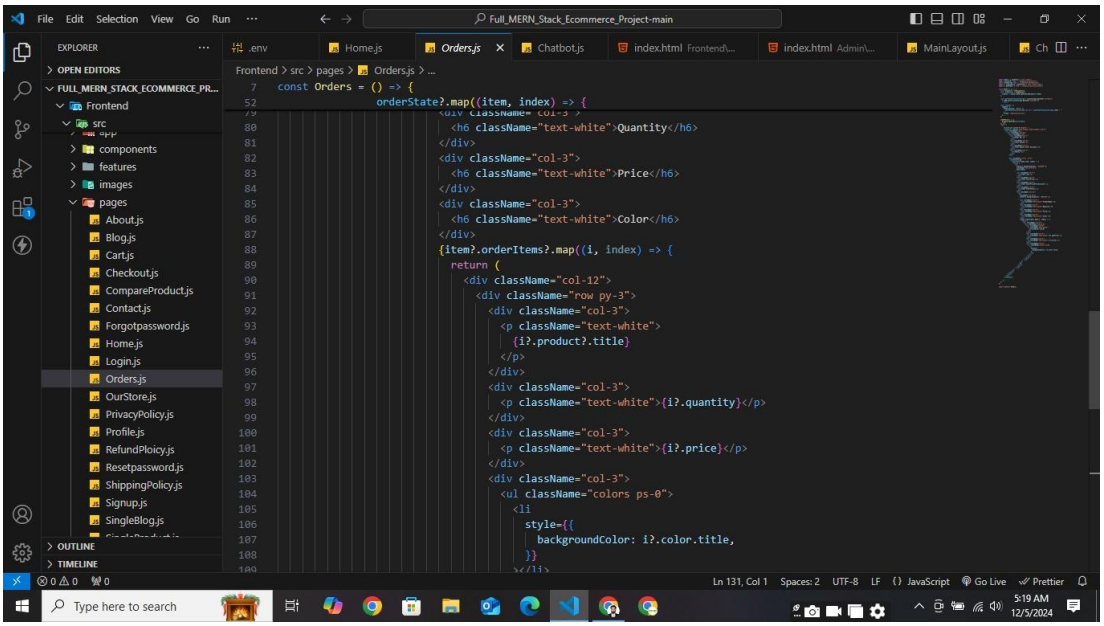


Figure 76: Order Page Code(4)

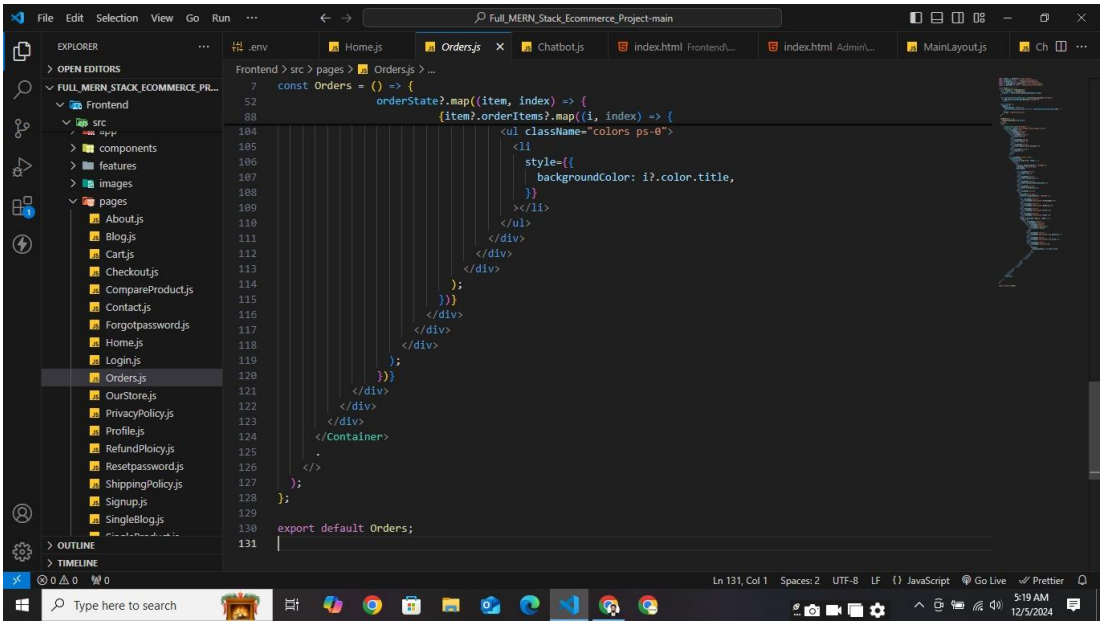


Figure 77: Order Page Code(5)

- **Contact Us Page**

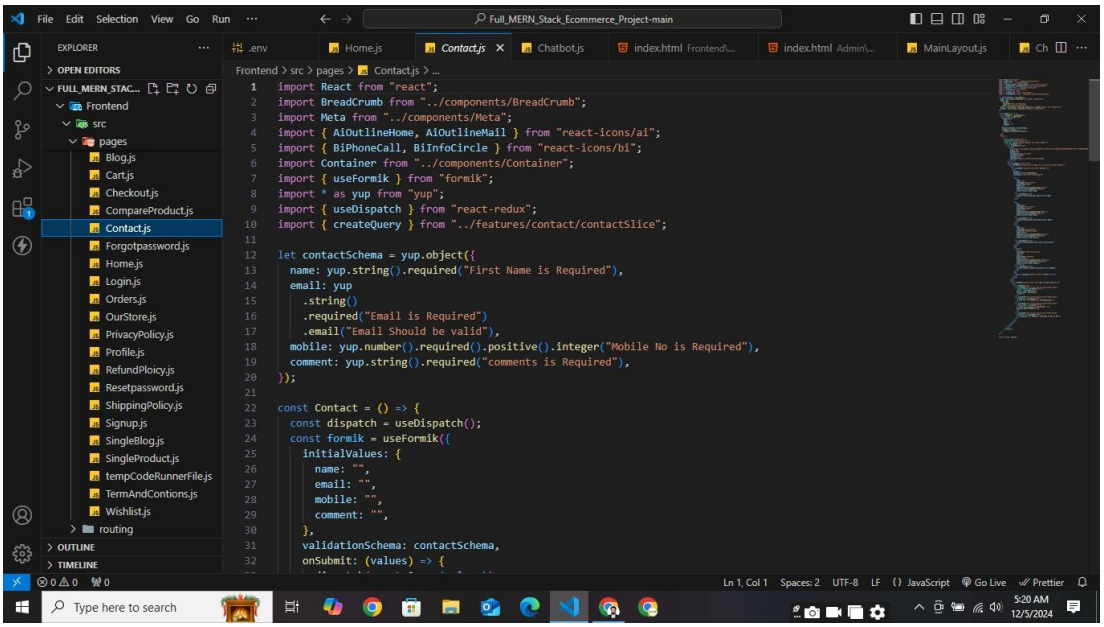


Figure 78: ContactUs Page Code(1)

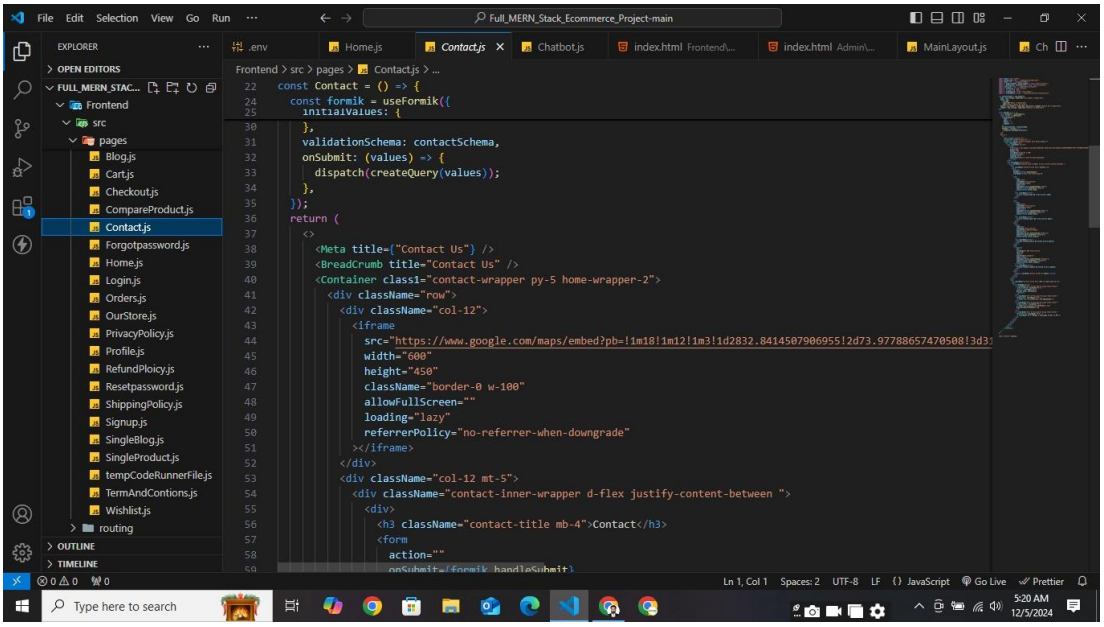


Figure 79: ContactUs Page Code(2)

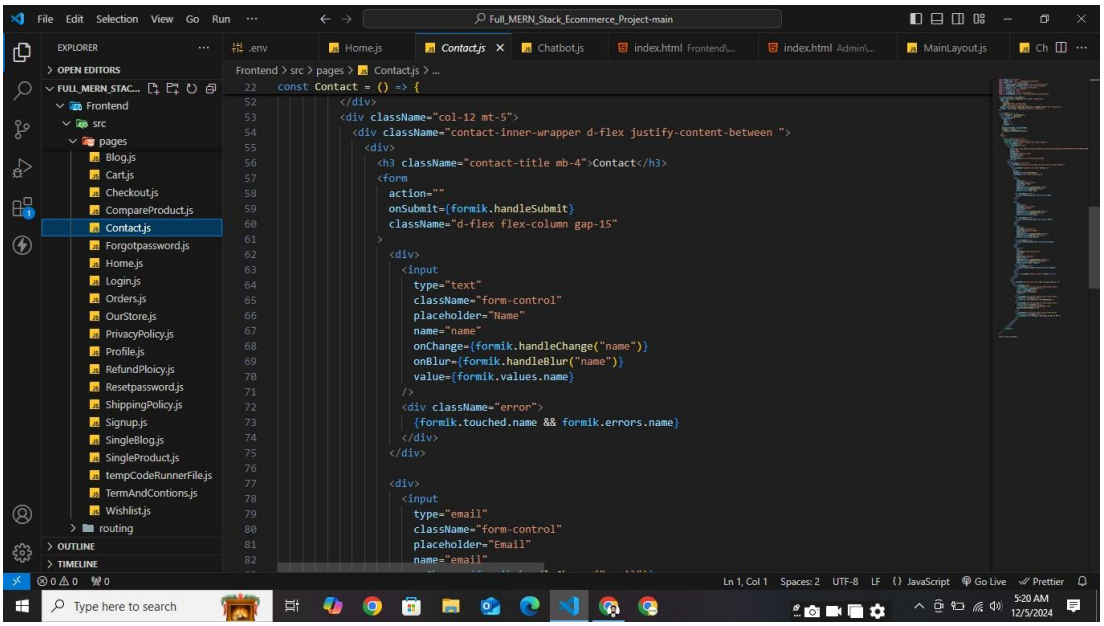
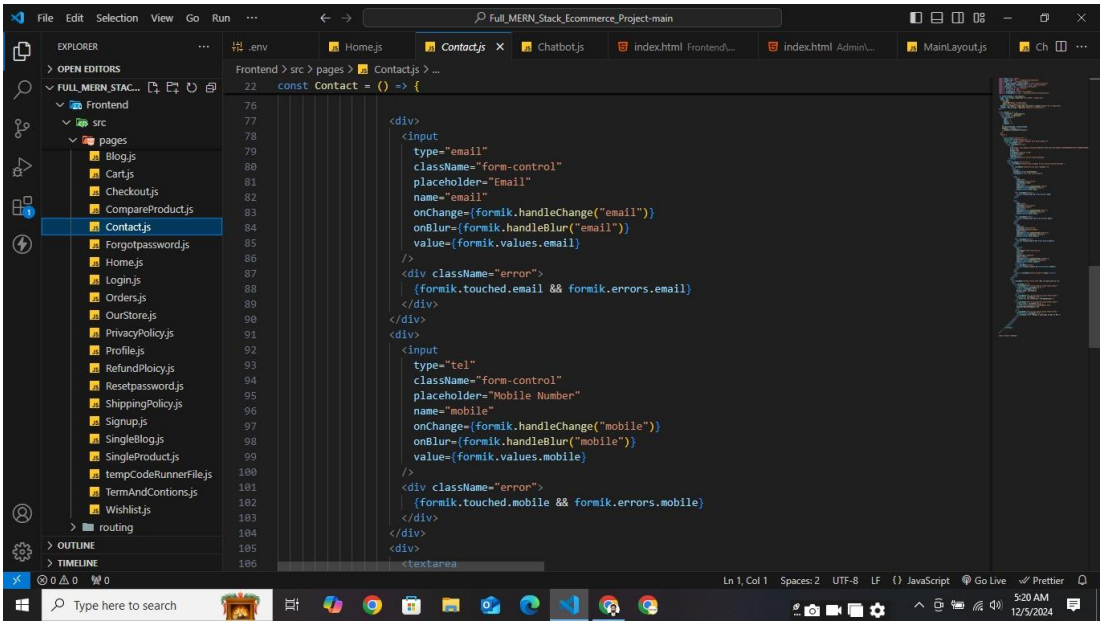


Figure 80: ContactUs Page Code(3)



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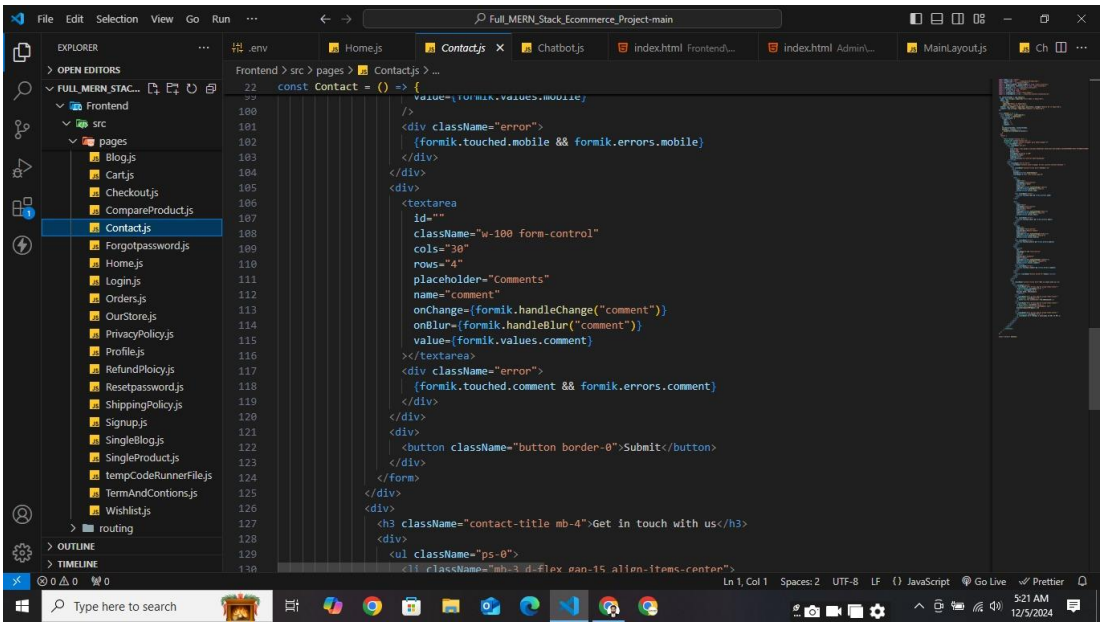

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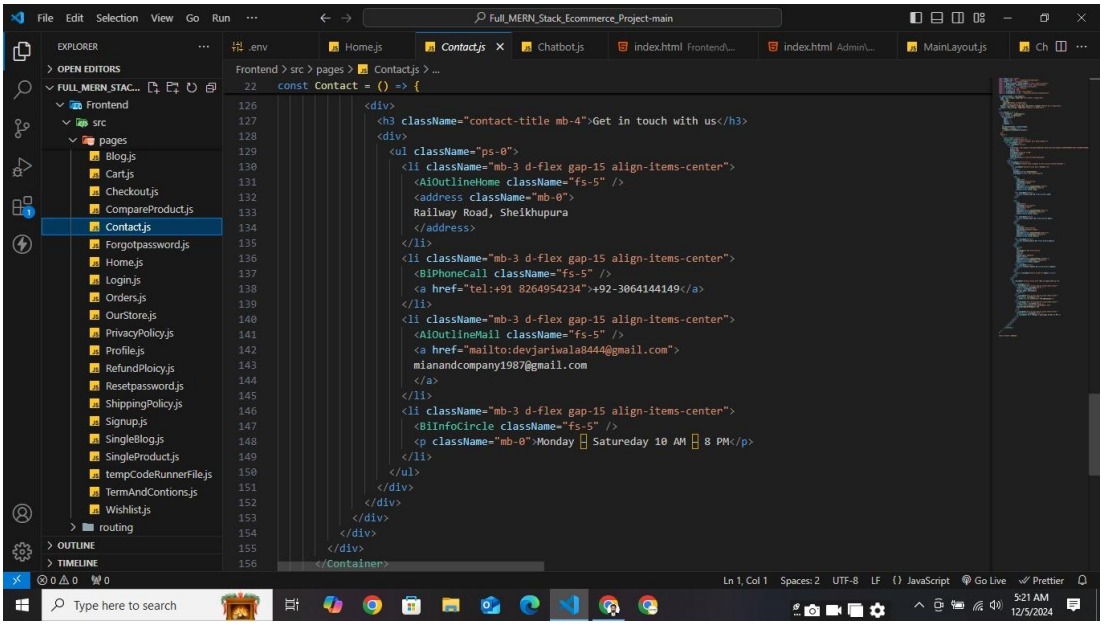

Figure 83: ContactUs Page Code(6)

- **Our Store Page**

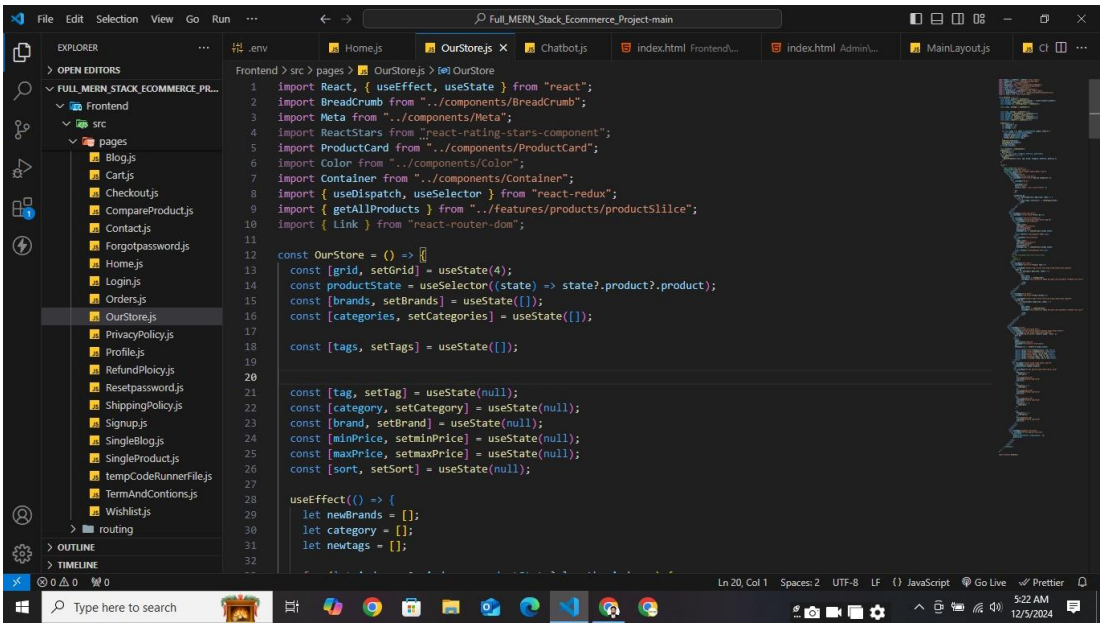

Figure 84: Our Store Page Code(1)

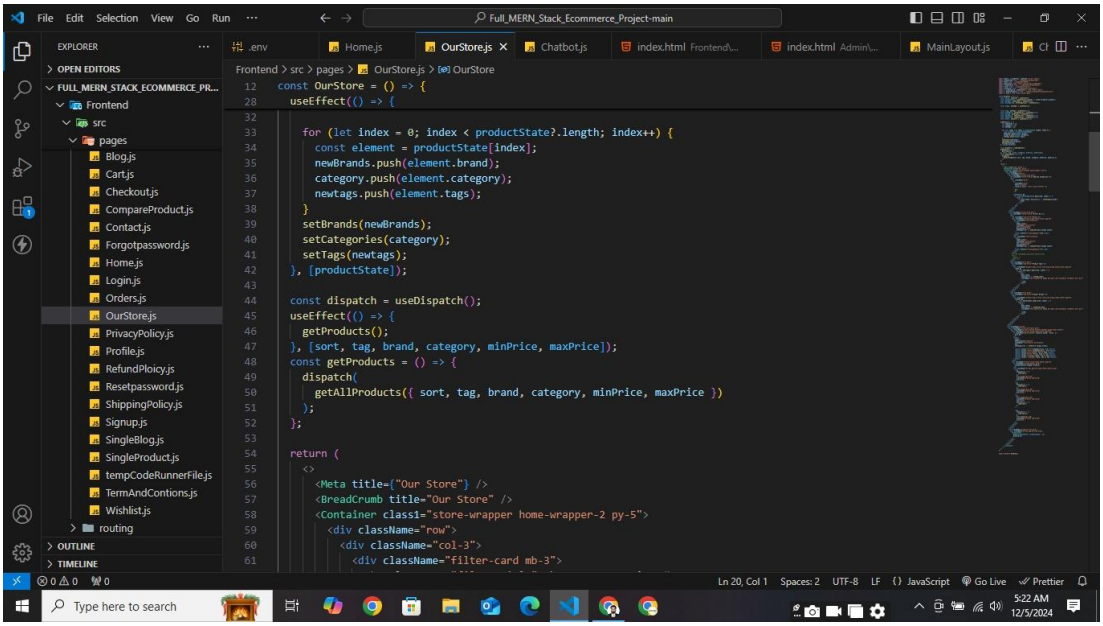

Figure 85: Our Store Page Code(2)

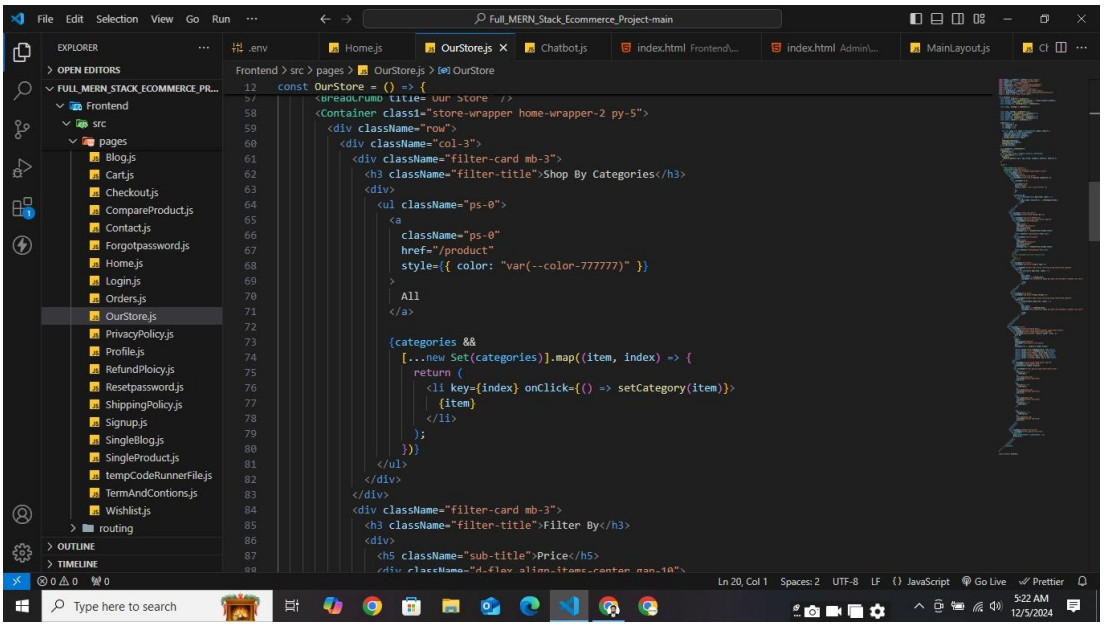

Figure 86: Our Store Page Code(3)

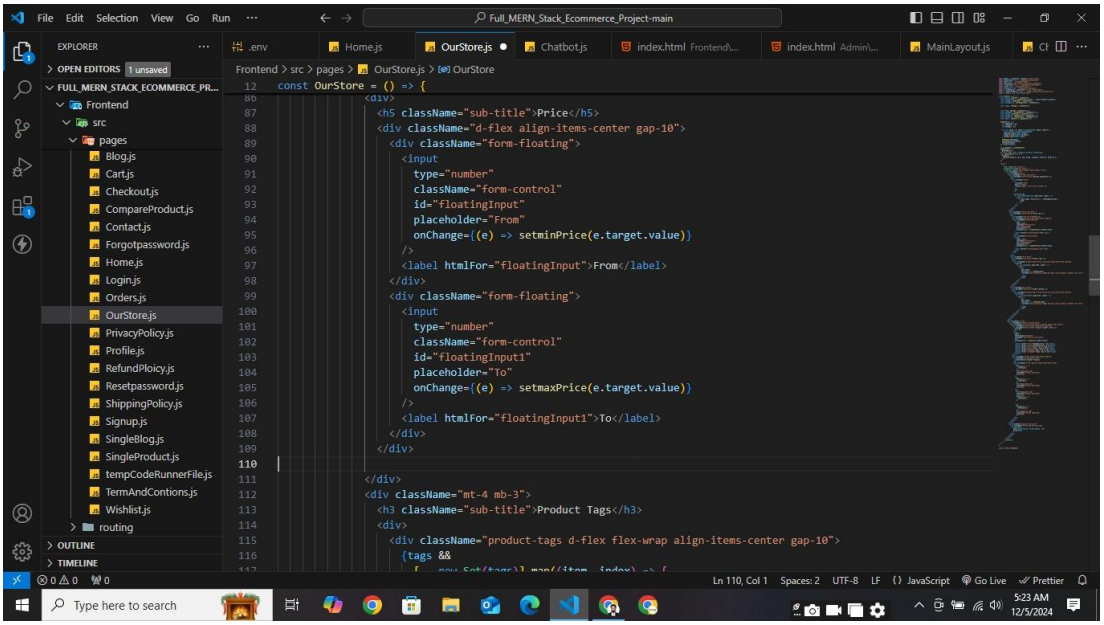

Figure 87: Our Store Page Code(4)

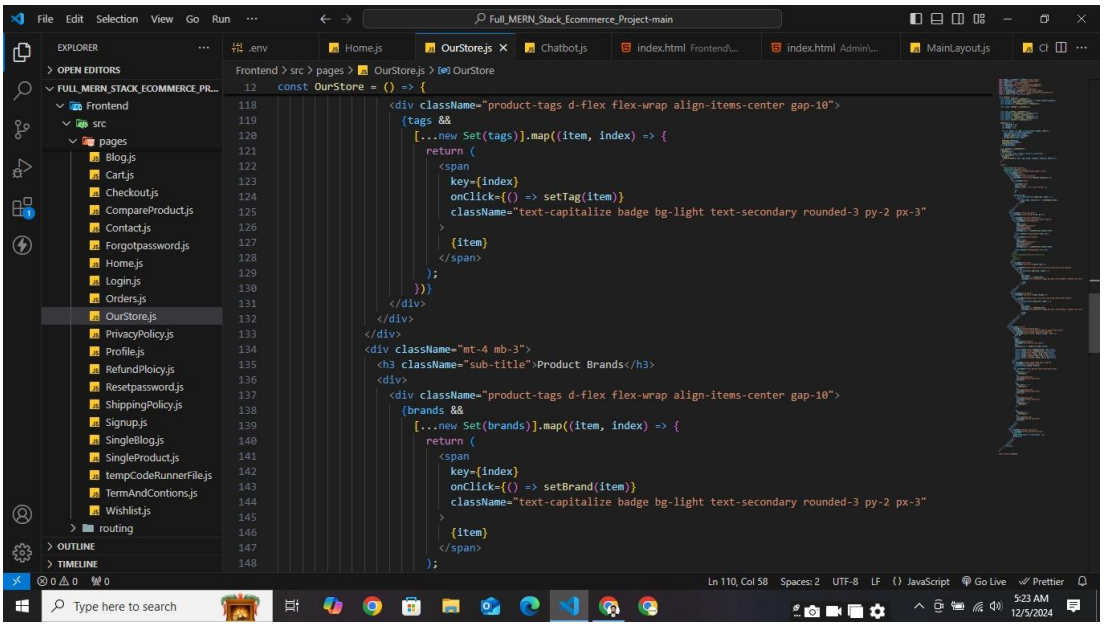

Figure 88: Our Store Page Code(5)

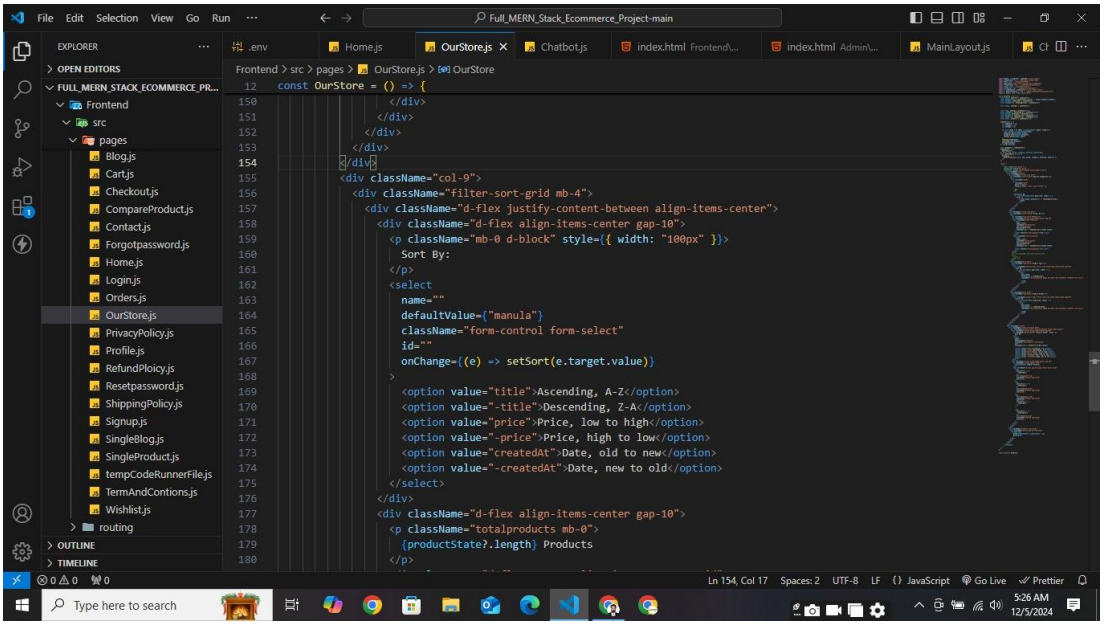

Figure 89: Our Store Page Code(6)

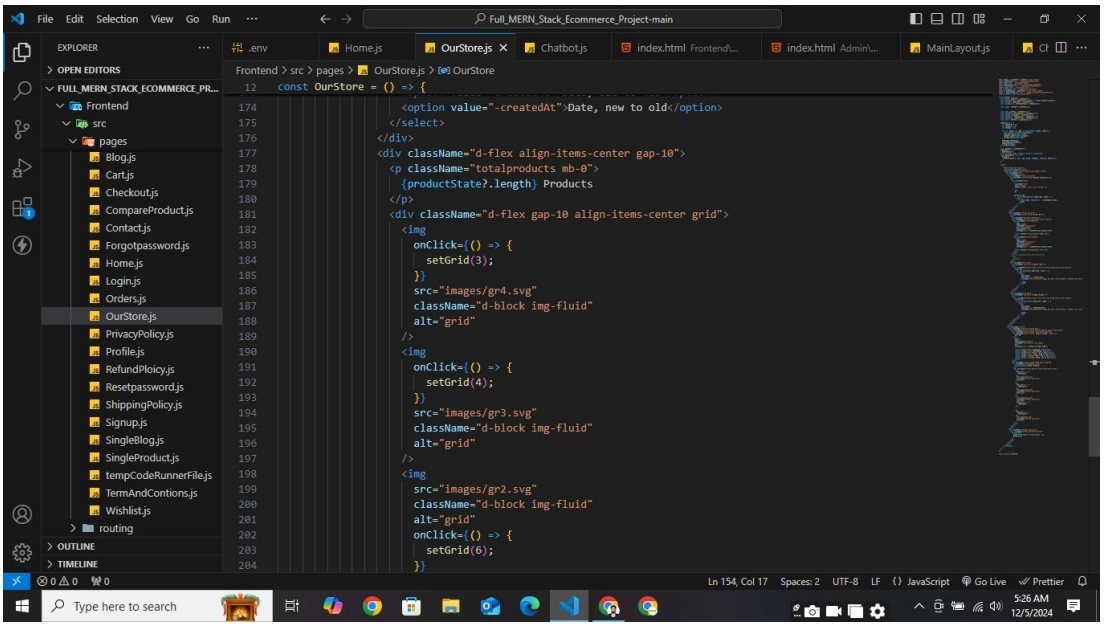

Figure 90: Our Store Page Code(7)

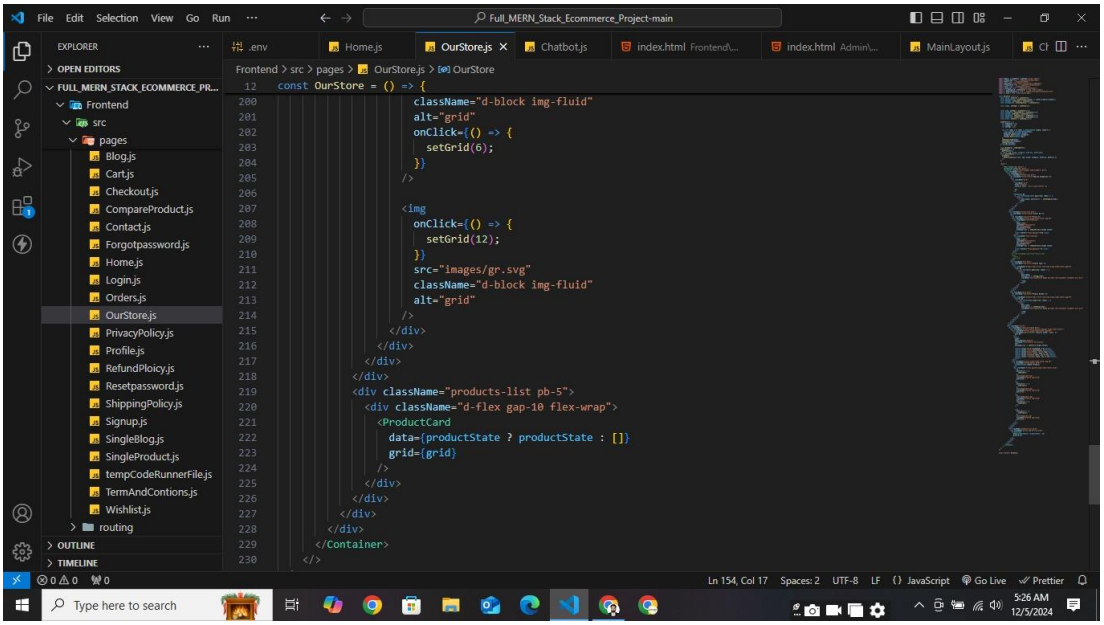

Figure 91: Our Store Page Code(8)

- **ChatBot Page**

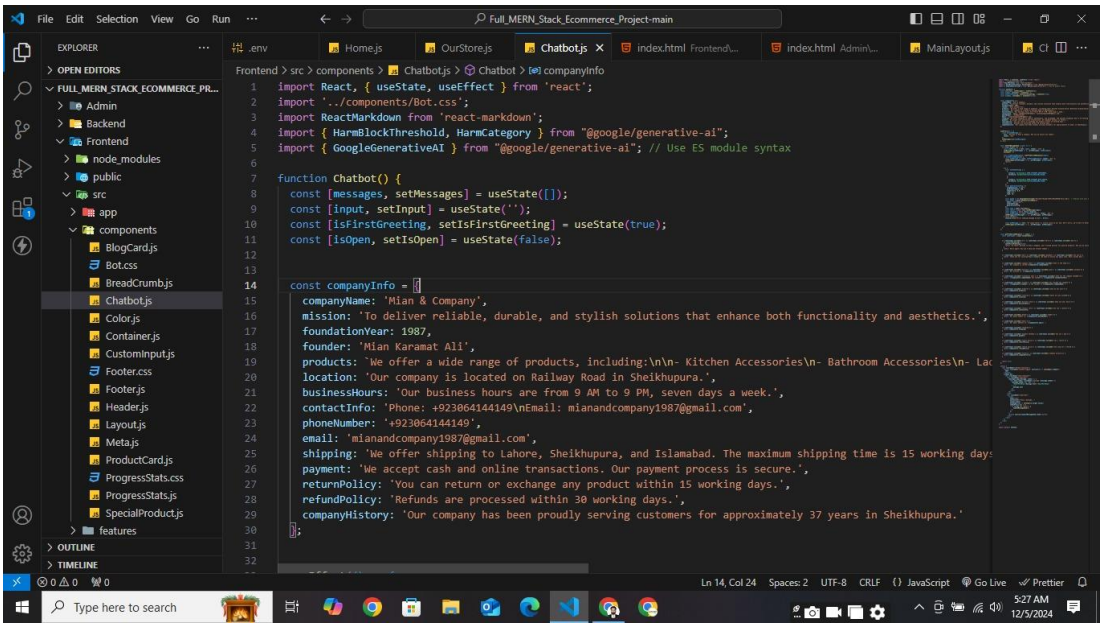

Figure 92: ChatBot Page Code(1)

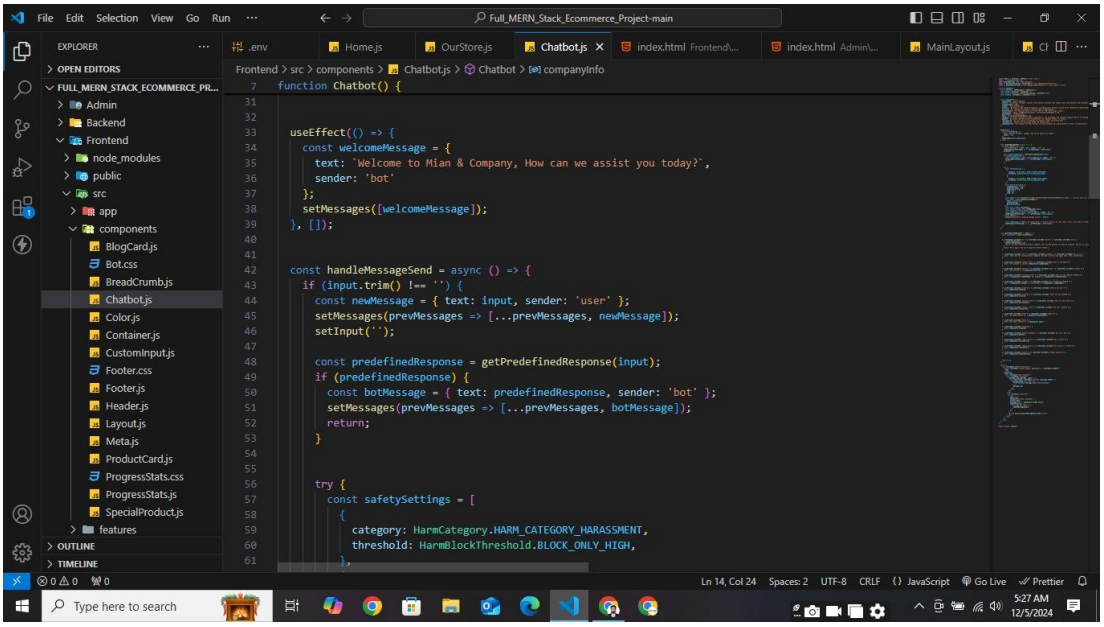

Figure 93: ChatBot Page Code(2)

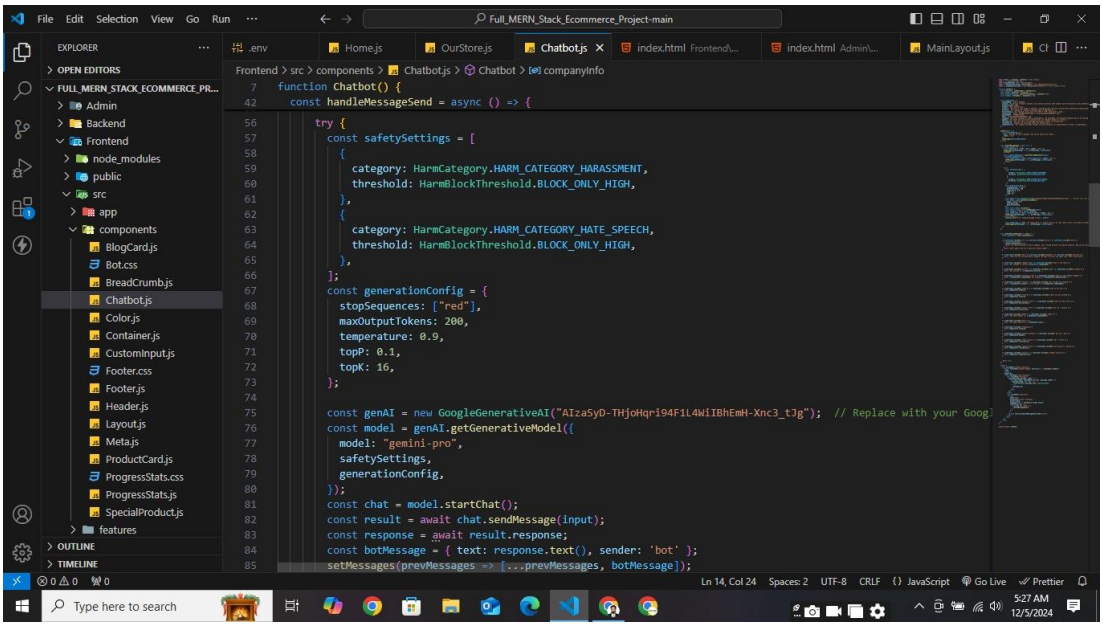

Figure 94: ChatBot Page Code(3)

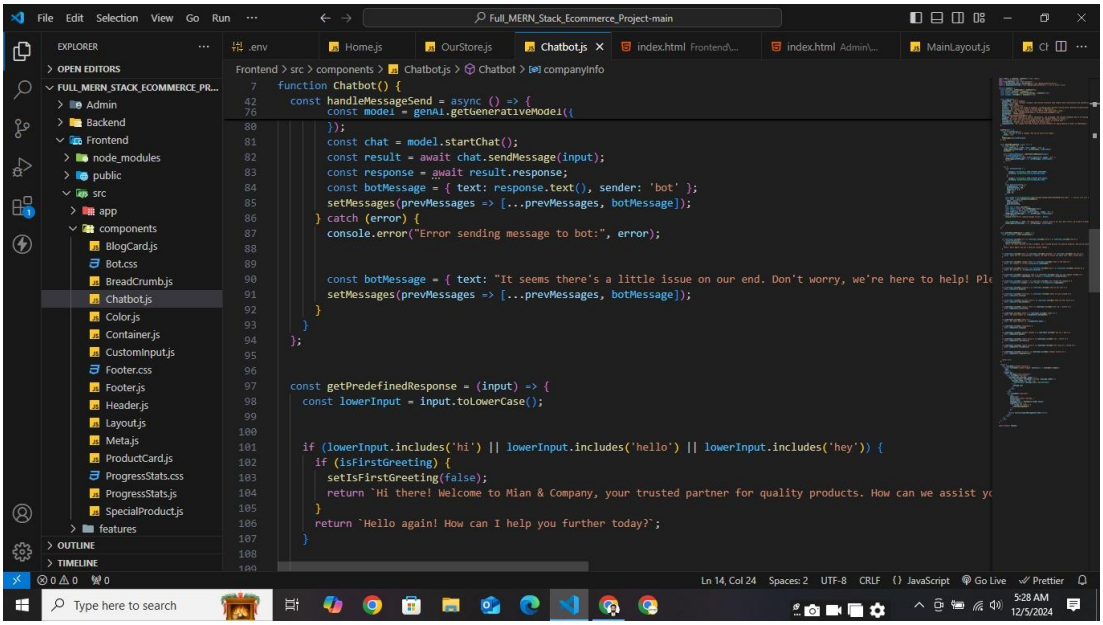

Figure 95: ChatBot Page Code(4)

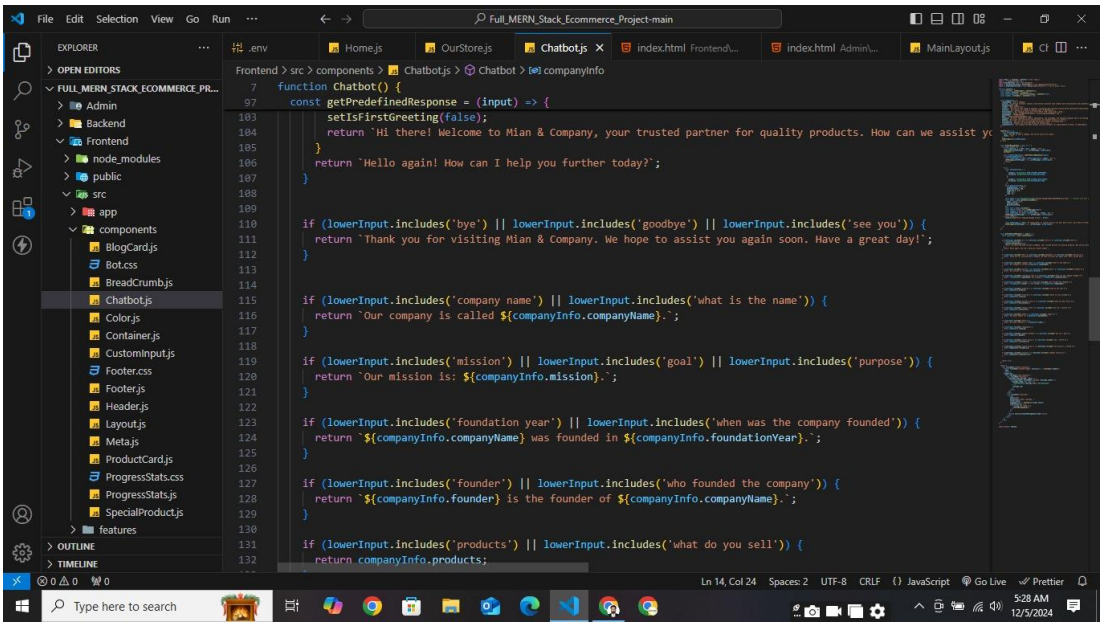

Figure 96: ChatBot Page Code(5)

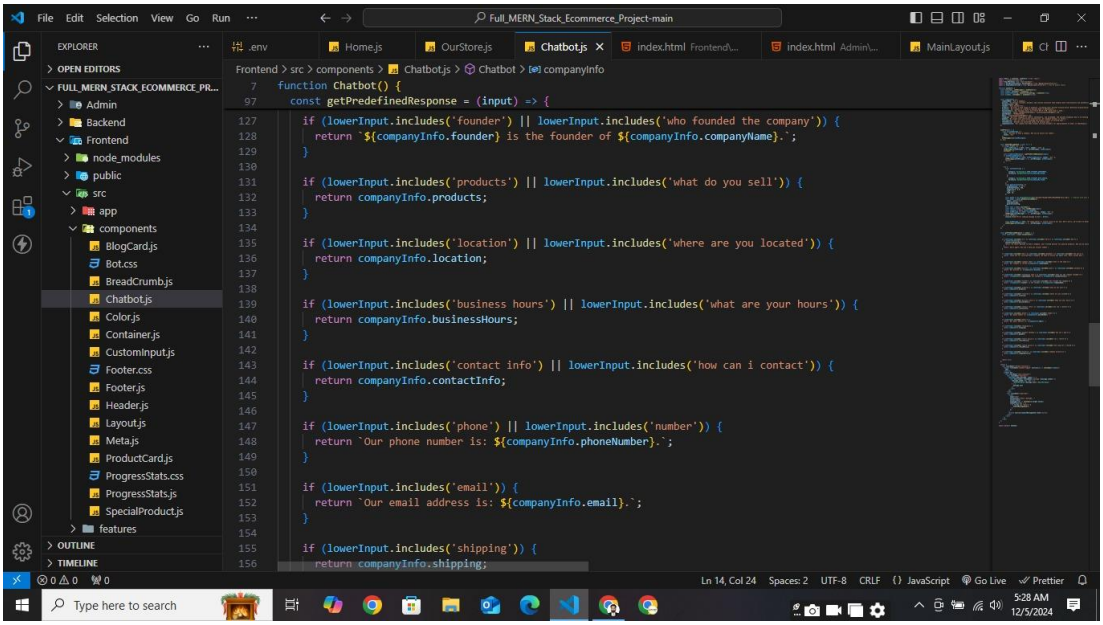

Figure 97: ChatBot Page Code(6)

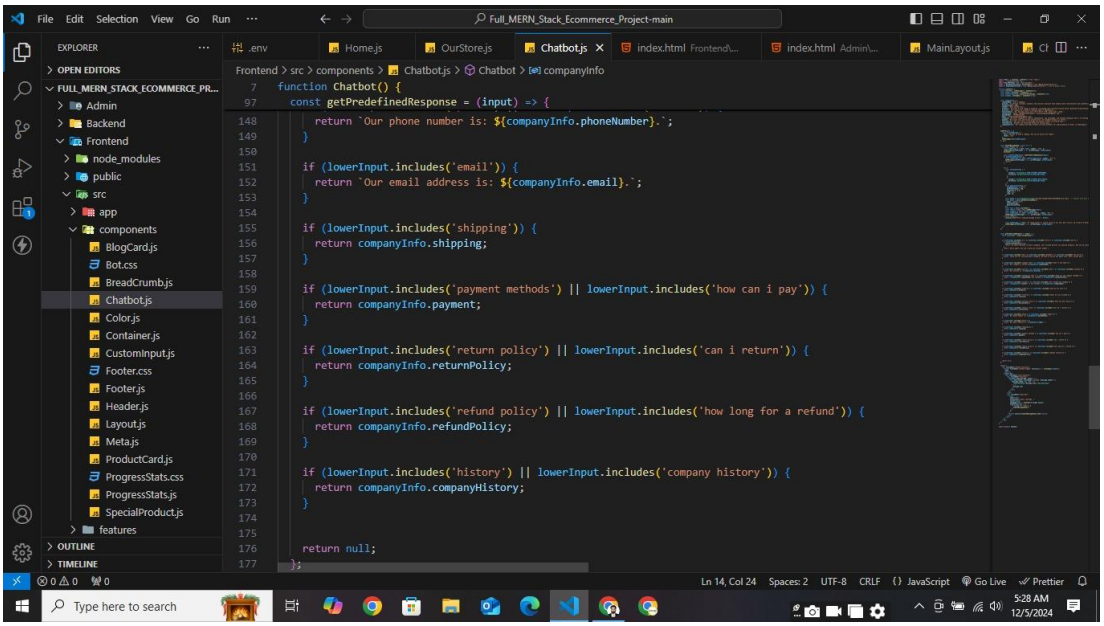

Figure 98: ChatBot Page Code(7)

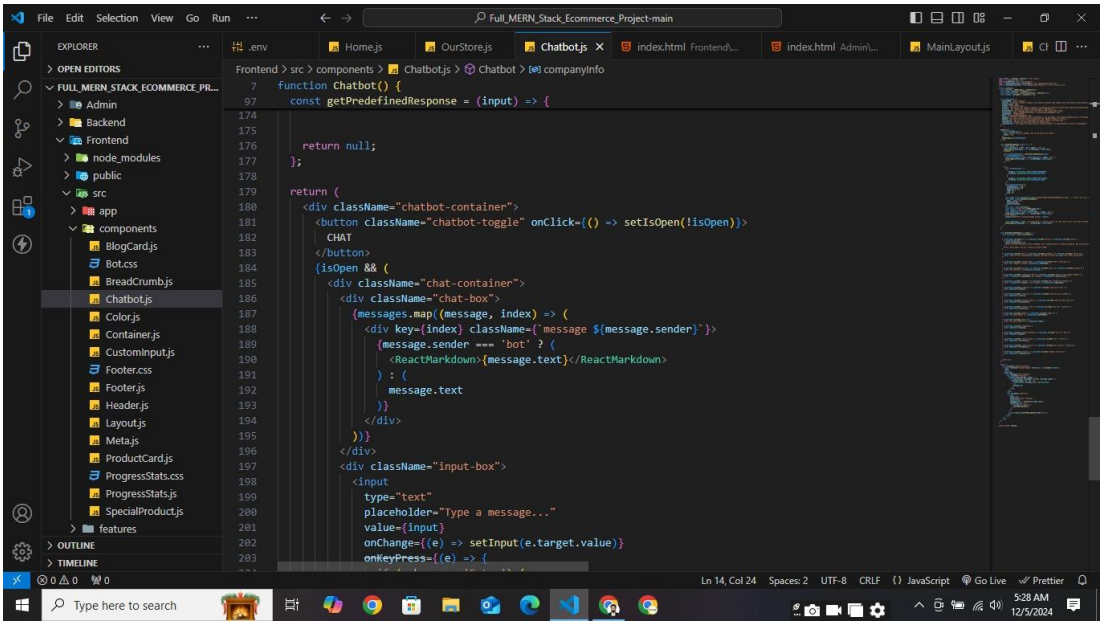

Figure 99: ChatBot Page Code(8)

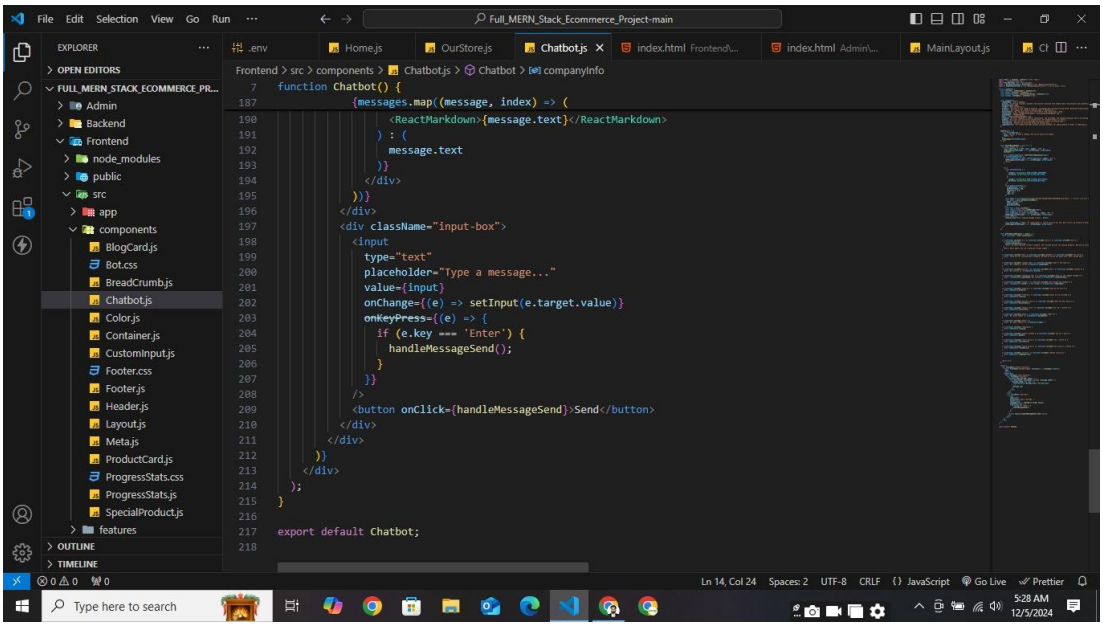

Figure 100: ChatBot Page Code(9)

- **Admin Dashboard**

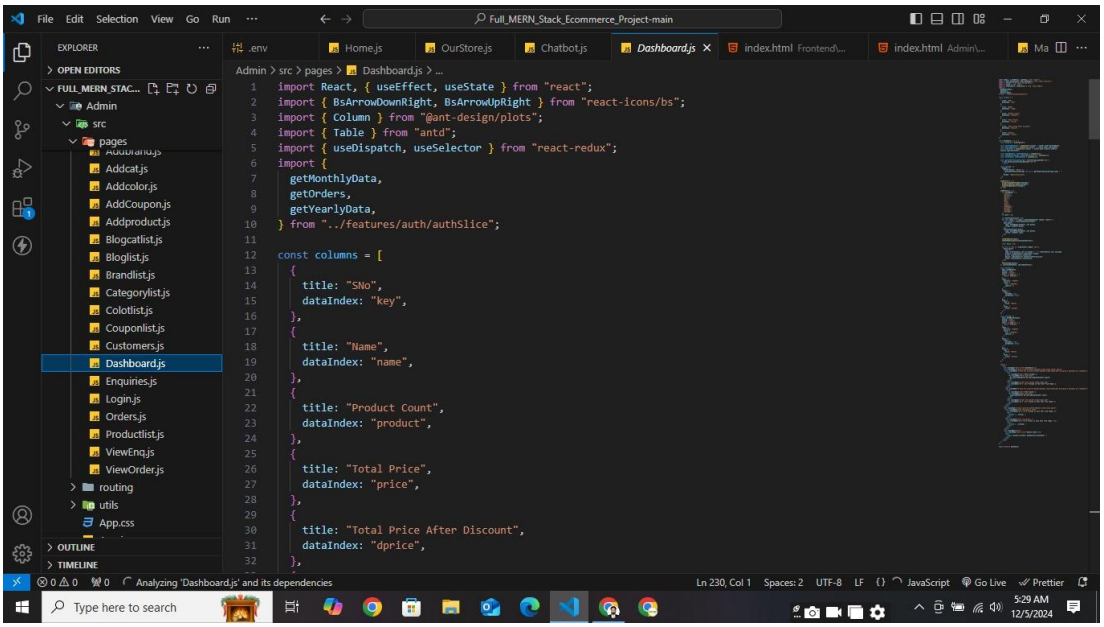

Figure 101: Admin Dashboard Code(1)

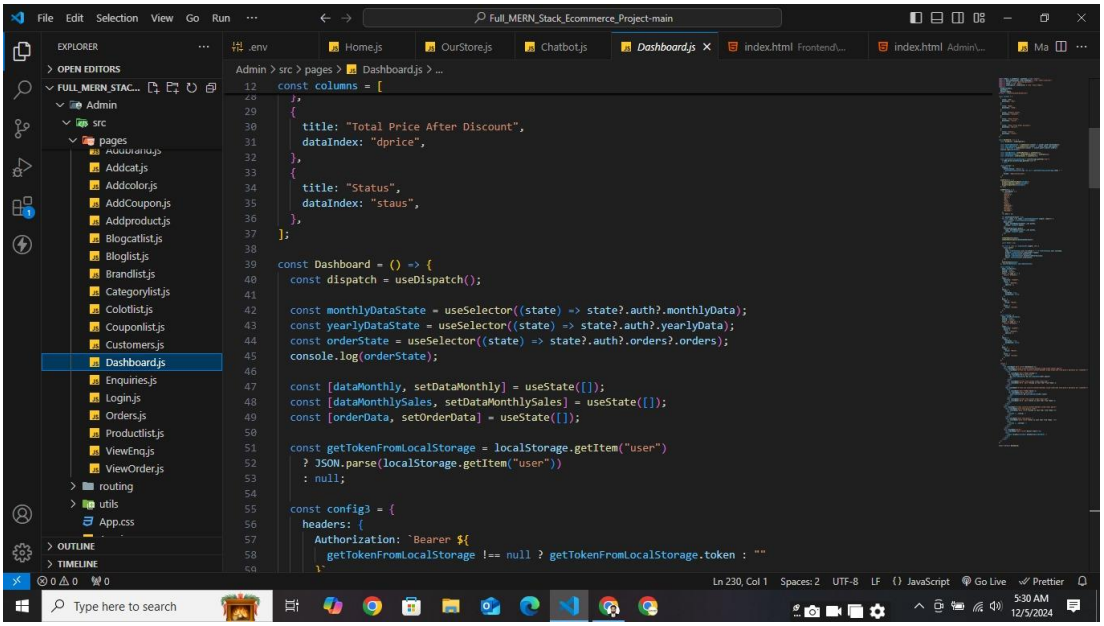

Figure 102: Admin Dashboard Code(2)

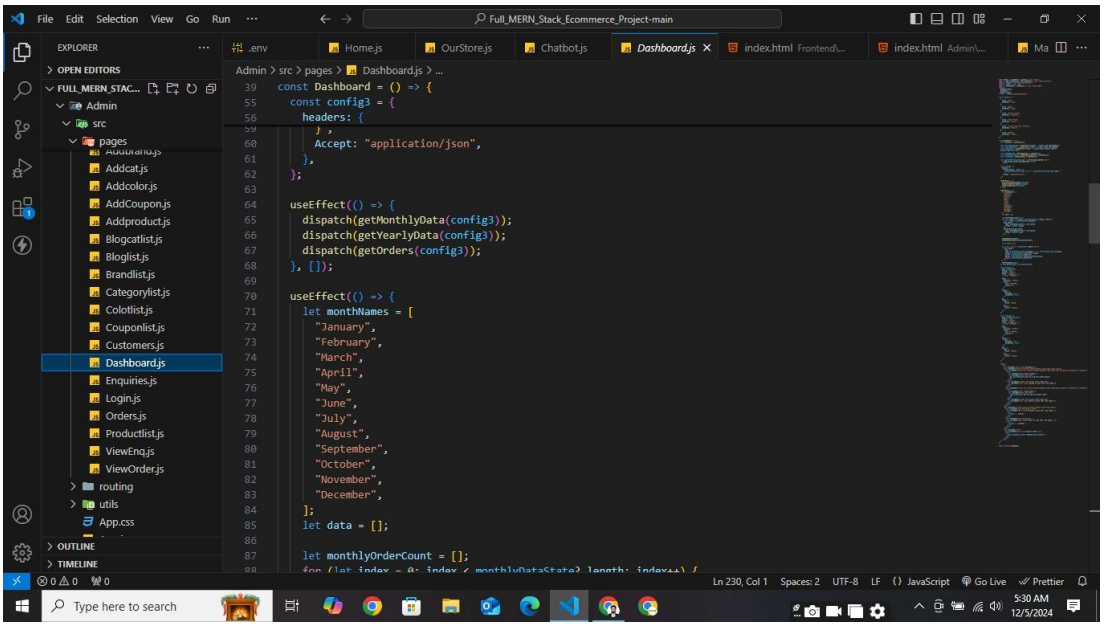

Figure 103: Admin Dashboard Code(3)

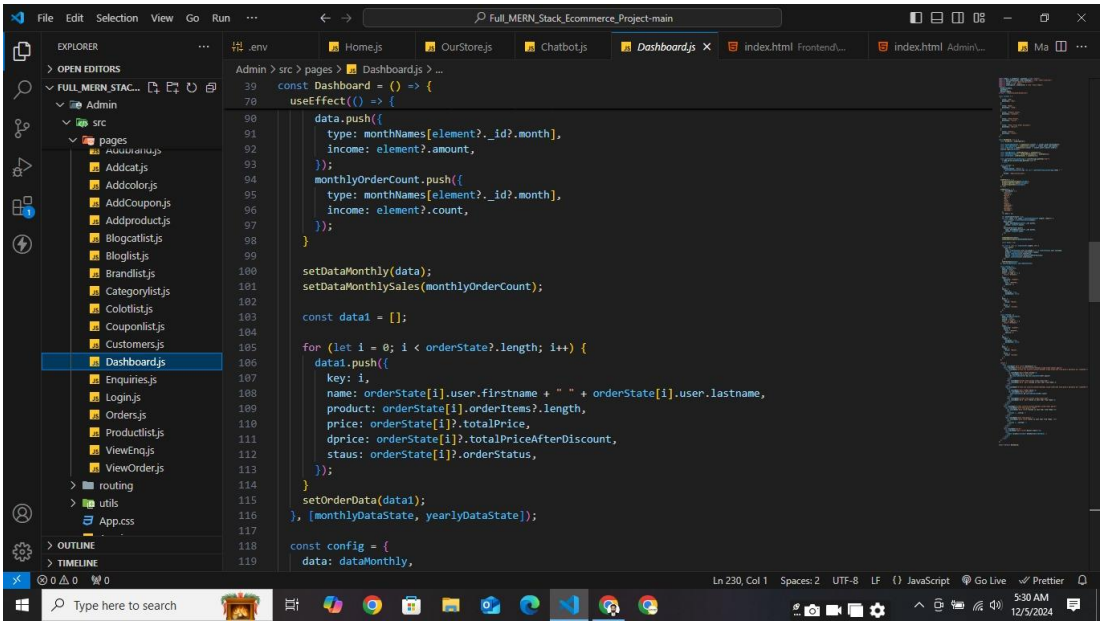

Figure 104: Admin Dashboard Code(4)

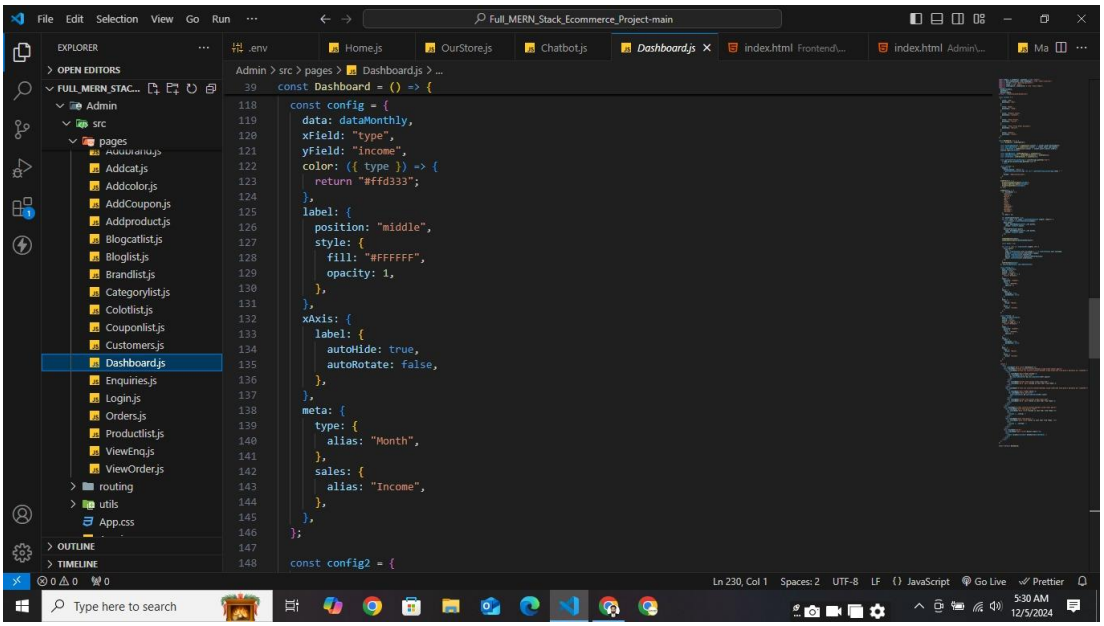

Figure 105: Admin Dashboard Code(5)

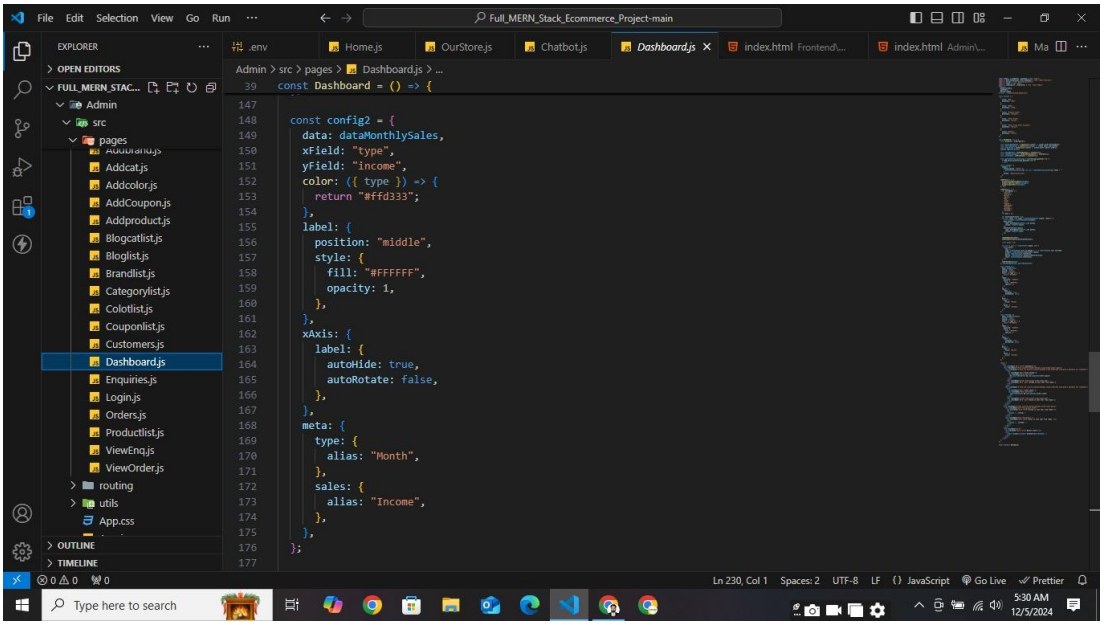

Figure 106: Admin Dashboard Code(6)

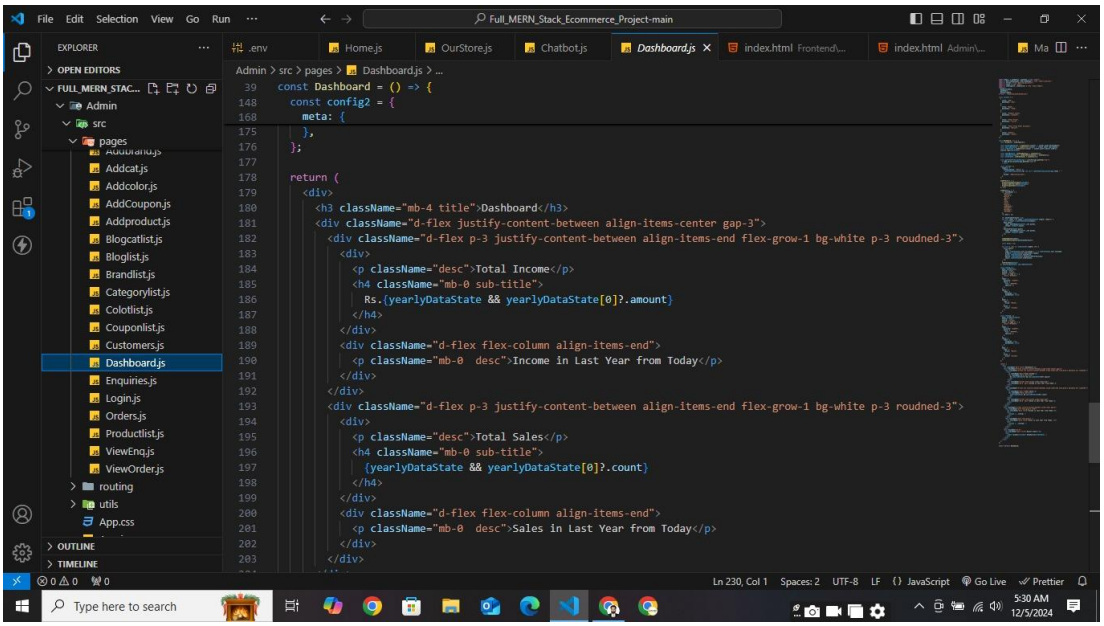

Figure 107: Admin Dashboard Code(7)

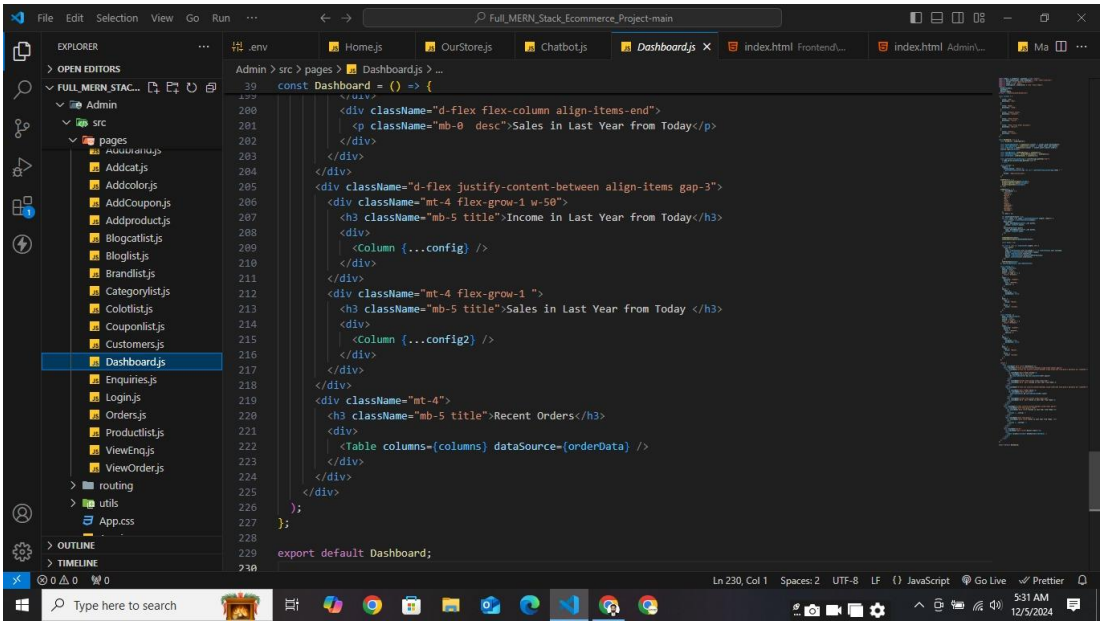

Figure 108: Admin Dashboard Code(8)

- **Admin Customer Page**

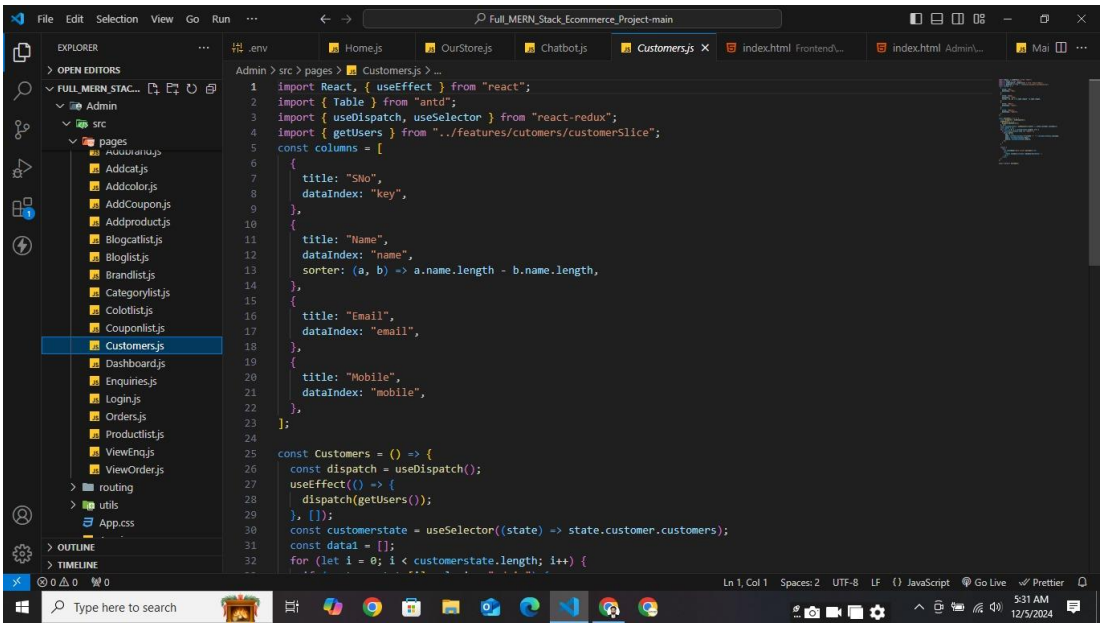

Figure 109: Admin Customer Page Code(1)

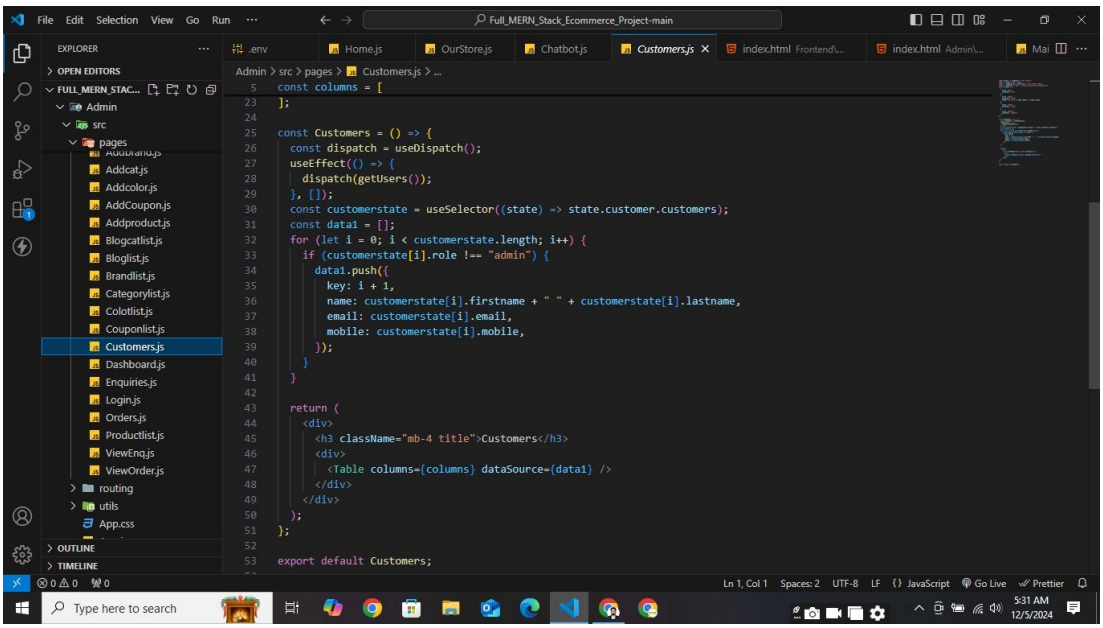

Figure 110: Admin Customer Page Code(2)

- **Admin Add Product**

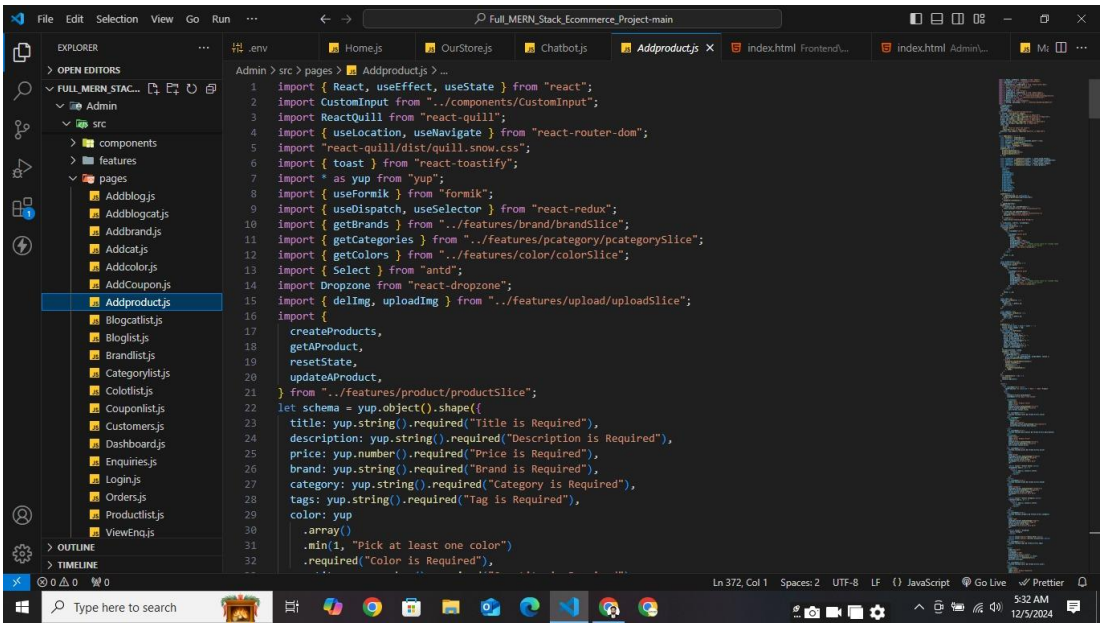

Figure 111: Admin Add Product Page Code(1)

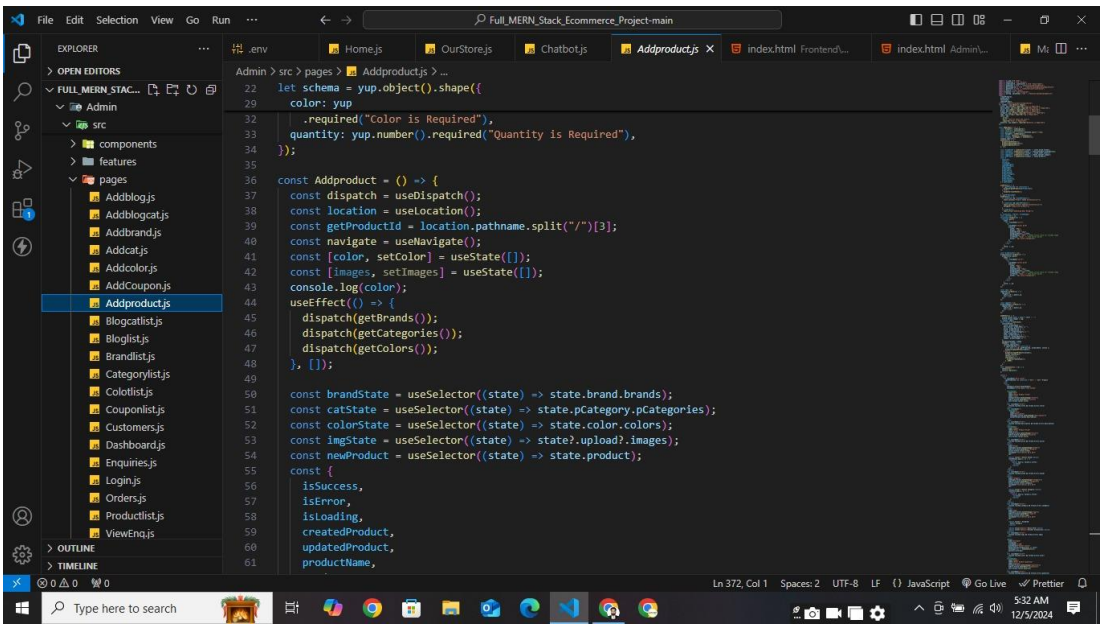

Figure 112: Admin Add Product Page Code(2)

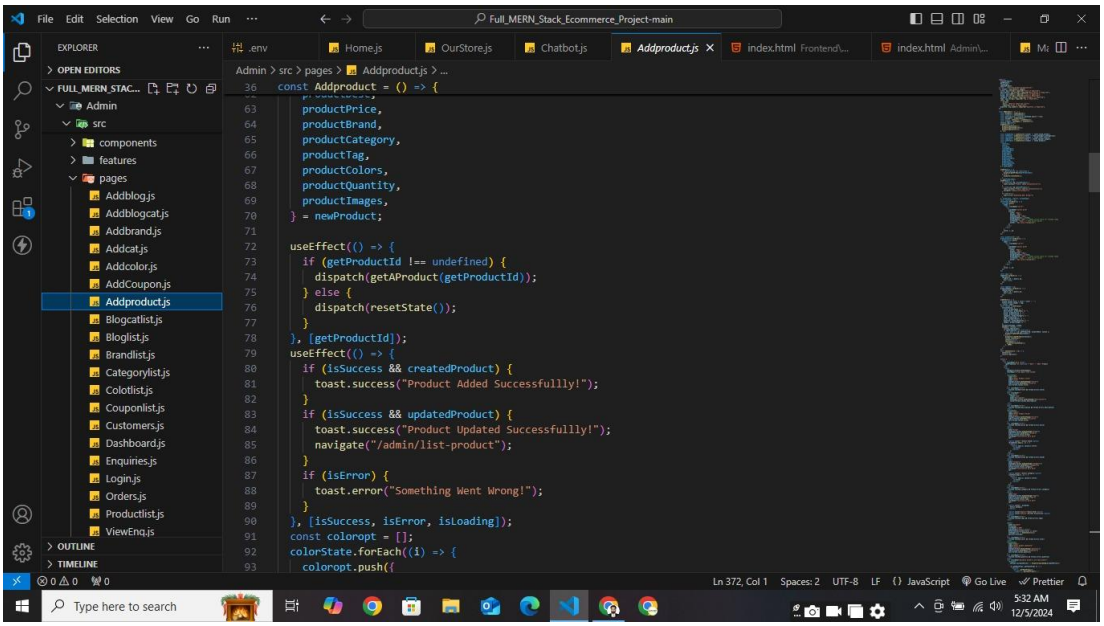

Figure 113: Admin Add Product Page Code(3)

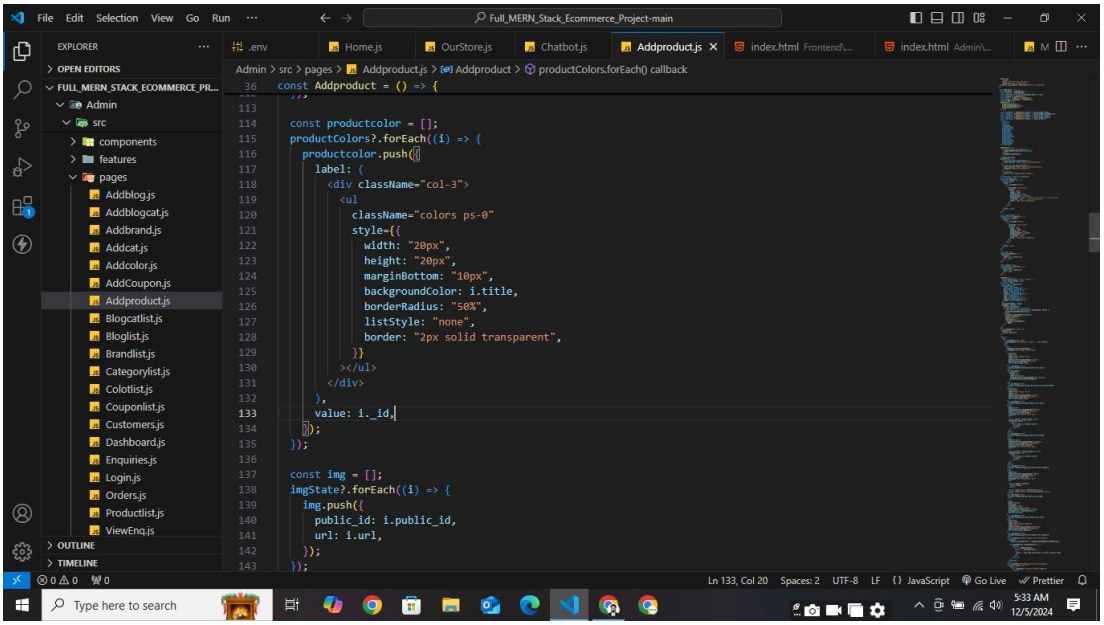

Figure 114: Admin Add Product Page Code(4)

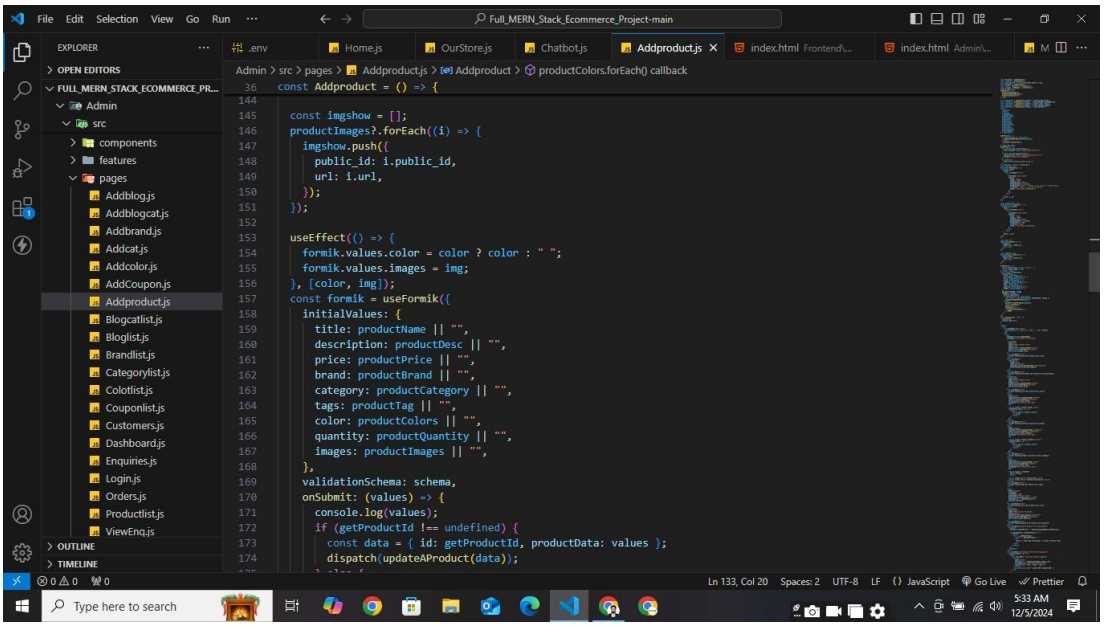

Figure 115: Admin Add Product Page Code(5)

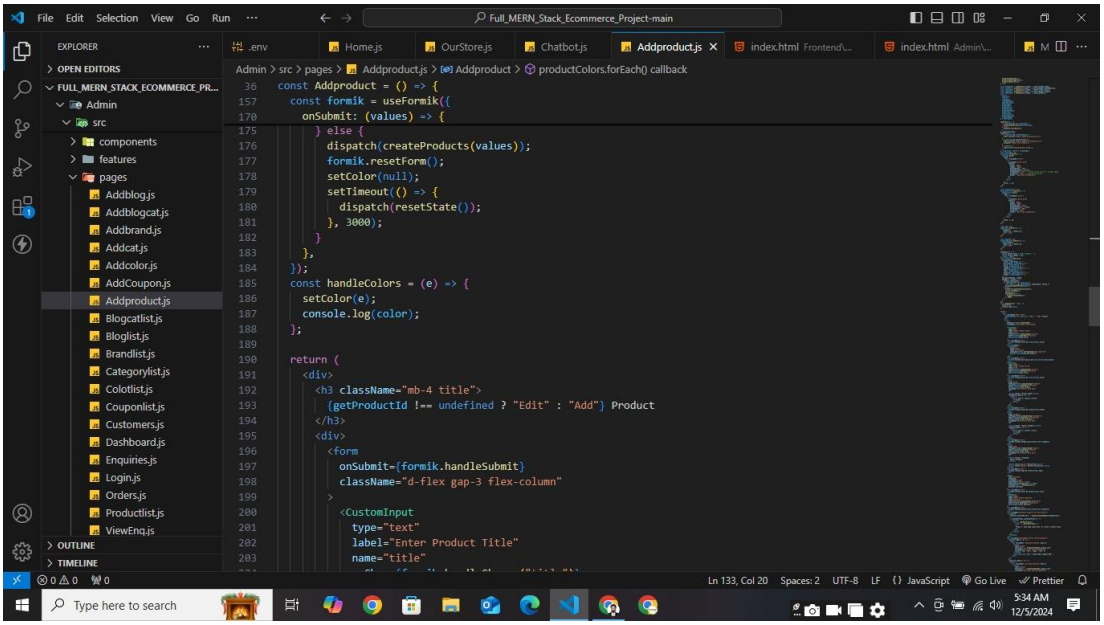

Figure 116: Admin Add Product Page Code(6)

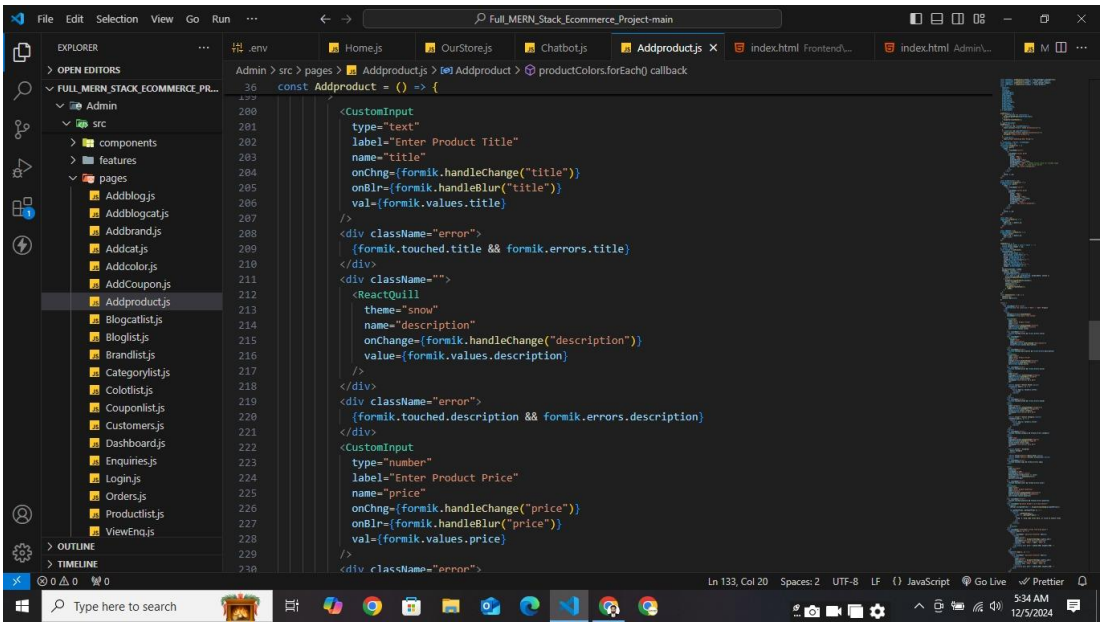

Figure 117: Admin Add Product Page Code(7)

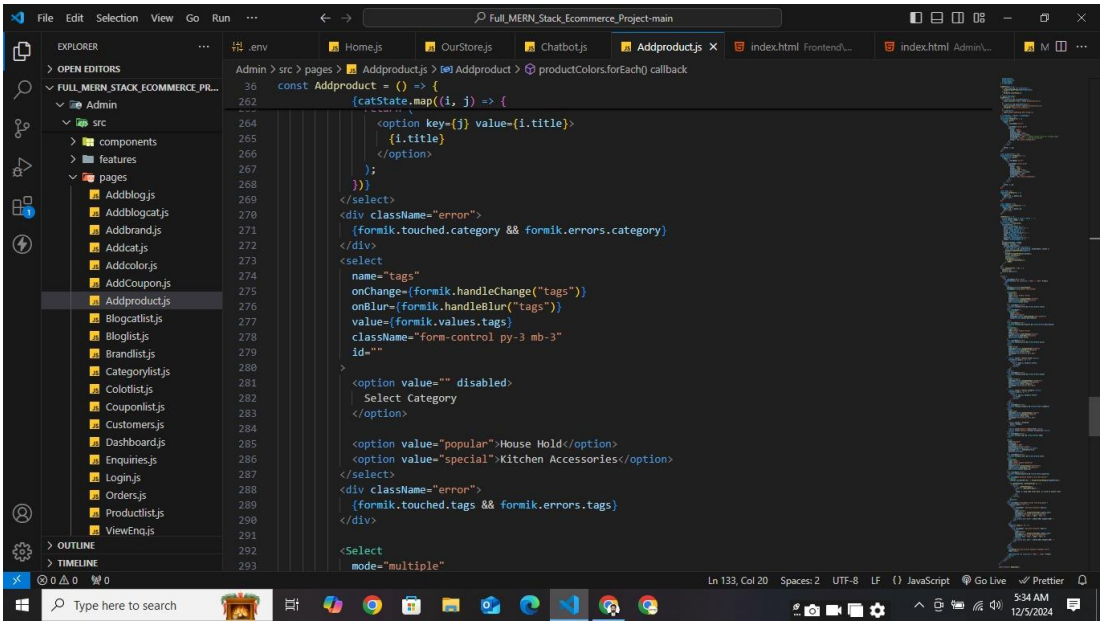

Figure 118: Admin Add Product Page Code(8)

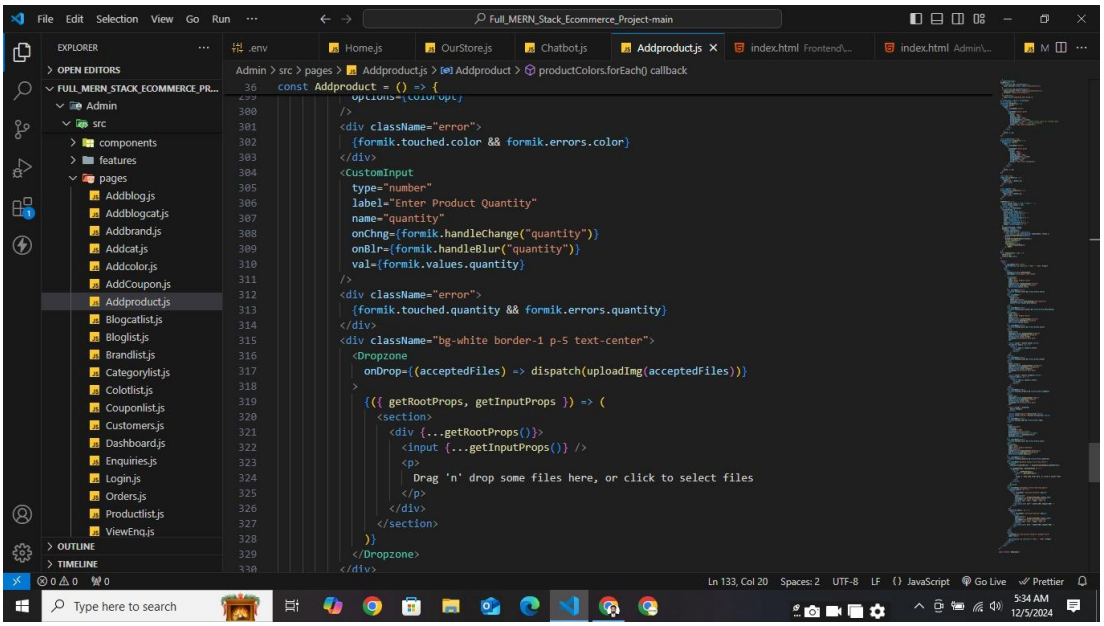

Figure 119: Admin Add Product Page Code(9)

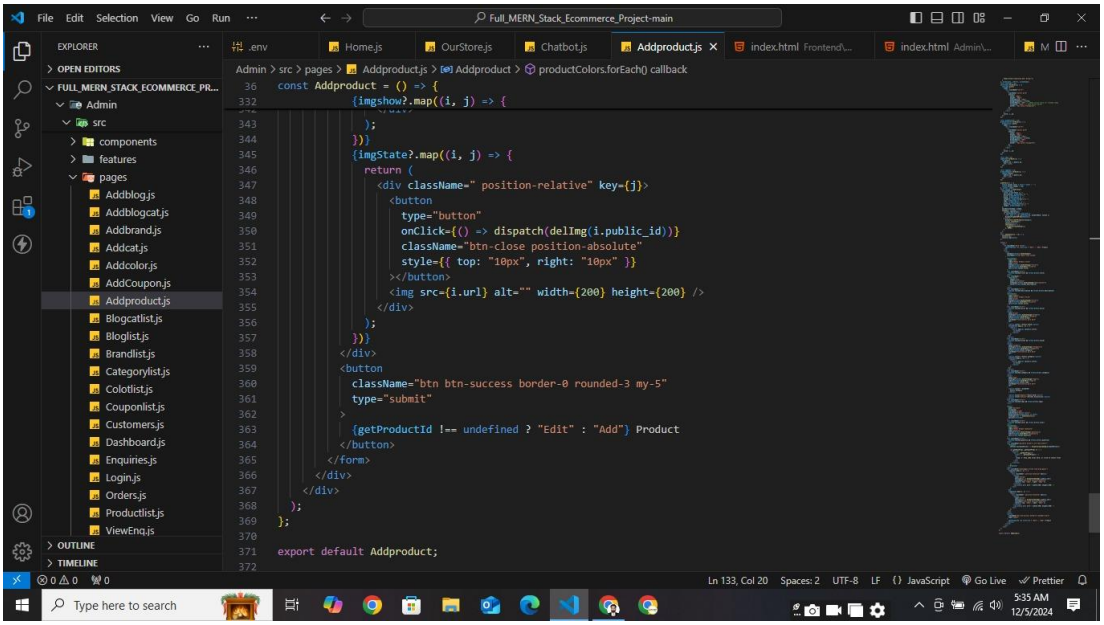

Figure 120: Admin Add Product Page Code(10)

- **Enquiry Page**

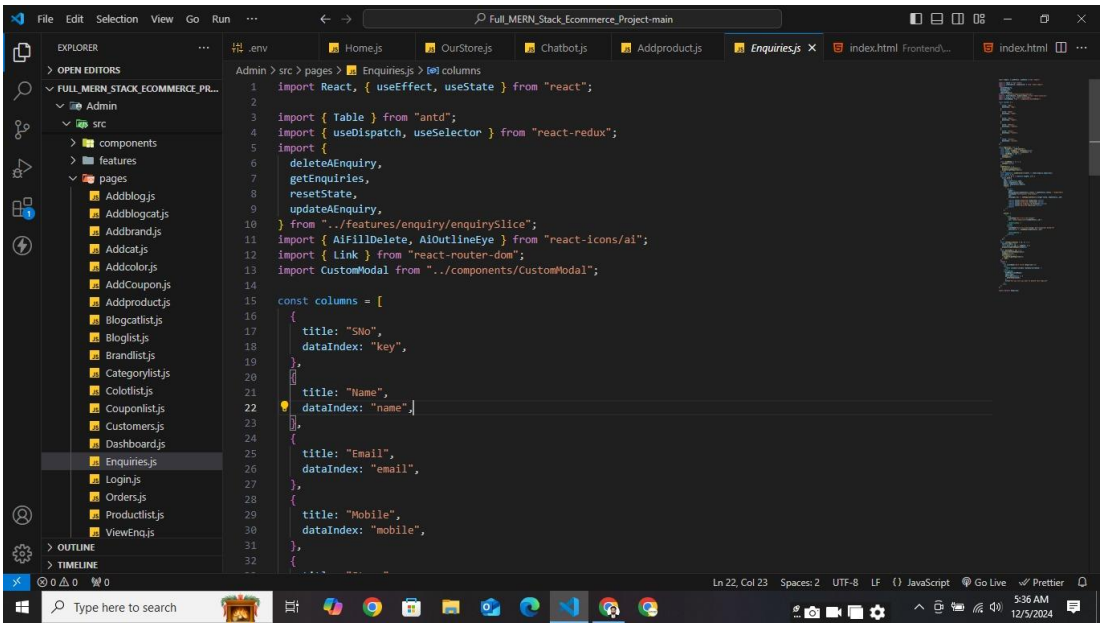

Figure 121: Enquiry Page Code(1)

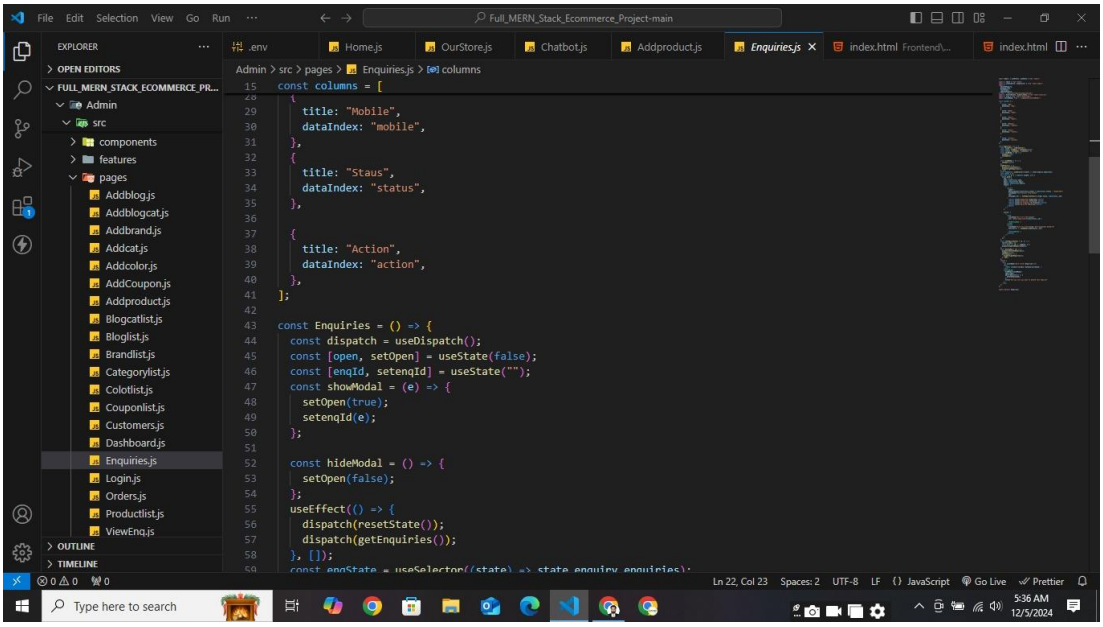

Figure 122: Enquiry Page Code(2)

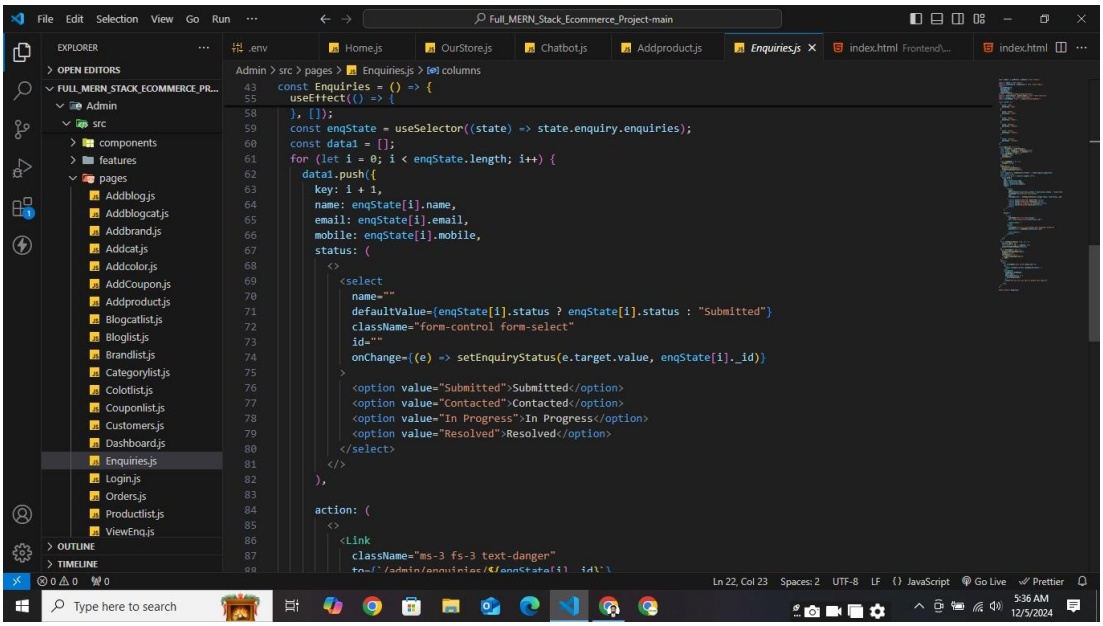

Figure 123: Enquiry Page Code(3)

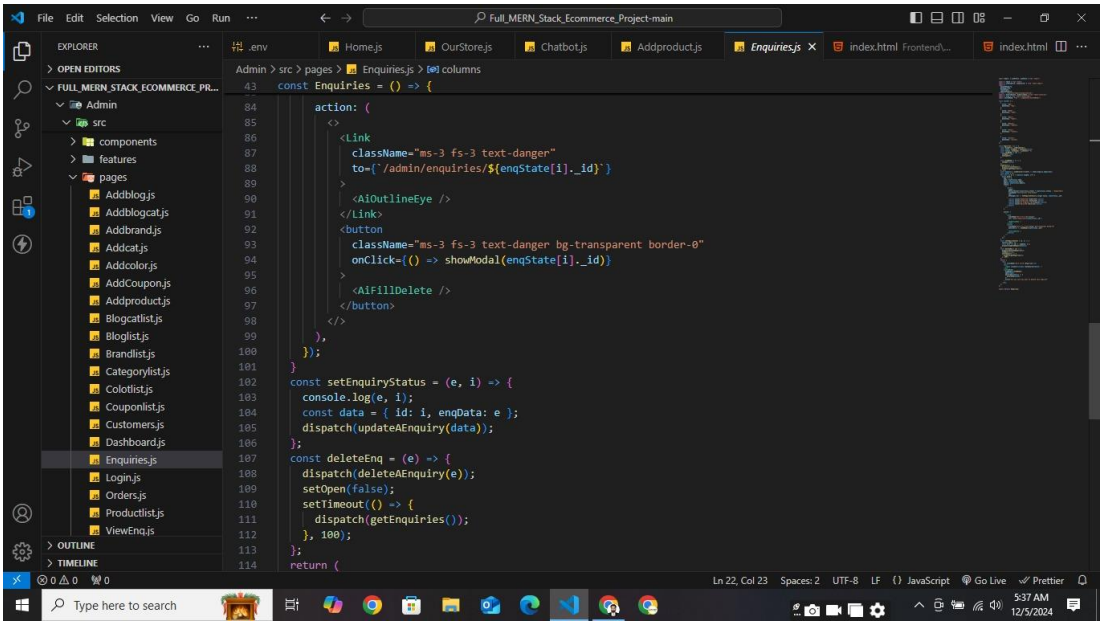

Figure 124: Enquiry Page Code(4)

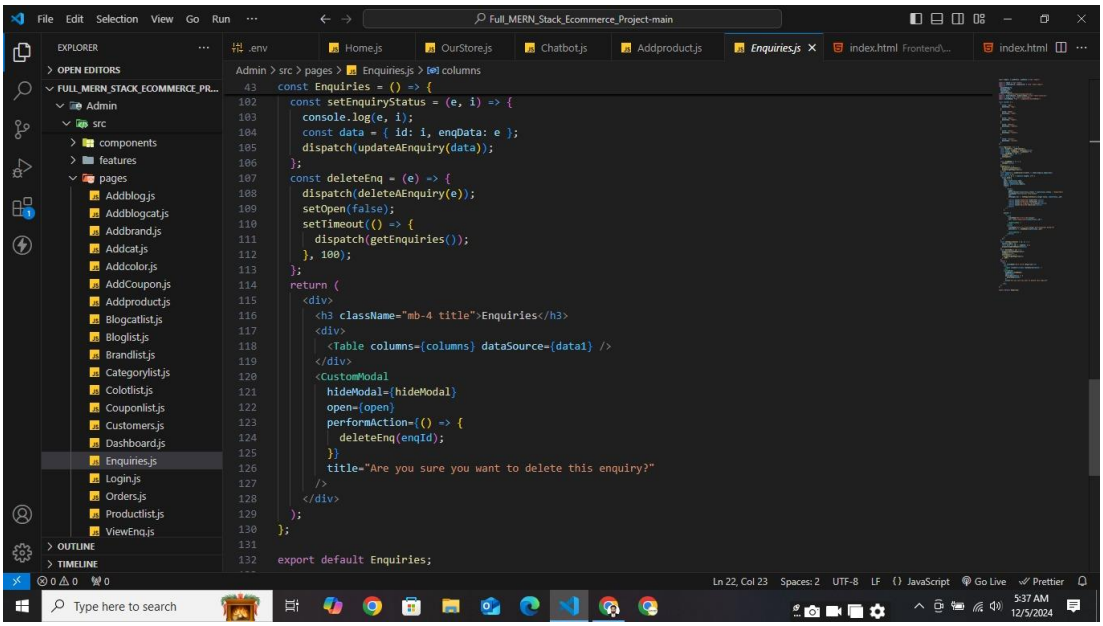

Figure 125: Enquiry Page Code(5)