DESIGN AND DEVELOPMENT OF A MULTI-VENDOR E-COMMERCE WEBSITE

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering.

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APPROVAL

This Project/internship titled **"MULTI-VENDOR E-COMMERCE WEBSITE"**, submitted by Ridwan Al Monsoor ID: 203-15-14562 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents.

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DECLARATION

We hereby declare that, this thesis base project has been done by us under the supervision of **Professor Dr. Touhid Bhuiyan, Professor & Head of CSE Department,** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.
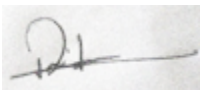
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ABSTRACT

The way businesses operate and how customers engage with their products and services have both undergone significant shifts as an outcome of the digital landscape's rapid development. In this regard, creating an e-commerce website is an essential job for any business that is looking to build a strong online identity and take advantage of the enormous potential of the worldwide market. The project focuses on creating a website where customers can easily discover, browse, and purchase products, providing a seamless shopping experience. The objective is to design and implement key features such as a product catalog, user accounts, secure payment gateways, advanced search options, responsive design, and integration with social media platforms. This e-commerce website project's successful conclusion will enable businesses to take advantage of the enormous potential of online sales, grow their customer base, and increase revenue. The website will build trust, encourage consumer loyalty, and position the company as a competitive participant in the online market by offering a seamless buying experience.

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INTRODUCTION

1.1 Introduction

The introduction of the internet has changed how we work, live, and shop. E-commerce has become a potent tool for connecting businesses and customers in the digital age, providing convenience, accessibility, and a huge selection of goods and services at the touch of a button. Customers can have a seamless and beneficial online purchasing experience thanks to e-commerce websites, which act as the virtual storefront.

A business's ability to access a global audience, grow its customer base, and increase sales outside of the confines of traditional brick-and-mortar stores is made possible by an e-commerce website. An e-commerce website can serve as a powerful tool for businesses to promote their goods or services, increase brand recognition, and forge strong customer relationships with the correct design, functionality, and user experience.

1.2 Motivation

The motivation behind developing an e-commerce website stems from the ever-growing influence of the digital landscape on consumer behavior and the immense opportunities it presents for businesses. Here are some key motivations for businesses to invest in an e-commerce website:

- Global Reach: By eliminating geographical restrictions, an e-commerce website gives businesses a platform to connect with a global audience.
- 24/7 Accessibility: Unlike conventional establishments with set business hours, e-commerce websites allow customers to visit them whenever they want.
- Cost-Effectiveness: Building and operating an e-commerce website is far less expensive than opening and operating physical businesses. Businesses may devote resources to marketing, product development, or customer service because it removes costs for rent, utilities, and staffing.

- Data-Driven Insights: E-commerce websites produce useful data about consumer behavior, buying habits, and preferences. Businesses can obtain insights into client preferences, enhance marketing strategies, and make wise decisions to continuously improve their offerings and customer experience by utilizing this data through analytics and tracking technologies.

1.3 Rationale of the Study

The rationale behind conducting a study on the development of an e-commerce website lies in the growing significance of online commerce and its potential to transform the way businesses operate and interact with customers. This section presents the key reasons and justifications for undertaking the study:

- Changing Consumer Behavior: Consumer behavior has shifted significantly in recent years, with a substantial increase in online shopping. The convenience, accessibility, and wider product selection offered by e-commerce have attracted a growing number of consumers to embrace online purchasing. As a result, businesses must adapt to this changing landscape to meet customer expectations and remain competitive.
- Competitive Advantage: In the digital era, an e-commerce website has become an essential tool for gaining a competitive edge. Businesses that invest in a well-designed and user-friendly e-commerce platform are better positioned to attract and retain customers, outperform competitors, and establish a strong online brand presence.
- Business Growth Opportunities: An e-commerce website provides businesses with immense growth opportunities. It enables them to tap into a global market, reach a wider customer base, and expand their revenue streams beyond traditional brick-and-mortar operations.
- Optimization of Resources: An e-commerce website offers cost-effective advantages over traditional retail models. It reduces the need for physical store locations, lowers operational costs, and allows businesses to optimize their resources.
- Market Research and Insights: Undertaking a study on e-commerce website development provides an opportunity for market research and data collection. Through surveys, user testing, and analytics, businesses can gather valuable insights into consumer preferences, behavior, and market trends. These insights guide decision-making processes, marketing strategies, and product offerings, ensuring businesses

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remain relevant and responsive to customer needs.

1.4 Objectives

Develop an intuitive and user-friendly interface for the e-commerce website to ensure effortless navigation and enhance the overall user experience.

- Implement a product catalog with comprehensive search and filtering options to enable customers to easily discover and locate desired products.
- Create personalized user accounts and profiles to enable customers to save their preferences, track order history
- Optimize the website for multi-device compatibility, including responsive design, to ensure seamless accessibility across desktops, tablets, and mobile devices.
- Implement effective order processing and shipping logistics to ensure timely delivery of products, including order tracking and notifications for customers.

1.5 Expected Outcome

- This platform will combine supermarkets, e-commerce, pharmacies, and food ordering services.
- The user will also be able to purchase and sell their used goods.
- A community system for quick reaction will be in place.
- DCommerce will allow business owners to set up their own store and sell things.
- The admin panel will be able to keep track of everything and make changes as necessary.
- Delivery heroes will be able to sign up on their own and accept orders independently without us paying any commission to DCommerce.

1.6 Report Layout

Chapter 2, The discussion in this part will center on analysis. We'll review the project's different aspects, advantages, and disadvantages. Additionally, we'll search for similar projects to see what unites our application and purpose. We talk about the challenges of the development process in our discussion of the feasibility analysis.

Chapter 3, As a result of our previous section, we are aware of the services we will offer and any difficulties. It is now time to decide the features we will offer and how they will function. To do this, we will utilize a few models and diagrams to visualize the needs.

Chapter 4, Now that we have all of our needs, it's time to design the structure. The look is important in the realm of online applications. The application must also make sure that the interface is engaging and user-friendly. Along with that, we'll talk about the application's frontend and backend design.

Chapter 5, The action starts here. Here, we'll put our idea into practice and give it some life. After certain standard testing procedures, reports will be presented.

Chapter 6 & 7, This section will cover the applications' effects, sustainability, and conclusion by examining the project's future.

CHAPTER 2
BACKGROUND

2.1 Introduction

With the development of the internet, e-commerce has transformed company practices and how consumers interact with products and services. Platforms like Amazon and eBay were pioneers in the development of the concept in the 1990s. E-commerce websites give businesses access to a large market, cost efficiency, and data-driven insights. Since consumers now place a high value on accessibility and convenience, e-commerce is crucial in the digital era. With the widespread use of smartphones and tablets, mobile commerce, or m-commerce, has also experienced substantial growth. However, issues like data security and competition require constant innovation. By being aware of these trends, businesses can build safe and user-friendly e-commerce websites that succeed in the competitive online market.

2.2 Related Works

My project developed a distinctive concept. A few years ago, a mobile application called Tapzo combined numerous platforms into one location. However, given that my website appears to be an e-commerce site as well, relevant platforms might include "Daraz," "Alesha Mart," etc.

Figure 2.1: Daraz Logo

A system for ordering food will also be included in my application. So, it might resemble "Foodpanda" in some ways. In addition, it can be comparable to "Aroggo," "ChalDal," etc. because it also features some grocery and pharmacy stores. A mobile application called "Tapzo" from 2016 featured ideas that were comparable to ours. But the app was abandoned in 2019.

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Figure 2.2: Foodpanda Logo

Figure 2.3: Chaldal Logo

2.3 Comparative Analysis

There are several platforms like mine that are similar. Along with a distribution system, they also offer multi-vendor, multi-purpose web apps. Being able to combine many applications in one location is what distinguishes us from other companies. A user of this site can conveniently locate all of their needs here. When I use the word "need," I'm referring to things like food, groceries, clothing, medications, and other everyday necessities. The online user experience will be more convenient as a result. Users can also use the help forum to quickly seek assistance from the community.

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2.4 Scope of the problem

The easiest way to determine the scope of the problem is to ask potential users what they want and don't want from a web application on a regular basis. I discovered the following by asking this:

- Users don't want to use different platforms for the same purpose.
- They want everything in one location.
- Users require a platform that is reliable, long-lasting, and easy to use so they may launch their own businesses.
- Delivery heroes are unwilling to offer high commissions.

2.5 Challenges

It says, "Until your death, every day is a new challenge." I also faced different challenges with my project as well. Below is a list of them:

- DCommerce needs the internet to function, but our objective is to be your constant companion. This means that if a user doesn't have an internet connection, he or she won't be able to use our service.
- Another issue is that because DCommerce is entirely web-based, users need to have a browser on their desktop or mobile device in order to browse our site.
- The membership of store owners determines a significant challenge for DCommerce. The site will entirely look like a desert if there is no enlisted store owner and they aren't selling anything.

CHAPTER 3
REQUIREMENT SPECIFICATION

3.1 Requirement Collection and Analysis

This base service system is available online. The procurement requirements procedure must therefore consider all relevant factors. It is necessary to identify needs and perceptions at all levels for this reason.

Software prerequisites:

Users

System for logging in users;

Time advantage;

Ease of acceptance

3.2 Hardware and Software Requirements:

It is important to confirm that the digital platform can meet the system requirements before purchasing any software or hardware for it. PC satisfies the minimal system needs for the best performance of this software and hardware. Given that our product is a web-based application. Therefore, a machine must meet basic requirements in order to operate a browser. However, some of the tools listed below are necessary if we wish to complete the development phase of our system in a new device.

- Git
- Node Js
- Visual Studio Code
- Browser

3.3 Use Case Modeling and Description

A use case diagram is a graphical depiction of a user's possible interactions with a system. A use case diagram shows various use cases and different types of users the system has.
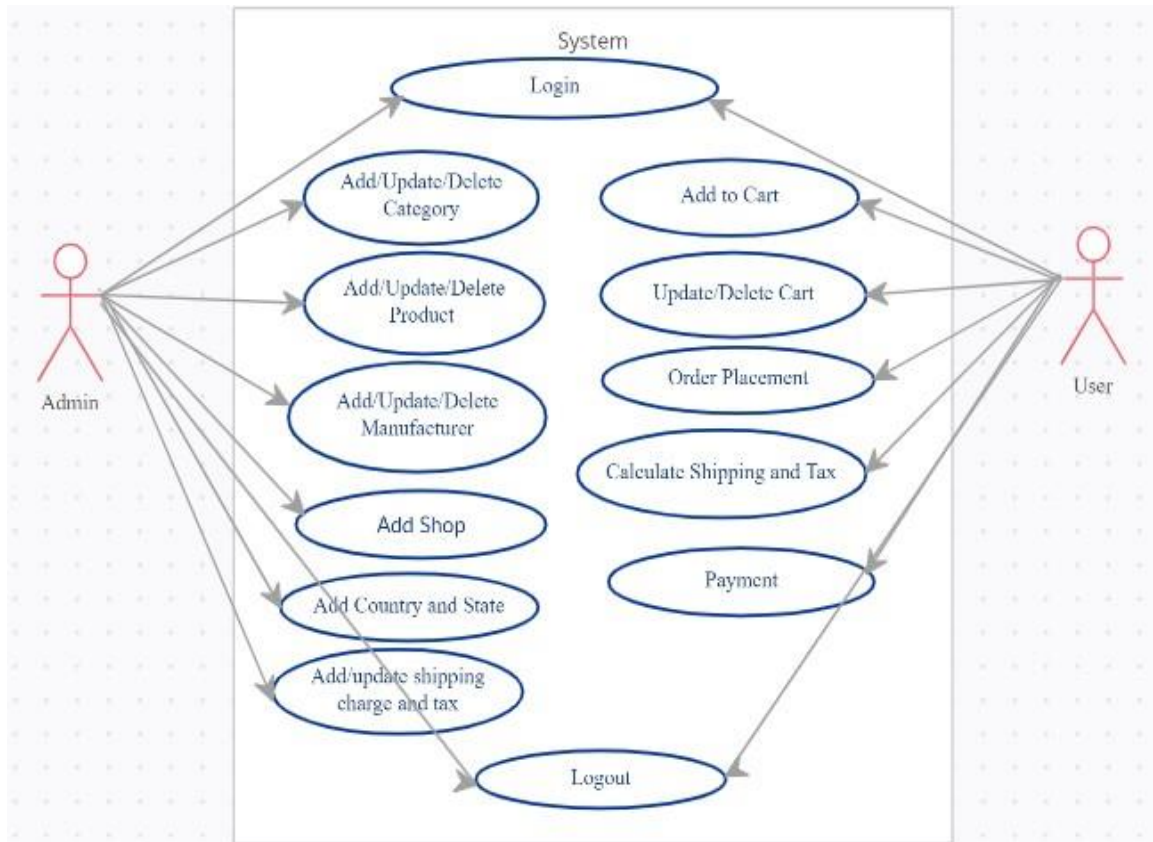
Figure 3.1: Use Case Model for Admin and User

Actors: Admin, User and Seller

The associated use cases for these actors:

Admin: Login, Add/Update/Delete Category, Add/Update/Delete Product, Add/Update/Delete Manufacturer, Add Shop, Add Country and State, Add/Update Shipping charge and Tax, Logout.

User: Login, Add to cart, Update/Delete cart, Order Placement, Calculate Shipping and Tax, Payment, Logout.

Seller: Registration, Login, Edit profile, Create shop, Add product on his/her own shop, Delete or edit own shop product, Search his own product, Logout
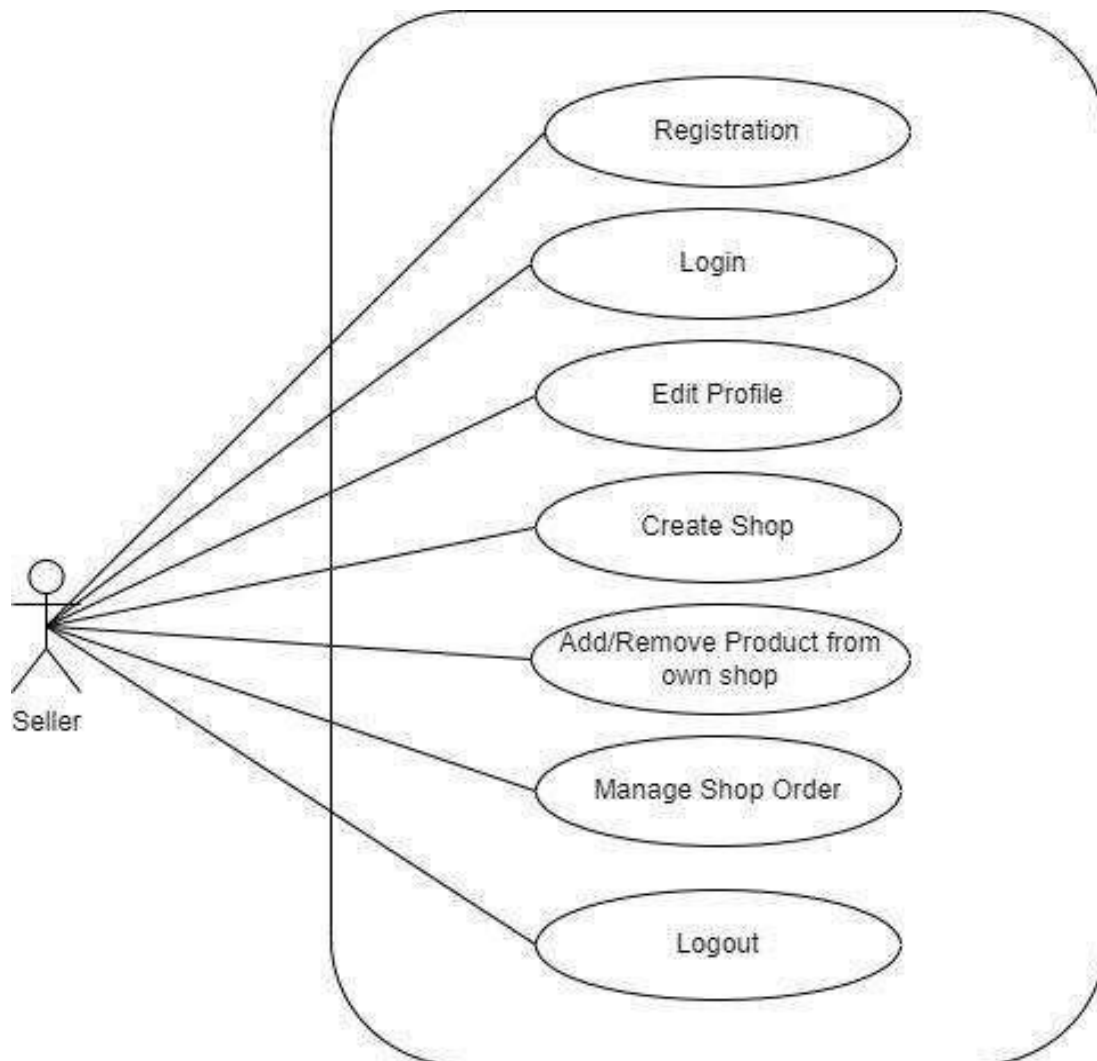
Figure 3.2: Use Case Model for Seller

3.4 Activity Diagram and Description
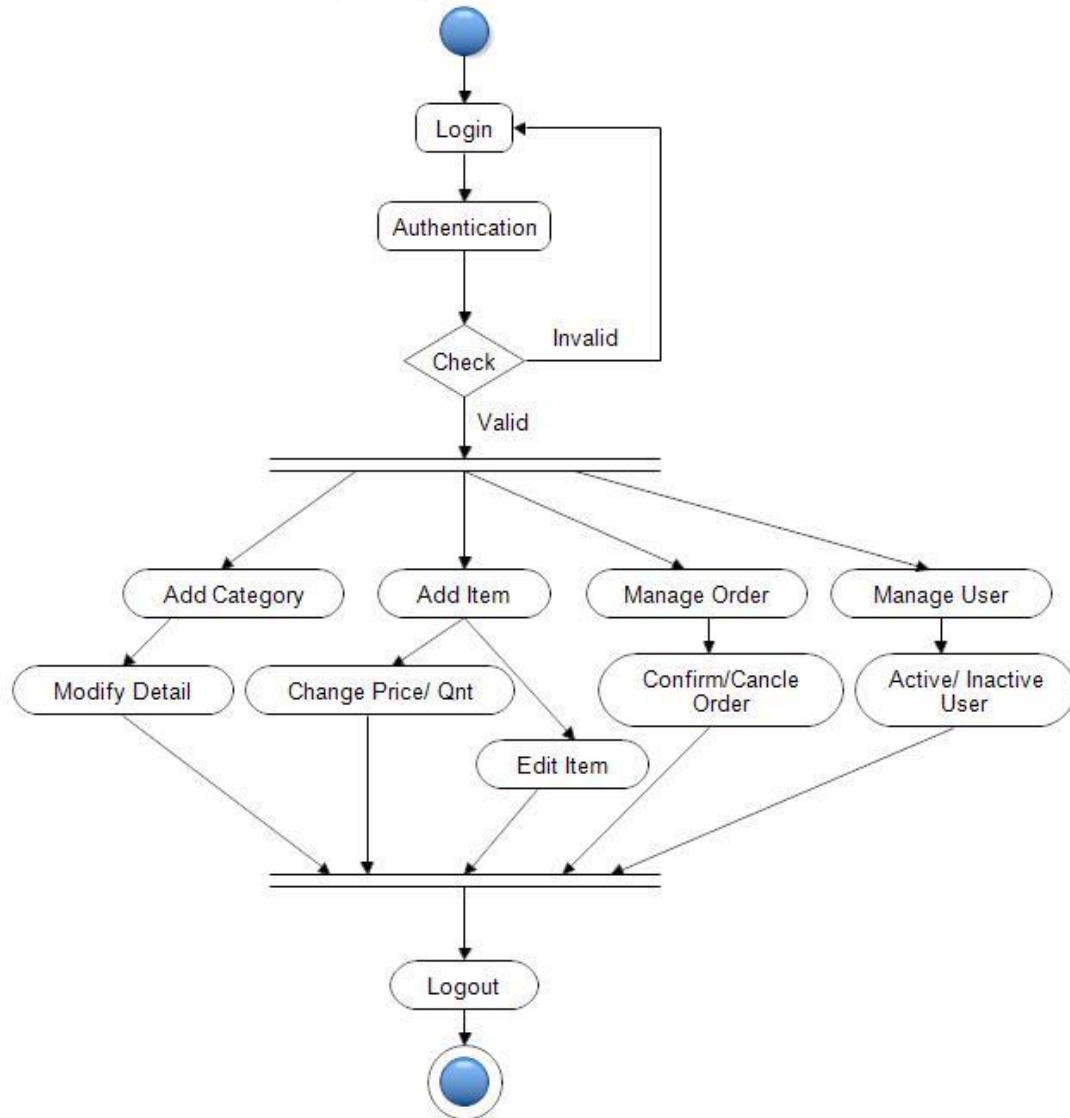
Figure 3.3: Activity diagram for the admin side

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Activity Diagram for User Side
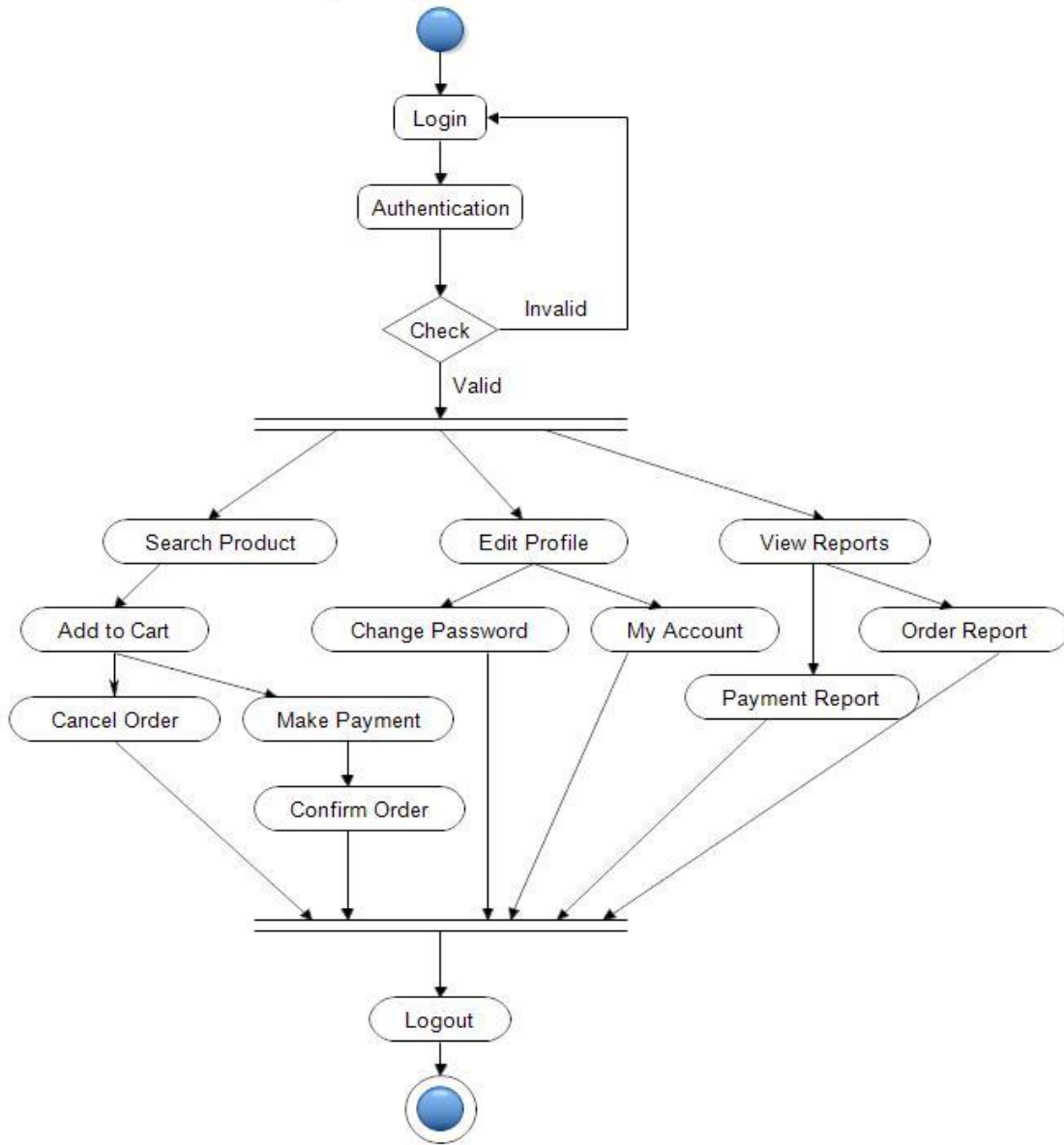
Figure 3.4: Activity diagram for the user side

3.5 Sequence Diagram and description
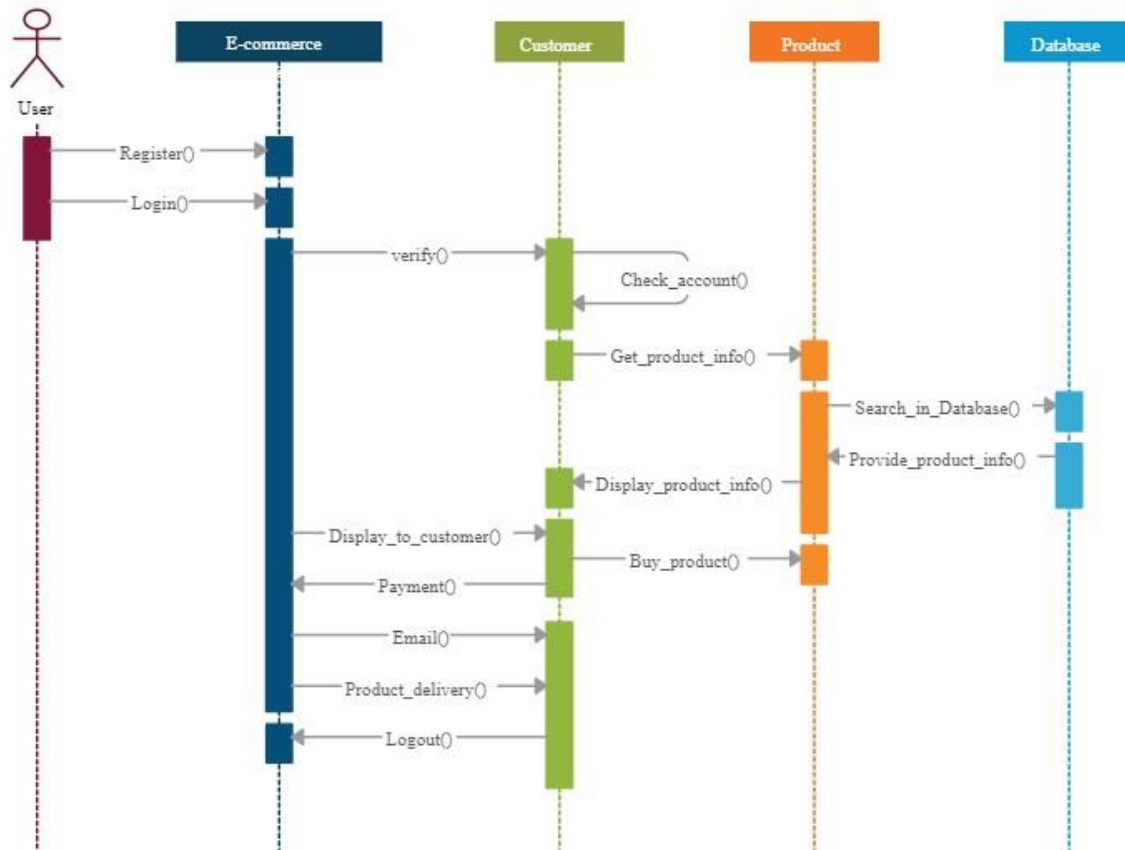
Figure 3.5: Sequence Diagram

3.6: Design Requirements:

My system is an interactive website. Both the front end and the back end of my website were developed using some web programming languages. In order to create websites, we used HTML, CSS, react JS, and the Bootstrap framework. React is what we use for front-end design. On the other side, the backend is created using the well-known programming language node js. Here, the MongoDB database server aids in making it dynamic.

HTML:

HTML (HyperText Markup Language) is the most basic building block of the Web. It defines the meaning and structure of web content. Other technologies besides HTML are generally used to describe a webpage's appearance/presentation(CSS) or functionality/behavior (JavaScript).

CSS:

CSS is the language used to describe how web pages are presented, including their colors, formats, and text styles. Any XML-based markup language can be used with CSS, which is HTML-free.

It is applied to create visually appealing web pages. An effective website must be visually appealing.

Bootstrap:

As opposed to web apps, Bootstrap is an HTML, CSS, and JS package that makes it simple to create informative web pages. It is used to apply decisions regarding a web project's color, size, font, and layout.

CHAPTER 4

DESIGN SPECIFICATION

4.1 Front-end Design

First impressions are crucial. A user will initially evaluate a web platform by its appearance. Consequently, the front-end design must be attractive. However, it can lengthen the loading time, so we also need to keep it straightforward. I started by creating a UI design. 'KachaBazar' is a website that served as part of our inspiration. Then I took measurements for all the factors and created a responsive UI design for the project DCommerce's front end. I also decided what I would employ to give the UI design a practical application. I choose to use React Bootstrap and React Js together.

4.2 Back-end design

My backend was split into two sections. Authentication is the first step. A proper, robust authentication system is a requirement for any website. Database design is the second. Our project is based on an API. Therefore, we made use of internet cloud storage. We utilized MongoDB, a NoSQL database, as our database. Because our website will have a lot of data and NoSQL can manage this more quickly, we picked a NoSQL database. It also allows us to update the database without using any rules like SQL.

4.3 Implementation of requirements

My requirements analysis was previously mentioned. What features I'm planning to offer were extracted. I choose to employ the well-known full stack combination known as the MERN stack to implement my requirements. Mongo DB will be used to store the data. My front-end will be animated using React Js. I'll utilize node js and its framework, express js, to build restful APIs. I will also use some more libraries, such as react axios, react slick, react toastify, etc. Each feature will be developed piece by piece and then assembled. Finally, I will use api calls to link our front end to our back end.

4.4 Interaction Design and UX

Homepage: The main page of the Sohozogi web application is distinctive and well-organized to allow users to identify and go in the desired direction with ease.
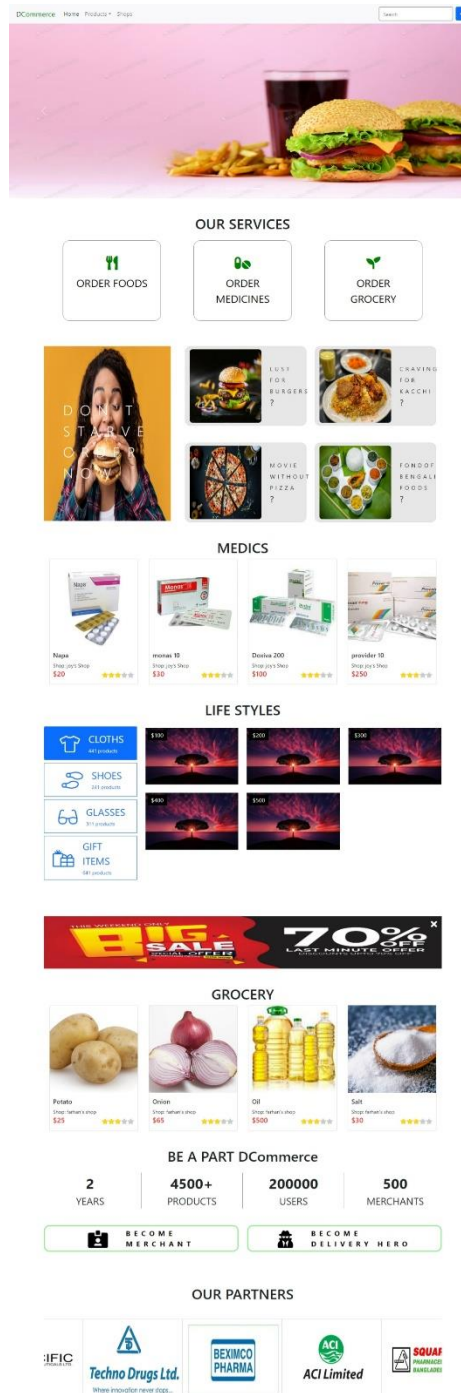
Figure4.1.1: DCommerce's home page

Figure 4.1.1 displays our landing page. We added a carousel so users may view the website's

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trending updates in the first section.

According to our application's requirements, DCommerce also has a method for ordering food. A quick food category searching option has been provided for user convenience, as seen in figure 4.1.2.
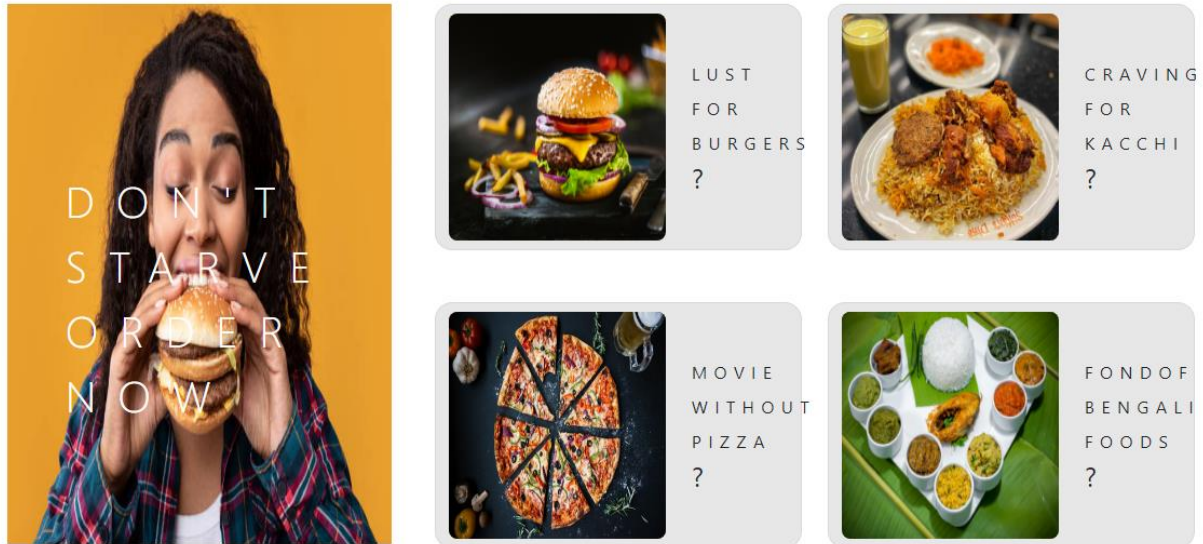
Figure4.1.2: Navigation for categorized foods

Additionally, this encourages users to use the application more and subconsciously compels them to buy food. More products will be shown later in this part so the user can see what is in our inventory. In fig. 4.1.3, this implementation is depicted.

MEDICS

Napa	**monas 10**	**Doxiva 200**	**provider 10**
Shop: joy's Shop	Shop: joy's Shop	Shop: joy's Shop	Shop: joy's Shop
$20 ★★★☆☆	$30 ★★★☆☆	$100 ★★★☆☆	$250 ★★★☆☆

LIFE STYLES

Figure 4.1.3: Medical Products and Inventory

The user can also ask to become a delivery hero or a shop owner. within figure 4.1.4.

Figure 4.1.4: Merchant and Delivery Hero Request

Registration for Merchant: Merchants can register their shops from this page shown in fig 4.1.5

Figure 4.1.5: Merchant Registration

Registration for Delivery Hero: Delivery heroes can register themselves from this page shown in figure 4.1.6
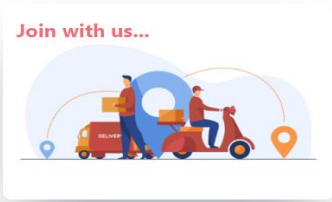
Figure 4.1.6: Delivery Hero Registration

Products: From products section you can see all products together as shown in figure 4.1.7 and if you wish to see categorized products you can do that too. Figure 4.1.8 shows the products in grocery section.
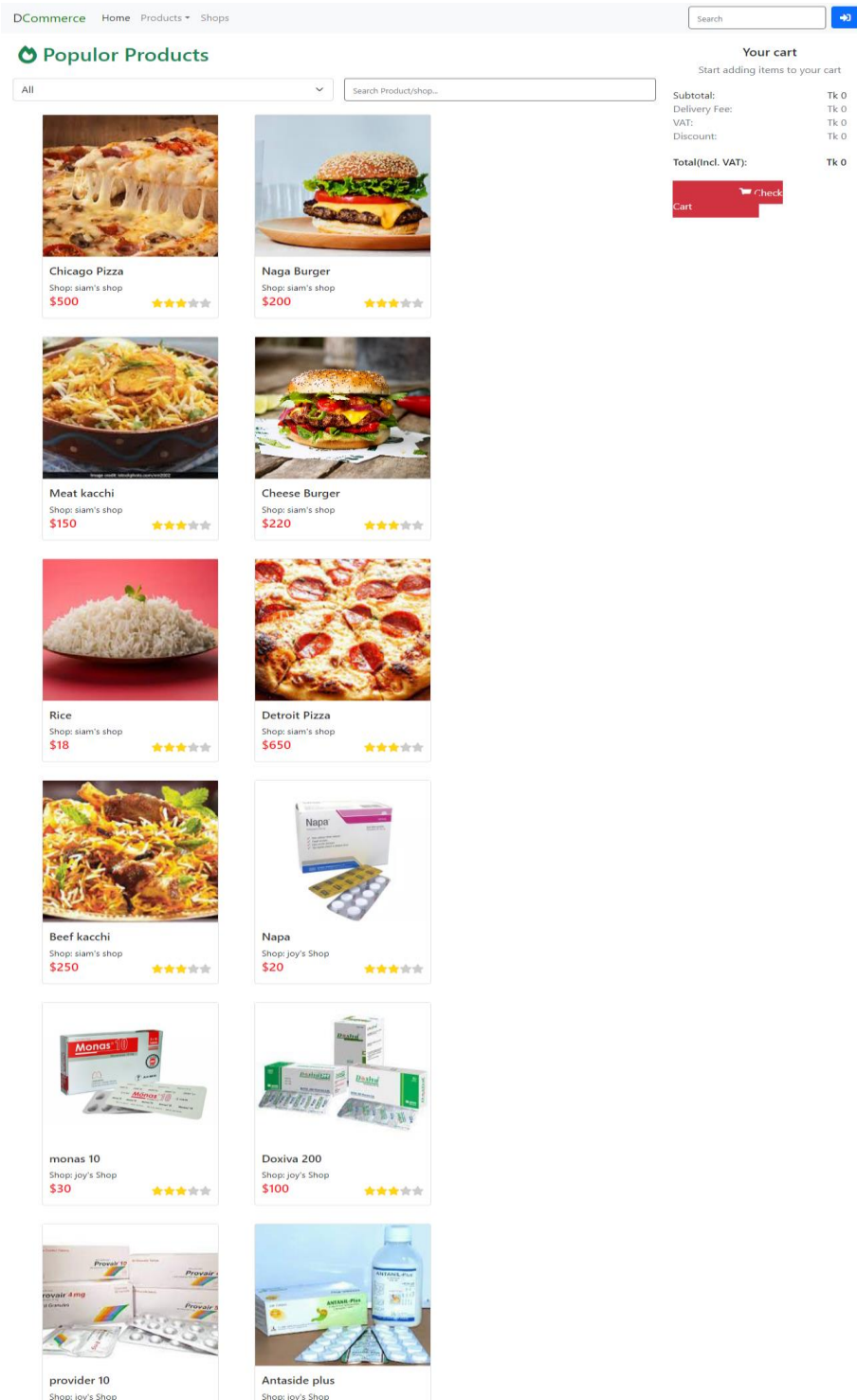

Figure 4.1.7: All Products

Figure 4.1.8: Grocery Products

You can also see a particular product's details by clicking on the details button and a pop-up will show you the details. You can see the pop-up in figure 4.1.9. You can add the product to cart from that pop-up.
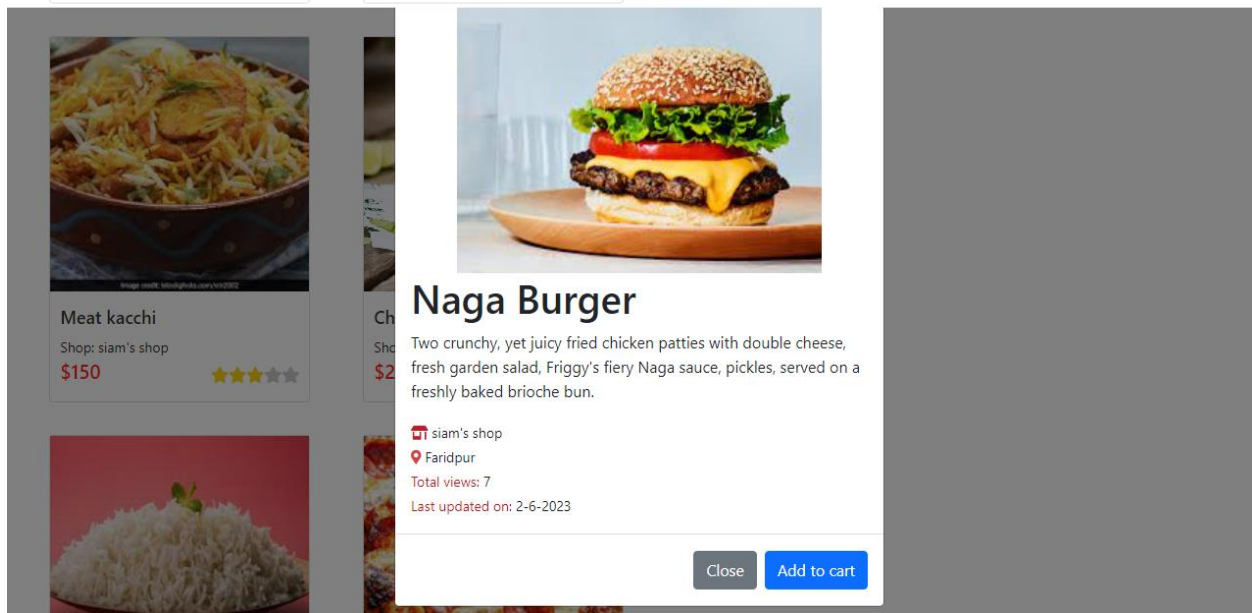
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Figure 4.1.9: Product Details

Cart: Users can see all their chosen products in cart. But they have to login first to add products to their cart. Figure 4.1.10 shows a user's cart

Figure 4.1.10: Cart

Tracking Orders: Users can track their orders from tracking order section as shown in figure 4.1.11.

Figure 4.1.11: Order tracking

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Database Implementation

We use a database to store the data that we receive from our users (Seller and Customer). 7s5 Although there are many different kinds of databases accessible, we decided to use the MongoDB (NOSQL) database for our project because it serves as a storage for all of the site's data. We use the data in an organized manner, display it to users of the website, and gather it from users who voluntarily provide it. It adds to the size and importance of the website and is continuously saved data.

5.2 Implementation of Front-end Design

Front-end design refers to everything that a user sees when visiting a website. It gives users a channel of communication with the server. A website's user interface not only draws visitors, but also makes it simple for users to interact with the site. I put a lot of time and effort on the project's front-end design. To come up with a better front-end concept, I looked into an e-commerce platform from themeforest created by "Venam." I made every effort to make the design interactive as simple and well-executed as possible.

5.3 Implementation of Back-end Design

The core, logical portion of an application is known as the back-end or server-side design. The back-end can be used to create dynamic apps. It is the most crucial phase of the development of the application. Using the backend, we can manage security, authentication, sessions, data validation, database administration, data exchange, etc. For the server site language, I wrote all of the system's functionality in Node JS. Our data are managed and stored in the Mongo DB database. Node JS must first be downloaded and installed on the computer before it can be used. The next step is to make a file called app.js. Give the server an HTTP status code and specify a hostname and port, for instance: const hostname = "127.0.0.1" and const port = 5000.

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5.4 Testing Implementation

The creation of applications must include testing. No one can guarantee that the system is functioning properly without testing. There are numerous testing methods. I primarily did alpha testing. During this phase, I first made sure that each feature was operational. And that's how white box testing works. Later, after creating test cases and providing numerous potential users with commands to communicate with the backend, I performed a number of tests to verify the backend functionality. 90% of test cases were successfully completed. This was the Blackbox testing portion. By doing these steps, I ensured that the system was functioning properly.

I also created an early test report using the Google Dev Tool's Lighthouse System. The test result was really encouraging. Figure 5.4 displays the test report produced by Google Light House. Here, the report demonstrates that DCommerce is performing seventy. It also reveals that there are 73 best practices. The system's blocking time was only 210ms. The duration of the interaction was 2.2 seconds. The analysis gave the team confidence that the website is SEO-friendly because the SEO result is 91. This website is simple for anyone to use without any effort.

Figure 5.1 Light house test result

CHAPTER 6
IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY

6.1 Impact on society

- Economic Growth: My e-commerce website can promote economic growth by giving different merchants a platform to connect with buyers all around the nation. It enables small and medium-sized firms to broaden their customer base and boost sales, resulting in the creation of jobs and local economies.

- Empowerment of Local Entrepreneurs: By providing access to a larger customer base outside of their physical store locations, my multivendor e-commerce platform benefits local business owners and craftsmen. This promotes business and gives gifted people a chance to present their goods on a national level.

- Accessibility and Convenience: For customers all throughout Bangladesh, my website improves accessibility and convenience. In comparison to traditional shopping, people from all walks of life may easily access a large variety of goods and services, saving time and effort.

- Impact on Traditional Retail: My e-commerce platform may have an impact on traditional retail practices by urging companies to embrace a multichannel approach or adjust to the digital environment in order to compete.

- Job Creation and Skills Development: As my website grows and draws in additional vendors, it might open up positions in a variety of e-commerce-related industries, including website management, logistics, and customer service. The local workforce benefits from increased employment possibilities and skill development.

6.2 Impact on Environment

As an e-commerce website, DCommerce can have positive impacts on environment. By facilitating online shopping, my e-commerce platform reduces the need for consumers to travel to physical stores. This leads to a reduction in carbon emissions from individual vehicles, contributing to improved air quality and reduced traffic congestion. Also, E-commerce

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operations generally require less energy compared to brick-and-mortar stores. My website's digital infrastructure consumes less power than maintaining physical storefronts, leading to overall energy savings. And DCommerce always encourages its vendors to adopt eco-friendly packaging materials.

6.3 Ethical aspects:

No codes from another website were used in the creation of this project. I wrote the entire project's code. I don't even employ any coding in our product that can compromise user privacy. In addition, I made use of various open-source libraries that are accessible to everyone. In our project, no culture is disrespected. Here, I uphold the fundamental rights of employees.

My project's front-end design is totally original. No design was taken directly from another website. My system does not accept any adult content, including pornography, sex toys, etc. We guarantee that no user will be defrauded while purchasing a product.

6.4 Sustainability plan

DCommerce's goal is to offer a sustainable solution, among other things. The sustainability strategy for DCommerce is pretty detailed. There are no costs associated with this site because it will be created and maintained by the owners themselves. DCommerce will make money by taking 1% of each transaction that store owners make. Additionally, by urging store owners to cut prices and, if possible, offer a discount. In addition, each proprietor must guarantee product quality and refund policies. More people will use these goods. We earn more money as more customers visit and make purchases. This revenue will be used to pay for more data space, advertising, and updating the website. DCommerce intends to continue operating in the market in this manner.

CHAPTER 7

CONCLUSION AND FUTURE SCOPE

7.1 Discussion and Conclusion

DCommerce is more than simply a website. It is the creation of its creator. It was truly fantastic to work on a multipurpose, multi-vendor site. The fact that I'm attempting to serve an extensive population by making their lives more convenient is what keeps me driven.

DCommerce's progress was like climbing a hill. There were a lot of highs and lows. While putting some key elements into place, I spent many restless nights and encountered numerous difficulties. However, I didn't give up. I exerted more effort and went beyond my comfort zone till satisfaction eventually came.

7.2 Future work and Further Development:

- I'll increase the number of features I provide in the UI.
- An email verification system will be in place.
- I'll add the SSL security protocol.
- Create a mobile application for the website.
- Product comparing system
- Rental services, among other things

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DESIGN AND DEVELOPMENT OF A MULTI-VENDOR E-COMMERCE WEBSITE

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6	Submitted to University College for the Creative Arts at Canterbury, Epsom, Farnham, Maidstone and Rochester Student Paper	<1%
7	Submitted to Visayas State University Student Paper	<1%
8	Submitted to Daffodil International University Student Paper	<1%