Online Accessories Shop

BY

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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 titled "**Online Accessories Shop**", submitted by **Saiful Aziz,** ID No:**142-15-3831** 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. The presentation has been held on 29 January 2023.

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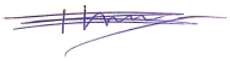

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DECLARATION

I hereby declare that, this project has been done by me under the supervision of **Mr. Rubel Sheikh, Lecturer, Department of CSE,** Daffodil International University. I 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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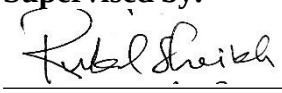

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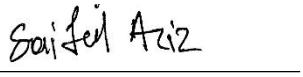

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I would like to express my gratitude to **Dr. Touhid Bhuiyan, Professor and Head,** Department of Computer Science and Engineering, for his kind help to finish my project and also to other faculty members and the staff of CSE department of Daffodil International University.

I also thank my family who encouraged me and prayed for me throughout the time of my project.

ABSTRACT

Ecommerce (or electronic commerce) is the buying and selling of goods or services on the Internet. It encompasses a wide variety of data, systems and tools for online buyers and sellers, including mobile shopping and online payment encryption. Most businesses with an online presence use an online store and/or platform to conduct ecommerce marketing and sales activities and to oversee logistics and fulfillment. According to eMarketer, in 2022, global retail ecommerce sales will surpass $5 trillion for the first time, accounting for more than a fifth of overall retail sales. And by 2025, total spending will exceed $7 trillion, despite slowing growth. For many retailers, the growth of ecommerce can expand their brands' reach and positively impact their bottom lines. But retailers who have been slow to embrace the online marketplace are the ones facing the biggest challenges. Driven by changes in technology and global circumstances, ecommerce is growing and shows no sign of stopping. In this project, I've implemented several types of frontend & backend technology to create an ecommerce shop with proper authentication & monitored delivery process. My main focus on this project was to make this application super user friendly, secure and faster at the same time.

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CHAPTER 1
INTRODUCTION

1.1 Introduction

Today, small businesses – even one-person "social sellers" – can run as global entities thanks to the growing availability of inexpensive digital tools that allow them to source, ship, deliver, pay, collect and virtualize other key aspects of their operations. The fast-developing e-commerce ecosystem, which includes marketplaces, payment gateways and online logistics, is helping to reduce barriers to trade across borders. Put simply, e-commerce is creating economic employment opportunities for new sets of players.

1.2 Motivation

Modern ECommerce is about much more than just offering products online. On the one hand, the increasing accessibility of the internet on various devices has made it easier than ever for people to browse and complete transactions online. For example, mobile e-commerce via web browsers and dedicated apps is rising, meaning more people are choosing to shop and buy on the go. However, while this opens up great potential for retailers to connect with shoppers, it also means competition to do so is fierce.

1.3 Objectives

Development intention of this endeavor effort are actionable plans put in place to make a user's experience better and easier which goes far beyond performance objectives. Though, faster performance and easy marketing were also two of the main objectives of this development project, but a user's experience and priority will always come first. And making every transaction and user's data secure of course a first priority.

1.4 Expected Outcomes

While building up entire development, secured register and login, using firebase authentication has been used. For pagination and navigation, both firebase and react-router-dom has been used. There several backend technologies such as PHP, Django, Ruby Rails and others. For backend technology firebase provides a NoSQL database which is easy to implement and effective for fetching data. As the main perspective of this project, every user should be able to use this web application easily and fulfill their shopping needs with a very secure transaction using stripe as a pay medium.

1.5 Project Management and Finance

Developing an ecommerce web application needs good project management and finance, since they are typically large and kind of complex application. For the project management I used react and firebase. React gave me the freedom of making new requests and inputting new data quickly. And for updating state management using redux worked like a charm.

And for the project finance part, I mainly used open source and free to use tools and technologies. This ensured that the development cost is very minimal, since I didn't use any paid cloud hosting and for database I've mainly used firebase and firestore. Specially for developers firebase provides a open source database to a fixed limit of use.

1.6 Report Layout

The entire development script has been split into seven chapters. The entire development criteria would be:

Chapter 01: I tried to put my first thoughts of the development process, how it inspired me and my development analysis.

Chapter 02: I mainly expressed myself how I started my development process, what other alternatives I did have and why I chose some specific technologies to start with.

Chapter 03: Object property modeling and required architecture proposition.

Chapter 04: What kinds of tools I used for frontend and backend design and how I implemented them.

Chapter 05: Analyzation of how I implemented both frontend and database together and test results.

Chapter 06: A walkthrough of important topics like ethical aspects and impact on society of this app, how it makes life a little bit easier for us.

Chapter 07: Further advancement of this kinds of web applications/business.

CHAPTER 2

BACKGROUND

2.1 Preliminaries/Terminologies

As inhabitants of a modern world, where everything is connected by technology. Almost everyone is relying on online platform. The internet is used by millions of people everyday around the world. Everyone is dependent on something. That something could be a media, an application, a platform and many other things. As time going, people are getting busier day by day and they are being more efficient online. If somebody wants to do some online shopping to save some time and money and comparing products, then a secure, user friendly and fast ecommerce site would be a basic need to them.

2.2 Related Works

In this project report, I will briefly discuss about some other backend technologies which are well known for web development.

PHP (Role of PHP In Backend Development)

PHP plays a crucial role in the backend development of a website. It is integrated with multiple databases such as MySQL, SQL Server, PostgreSQL, and Oracle. Programming languages such as PHP run on frameworks that ease the web development process.

Laravel is one of the best PHP backend frameworks that offers an immense development environment without installing PHP, web server, or third-party software. It supports WordPress, Symfony, Zend, CakePHP3, etc.

Symfony is the jack of all trades. It is a PHP framework and a collection of PHP elements to build any type of website. It is adaptable and allows developers to choose the component needs for a particular project. Symfony supports popular PHP frameworks including Oracle, Drizzle, MySQL, PostgreSQL, etc.

Python (Role of Python in Backend Development)

According to Statista, in early 2020, Python was among the top five most widely used programming languages around the world, only yielding the palm to JavaScript, HTML/CSS, and SQL. Popularity is a reasonably good reference point when it comes to choosing the best technology for app development and, in particular, for designing the app's back-end.

The Django framework is one of the most used Python web frameworks for developing large-scale web applications and websites. It tends to follow the MVC architecture minutely enough to be known as an MVC framework. One major reason for its popularity is, it is open source and free to use a full-stack Python framework.

Flask is another well-known and best Python framework that comes under the Microframework category and comes with the BSD license. It is inspired by the Sinatra Ruby framework. Thanks to the functionality, restful request dispatching, request handling, modular, and lightweight frontend design of Flask, it is more adaptable than Django.

Just like Django, CherryPy also comes under open-source web development frameworks that mainly use the object-oriented paradigm. It comes with its own HTTP/1.1 compliant WSGI multi-strung Python web servers for developing web applications in a short period of time. Developers, as per their coding styles, can build the application and database connectivity with this framework. They can also view on their multi-threaded web server.

2.3 Comparative Analysis

Laravel Use Cases:

In this figure 2.1 showing below, some of the Laravel use cases have been mentioned. For small-scale websites, it is considered overkill. It is an MVC framework built on the PHP language. one of the best things about Laravel PHP Framework is, that it standardizes everything. in turn, it makes code more manageable among teams personally, this is the most productive framework to date. Laravel PHP Framework effectively solves the problem of coming up with a quick & battle-tested solution.

Figure 2.1: Scopes for using Laravel as backend

Node.js Use Cases:

In this figure 2.2 showing below, some of the node.js use cases have been mentioned. Node.js has a built-in interface for writing and readable streams, which may be processed and monitored in a fast and straightforward manner by the user. Consequently, streams in Node.js do not need the use of caching or the storage of temporary data.

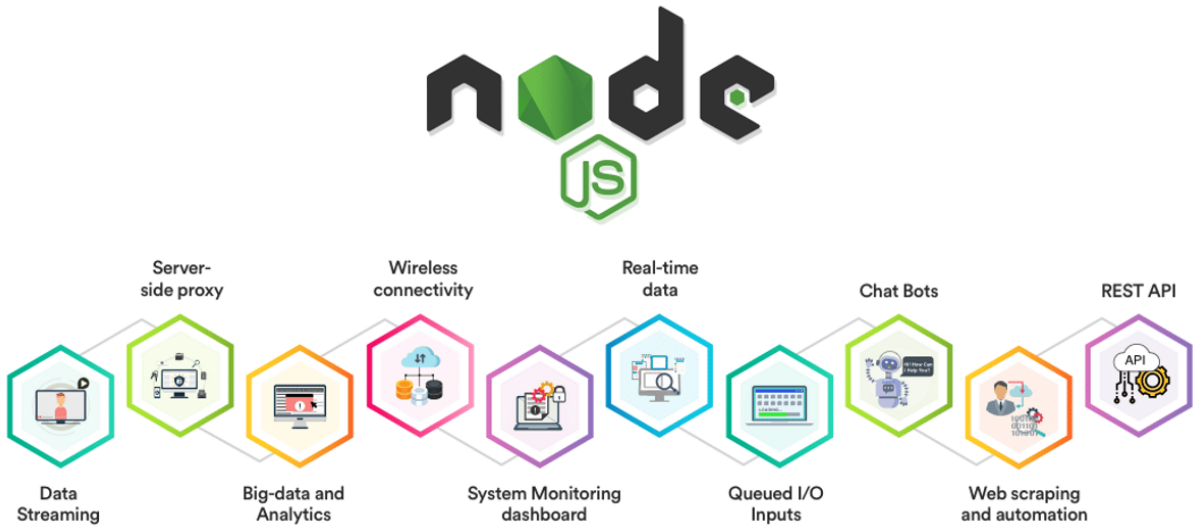

Figure 2.2: Scopes for using Node.js as backend

2.4 Scope of the Problem

Always something new and advanced technology continuously evolving in web technology. As many people using online websites, there is always some kind of performance problem as well as threat of data hacking.

At the time of building this web application project, I tried my best to use the latest and updated tools available to make a faster, reliable and easygoing website. Afterall, there is always something new to learn and implement.

2.5 Challenges

At the beginning of this project, I had to tackle with some kind of difficulties as I wasn't familiar with all of those technologies. I wasn't sure what I should choose as my handy tools. Every web technology has it's pro and cons. During making decisions, I noticed almost more than 90% people use g-mail to create any online identity or use any online services. As firebase already provides faster and secure backend service, so I decided to keep firebase as my backend.

CHAPTER 3

REQUIREMENT SPECIFICATION

3.1 Business Process Modeling

We can understand a living mechanism's interactive operations by a simple crystal portrayal of it's operation measures. The figure below should be a proper demonstration of an ecommerce website's business processing model:

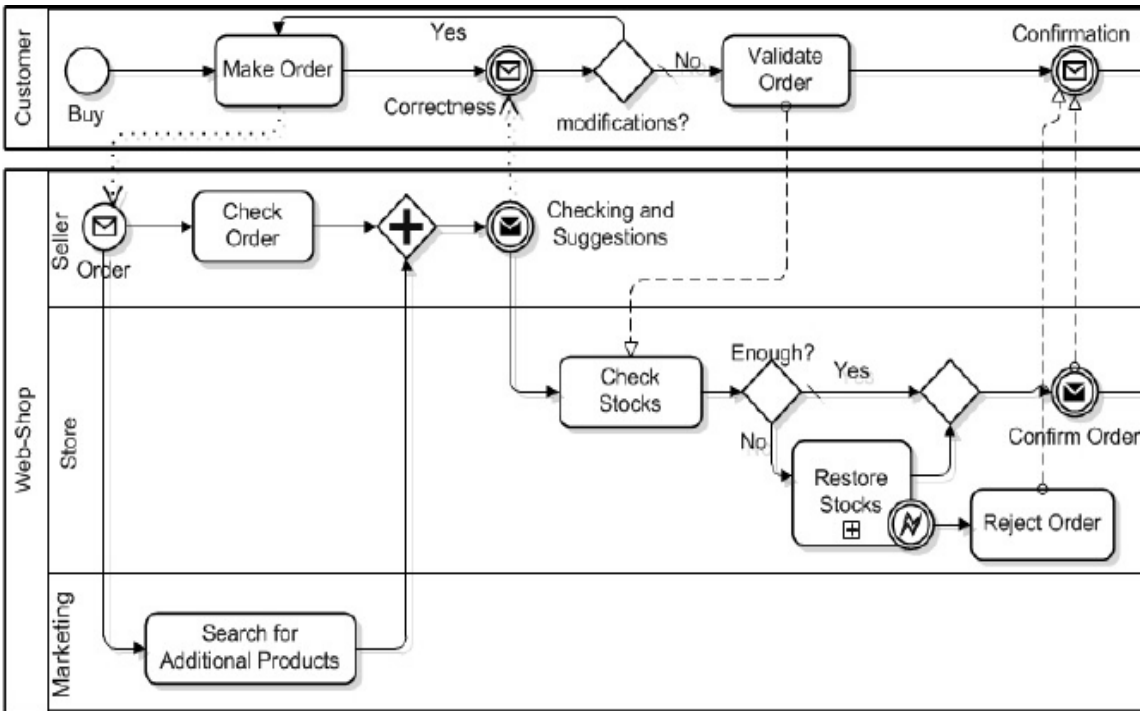

Figure 3.1: A brief scenario of interactions between customers and sellers

In this figure above, the whole process of creating a product cart, updating and finally checking it out has been shown briefly. When a customer makes an order, he or she can update the quantity of this particular order and confirm it.

On the other hand, when a seller receives an order, he or she checks if the product is in stock. If not, then restores stock, add some new products according to customer's request and then confirm and send the order.

3.2 Requirement Collection and Analysis

1. User Actions on The Website

Analyzing the browsing behavior of web store visitors is an important aspect of ecommerce. The drivers, barriers, and hooks, provides useful information on what customers like and dislike.

01) While searching, did users go straight from product pages to checkout without any additional shopping?

02) Sorting products based on the filters provided. Customers come to web store looking for something to buy or at least consider buying at some point. Is there an event that is always triggered first? Does it lead users to more events or more pages?

03) Are there paths through website that are more popular than others, and if so, are those the paths that I want users to follow?

2. Admin Console

An administration panel should help optimize the team's work and make it more efficient, achieving tasks as fast as possible. These include:

01) Audit – It's a good idea to record all users' actions in admin panel and have a particular place to view them. An admin panel normally contains a lot of data. So, it's worth considering the lists' pagination.

02) Content management – It's worth providing control panel user with special rights to create, manage, view, modify, and delete content without writing the code. To make it easier for user to work with the content providing visual templates is important.

There are many pitfalls and challenges in making such an admin panel helpful, straightforward, and easy to use. When it comes to designing websites, web services, or applications, we pay much attention to how usable and intuitive they will be.

3. User Checkout and Payment

The checkout process is the series of steps a customer follows to purchase the items in their shopping cart on an ecommerce store. This includes every step that a customer goes through to proceed through to checkout.

The typical checkout process for a customer is:

shopping cart > billing info > shipping info > preview order > payment > confirmation

3.3 Use Case Modeling and Description

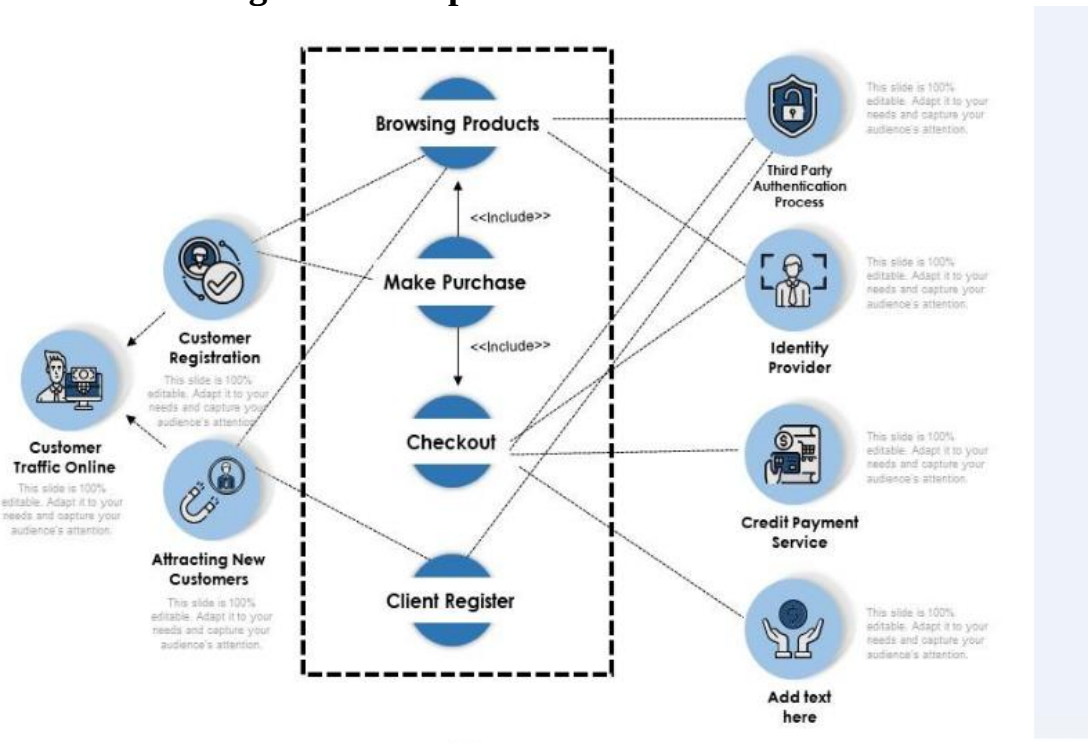

Figure 3.2: Functional scenarios of admins & customers interaction with platform.

Attempt 01: Login
Primary actor: User, Admin
Precondition: N/A
Success scenario:

- User / admin enters valid email in the email field
- User / admin enters valid password in the password field

Exception scenario:

- Email is not valid
- Password is not valid
- Invalid credentials

Attempt 02: Access admin
dashboard **Primary actor:** Admin
Precondition: Login
Success scenario: Admin able to access the admin dashboard.

Attempt 03: Access user
dashboard **Primary actor:** User
Precondition: Login
Success scenario: user able to access the user dashboard.

Attempt 04: Create new user
Primary actor: User
Precondition: Registration dashboard
Success scenario:

- User enters the info of themselves
- Clicks save user button

Exception scenario:

- All the required fields are not filled
- User already exists

Attempt 05: Update product info
Primary actor: Admin
Precondition: View product info
scenario:

- Admin update their product info
- Admin changes their product photo
- Clicks update product button

Exception scenario:

- All the required fields are not filled
- Invalid info

Attempt 06: Product checkout
dashboard **Primary actor:** User
Precondition: Login
Success scenario: user able to check-out the product.

Exception scenario:

- All the required fields are not filled
- Invalid info

Attempt 07: Add new product
Primary actor: Admin
Precondition: Admin dashboard
scenario:

- Admin add their new product info
- Admin upload their product photo
- Clicks add product button

Attempt 08: delete product
Primary actor: Admin
Precondition: Admin dashboard
scenario:

- Admin delete their product
- Clicks delete button

Attempt 09: Payment checkout
dashboard **Primary actor:** User
Precondition: Login
Success scenario: user able to pay for the product.

Exception scenario:

- All the required fields are not filled
- Invalid info

Attempt 10: User Contact
dashboard **Primary actor:** User
Success scenario: user able to send messages to admin

Exception scenario:

- All the required fields are not filled
- Invalid info

Attempt 11: Reset Password
dashboard **Primary actor**: User
Precondition: N/A
Success scenario: user able to access the user dashboard.

3.4 Logical Data Model

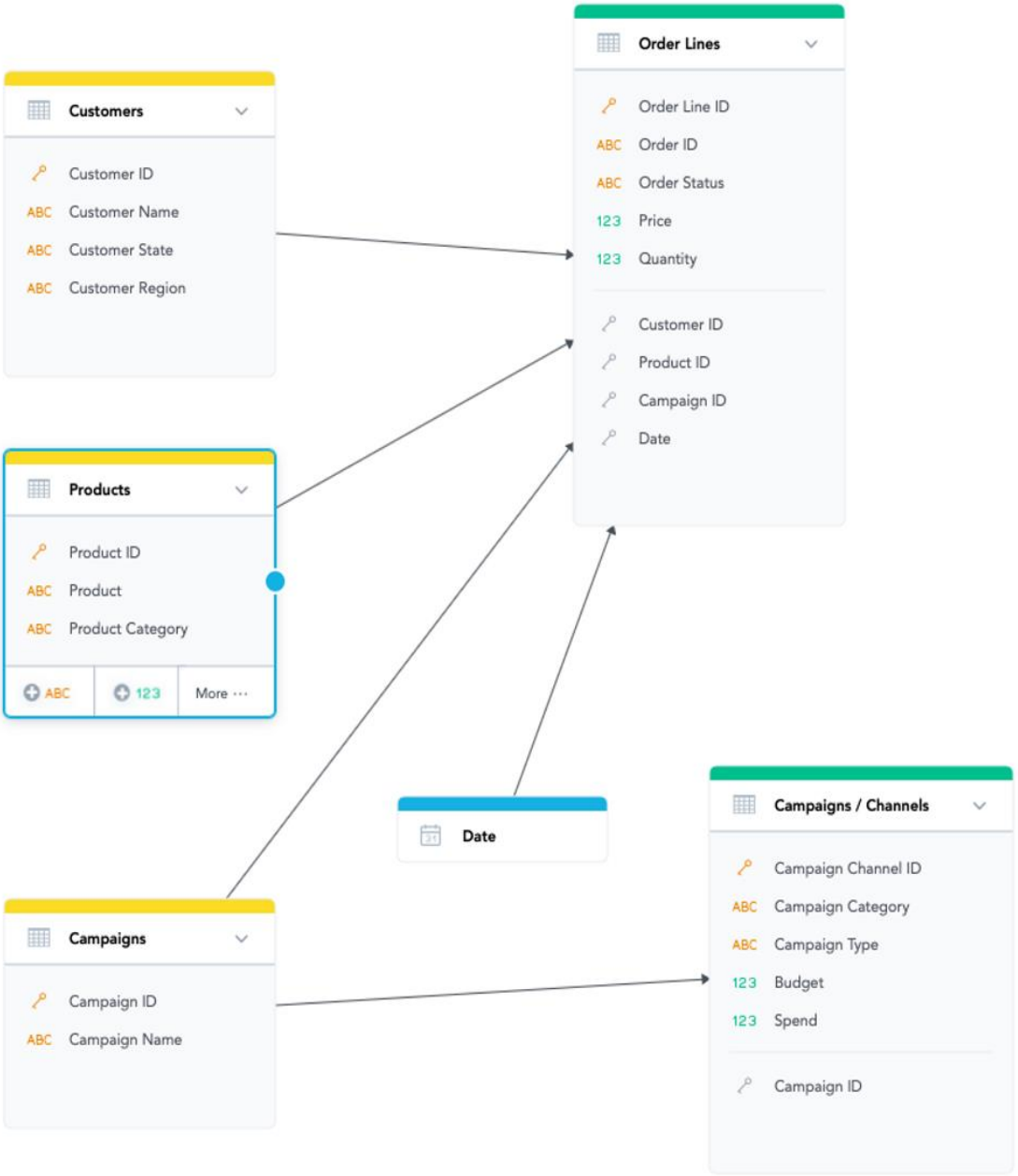

Figure 3.3: Different key-value Sets of several object properties

In this figure showing above, we can see various kinds schemas for different kinds of data. Where category object property is so simple, on the other hand customer's object has more key-value properties. And all of them are essential for next object properties.

3.5 Design Requirement

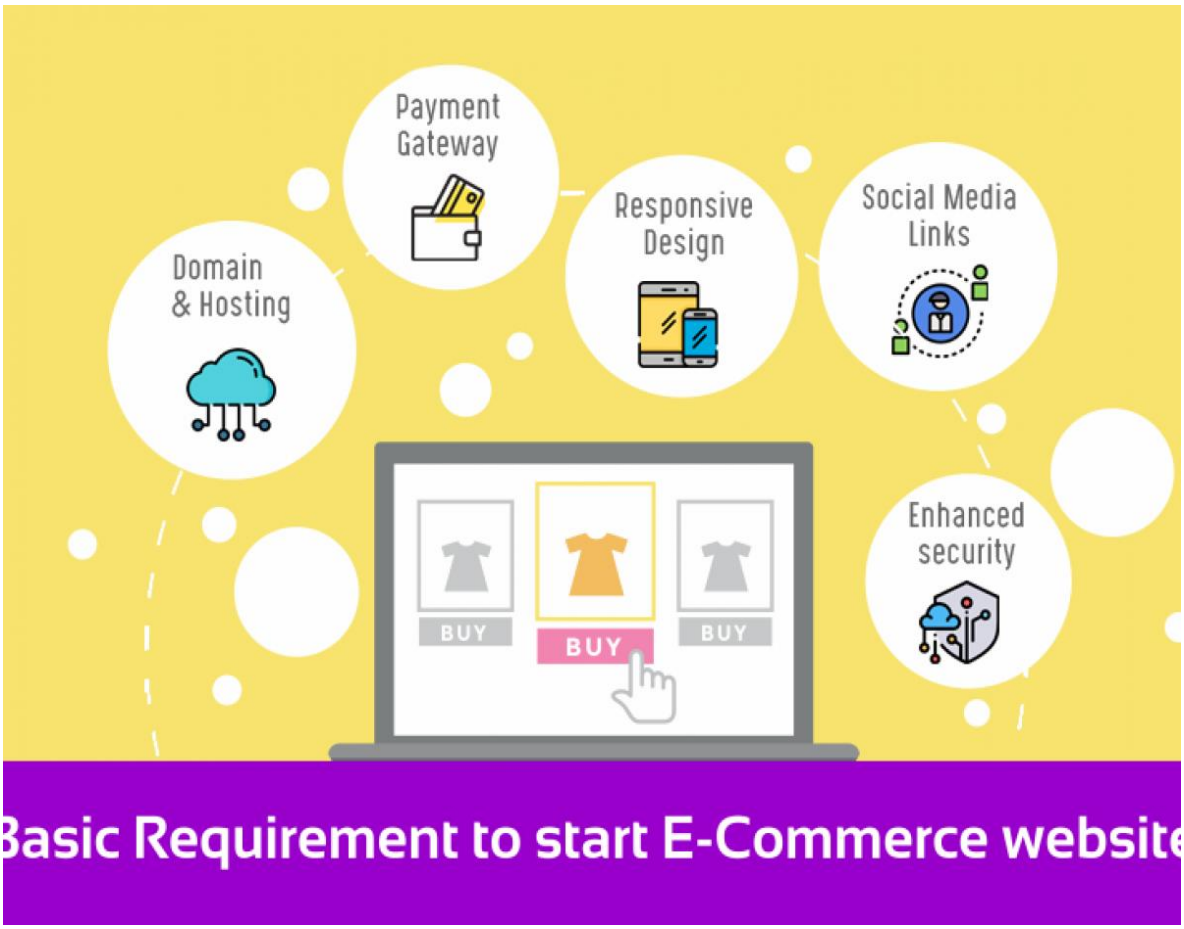

Figure 3.4: Some basic ideas for design requirement

As picture shown above, some of the basic design requirements for an ecommerce website would be:

01) Domain and Hosting

02) Payment Gateway

03) Responsive Design

04) User Friendly UI

05) Enhanced Security

CHAPTER 4

DESIGN SPECIFICATION

4.1 Front-end Design

User interface would be first thing when a user interacts with online services. The smoothest interaction of an online application totally depends on it. This is the actually the first thing that attracts the user. With that info in mind, I tried my best to design a well-organized UI for my web application project. The technologies I've used for the frontend of this projects, are:

01) React JS: Right now, React JS is the most popular java-script library for building frontend after Next JS.

02) SCSS: For styling my pages I've mainly used SCSS which is basically a CSS pre-processor.

Figure 4.1: Benefits of using React at frontend

4.2 Back-end Design

To go along with the current flow of technological development, every developer wants to build great apps, that will serve as business solutions. I chose firebase as my backend technology for this project. Firebase is a toolkit and infrastructure that aims at supporting the process of building better applications and growing a successful business. This technique continues to innovate and dominate the BaaS (Backend as a Service) market. The Firebase database offers so many services due to which it has great potential, so that it may easily replace custom backend development depending on the product development stage and the final goal (whether the product is built to engage active users or you need an MVP or a prototype).

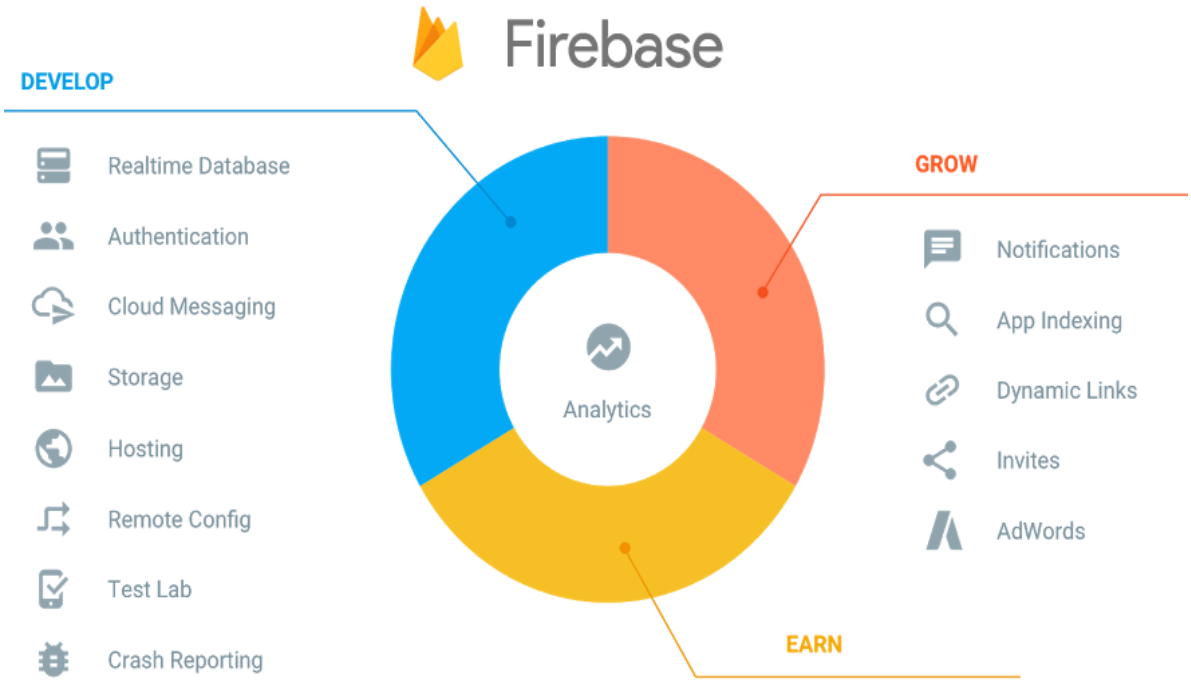

Figure 4.2: Benefits of using Firebase both at backend and as database

4.3 Interaction Design and User Experience (UX)

In process of creating a smooth and attractive user experience I've considered the following points as my (UX) specification:

01) Simple and neat UI

02) Simple color use

03) Small device responsive

04) Toggle sidebar for small devices

05) Loading Animations

Figure 4.3: Some basic requirements for an ideal UX design

4.4 Implementation Requirements

Before designing an ecommerce implementation, mapping all business processes and defining key areas are very important where automation is required. My through implementation requirements were:

01) Managing product information

02) Pricing

03) Receiving and processing orders

04) Resource planning

05) Customer Support

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation of Database

As mentioned before firebase-db has been implemented here. Storage, here are some info figures of my firebase data:

Products data:

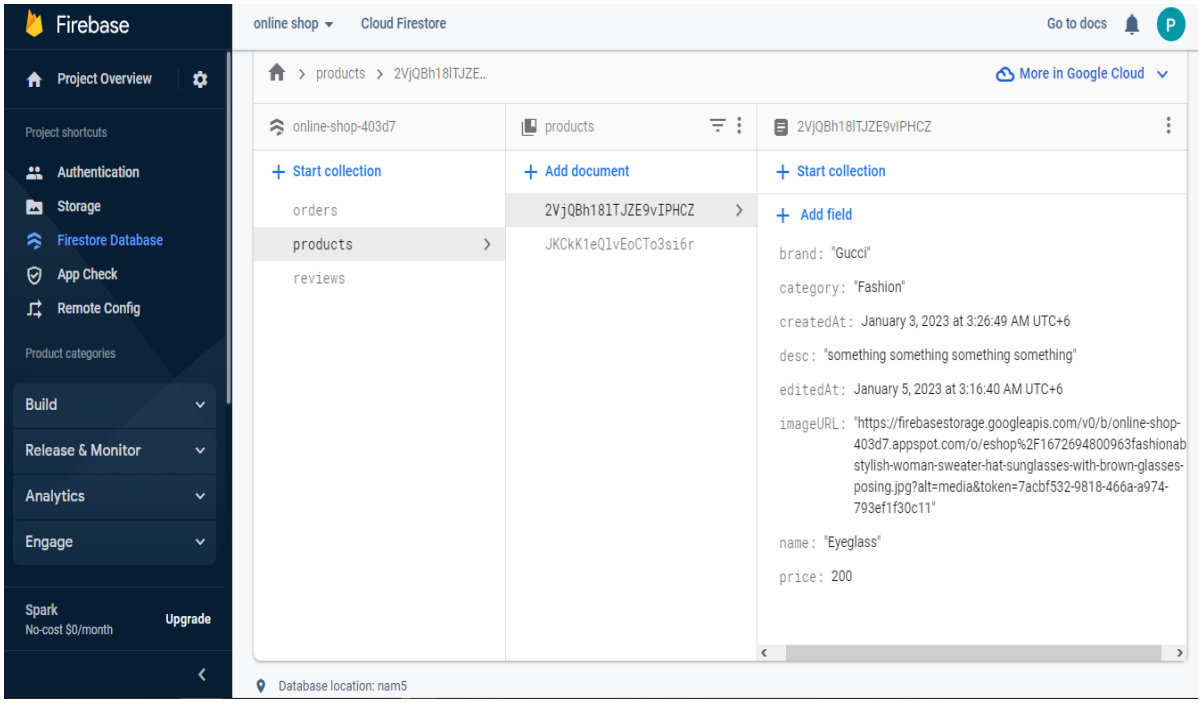

Figure 5.1: Stored products data in firebase

In this picture showing above, we can see, every time when a new product is entered by admin or updated by admin, firebase add or update the product/product data immediately. It is a routine process continuously happening.

Just like that, if the admin deletes data from store, firebase deletes the data from database immediately.

By clicking a particular data, we can see all the data properties on firebase database. It gives us a proper insight data property.

Orders data:

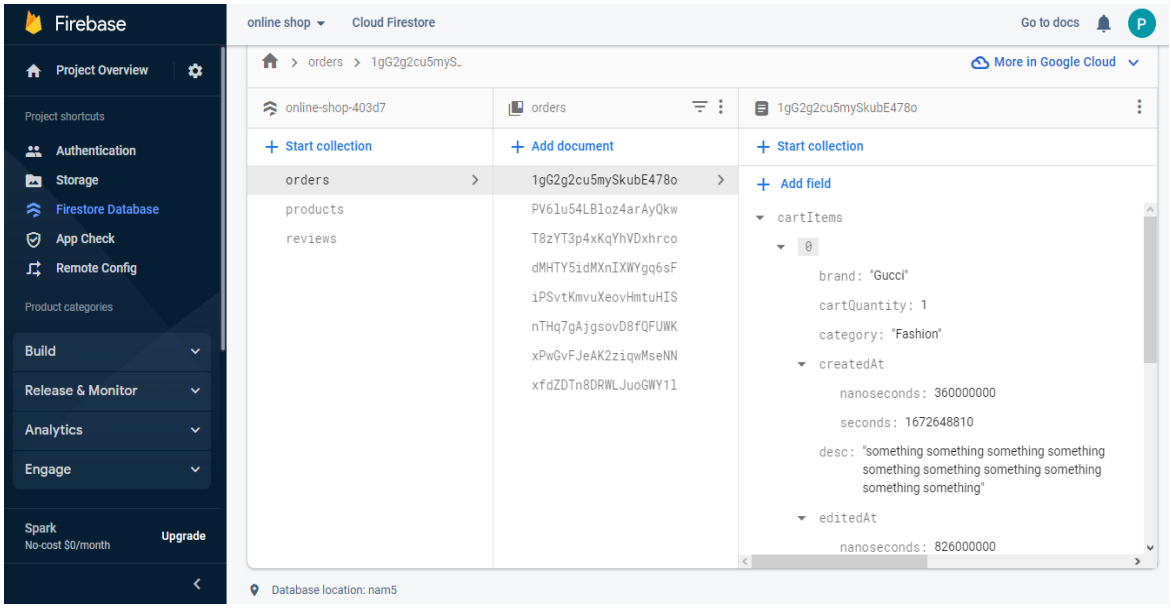

Figure 5.2: Showing order details on database

In this picture showing above, we can see, every time when an order is created by user, firebase add the total descriptions of ordered data immediately. It is a routine process continuously happening.

Just like that, if the admin changes order data status from order placed to processing/delivered, firebase updates the order status in database immediately.

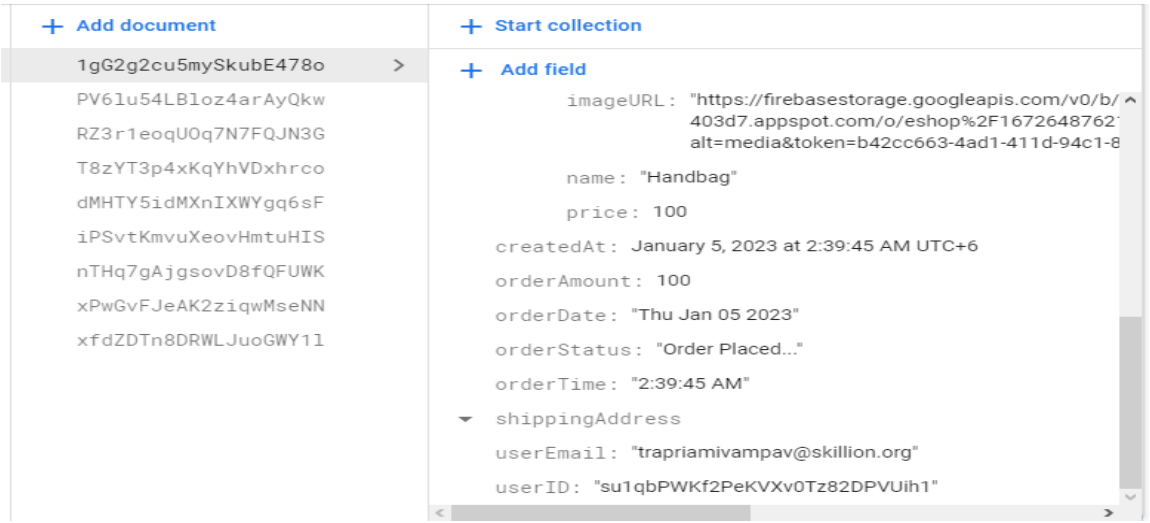

Figure 5.3: Visible order status along with other properties

5.2 Implementation of Front-end Design

Landing Page:

In figure 5.4 showing below, the default landing page of web application has been shown. As we can see, along with fixed header and footer section, we have products on this landing page with different functionalities such as sorting and search options. A user can choose to see products list by selecting different kinds of sorting. If a user wants to get back to previous default state, clear filter is a handy option to clear any kind of filter. And after all of that, a user can add any product to his/her cart by clicking on add to cart button. And also different view mods have been applied.

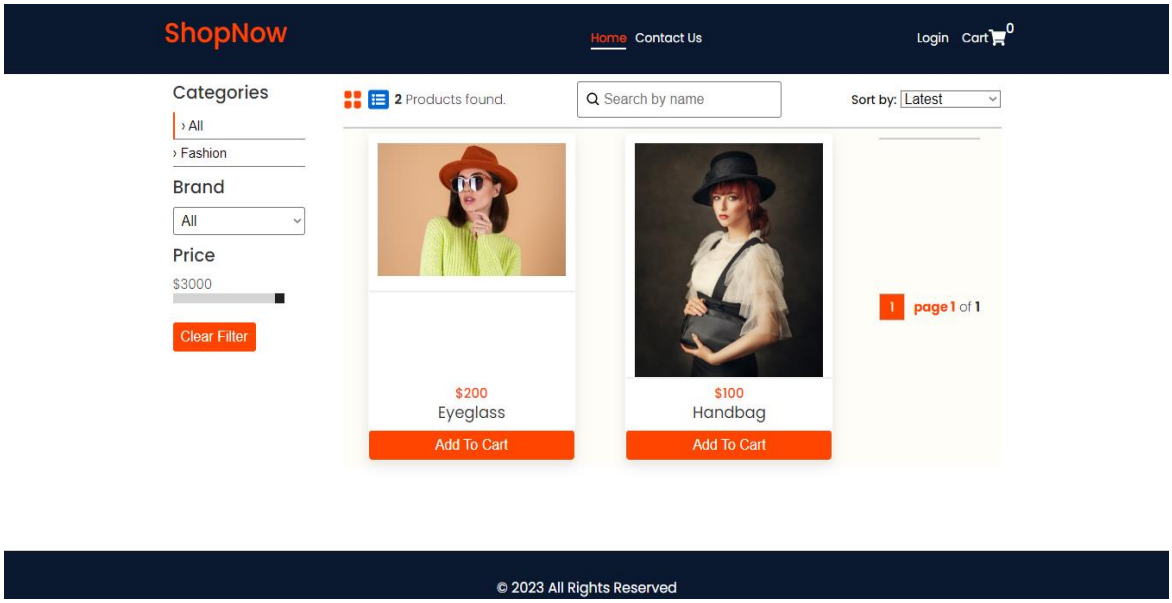

Figure 5.4: Ecommerce Website's Landing Route

Registration Page:

In figure 5.5 showing below, the registration page of web application has been shown. As we can see, along with fixed header and footer section, we have some input fields on this registration page such as email, password and confirm password. After clicking on register button a new user's signing data automatically gets stored in firebase database.

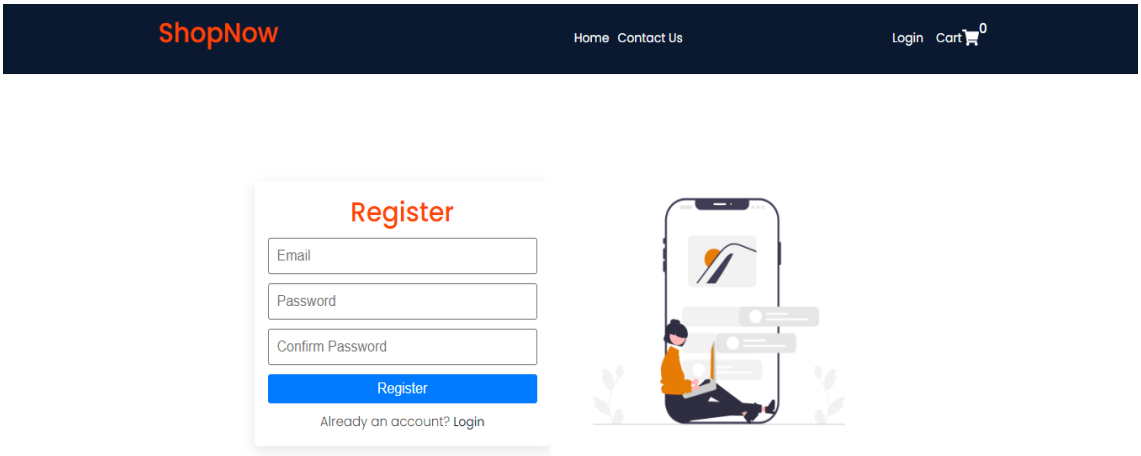

Figure 5.5: Ecommerce Website's Registration Route

Login Page:

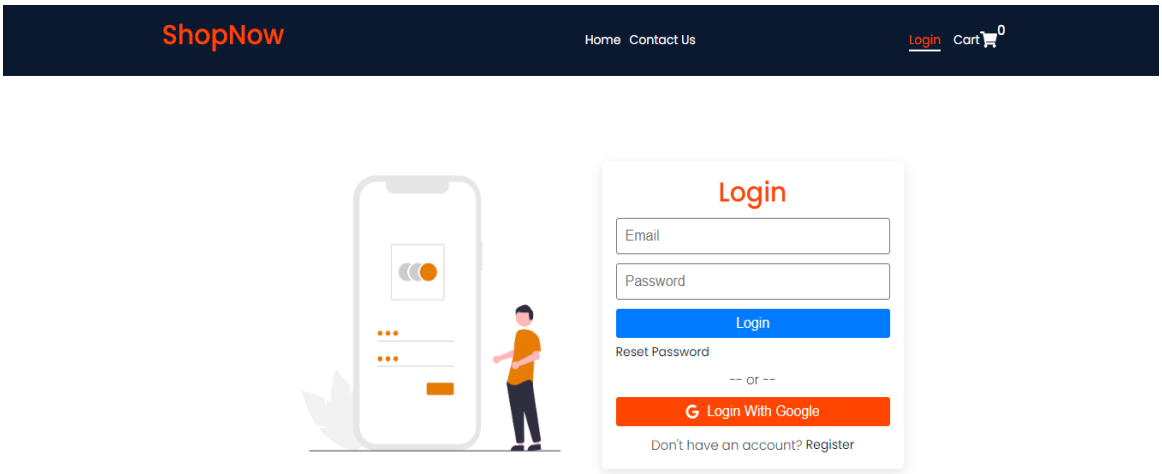

Figure 5.6: Ecommerce Website's Login Route

In figure 5.6 showing above, along with fixed header and footer section, we have some input fields on this registration page such as email, and password. As a different choice, a user can always login with an existing google account.

Reset Password:

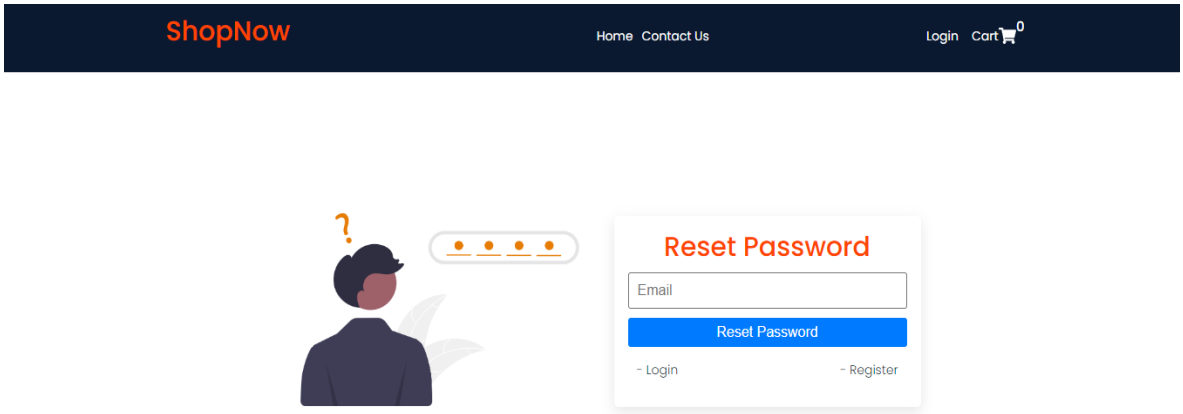

Figure 5.7: Ecommerce Business's Reset Password Route

In figure 5.7 showing above, along with fixed header and footer section, we have some input fields on this reset password page such as email.

Cart:

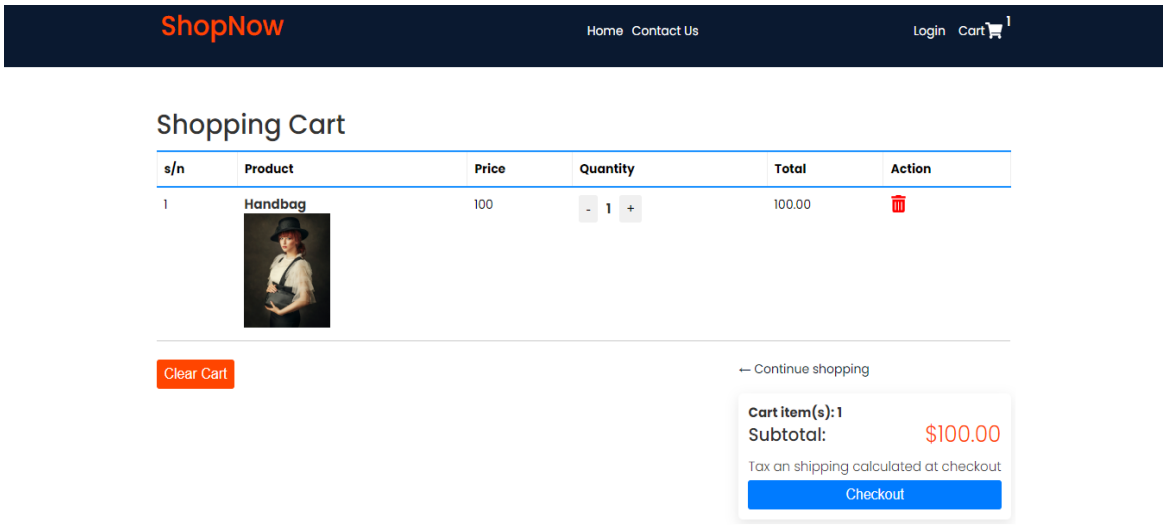

Figure 5.8: Showing product detail on cart page of ecommerce website

In figure 5.8 showing above, along with fixed header section, we have shopping cart item added by user on this cart page along with checkout option.

Admin Home Page:

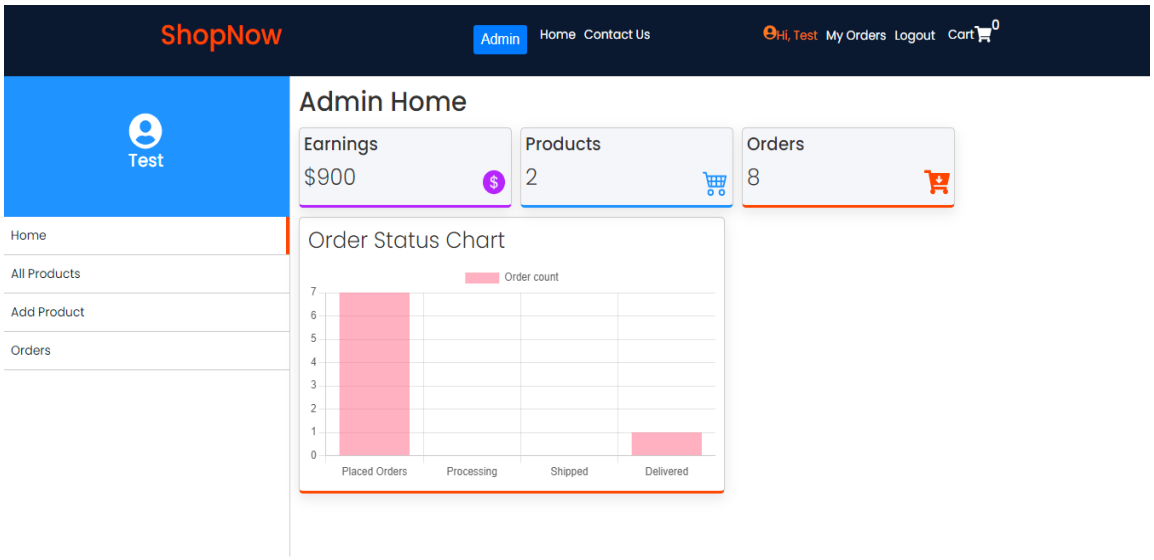

Figure 5.9: Ecommerce Business's Default Admin Route

In figure 5.9 showing above, along with fixed header section, we have admin home panel on this page. All the earnings, products and orders are being shown sequentially along with a easily understandable chart.

There are different route options on this admin page. By default it is a admin page, but choosing other options such all products, add products and orders, admin can easily check all the products, update any product, delete any product and vice versa.

To check any order or update any order status, admin can always go to order route. There are multiple options available to track a product's order state. If a product is not available, admin can always cancel the order and refund the money.

Contact:

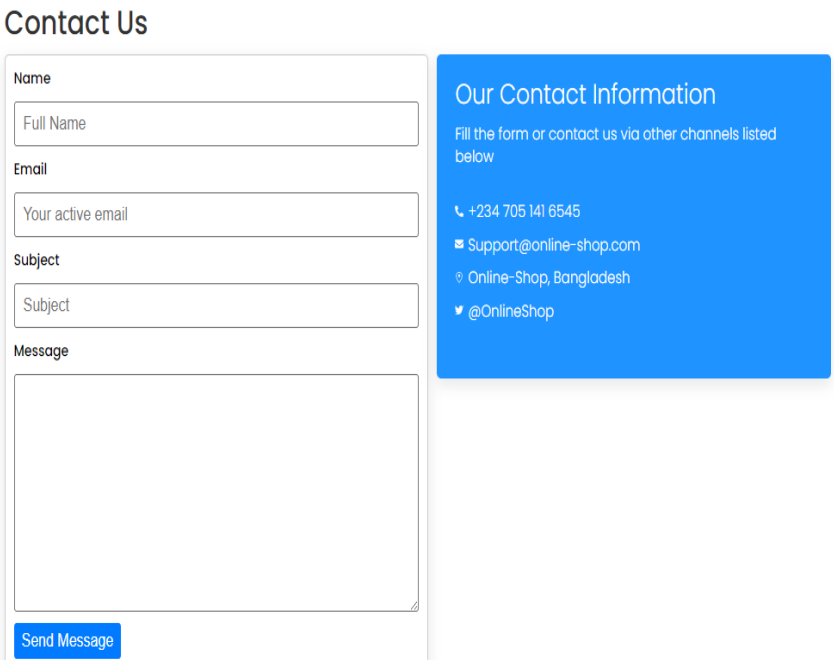

Figure 5.10: Default Contact Us Page of ecommerce website

In figure 5.10 showing above, the default contact page of web application has been shown. For any king of enquiry, any user can always contact to admin through this page.

5.3 Testing Implementation

Any non-examined development procedure isn't reliable. Considering this, once the development part was finished, I did full testing on my ecommerce website. And the test results were positive as expected, ensuring that the application is running properly.

In these following figures, I've created an order and in console option all the details of this particular order are showing orderly. The Id of the order history and the Id of the console's first array data, both are a match.

There are several testing tools for checking backend processes properly. For web development browser integrated consoles are very popular among developers.

Order History:

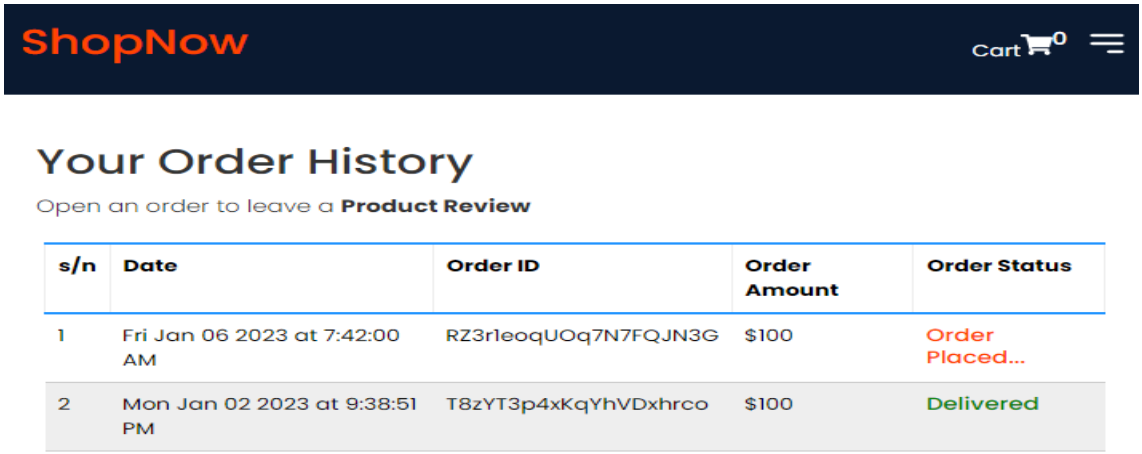

Figure 5.11: Detailed Order History of customer

In figure 5.11 showing above, the order history page of web application has been shown.

Console Data:

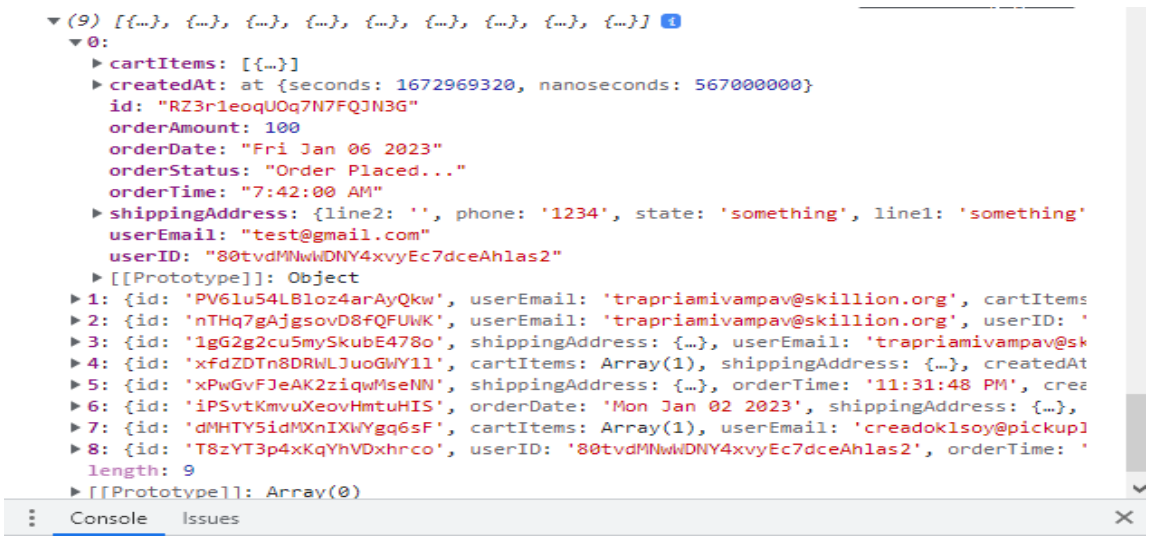

Figure 5.12: Detailed Console Data of users

In figure 5.12 showing above, the console data of web application has been shown. Console data is used for debugging any kind of error.

5.4 Test Results and Reports

To examine the performance my ecommerce website, I have used Lighthouse tools from Google LLC. The test results were positive. From the generated test report shown in Figure 5.4.1, we can see that my application did good at SEO, Accessibility, Best Practices category.

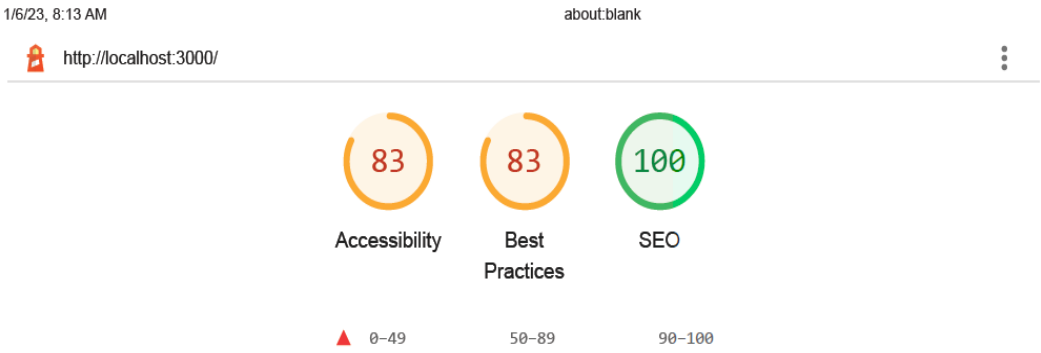

Figure 5.13: Detailed Test Result Reports with Lighthouse

CHAPTER 6

IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY

6.1 Impact on Society

COVID-19 outbreak has totally changed the way we used to manage in our daily life. In order to prevent COVID-19, we are forced to stay in home, in a quarantine environment. All academic institutions were physically shut down. But with the help of modern-day technology and advanced communication system, we overcame the challenges caused by COVID-19 pandemic. Using my development project, like many existing others, people will be able to purchase their necessary goods and fulfill their needs staying at home.

6.2 Impact on Environment

Being a web application that only deals with online purchasing, my ecommerce web application offers no negative impact on the environment. But if we look at the main motivation behind my ecommerce web application, we will see that it encourages people, buyers and sellers to get more active. The economy of our country is still at recovery state after the COVID-19 pandemic. When the people of country will more active about businesses and transactions it will help our economy to recover immediately and effectively.

Web applications have many benefits. Some common benefits include the following:

- Multiple users can access the same version of an application.
- Users don't need to install the app.
- Users can access the app through various platforms such as a desktop, laptop or mobile.
- Users can access the app through multiple browsers.

Due to the manageability and cross platform support deploying web applications for any platform in any type of work environment is easier. It is ideal where bandwidth is limited and the system and data is remote to the user.

6.3 Ethical Aspects

I maintained proper honest approach while developing this online service. During the development of my application, I did not use any licensed or paid services. All the images were collected from free open-source platforms. Besides that, my application does not violate any of the user's rights and privacy.

6.4 Sustainability Plan

I do not intend to make any profit from the application. My application will use open-source license. It will be uploaded to git-hub soon so that the other developers who are interested in these kinds of project can modify and maintain the source code by themselves. Which is the one of the strong points of my application. I hope, many open-source developers will contribute to this project.

CHAPTER 7

CONCLUSION AND FUTURE SCOPE

7.1 Discussion and Conclusion

As human being, work very hard to earn our livelihood is a must. After a lot of hard work and innovation through history and time now we have reached at this stage of today's world. But life still not easy for everyone. Sometimes very little things in life are very time consuming. With the help of modern technology we are trying to reduce our daily worthless time consumption and make our life more productive and enjoyable. My ecommerce website project is just one of the modern technology that brings easiness in our life and make our activities more logical.

7.2 Scope for Further Developments

Some of the essential features are still missing in my web application. Obviously with short amount of time, including those features was not possible. Given enough time, I would like to add some features in my application,

- User's search history
- User's favorite item
- Order cancellation by user
- Money refund policy if the user cancels order

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