CS5054NI Advanced Programming and Technologies

50% Group Coursework

2023 Spring

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CS5054NI **Advanced Programming and Technologies**

I confirm that I understand my coursework needs to be submitted online via Google Classroom under the relevant module page before the deadline in order for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a marks of zero will be awarded.

Contents

1. Introduction 1

1.1. Aims 2

1.2. Objective 3

2. User Interface design 4

2.1. Wireframe 4

a) Register Page 5

b) Login Page 6

c) Home Page 7

- When user is login in 7
- When user is not login (not a home page) 8

d) Admin page 9

e) Product page 10

f) Add to cart 11

g) User page 12

2.2. Actual Design 13

(a) Register page 13

(b) Login page 14

(c) Home page 15

- When user is login in 15
- When user is not login (not a home page) 15

(d) Admin page 16

(e) Product page 16
(f) Add to cart page 17
(g) User page 17
3. Class Diagram 18
4. Method Description 19
5. Test Cases 22
5.1. Test 1 22
5.2. Test:2 24
5.3. Test: 3 25
5.4. Test: 4 28
5.5. Test: 5 30
5.6. Test: 6 31
5.7. Test: 7 36
5.8. Test: 8 37
5.9. Test: 9 39
5.10. Test: 10 42
5.11. Test: 11 44
6. Tools and Libraries used 46
7. Development Process 48
7.1. Analysis 48
7.2. Design 48
7.3. Front-end Development 49
7.4. Database Development 49
7.5. Back-end Development 50
8. Critical Analysis 51

9. Conclusion 52

References 53

Table of Figures

Figure 1 : Wireframe Register page 5
Figure 2 : Wireframe Login page 6
Figure 3 : Wireframe Home page 7
Figure 4 : Wireframe when user is not login (not a home page) 8
Figure 5 : Wireframe Admin page 9
Figure 6 : Wireframe Product page 10
Figure 7 : Wireframe Add to cart page 11
Figure 8 : Wireframe User page 12
Figure 9 : Register page 13
Figure 10 : Login page 14
Figure 11 : Home page (when user is login in) 15
Figure 12 : When user is not login (not a home page) 15
Figure 13 : Admin page 16
Figure 14 : Product page 16
Figure 15 : Add to cart page 17
Figure 16 : User page 17
Figure 17 : Class Diagram of E-commerce Website 18
Figure 18 : Enter required details in the register page 22
Figure 19 : filled information gets stored in the database 23
Figure 20 : Entering Login Details 24
Figure 21 : After logging in 25
Figure 22 : Details of both admin and user in database 26
Figure 23 : Login in as admin in the webpage 26
Figure 24 : Logged in as Admin in Admin Panel 27

Figure 25 : Login in as user in the webpage 27
Figure 26 : Logged in as User in Homme Page 28
Figure 27 : Adding product through admin panel 29
Figure 28 : product gets added to the database. 29
Figure 29 : Adding product through the admin 30
Figure 30 : Product gets added to the product page 31
Figure 31 : Choosing edit option in the admin panel 32
Figure 32 : Updating the data 32
Figure 33 : Product data gets updated 33
Figure 34 : Displaying updated Product 34
Figure 35 : Selecting delete button 35
Figure 36 : Product getting deleted 35
Figure 37 : Adding product to the cart 36
Figure 38 : Products getting added to the cart 37
Figure 39 : Order details before 38
Figure 40 : adding new orders 38
Figure 41 : New orders added tot eh database 39
Figure 42 : Final Order Details 39
Figure 43 : Opening the user profile page and clicking edit button 40
Figure 44 : updating the values 41
Figure 45 : Updated user profile 42
Figure 46 : Clicking the logout button 43
Figure 47 : Logged out from the user page 43
Figure 48 : Clicking the Home Page Button 44
Figure 49 : Viewing home page without logging in 45

Figure of table

Table 1 : To register and add the details to the database. 22
Table 2 : To be able to login after registration 24
Table 3 :Checking the role for both admin and user 25
Table 4 : Adding product from admin panel 28
Table 5 : Checking updated product page 30
Table 6 : Updating and removing products 31
Table 7 : Adding products to Cart 36
Table 8 : Adding products to Cart 37
Table 9 : To change user profile 39
Table 10 : To logout the session 42
Table 11 : To logout the session 44

1. Introduction

To begin with this coursework, we were given a groupwork assignment for this coursework that involved creating an e-commerce website using the code for HTML, CSS, JavaScript, and java with the help of the Eclipse IDE. An e-commerce website is one that enables customers to buy and sell tangible products, services, and digital goods over the internet as compared to at a physical store. A business can process orders, accept payments, handle logistics and delivery, and offer customer service through an e-commerce website. The main features and functionalities of the website are that we made it's a user-friendly interface were it is easy to navigate and making it a simple for the customer to find the products they are looking for. Next is that we have categorized the product and allowing the user to create their own accounts to save their preferences, the website also have secure payment gateway to ensure a safe and secure payment. So as to fulfil the needs of the customer, the website will have these features.

In overall, the clothing brand's e-commerce website provides a variety of features and functions that will respond to the needs of its targeted market. A basic user interface, search and filter options, product categorization, user accounts, a secure payment gateway, and product reviews are some of these. Customers can quickly find, buy, and review their products thanks to the safe, security, and user-friendliness that all of these features together offer.

1.1. Aims

The following are various aims for the e-commerce system.

1. Create a three-package MVC-based e-commerce system using model, view, and controller.

2. Implement a login system that allows users and administrators to register, create encrypted passwords, and log in at the same time.

3. Design a page for the admin panel that includes tools for adding, viewing, editing, and deleting product information with images from the database as well as for viewing a list of each client's orders.

4. Create a home page with products that include an image, a price, a stock level, an AddToCart option, a search option, and the ability to filter products by category, highest price, and highest rating.

5.Make it possible for users to access the homepage without logging in, search for products by category, price, and brand, and register if they haven't already.

6.Install features that allow users who are logged in to edit their profiles, change their passwords, search for products based on category, price, or brand, view the items they have already purchased or added to their cart, add items to their shopping cart using.

7.AddToCart, view their order list, and log out.

Thus, these are aims for designing and building an e-commerce website.

1.2. Objective

The objectives of the e-commerce website are:

1.To develop a functional e-commerce website following the MVC pattern with three packages - model, view, and controller1. To create a working e-commerce website using the MVC design pattern and three packages—model, view, and controller.

2. To implement a secure login system that enables login sessions and allows users and admins to register, login, and have their passwords encrypted.

3. To build an admin panel page that allows the admin to view each client's order list and add, view, edit, and delete product information with images from the database.

4. To create a Home Page that enables users to add items to their cart by selecting the AddToCart button, as well as search and filter products based on category, highest price, and highest rating.

5.To make it possible for users to access the homepage without logging in, search for products by category, price, and brand, and register if they haven't already.

6. To give logged-in users the ability to edit their profile, change their password, search for products by category, price, or brand, view the products they have already purchased or added to their cart, place AddToCart orders, view their order history, and logout.

7. To use naming conventions, comments, and proper exception handling codes and programming styles.

Therefore, the previously mentioned points are the main objectives of the e-commerce website.

2. User Interface design

The front-end application view with which a user interacts in order to use the software is known as the user interface (PranathiBadugu, 2023). The user interface of the software gains in popularity if:

- Attractive
- simple to use
- Response time is quick.
- Simple for understanding
- consistent across all interface screens.

  There are two types of User Interface which are:

  a. Command Line Interface
  b. Graphical User Interface (GUI)

2.1. Wireframe

A wireframe is a diagram or blueprint that can be used to facilitate communication between you, your programmers, and your designers regarding the organizational layout of the software or website you're developing (balsamiq, 2022).

a) Register Page

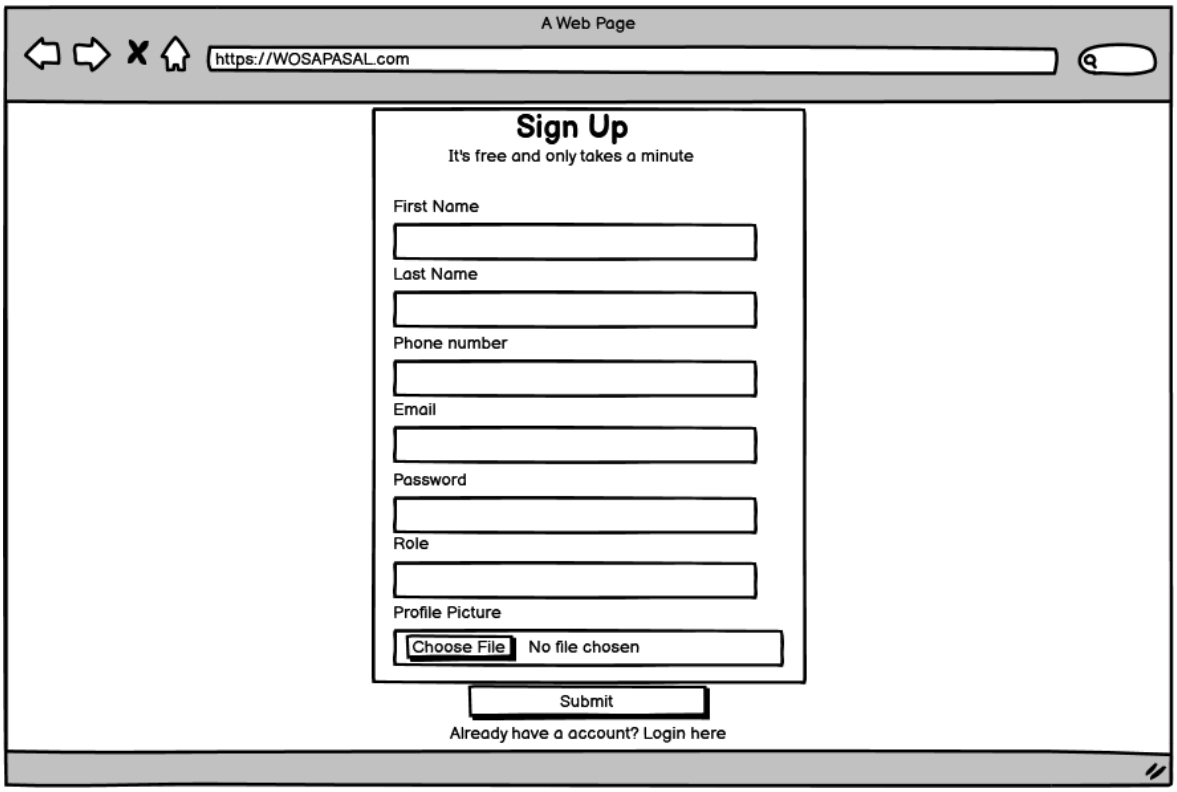

Figure 1 : Wireframe Register page

b) Login Page

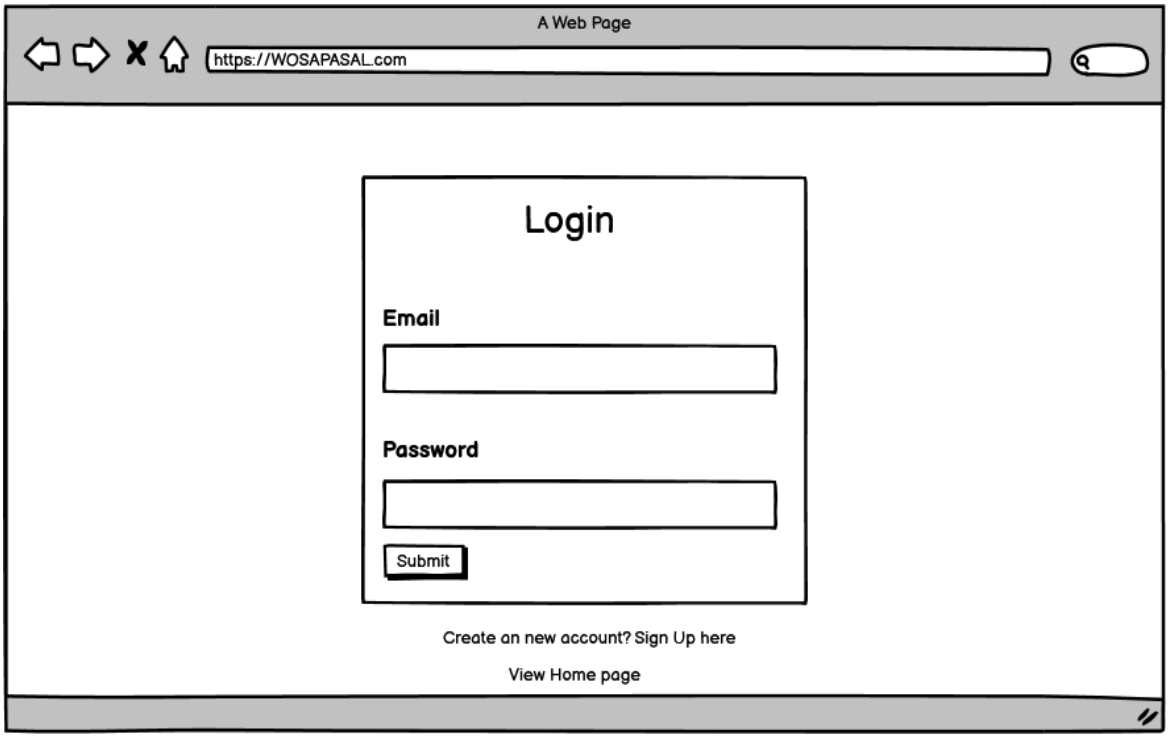

Figure 2 : Wireframe Login page

c) Home Page

- **When user is login in**

Figure 3 : Wireframe Home page

- **When user is not login (not a home page)**

Figure 4 : Wireframe when user is not login (not a home page)

d) Admin page

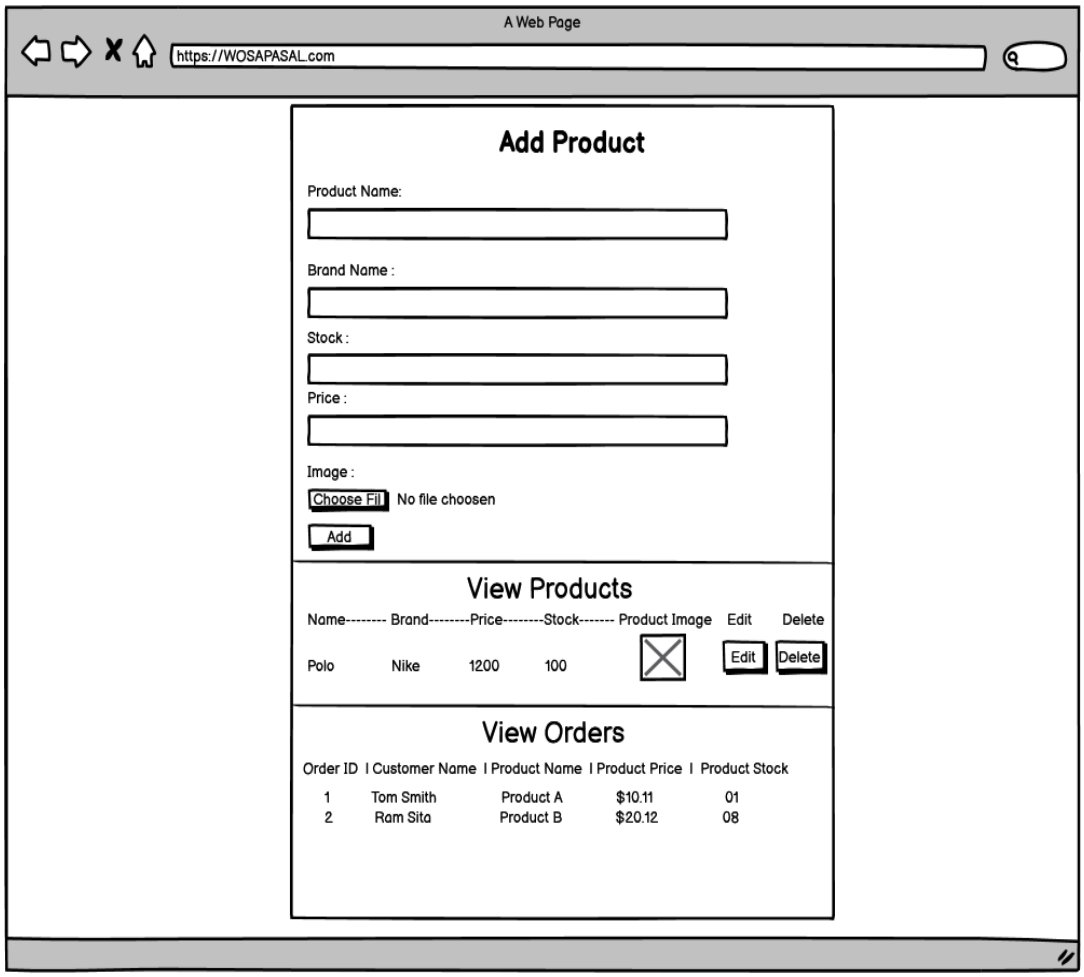

Figure 5 : Wireframe Admin page

e) Product page

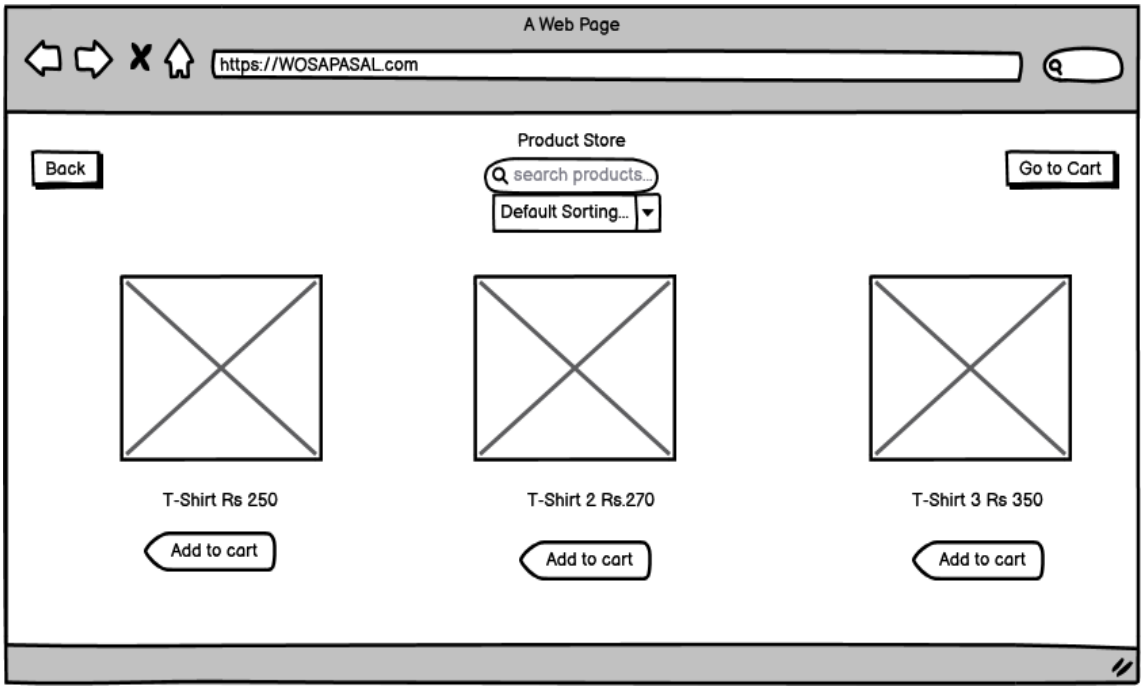

Figure 6 : Wireframe Product page

f) Add to cart

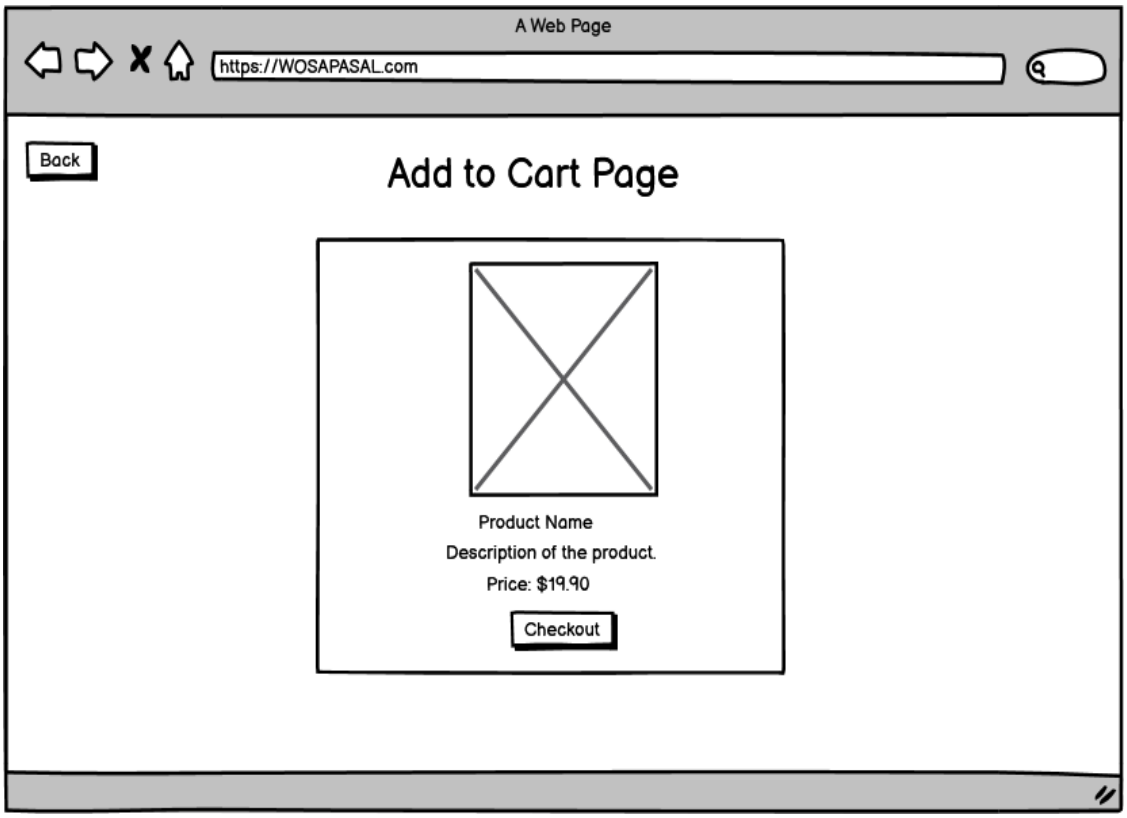

Figure 7 : Wireframe Add to cart page

g) User page

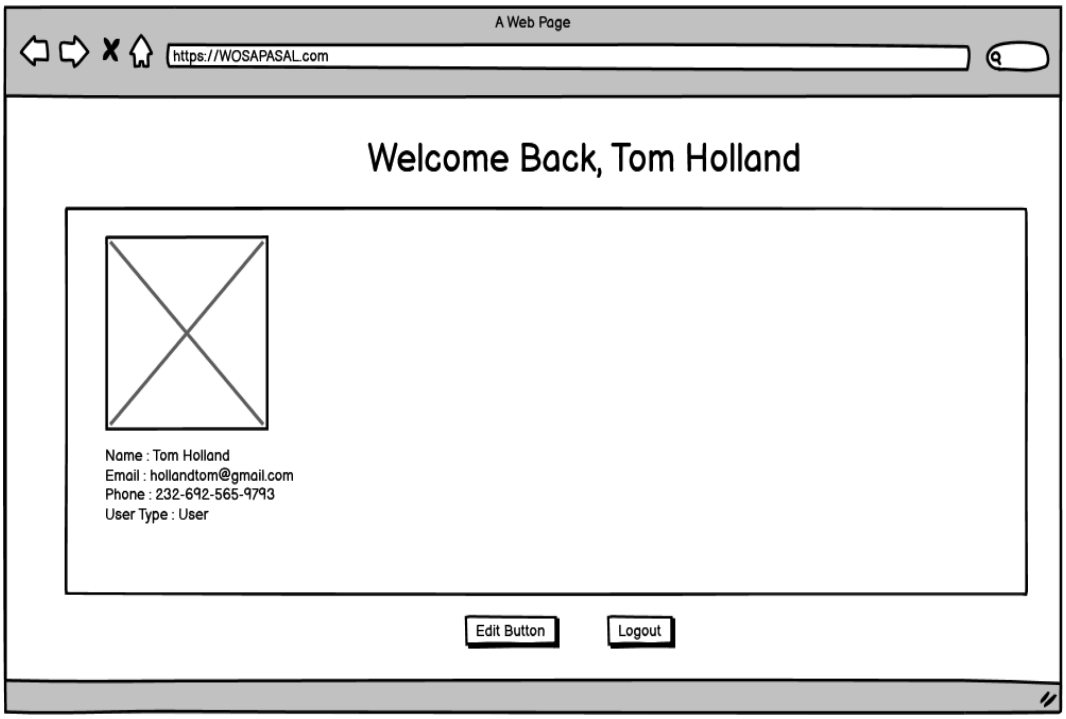

Figure 8 : Wireframe User page

2.2. Actual Design

Actual design simply refers to the stage or final product that is recognized as the result of the design process. This could be a physical or digital product, system, or service. This can be a material or digital product, system, or service. It represents the design concept in action and frequently uses design components like colour, shape, texture, etc.

(a) Register page

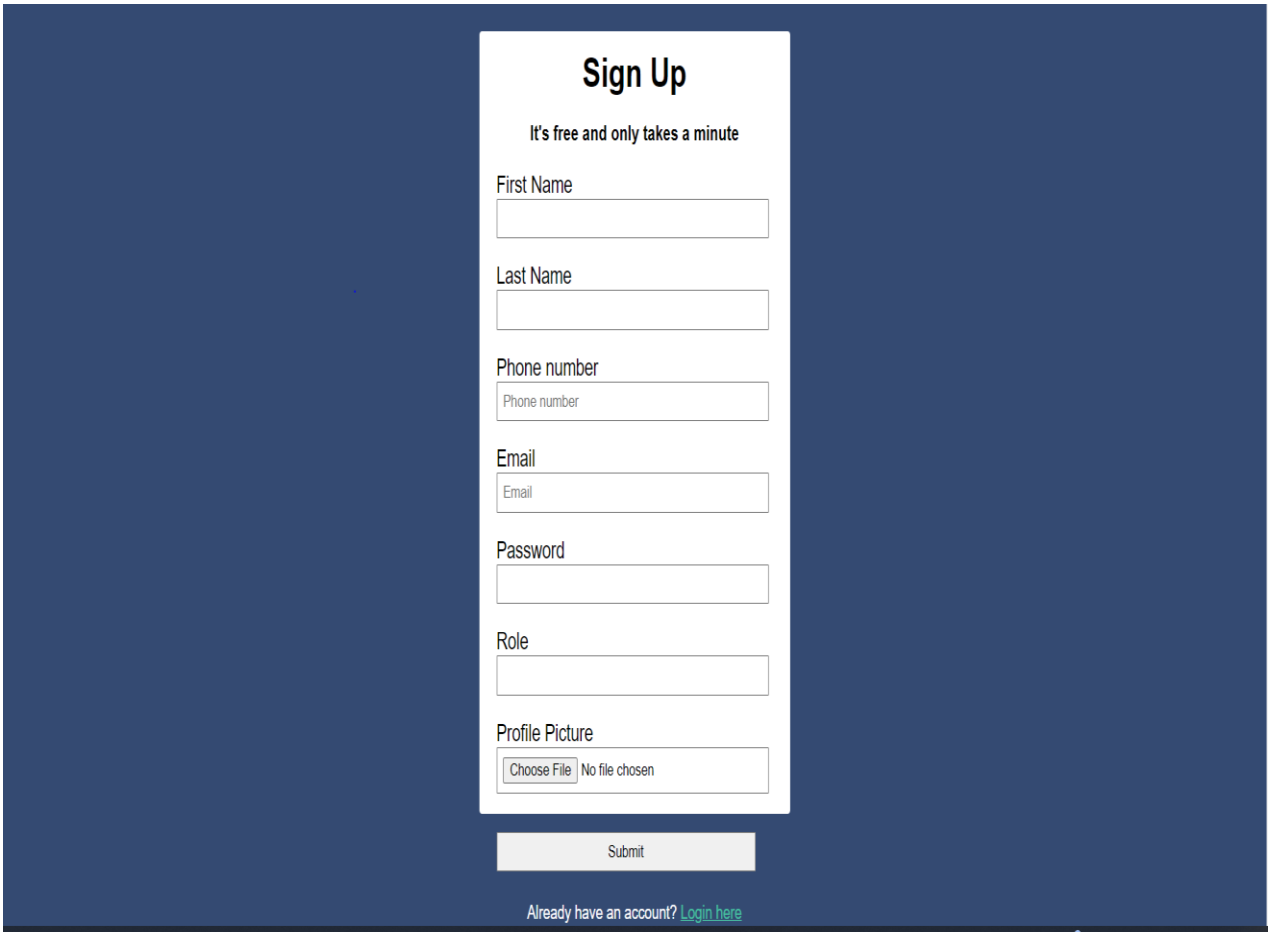

Figure 9 : Register page

(b) Login page

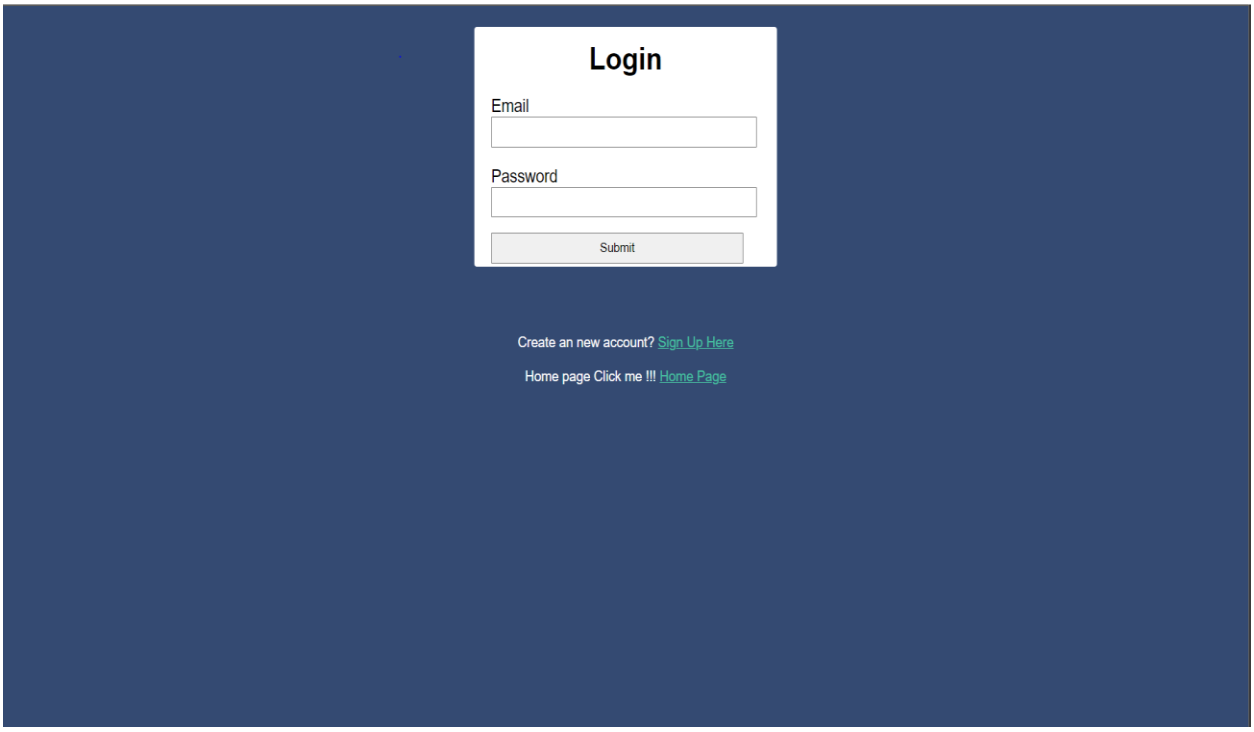

Figure 10 : Login page

(c)Home page

- **When user is login in**

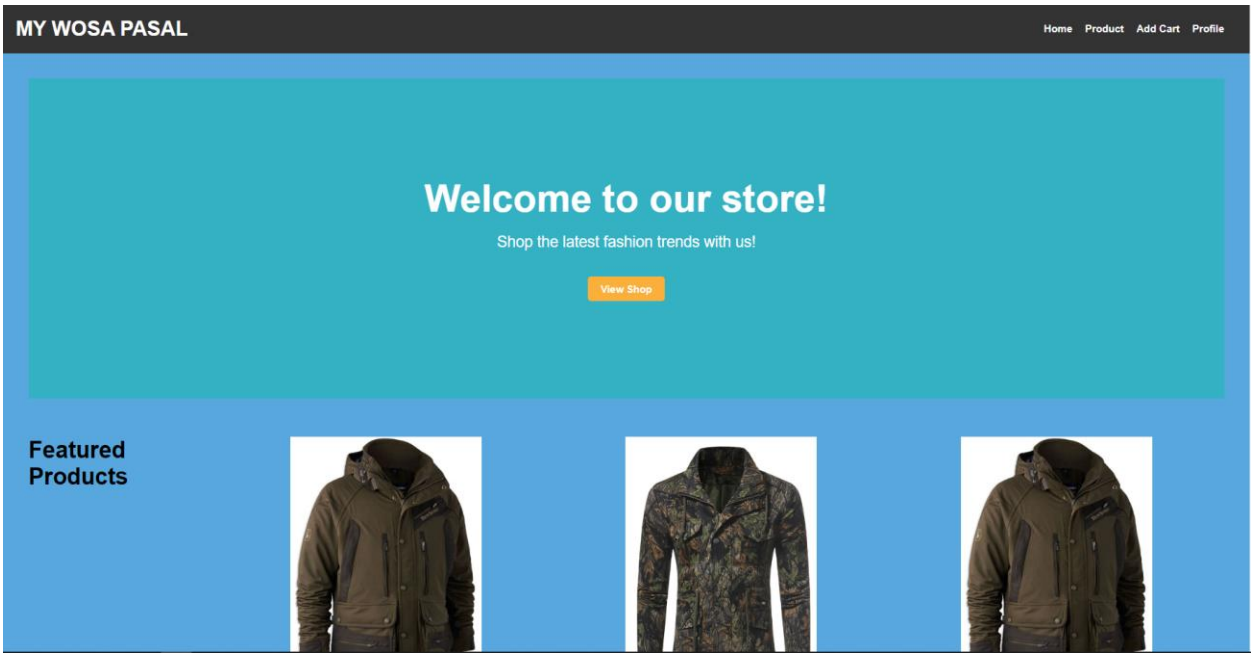

Figure 11 : Home page (when user is login in)

- **When user is not login (not a home page)**

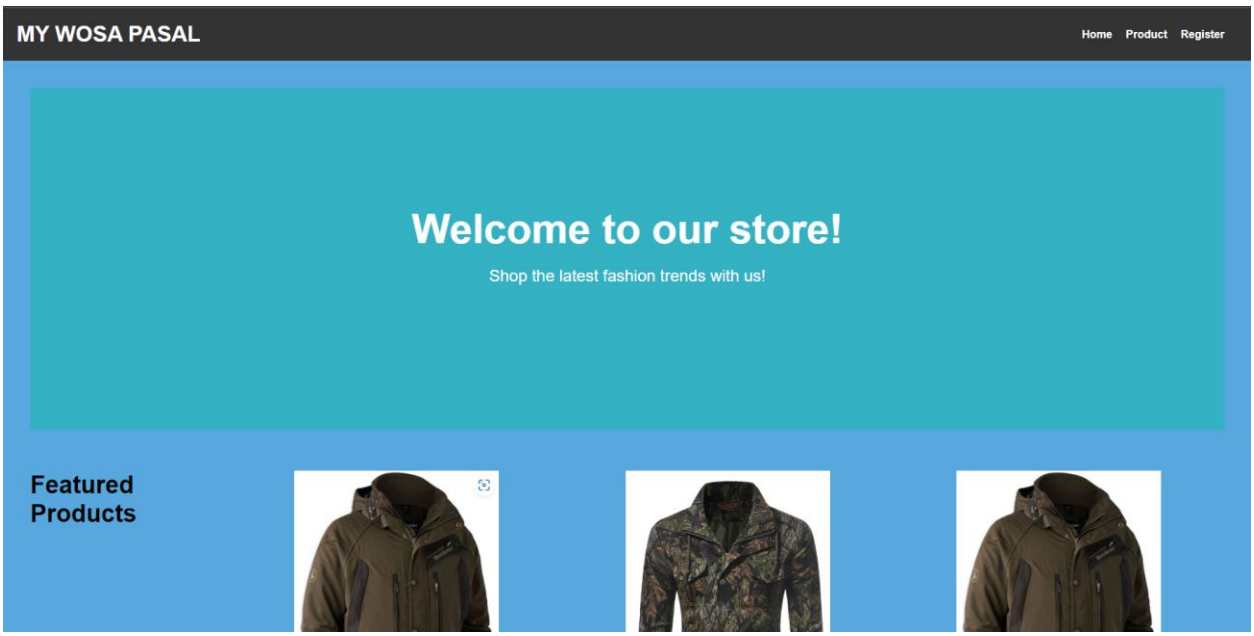

Figure 12 : When user is not login (not a home page)

(d)Admin page

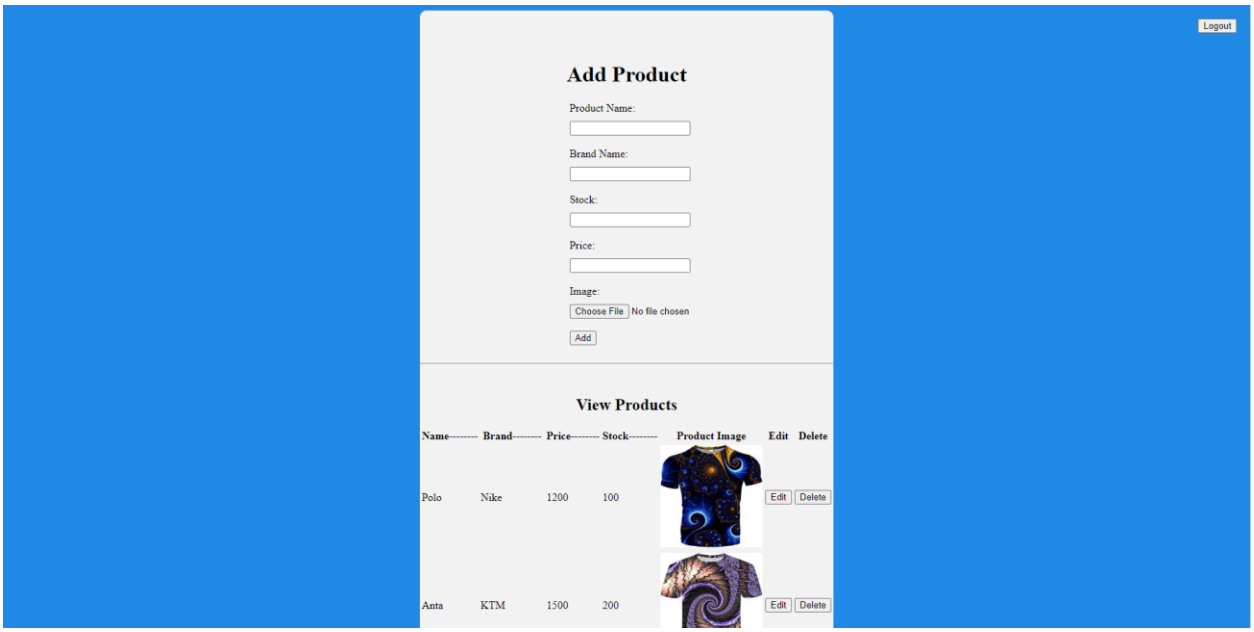

Figure 13 : Admin page

(e)Product page

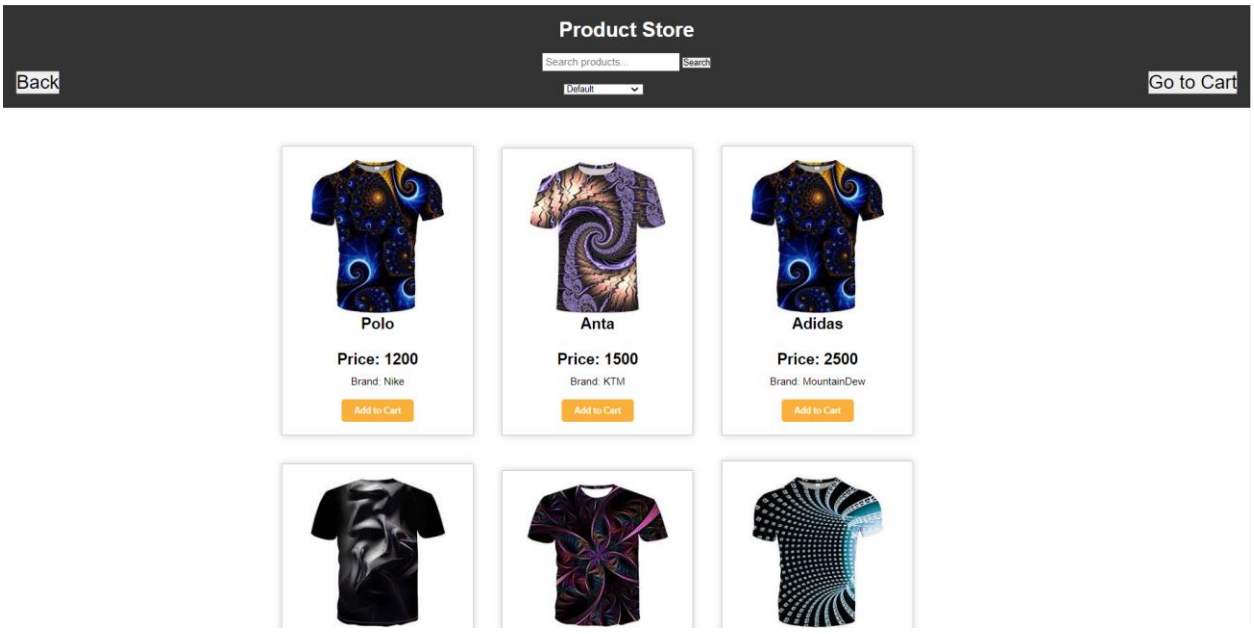

Figure 14 : Product page

(f) Add to cart page

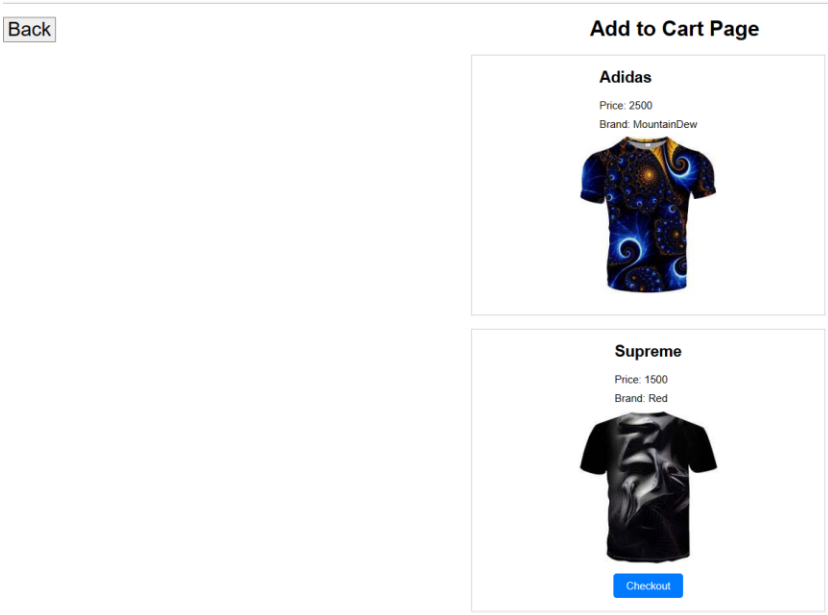

Figure 15 : Add to cart page

(g)User page

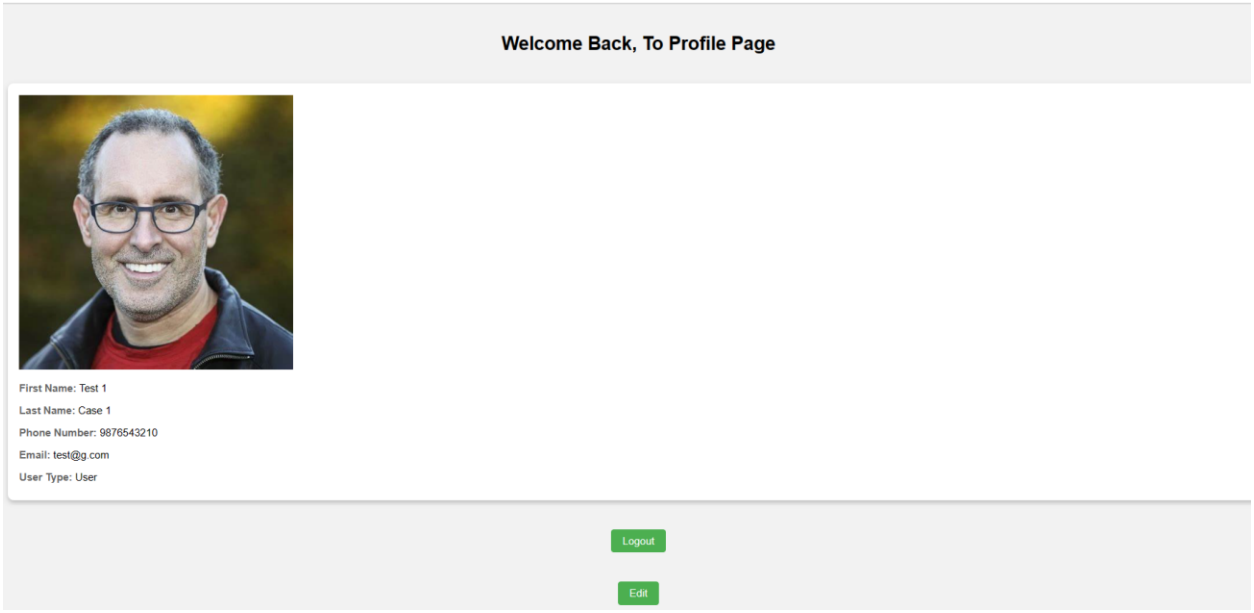

Figure 16 : User page

3. Class Diagram

In the Unified Modelling Language (UML), a class diagram is a type of static structure diagram that demonstrates the classes, attributes, operations, and relationships between the system's objects in order to describe the system's structure (visual-paradigm, 2022).

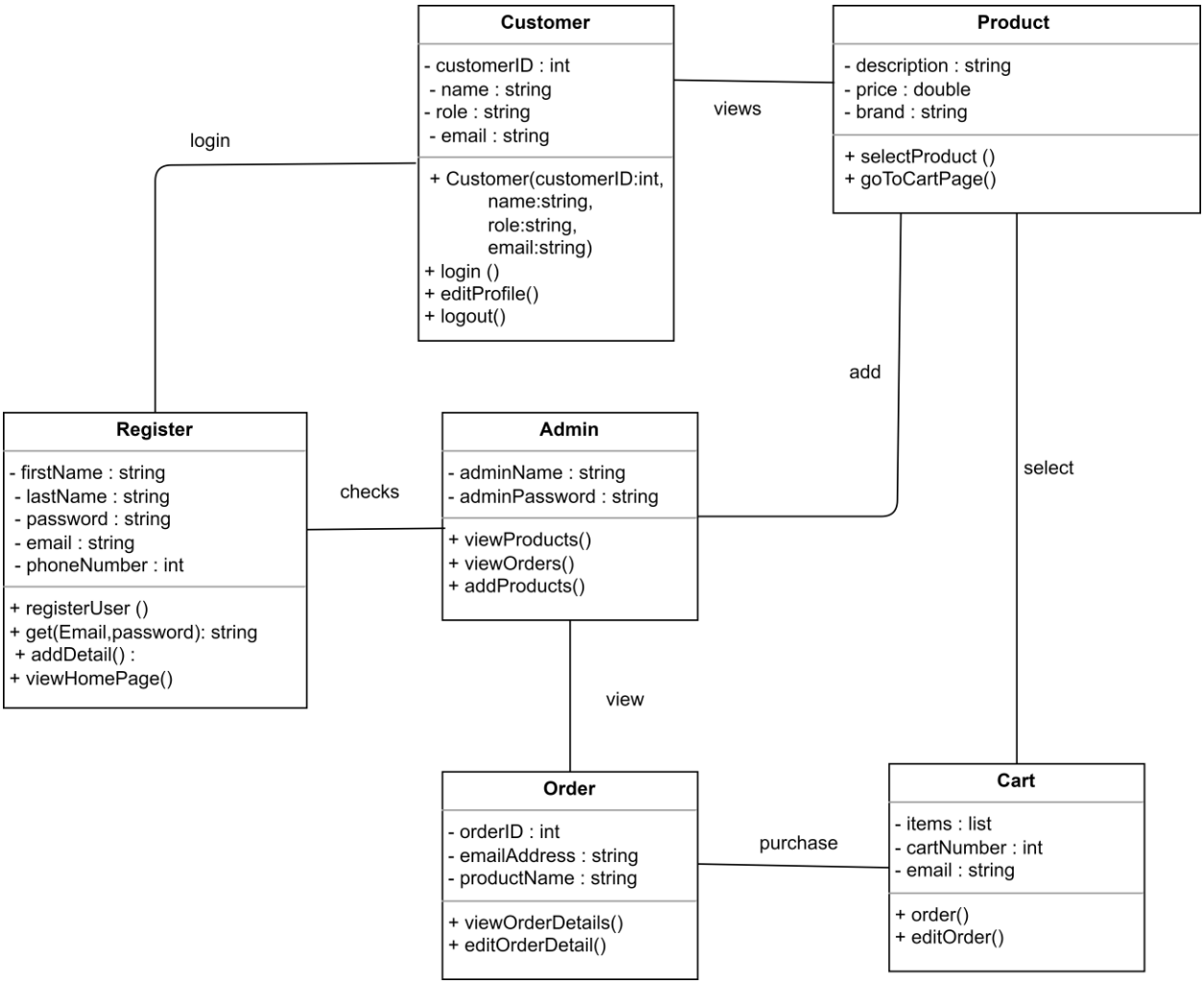

Figure 17 : Class Diagram of E-commerce Website

4. Method Description

A method is a subroutine attached to a particular class defined in a program's source code. Though it can only be called by an object made from a class, it is similar to a function (techterms, 2011).

Method	Description
isUserAlreadyRegistered ()	This function checks if whether the user is already register in the system. It basically checks if the user's email address or the username is already existed in the database or not, this method is used to prevent the whether the user registration is duplicate or not and it also ensure that user can log in successfully.
isUserRegistered ()	This function is used to verify the user in the system of the registration. It also checks that if the user's email address or the username and password match the on that is stored in the database. This method is used to validate user login attempts and it also ensure that the only registered user can access the restricted areas if the website.
isAdmin ()	This function is used whether to determine the user is the administrator or not in the system. It also checks if the user's email / username and the password match or not in the stored database and also checks is the user's account has the privileges the administrative controls. This method is also used to limit the access of the certain parts of the website that are reserved for the administrators only.
registerUser ()	This function is used to check the new user register in the e-commerce website. In this method it performs various checks such as verifying the user email and username are unique or not, and it also validate the password strength and saving such as

	the user's data to the database. And finally, this method is used to give access the new user to create the account and give access to the website's features such as purchasing the product and viewing the order list etc.
updateUser ()	This function is used to update the user's personal info in the website database. It then performs various checks such as validating the new data and user's records been updated in the database. And it also allows the users to modify their personal info which can help in accurate shipping delivery and billing information, which ensures their account.
deleteUser ()	This method is used to take responsible for deleting the user for the database based on the user provided user ID. It also first check if the user is existed in the database or not by giving a calls 'isUserRegistered' method. In the database if the user is found, basically it removes the user information from the database by using appropriate SQL statements. In the final process of this method, it throws an exception where the user cannot be deleted because it does not exist in the database and can not be delete.
registerProduct ()	In this method we use to add new product to the database. This method first checks about the product if it has the same name already existed in the database or not. If it exists, it is returned as error message. Apart from it, it inserts the detail of the products into the database and returns as the success message.
ProductRegister ()	It checks whether the product is already registered or not in the database.
delectProduct ()	In this method it removes product specific from the database. This method basically used in the admin

	panel of the e-commerce website which allows the admin to remove the products that are not available or has been discontinued.
UpdateProduct ()	In this method we first check if the admin user is verified and has the required permissions in order to update the products. After that it recovers the product from the database using the ID, and the information with new values will be updated with the new values and it will be saved the changes back to the database. Finally, the method will be returned as message status specify where the update was success or not.
AddCart ()	First of all, it checks whether both the user and product exist or not in the database by calling the method 'isUserRegistered' and 'isProductRegistered'. If both the product and its user exist, then it adds the product to the cart and then update the cart information in the database by using the appropriate SQL statements. At last, if both user or product do not exist, again it throws an exceptions where it indicates the product cannot be added to the cart as the user or the product does not exist in the first place of the database.

5. Test Cases

5.1. Test 1

Objective	To register and add the details to the database.
Action	Enter all required details in the register page
Expected result	To store our information in the database
Actual result	Our information gets stored in the database
Conclusion	Test Successful

Table 1 : To register and add the details to the database.

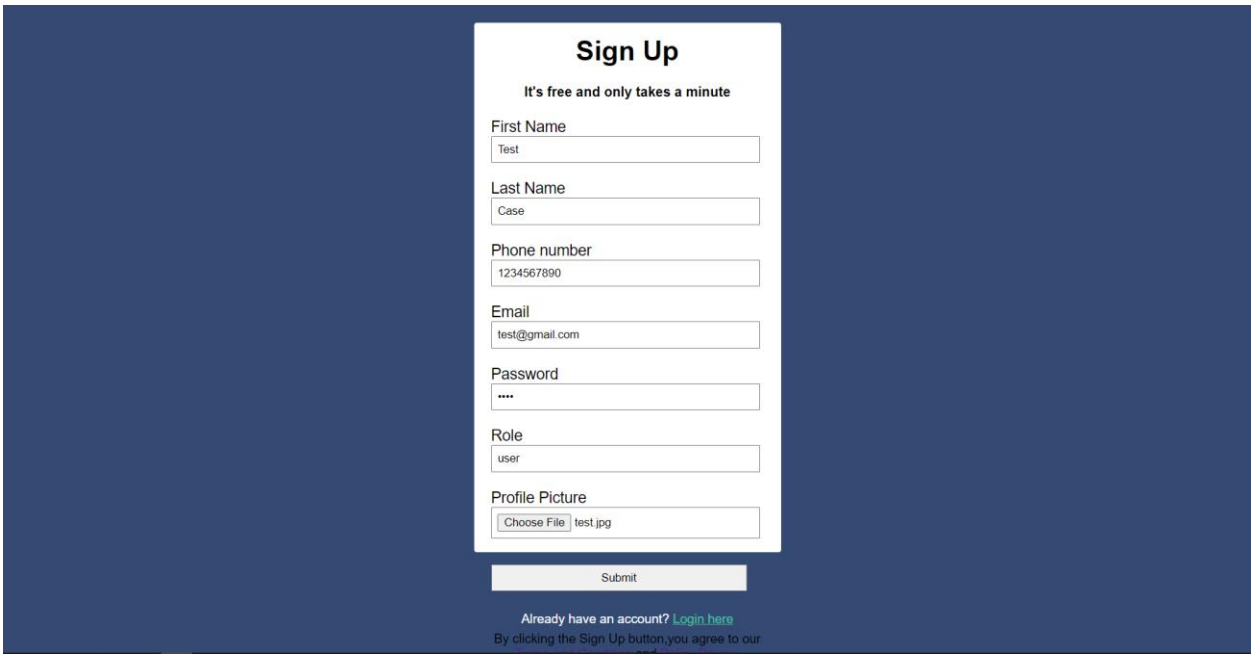

Figure 18 : Enter required details in the register page

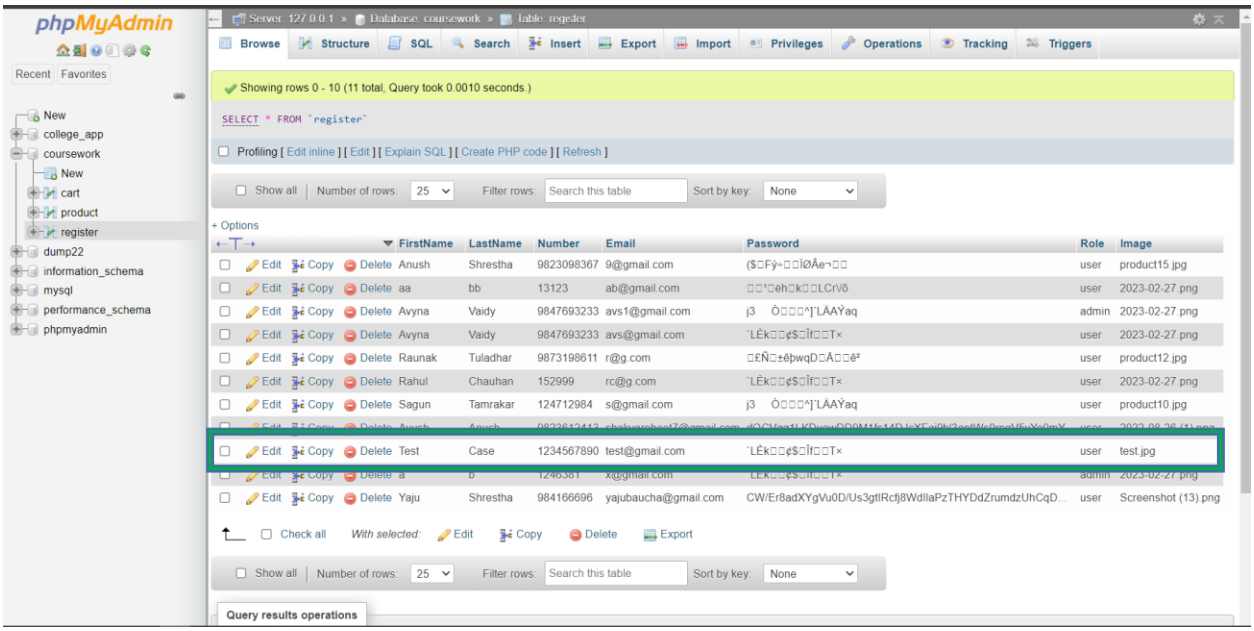

Figure 19 : filled information gets stored in the database

5.2. Test:2

Objective	To be able to login after registration
Action	Enter all required details in the login page
Expected result	To be able to log in the website
Actual result	Able to access to the home page after logging in
Conclusion	Test Successful

Table 2 : To be able to login after registration

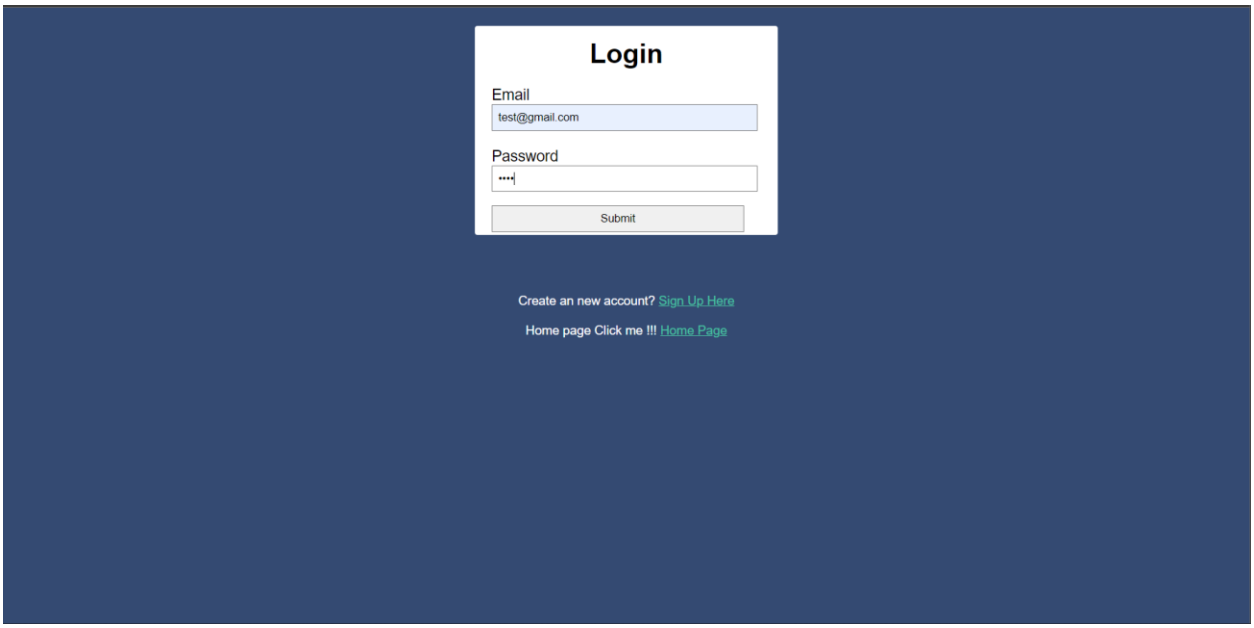

Figure 20 : Entering Login Details

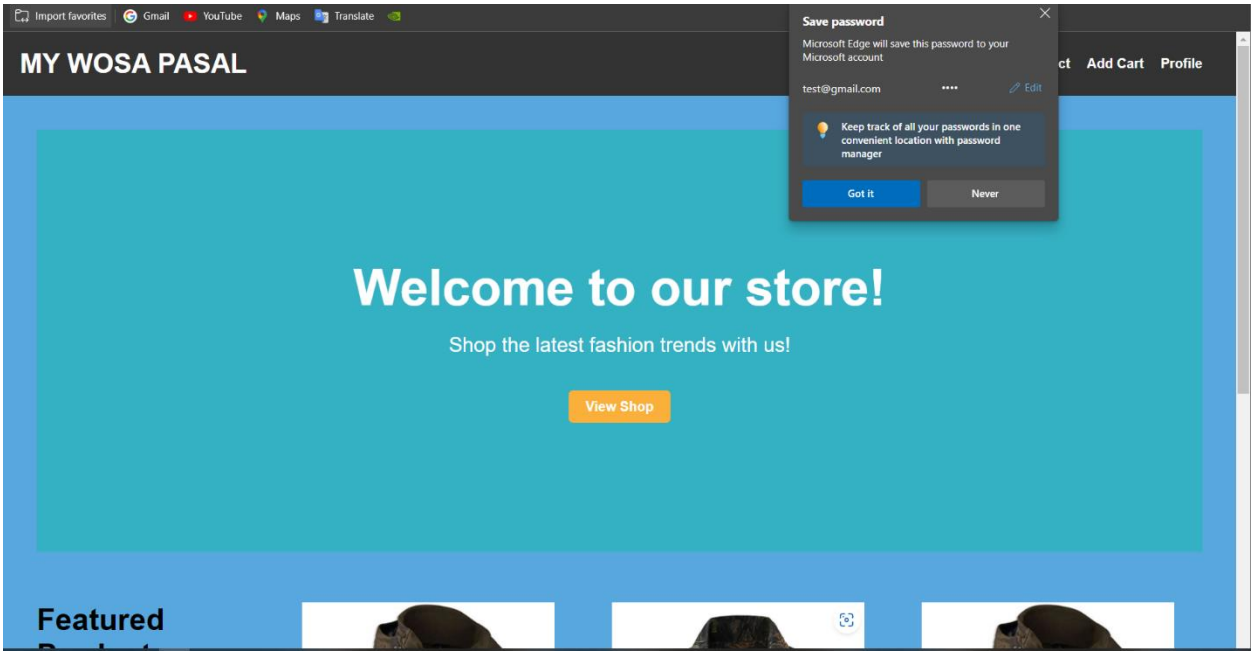

Figure 21 : After logging in

5.3. Test: 3

Objective	Checking the role for both admin and user
Action	Entering multiple login details with different role
Expected result	To be able to log in the website as both user and admin
Actual result	Able to access to as both user and admin
Conclusion	Test Successful

Table 3 :Checking the role for both admin and user

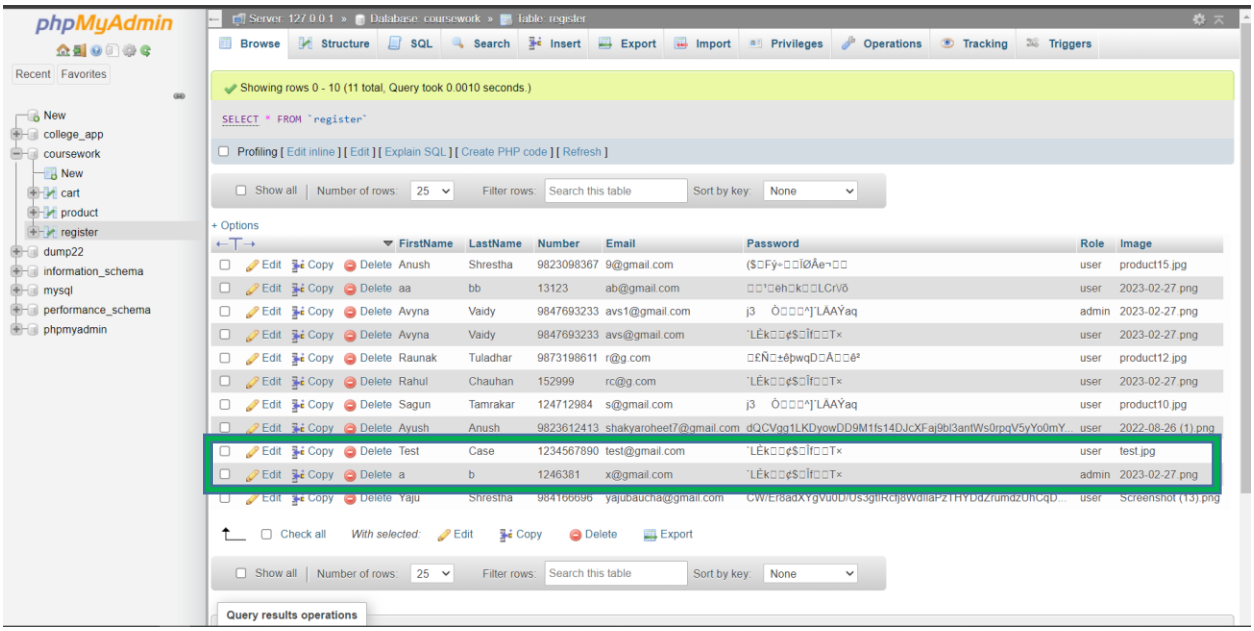

Figure 22 : Details of both admin and user in database

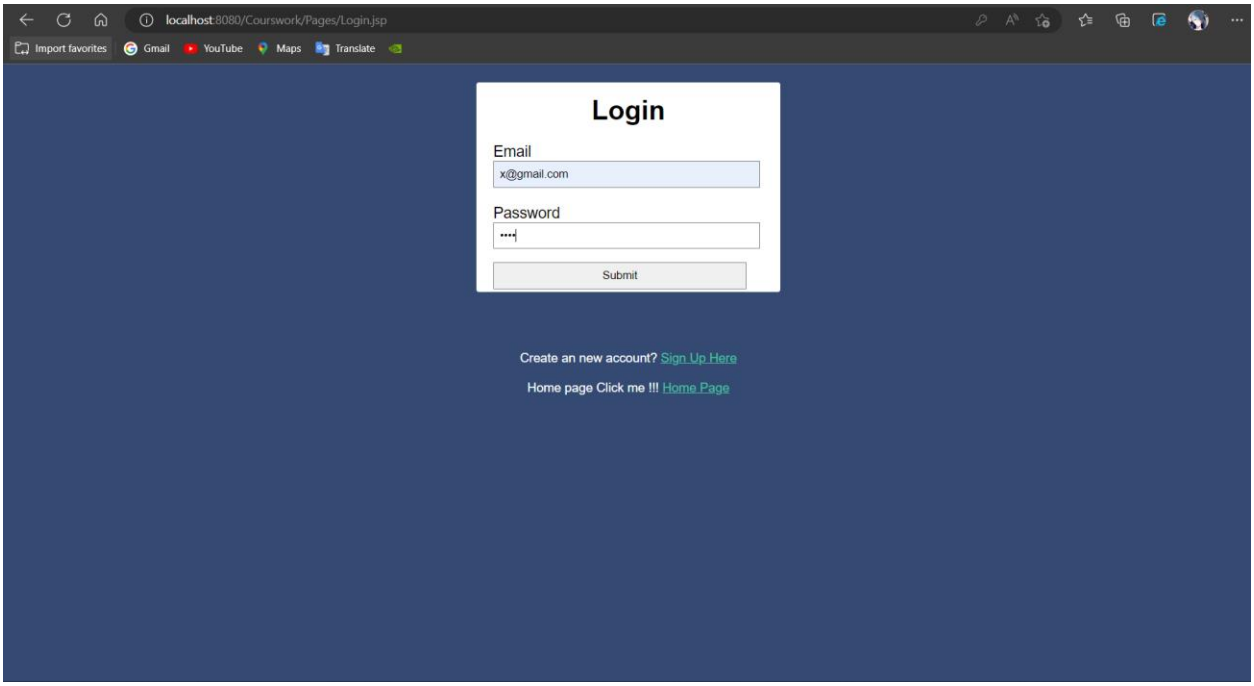

Figure 23 : Login in as admin in the webpage

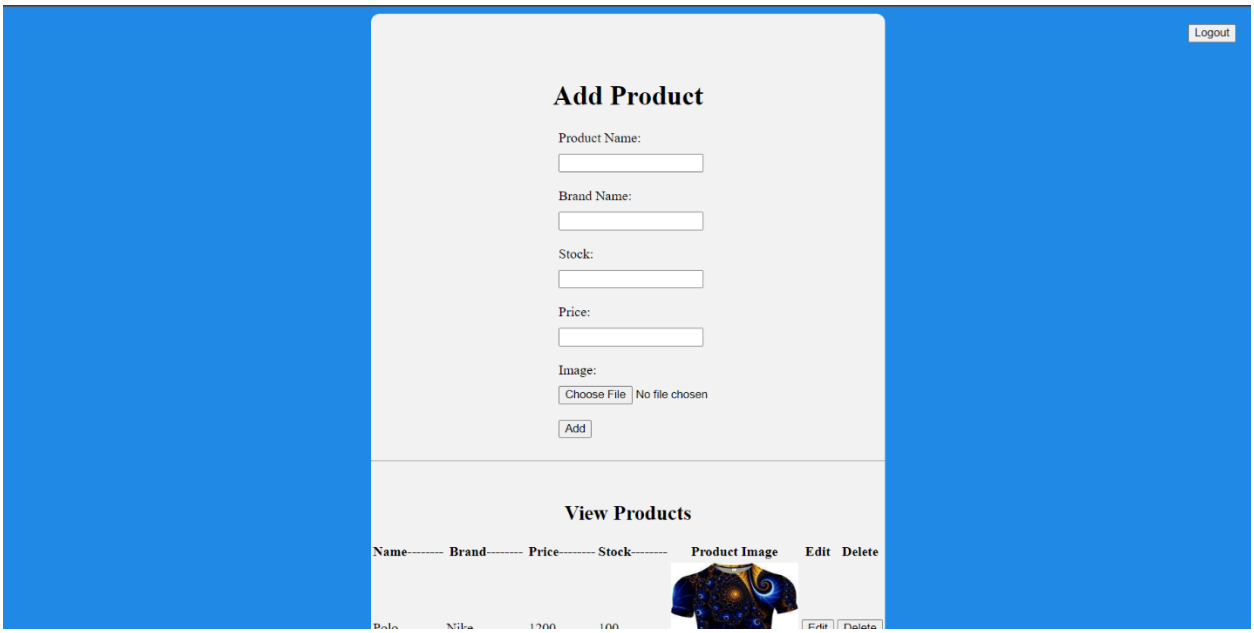

Figure 24 : Logged in as Admin in Admin Panel

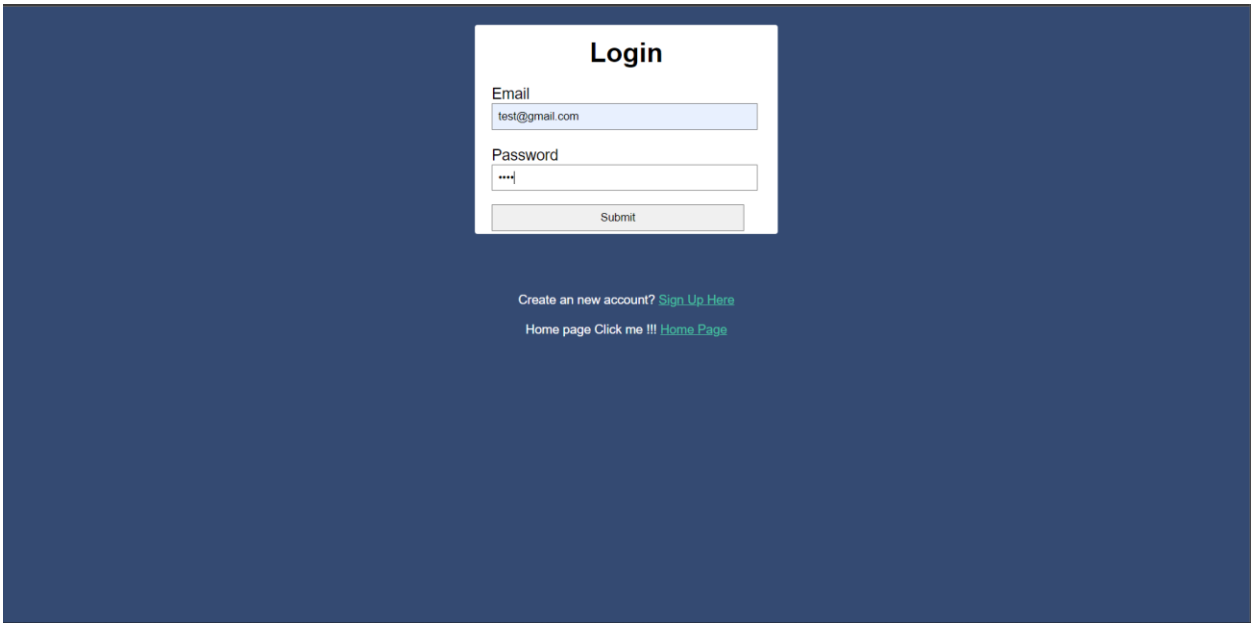

Figure 25 : Login in as user in the webpage

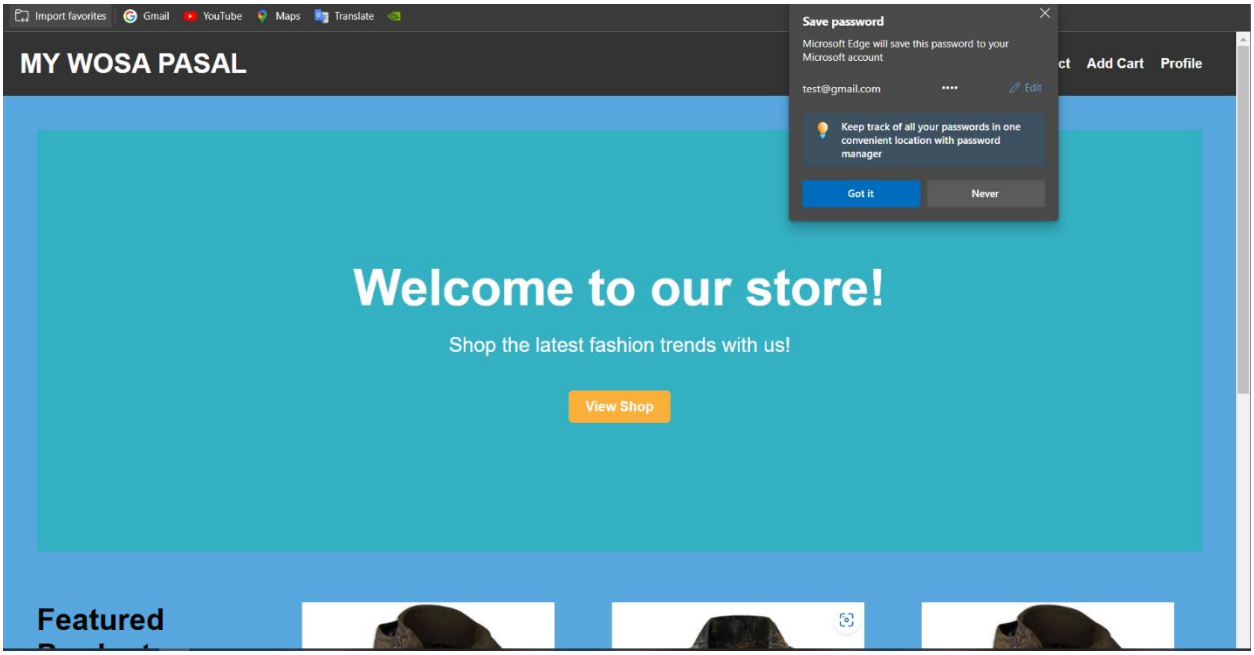

Figure 26 : Logged in as User in Homme Page

5.4. Test: 4

Objective	Adding product from admin panel
Action	Entering product details in the panel
Expected result	To add product in the database
Actual result	Product gets added to the database
Conclusion	Test Successful

Table 4 : Adding product from admin panel

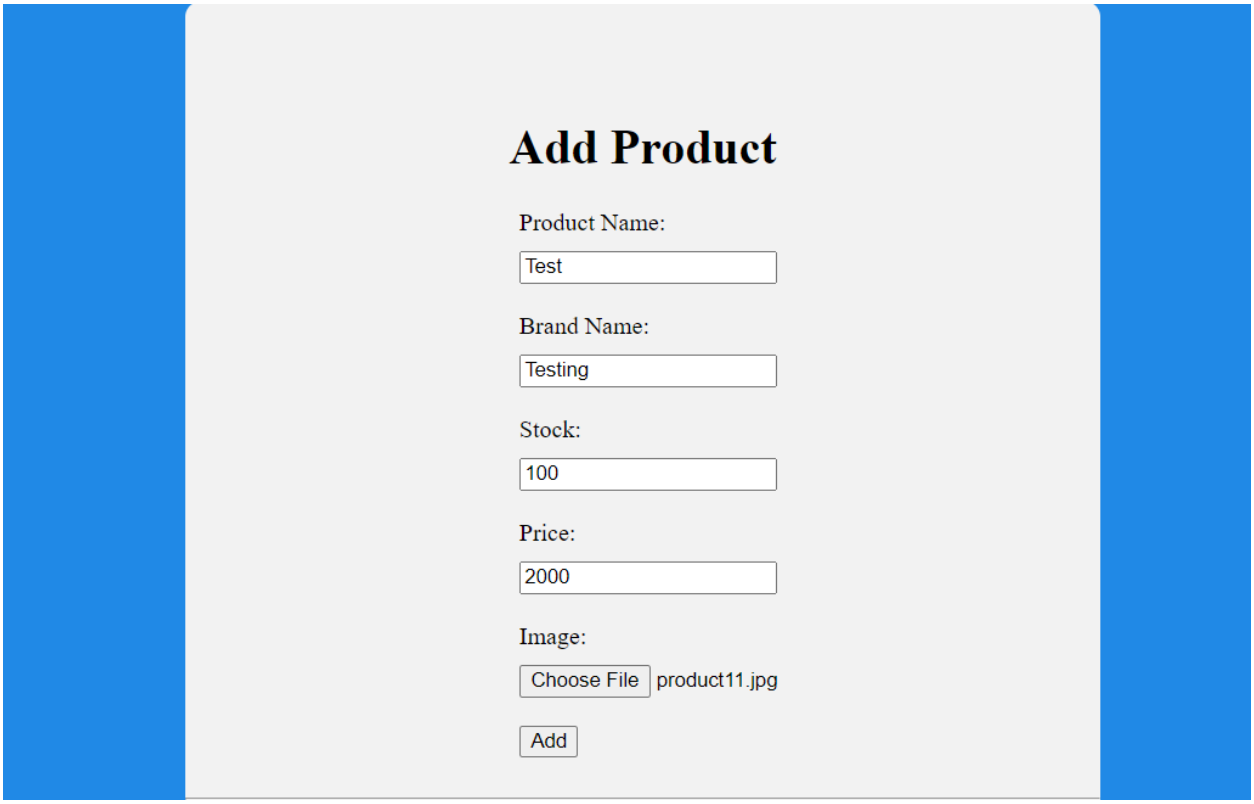

Figure 27 : Adding product through admin panel

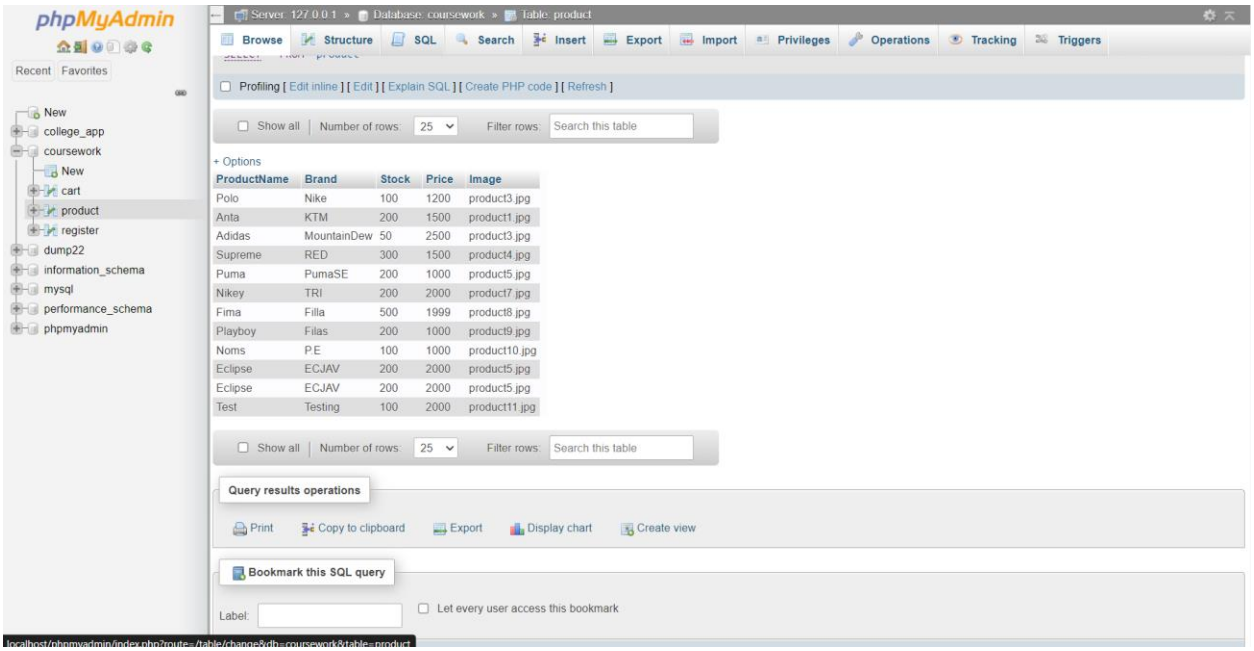

Figure 28 : product gets added to the database.

5.5. Test: 5

Objective	Checking updated product page
Action	To open the product page after adding a product
Expected result	The product should be added
Actual result	The product getsbe added
Conclusion	Test Successful

Table 5 : Checking updated product page

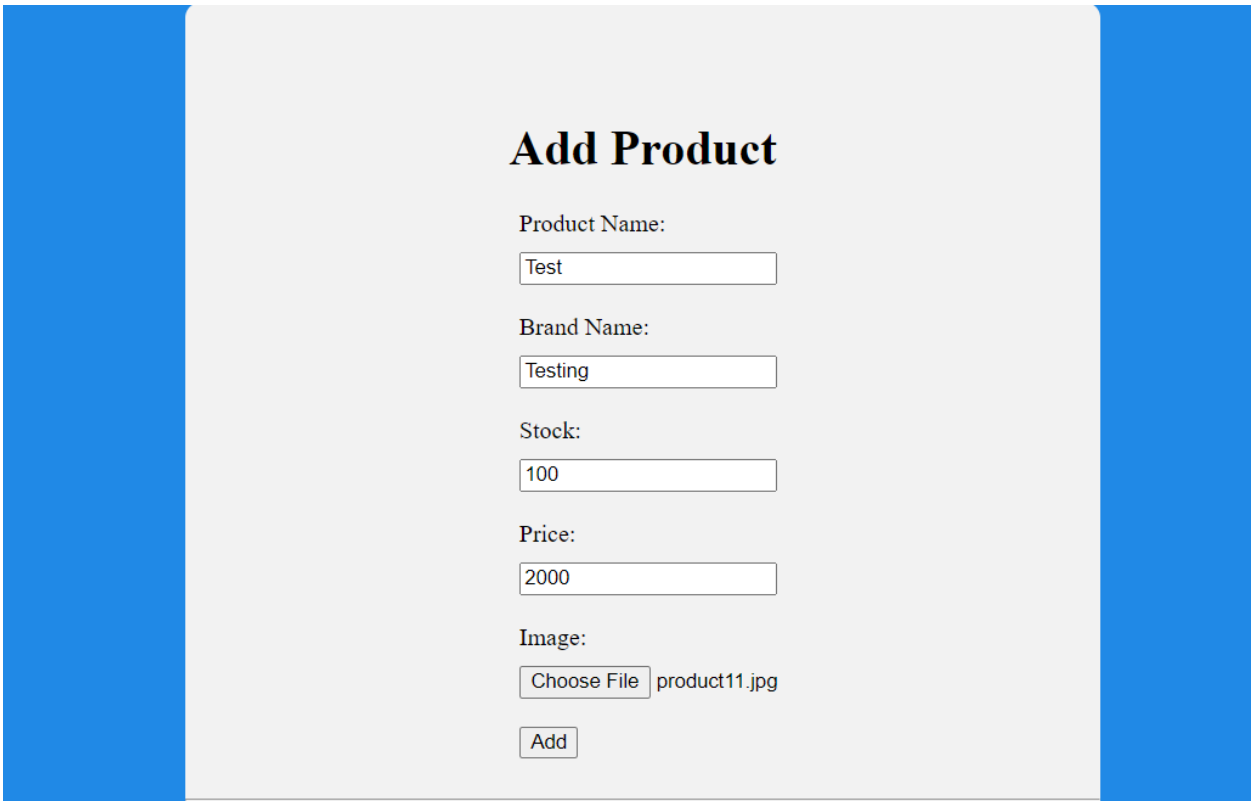

Figure 29 : Adding product through the admin

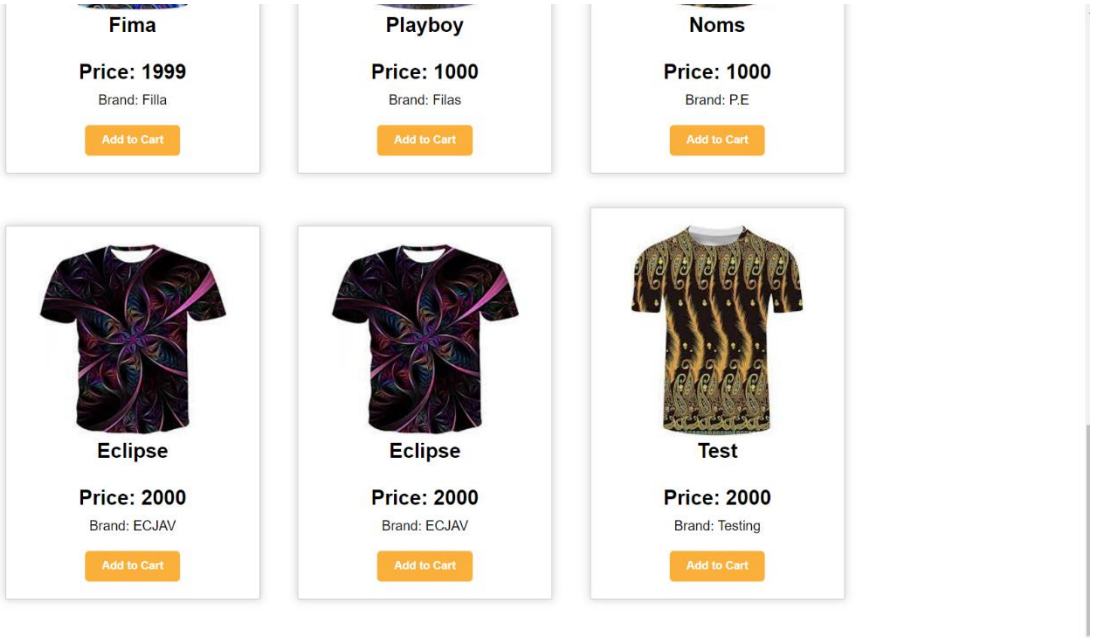

Figure 30 : Product gets added to the product page

5.6. Test: 6

Objective	Updating and removing products
Action	To update and remove products in the database through webpage
Expected result	The product should be updated and removed
Actual result	The product gets updated and removed
Conclusion	Test Successful

Table 6 : Updating and removing products

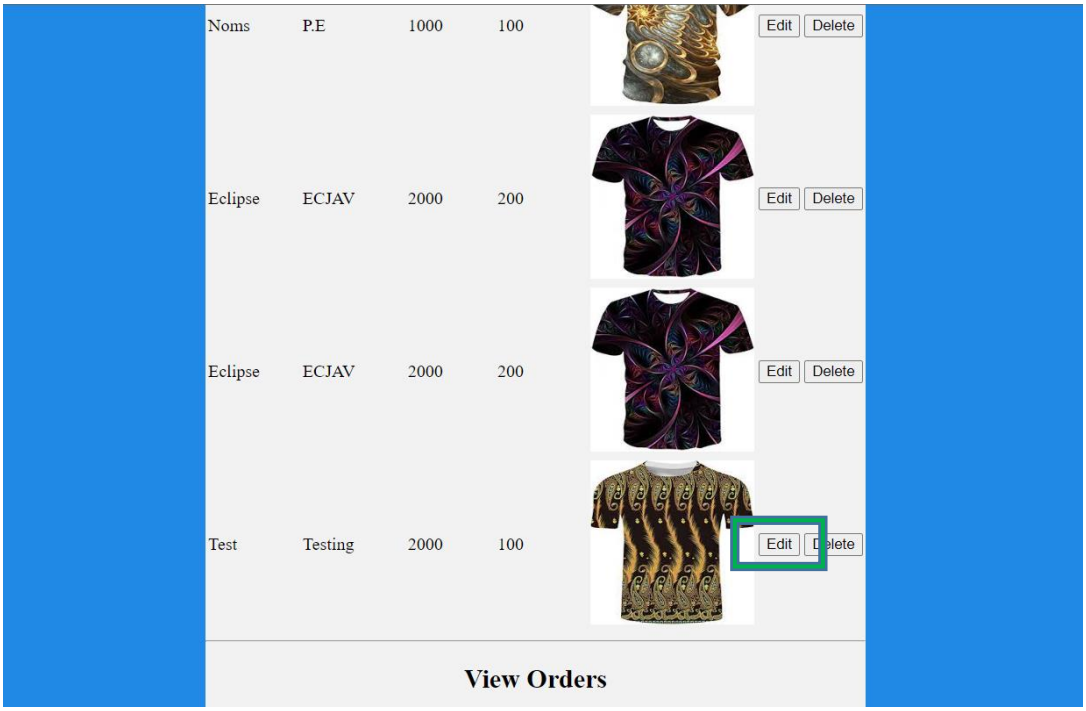

Figure 31 : Choosing edit option in the admin panel

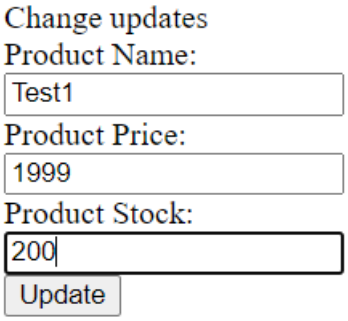

Figure 32 : Updating the data

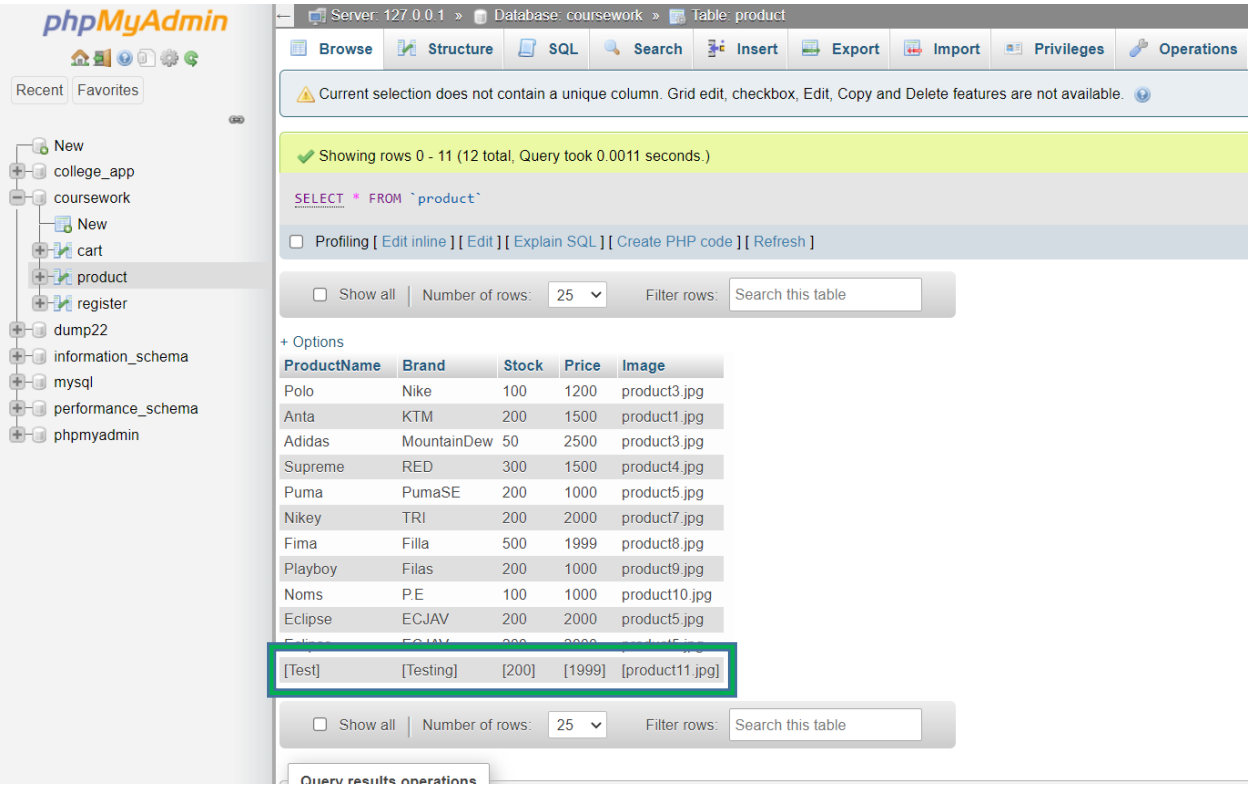

Figure 33 : Product data gets updated

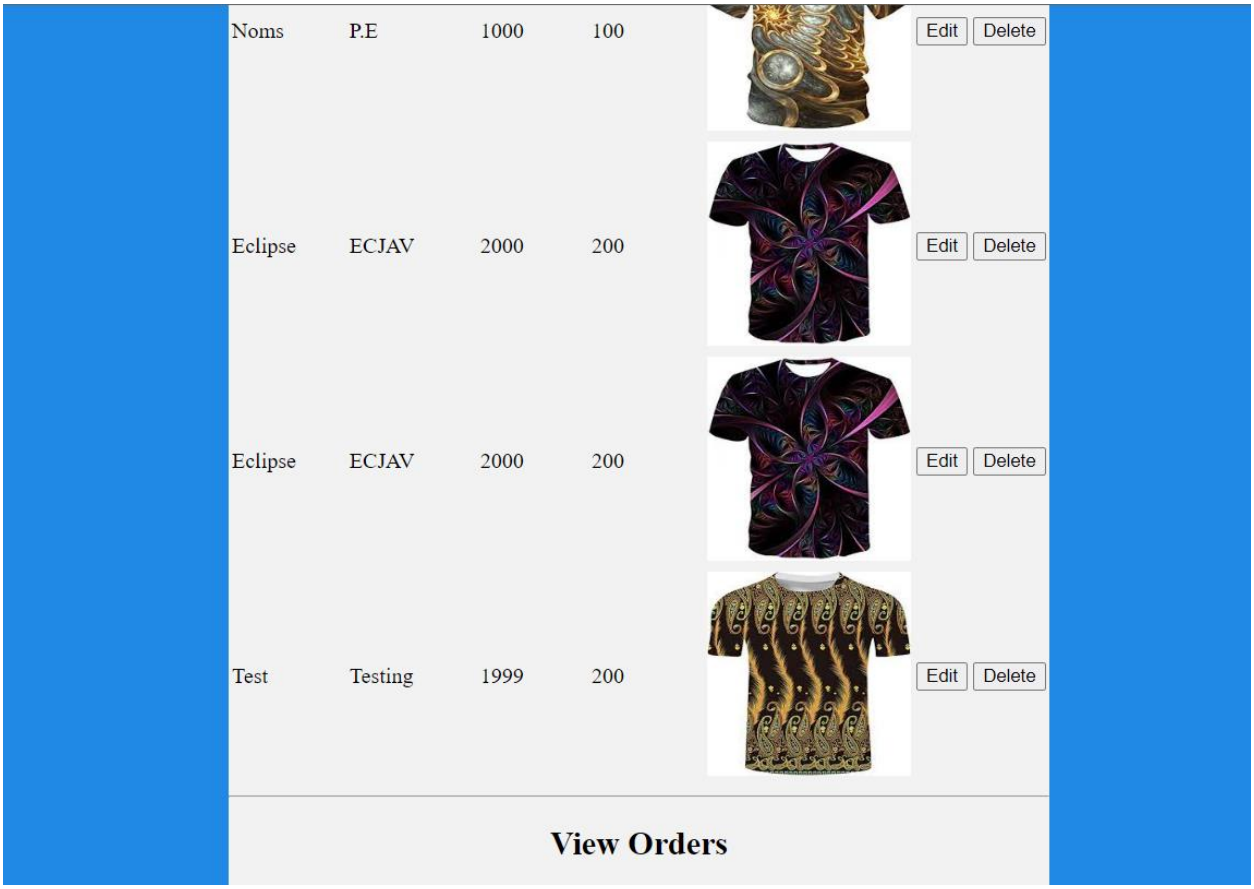

Figure 34 : Displaying updated Product

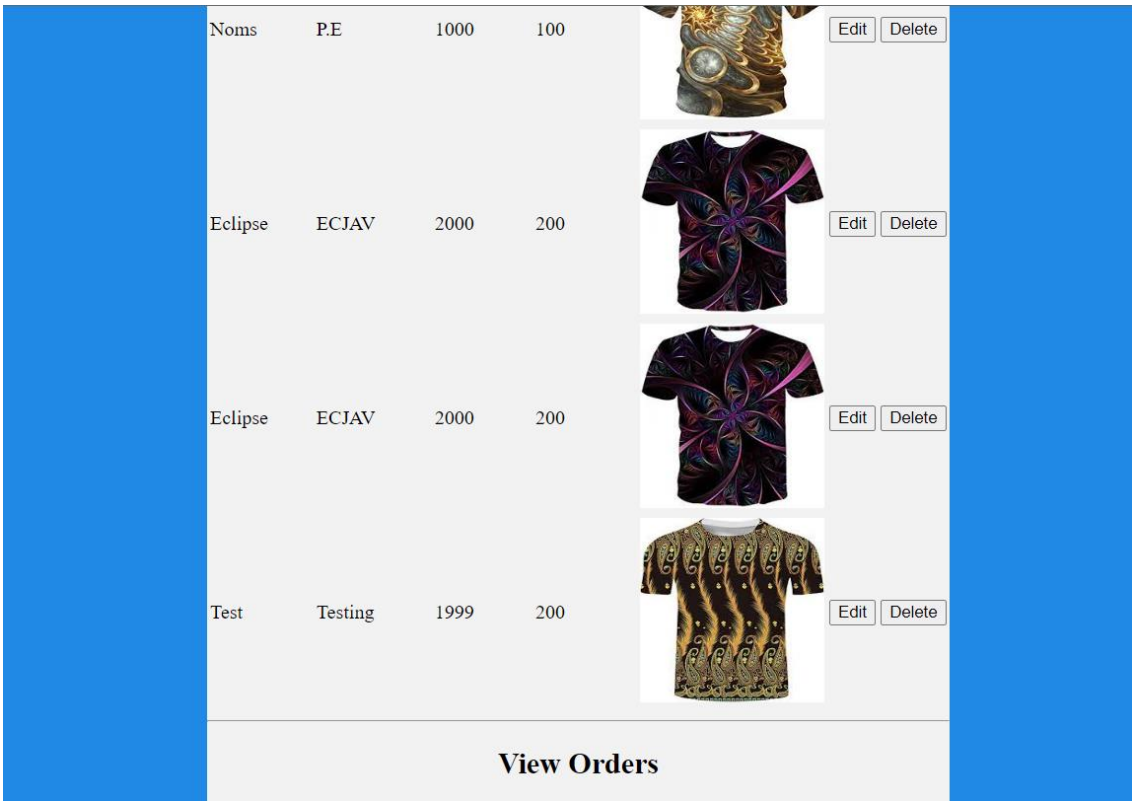

Figure 35 : Selecting delete button

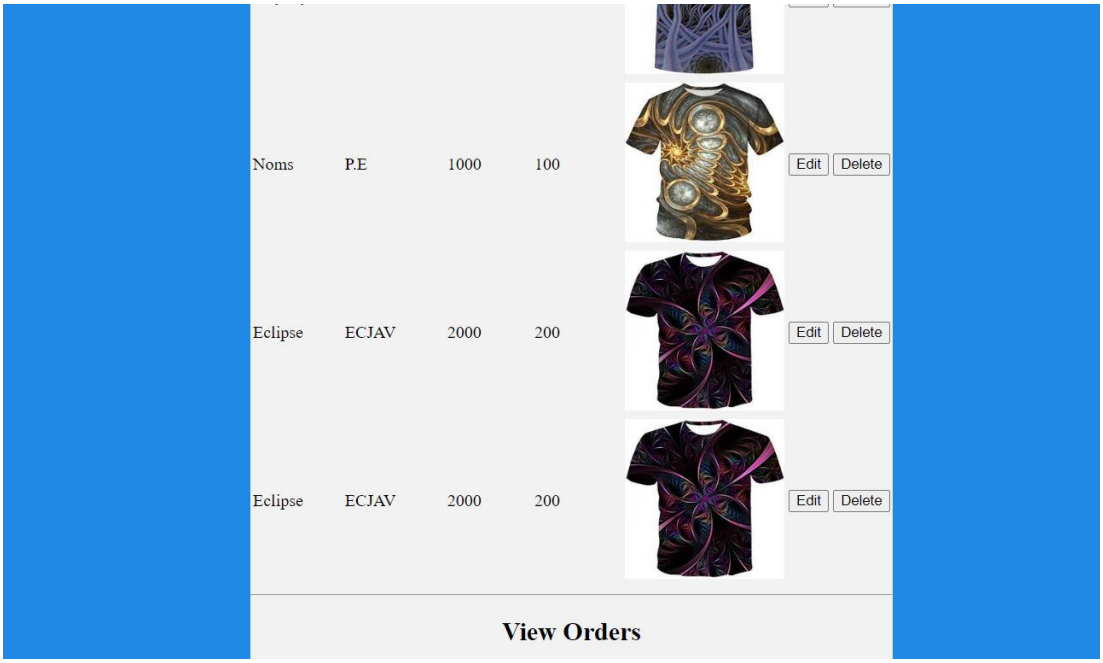

Figure 36 : Product getting deleted

5.7. Test: 7

Objective	Adding products to Cart
Action	Adding selected products to cart by pressing add button
Expected result	Product get added to the cart
Actual result	Product gets added to the cart
Conclusion	Test Successful

Table 7 : Adding products to Cart

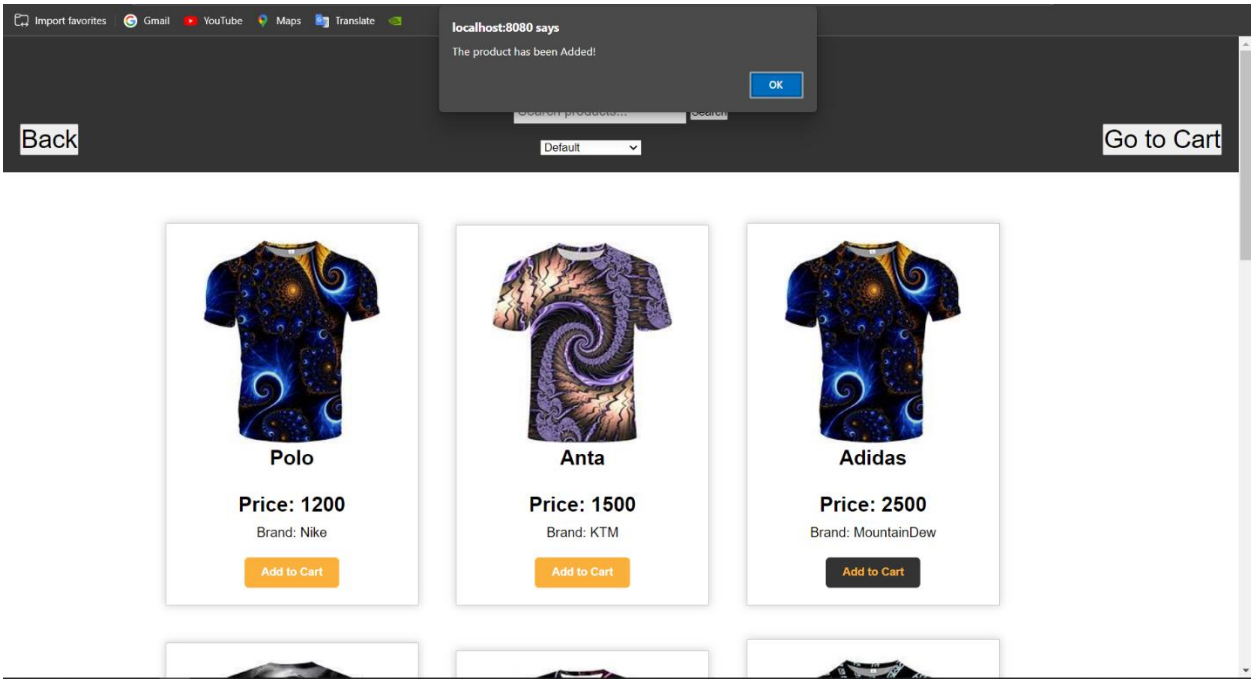

Figure 37 : Adding product to the cart

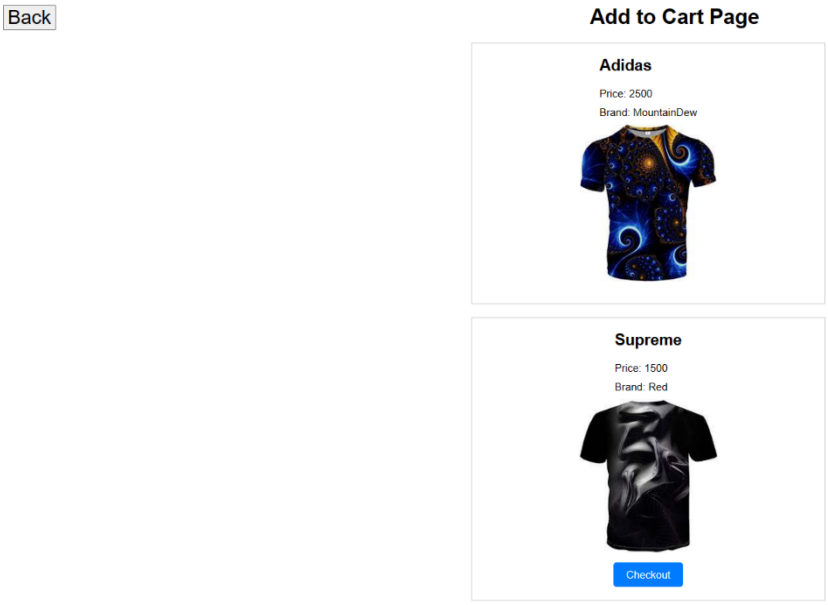

Figure 38 : Products getting added to the cart

5.8. Test: 8

Objective	To view all the orders by admin.
Action	To see if the order tab gets updated after an order
Expected result	To be able to view the products
Actual result	Order details get displayed
Conclusion	Test Successful

Table 8 : Adding products to Cart

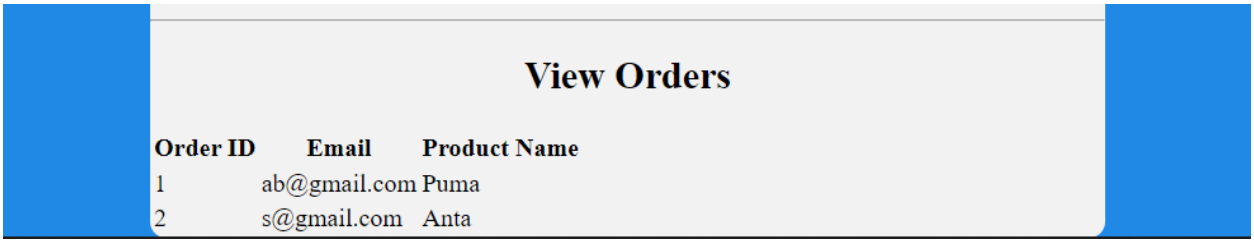

Figure 39 : Order details before

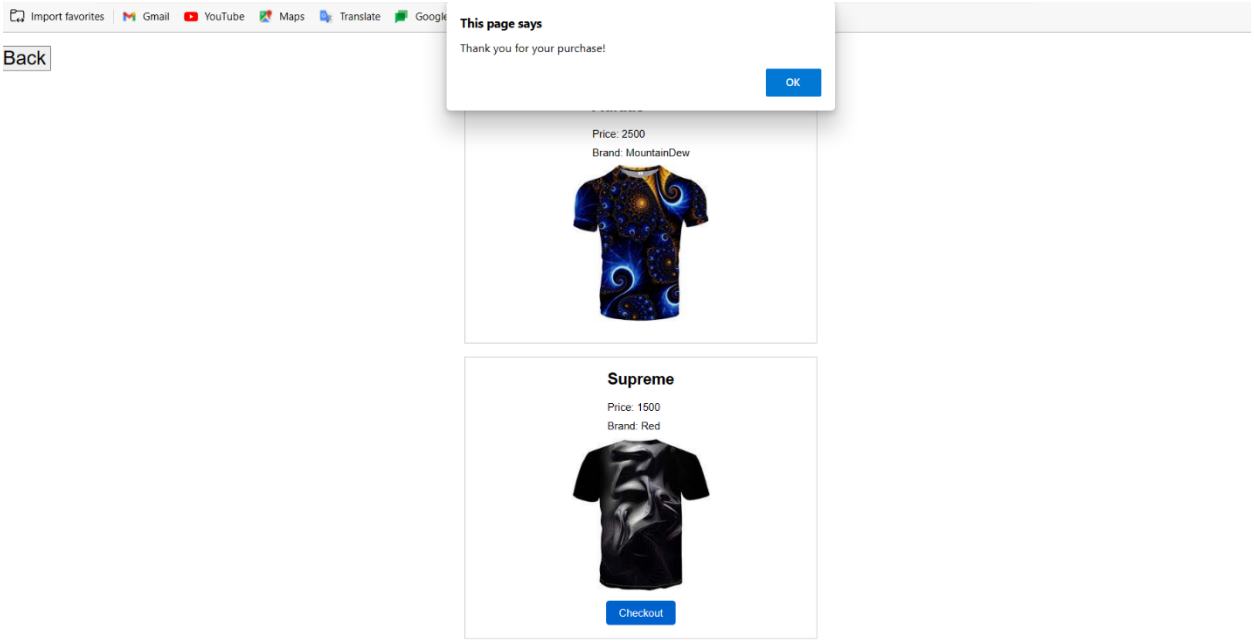

Figure 40 : adding new orders

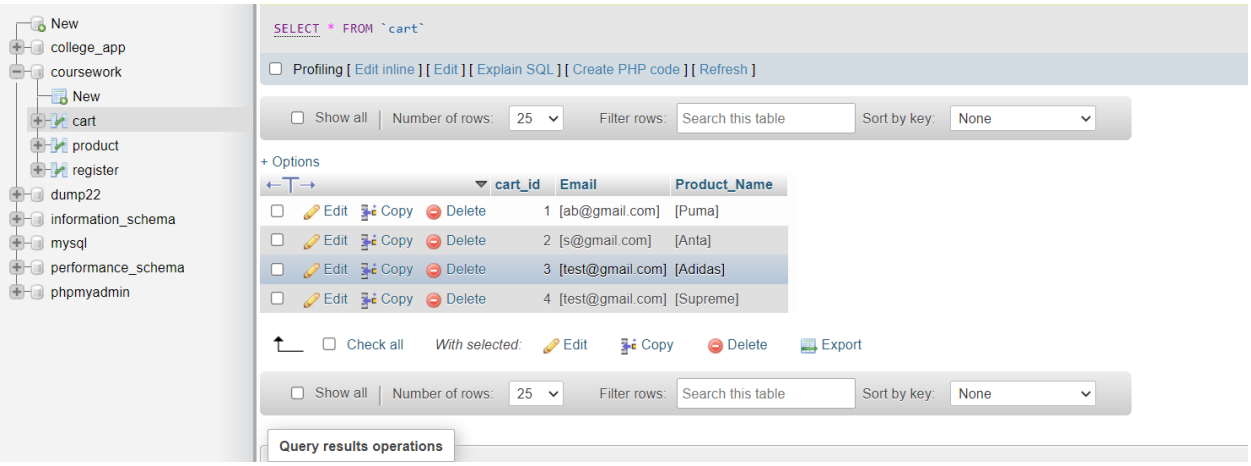

Figure 41 : New orders added tot eh database

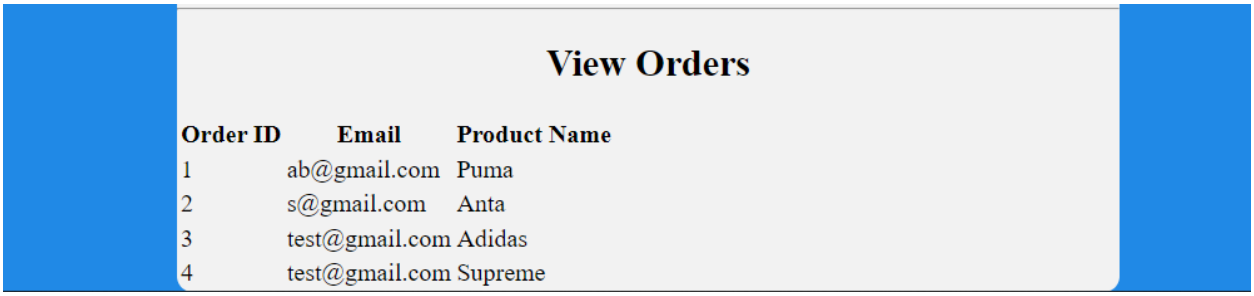

Figure 42 : Final Order Details

5.9. Test: 9

Objective	To change user profile
Action	Changing the user details along with Password
Expected result	To be able to change user details
Actual result	The user details were changed
Conclusion	Test Successful

Table 9 : To change user profile

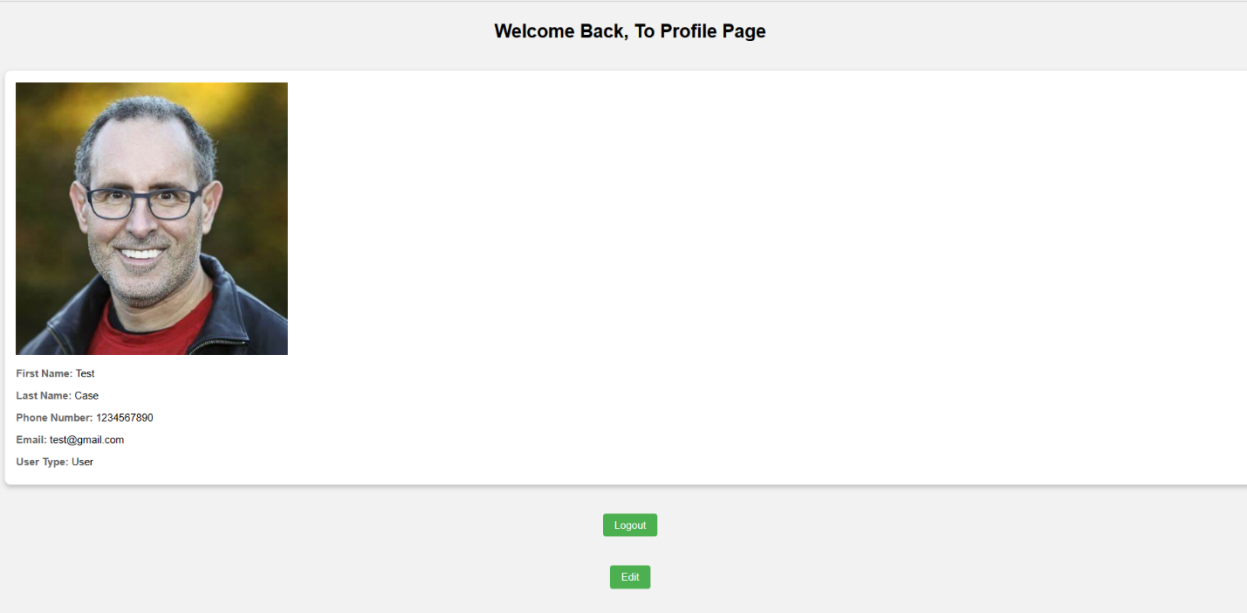

Figure 43 : Opening the user profile page and clicking edit button

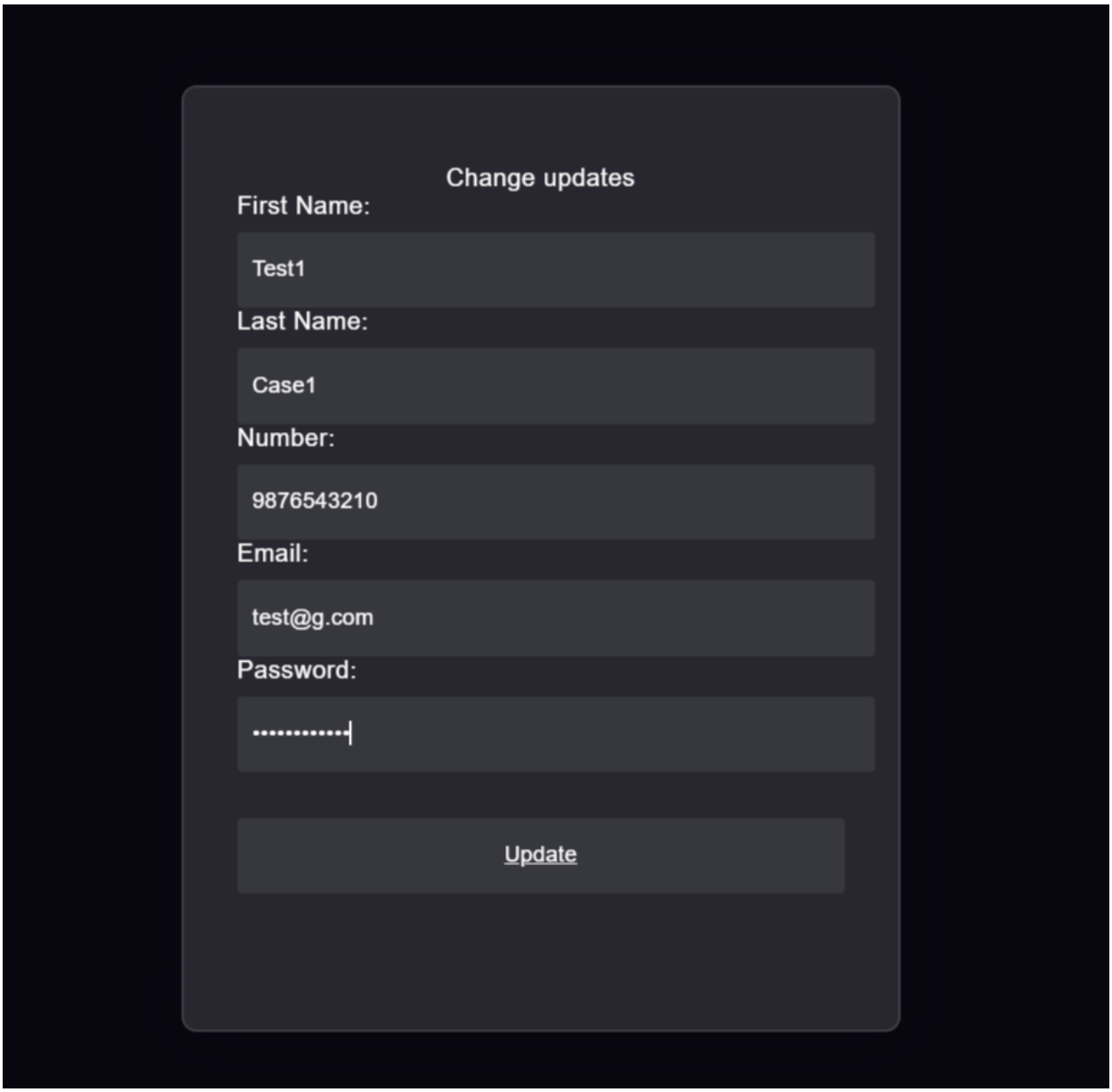

Figure 44 : updating the values

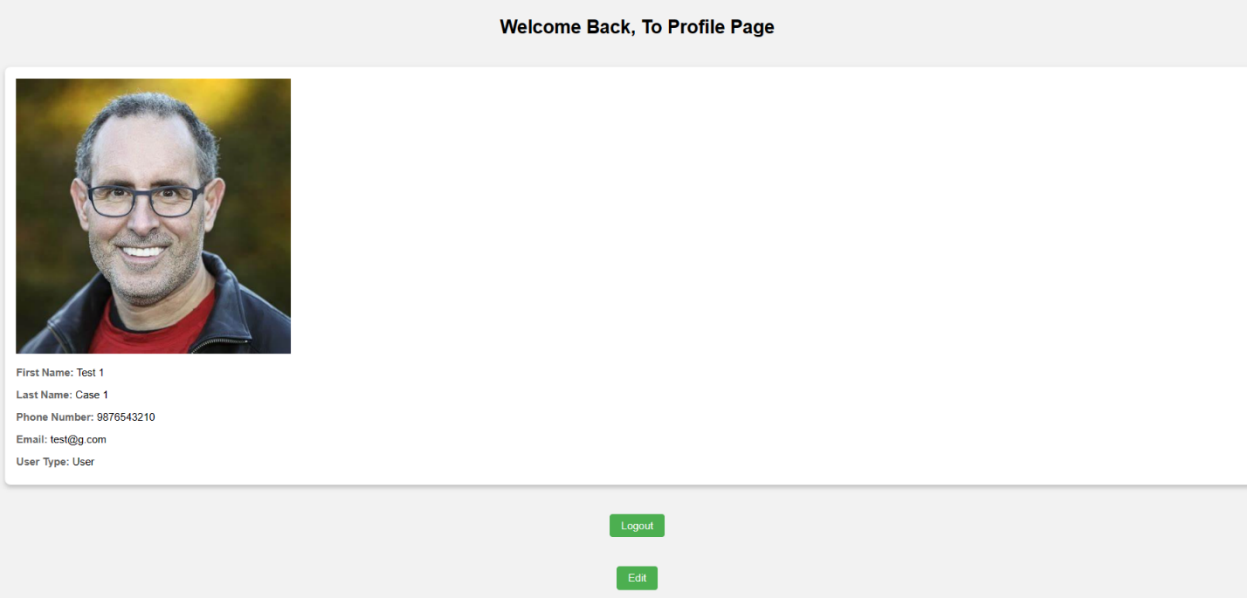

Figure 45 : Updated user profile

5.10. Test: 10

Objective	To logout the session
Action	Clicking the logout button in profile page
Expected result	To be able to log out
Actual result	Go Logged out from the user profile
Conclusion	Test Successful

Table 10 : To logout the session

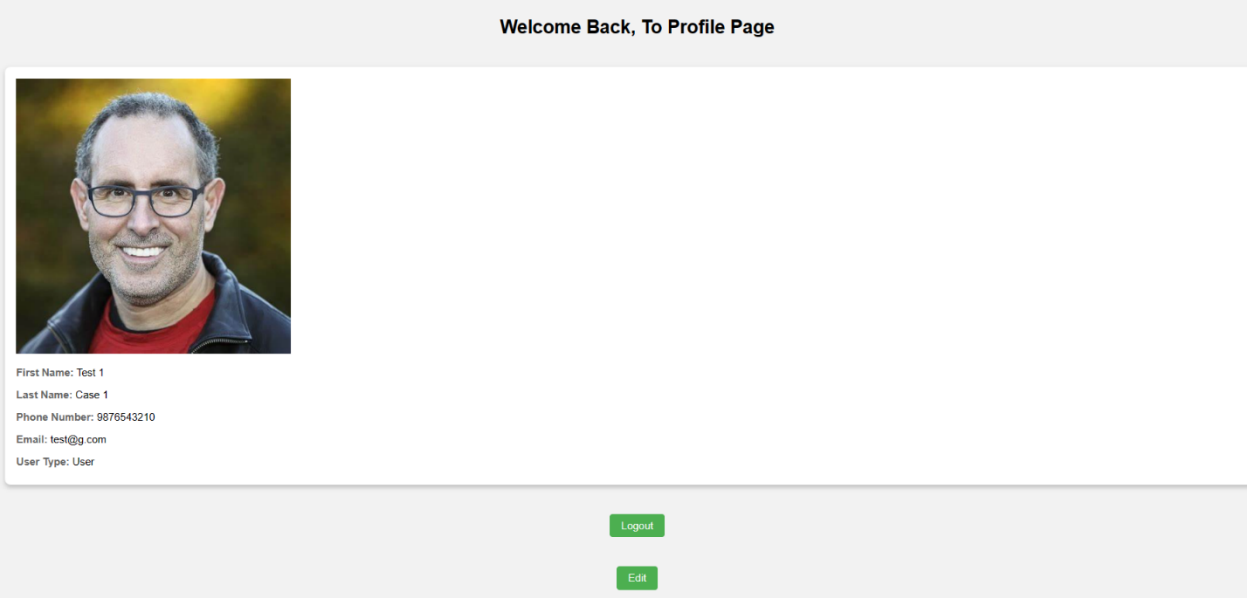

Figure 46 : Clicking the logout button

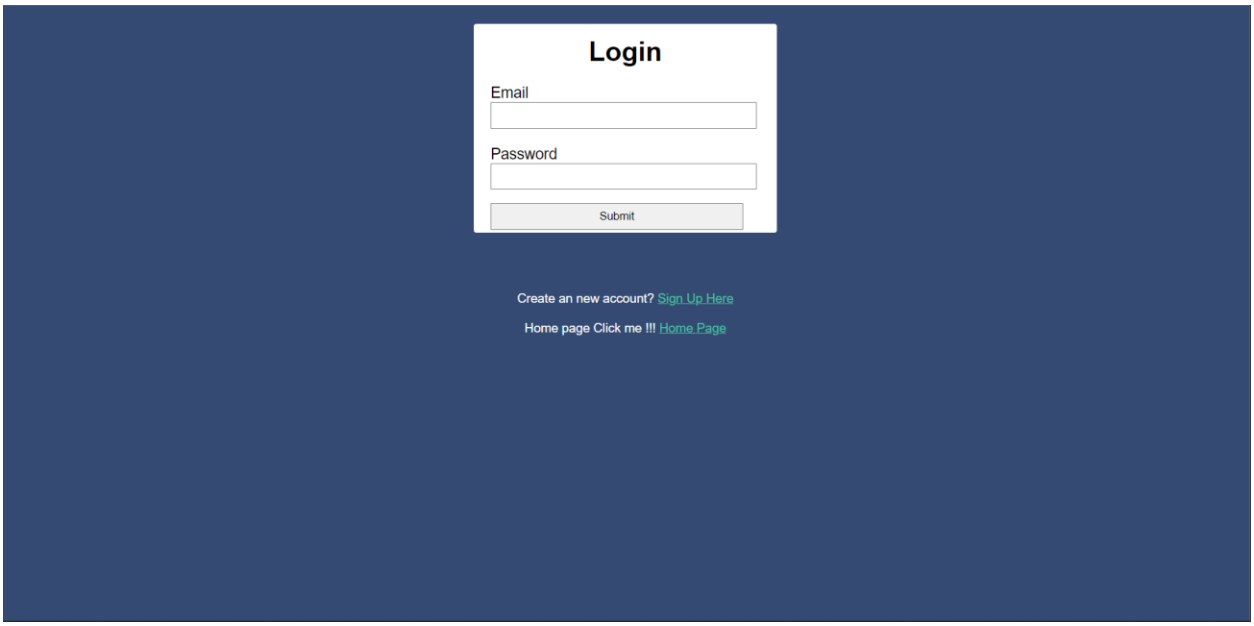

Figure 47 : Logged out from the user page

5.11. Test: 11

Objective	To view home page without Logging in
Action	To click the view home page button
Expected result	To be able to view home page
Actual result	Able to view home page without logging in
Conclusion	Test Successful

Table 11 : To logout the session

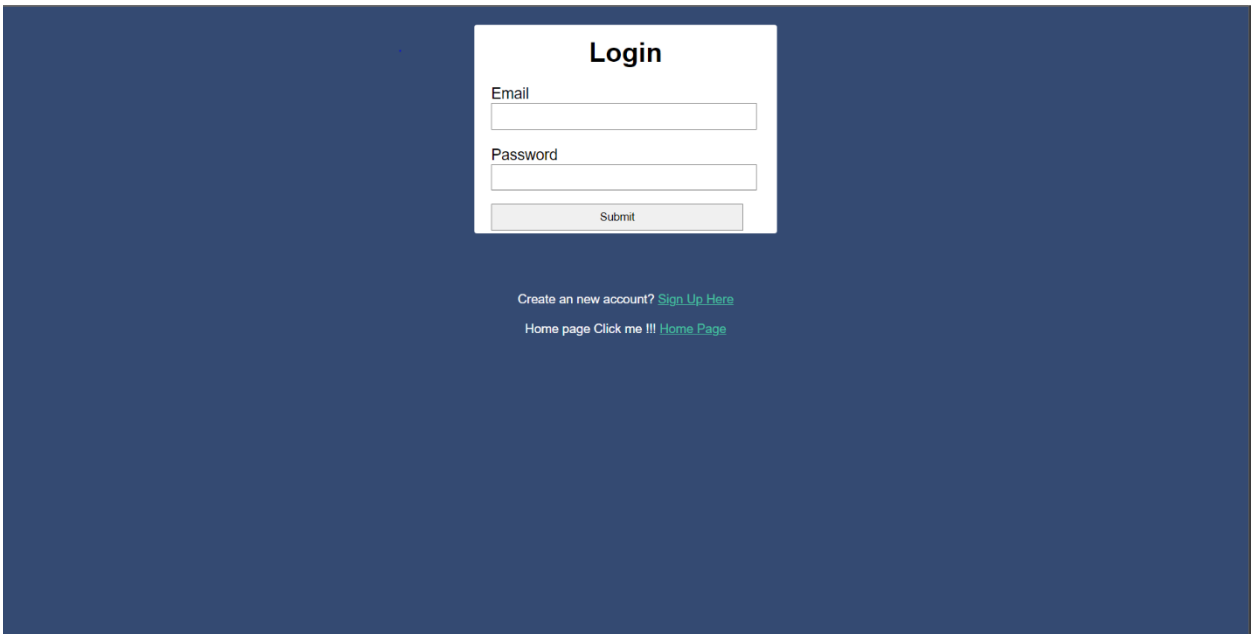

Figure 48 : Clicking the Home Page Button

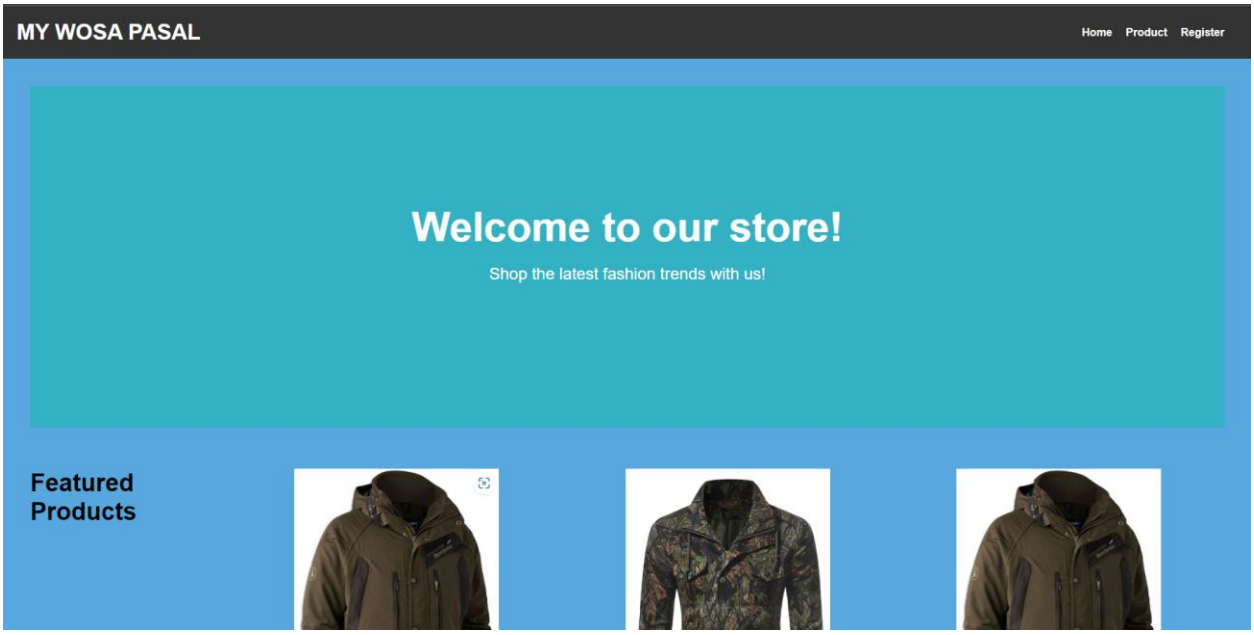

Figure 49 : Viewing home page without logging in

6. Tools and Libraries used

A well-known integrated development environment (IDE) is an Eclipse IDE that offers a number of tools and modules to accelerate and increase the effectiveness of software development. The tools and libraries that are regularly used in the Eclipse IDE that are listed below:

1. **MySQL Connector:** Java programs can connect to a MySQL database using the MySQL Connector/J, a JDBC (Java Database Connectivity) driver. Developers can run SQL commands and receive database results using its standardized interface for accessing relational databases.

2. **Taglibs:** To make the process of creating dynamic content more straightforward, taglibs are collections of unique tags that can be used in Java Server Pages (JSPs). They offer a method for encapsulating intricate functionality into reusable parts that are simple to use into web applications.

3. **JRE System Library:** JRE is a software set that consists of the Java Virtual Machine (JVM) and other parts necessary for running Java programs. Eclipse's JRE System Library has the classes and tools required to create and run Java applications.

4. **EAR Libraries:** Java EE applications are packaged using the Enterprise Archive (EAR) file format. JAR files, including Java libraries, third-party libraries, and application-specific resources, are contained in EAR libraries, and are needed by the application during runtime.

5. **Server Runtime:** Apache Tomcat, and others are just a few of the server runtimes that Eclipse supports. The components and configuration files required to run web applications on the server are included in the server runtime.

6. **Web app libraries for Apache Tomcat:** Apache Tomcat is a well-liked servlet container and open-source web server. The JAR files necessary to create and operate web apps on Tomcat are included in the Tomcat Web App Libraries in Eclipse.

Overall, these modules and programs makes Eclipse an effective IDE for Java development by enabling programmers to test, create and deploy Java applications more quickly.

7. Development Process

7.1. Analysis

The first step in the developing an e-commerce website is to conduct a thorough analysis of the requirements and needs to build an effective working e-commerce website. This involves gathering information about the target audience, the products to register and to be sold, and the desired features and functionality of the website. the analysis should also consider making a full-fledged E-commerce website (Clothe Website).

7.2. Design

Once the analysis is complete, the next step is to create a design for the website. this involves creating wireframes and to create a wireframe we used balsamiq. In balsamiq we did all the layout and build a blueprint of the website. The design should be visually appealing and easy to navigate, while also reflecting the identity of the clothing store to the targeted audience. Eclipse IDE offers a range of design tools, such as the Eclipse Web Tools Platform (WTP) and Eclipse Visual Editor, to help us create visual designs for our websites.

7.3. Front-end Development

With the design in place, the front-end development can begin. This involves coding the website's Html, CSS, and JavaScript to create the user interface and implement the design. The front-end development should ensure that the website is responsive and works well on the device. We used html to structure and display content on the web. It provides the basic building blocks for web page, such as headings, paragraphs, images, links, and forms. we use html to create the basic layout and structure of a website. CSS is a style sheet language that is used to control the appearance of web pages. it allows us to separate the visual design of a web page from its content. CSS is used to define the colours, fonts, layout, and other visual elements of a web page. JavaScript is a programming language that is used to add interactivity and dynamic behaviour to web pages. It allows us to create interactive elements such as forms, dropdown menus, and slideshows. JavaScript is also used to create animations, validate forms, and manipulate the content of a web page in real-time. It is used to create interactions that occur within the wed page. Together, Html, CSS, JavaScript form the foundation of web development. Eclipse IDE offers a range of front-end development tools, such as the Eclipse JavaScript Development Tools (JSDT) and Eclipse HTML Editor, to help web developers write code efficiently and effectively.

7.4. Database Development

In parallel with front-end development, the database development also starts. This involves designing and creating the database schema, setting up the database tables, and implementing the data storage and retrieval functionality. Eclipse IDE offers a range of database development tools, such as the Eclipse Data Tools Platform (DTP) and Eclipse SQL Explorer, to help us design and manage the databases.

7.5. Back-end Development

Once the front-end and database development are complete, the back-end development can begin. This involves coding the server-side logic of the website, including implementing the payment gateway, user authentication and authorization, and order processing functionality. Eclipse IDE offers a range of back-end development tools, such as the Eclipse Java EE IDE and Eclipse Web Services Tools, to help us developer write efficient and scalable server-side code.

Overall, the development process for an e-commerce website requires a coordinated effort between the analysis, design, front-end development, database development, and back-end development teams. By using Eclipse IDE and its range of development tools, we can create robust and scalable e-commerce websites that provide a seamless shopping experience to their customers.

8. Critical Analysis

The assigned group coursework necessitates the development of an e-commerce website with a corresponding report that conforms to the MVC design pattern and is made up of the three packages model, view, and controller. The Model package contains methods for database operations and the Model class, whereas the View package contains.jsp and html files for the user response. The Controller package also includes Servlets that receive user requests. Three tasks make up the curriculum. Create a login system where users and administrators may log in, passwords are encrypted, and administrators have ability to add, view, modify, and delete product information and order lists. Task 1 is worth 20 marks.

Create a Home Page with search and filter options for product information, an AddToCart button, and user profile management options for Task 2, which is worth 20 marks. Implementing Validation and Exception Handling while utilizing suitable programming etiquette, such as proper comments and naming conventions, is the emphasis of Task 3, which is worth 10 points. The coursework is a thorough project that covers a variety of themes connected to developing e-commerce websites and encourages students to use their knowledge and skills to solve real-world issues in this area.

9. Conclusion

We have learnt a lot about Advanced Programming and Technologies knowledge. In that we learnt about Eclipse IDE which is a powerful integrated development environment that supports a wide range of programming languages such as Java, C/C++, Python, PHP and more. As the coursework requirement we must learned and use Html, CSS, Java, JavaScript and MySQL Programming Language and Libraries as EAR libraries, Web App Libraries, Server Runtime[apache-tomcat-8.5.78], MySQL-connector, and few Taglibs. Since we are new to this sector and we were anxious since we lacked experience and skills, and it was our first Advanced Programming and Technologies knowledge assignment where we must Sdemonstrate our skill to make a full-fledged E-commerce website (Clothe Website). Finally, after devoting all the time and effort necessary to complete coursework, all the task's set were completed effectively. The coursework tasks were different and demanding. After a lot of research and study on relevant subjects, they were much simpler to overcome. The coursework assignments were beyond basic. The tasks were divided into weeks to ensure that they were completed on time. Several mistakes have been made to do the given tasks, and information on this type of coursework was acquired through those mistakes. The required knowledge for this coursework were acquired after that. We have learnt a lot about Advanced Programming knowledge because of this coursework. We are delighted to say that we completed the coursework in the allowed period after a lot of hard work and effort. During this period, we as a team did a lot of studying and had the chance to improve our skills. In terms of academics and the amount of information it provided, this assignment was essential, and it helped us to develop new skills and knowledge that are relevant to our career goals. Completing this assignment was a valuable learning experience that challenged us to think critically and creatively, while also giving us the opportunity to work within classmates and learn from their perspectives and experiences. Overall, this

experience helped us to grow as a student and as a person, and we believe it will be beneficial for our future studies and professional endeavours.

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