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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 mark of zero will be awarded.

Table of Contents

| | | |
|-------|---|----|
| 1 | Introduction..... | 1 |
| 1.1 | Aims and Objectives | 1 |
| 2 | User Interface design | 2 |
| 2.1 | Wireframe | 2 |
| 2.2 | Actual Design | 8 |
| 3 | Class Diagram | 14 |
| 3.1 | Overall Class Diagram | 14 |
| 3.2 | Individual class diagram | 15 |
| 3.2.1 | Register class | 15 |
| 3.2.2 | Product Class..... | 15 |
| 3.2.3 | Cart Class | 16 |
| 3.2.4 | Purchase Class..... | 16 |
| 4 | Method Description | 17 |
| 4.1 | Servlet: Cart | 17 |
| 4.1.1 | doGet()..... | 17 |
| 4.1.2 | doPost()..... | 17 |
| 4.2 | Servlet: deleteCart..... | 17 |
| 4.2.1 | doPost()..... | 17 |
| 4.3 | Class: DbConnection | 18 |
| 4.3.1 | getConnection()..... | 18 |
| 4.3.2 | isUserRegistered(String username,String password) | 18 |
| 4.3.3 | dataForCookies(String username) | 18 |
| 4.3.4 | addItemCart(String username,String productId)..... | 18 |
| 4.3.5 | deleteCartItem(String username,String productId) | 18 |
| 4.3.6 | purchase (int id)..... | 19 |
| 4.3.7 | deleteCart(int id) | 19 |
| 5 | Test Cases: | 20 |
| 5.1 | To test if a new user registers in the database..... | 20 |
| 5.2 | To test duplicate registration | 21 |
| 5.3 | To test if a product is being added to cart. | 23 |
| 5.4 | To test the checkout process..... | 24 |
| 5.5 | To test password authentication..... | 26 |

| | | |
|-----|--|----|
| 6 | Tools and Libraries used | 28 |
| 7 | Development Process | 31 |
| 7.1 | Evidence of the development process: | 32 |
| 8 | Critical Analysis | 34 |
| 9 | Conclusion | 35 |
| 10 | References..... | 36 |

Table of Figures

| | |
|---|----|
| Figure 1: Wireframe of Login Page..... | 2 |
| Figure 2: Wireframe of Signup Page | 3 |
| Figure 3: Wireframe of Product Page | 3 |
| Figure 4: Wireframe of About Us Page | 4 |
| Figure 5: Wireframe of Profile Page | 4 |
| Figure 6: Wireframe of Cart Page | 5 |
| Figure 7: Wireframe of User Page..... | 5 |
| Figure 8: Wireframe of Order page..... | 6 |
| Figure 9: Wireframe of UserEdit page | 6 |
| Figure 10 : Wireframe of Home page | 7 |
| Figure 11: Wireframe of ProductEdit Page | 7 |
| Figure 12: Actual design of Register page..... | 8 |
| Figure 13: Actual Design of Login Page | 8 |
| Figure 14: Actual Design of Product Edit Page..... | 9 |
| Figure 15: Actual Design of Product Page..... | 9 |
| Figure 16: Actual Design of About Us Page..... | 10 |
| Figure 17: Actual Design of Profile Page..... | 10 |
| Figure 18: Actual Design of UserEdit Page | 11 |
| Figure 19: Actual Design of Cart page..... | 11 |
| Figure 20: Actual Design of Order Page | 12 |
| Figure 21: Actual Design of Home Page | 12 |
| Figure 22: Actual Design of ProductEdit Page..... | 13 |
| Figure 23: Class Diagram | 14 |
| Figure 24: Individual class diagram for register class | 15 |
| Figure 25: Individual class diagram for product class | 15 |
| Figure 26: Individual class diagram for cart class | 16 |
| Figure 27: Individual Class Diagram for Purchase class..... | 16 |
| Figure 28: Registering a new account..... | 20 |
| Figure 29: The account successfully being stored in database..... | 21 |
| Figure 30: Trying to duplicate registration..... | 22 |
| Figure 31: An error message being displayed | 22 |
| Figure 32 : Item being added to cart message being displayed..... | 23 |
| Figure 33: Item successfully added to cart | 24 |
| Figure 34: Item being purchased and checked out..... | 25 |
| Figure 35: Item being successfully added to order history | 25 |
| Figure 36: Entering invalid password in the login page..... | 26 |
| Figure 37: An error message displaying invalid information..... | 27 |
| Figure 38: Eclipse IDE | 28 |
| Figure 39: XAMPP | 29 |
| Figure 40: Balsamiq Wireframes | 29 |
| Figure 41: Microsoft word..... | 30 |
| Figure 42: Developing the css in the cart page..... | 32 |

| | |
|---|----|
| Figure 43: Development of a Java Servlet responsible for handling the functionality of editing product details in the application | 33 |
| Figure 44 Critical analysis 1 | 34 |
| Figure 45 Critical Analysis 2 | 35 |

Table of Tables

| | |
|---------------------------|----|
| Table 1: Test Case 1..... | 20 |
| Table 2: Test Case 2..... | 21 |
| Table 3: Test Case 3..... | 23 |
| Table 4: Test Case 4..... | 24 |
| Table 5: Test Case 5..... | 26 |

1 Introduction

E-commerce covers every online transaction encompassing the buying and sale of goods and services. Otherwise, it can also be defined as the method used for online transaction. E-commerce happens when one gets a new pair of shoes from one's favorite online shop. E-commerce is currently paying for reservations for performances and airline tickets online. For simplicity and accessibility e-commerce offers the greatest. Whether to manage a fully digital company or utilize e-commerce in addition to the physical shops, it's a very effective way to sell products and services (Hayes, Molly, Downie Amanda, 2024).

1.1 Aims and Objectives

The main aim of this coursework is to apply the Modern View Controller(MVC) design pattern to design and create a fully performing dynamic e-commerce website making use of servlets, JSP, HTML, and CSS.

The objective behind this coursework is listed below:

- To establish a record of data that stores user and product information.
- To utilize several libraries to get data from database and display it on an internet page.
- To establish the admin's basic user and product management system.
- To deploy servlets that are to connect the site's front end and back end.
- To allow CRUD (Create, Read, Update and Delete) operations on the user's profile.

2 User Interface design

The User interface (UI) design is responsible for a product's appearance, interactivity, usability, behavior, and overall feel. It is the first thing you encounter when you use an application or visit a website. User Interface determines whether a user has a positive experience with a product, so it's essential for companies and creators to familiarize themselves with UI design best practices (Coursera, 2023).

The User Interface design is a very essential aspect of the e-commerce website a sit aims to combine visual design and interface which are to be used by shoppers to navigate the website. A UI design is important for users to have a wonderful experience and ease the website navigation problem with the functionality improvement.

2.1 Wireframe

A wireframe is an outline of a webpage or app and it is a two-dimensional skeleton outlining what you'll include in each view of your app, kind of like a blueprint. It provides a clear visual understanding of page structure, layout, information architecture, user flow, functionality and intended behaviours (Bruton, 2022).

The wireframes were designed prior to the development process. They are given below:

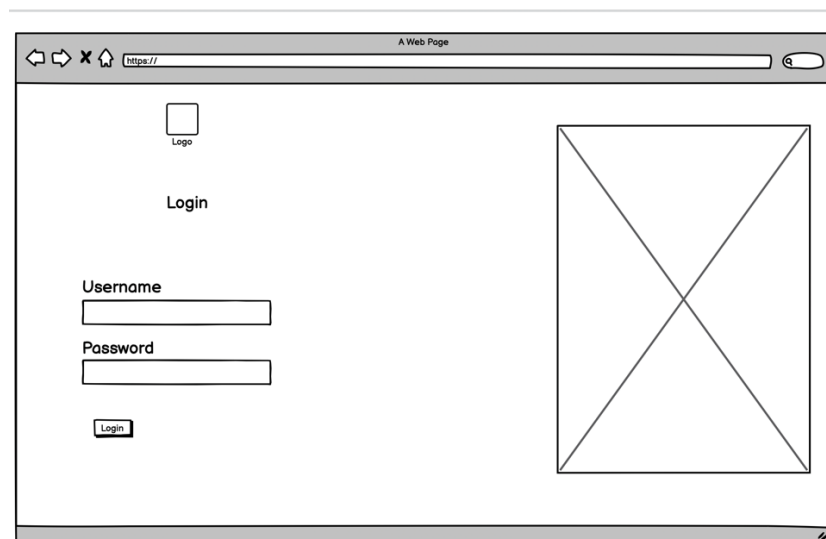
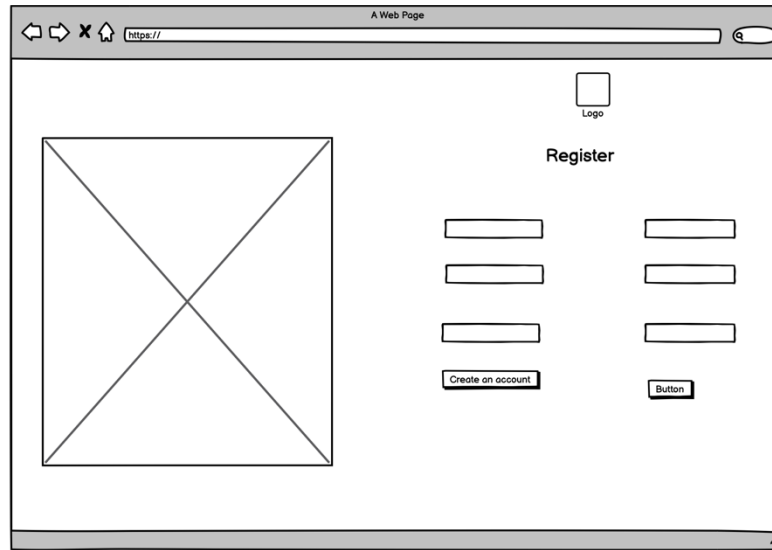
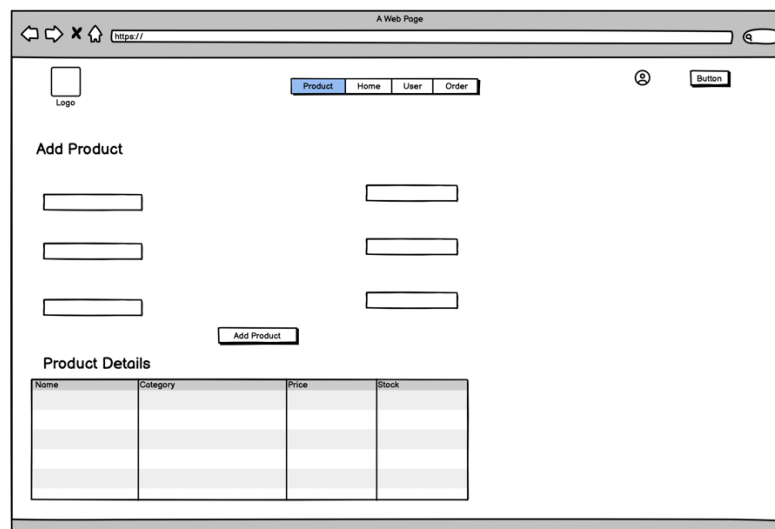


Figure 1: Wireframe of Login Page



A wireframe of a web browser window titled "A Web Page". The address bar shows "https://". The page layout includes a logo placeholder (a square with an 'X') on the left. On the right, there is a "Register" section. Above the form is a small square labeled "Logo". The form consists of two columns of input fields: the left column has three fields, and the right column has three fields. Below the left column is a button labeled "Create an account", and below the right column is a button labeled "Button".

Figure 2: Wireframe of Signup Page



A wireframe of a web browser window titled "A Web Page". The address bar shows "https://". The page layout includes a logo placeholder (a square with an 'X') on the left. A navigation bar at the top right contains links: "Product" (highlighted), "Home", "User", and "Order". To the right of the navigation bar is a user icon (a circle with a question mark) and a "Button". Below the navigation bar, there is an "Add Product" section with two columns of input fields: the left column has three fields, and the right column has three fields. Below these fields is a button labeled "Add Product". At the bottom, there is a "Product Details" section with a table.

| Name | Category | Price | Stock |
|------|----------|-------|-------|
| | | | |
| | | | |
| | | | |

Figure 3: Wireframe of Product Page

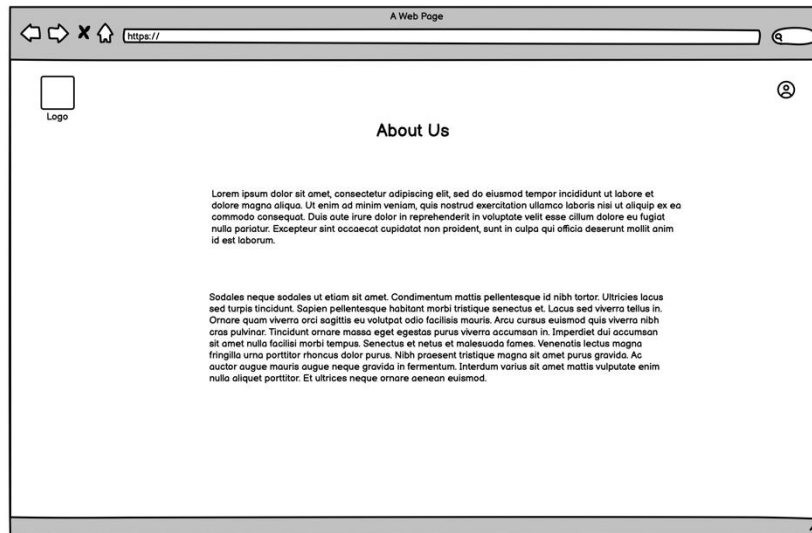


Figure 4: Wireframe of About Us Page

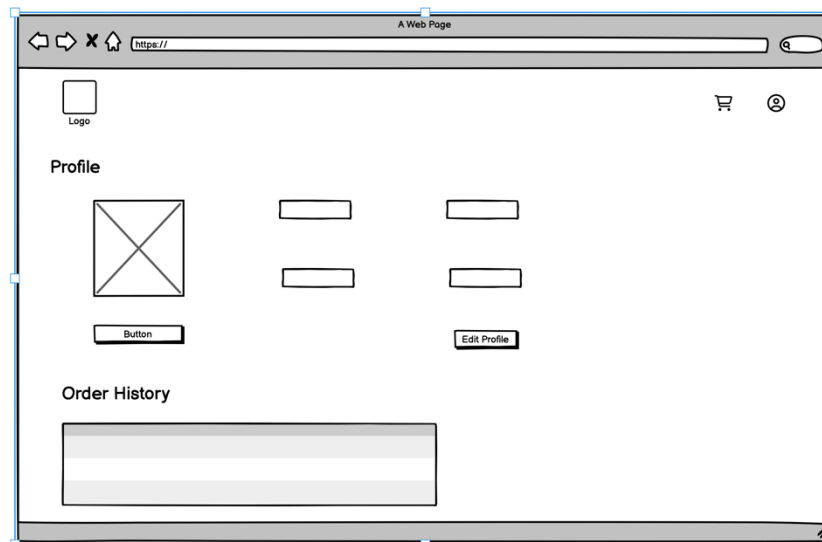


Figure 5: Wireframe of Profile Page

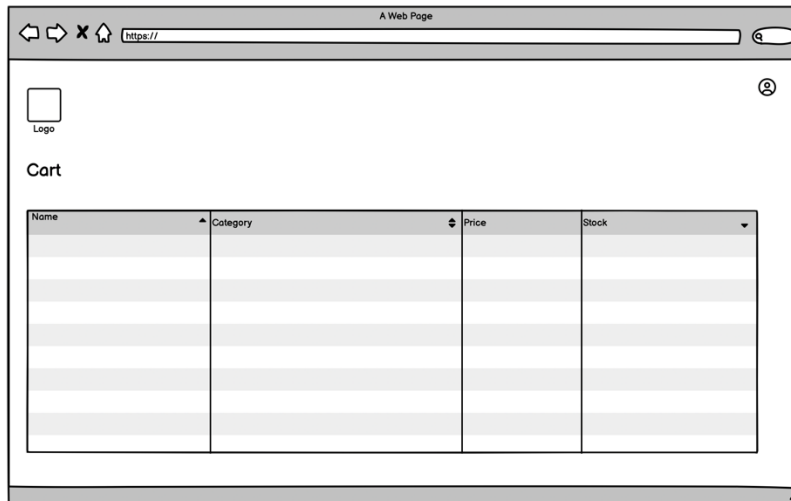


Figure 6: Wireframe of Cart Page

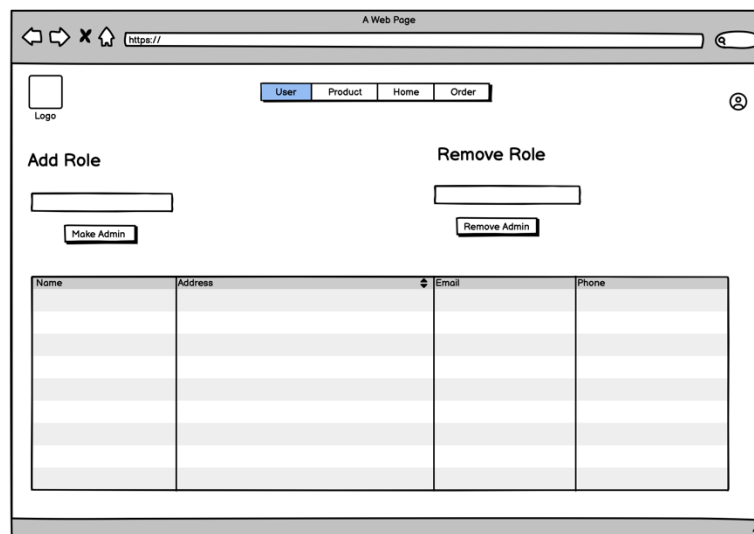


Figure 7: Wireframe of User Page

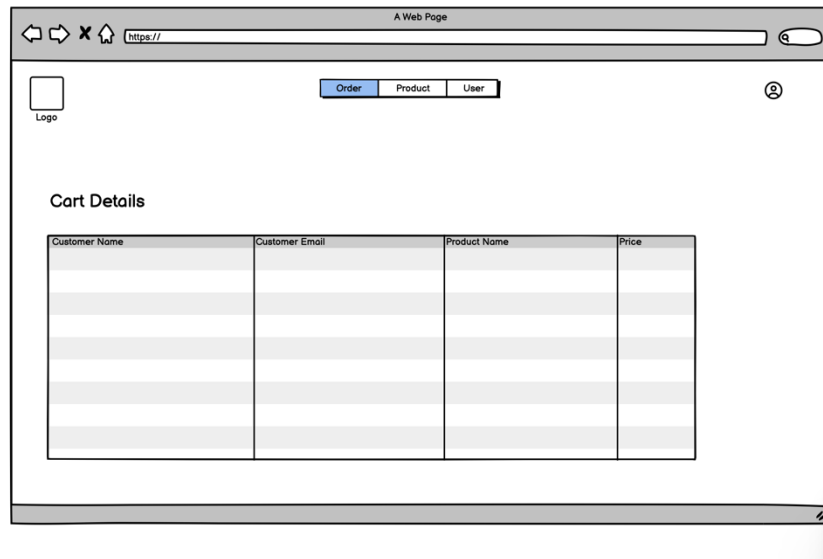


Figure 8: Wireframe of Order page

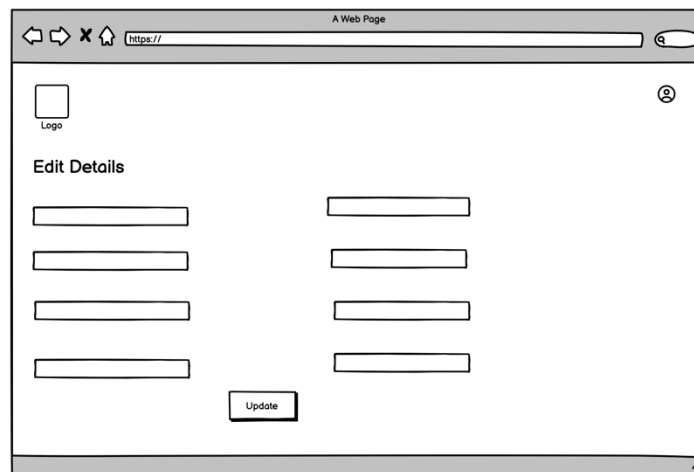


Figure 9: Wireframe of UserEdit page

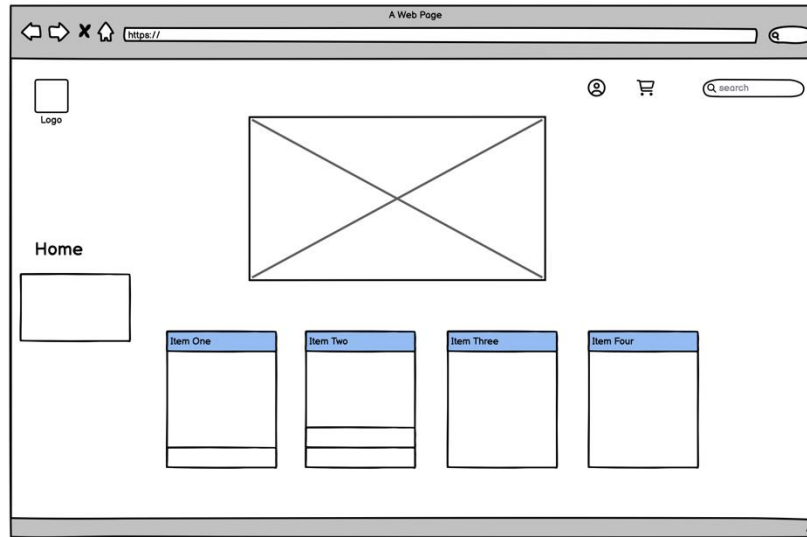


Figure 10 : Wireframe of Home page

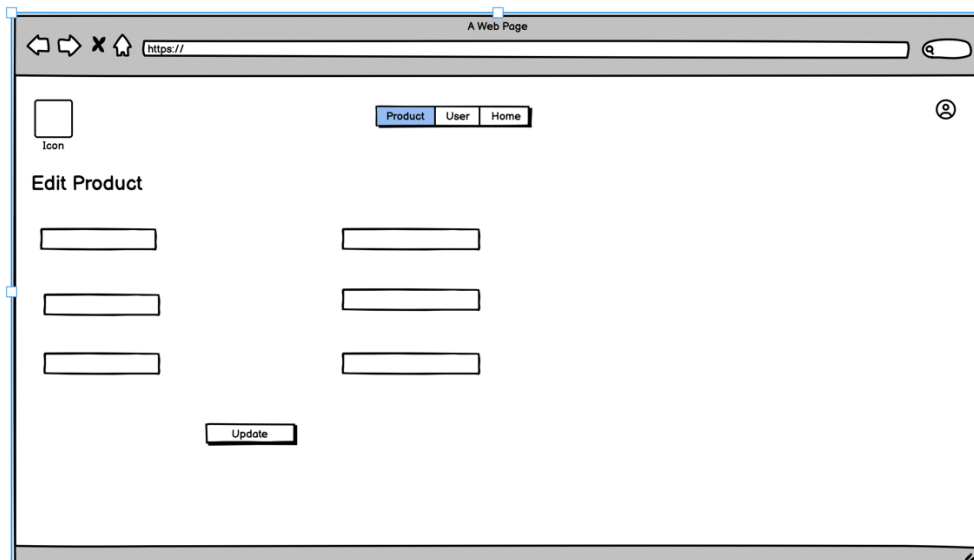
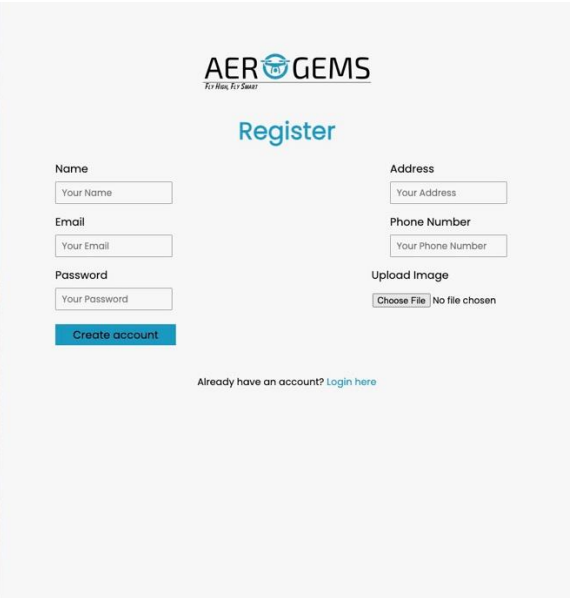
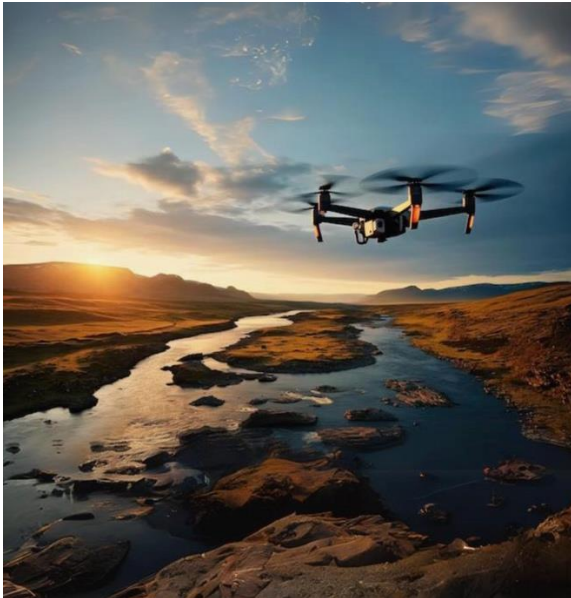


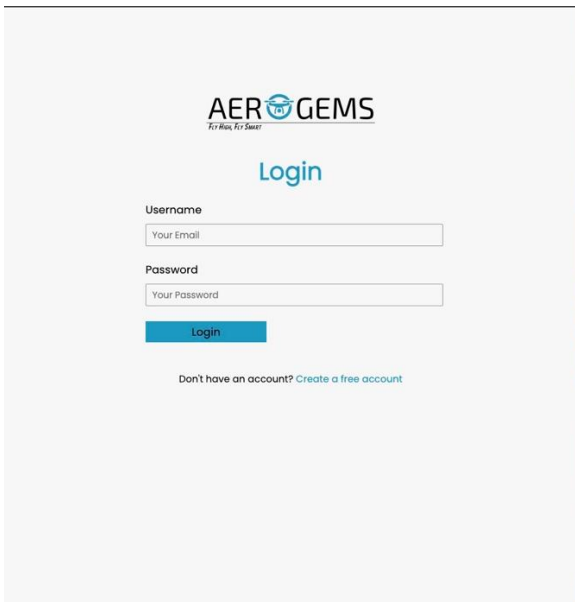

Figure 11: Wireframe of ProductEdit Page

2.2 Actual Design




The image shows the actual design of the Register page for AEROGEMS. The page features a header with the AEROGEMS logo and the tagline "Fly High, Fly Smart". Below the header, the word "Register" is displayed in a large, blue font. The registration form consists of several input fields: "Name" (with a sub-label "Your Name"), "Email" (with a sub-label "Your Email"), "Password" (with a sub-label "Your Password"), "Address" (with a sub-label "Your Address"), "Phone Number" (with a sub-label "Your Phone Number"), and "Upload Image" (with a sub-label "Choose File" and a note "No file chosen"). A blue "Create account" button is located below the form. At the bottom, there is a link for users who already have an account: "Already have an account? [Login here](#)".


Figure 12: Actual design of Register page



The image shows the actual design of the Login page for AEROGEMS. The page features a header with the AEROGEMS logo and the tagline "Fly High, Fly Smart". Below the header, the word "Login" is displayed in a large, blue font. The login form consists of two input fields: "Username" (with a sub-label "Your Email") and "Password" (with a sub-label "Your Password"). A blue "Login" button is located below the form. At the bottom, there is a link for users who don't have an account: "Don't have an account? [Create a free account](#)".

Figure 13: Actual Design of Login Page


Product
User



Adarsha Dawadi
Admin

Log Out

Edit Product

Product Name

Product Type

Category

Rating


Stock


Price

Upload Image

No file chosen

Figure 14: Actual Design of Product Edit Page


Product
User
Order



Adarsha Dawadi
Admin

Log Out

Add Product

Product Name

Product Type

Category

Rating

Stock

Price

Upload Image

No file chosen

Figure 15: Actual Design of Product Page

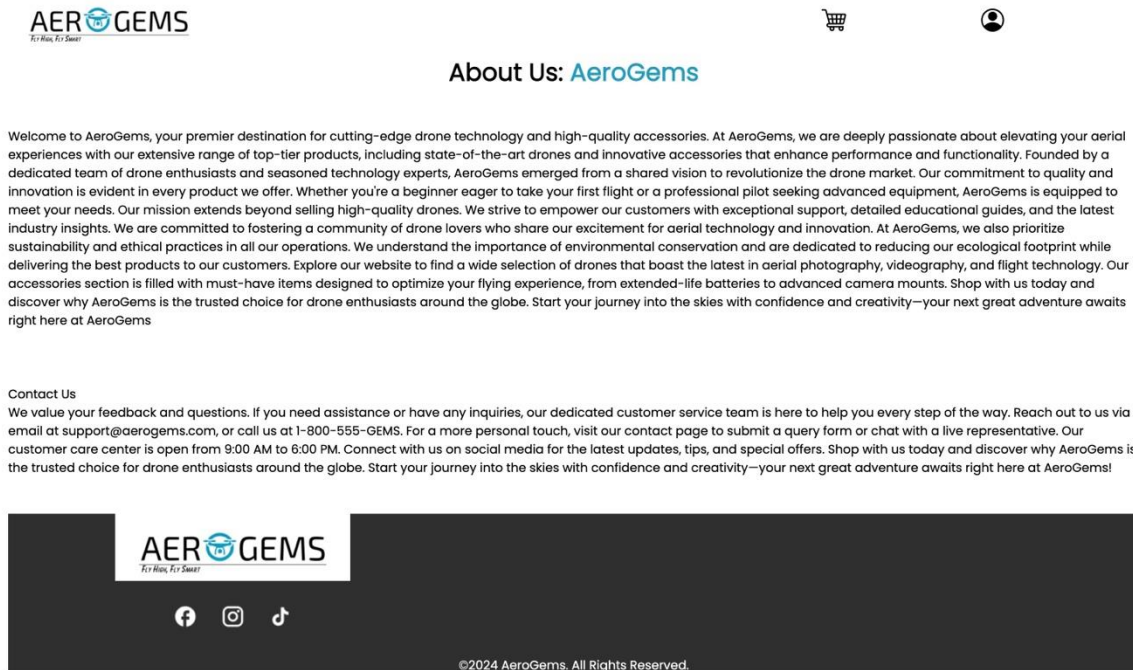


Figure 16: Actual Design of About Us Page

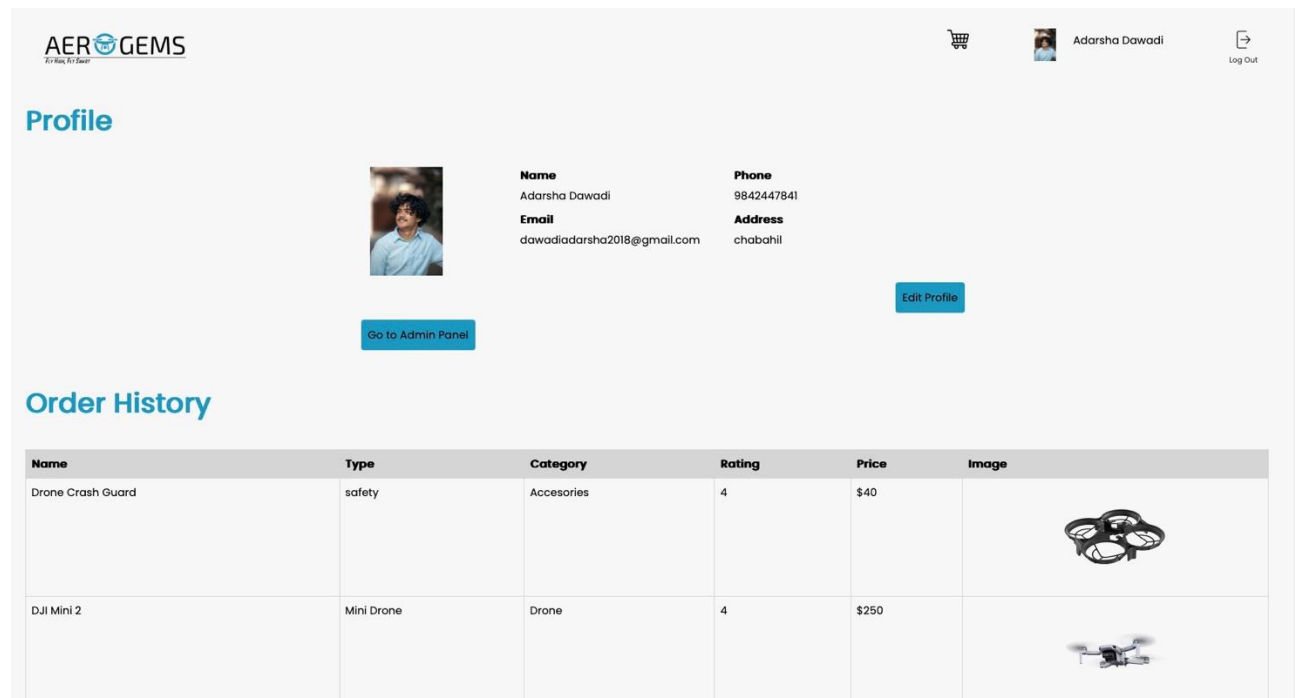




Figure 17: Actual Design of Profile Page



Adarsha Dawadi

Edit Details

Email

dawadiadarsha2018@gmail.com

Phone

9842447841

Name

Adarsha Dawadi

Password

Address

chabahl

Upload Image



Choose File

No file chosen




No file chosen

Update

Figure 18: Actual Design of UserEdit Page



Adarsha Dawadi

Cart







| Name | Type | Category | Rating | Price | Image | Action |
|-------------------|------------|-------------|--------|-------|---|------------------|
| Drone Crash Guard | safety | Accessories | 4 | \$40 |  | <div>Clear</div> |
| DJI Mini | Mini Drone | Drone | 4 | \$270 |  | <div>Clear</div> |
| VR D2 Goggles | Goggles | VR | 2 | \$970 |  | <div>Clear</div> |

Checkout

About company

AeroGems is a premier online destination for drone enthusiasts and professionals alike. Since our launch, we have proudly served a growing community of customers, delivering close to 200 high-quality

Figure 19: Actual Design of Cart page

| <div>  <div> Product User Order </div> <div>  <div> Adarsha Dawadi Admin </div> <div>  Log Out </div> </div> </div> | | | | | | |
|--|-----------------------------|-------------------|------------------|--------------|-------|---|
| Cart Details | | | | | | |
| Customer Name | Customer Email | Product Name | Product Category | Product Type | Price | Image |
| Adarsha Dawadi | dawadiadarsha2018@gmail.com | Drone Crash Guard | Accessories | safety | \$40 |  |
| Adarsha Dawadi | dawadiadarsha2018@gmail.com | DJI Mini | Drone | Mini Drone | \$270 |  |
| Adarsha Dawadi | dawadiadarsha2018@gmail.com | VR D2 Goggles | VR | Goggles | \$970 |  |


| Order History | | | | | | |
|----------------|-----------------------------|-------------------|------------------|--------------|-------|---|
| Customer Name | Customer Email | Product Name | Product Category | Product Type | Price | Image |
| Adarsha Dawadi | dawadiadarsha2018@gmail.com | Drone Crash Guard | Accessories | safety | \$40 |  |

Figure 20: Actual Design of Order Page

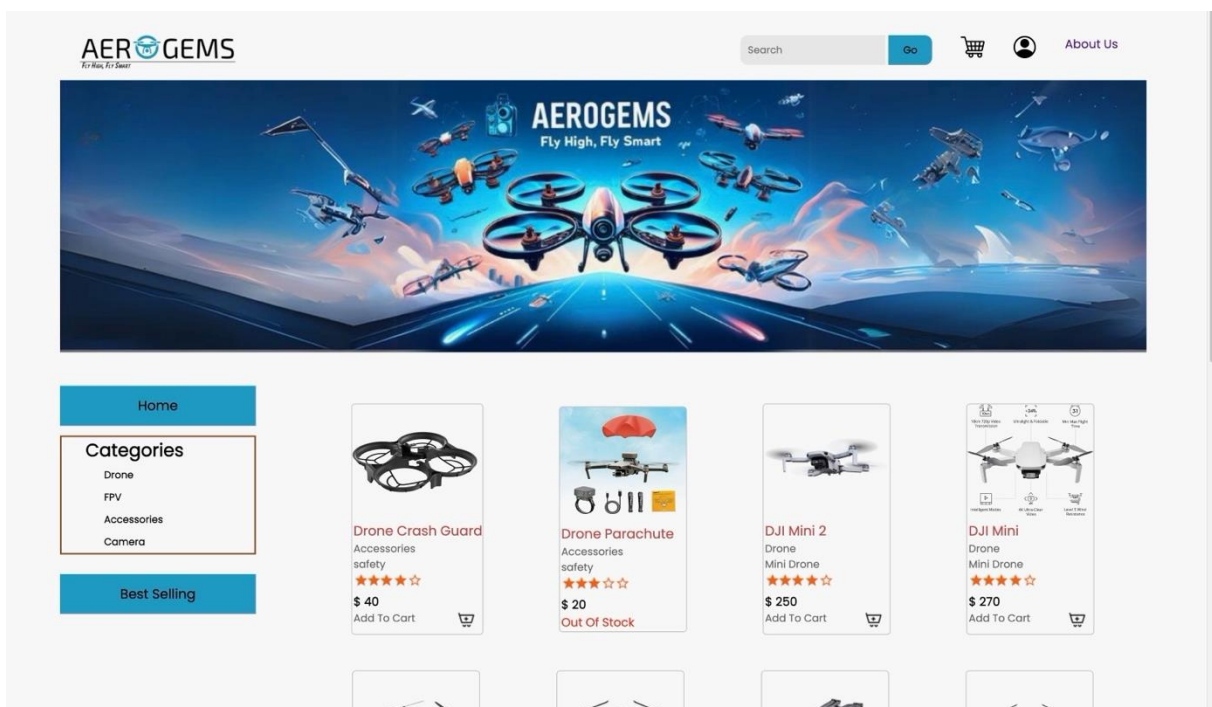




Figure 21: Actual Design of Home Page




[Product](#)

[User](#)



Adarsha Dawadi
Admin


Log Out

Edit Product

| | |
|--|-------------------------------------|
| Product Name | Product Type |
| <input type="text" value="Drone Crash Guard"/> | <input type="text" value="safety"/> |
| Category | Rating |
| <input type="text" value="Accessories"/> | <input type="text" value="4"/> |
| Stock | Price |
| <input type="text" value="25"/> | <input type="text" value="40"/> |

Upload Image

No file chosen

Figure 22: Actual Design of ProductEdit Page

3 Class Diagram

Class diagrams are a type of UML (Unified Modeling Language) diagram used in software engineering to visually represent the structure and relationships of classes in a system. It is a standardized modeling language that helps in designing and documenting software systems. They are an integral part of the software development process, helping in both the design and documentation phases (GeeksforGeeks, 2024).

3.1 Overall Class Diagram

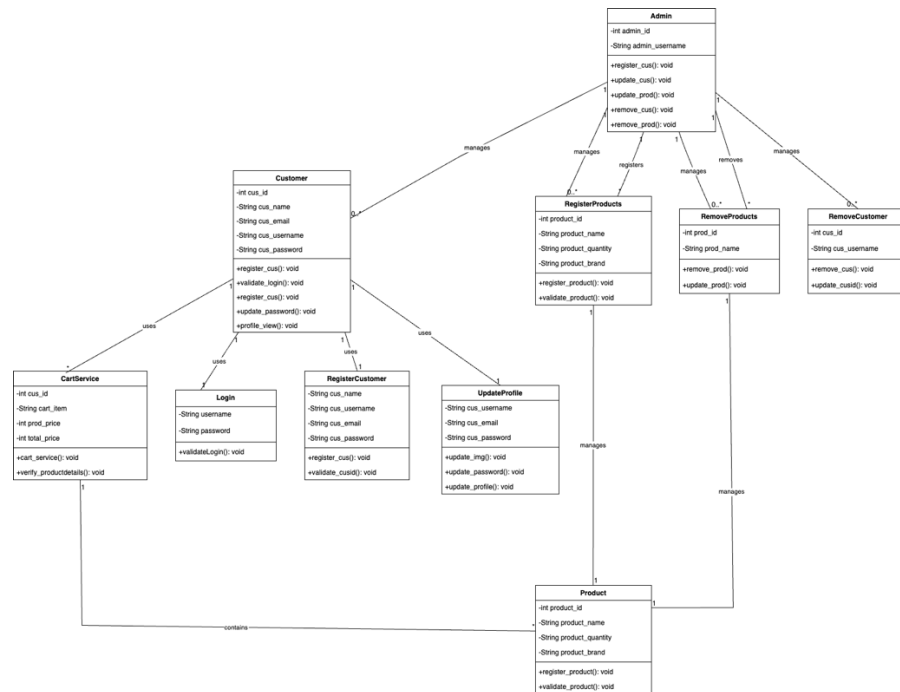


Figure 23: Class Diagram

3.2 Individual class diagram

3.2.1 Register class

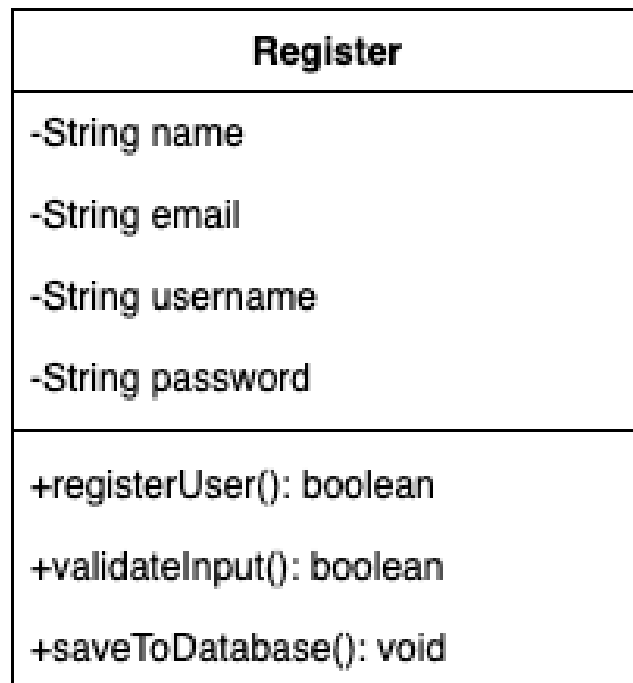


Figure 24: Individual class diagram for register class

3.2.2 Product Class

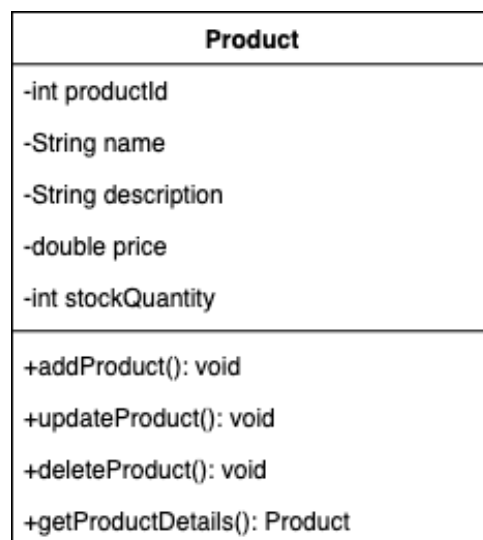


Figure 25: Individual class diagram for product class

3.2.3 Cart Class

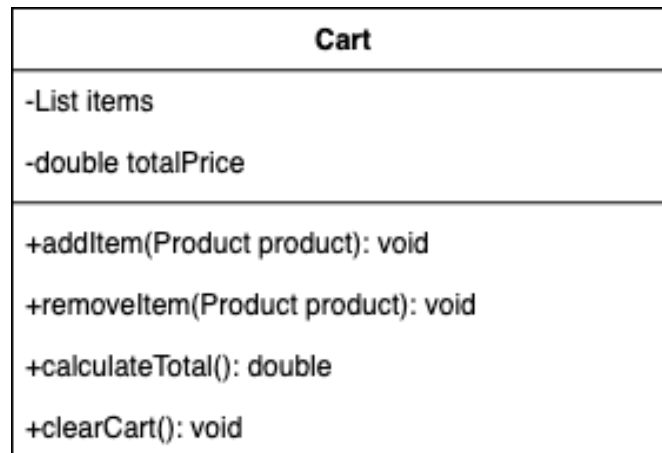


Figure 26: Individual class diagram for cart class

3.2.4 Purchase Class

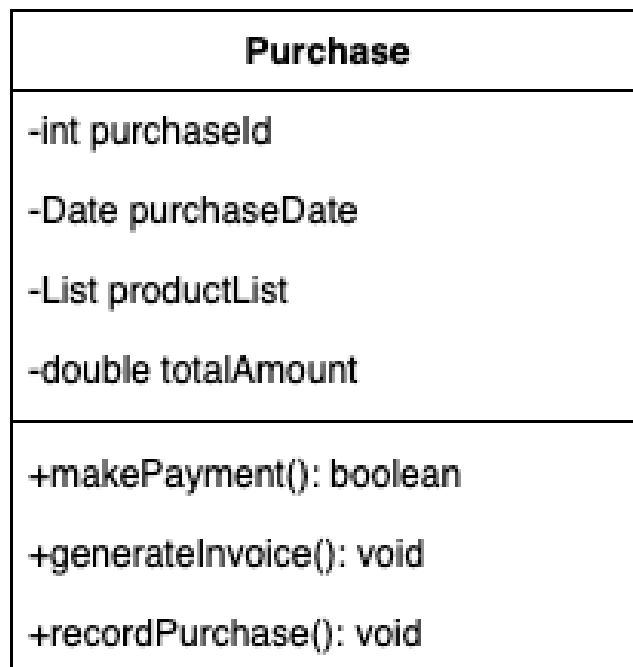


Figure 27: Individual Class Diagram for Purchase class

4 Method Description

The method definitions for the project's servlets that are and data connectivity that states the above documents which also provide a variety of important information and features that is needed for the project functioning of the website for e-commerce. So, here's a summary of the methods:

4.1 Servlet: Cart

4.1.1 doGet()

This method transmits the visitor to the website('index's') and helps be employed for displaying tasks, with HTTP requests and gives the responses to the objects as inputs to operate and to function.

4.1.2 doPost()

This method supports inserting all the items to the cart with the help of dB Connection class's 'addItemCart' work. It also examines the request and updates the user's sessions cart correctly.

4.2 Servlet: deleteCart

4.2.1 doPost()

This method sends visitors to the cart page ('cart.jsp') and makes it easier to delete items from the shop using the 'deleteCartItem' work and it also accept transactions that are included within the identical same request scope.

4.3 Class: DbConnection

4.3.1 getConnection()

A static approach that returns a connection to the database object which also lets the website's application communicate and interact with the database.

4.3.2 isUserRegistered(String username,String password)

It gives a true or false end that shows if the user with the given password and username exists in a database.

4.3.3 dataForCookies(String username)

It gets individual-specific data for cookie management which also helps in keeping track of sessions by the help of the users and customized configurations.

4.3.4 addItemCart(String username,String productId)

It introduces a specific item to the consumer's cart while also changing the shopping cart data in the relational database.

4.3.5 deleteCartItem(String username,String productId)

It reduces an item from the user's container that is based on the user one's identity and the product details are offered accordingly.

4.3.6 purchase (int id)

It also supports the purchase of the products and services by also changing the information of the database with the items that goes from the shopping cart to the paid state.

4.3.7 deleteCart(int id)

It helps to develop a user's cart totally, which also typically occurs during the session clearing or after a purchase is completed.

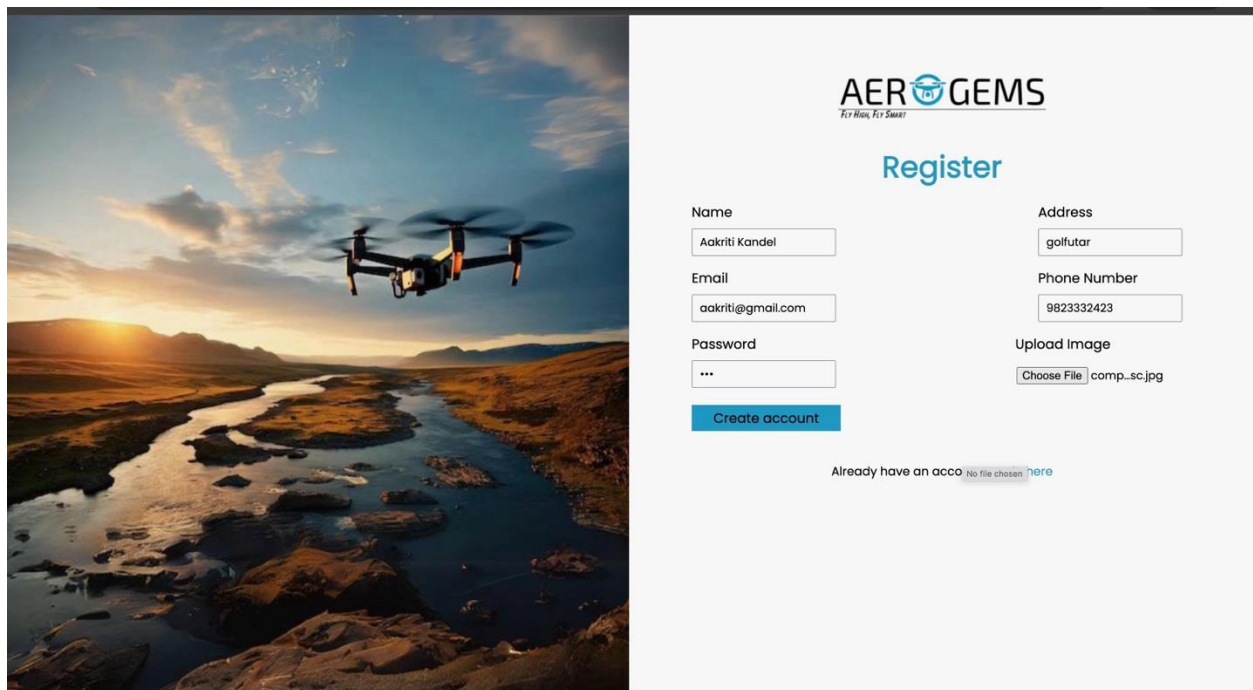
The above descriptions record the basic logic and needs required for handling the user interactions with cart maintenance on a platform for e-commerce. They also make sure that the website is also capable of handling user conversations and payments in an effective and secure way.

5 Test Cases:

5.1 To test if a new user registers in the database.

| | |
|------------------|---|
| Test No: | 1 |
| Objective: | To test whether a new user is registered in the database or not. |
| Action: | The user's register details is entered on the registration form and the form was submitted. |
| Expected Result: | The new user details would be stored in the database. |
| Actual Result: | The new user details was stored in the database. |
| Conclusion: | The test was successful. |

Table 1: Test Case 1



The image is a composite. On the left, a drone is shown flying over a winding river in a desert-like landscape during sunset. On the right, the AeroGems registration form is displayed. The form includes fields for Name, Address, Email, Phone Number, Password, and an Upload Image section. A 'Create account' button is at the bottom of the form. Below the form, there is a link for users who already have an account.

AEROGEMS
For Many, For Smaller

Register

Name:

Address:

Email:

Phone Number:

Password:

Upload Image: comp_sc.jpg

Already have an account? [No file chosen here](#)

Figure 28: Registering a new account

Showing rows 0 - 2 (3 total, Query took 0.0001 seconds.)

SELECT * FROM `register`

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

Extra options

| | | id | name | address | email | phone | password | image | isadmin |
|--------------------------|------------------|----|----------------|------------|-----------------------------|------------|-------------------|---|---------|
| <input type="checkbox"/> | Edit Copy Delete | 89 | Utsav Katuwal | kadhaghari | bomb@gmail.com | 8927323423 | Q40U=Q, Q#p&\$aQ% | 2ebd4b1b-1fa3-4c66-babb-b0329e460305.JPG | false |
| <input type="checkbox"/> | Edit Copy Delete | 90 | Adarsha Dawadi | chabahil | dawadiadarsha2018@gmail.com | 9842447841 | Q40U=Q, Q#p&\$aQ% | IMG_0069.jpeg | true |
| <input type="checkbox"/> | Edit Copy Delete | 91 | Aakriti Kandel | golfutar | aakriti@gmail.com | 9823332423 | Q40U=Q, Q#p&\$aQ% | compressed_gm_40_img_191928_2c490e8a_1691550189220... | false |

Check all | With selected: Edit Copy Delete Export

Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

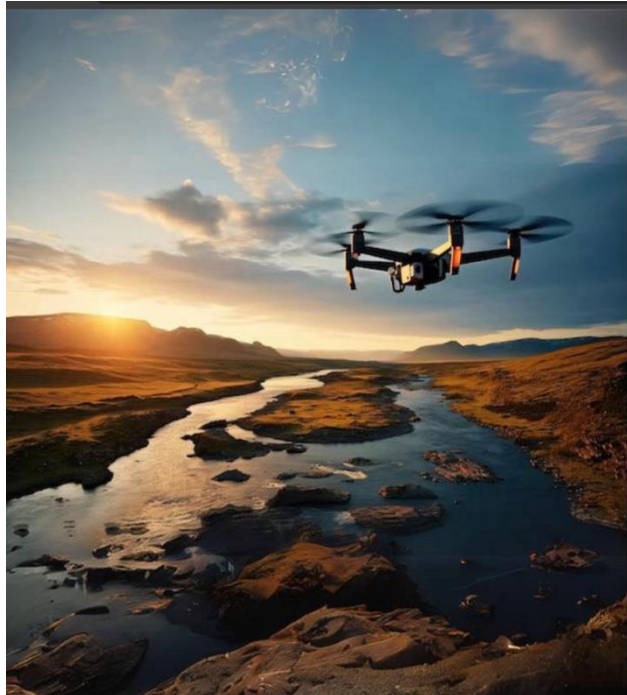
Query results operations

Figure 29: The account successfully being stored in database

5.2 To test duplicate registration

| | |
|------------------|---|
| Test No: | 2 |
| Objective: | To test the system's response when trying to register by using an email or phone number already in use. |
| Action: | A registration is attempted using details of an existing user. |
| Expected Result: | An error message would be displayed indicating that the details is already in use. |
| Actual Result: | An error message was displayed. |
| Conclusion: | The test was successful. |

Table 2: Test Case 2



AEROGEMS
FLY HIGH, FLY SMART

Register

Name

Address

Email

Phone Number

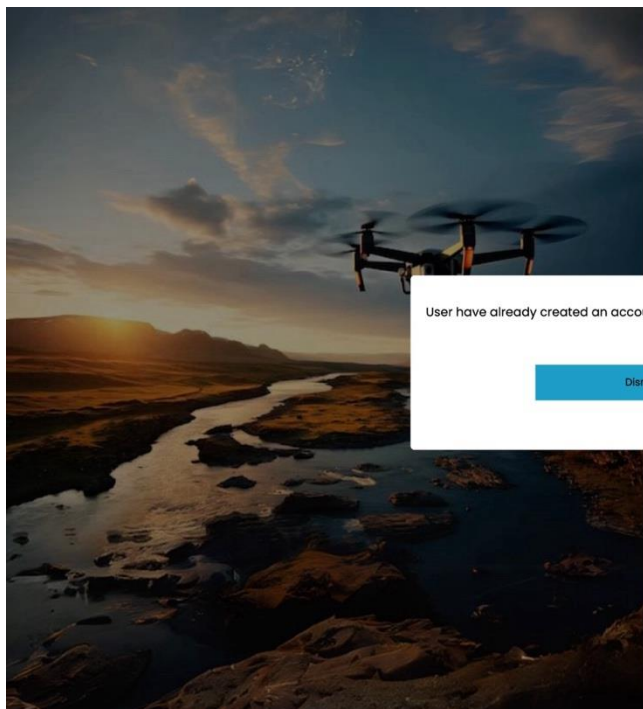
Password

Upload Image

No file chosen

Already have an account? [Login here](#)

Figure 30: Trying to duplicate registration



AEROGEMS
FLY HIGH, FLY SMART

Register

Name

Address

Email

Phone Number

Upload Image

Already have an account? [Login here](#)

User have already created an account with this Email or phone Number

Figure 31: An error message being displayed

5.3 To test if a product is being added to cart.

| | |
|------------------|--|
| Test No: | 3 |
| Objective: | To test whether a product is being added to cart or not. |
| Action: | A product is selected and the “add to cart” button is pressed. |
| Expected Result: | The product would be added to the cart and a message would show. |
| Actual Result: | The product was added to the cart and a message was shown. |
| Conclusion: | The test was successful. |

Table 3: Test Case 3

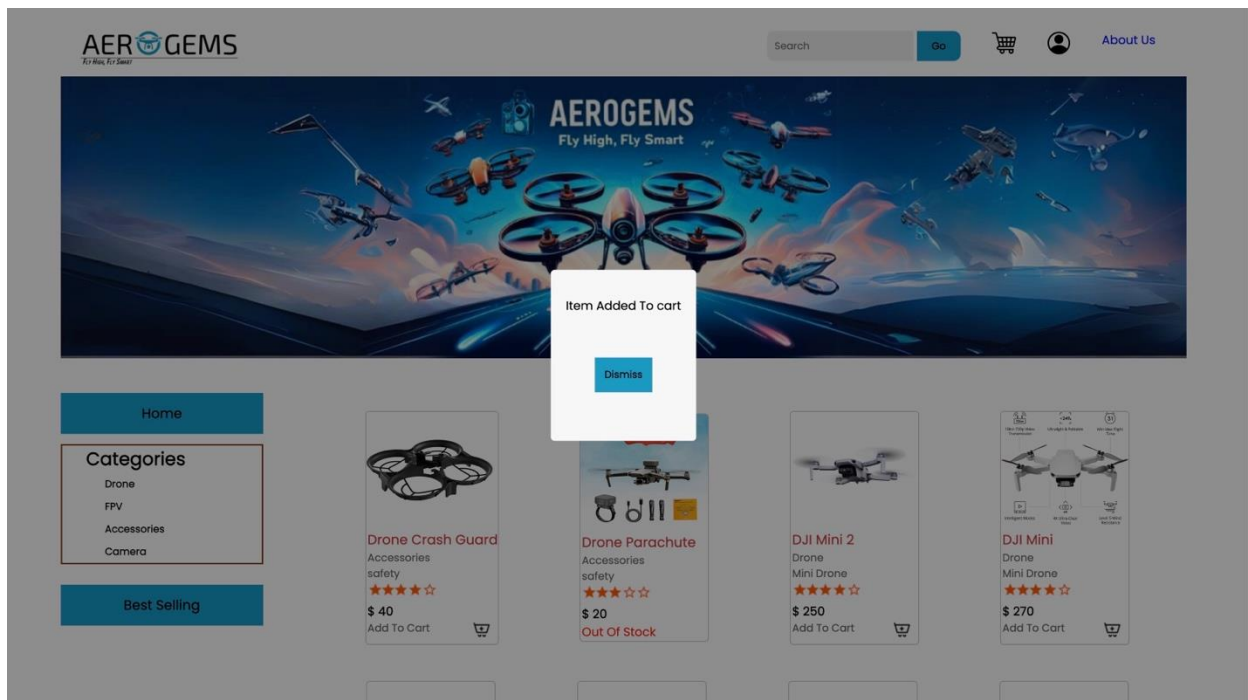


Figure 32 : Item being added to cart message being displayed

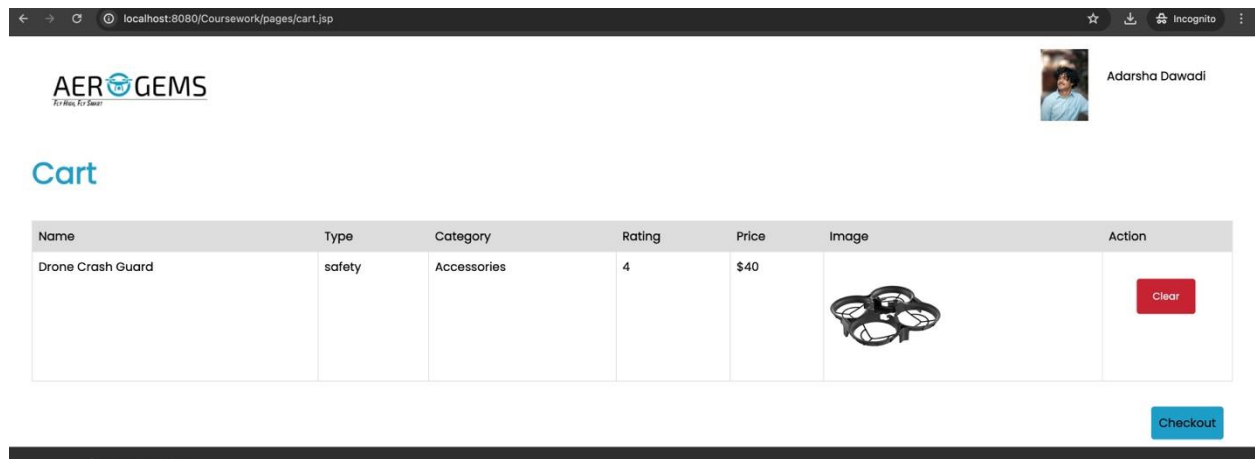


Figure 33: Item successfully added to cart

5.4 To test the checkout process

| | |
|------------------|--|
| Test No: | 4 |
| Objective: | To check out the product from the cart. |
| Action: | The checkout button was clicked to confirm the purchase. |
| Expected Result: | The product would be removed from cart and appear in order history with a success message. |
| Actual result: | The product was removed from the cart and added in the order history and a message appeared. |
| Conclusion: | The test was successful. |

Table 4: Test Case 4

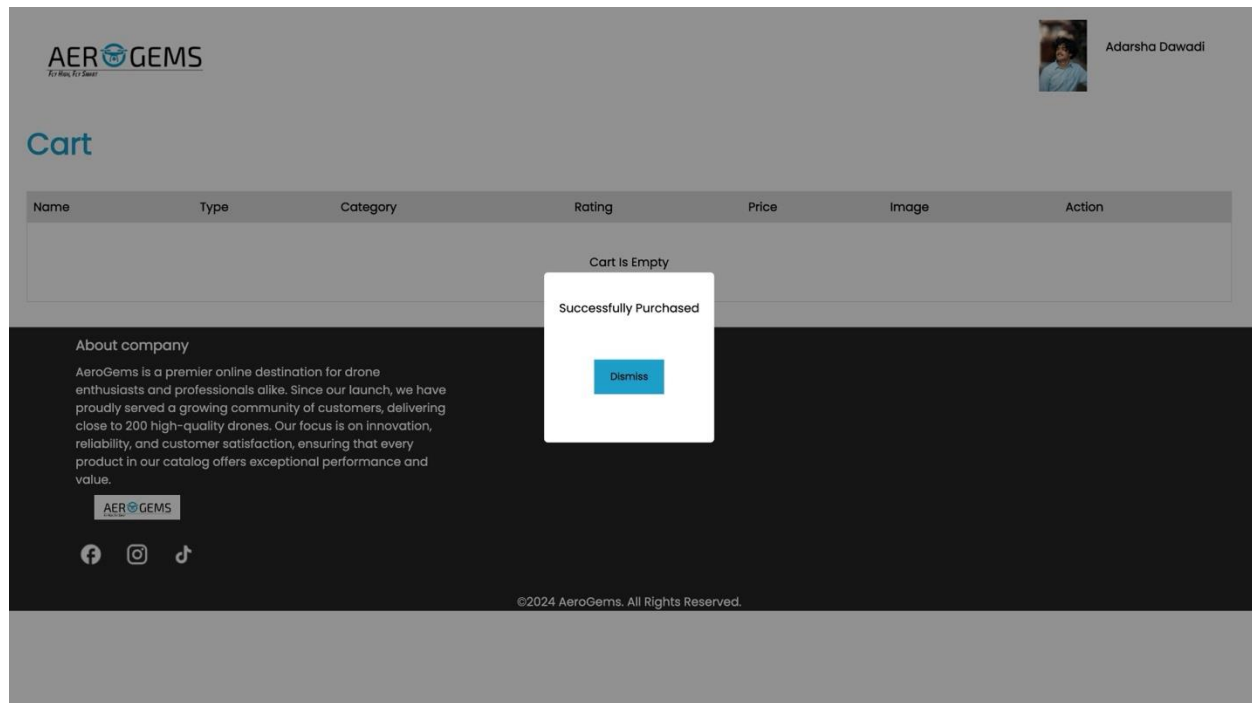


Figure 34: Item being purchased and checked out

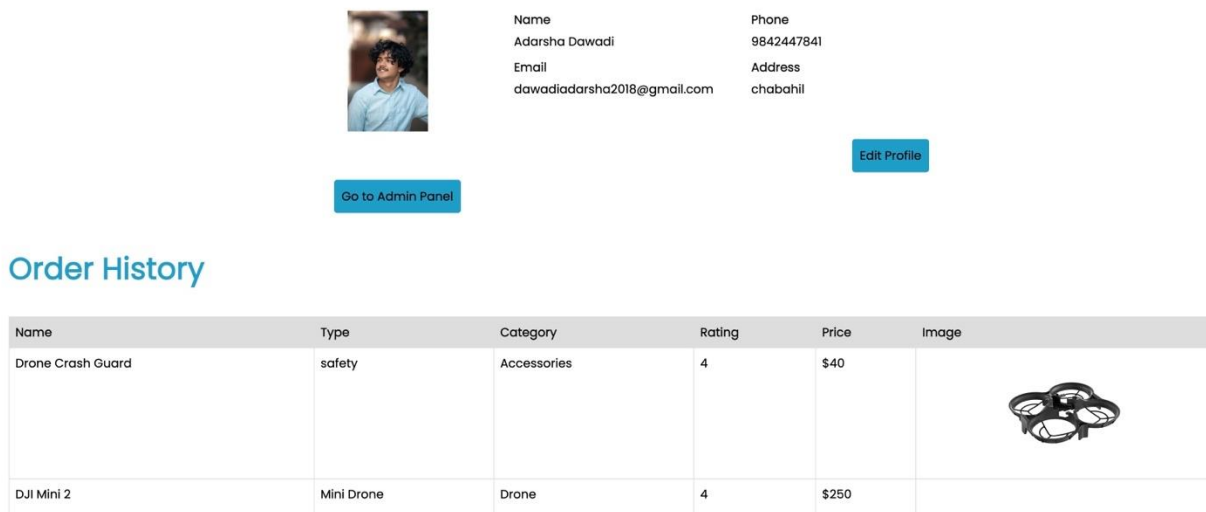


Figure 35: Item being successfully added to order history

5.5 To test password authentication

| | |
|------------------|---|
| Test No: | 5 |
| Objective: | To test whether the password authentication is valid. |
| Action: | In the login page, an invalid password is entered. |
| Expected Result: | An error message would appear and the user wouldn't access the website. |
| Actual Result: | An error message was displayed and the website was not accessed. |
| Conclusion: | The test was successful. |

Table 5: Test Case 5



AEROGEMS
Fly High, Fly Smart

Login

Username
dawadiadarsha2018@gmail.com

Password

Login

Don't have an account? [Create a free account](#)

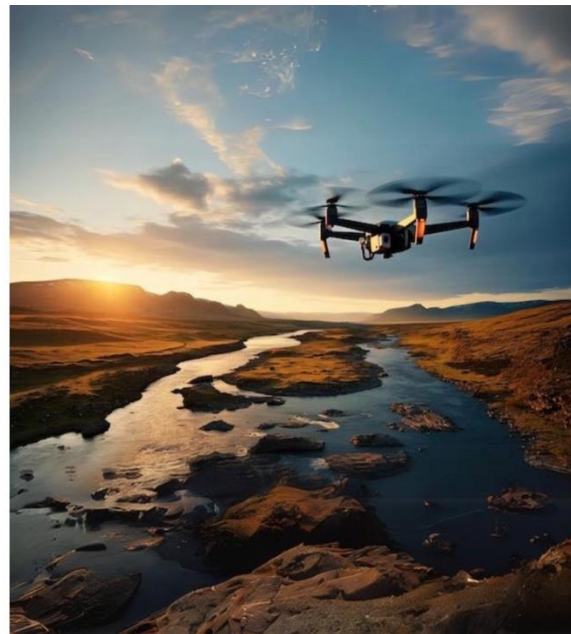


Figure 36: Entering invalid password in the login page

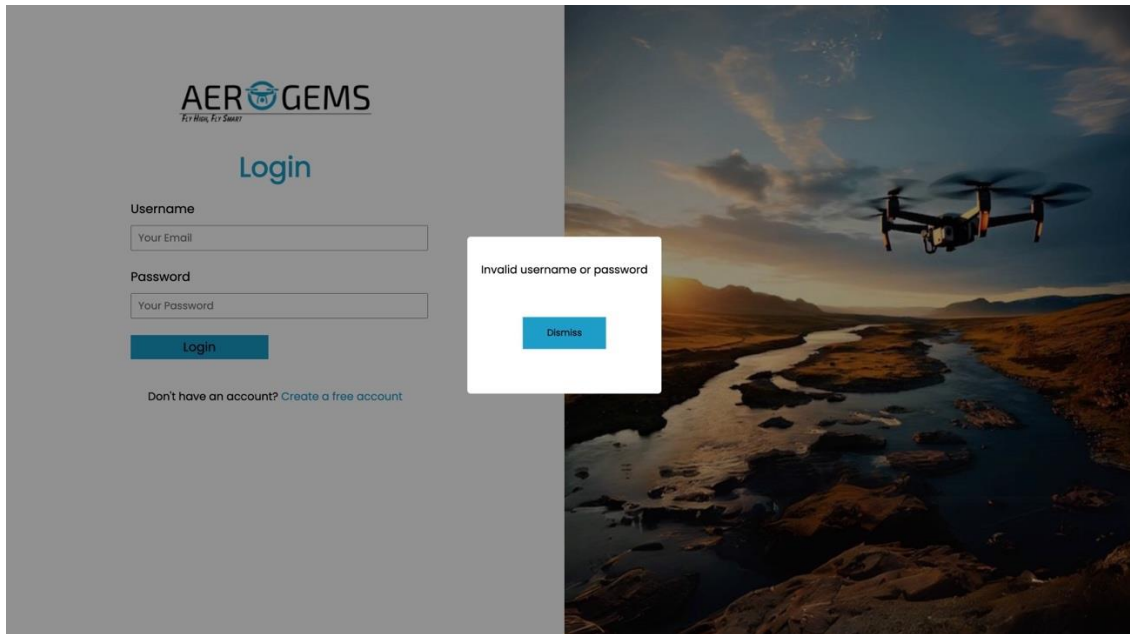


Figure 37: An error message displaying invalid information

6 Tools and Libraries used

There were various tools and libraries used during the development of this coursework. The various tools used are further explained below:

Eclipse IDE:

Eclipse is an integrated development environment (IDE) for Java and other programming languages like C, C++, PHP, and Ruby etc. Development environment provided by Eclipse includes the Eclipse Java development tools (JDT) for Java, Eclipse CDT for C/C++, and Eclipse PDT for PHP, among others (tutorialspoint, 2024). Eclipse was used for coding, debugging and testing and developing the software.



Figure 38: Eclipse IDE

XAMPP:

XAMPP is one of the widely used cross-platform web servers, which helps developers to create and test their programs on a local webserver. It was developed by the Apache Friends, and its native source code can be revised or modified by the audience (JavatPoint, 2024). Xampp was used in this coursework to set up a local development environment quickly.



Figure 39: XAMPP

Balsamiq Wireframes:

Balsamiq Wireframes is a rapid low-fidelity UI wireframe tool that reproduces the experience of sketching on a notepad or whiteboard, but using a computer (Balsamiq, 2024). Balsamiq was used for creating wireframes for webpages for visualizing the layout and navigations before the development process.



Figure 40: Balsamiq Wireframes

Microsoft word:

Microsoft word is a word processing program used for creating various documents and in this coursework, it was used to prepare a report that documents the whole development process along with the user interface design, class diagrams, method description and test cases.



Figure 41: Microsoft word

In Java, there is a virtual library of tested code, which includes ready-made frameworks for many problems which programmers face in their daily work which is called a Java Library (Vertex Academy, 2016). There were various libraries that were used in the development process which are given below:

MySQL Connector:

MySQL provides standards-based drivers for JDBC, ODBC, and .Net enabling developers to build database applications in their language of choice and it also provides set of classes and

methods which enable Java programs to interact with MySQL server (MySQL, 2024). MySQL was essential in this coursework for integrating a MySQL database with applications developed in Java.

JSTL (JavaServer Pages Standard Tag Library):

The JSP Standard Tag Library (JSTL) represents a set of tags to simplify the JSP development and it is important as it provides many tags that simplify the JSP (JavatPoint, 2024). It was used to simplify the Java code in JSP pages by using custom tag libraries that are easy to understand and maintain.

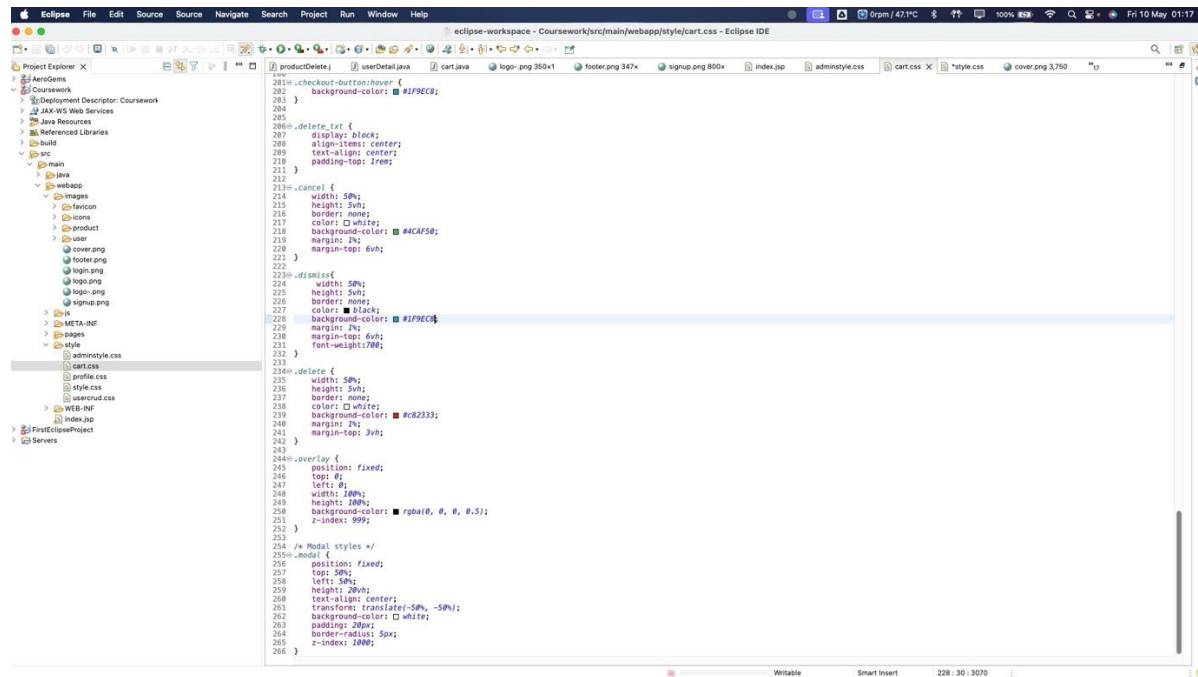
7 Development Process

During the development of this coursework, the project was cautiously designed and organized so that the whole work progressed accurately and successfully. At the commencement of the project stage was a detailed planning process where our team joined forces to gather, analyze and eventually present a comprehensive project scope. Later, the wireframes and detailed designs were created on Balsamiq Wireframes, which served as a visualization tool for the user interface and user experience and helped our designers during the early stages of the software development process. Visual planning became a significant reason for members of the team to be of one accord and led a smooth and transition into following stages.

The UI/UX design was laid down to enabling us to dive into the coding and start with the front-end implementation for a scalable solution. The website was designed by adopting the Model-View-Controller (MVC) model in order to achieve a well-defined separation of concerns that make its modification and scaling more effective. Then, we moved on to the front-end development and successfully completed it. This was a critical phase as we had to create an elaborate database schema to support the backend functionality. We used JSP for the view tier and Servlets as a controller layer to create a web

application in which we specifically make it dynamic. Centralized DB Access class was created primarily to ensure all database related tasks are performed in a consistent, organized fashion. These tasks involve both sides of the site, comprised of the user side and administrative interface. We have been conducting unit and system-level testing at all times to make sure that our solutions' functionality and robustness are sufficient for the testing environment, and we have secured the user passwords by using the AES encryption so the user data is protected.

7.1 Evidence of the development process:



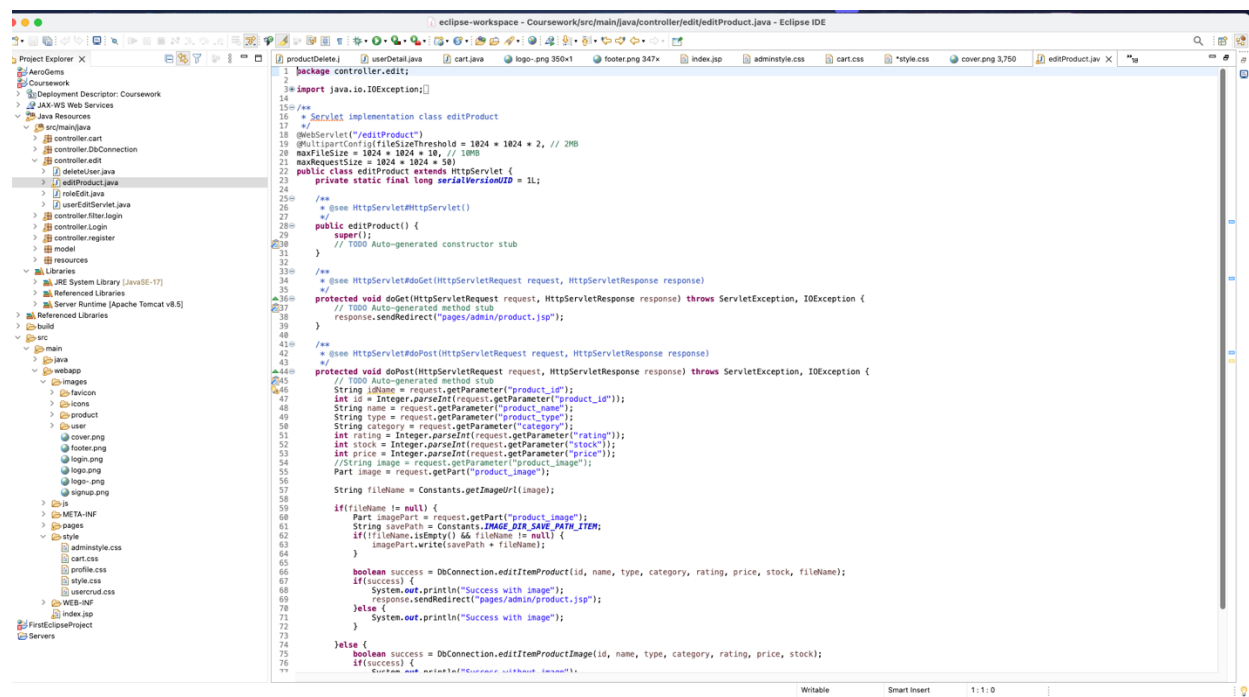


Figure 43: Development of a Java Servlet responsible for handling the functionality of editing product details in the application

8 Critical Analysis

A few issues occurred during the process, requiring clever solutions and adaptations. Here, I describe some of the major obstacles faced and the lessons learned while overcoming them. Ensuring sure the website was responsive and provided the same user interface across several devices was another big difficulty. The website's layout frequently did not work on smaller screens in its early cycles, and the pictures did not scale well. Developing the electronics and gadgets e-commerce website was a difficult but enjoyable process to make.

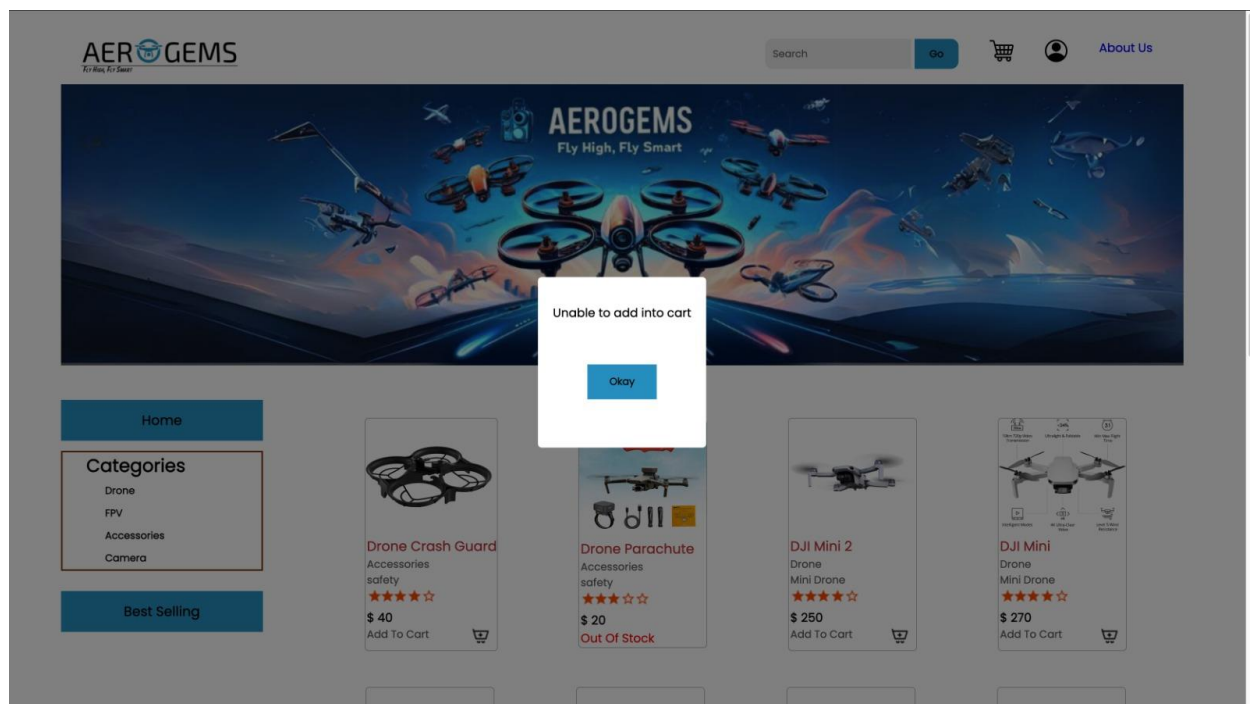


Figure 44 Critical analysis 1

This error was caused by no implementing auto increment in the card id.



Figure 45 Critical Analysis 2

This error was caused due to mistake in naming path.

9 Conclusion

The launch of our drone e-commerce website gave us the ability to use MVC architecture to create a strong and user-friendly online platform. Throughout the entire project, we took over various technical barriers that improved our skills in building and developing user interface design. While doing this task, the difficulties we faced not only met our project's goal, but it has also taken over our understanding and prepared us for the future career projects. This website is a respect to our passion and skill to turn academic knowledge into real world object.

As we conclude, it is true that the project met the goal but also set the road for changes that can come up in the future. The task gave us the opportunity to know about partnerships and ideas alongside my technical skills. This coursework made us smart and more creative for developing the website. We are now better prepared to take on larger tasks and deliver all the IOT to satisfy the online consumers. This project played a vital role in our growth as fresh and new software developers.

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