INTERNATIONAL UNIVERSITY- VIETNAM NATIONAL UNIVERSITY, HCM CITY
School of Computer Science & Engineering
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E-COMMERCE PROJECT REPORT

WEB APPLICATION PROGRAMING

Second semester, 2023 – 2024

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CHAPTER 1: INTRODUCTION

1. MOTIVATION.

The ecommerce or electronic commerce business model enables organizations and individuals to buy and sell goods and services over the internet. To better understand this business model, our team has decided to develop a fully functional ecommerce website as the project for this course. Throughout this project, we also aim to gain broader knowledge about web development that can serve as a foundation for future endeavors.

2. PROBLEM STATEMENT.

In recent years, online shopping has become increasingly popular as the primary way for people to purchase goods. This is due to the convenience and lower costs associated with running an online store, compared to a traditional brick-and-mortar model. As a result, many businesses - both large and small - have begun transitioning from the traditional shopping approach to ecommerce websites. For this project, our team aims to create a fully functional and user-friendly ecommerce website focused on selling electronic products on a small scale. By building our own website instead of using third-party ecommerce platforms such as Shopee or Lazada, we will not have to pay any commission fees on product sales, and we will also have full control over the website's design and content.

3. SCOPE.

A. Current Functionalities.

While there are still some missing and unfinished features, our ecommerce website will include most of the core functionalities found in other similar ecommerce platforms, such as:

- Order processing
- Admin panel for data management
- User registration and authentication
- Real-time updates

- Filtering and sorting of products
- Shopping cart, checkout, wishlist, and user profile features

B. Real-life Benefits.

Building an ecommerce website offers several advantages:

- The website owner has complete control over the website's appearance and design
- The owner only needs to cover maintenance and hosting costs, without having to pay any additional fees
- The website provides more extensive analytics than using third-party ecommerce platforms.

CHAPTER 2: LITERATURE REVIEW

1. SIMILAR APPLICATIONS/SYSTEMS.

A. THEGIOIDIDONG.

TheGioiDiDong is a retail company in Vietnam that primarily sells mobile phones, digital devices, and consumer electronics. It is considered a potential sales channel and an excellent example of an ecommerce system.

With over 1.2 million daily visitors, TheGioiDiDong is one of the largest ecommerce websites in Vietnam. The site provides detailed information on pricing and technical specifications for more than 500 phone models and 200 laptop models from major brands like Samsung, Apple, and others.

Figure 2.1 – TheGioiDiDong's Logo

B. FPT Shop

FPT Shop is the leading ecommerce website and one of the largest electronics retail chains in Vietnam, specializing in digital products like phones, tablets, laptops, PCs, and other electronic accessories .

FPT has solidified its unique position not only in the technology industry, but also in the ecommerce market in Vietnam. FPT Shop offers high-quality, authentic products and is the first retail chain system in Vietnam to receive ISO 9001:2000 certification for its quality management processes, in accordance with international standards.

Figure 2.1 – FPT's Logo.

C. CellphoneS

CellphoneS is an ecommerce website that specializes in selling the most prestigious technology products and accessories on the market. Along with TheGioiDiDong and FPT Shop, CellphoneS is one of the three major phone retail platforms in Vietnam.

CellphoneS has focused on optimizing its human and software management systems. This has allowed the company to effectively control its operations and service quality, making CellphoneS' service, warranty, return policies, and pricing among the best in the industry.

Figure 2.3 – CellphoneS's Logo

2. PLATFORM AND TOOLS REVIEW.

I. SOFTWARE.

- *Visual Studio Code*:

Visual Studio Code is a free, feature-rich code editor created by Microsoft that supports a wide range of programming languages and has cross-platform compatibility.

- *XAMPP*:

XAMPP is a popular software application used by PHP programmers to set up a local web server with Apache, PHP, MySQL, and other utilities for website development.

II. FRONTEND.

- *HTML:*

HTML provides the structural foundation for websites, acting as the backbone.

- *CSS:*

  CSS is used to style and format the appearance of web pages, allowing for customizations like colors, fonts, layouts, etc.

- *JavaScript:*

  JavaScript enhances interactivity and user experience on websites, with features like event handling, DOM manipulation, and client-side validation.

- *jQuery:*

  jQuery is a popular JavaScript library that simplifies writing JavaScript code and provides a wide range of pre-built functions and plugins.

- *Bootstrap:*

  Bootstrap is a frontend framework that accelerates web development by providing pre-designed HTML/CSS components and responsive design capabilities.

III. BACKEND:

- *PHP:*

  PHP is a widely used programming language for building web applications due to its user-friendly nature and compatibility with a variety of languages and web browsers.

- *MySQL:*

MySQL is a popular open-source SQL relational database management system widely used on the web.

It is a high-speed, stable, and easy-to-use database system that can adapt to different usage patterns and portable working conditions.

MySQL runs on multiple operating systems and supports various programming languages, providing a powerful and user-friendly utility system.

IV. LIBRARY AND API.

➢ *provinces.open-api.vn*

- This API allows the website to fetch all provinces, district and ward in Vietnam

Figure 2.4 – Provinces API.

➢ *SweetAlert2*

- This library helps create beautiful, responsive, and customizable popup boxes.

Figure 2.5 – SweetAlert2

CHAPTER 3: SYSTEM DESIGN

1. SYSTEM REQUIREMENT SPECIFICATION.

a. Functional Requirements.

No.	Functional Requirement Name
1	Listing product to the front-end

2	Setting Pages
3	Shopping cart
4	Checking out
5	Sorting, filter product by price and brands
6	Login, Logout, Register
7	Wishlist
8	Admin Panel
9	Product Pages

b. Requirement Analysis.

Name	Description
Registration	- Customers need to register an account to buy a product. - If the customer enters a duplicate username or email, the system will display an error notification. - The customer password is encrypted when it is saved in the database.
Login	- The customer must enter the valid username and password needed to log in to the system. - The system will automatically validate the customer's input
Product Listing	- Products must be displayed at the front end and also be displayed on multiple category pages.
Product Pages	- Each product must have its own page, consisting of product details, description, price, and name. - On a product page, the customers can add the product to their cart or add it to their wishlist.
Product Filter	- Products will be automatically filtered when the user types in the search field. - Products can also be filtered using the price range slider.
Sorting	- Products can be sorted by their price or by their brands.
Shopping Cart	- Customers can add products to their cart. - On the cart page, customers can remove a product, clear the whole cart, and change the quantity of the product. - A product’s quantity is changed the system will

	automatically re-calculate the cart total amount.
Setting Pages	- The customer can change his or her personal information on the setting page. - The customers can also see the status of their orders here.
Wishlist	- The customer can add one or multiple products to their wishlist. - When a product is added to the wishlist, the "Add to wishlist" button on the product page will be changed to "Remove from wishlist". - Customers can either remove the product from the wishlist from the product page or on the wishlist page.
Admin Panel	- The admin panel provided tools that help the owner to modify the content on the website.

c. Non-functional Requirements.

- Usability:

One of the most basic non-functional requirements is the way of creating a website layout so that users can interact with the website easily. It requires the UI to be simple and nice. All operations must be on the screen so users can complete a task on the system as quickly as possible.

- Security

During the use of the system, the website should provide privacy requirements. The password of the user must be hashed before storing it in the database. When the user makes an online payment, the system is not allowed to store the Credit/ Debit card information of the user.

- Performance

One of the most important requirements is performance to increase the traffic on the website. The website needs to load as quickly as possible. The factors that can improve the performance are creating a good UX effectively, making large resources such as: storage, RAM, Database storage, …

- Maintainability

To detect errors whether the system is easily detected and corrected, it needs a solution to maintain the system. Therefore, when encountering a bug, the developer can quickly identify the cause, and fix as soon as possible. It is required to have an appropriate convention when developing the system. Documents must be clear for each module, each feature.

- Scalability
  The system can be expanded bigger by developing more features and functionalities without impacting the performance of the website. It is critical that the web store do load balancing to ensure optimal use of servers, ensuring a dependable, fast shopping experience for clients [14].

2. SYSTEM DESIGN SPECIFICATION

A. USECASE DIAGRAM.

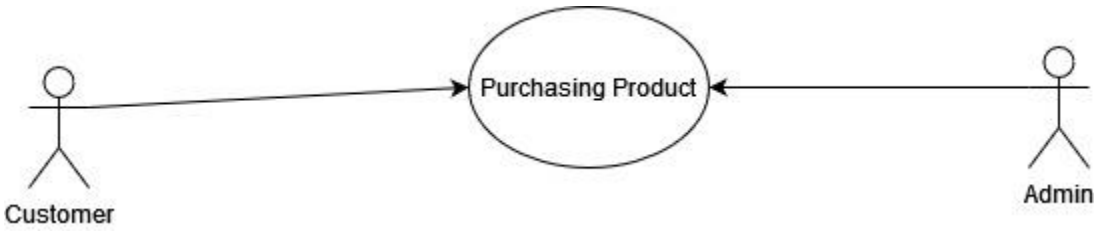


Figure 3.1 – Summary Goal Usecase Diagram.

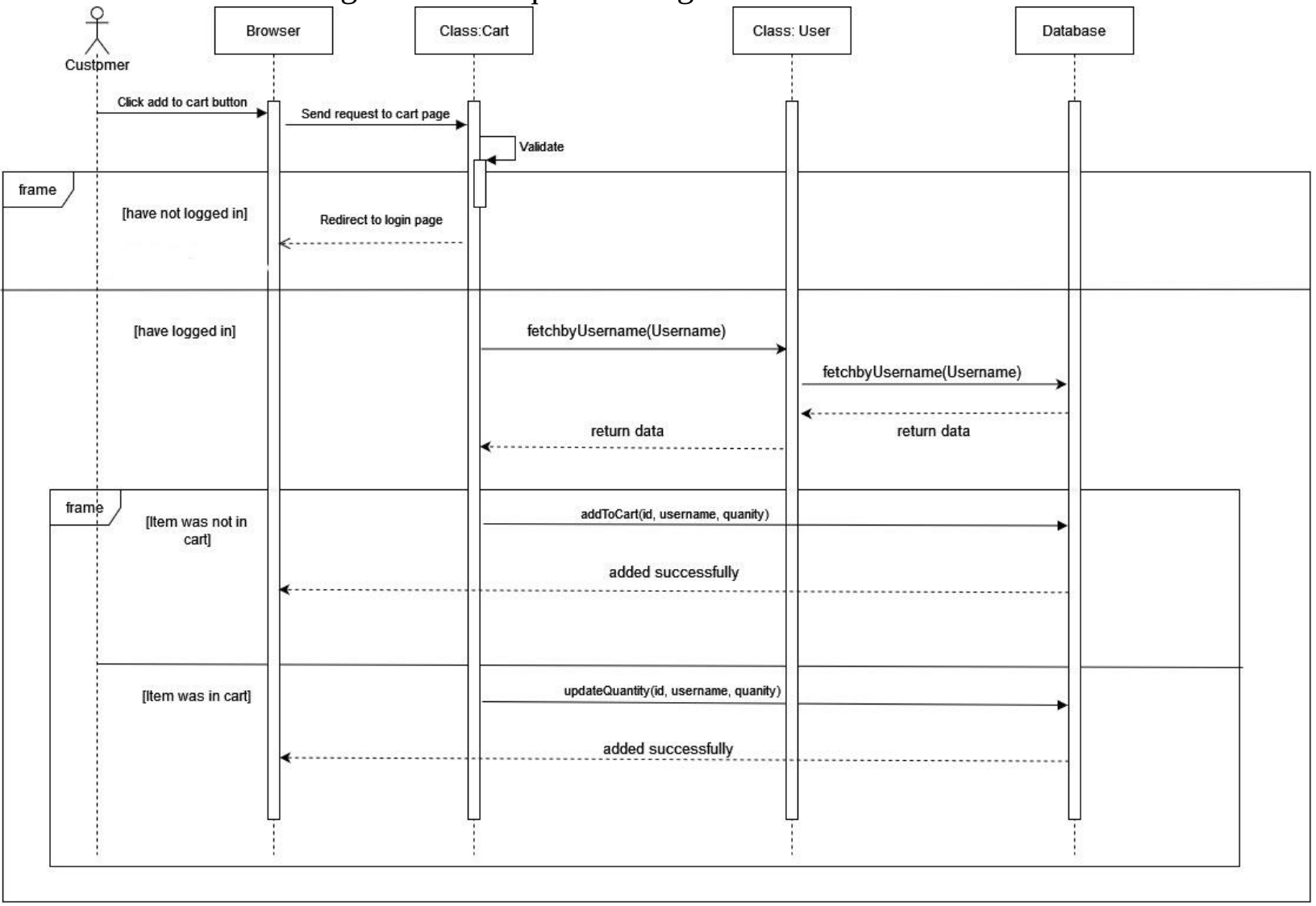
Figure 3.2 – Use Goal Use Case Diagram.

C. SEQUENCE DIAGRAM.

1. Sequence Diagram 1 - Add product to cart.
   - When a customer clicks on the Cart icon, it will check whether he or she has logged into the system. If the customer has not logged in, then he or she will be redirected back to the main page. If the customer had already login in, then the cart class will send a fetch request to get the data of the cart the belong to that specific customer, after that it will fetch all

the products that were added to the cart by that customer from the database and display it to the front-end.

Figure 3.3 – Sequence Diagram of Use case Add to Cart.

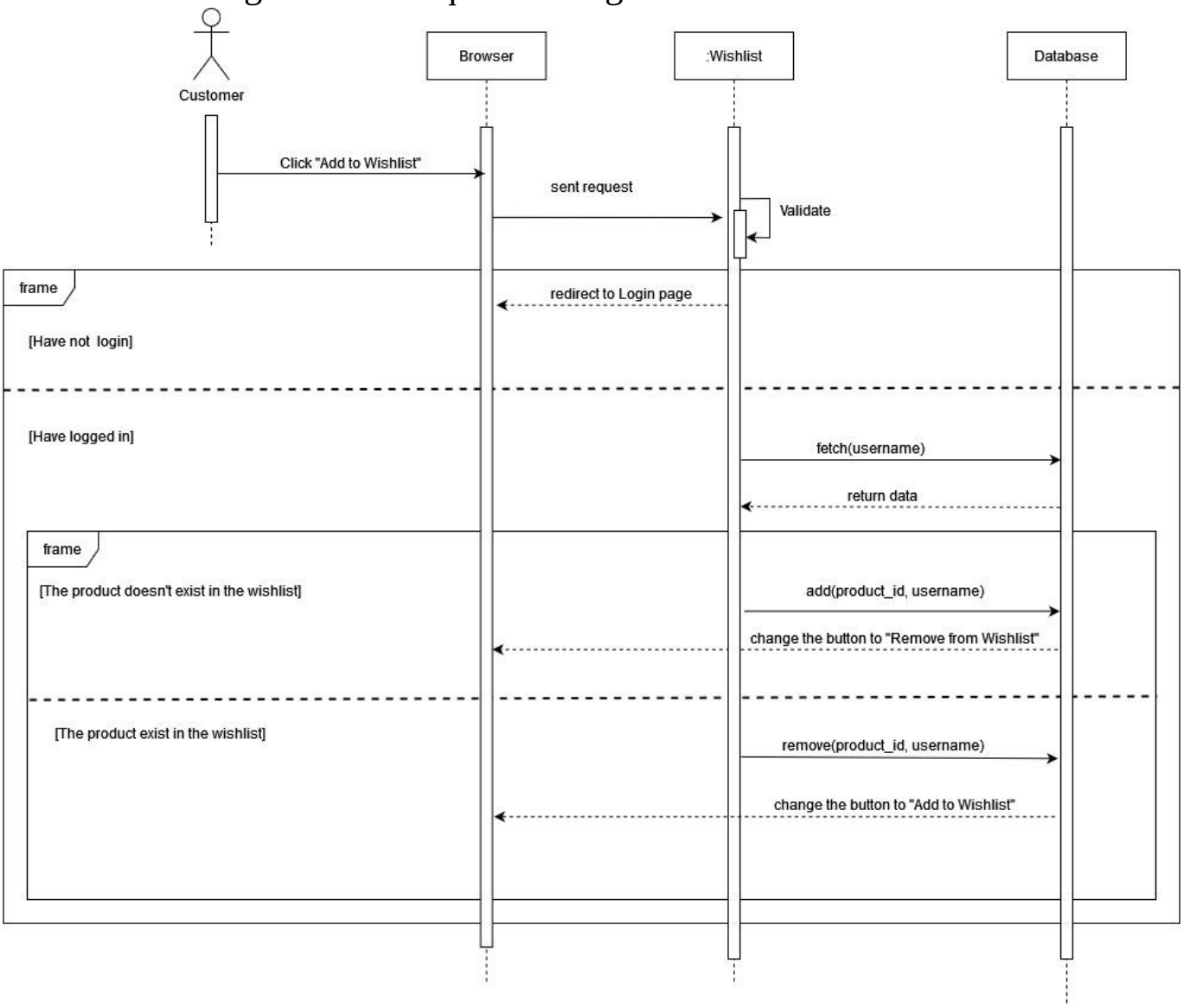


2. Sequence Diagram 2 – Add to Wishlist.

- When a customer clicks on the Add to Wishlist button at a product page, the website will check if the customer has logged in or not. If the customer hasn't logged in then he or she will be redirected to the login page, else if the customer has already logged in, then the cart class will send a fetch request to the database to get the customer's wishlist. If the product that the customer wants

to add to the wishlist hasn't been added, then the cart class will add it to the database, if it has already been added then the cart class will remove it from the database.

Figure 3.4 – Sequence Diagram of Add to Wishlist.



3. Sequence Diagram 3 - Checkout
   - When the customer clicks on the "Checkout button" on the cart page. The cart class will check if the cart was empty or not. If the cart was empty then nothing will happen, if the cart contains one or more products, then, the customer will be redirected to the Checkout page. Here, customers must enter

their information which includes name, address, and payment details, when finished the order request will be saved in the database and the customer's cart will be cleared.

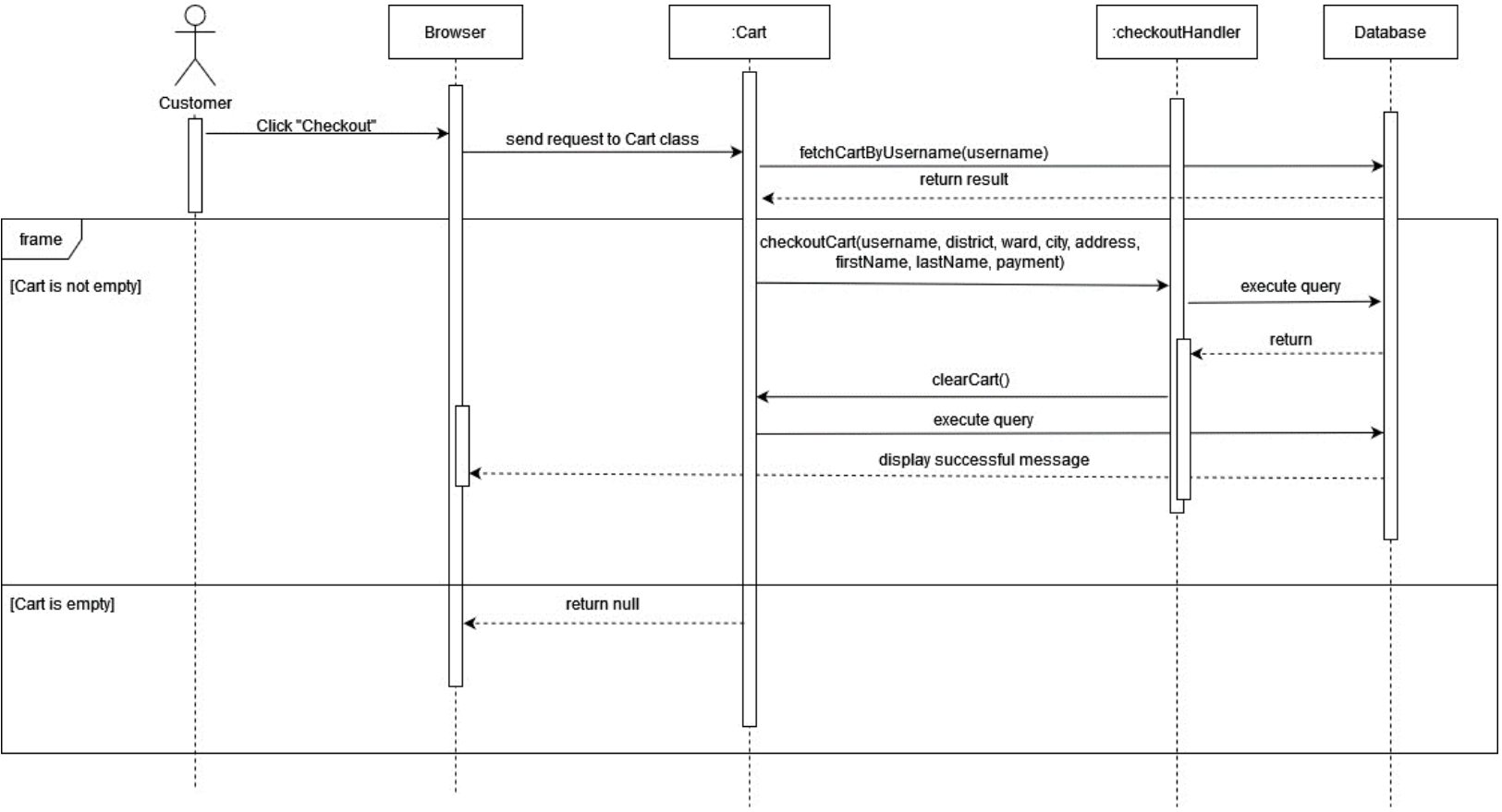
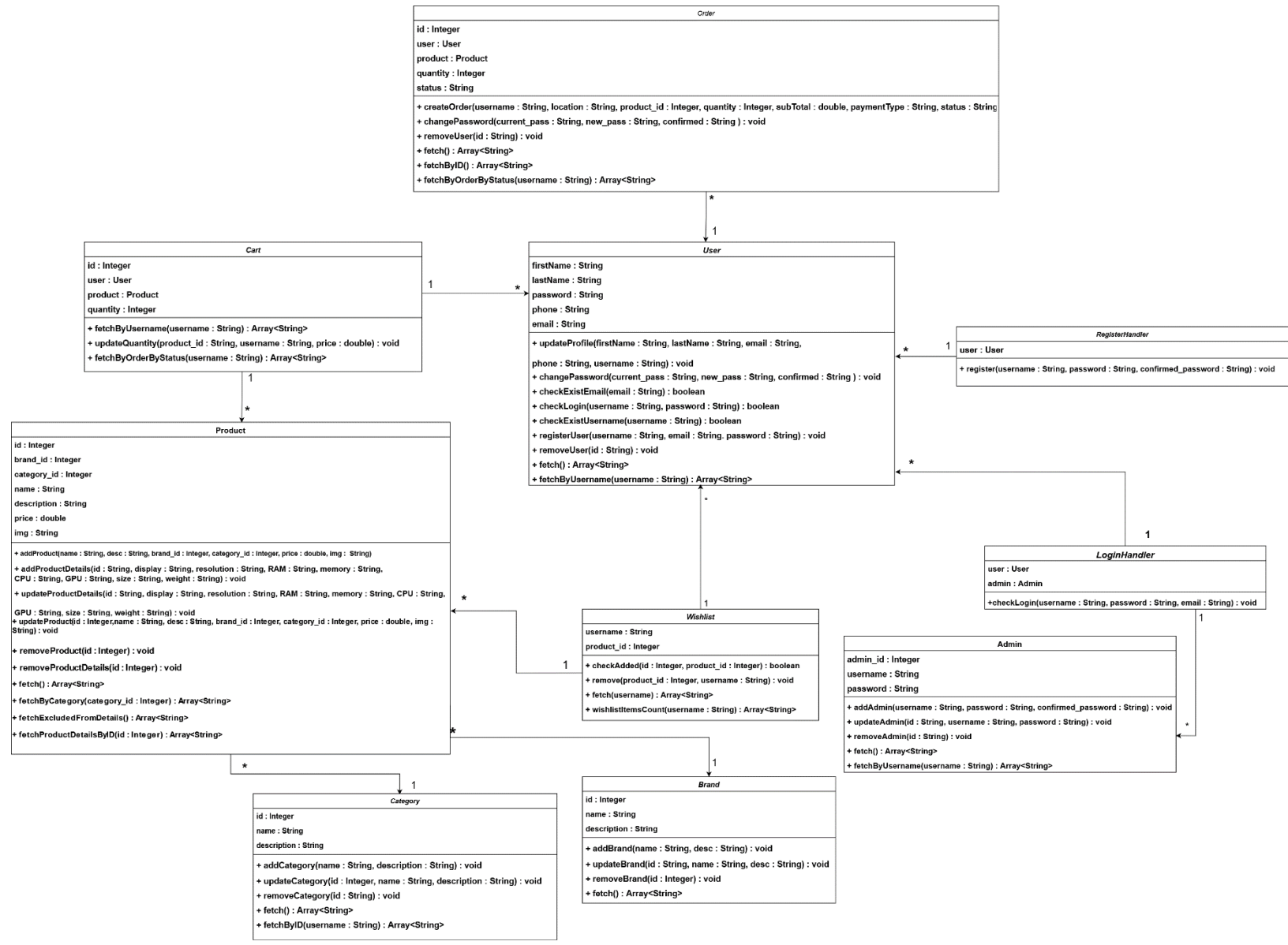


Figure 3.5 – Sequence Diagram of Usecase Checkout.

c. Class Diagram.



d. Entity Relationship diagram

CHAPTER 4: SYSTEM IMPLEMENTATION

Our E-commerce website is split into 2 parts front-end codes and back-end codes.

- **Front-end Design:**

- Our front-end code is mostly written using HTML, CSS, with the help of Bootstrap 5.

- Our front-end are split into 3 categories: the customer pages and the admin pages, and login/register pages.

- The customer pages allow access for all customers and the admin pages can only be accessed by the shop owner.

1. The Customer Pages:

a. The Homepage

- The HomePage consists of 3 sections: navigation bar (header), product display (main body) and the website's contact information

(footer). This is the first page all using must see when they going to the website for the first time.

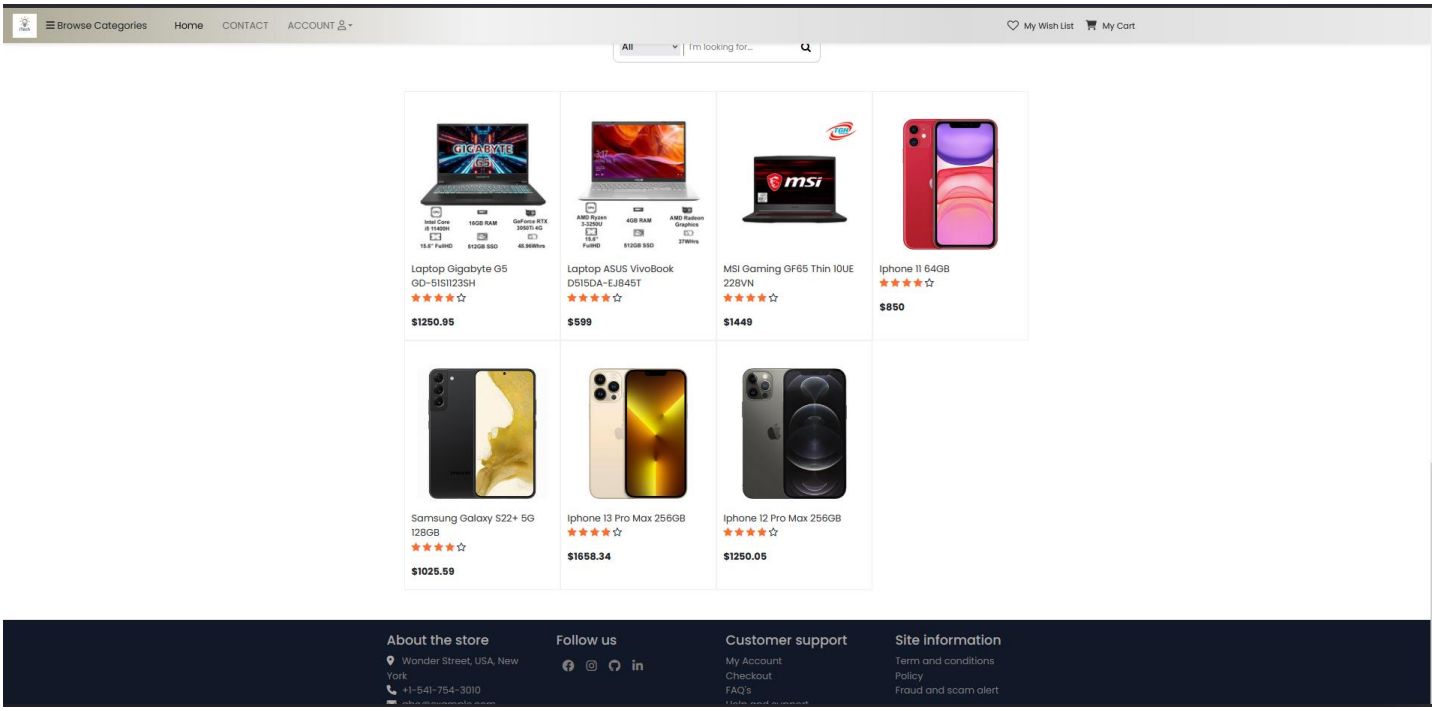


Figure 4.1- Homepage Design.

b. Products Page.

- When clicked on any product's link, the customer will be redirected to a product page of the specific product. Here, the customer can read all information related to the product, the customer can the can add it to their cart or to their wishlist.

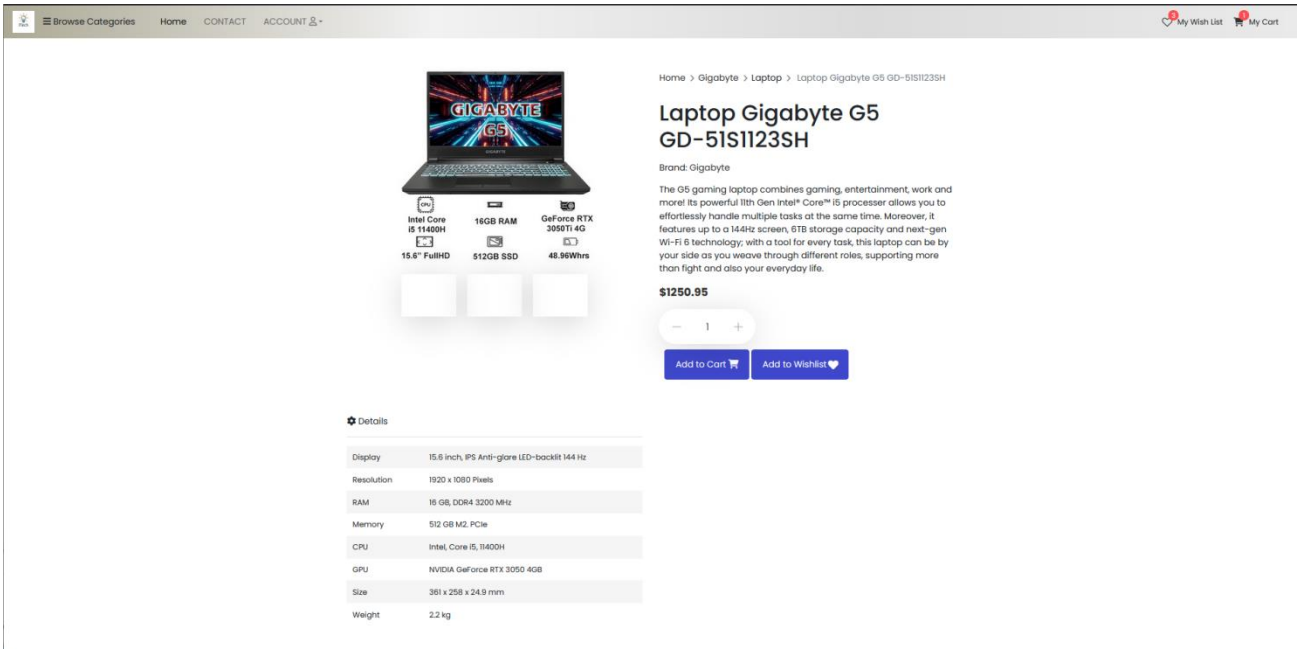


Figure 4.2 – Product Pages

c. Profile Page.

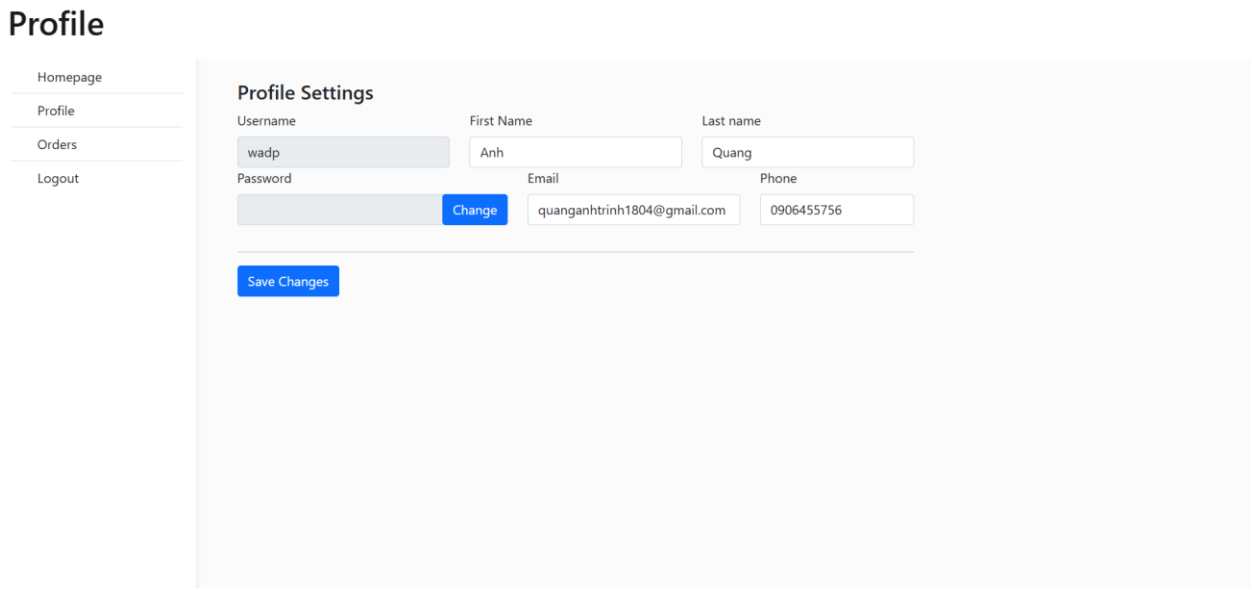


Figure 4.3 - Profile Page

- The Profile page is located under the ‘Account’ section of the navigation bar.

- When entered the profile page, except for username, the user can change their first and last name, phone number, email and password.

- The user can also view their previous orders information by clicking on the ‘Orders’ link in the sidebar.

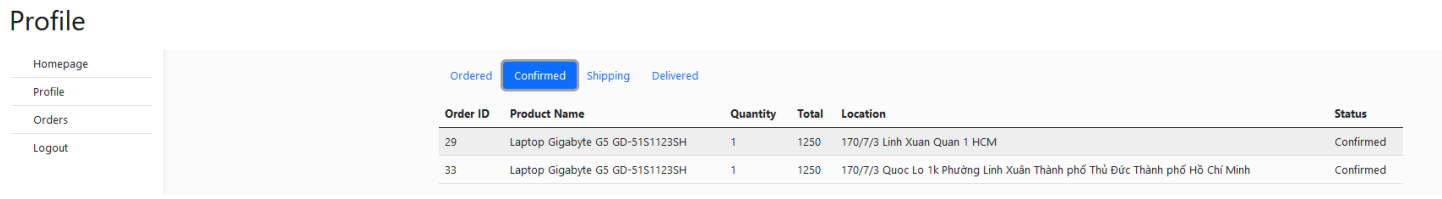


Figure 4.4 – View Orders Page

d. Wishlist Page.

- In the wishlist page, customers can keep track or remove of the product that he or she has interested in.

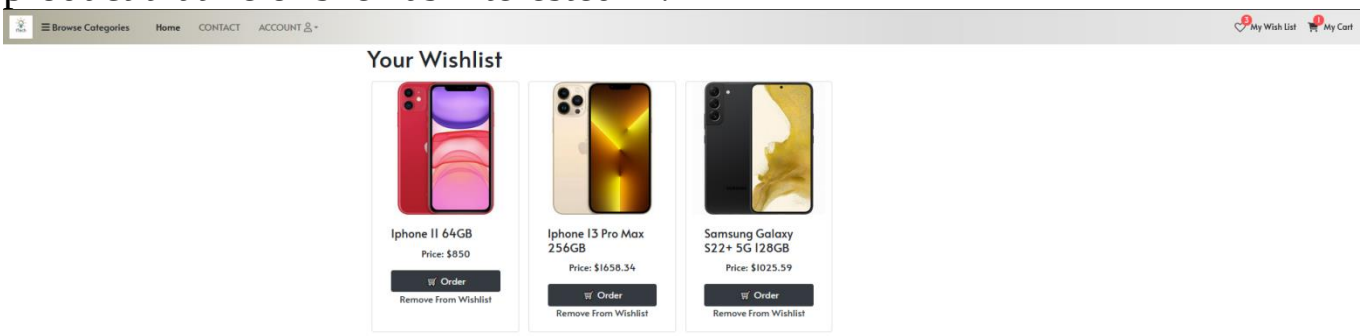


Figure 4.5 – Wishlist Page

- If the wishlist is empty, it will display “Your wishlist is empty”.

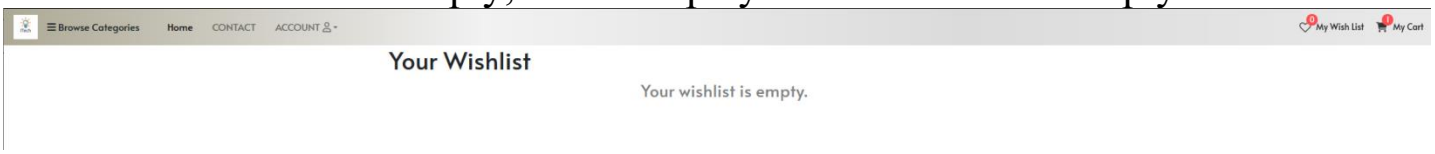


Figure 4.6 – Empty Wishlist

e. The Cart and Checkout Page.

- When customers add a product to their cart, that product will then be updated into the customer cart along with information about quantity, price, sub-total of that specific product and total amount that the customer must pay.

- While inside the cart page, customers can delete a product, clear their cart or change the quantity of a specific product.

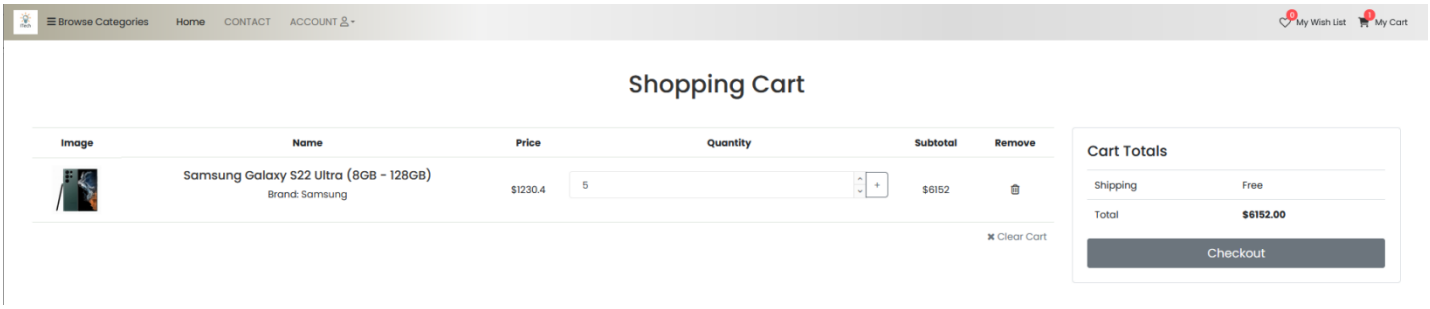


Figure 4.7 – Shopping Cart Page

- If the customers click on the "Checkout" button, they will be redirected to the Checkout Page.

- In this page, customers are required to fill in their personal information, address, and payment methods.

- The city, district and ward field are created using an open API to fetch all cities, districts and ward in Vietnam. (https://provinces.open-api.vn/)

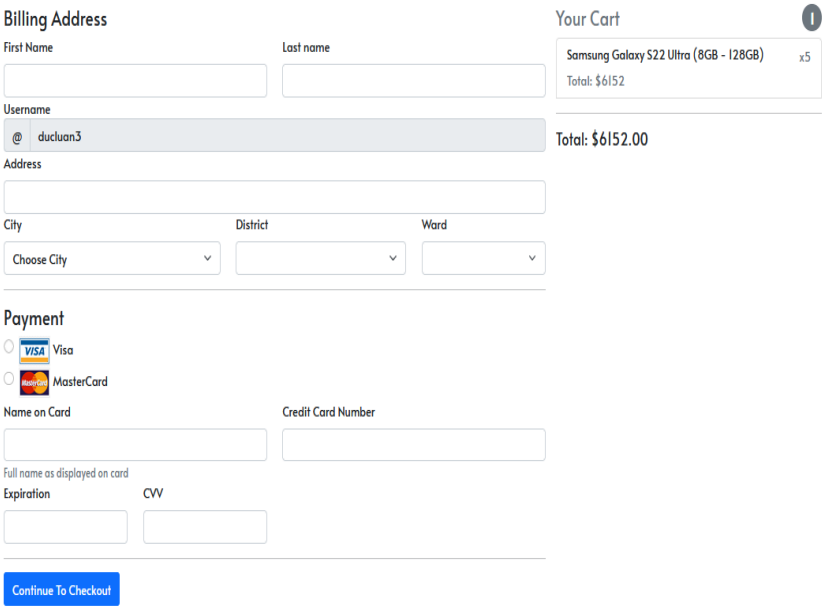


Figure 4.8 – Checkout Page.

2. The Admin Pages:

- There are a total of 7 admin pages used to manage the website. These Admin Pages are tools that give the shop owner the ability to add/update/insert data for their website.

- For example, if the shop owner wants to add a new product to their website, they must do the following steps:

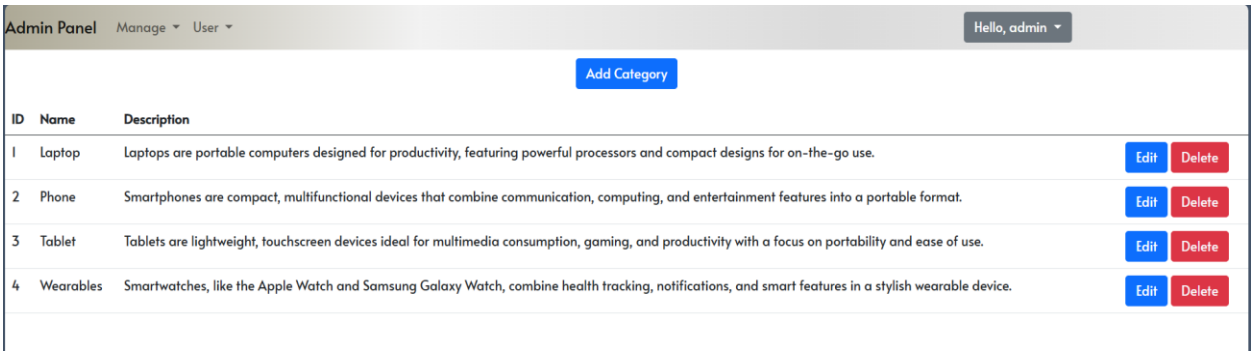


Figure 4.9 - Step 1: Login into the Admin Panel.

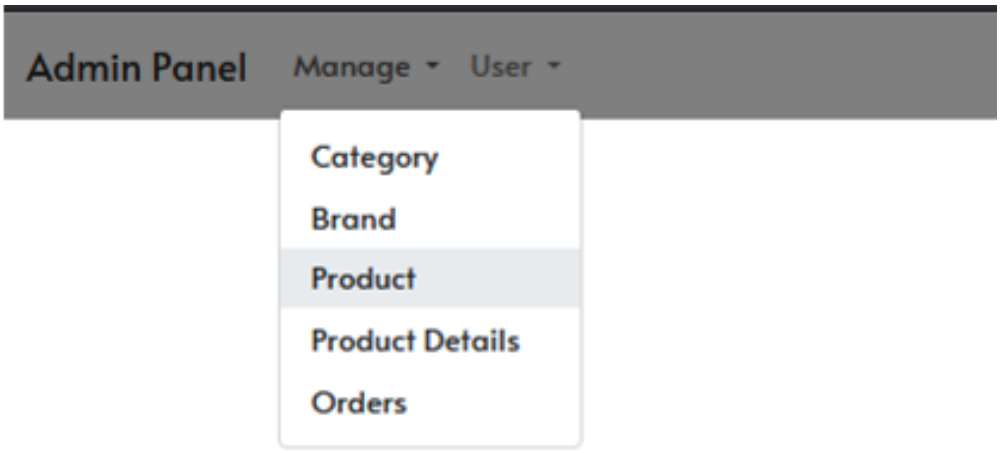


Figure 4.10 - Step 2: Go to “Manage” and select “Product”

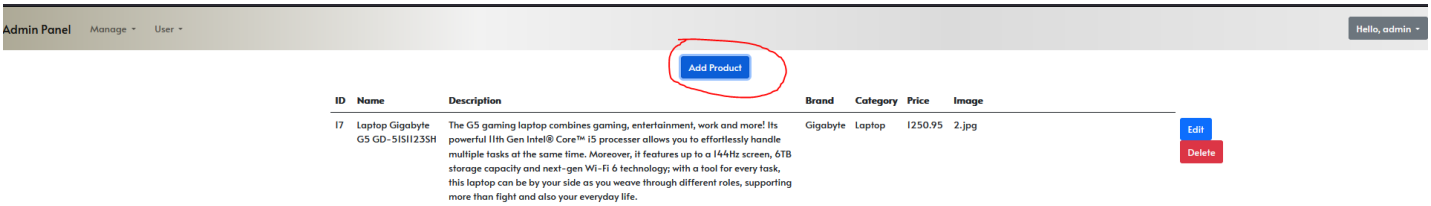


Figure 4.11 - Step 3: Click on “Add Product”

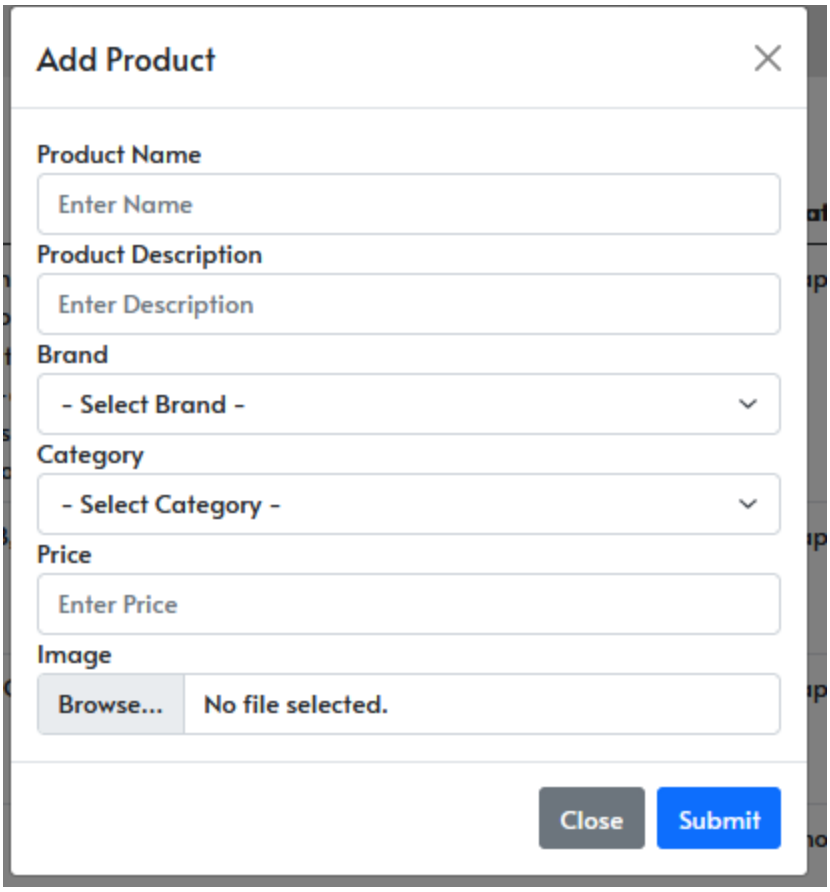


Figure 4.12 - Step 4: Fill every field, then press submit

➢ Back-end:

- Our back-end codes are made entirely using PHP, and the code is written using the OOP format.

- There are total of 11 classes:

- Admin: use for insert/update/delete admin accounts
- User: used to handle information about customer accounts.
- LoginHandler: help verifying login from customer and admin.
- RegisterHandler: help create new customer accounts.
- Orders: used to create orders for customers.
- Brand: used to create, update, delete and query brand information.
- Category: used to create, update, delete and query product categories information.

- Product: used to add to product to the website, update and delete product information and details.
- Cart: used to add and remove products to the customer's shopping cart.
- CheckoutHandler: use to handling checkout.
- Wishlist: use keep track of customer’s wishlist by allowing customers to add and remove the product from their wishlist.

Class Structure:

- Each class will have at least one function that is involved in execute SQL statements. These statements can be inserted, updated, deleted, or query statements.

```php
public function addProduct($name, $desc, $brand_id, $category_id, $price, $img)
{       You, 2 weeks ago via PR #2 • - Add banner …
    $description = $this->db->connect()->real_escape_string($desc);
    $sql = "INSERT INTO product(name, description, brand_id, category_id, price, img) VALUES (?, ?, ?, ?, ?, ?)";
    $stmt = $this->db->connect()->prepare($sql);
    $stmt->bind_param("ssiiis", $name, $description, $brand_id, $category_id, $price, $img);

    if ($stmt->execute()) {
        $_SESSION['status_code'] = 'success';
        $_SESSION['status'] = 'Add Successfully';
        header("refresh:1.5;url=product-view.php");
    } else {
        die($stmt->error);
    }

    $stmt->close();
}
```

Figure 4.12 – Add product function from the product class.

```php
public function updateProduct($id, $name, $desc, $brand_id, $category_id, $price, $img)
{
    $description = $this->db->connect()->real_escape_string($desc);
    $sql = "UPDATE product SET name=?, description=?, brand_id=?, category_id=?, price=?, img=? WHERE id=?";
    $stmt = $this->db->connect()->prepare($sql);
    $stmt->bind_param("ssiiisi", $name, $description, $brand_id, $category_id, $price, $img, $id);

    if ($stmt->execute()) {
        $_SESSION['status_code'] = 'success';
        $_SESSION['status'] = 'Update Successful';
        header("refresh:1.5;url=product-view.php");
    } else {
        $_SESSION['status_code'] = 'error';
        $_SESSION['status'] = 'Something is wrong. Please try again.';
    }

    $stmt->close();
}
```

Figure 4.13 – Update product function from the product class.

```php
public function removeProduct($id)
{
    $id = $this->db->connect()->real_escape_string($id);
    $sql = "DELETE FROM product WHERE id=?";
    $stmt = $this->db->connect()->prepare($sql);
    $stmt->bind_param("i", $id);

    if ($stmt->execute()) {
        header("refresh:0.5;url=product-view.php");
    } else {
        echo "<script>alert('Error')</script>";
    }

    $stmt->close();
}
```

Figure 4.14 – Remove product function from the product class.

```php
public function fetchByID($id)
{
    $id = $this->db->connect()->real_escape_string($id);
    $data = null;
    $sql = "SELECT product.id, product.name, product.description, brand.name
    AS brand_name, category.name
    AS category_name, product.price, product.img
    FROM product INNER JOIN brand ON product.brand_id = brand.id
    INNER JOIN category ON product.category_id = category.id
    WHERE product.id=?";      You, 1 second ago • Uncommitted changes
    $stmt = $this->db->connect()->prepare($sql);
    $stmt->bind_param("i", $id);
    $stmt->execute();
    $result = $stmt->get_result();

    if ($result) {
        while ($row = $result->fetch_assoc()) {
            $data[] = $row;
        }
    }

    $stmt->close();
    return $data;
}
```

Figure 4.14 – Query function from product class.

CHAPTER 5: CONCLUSION AND DISCUSSION

1. LIST OF ACCOMPLISHED WORKS.

a. Customer Registration.

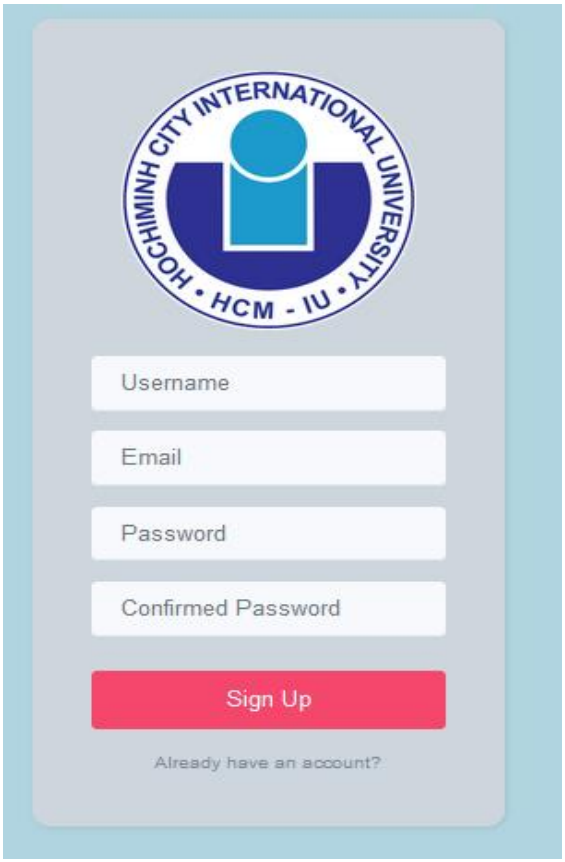


Figure 5.1 – Register form for customers

b. Customer and Admin Sign-in.

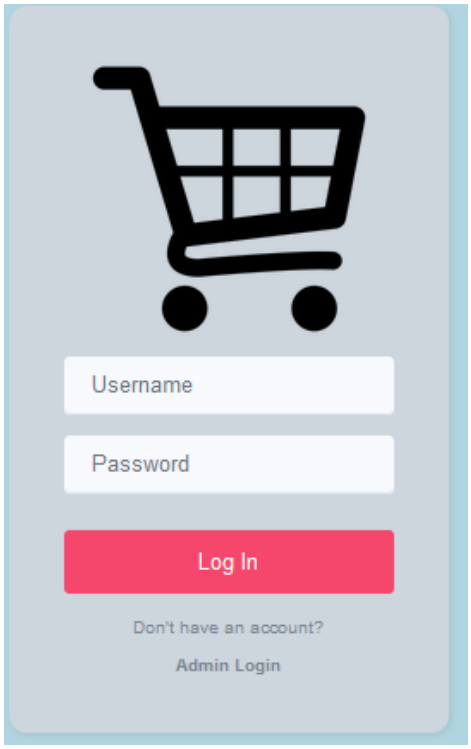


Figure 5.2 – Customers login form

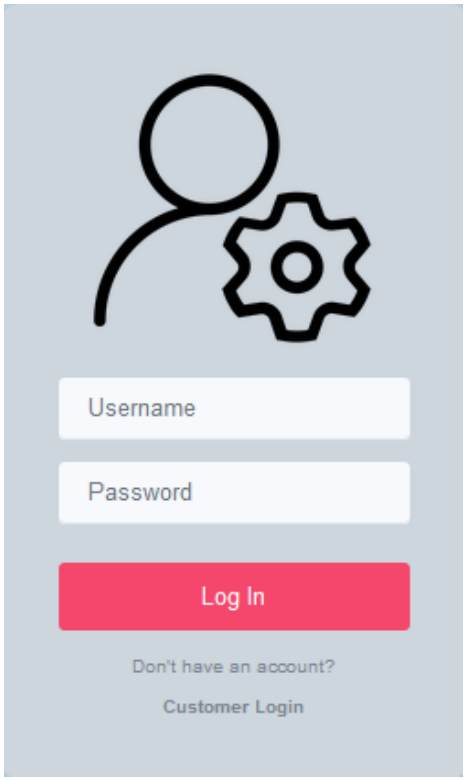
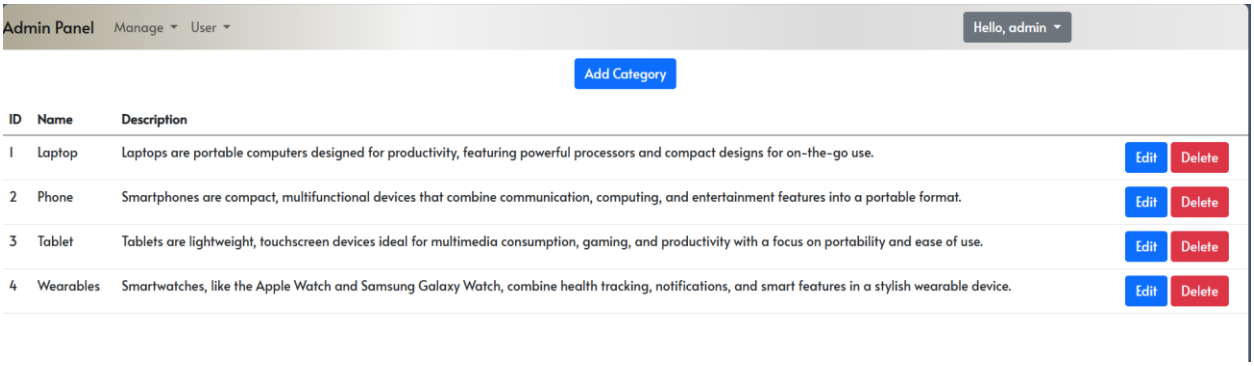


Figure 5.3 – Admins login form

c. Admin Panel.



- Add/Delete/Edit Category:

Figure 5.4 – Category CRUD Page.

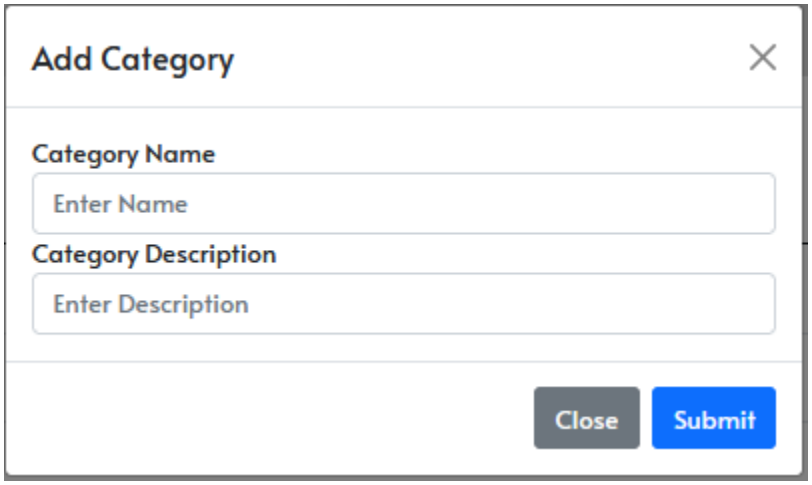


Figure 5.5 – Add Category Form

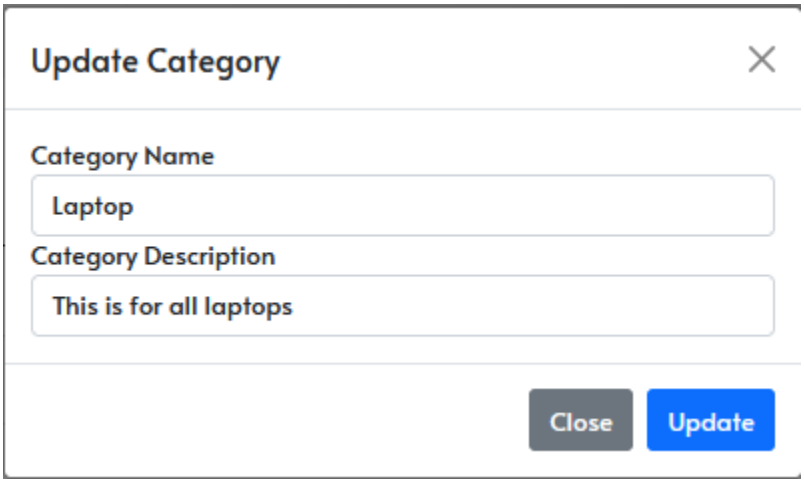
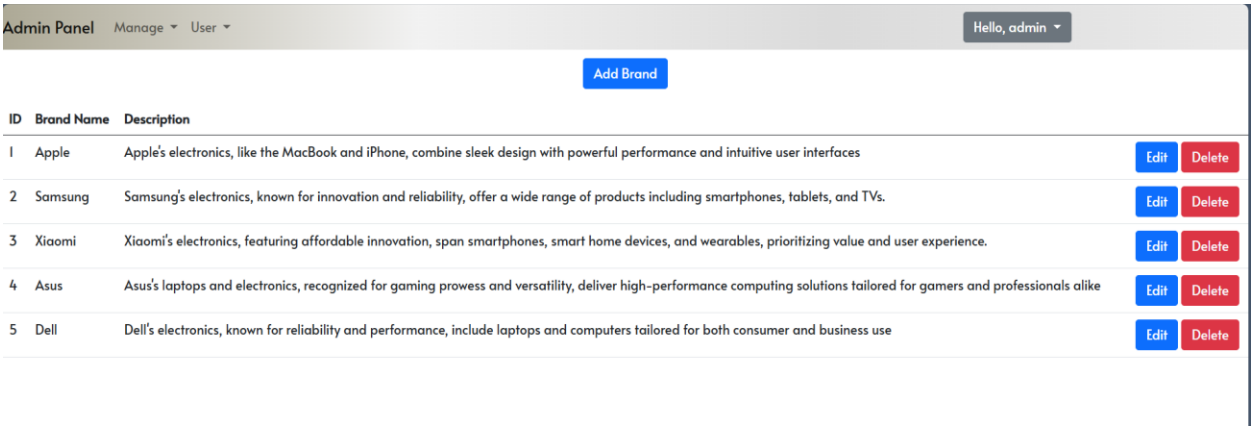


Figure 5.6 – Update Category Form



- Add/Delete/Edit Brand:

Figure 5.7 – Brand CRUD Page

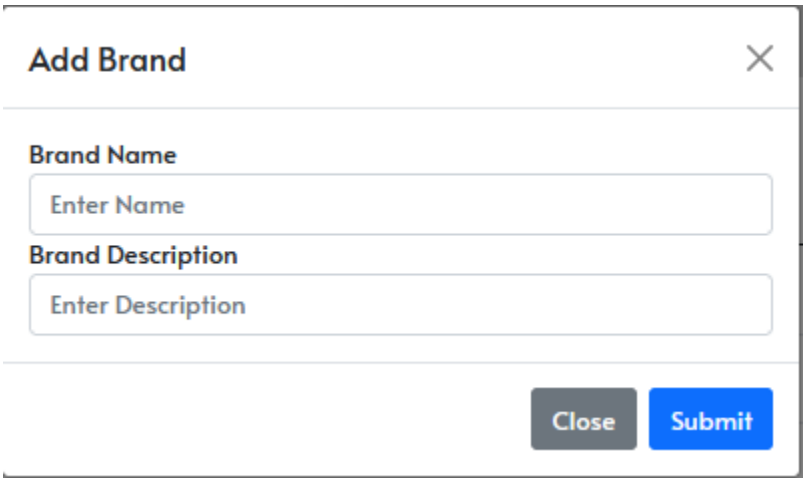


Figure 5.8 – Add Brand Form

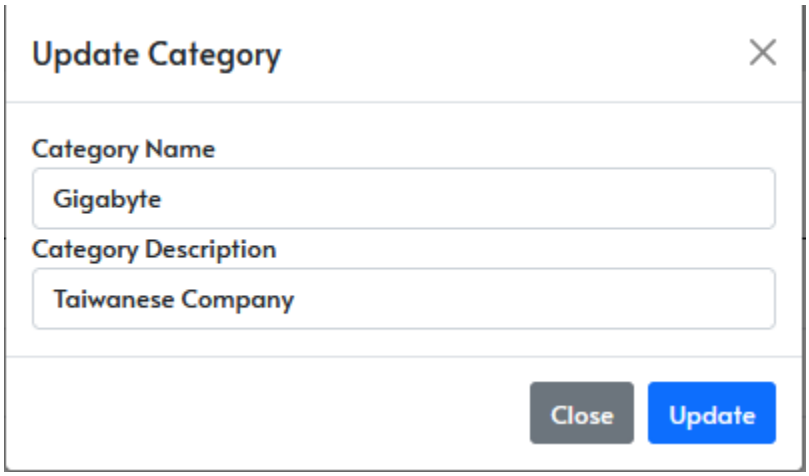


Figure 5.9 – Update Brand Form

- Add/Delete/Edit Product.

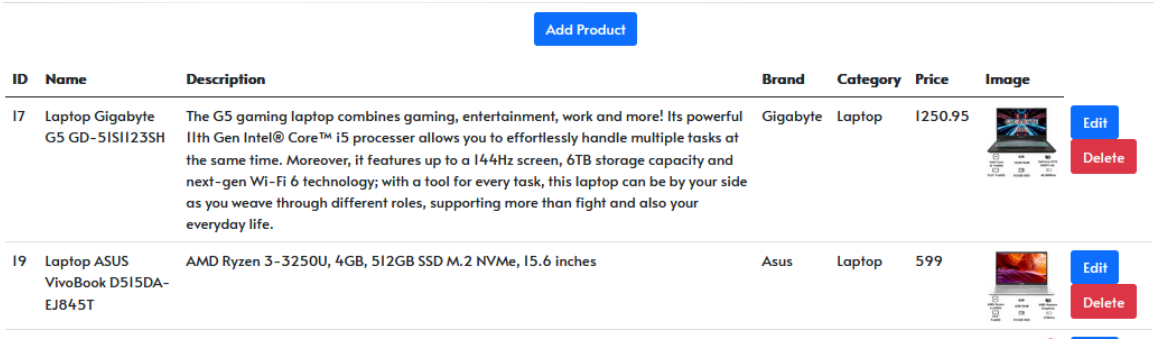


Figure 5.10 – Product CRUD Page

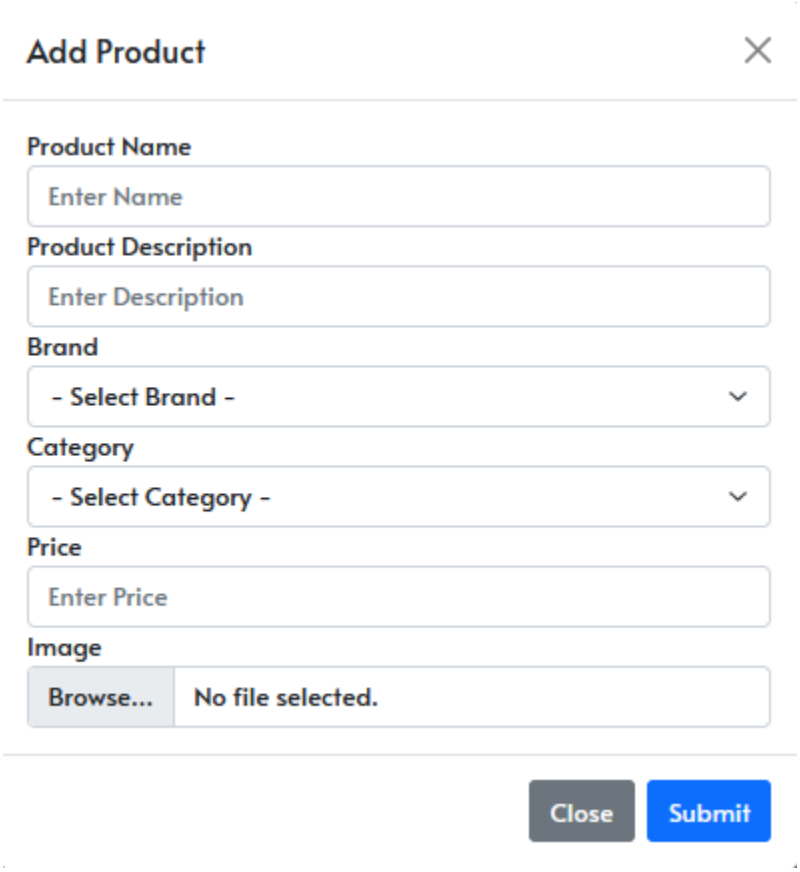


Figure 5.11 – Add Product Form

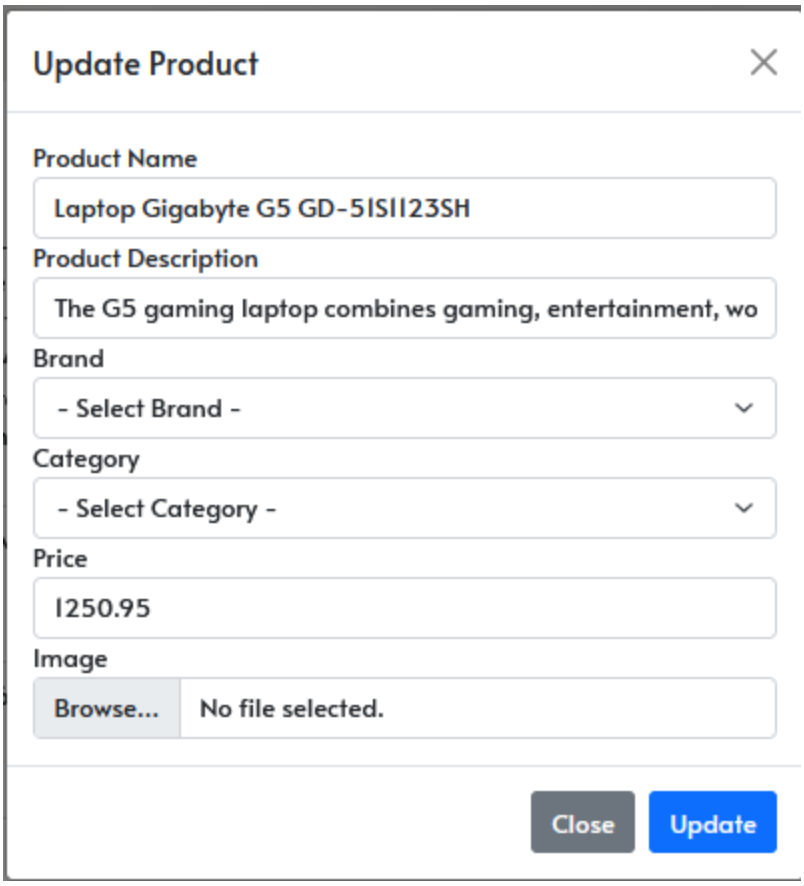
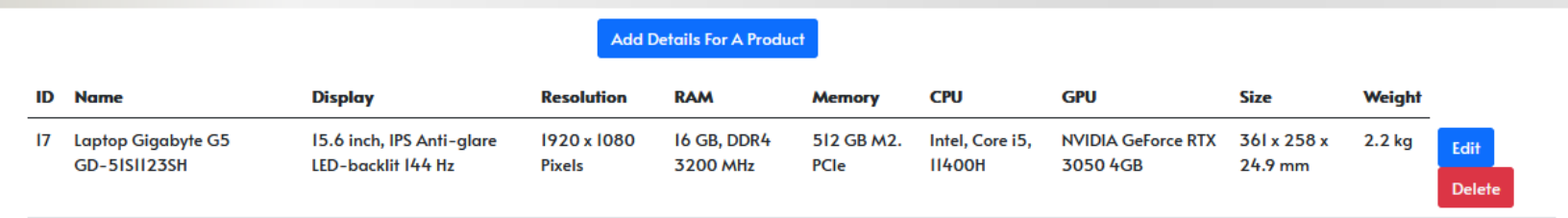


Figure 5.12 – Update Product Form.



- Add/Delete/Edit Product Details:

Figure 5.13 – Product Details CRUD Page.

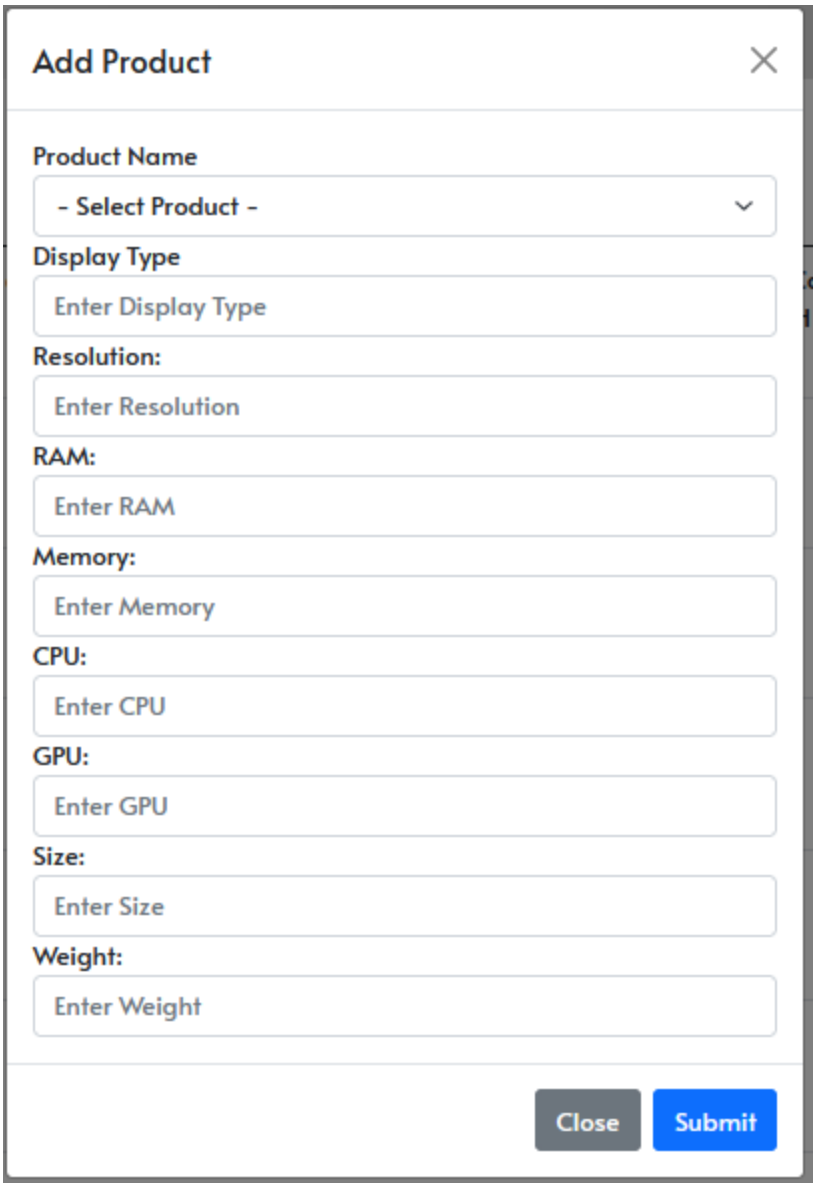


Figure 5.14 – Add Details of a Product

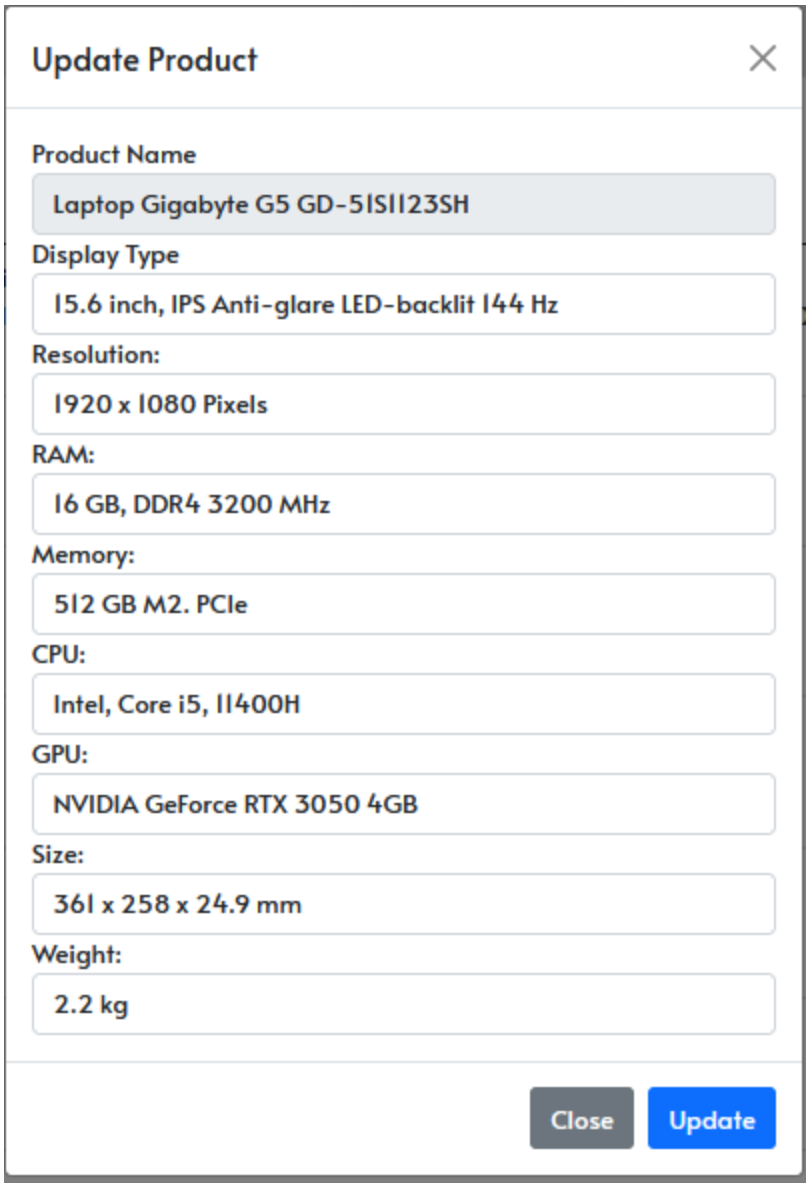


Figure 5.14 – Update Details of a Product

- Delete and Change Orders Status:

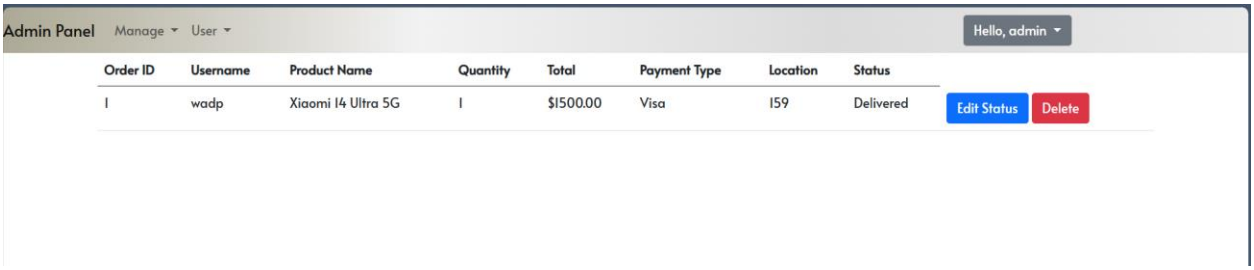


Figure 5.15 – Order CRUD Page

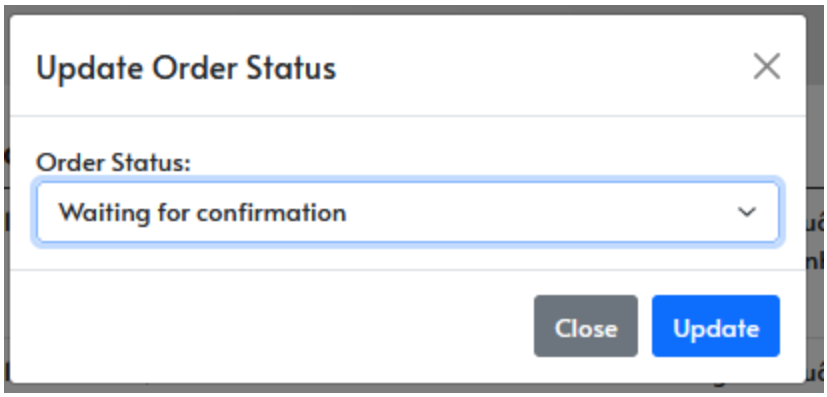


Figure 5.16 – Update Order Status Form

- Delete Customer:

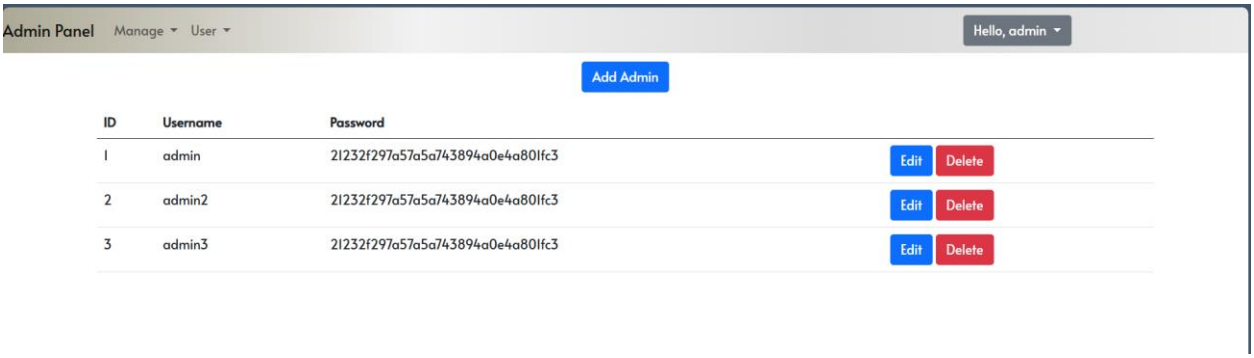


Figure 5.17 – Customer CRUD Page.

- Add/Delete/Edit Admin Account:

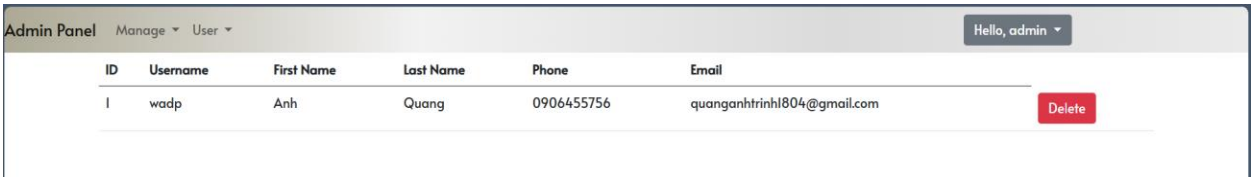


Figure 5.18 – Admin CRUD Page

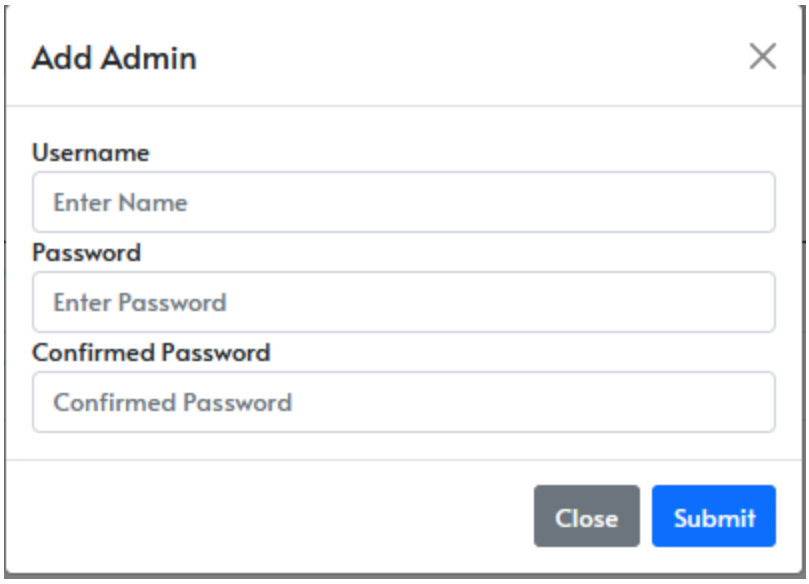


Figure 5.19 – Add New Admin Account Form.

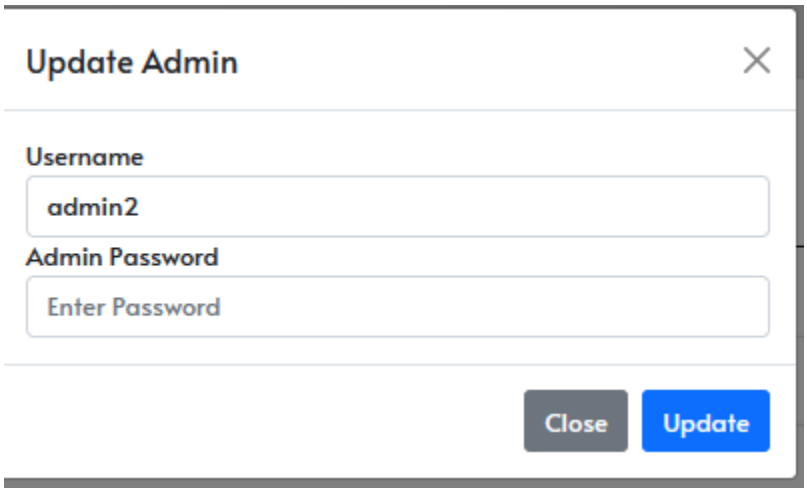


Figure 5.20 – Update Admin Account Form

d. Shopping Panel.

- Display all products on the Homepage:

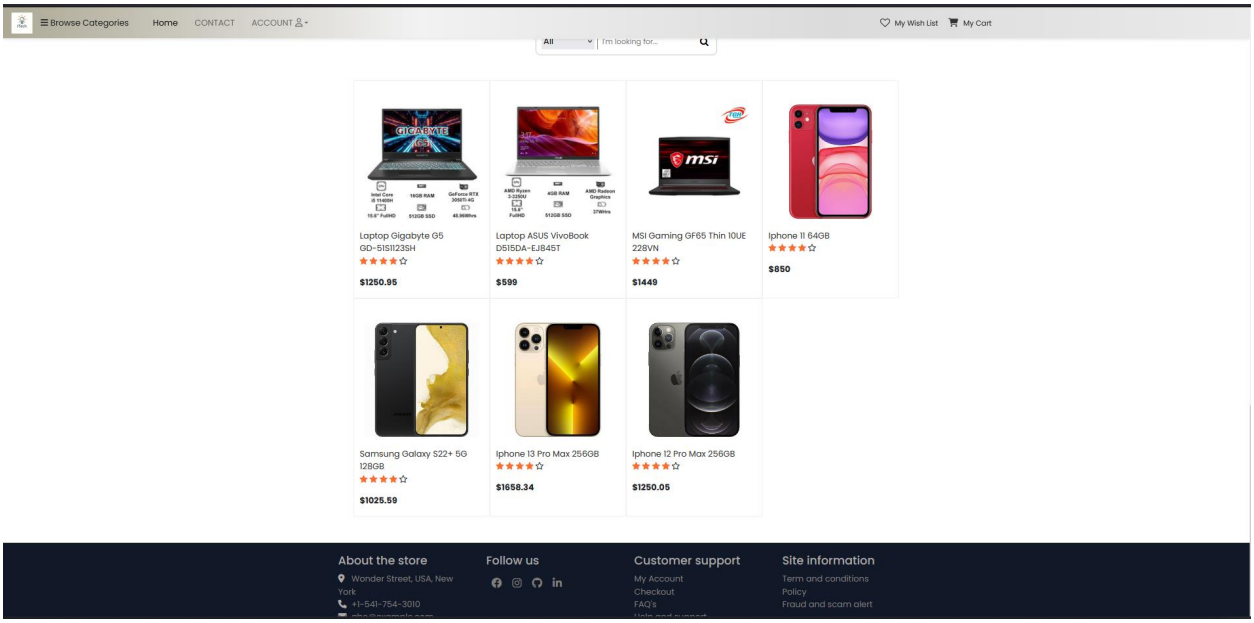


Figure 5.21 – Home Page.

- Product Search Bar:

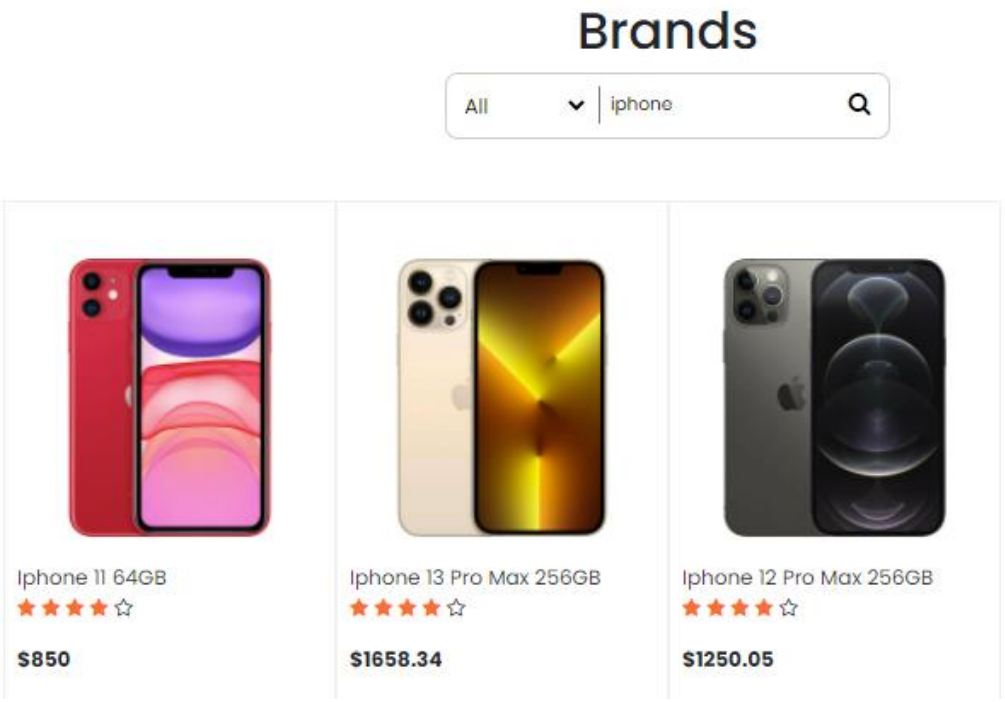


Figure 5.21 – Search Bar.

- Browse Category:

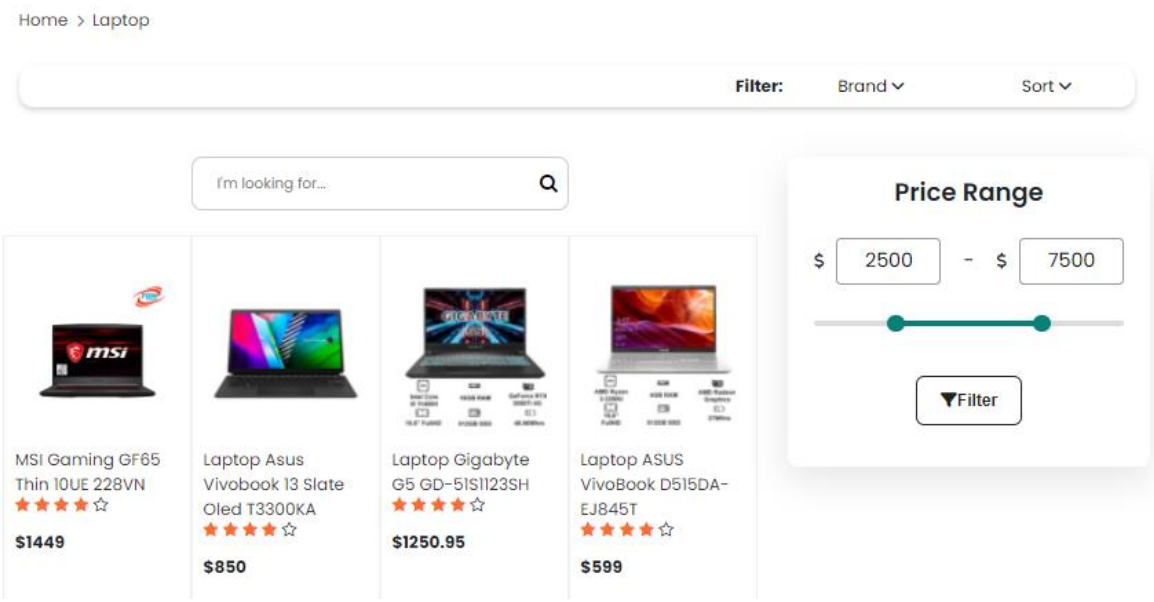


Figure 5.22 – Browse All Products Under Category ‘Phone’.

- Product Filter:

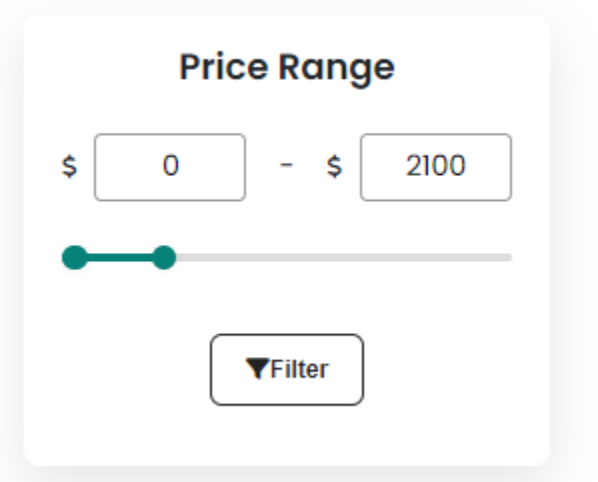


Figure 5.23 – Filter By Price Range.

- Product Page:

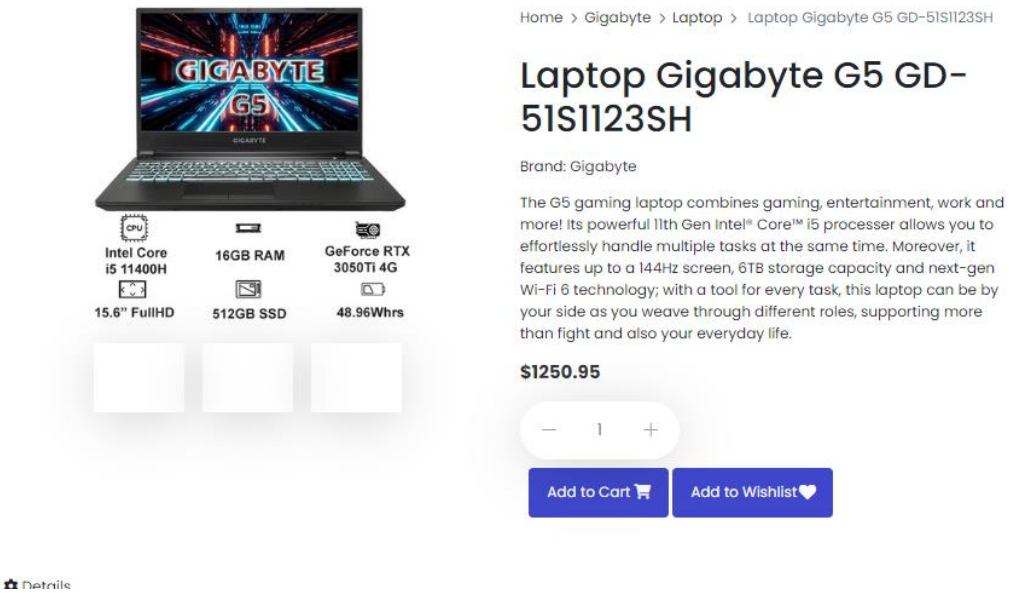


Figure 5.24 – Product Page.

- Wishlist:

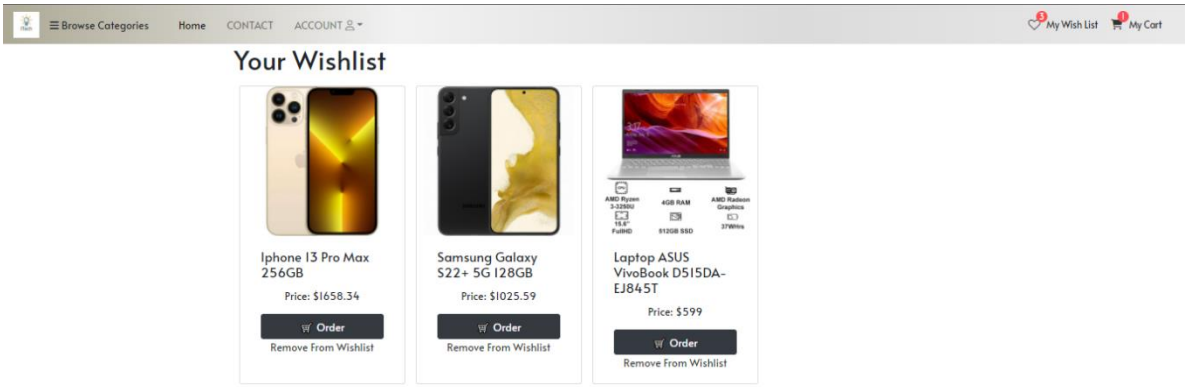


Figure 5.25 – Wishlist Page.

- Shopping Cart:

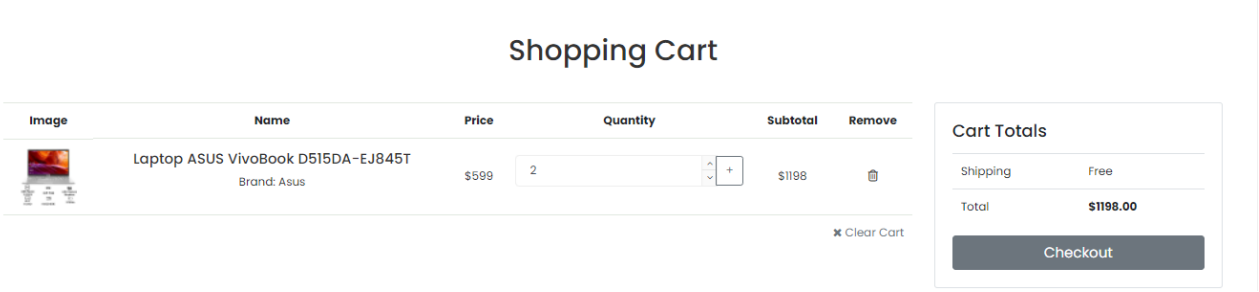


Figure 5.26 – Shopping Cart Page.

- Checkout:

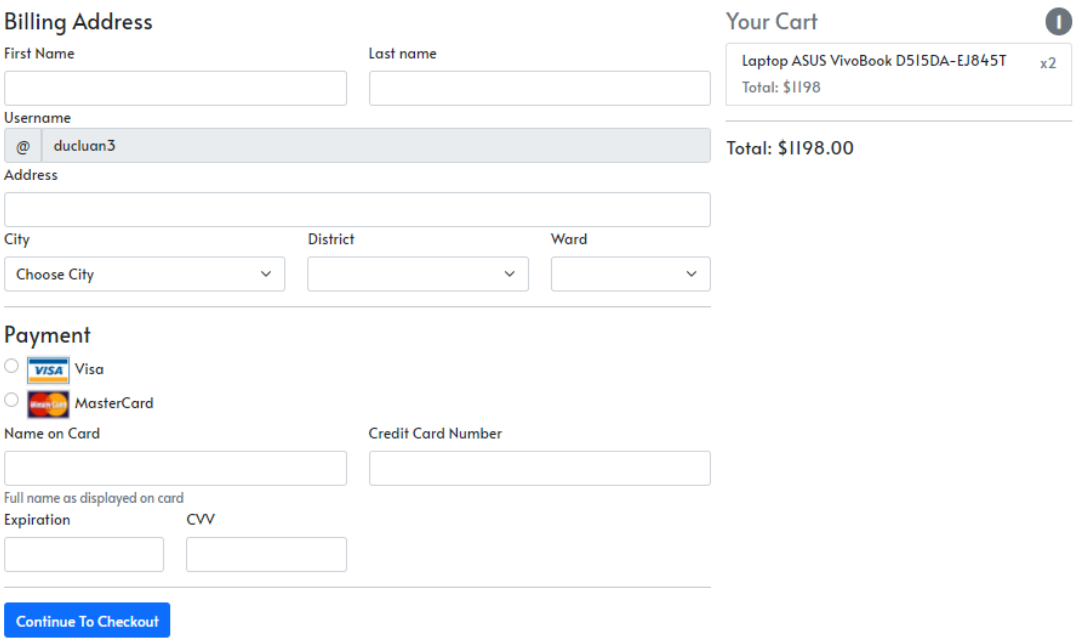


Figure 5.27 – Checkout Page.

- Update Personal Information:

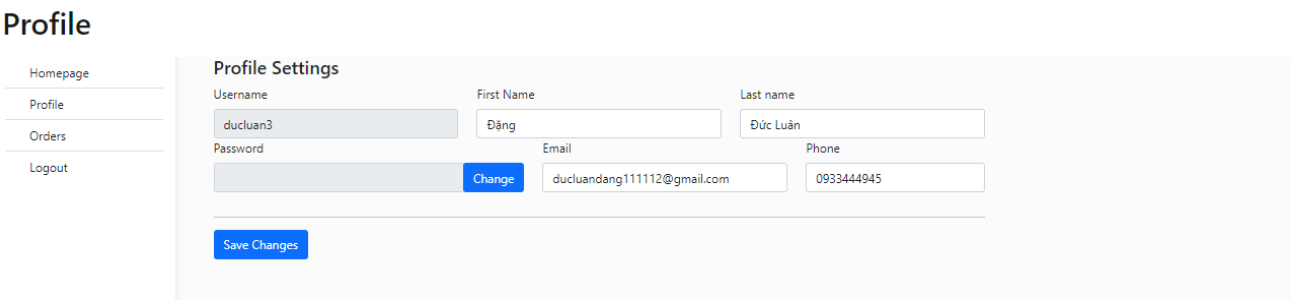


Figure 5.28 – Profile Page

- Order History.

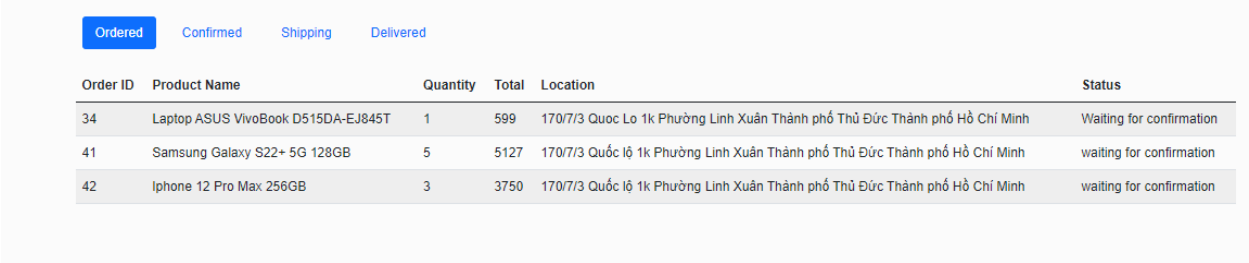


Figure 5.29 – View Customer Order History Page.

2. STRENGTH AND WEAKNESS.

a. Strength:

- The website is easy to set up and deploy with the help of PHP's MySQLi library.
- Very dynamic
- SQL Injection proof.
- Very cost-effective to run.

b. Weakness:

- Poor extendibility.
- Lack of encryption.
- Hard to maintain.
- Unresponsive UI.
- Not good-looking UI.

3. FUTURE WORK

- Product discounts: coupons, discount deals, ...
- Customer support: Chatbox, product report, handling return items, ...
- Product reviews.
- Improve Administrator Panel: add dashboards, better UI, ...
- Improve website responsiveness
- Shopping without login.

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