

# ASSIGNMENT 3 – DESIGN

## Shuchaku Anime Store

### ❖ **Abstract**

*The Shūchaku Anime store is one of the retail stores in a regional area, who's owner has a desire to develop his small business into a large competing business. This decision tends the owner to contract a Project Manager to develop an information system for \$100,000.*

### ❖ **1802ICT Systems Development**

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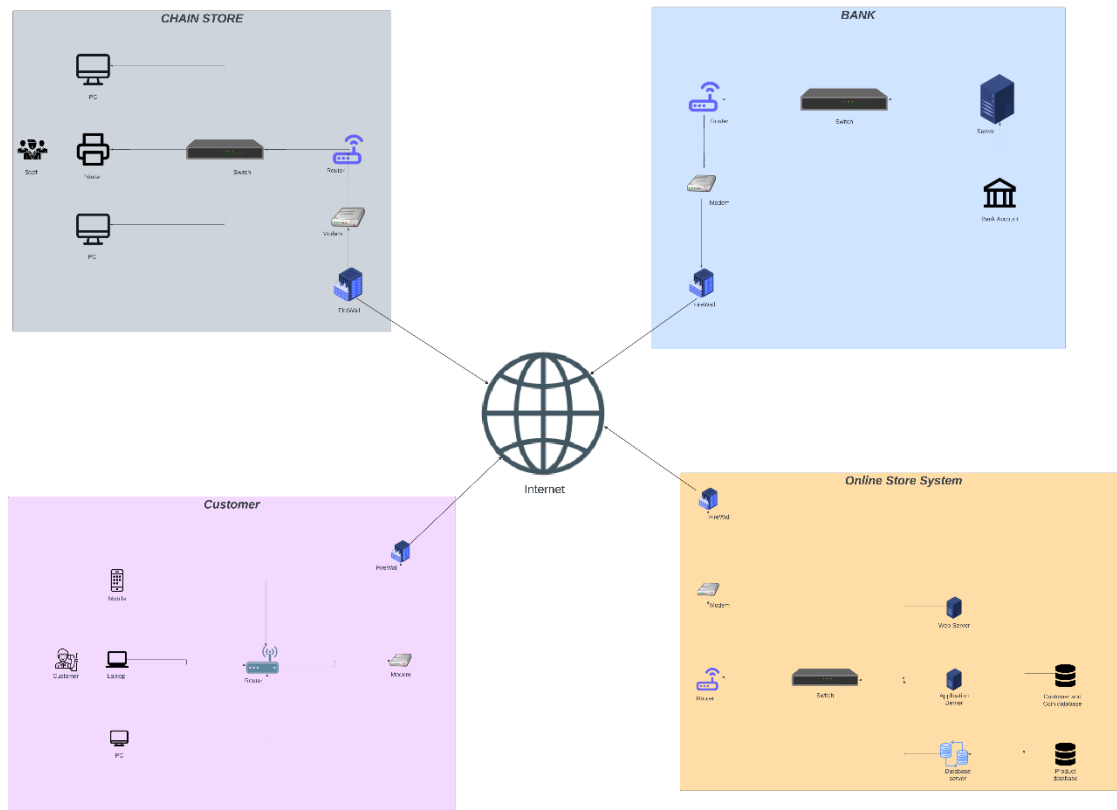
# 1. System Environment

Shuchaku Anime Store's new web-based application system, developed and maintained by a reliable contractor, now allows both staff and customers to have seamless online access. The system infrastructure, illustrated in the figure given below, is stored on the contractor's server side, while the company's website is conveniently stored on a separate web server. The system software is stored on an efficient application server that efficiently executes components linking to the database server.

This new system ensures that customers and employees can easily navigate the store's website via a URL on their devices. The web server immediately provides an HTTP response if the requested resource is available. If unavailable, the application server allows for quick access and alteration of the database data, which the web server then sends back to the client. For added convenience, the web server directs the session to the bank system network to settle payment for customers who complete a purchase.

The system has a cutting-edge client/server three-layer architecture, which includes the view, domain, and data layers. Detailed information about this architecture can be viewed in the Component Diagram. There are four different networks: Chain Store, Customer, Bank, and Online Store. All networks have endpoints connected to a switch, which is then connected to a router. The router is connected to a modem, which connects to a firewall, and then to the internet.

This highly efficient system uses the TCP/IP protocol to seamlessly link all network devices with an IP address. The HTTP protocol is used to define the format and content for the transfer of web documents, while the HTTPS protocol encrypts and secures HTTP transfers, particularly in a payment environment. With this new system, Shuchaku Anime Store ensures that both staff and customers can enjoy seamless and secure online access, making for an exceptional shopping experience.



## 2. User Interface and Story Boards

This user interface design is inspired by the 8 Golden Rules by Ben Shneiderman, a well-recognized principle in the field of human-computer interaction:

**Strive for consistency:** this rule states that it is important to maintain consistency in the design of user interfaces. Users should be able to predict the behavior of elements based on their prior experiences with the system. This design focuses on layout consistency, as every storyboard below will have a navigation bar, and the main content, button for submission usually be placed at the bottom right of the page.

**Enable frequent users to use shortcuts:** this rule states that experienced users should be able to perform tasks quickly by providing shortcuts or accelerators. This design applies this rule by providing a shortcut feature on the navigation bar at the top of the page. There are also additional shortcuts such as the purchase option in Storyboard 2 so that users will not need to click on the shopping cart, or the select all option in Storyboard 3

Design dialogs to yield closure: this rule states that user interactions should follow a logical and coherent sequence, leading to a sense of completion or closure. This rule is implemented in making the sequence of the storyboard, from browsing to checking to product detail, selecting the product in the cart, checkout, modifying information, and confirming the purchase

Support internal locus of control: this rule states that Users should feel in control of the system. They should be able to initiate actions and see the outcomes. This is the principle for a shopping experience, user need to be able to manage check, and review all the option that they make, which is why the 3<sup>rd</sup> and 4<sup>th</sup> 5<sup>th</sup> storyboard is important so that user can control most of their shopping options such as managing the shopping cart, payment option and change the shipping detail.

Reduce short-term memory load: this rule states that the user interface should minimize the amount of information that users need to keep in their short-term memory to complete tasks. In this design most of the information gets repeated in each storyboard, such as the product name, price, and images are displayed from the 1<sup>st</sup> to the 4<sup>th</sup> storyboard, and the product option and quantity are displayed from the 2<sup>nd</sup> storyboard to the 4<sup>th</sup> storyboard. This ensures the user does not need to remember information and the products they choose.

## Storyboard 1

This is the design for the homepage, which aimed to serve as a central hub for navigation. On top of the page is a toolbar with a search bar for quickly finding products, a feature for tracking orders, convenient access to the shopping cart, and the ability to manage user account details. This site is also for promoting the latest deals, exclusive discounts, and exciting sales events, ensuring visitors are immediately aware of the savings and opportunities. Moreover, this page displays the store products that are sorted by category. Each product listing is presented with its image, name, price, and rating, making it easy for users to evaluate and choose the items that best suit their needs. Clicking on the product will bring us to the product page (Storyboard 2)

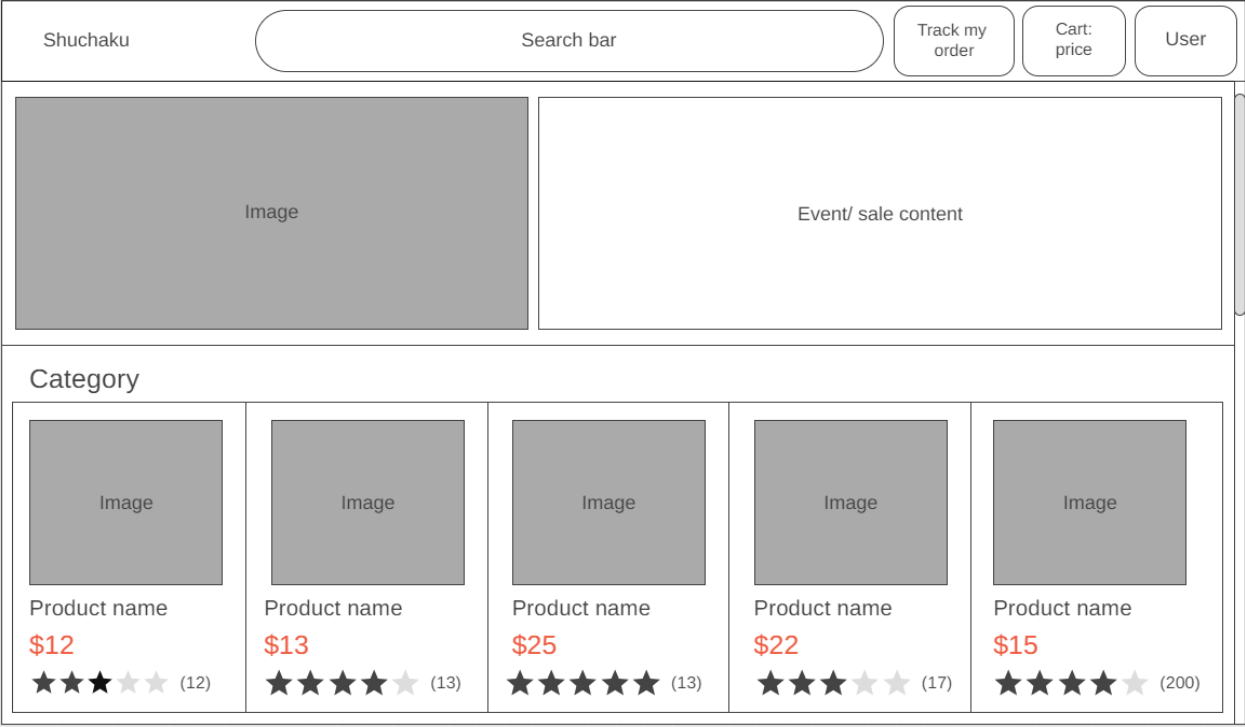
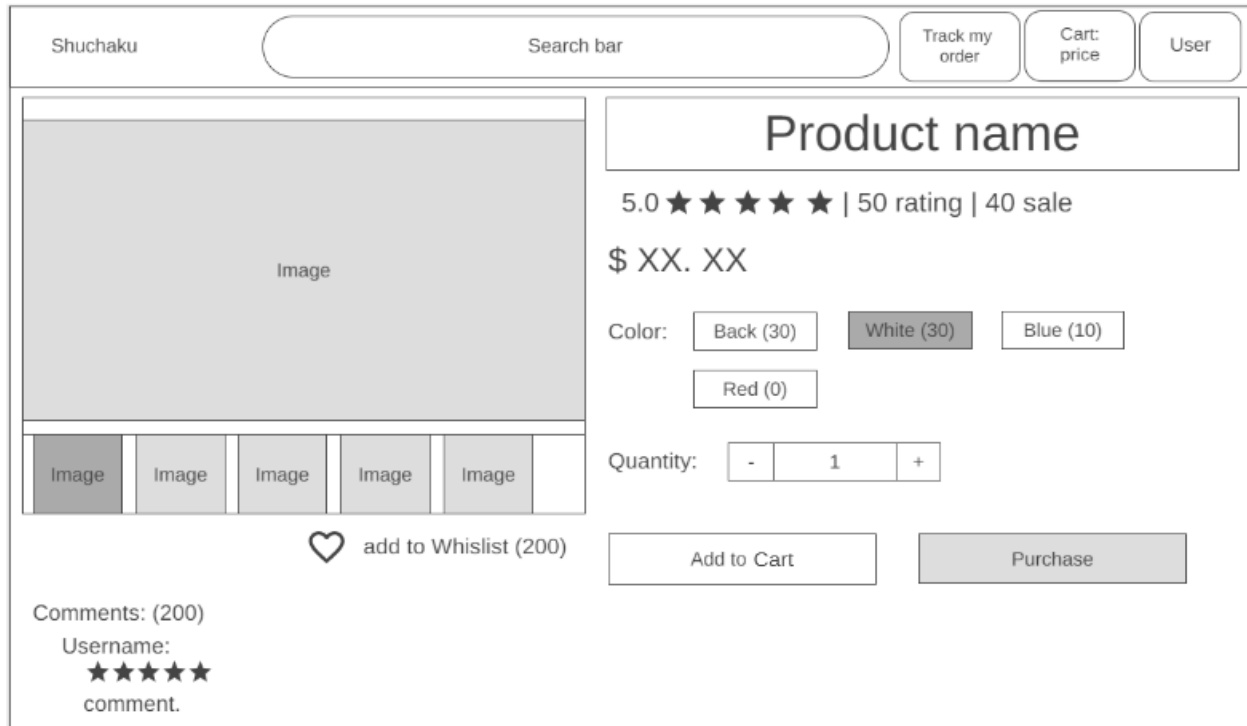


Figure 2.1: Homepage

## Storyboard 2

The product view page offers the user the essential information of a product. It provides information about each product, featuring detailed descriptions, specifications, and key features. Additionally, there are images and visuals of the product. Customer reviews and ratings are available, allowing users to give feedback on the opinions of others and make confident choices. Users can choose the product color or option that is listed, and the quantity of the product before clicking Add to Cart to keep shopping or Purchase to get to Storyboard 3



The wireframe illustrates the layout of a product view page. At the top, a navigation bar includes the site name 'Shuchaku', a search bar, and links for 'Track my order', 'Cart: price', and 'User'. The main content area is divided into two columns. The left column features a large placeholder for the main product image, with a row of five smaller image thumbnails below it. The right column displays the product details: the product name, a 5.0 star rating with 50 reviews and 40 sales, the price '\$ XX. XX', and color selection options (Back (30), White (30), Blue (10), and Red (0)). Below the colors is a quantity selector with minus, 1, and plus buttons. At the bottom of the right column are 'Add to Cart' and 'Purchase' buttons. On the left side, below the thumbnails, there is a heart icon for 'add to Whislist (200)' and a comments section showing a username, a 5-star rating, and a comment placeholder.

Shuchaku

Search bar

Track my order

Cart: price

User

Image

Image

Image

Image

Image

Product name

5.0 ★★★★★ | 50 rating | 40 sale

\$ XX. XX

Color: Back (30) White (30) Blue (10) Red (0)

Quantity: - 1 +

Add to Cart

Purchase

add to Whislist (200)

Comments: (200)

Username: ★★★★★ comment.

Figure 2.2: Product View Page

## Storyboard 3

This is the shopping cart page that is designed to display user shopping carts. The top of the page still has a navigation bar, allowing users to navigate through the main feature of the website without needing to redirect to the home page. The main section, of this page includes features for customers to review and edit the items in their cart. Each product in the cart will be displayed with a clear option for modifying quantities or removing products. It also presents a cost summary, ensuring that customers are fully aware of their purchase. There are options to select and remove all the products in the shopping cart. After selecting the product user can click Proceed to Checkout and get to Storyboard 4

The mockup shows a shopping cart interface. At the top is a navigation bar with the text 'Shuchaku', a 'Search bar' placeholder, and three buttons: 'Track my order', 'Cart: price', and 'User'. Below the navigation bar is the 'Shoping Cart' section. It features a table with columns: 'Product', 'Unit price', 'Number', and 'Price'. The table contains two rows of product information. Each row includes a checkbox, a product image placeholder, the product name, an 'Option: Back | ...' link, the unit price '\$ XX.XX', a quantity selector with minus, plus, and a central value (2), and the total price '\$ XX.XX'. Below the table, there is a summary row with a checkbox, the text 'Select all (2) Clear', the total price 'Total: \$XX.XX', and a 'Proceed to Checkout' button.

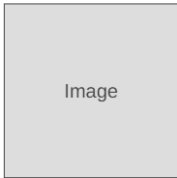
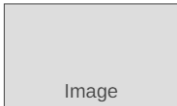
<input type="checkbox"/>	Product	Unit price	Number	Price
<input type="checkbox"/>	 Product Name Option: Back   ...	\$ XX.XX	- 2 +	\$ XX.XX
<input checked="" type="checkbox"/>	 Product Name Option: Back   ...	\$ XX.XX	- 2 +	\$ XX.XX
<input type="checkbox"/>	Select all (2) Clear	Total: \$XX.XX	Proceed to Checkout	

Figure 2.3: Shopping Cart Page



## Storyboard 4

This is the design for the checkout page. This page serves as the final gateway for customers to complete their online shopping journey. The top of the page is a field that displays user shipping information, allowing a user to verify and change shipping information by clicking on the Change options the website will bring the user to Storyboard 5. Then all the products that have been selected for the checkout will be displayed one more time for the user to review and confirm their chosen products and quantity. It calculates and presents the total cost, including any applicable taxes and fees, and allows customers to apply promotional codes or discounts. There is a field for the user to select and enter their payment method. After reviewing all the information, user can enter their payment information finish the checkout process, and place an order by clicking on PLACE ORDER

Shuchaku


Search bar

Track my order

Cart: price

User

Checkout

 Shipping information

Username (+61) XXX XXX XXX98 xxxxxx Street xxxxxx QLD xxxx AUSTRALIA

Change

Image	Product Name	Option: Back   ...	Unit price	Number	Price
			\$ XX.XX	2	\$ XX.XX
			\$ XX.XX		

Voucher (2)[Select voucher](#)

Payment method

Shuchaku point

Credit Card

Visa/Mastercard

Credit Card Type

Credit Card Number

Expiry Date

Card Verification Number

PLACE ORDER

Subtotal:

\$ XX.XX

Shipping:

\$ XX.XX

GRAND TOTAL:

\$ XX.XX

Figure 2.4: Checkout Page

## Storyboard 5

This is the design for the shipping information form. Starting from the checkout page, if a user needs to adjust the shipping information, they can click on the “Change” button, this form will be displayed. This form allows the user to change any information about the shipping including name, contact of the receiver, and the location that the package will be sent to. After filling out the form, the user can confirm to save the shipping information, then they will be redirected to the checkout page with the updated shipping information or simply hit cancel to return to the checkout page without performing any modification.

The image shows a web application interface. At the top, there is a header bar with the text 'Shuchaku' on the left, a 'Search bar' in the center, and three buttons on the right: 'Track my order', 'Cart: price', and 'User'. Below the header, a modal window titled 'Shipping information' is displayed. The modal has a close button (X) in the top right corner. Inside the modal, there are several input fields for shipping information: 'First Name', 'Last Name', 'Email', 'Phone Number', 'Address', 'Suburb/Town', 'State/Territory' (with a dropdown arrow), 'Post Code', and 'Country' (with a dropdown arrow). At the bottom right of the modal are 'Confirm' and 'Cancel' buttons.

Figure 2.5: Shipping Information Form

## 3. Application architecture and software

### a) Component Diagram

Figure 3. illustrates the component diagram of the Shūchaku store system designed using the 3 layers architecture. In the user interface layer, the primary component, the website, is coded in JavaScript and HTML. The core system functions and components are in the domain layer. Here, a web server, responsible for managing sessions, communicates with an application server developed using PHP and Laravel. The web server sends requests to the main online store system, which includes all subsystems. In the data layer, the database is managed by the database SQL store and exchanges

data with the applications server and the online store system.

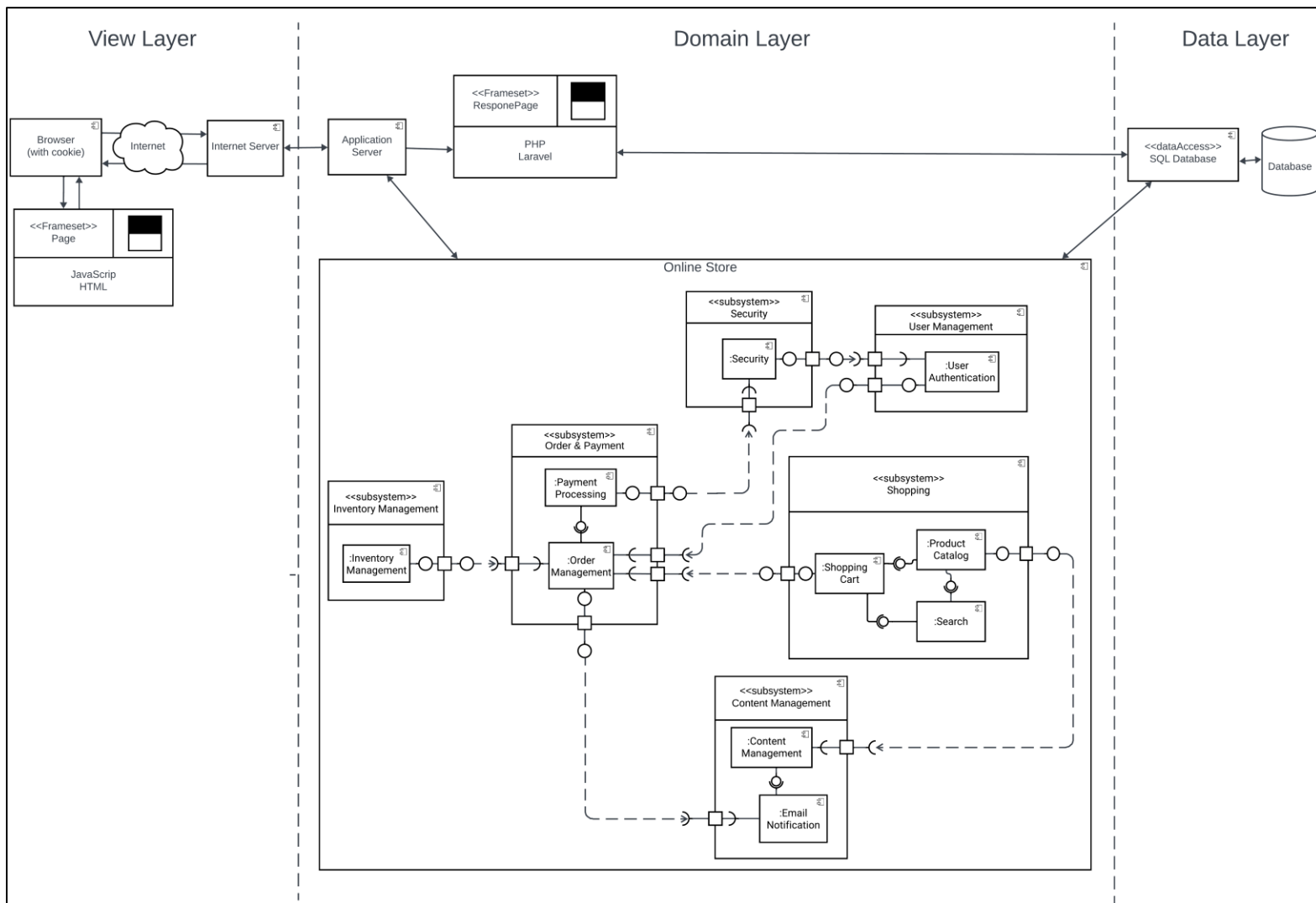


Figure 3. a: Component Diagram

## b) Design Class Diagram

Below is the Design Class diagram illustrating the Placing Order use case for the Shūchaku Anime store system, showing the classes and controllers that are related to a corresponding use case. A login handler is used to manage the login sessions of the user. Payment controllers are tasked with initializing payment information and executing payment options. The order controller is used to manage orders and communicate with payment controllers and product controllers. Product controller product to create updates and retrieve information on the product including details related to the warehouse. The lottery handler is used to create and retrieve information about a lottery. This Design Class

diagram offers a clear overview of the components that come together to enable the Placing Order use case in the Shūchaku Anime store system.

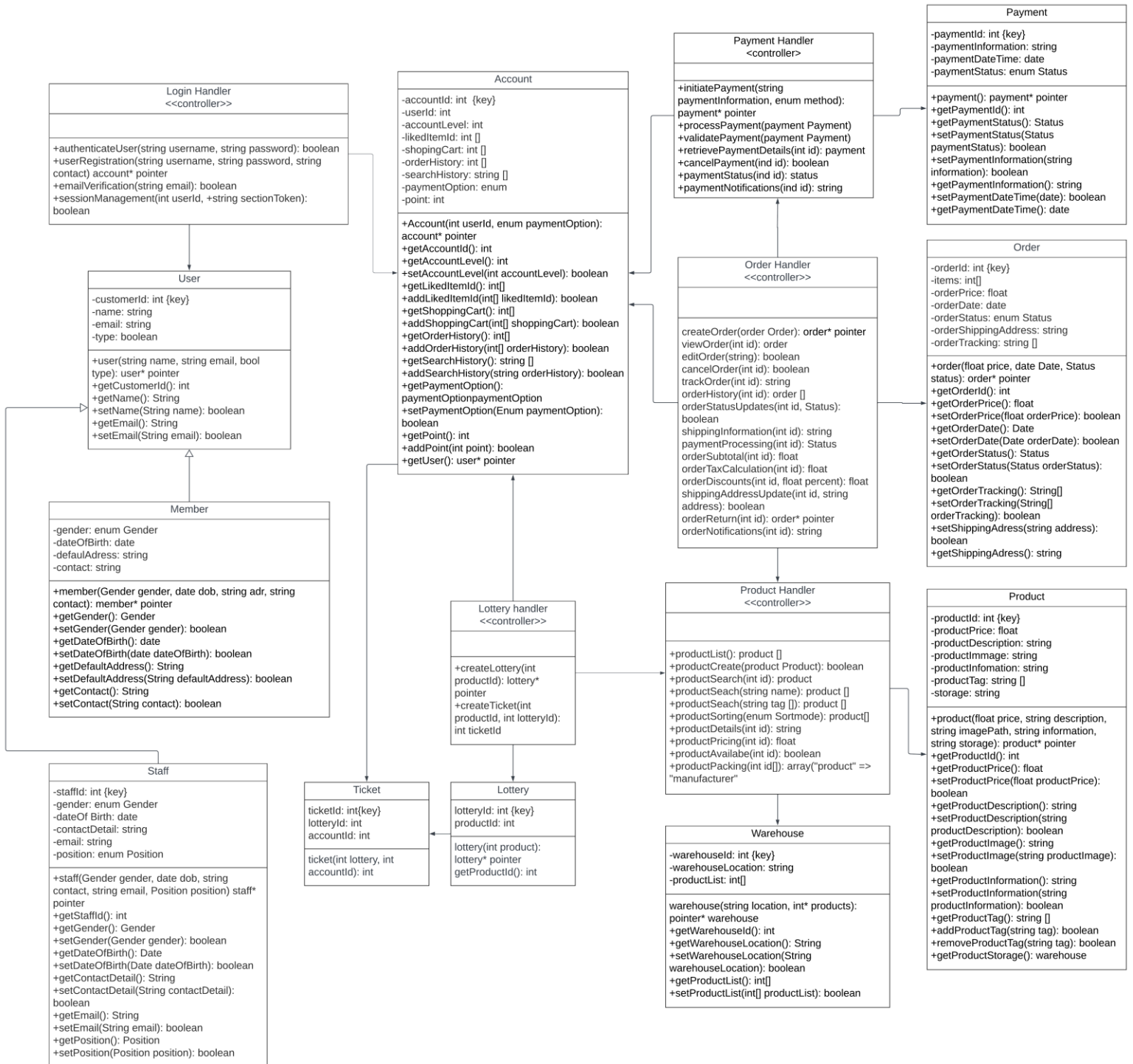


Figure 3. b: Design Class Diagram

## 4. System Control and Security

The online system must protect the organization, customers & system environment. Reinforce 4 security aspects:

### 4.1. Access Controls

To control user access to resources, implement access controls using an access control list. Users fall into three categories: registered users (customers, retail staff, and accountants), unauthorized users (former employees and outsiders), and privileged users (administrative staff, store managers, and store owners).

In addition, the list of authenticated users will be utilized to grant different access rights to various users. Registered users are allowed to view product information, purchase products, and edit their personal information. Retail staff members can edit product details and process sales orders. Accountants can view sales reports and record them. Unauthorized users can only access basic public information on the website. Privileged users are eligible to access the database to edit product, class, and coach details, as well as view and edit sales reports, among other things.

### 4.2. Encryption

Online shopping has transformed the way we buy goods and services, but with this convenience comes the responsibility of protecting sensitive customer information such as credit card numbers, personal details, and addresses. To ensure data security between the server and the client, we have implemented a powerful encryption mechanism.

Simply put, encryption is the process of safeguarding data by modifying it to prevent unauthorized access. In our system, we use asymmetric key encryption, also known as Public key encryption. This means that a public key is used for encryption and a private key is used for decryption. The web server will publish the public key to anyone who requests it.

Before sending personal customer information, we encrypt it with the public key. On the server side, the private key is then used to decode the message, guaranteeing that no one else can read it. We keep the private key only on the web server, ensuring that there is no possibility of interference.

In short, our encryption mechanism provides a secure environment for online shopping, giving our customers the confidence to transact with us, knowing that their sensitive information is protected.

### 4.3. Digital Signatures

Digital Signature is a powerful and reliable technique that allows you to verify the sender of any document. By encrypting a message with a private key and decrypting it with a public key, you can be confident that the message was sent by the intended sender.

But to ensure the authenticity of the public key, you need a Digital Certificate. This certificate includes the name of the institution and the public key, both of which are encrypted and certified by a trusted third-party Certifying Authority. When you request the public key from the web server, the certificate is returned, allowing you to confirm that you are communicating with the intended destination.

In short, by using Digital Signatures and Digital Certificates, you can be sure that your messages are secure and trustworthy, giving you peace of mind and protecting you from fraud.

### 4.4. Secure Transactions

Providing a safe and secure online shopping experience for your customers is paramount, and one of the most important ways to achieve this is by ensuring secure payment transactions. By using Hypertext Transfer Protocol Secure (HTTPS) to transmit web pages, you can encrypt web content and media, which helps prevent spoofing attacks. This is supported by modern web

browsers and servers, so you can rest assured that your system is up to date and secure.

But that's not all. It's also crucial to implement Transport Layer Security (TLS) 1.2 to ensure secure message transmission over the Internet. This method requires digital signatures, keys, and certificates for both parties, which helps ensure that the messages are authentic and secure. By taking these steps, you can provide your customers with the peace of mind knowing that their transactions are safe and secure.

To support secure transactions, you can also utilize Secure Sockets Layer (SSL) for authentication, authorization, privacy, and integrity. By implementing these measures, you can create a secure platform for online payments, which will help establish trust and confidence with your customers.

In summary, by implementing HTTPS, TLS 1.2, and SSL, you can provide a secure platform for your customers to make online payments and create a trustworthy relationship with them.

## 5. Unit test the software

Below are the unit test test cases for the Order Handler and Product class. To pass the test case, the actual output needs to be the same data type and value as the expected output.

### Testcase Order Handler Controller

Test Case ID	Input	Expected Output
1	createOrder( order{10, "2023-09-20 17:16:00.000", "Waiting"})	Pointer* to new Order
2	viewOrder(1)	Order{10, "2023-09-20 17:16:00.000, "Shipping"}
3	editOrder( "1 – 11, 2023-09-20 17:16:00.000, Done")	True
4	cancelOrder(1)	True
5	trackOrder(1)	"Warehouse B2, Packed"

6	orderHistory(2)	Order[]
7	orderStatusUpdates(1, 'Cancelled')	True
8	shippingInformation(1)	"Warehouse C4 2023:09:18 19:20:00.000"
9	paymentProcessing(1)	'Processing'
10	orderSubtotal(1)	17.99
11	orderTaxCalculation(1)	2.34
12	orderDiscounts(2, 7.5)	3.23
13	shippingAddressUpdate(1, "12 Clare St, Southport QLD 4215 ")	True
14	orderReturn(3)	Order*
15	orderNotifications(3)	"Your order has arrived"

## Testcase Product Class

Test Case ID	Input	Expected Output
1	product(25.0, "Example product", "image.jpg", "Product info", "Storage A")	Product*
2	getProductId()	111
3	getProductPrice()	25.0
4	setProductPrice(30.0)	True
5	getProductDescription()	"Example product"
6	setProductDescription("Updated product")	True
7	getProductImage()	"image.jpg"
8	setProductImage("resource/images/new_image.jpg")	True
9	getProductInformation()	"This is a testing product"
10	setProductInformation("New info")	True
11	getProductTag()	["top 10", "poster"]
12	addProductTag("Tag2")	True
13	removeProductTag("Tag1")	True
14	getProductStorage()	Warehouse object

## 6. Deploy the solution



## 6.1. Converting and initializing Data

Shuchaku Anime's current method of storing data using Microsoft Excel spreadsheets is not the most efficient or effective solution. By switching to a proper database management system, the company can save time, increase accuracy, and ultimately improve its operations. Although the new system will require some changes, the majority of the data can be easily transferred.

To ensure that the new system is loaded with accurate and error-free data, our team will thoroughly verify and check all information for missing data during the conversion process. With our expertise and attention to detail, we guarantee a seamless transition that minimizes disruptions to your business.

Make the switch to a better data management solution. Contact us today to learn more about how we can help improve your operations.

## 6.2. Training Users

The implementation of the new system is critical to the success of your business. To ensure that your team uses the system effectively, you need to provide adequate training to three groups of users: end-users, management, and the IT team.

The end-users must know how to perform their daily tasks with the new system. They don't need to understand the operational management of your business. For management, it's essential to have a basic understanding of the system's overview and ensure proper usage by all end-users. The IT team requires a comprehensive understanding of how the system works and the skills required by end-users.

We'll take care of training all three groups of users, individually, after the interfaces have stabilized. This will allow us to make any necessary improvements based on feedback from the users. All training will be

conducted in person with a demonstration for one day, allowing for quick interactions between the groups and trainers.

To support your team's learning, we'll prepare two sets of documentation: user documentation and system documentation. User documentation will cover the daily operation procedures of the system, including how to create, edit, and complete orders, along with common errors and solutions. System documentation will cover system requirements, architecture, and construction information. End-users will receive user documentation, while management and IT teams will receive both user and system documentation.

To ensure that the system meets your unique needs, we'll provide an evaluation form to each group at the end of each training session. This feedback will be used to identify areas that require further training or clarification and determine whether the system needs improvement. Our training program will help your team feel confident and prepared to use the new system effectively, giving your business the competitive edge, it needs.

### 6.3. Configuring the Production Environment

Our new system will be a powerful web-based application, developed and supported by a highly experienced contractor. They will set up the production environment with state-of-the-art hardware and network devices, including servers, switches, and routers. Our cloud hosting service personnel will expertly manage the server hosting, while the network engineer assigned to the project will ensure the server-side environment is set up flawlessly. With our client-side, we will continue using our current hardware and network devices.

To ensure we meet our project schedule, we must complete the infrastructure on time, and that's why we've handpicked the best team to handle this critical task. The contractor development team will create the software part of our system, including the interface and database, using cutting-edge technologies like PHP, JavaScript, MySQL, and more. Once the interface and database are stable, the basic environment configuration can be done, and the team can perform some testing to iron out any issues.

Our development team will also set up initial user accounts for retail staff and administrative staff before training begins, to allow them to train with test data and perform tasks with ease. With this system, we'll streamline our operations, reduce errors, and increase efficiency, making us more competitive in our industry.

## 6.4. Deployment Approach

When it comes to transitioning from old to new systems, businesses need a seamless approach that reduces risks and ensures that the new system is functioning correctly. The parallel deployment approach is the best option for this purpose, even if it may cost more. It allows the old and new systems to operate seamlessly for weeks or months, which significantly reduces the risks associated with system migration.

Another significant advantage of parallel deployment is that specific employees and customers can use and test the new system while the old system is still running. This overlapping period allows any issues with the new system to be identified and resolved before full migration, while also providing an opportunity for fine-tuning the new system based on user feedback.

During the planning stage of the project, the project manager sets a specific overlapping period and date that includes the time for deployment and configuration. Only developers have access to the new servers and devices during the installation phase. They can access the store workstations as a program is required to connect to the system on the server. Furthermore, another folder or disk partition is needed for the program and coaching data. As a result, store PCs can directly connect to the system without using a browser, while customers can access the system via URL using their device.

By using parallel deployment, businesses can ensure a smooth transition to new systems without disrupting their operations or causing unnecessary risks. It is a proven approach that has been used successfully by many businesses to upgrade their systems while minimizing costs and risks.

## 6.5. Change and Version Control

Developing a new online store system is an exciting and challenging project with many moving parts. In order to ensure success, it's crucial to have a solid change and version control process in place. This is where CVS (Concurrent Versions System) comes in handy. By keeping track of all modifications made to the code and documenting changes made to files, CVS allows for easy restoration of previous versions and helps identify the root cause of any bugs.

To ensure a smooth development process, multiple versions of the system are developed, each with its own purpose. The test version is a vital step towards completion, allowing for in-house development and the building of all subsystems, interfaces, and test data. Following this is the alpha version, which is ready for usability testing and integration of functionalities, interfaces, and databases. This version has a short lifespan of only a few days or weeks, but it's crucial for identifying any issues before moving on to the beta version.

The beta version is the most stable version, and it's ready for end-user testing. Once all issues have been identified and addressed, the beta version is launched, and end-users can perform real-world testing. The testing period can last for several weeks or months, allowing for thorough testing and quality assurance. Finally, once the beta version has been approved by users, the production version is released. This version is the final product, ready to be deployed and released to the client.

Once the production version is live, maintenance services are available to ensure that the system remains bug-free and efficient. If any issues arise, clients can submit an error report or a change request, which is then integrated into the application development tool and source code control system. The project manager receives and manages these reports, assigning amendment work to developers. The changes are then implemented and tested on a copy of the production system known as the test system, ensuring that the final product remains top-notch.

In conclusion, by following a comprehensive version control process and developing multiple versions of the system, we can ensure that the final product is of the highest quality. The CVS tool will help us keep track of all modifications made to the code and document changes made to files, and the various versions of the system will help us identify and address any issues

that arise. With maintenance services available and a team of dedicated developers, we're confident that we can deliver a top-notch online store system that meets all of your needs.