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Web-based Sales and Purchase System for Care Technology Enterprise

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Abstract: Web-based Sales and Purchase System is intended to help a business company to manage its sales and purchase information. Care Technology Enterprise is a small company that sells computer products and runs a physical shop. The owner and employees had some problems in managing their sales and purchase information. The owner of the company used traditional methods to manage and store their information. The traditional methods of managing their information were very unorganized, requires a lot of space to store the information, and insecure due to physical storage. Therefore, this project aimed to design, develop, and test an online sales and purchase system for Care Technology Enterprise. The system helped them organize their sales and purchase information using computerized methods and databases. Storing information in databases makes adding, updating, and removing processes much easier while also providing security to protect the information. The system was a web-based system that provides the availability of the data. It was written in PHP programming language. The project followed the object-oriented software development methodology because the system was developed using an object-oriented approach. The database used MySQL service, and the system hosted on InfinityFree web hosting service. The system managed client, user accounts, expense, inventory, invoice, and sales information while allowing purchase orders to be recorded. The system had succeeded in achieving all the objectives set in this project.

Keywords: Object-oriented, Sales and Purchase, System Security, Web-based system

1. Introduction

Information systems (IS) are systems that are designed to collect, process, store, and distribute information where it is made up of task, people, structure, and technology. The main goal of information system is to help in organization operations, managements, and performance. Since information systems handles information, security is a crucial part of it. One of the security measures used in information systems is authentication. Authentication is the process of proving the identity of the user using a piece of information where only an authorized person should know like login credentials.

Care Technology Enterprise is a small business company that sells products related to computers and technologies. The company runs a physical store owned by Mr. Alvin Lee that is located in No.52, Jalan Tun Razak, 27600 Raub, Pahang. Since the company runs business, there are a lot of information needed to ensure the business run smoothly. Currently, the company keep their sales and purchase information in the form of loose papers and logbooks. The large number of receipts makes keeping them very messy and space consuming. Also, it is very hard for the company to find the information needed. It also takes a lot of effort for the company to manage their sales record because the owner needs to manually calculate the numbers every day. Besides, the company faces problems in keeping track of their inventory. It is hard for the company to restock their products.

The objectives of the project are determined based on the problems faced by the company. The objectives of this project are to design an Online Sales and Purchase System for Care Technology Enterprise, to develop an Online Sales and Purchase System for Care Technology Enterprise, and to test the Online Sales and Purchase System for Care Technology Enterprise. The system should only be used by the owner and the employees of the company. Since it is a web-based system, it can be accessed using any devices as long as it is connected to the Internet. The system should allow users to manage the sales and purchase information of the company. The system also protects the information against physical threats because it is stored in the database. It also provides access control to the system where different user types such as the admin and employees have different privileges in the system.

The proposed system is able to store information such as employee information, inventory information, purchase orders, client information, expense information, and sales information. It is also able to generate invoices and delivering them through emails to facilitate the business activities. Besides, the system can authenticate users using login credentials. The system only allows access using login credentials such as usernames and passwords to authenticate users. Therefore, only the owner and employees can access the system. Lastly, the system provide confidentiality by keeping the information hidden from the public by keeping them in the database. It is much more secured then keeping the information in log books and papers.

2. Related Work

2.1 Accounting Information System

Accounting information system (AIS) can be regarded as the computerized method of tracking accounting activities. It is widely used by most organizations and companies because of the improvements of information technology. Business environment changes in recent years had forced companies to improve management practice and systems. The use of AIS can help owners to identify customer preferences which will be needed to assist decision-making and improve customer satisfaction [1].

AIS handles a lot of information such as bill statements, invoices, sales orders, and inventory data. The information must be stored in a database. An AIS must have a database structure to store all the information and be able to retrieve them whenever needed. Implementation of accounting information systems had shown positive results in companies [2]. AIS can provide accurate, precise and quality information for owners to create financial statements.

There are many commercialized AIS for subscription on the Internet. Most AIS available online are software as a service (SaaS). SaaS is also known as subscribeware because the software must be subscribed to be able to use it. SaaS software are web-based, meaning that it is centrally hosted by the vendor. The subscriber or user of the software must pay the fees monthly or annually to renew their license and continue using the software.

Existing AIS are offered through cloud computing services. Cloud services allows users to access, manage, update and delete their data easily. Cloud services can be accessed with any device at any place and any time [3]. SaaS had been a very good way to offer AIS services because of its usability [4].

This project was guided by trying out and experiencing similar existing systems such as FreshBooks and QuickBooks. Table 1 shows the comparison of proposed system with FreshBooks and QuickBooks. FreshBooks and QuickBooks are accounting software that are commonly used in small and medium-sized business company such as Care Technology Enterprise. FreshBooks and QuickBooks offer their services as software as a service (SaaS) to any company that pays a subscription fee.

All three systems compared are web-based and can generate invoices. However, QuickBooks and the proposed system supports storing inventory information while FreshBooks does not. Next, the proposed system does not have user and customer limits. FreshBooks and QuickBooks limit the number of customers and users so that their clients must subscribe to a more expensive plan to increase the limit. Lastly, the proposed system allows the owner to check activity logs to track the activities done in the system, but FreshBooks and QuickBooks do not allow checking activity logs.

Table 1: Comparison of Existing System

Feature	FreshBooks	QuickBooks	Proposed System
Platform	Web-based	Web-based	Web-based
Generate Invoice	Yes	Yes	Yes
Inventory Information	No	Yes	Yes
Customer Limit	Yes	Yes	No
User Limit	Yes	Yes	No
Allow Check Logs	No	No	Yes

2.2 The Importance of Information Security

Information are important assets of a company. All companies and businesses deal with a lot of information. In order to protect these assets, security must be implemented in their systems. Data stored in computer systems requires information security techniques to protect them. Information security is the practice to protect information assets through mitigating the risks. The core of information security is information assurance. It maintains the confidentiality, integrity, and availability of information. It is commonly referred as the CIA triad in information security.

The digitalization of information had significantly increased the number of cybercrimes. The cybercrimes are also transforming into more sophisticated and complex. Lack of awareness and practice in cyber security also contributes towards the rapid increase in cybercrimes. Data are moving fast in cyber space and a system must avoid unauthorized people to access the data. It is because they can use the data for malicious purpose that can cause harm to the data owner and the organization that is responsible for it.

In the case of Care Technology Enterprise, confidentiality and availability of data are the main focus. Confidentiality of data is needed to protect company's information assets, and availability of information is needed to conduct business quickly and efficiently. Care Technology Enterprise also falls under the category of small and medium-sized enterprises (SMEs) which is the main objective and targets of cybercriminals [5]. This category of companies has weaker system security while not having affordable solutions to this issue [6].

Confidentiality in information security is defined as the information that are not disclosed to unauthorized entities. Confidentiality is regarded as a set of rules that protects information against unauthorized access even by the service provider for cloud services [7]. Confidentiality is important in most organizations and companies because most of their information assets must be kept secret from

the public. Even in small businesses like Care Technology Enterprise, they also have confidential information to protect. Information such as employee records, inventory records, and customer records contains sensitive information that must be kept confidential. Without confidentiality, the data stored by the company may be viewed by unauthorized parties. For example, leaked personal information can potentially cause damage to their reputation. It may also put their safety at risk. Attackers can use names, addresses, and telephone numbers to carry out social engineering attacks and scams towards the victims.

Availability of information is the ability of authorized entities to access or retrieve the information whenever needed. Availability is important to ensure smooth operations in an organization, service, and company. As important as it is to protect the confidentiality of information, the information should also be easily accessible by authorized people to do their jobs timely while allowing the owner to constantly keep track of company income and spending.

Authentication is needed by systems to verifying a person's identity. Information systems contains many sensitive information, therefore only authorized person can access that information. The system authenticates people using their login credentials such as username and passwords. Only people who had been successfully authenticated can gain access into the system.

Password is one of the most mainstream methods to provide authentication. Most systems utilize passwords to authenticate their users, even a highly secured system like online banking systems. Password authentication is considered a weak security because passwords can be easily cracked if the password used is weak [8]. Therefore, sufficiently strong password should be used to improve the security of this authentication method [9]. Commonly, passwords are recommended to have at least one upper-case character, lower-case characters, numbers and at least 8 characters long. These requirements are commonly used in strict password policies. Besides, the system should also limit the number of wrong passwords attempts to avoid password attacks such as the brute force attacks and dictionary attacks.

3. Methodology/Framework

This section describes the methodology used to develop the system. The system development is done by following the object-oriented software development (OOSD) model. The system is developed using object-oriented approach in PHP programming language as the backend. Since the system is web-based, the frontend utilizes hypertext markup language (HTML).

The OOSD model is made up of five phases which are requirement analysis, analysis, design, implementation, and testing. Each phase of the OOSD was explained in more details in the subsections below.

3.1 Object-oriented Requirement Analysis

The first phase of the OOSD model is the requirement analysis. In this phase, the problem statement is outlined by using the problems faced by Care Technology Enterprise in their business model. After that, the objectives of the project are defined in align to solving the problems faced by Care Technology Enterprise as mentioned in the problem statement.

The software and hardware requirements were outlined in this phase. The software requirements of this project were a web browser, a source code editor tool, XAMPP software, and MySQL database. The hardware requirement of this project was a device that supports web browsers and have internet access. The specifications of the laptop used to develop and test the system are Intel Core i7-8750H Processor, 16 GB RAM and running on 64-bit Windows Operating System.

3.2 Object-oriented Analysis Phase

The second phase of the OOSD model is analysis phase. The user requirements and system requirements are analyzed and outlined in this phase. The user requirements were different for admin and staff level users. Table 2 shows the user requirements for admin. Table 3 shows the user requirements for staff.

Table 2: User Requirements for Admin

No	User Requirements for Admin
1	Admin should able to login into the system using a username and password.
2	Admin should able to view, add, edit, and delete user accounts.
3	Admin should able to view, add, edit, and delete client information.
4	Admin should able to view, add, edit, and delete expense information.
5	Admin should able to view, add, edit, and delete inventory information.
6	Admin should able to view, add, edit, and delete sales information.
7	Admin should able to change their password.
8	Admin should able to view, add, edit, and delete purchase orders.
9	Admin should able to view, add, edit, delete invoice information.
10	Admin should able to check user activity logs.

Table 3: User Requirements for Staff

No	User Requirements for Staff
1	Staff should able to login into the system using a username and password.
2	Staff should able to view and add purchase order.
3	Staff should able to view, add, and edit client information.
4	Staff should able to view, add, and edit invoice information.
5	Staff should able to view, add, and edit inventory information.
6	Staff should able to change their default password into a strong password in the first login.
7	Staff should able to change their password.

Besides, the object-oriented software development model is also decided in this phase by taking consideration of how the object-oriented programming approach will benefit the whole project. Since the system requires many functions to be used between separate user types, the reusability of codes allowed by object-oriented approach can significantly reduce the time needed to implement the project.

3.3 Object-oriented Design Phase

The third phase of the OOSD model is the design phase. In this phase, the complete architecture of the proposed system is designed. The system architecture is created using Unified Modelling Language (UML) diagrams which visualizes the system architecture. As per the specifications of UML, there are four diagrams used which include use case diagram, sequence diagram, activity diagram, and class diagram.

The system is designed to have two levels of privileges for users which are the 'Admin' and 'Staff'. The 'Admin' level user is intended for the company owner and its executives to use while the 'Staff' level user is intended for its employees to use. The 'Admin' level user will have more privileges compared to the 'Staff' level user. 'Admin' level user is allowed to access all available function while 'Staff' level user is restricted to functions that is required to do their jobs such as recording a purchase order.

The use case diagram designed shows all the use cases allowed for ‘Admin’ level user and ‘Staff’ level user. ‘Admin’ level user is allowed to login, manage user accounts, manage client information, manage expense information, manage inventory information, access sales information, manage invoice information and record purchase orders. On the other hand, ‘Staff’ level user is allowed to login, manage client information, manage inventory information, record purchase orders, and manage invoice information. The sequence diagram designed shows the detailed flow of information of a use case. Every use case has a sequence diagram to explain the flow of information. Figure 1 shows the use case diagram of the system.

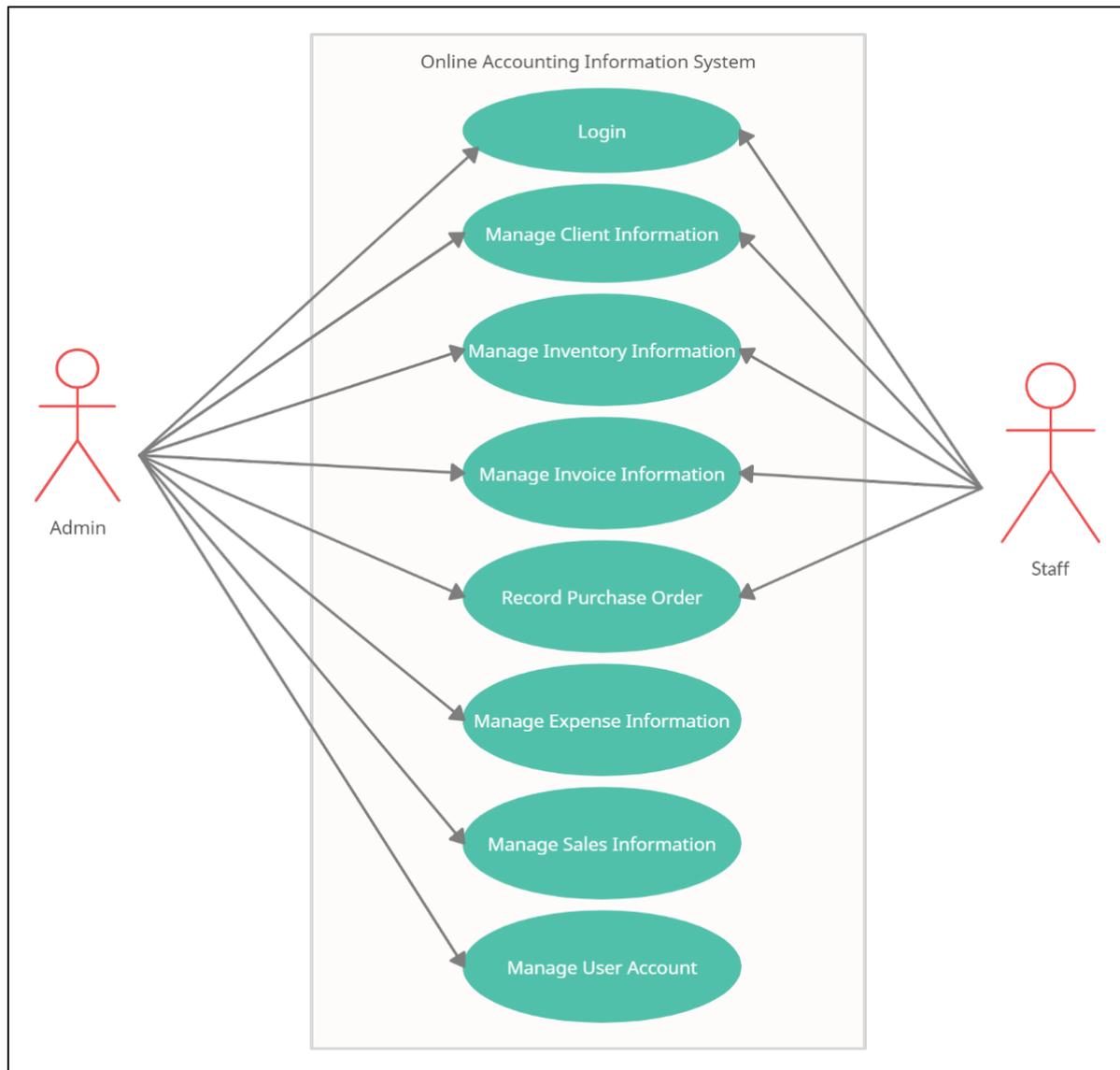


Figure 1: Use Case Diagram

The activity diagram describes the activity flow of the system. Two activity diagrams are designed to show the activity flow of the two types of user privileges. The ‘Admin’ level user and ‘Staff’ level user have separate activity diagram because the activities that can be done by them within the system are different. Therefore, they will have different activity flow. Figure 2 shows the activity diagram for ‘Admin’ users. Figure 3 shows the activity diagram for ‘Staff’ users.

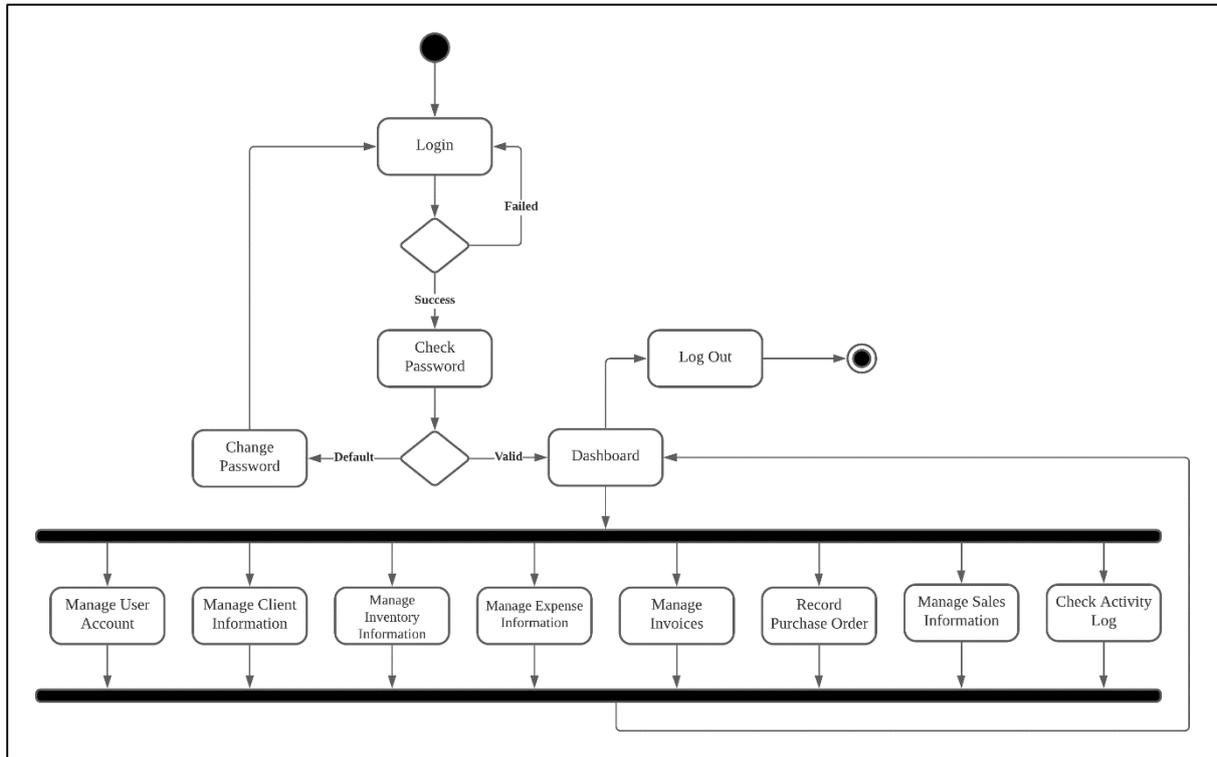


Figure 2: Activity Diagram for Admin

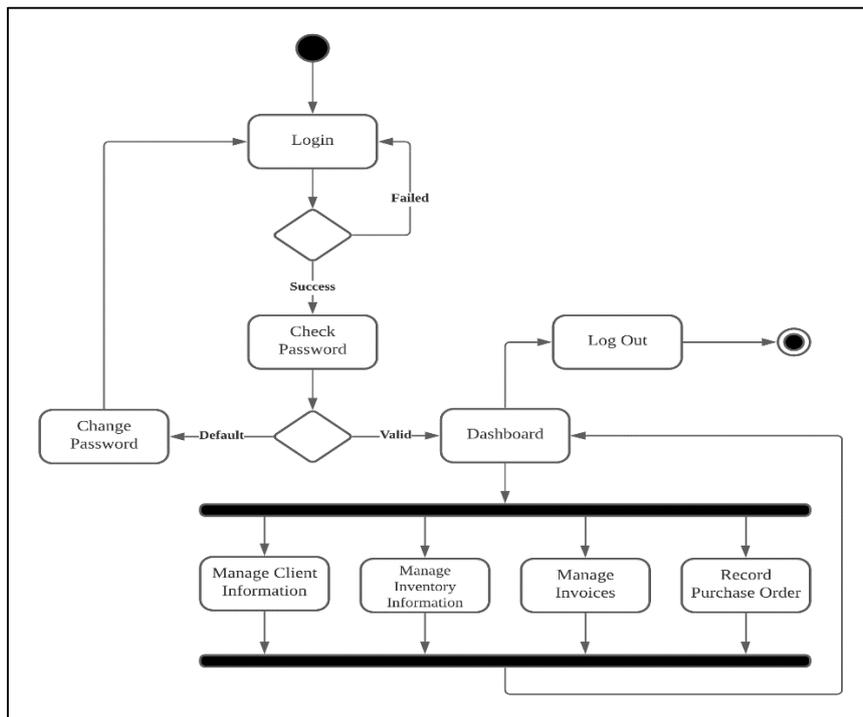


Figure 3: Activity Diagram for Staff

The class diagram describes the type of objects in the system. The system is designed to have 11 classes. The classes are 'User', 'Login', 'Product', 'Client', 'Expense', 'Service', 'Purchase', 'Custom', 'Invoice', 'Sales', and 'Activity'. Each of the class is responsible to carry out functions that are responsible to each class. The functionalities of the system are depending on the methods of the classes. Figure 4 shows the class diagram of the system.

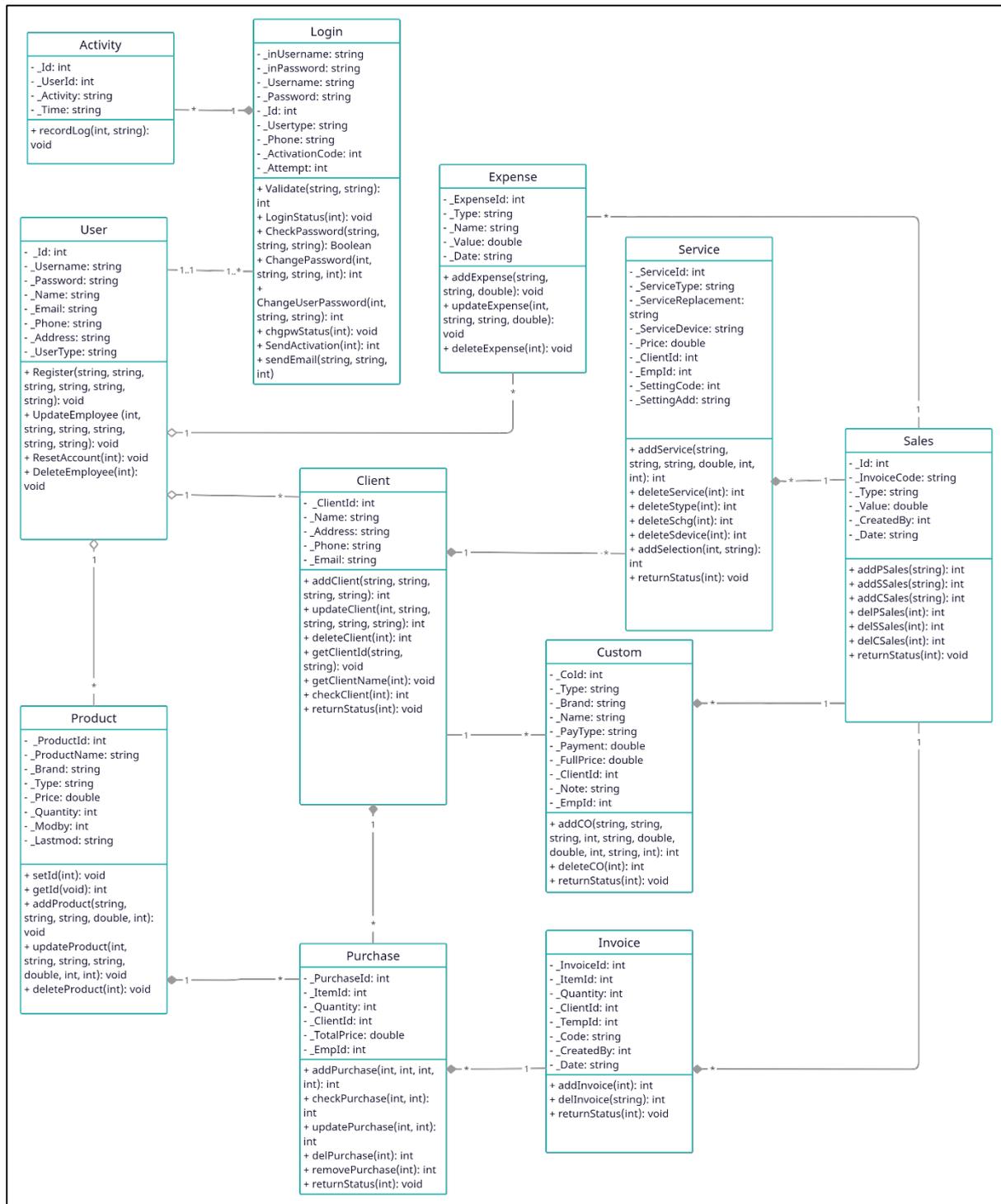


Figure 4: Class Diagram

Lastly, the user interfaces are also designed in this phase. The system has a total of 35 interfaces where ‘Admin’ level users can access 29 of them while ‘Staff’ level users can access 16 of them. Information presented in the interfaces are mostly placed in tables for easier referring and searching. Figure 5 shows the homepage for ‘Admin’ level users. Figure 6 shows homepage for ‘Staff’ level users. There is a navigation bar on top of every interface that shows the company name, system name, current page location and the name of user. Also, a light-colored background in contrast with black font are used so that information can be presented clearly to users without straining their eyes.



Figure 5: Admin Homepage



Figure 6: Staff Homepage

Figure 7 shows the weekly sales interface. Figure 8 shows the weekly sales summary. The sales done on the week were shown in the weekly sales interface along with the summary. Users can view the invoice for the sales by clicking on the ‘View’ button. The summary shows the comparison of sales done last week and current week. The value and percentage difference were shown in tables. Additionally, the financial summary was also shown which shows the expected money gain in that week.

No	Invoice Code	Type	Value	Date	Action
1	Invoice#S12	Service	300.00	2021-07-02 17:36:40	View Delete
2	Invoice#C19	Custom	4,000.00	2021-07-01 17:30:02	View Delete
3	Invoice#C17	Custom	2,000.00	2021-06-29 17:36:45	View Delete
4	Invoice#Pca98b	Purchase	733.00	2021-06-29 12:09:57	View Delete
5	Invoice#P08876	Purchase	84.00	2021-06-28 21:39:54	View Delete

Figure 7: Weekly Sales Interface

Sales Comparison

This Week Sales Value	8,777.00
Last Week Sales Value	8,063.40
Sales Value Increment	713.60
Sales Changes	8.85%

Financial Summary

Sales Value This Week	8,777.00
Expense Value This Week	300.00
Expected Gain	RM 8,477.00

Figure 8: Weekly Sales Summary

Figure 9 shows the record service interface. Figure 10 shows the record purchase product interface. Figure 11 shows the record custom order interface. Since the company offers three types of purchases which are service, product purchase, and custom order, the system allows all three types of purchases to be recorded. It is to ensure the system can accept all kinds of business conducted by the company. All the recorded businesses generate an invoice that can be sent to the customers through email or downloaded by the user.

Care Technology Enterprise Online Sales and Purchase System Purchase Order Liew

Setting Back

Type Formatting ▾
 Replacements None ▾
 Device Type Laptop ▾
 Price 60
 New Client
 Existing Client
 Client Wong ▾
 Submit

Figure 9: Record Service Interface

Selected Product							
No	Brand	Product Name	Type	Price per Unit	Quantity	Price	Action
1	HP	HP 680 Black Original Ink Advantage Cartridge	Ink Cartridge	60.00	1	60.00	<input type="button" value="Update"/> <input type="button" value="Delete"/>
2	HP	905XL OfficeJet	Ink Cartridge	42.00	2	84.00	<input type="button" value="Update"/> <input type="button" value="Delete"/>
3	Canon	Pixma G3000	Printer	721.00	1	721.00	<input type="button" value="Update"/> <input type="button" value="Delete"/>

Client Name: Wong
 Total Price: **RM 865.00**

Figure 10: Record Purchase Product Interface

Care Technology Enterprise Online Sales and Purchase System Custom Order Liew

Item Type

Item Brand

Item Name

Quantity

No payment

Payment Type Item Price (1)

Deposit
 Full Payment
 New Client
 Existing Client

Client

Extra Notes

Figure 11: Record Custom Order Interface

Figure 12 shows the invoice interface. Purchase order invoices, service invoices, and custom order invoices are shown in this page. The purchase orders recorded are shown in this page. In this page, users can view the invoice, send the invoice to the client email, and completing the invoice. Figure 13 shows the invoice email for client. The user can complete the invoice when full payment for that order had been paid by the client. Completed invoice are added into sales.

Care Technology Enterprise Online Sales and Purchase System Invoice Liew

Purchase

No	Invoice	Client	Date	Action	Complete
1	Invoice#P8639	John	2021-07-04 17:30:48	<input type="button" value="View"/>	<input type="button" value="Complete"/>

Service

No	Invoice	Service Type	Replacement	Device	Price	Client Name	Date	Action	Complete
1	Invoice#S11	Repair	Software	Laptop	30.00	Wong	2021-06-29 12:13:33	<input type="button" value="Invoice"/> <input type="button" value="Send Invoice"/> <input type="button" value="Delete"/>	<input type="button" value="Complete"/>
2	Invoice#S10	Formatting	Thermal Paste	Computer	70.00	Wong	2021-06-29 12:06:37	<input type="button" value="Invoice"/> <input type="button" value="Send Invoice"/> <input type="button" value="Delete"/>	<input type="button" value="Complete"/>

Figure 12: Invoice Interface

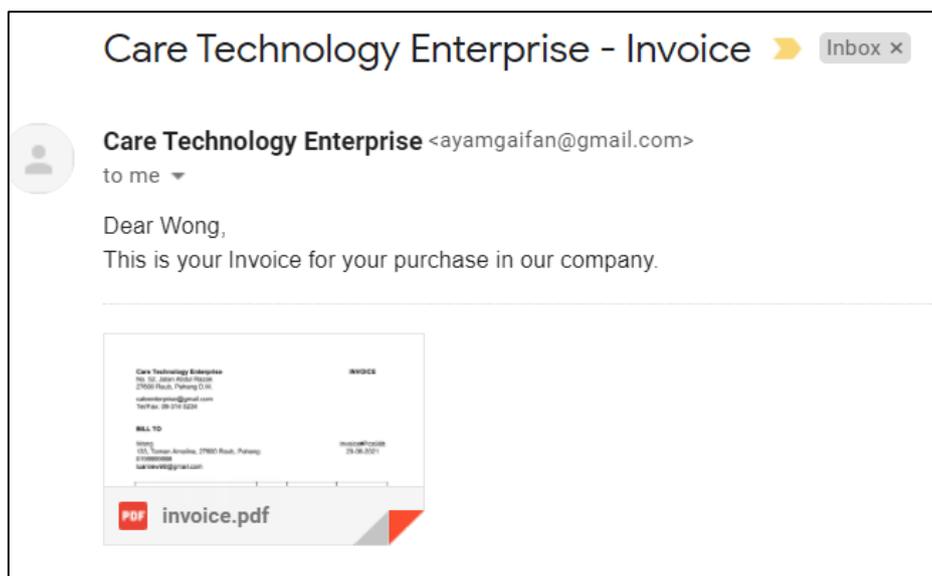


Figure 13: Invoice Email for Client

3.4 Object-oriented Implementation Phase

The fourth phase of the OOSD model is the implementation phase. This phase is where the designs are being made into working programming codes. The codes are written using Notepad++, a text editor that can be used to write source codes as well. The files are saved in .php extension.

The system is a web-based system; therefore, the interfaces are written in hypertext markup language (HTML) so that it can be read by web browsers. Other than HTML, Cascading Style Sheets (CSS) and JavaScript are also used to provide a better user experience. CSS codes helps in styling the HTML document by describing how they should be shown. It makes the system more beautiful and smoother to look at. JavaScript is used to assist in redirecting user to another page. It allows the system to behave properly and makes it easier for users to use the system.

The backend of the system which will be used to carry out functions are written in PHP programming language. Information collected from HTML forms are manipulated using this language. Classes are implemented and instantiated using PHP to access its attributes and methods. Information to and from databases are manipulated using PHP before being stored into or extracted from database.

The database used by the system is MySQL database. The system consists of one database with 12 tables. SQL language is used to manipulate the database. To improve the security, PHP prepared statements are used to sanitize the parameter inputted by users. It can effectively prevent SQL injection attacks where malicious users try to inject malicious codes into the SQL query with hopes to extract information, modify information, or destroy information stored in the database.

Next, passwords were hashed before storing in the database using bcrypt hashing algorithm. Hashing algorithm was chosen over encryption algorithm because hashing is a one-way function unlike encryption. Encryption can be reversed into obtaining its original string of characters, but hashing does not allow that to happen. Bcrypt hashing algorithm was chosen because it was specifically designed for password hashing and it provides salt on each hash. Therefore, having same passwords will still create distinct hash values.

To further enhance the security of the system, an account can only attempt to login with a wrong password for three times. Once the limit had been reached, the user had to contact the administrator to have their account reset. An account that had been reset will have the attempt count turned back to zero, but they have to login using their default password again.

Default password will be used when the account is newly created or has been reset due to many failed attempts. The system will force the user to change their password if the account is still using default password while needing to retrieve an activation code sent to their email address associated with the account. Requiring the activation code provides an extra layer of security in case another malicious user is trying to access an account with default password. It can also authenticate the person using the account is indeed the intended person.

The system is being hosted online by InfinityFree. InfinityFree is a free PHP web hosting service that is available to use. Through the web hosting service, the system can be accessed using any devices that has a web browser with internet connection. It is very convenient and easy to access only through a universal resource locator (URL).

3.5 Object-oriented Testing Phase

The fifth and final phase of OOSD is the testing phase. In this phase, two types of testing are done which are functional testing and browser compatibility testing. Additionally, ad-hoc testing is done throughout the system implementation process to reduce the number of defects during the actual testing phase. This testing allows any bugs to be identified prematurely so that it can be dealt with quickly before it creates further issues when more functionalities are being added.

Functional testing is done to test for the functionalities of the system. The test is done to see if the system behaves as expected and achieve the project objective and scope. Additionally, browser compatibility testing is done to test the system used on different web browsers. Since the Online Sales and Purchase System is a web-based system, it should be able to work on different web browsers.

4. Results and Discussion

This section discusses about the testing results obtained in the testing phase. Testing is essential to ensure the system achieves its objectives and scopes. Testing is also important to identify any bugs or errors that are not fixed.

4.1 Functional Testing

A test plan is developed to test the system for its functionalities. Table 4 shows the summary of functional testing results of login function. Table 5 shows the summary of functional testing results of product purchase order function. Table 6 show the summary of functional testing results of change password function.

Table 4: Functional Testing Results for Login

No	Test	Expected Result	Result
i.	Display proper input fields	Display username and password input fields with 'Login' and 'Reset' button	Success
ii.	User leave blank fields	Display Error Message	Success
iii.	User use non-existent username	Shows invalid username and password message	Success
iv.	User use wrong username or password	Shows invalid username and password message	Success
v.	User use correct username and password	Login successful	Success
vi.	User access account that uses default password	Shows message that prompts user to change password and redirect to change password page	Success
vii.	User access account that has been disabled	Shows account has been locked message	Success

Table 4: (cont.)

	Test	Expected Results	Result
viii.	User clicks on Reset button	Clears all fields	Success
ix.	User access account that has too many failed login attempts	Shows account has been locked message	Success

Table 5: Functional Testing Results for Product Purchase Order

No	Test	Expected Results	Result
i.	User do not select any client type	Display error message	Success
ii.	User select new client	Shows form to record client information	Success
iii.	User select old client	Shows a drop-down list containing all existing client names	Success
iv.	User select new client and leaves any field blank	Shows invalid client information message	Success
v.	User select new client and fill in all information	Client add successful and redirect to another page to select products	Success
vi.	User select old client and choose one client	Client select successful and redirect to another page to select products	Success
vii.	User add any product	Selected products shown in a table and available count decreases	Success
viii.	User add any product with zero quantity	Shows error message where selected product cannot be less than 1	Success
ix.	User add any product already selected	Shows error message where product is already existing	Success
x.	User select update selected product	Redirects user to another update page	Success
xi.	User delete selected product	Removes the product from selected product and increase the quantity back into available	Success
xii.	User select reset selected products	Removes all selected products and increase the quantity back into available	Success
xiii.	User select confirm purchase order	Show success message and redirects user back to purchase order page	Success

Table 6: Functional Testing Results for Change Password

No	Test	Expected Result	Result
i.	User login with default password	Shows change password message and redirect to change password page	Success
ii.	User leave blank fields	Display error message	Success
iii.	User inputs wrong old password	Shows invalid password message and redirects back to login page	Success
iv.	User input weak new password	Display error message	Success
v.	User input new password different from confirm password	Shows invalid password message and redirects back to login page	Success
vi.	User input wrong activation code	Shows invalid activation code message and redirects back to login page	Success

Table 6: (cont.)

No	Test	Expected Results	Result
viii.	User input new password as default password	Shows invalid message and redirects back to login page	Success
ix.	User input correctly	Shows successful message and returns to login page	Success
x.	Check login credentials in database	Shows hash value of password in database	Success

As shown in the tables above, functional testing was done on three important modules such as login, purchase order, and change password. The functional testing had shown positive results. All of the test cases were successful. The successful functional testing means that the system can function properly without any issues.

4.2 Browser Compatibility Testing

Browser compatibility testing is done by accessing the Online Sales and Purchase System for Care Technology Enterprise using different web browsers. Table 7 shows the summary of browser compatibility testing.

Table 7: Browser Compatibility Testing Results

No	Test	Expected Results	Result
1	Access the system using Google Chrome	System displays as designed originally	Success
2	Access the system using Firefox	System displays as designed originally	Success
3	Access the system using Microsoft Edge	System displays as designed originally	Success

As shown in Table 7, browser compatibility testing was done on three popular web browsers. The browsers tested were Google Chrome, Firefox, and Microsoft Edge. The testing had also shown positive results. The system can be accessed from all three tested web browsers without any issues. The positive testing result means that users can have the flexibility of using any of the three browsers to access the system without any issues.

5. Conclusion

The project had successfully achieved all of the objectives which are to design and develop a Web-based Sales and Purchase System for Care Technology Enterprise and test the developed system as well. The system developed had successfully helped the company to improve their management of sales and purchase information by processing them and storing them in databases. Also, the system also quickly updates the inventory information to provide accurate and up-to-date data.

The developed system uses password authentication to access the system. For first time users or users with locked account, one-time password (OTP) will be needed as an extra layer of verification. The OTP will be sent to the email account associated with the registered account.

Although the system achieved all of the objectives, there are still several limitations. One of the limitations is that the system can only be accessed when there is a working internet connection and a working device that has a web browser. Any internet or power outage may cause the system to be inaccessible at all. Next, the aesthetics of the system is designed solely based on the size of computer screens. Therefore, accessing the system using mobile devices may show disproportioned display which makes the system looks weird.

Improvements can be made to solve the limitations mentioned. Additional codes can be implemented so that the system can detect the device used to access the system and adjust its display proportion accordingly. It can greatly enhance the user experience when using the system in more device types.

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