Applied Information Technology And Computer Science Vol. 5 No. 1 (2024) 887-904

AITCS

Homepage: http://publisher.uthm.edu.my/periodicals/index.php/aitcs
e-ISSN :2773-5141

PH Sai Udayam Management System for PH Sai Udayam Shop

Sathiswaran Muthaiah[1], **Rabatul Aduni Sulaiman**[1]*

[1]Fakulti Sains Komputer dan Teknologi Maklumat,
Universiti Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat, 86400, MALAYSIA

DOI: https://doi.org/10.30880/aitcs.2024.05.01.050
Received 24 June 2023; Accepted 17 June 2024; Available online 30 August 2024

Abstract: The PH Sai Udayam Shop, a grocery store acting as a middleman between suppliers and consumers, faced internal challenges in managing its daily operations. To address these issues, a system was developed to streamline the overall functioning of the shop. The system enables administrators to efficiently handle product information, generate reports, and record supplier transactions. For staff members, the system assists in conducting sales activities, generating purchase invoices, and fulfilling online delivery orders. As for customers, they can browse the product list and place delivery orders. The system was created using Visual Studio and PHP, employing a prototype-based methodology and object-oriented approach. Its primary objective is to enhance the management of PH Sai Udayam Shop by organizing operational data and maintaining comprehensive records of shop activities in a database. By leveraging this system, the shop aims to improve efficiency and optimize its operations.

Keywords: *Grocery Shop, Database, Management system*

1. Introduction

A grocery shop is defined as a shop that sells food and small things that are often needed in homes. Grocery Shop offers consumers a variety of products for their daily necessities by being the connector between the supplier and consumers[1]. Its due to the influence on the economy, its role in distribution, and its interaction with companies that offer goods and services to consumers for their use or resale, grocery shops are an essential topic to research. It comprises all business activities related to selling products and services to customers for their personal, family, or household use. This can include sales of everything from households to dry foods to drinks to bill-paying service providers. The final phase of the distribution route is retailing. Shop management refers to the many procedures that enable customers to purchase the necessary goods from shop establishments for their intended uses. All the actions necessary to attract customers to the store and meet their shopping demands are included in shop management. Shop management guarantees that clients can quickly find the goods they want and that they go home happy. Shop management involves effectively overseeing all of the tasks required to make vendors' goods and services available to clients for their own or family's consumption. All business-related tasks are included in it, including generating funds, purchasing goods and services,

*Corresponding author: rabatul@uthm.edu.my

implementing accounting and management information systems inventory operations, creating new products, and marketing. Shop management is the term used to describe all these tasks in the industry.

The entire project's goal is to provide PH Sai Udayam (PSU) business with a management system that would allow them to keep accurate financial records, which will help them improve sales and, ultimately, profits for the shop. In addition, the project has the right to be developed with a web-based management system and an online ordering system. The system is now ready to undergo user acceptability testing to ensure that it functions properly.

PH Sai Udayam (PHSU) is a Grocery Shop that offers consumers a variety of products for their daily necessities by being the connector between the supplier and consumers. The shop is owned by Pugalenthi Rajah A/L Muthaiah who's running the shop with his shop assistant. As for now, they still depend on the manual way of conducting the sales in their shop which is calculating the price based on the price tag of each product via a calculator. The shop also offers two kinds of payment methods which is cash payment and Quick Response (QR) pay which involves Touch n Go (TnG) e-wallet and DuitNow. They need the management system to eliminate and reduce the hardship faced by the current method of conduct. Hence the PHSU Management System is going to help carry out operations smoothly and effectively.

In details, PHSU Management System helps to and keep track of their sales and review back the profits made, manage the stocks, order new stocks and manage the invoices, create login id for new staff for the cashier system, manage to close for each day, creating a membership for new customer. As for the staff, they can ease their work of sales by changing to a cashier system which will help to record each sale made and give out official receipts to the customers. The system will reduce as many as possible errors while entering records of data. The system will be user-friendly as no formal knowledge is needed to utilize the system completely. The PHSU Management System offers a secure, reliable, and fast management system by assisting users to concentrate on their other activities rather than focusing on record keeping. Thus, with this smooth and reliable management order, the sales of the shop could be increased over time.

2. Related Work

PHSU Shop offers daily necessities for consumers by endorsing itself as the middleman between supplier and end user. The operation of the shop starts off with checking stock from the shelves in the shop which is carried out by the shop staff. After the collection of data, the administrator will order new stocks for products which are low in stock. The supplier then takes the order from administrator via WhatsApp or Phone call. Later, the ordered item will be delivered to the shop along with invoice and Delivery Order (DO). Once the stock arrives the staff cross-check items and produces the invoice to an administrator for calculating the selling price of each item. Once the price is determined, staff arrange products on the shelf.

Once the consumer wants to purchase goods, a displayed product is chosen, and staff will calculate the total amount purchased using a calculator based on price tags on product packaging. Receipt of purchase is only issued upon asked by the customer via receipt book. Since the product price is determined by price tag sometimes when certain products do not have a price tag, price of product will be determined simply by either the admin or staff if the admin is not around. Thus, product prices would vary depending on the people who conducted the sales operation in the shop. Hence, customers will be very varied to buy again from the shop since the price is inconsistent every time even same person is in charge.

Management System refers to the ability of the system to store its records and be able to be maintained and manipulated by the management of an organization by complying with their objectives[1]. The system eases the workflow of the organization by organizing its structure and processes to act systematically and ensure smooth processes and achieve planned results. The

management system is very crucial to sort the overall operation of PHSU shop to run smoothly and boost sales on a daily basis.

Looking at how operations are now implemented in PHSU Shop, web-based technologies and databases are required to enhance the current processes. This is particularly true for the processes used to store, manage, and analyze data related to shop operations. Organizations will be able to manage their staff, products, business operations and online orders thanks to PHSU Management System. Additionally, three comparable systems were researched and contrasted with the suggested system. The findings of this study are crucial for identifying the positive attributes that can be included in a new system.

For the comparison three different systems have been chosen which are StoreHub, IRS POS System and Xilnex. StoreHub offers real-time sales performance data, such as current sales, overall transactions, sold goods, and members. Users may quickly view daily sales with the help of this tool. Inventory management, producing invoices and quotes, producing sales reports, calculating staff commissions, multi-store capabilities, low-stock alerts, and Customer Relationship Management (CRM) are all included in the IRS POS System. Xilnex facilitates inventory organization by enabling users to categorize various goods and services using pre-columned forms. Users may also make additional lists, like a vendor's list, enabling direct contact when it comes to refilling things. The comparative material for each system that was chosen for investigation and comparison with the suggested system is shown in the table below.

Table 1: Comparison with Existing System's

System / Features	Storehub	IRS Retail POS	Xilnex	Proposed
Users	Admin, Staff	Admin, Staff	Admin, Staff	Admin, Staff, Customer
Manage Product	Yes	Yes	Yes	Yes
Manage Supplier	Yes	Yes	Yes	Yes
Manage Staff	Yes	Yes	Yes	Yes
Reports	Yes	Yes	Yes	Yes
Online Order	No	No	No	Yes
Alert on low product Sock	Yes	No	Yes	Yes

3. Methodology/Framework

A prototype model is a type of software development model that consists of multiple stages in the prototype versions that are provided for customer evaluation to determine whether the need has been met. As soon as the prototype met the criteria, it was modified with new features to create the finished product [2]. This model was selected for the project since prototype models under System development lifecycle (SLDC) are required to meet the needs of the client. Starting off with Planning, Analysis, Design phases, implementation, and testing are the first stages of the prototyping paradigm. Each phase has been thoroughly carried out to gather necessary requirements and resources until a prototype was finally built.

Functional and nonfunctional requirements are the two categories into which the level of requirements details can be divided [3]. A system's functional need is a primary fundamental action or

feature that is necessary to support the primary driving system operations. Non-functional requirements are those that don't directly relate to the operation of the system as a whole [4]. While Table 2 lists the functional requirements in accordance with the research scenario.

Table 2: Functional Requirements.

No	Module	Description
1.	Log In	• The system should allow the user to register a new account. • The system should allow users to log into the system using a registered username and password. • The system should display an error message if the username and password are invalid. • The system should take the user to the home page after successfully logging in.
2.	Register	• The system should allow customers to register accounts. • The system should display an error message if it has an invalid input. • The system should display a message registration has been successful. • The system should allow the admin to register staff. • The system should display an error message if it has an invalid input. • The system should display a message registration has been a success.
3.	Manage user profile	• The system should allow the user to view account information. • The system should allow users to edit account information. • The username for each account must be unique. • If the username is already taken prompt error message.
4.	Manage products	• The system should allow the admin to view the products list. • The system should allow the admin to add, delete, edit, and update products and details. • The system should prompt an error message once a product is saved without full detail in forms. • The system shall prompt reminders if a certain batch of product expires in two weeks. • The system shall prompt reminders if a certain product is about to run out of stock. • The system shall allow the admin to add products in PO.
5.	Manage Supplier	• The system should allow the admin to store information about the Supplier. • The system shall allow the admin to generate PO based on the supplier. • The system should allow the admin to upload the Invoice, Credit Note and payment receipt to the specific Supplier. • The system also shall allow the admin to view the uploaded document and print it out whenever needed.
6.	Manage sales	• The system allows staff to input the barcode of the product into the system. • The system shall display the item detail with the price of products input. • The system shall allow administrator-level password to void a product, hold a transaction, recall a transaction, cancel the

		transaction, perform a refund, perform a return, or reprint the receipt. • The system should allow the supervisor to update the refund and return details.
7.	Assign Payment	• The system shows the total amount. • The system should allow staff to assign payment methods based on customer preference. • The system should allow staff to input the cash received and show the balance should give out. • The system shows the receipt of the purchase to the customer. • The system should allow customers to scan the QR to perform QR Pay. • The system shall allow staff to print out receipt after successful payment.
8.	Manage Online Orders	• The system shall allow customers to browse the products and place orders. • The system shall allow the customer to choose a payment method either cash or online transfer. • The system shall allow the admin to view the orders placed. • The system shall allow the admin to complete the order once the order has been delivered successfully.
9.	View reports	• The system should generate a report for the administrator to view. • The system should display an error message if the report cannot be generated. • The system should allow the administrator to view the report information. • The system should allow the administrator to print out the report.

Table 3: Non-functional requirements.

No	Requirement	Description
1.	System Performance	• System can be used anytime anywhere with an internet connection.
2.	System operation	• System response time is no more than 10 seconds. • The system must be user-friendly. • The system must be easy to maintain and update. • The system must be usable on any web browser.
3.	Security	• Users can only access their accounts by entering a valid username and password. • The password must not be less than eight characters with a combination of alphabets and numbers.

Table 3 relates the non-functional requirements that are needed for the execution of the system. The system's functionality, ease of use, and security features are what make it important. It guarantees a speedy response time and provides anytime, everywhere access with an internet connection. It is adaptable to any web browser, user-friendly, and simple to maintain and update. Accounts with restrictions and password protection are security measures. Together, these functions provide users with a dependable, effective, and secure experience.

Table 4: User Requirements.

No	Requirement
1.	To log in, all users must be able to input a username and password.
2.	Online registration for customers should be possible.
3.	Customers should be able to select the products offered.
4.	Customers should be allowed to view payment receipts.
5.	Customers should be able to view the product price once staff inputs product barcode.
6.	Customers able to receive proof of purchase via Receipt.
7.	Staff able to assign payment methods upon customer preference.
8.	Admin able to hold, recall, void transaction, perform a refund, perform a return, reprint receipt via admin level password.
11.	Admin can manage products and stocks in store.
12.	Admin place PO for products.
13.	Admin able to store documents based on the supplier.
14.	Admin able to manage supplier information.
15.	Admin able to view the generated report information.
16.	Admin able to print generated report.
17.	Admin manages staff information and staff account.

To identify and compile a list of user needs, user requirement analysis is crucial. The features or settings that will support system functioning may be described in the requirements section. The criteria could relate to function mapping, usability, or organization [5]. Table 4 contains a list of user needs. These are the features that consumers are expected to have.

Use Case Diagram is a system analysis approach used to define, clarify, and organize system requirements. Use Case diagram also describes the interplay between the system's internal parts[6]. A Use Case Diagram will be used to depict the actions involved in information management at PH Sai Udayam Shop. Administrators, supervisors, staff, and customers are among those who use this system. All users will have access to the system's many modules. The Use Case Diagram for the proposed system that would handle information at the PHSU Shop is present in **Appendix A**.

A class diagram is a type of Unified Modeling Language (UML) diagram that shows the structure of a system in terms of classes, methods, characteristics, and interactions between distinct classes. The class diagram for the PHSU Shop Management System is presented in **Appendix B**.

The proposed model, also known as the To-Be Model, is a procedure that will be employed in the future for the proposed system. This model improves on the previous model utilized at the PH Sai Udayam Shop. Existing information management methods will be enhanced to increase the quality of productive labor. Figure 3 depicts the Proposed Model or To-Be Model for the sales process . Figure 4 depicts the To-Be Model for product delivery process.

The model To-Be for Sales Process depicts the overall process from ordering stock from supplier to delivering the goods for purchase of customer. The admin will start off by entering product details or update information of product into system followed by customer choosing goods from the shop and checkout which is carried out by the staff and completed with a receipt of purchase.

The model To-Be for product delivery starts off with customer places online. The module is implemented since as a result, this system improves the efficiency and uniformity of taking customer orders. It offers a better platform for communication. Information about the user is electronically recorded [6].

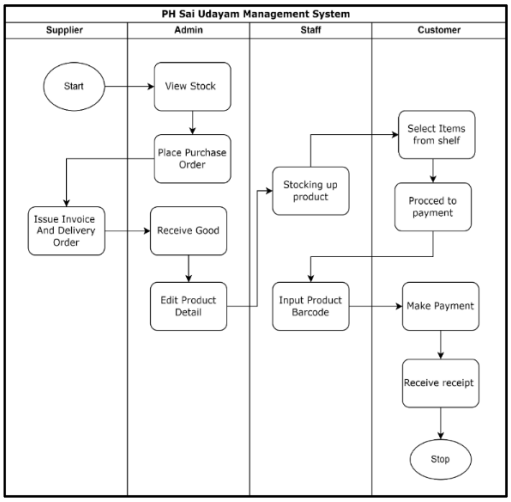


Figure 1: Model To-Be Sales Process

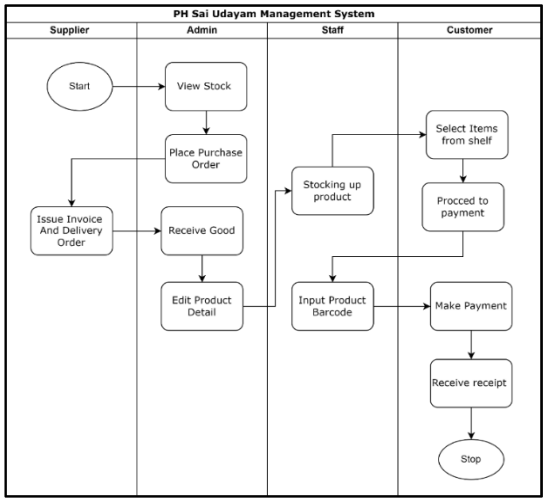


Figure 2: Model To-Be Product Delivery

To design an efficient system, system architecture must be determined. System architecture comprises principles guiding the system's organization and evolution and includes architecture decisions made upon system development and evolution [7]. PH Sai Udayam Management System is a computerized system that provides users with a dynamic website. It allows activities to routinely add, update, remove, and manage data in the PHSU Shop. Users can use this system to access the data contained in the database. They can use a web browser and customer mobile based website to access the system and handle data in accordance with their duties. The system architecture for this project is depicted in Figure 3.

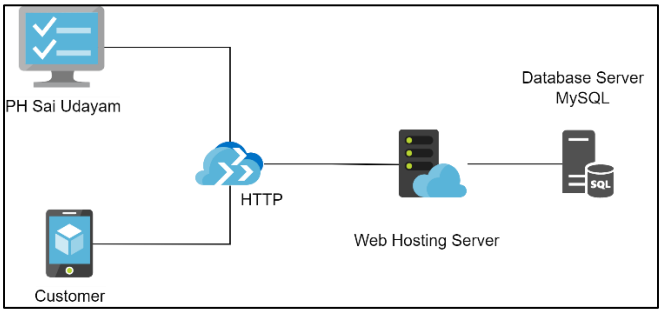


Figure 3: System Architecture

Eight tables make up the data schema, and each table represents a different system entity. In conclusion, the data schema has tables for managing administrators, employees, customers, goods, sales, receipts, and online orders. These tables make it easier to store and retrieve information about these entities, which makes it possible to manage the system's operations and transactions effectively.

```
i. Admin (admin_id, admin_username, admin_password, admin_email)
ii.Staff (staff_id, staff_username, staff_password,
staff_email,staff_number, staff_address)
iii. Customer (customer _id, customer _username, customer _password,
customer_email, customer_number, customer_address)
iv. Supplier (supplier_id, supplier_name, supplier_number,
supplier_email, supplier_address)
v. Product (product_id, product_name, product_category, product_price,
product_quantity, product_img)
vi. Receipt (invoice_id, product_id, product_name, product_price, total)
vii. Sales (sales_id, invoice_id)
viii. Online Order (order_id, product_id, product_name, product_price,
quantity, total)
```

The interface for the system in this project is designed according to user needs. A user-friendly system interface will facilitate interaction between users and the system at the PH Sai Udayam Shop. Figure 4 shows the login interface that allows users to access the system. Figure 5 shows the login interface for customers in the online order system. From the admin login interface, the staff able to redirect to staff login, using user-based access control (UAC). Users who attempt to access resources that are not authorized may also be found by access control. In terms of computer security, it is a mechanism that is crucial for protection [8].

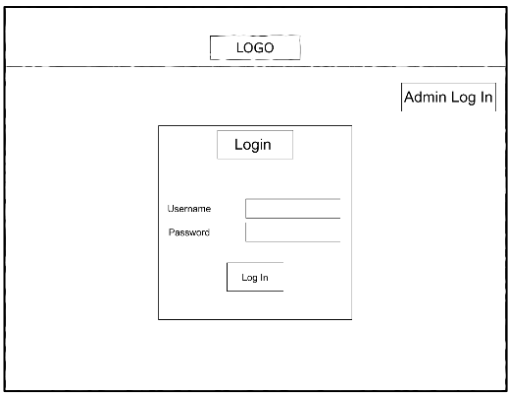


Figure 4: Staff Login Interface

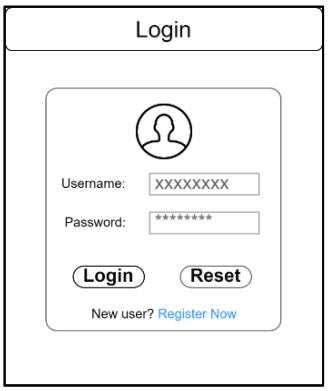


Figure 5: Customer Login Interface Design

Figure 6 depicts the register module for the customer as the user, here user have key in the necessary details in the registration form to make a successful login into system. Figure 7 drafts out the landing page or the main page of online ordering system for PH Sai Udayam which are customer as the user the product page will allow user to add them into shopping cart and carry out purchase from the shop.

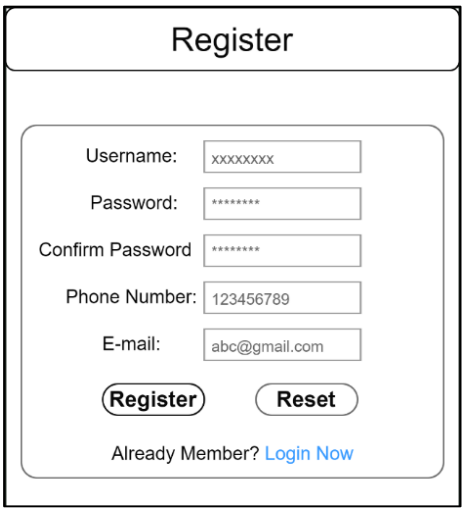


Figure 6: Customer Register Interface Design

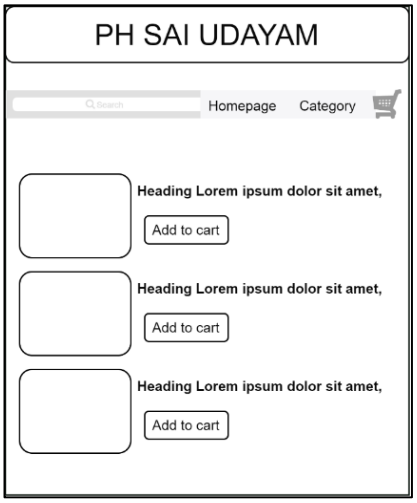


Figure 7: Customer Product Page Interface

Figure 8 depicts the administrator part of the system which is focused on the product page. The administrator will be able to add a new product registry and update the existing product details. The admin will be privileged to delete any product detail from the database and system. Figure 9 depicts the interface for staff to carry out the daily sales process. The staff will be key in product barcode to display product details and will be able to checkout from the system. The module will provide customers with a receipt of purchase for successful payment. Figure 10 depicts the wireframe layout for the manage online where it handles the update of new order incoming with the details of purchase and the list of items purchased. The admin will be able to assign the progress of order and update the status to customer.

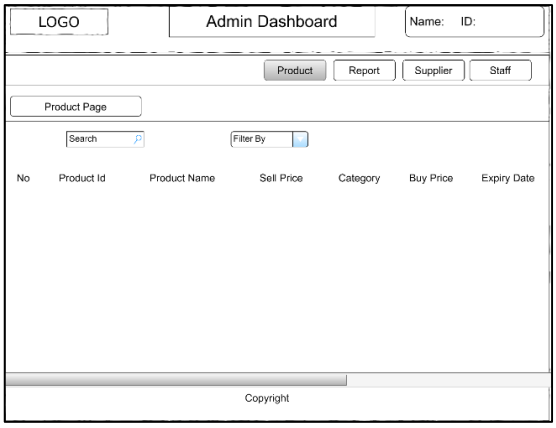


Figure 8: Administrator Product Page Interface

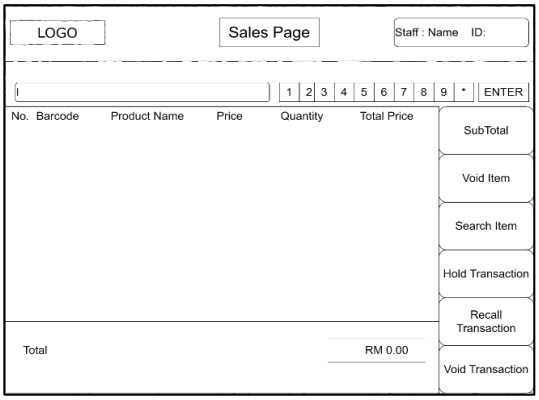


Figure 9: Staff Sales Page Interface

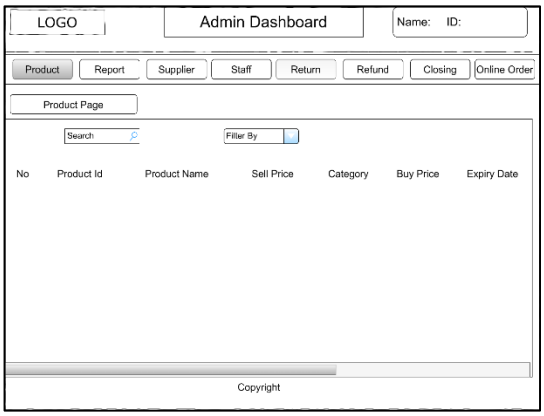


Figure 10: Administrator Online Order Interface Design

4. Result and Discussion

The section will discuss how the system been created from the wireframe sketch above. For the implementation of the overall system HTML and CSS have been the vital language along with PHP and JavaScript to implement the overall functionality and layout for the system.

4.1 Module Implementation

4.1.1 Login and Account Register Module

Common users which admin and staff are the two different types of users in this system. Options for login and registration are available on the system's home page via user access control (UAC). User control access refers to users' consents must be obtained for the following: the definition of a specific purpose, the collection of data, the regulation of access to personal data, and the preservation of users' unlikability across service and identity providers [9]. The user interface has been designed to be intuitive and straightforward to use. When a user clicks the "Admin Login" button on the system's home page, the admin will be redirected to the admin login page and for staff its vice versa. The user must input their email and password to gain access to the system and perform their responsibility for the shop. For the implementation of validating login credential a *SELECT* query is implemented to fetch the data

from the database table to compare and validate. Figure 11 shows the User Interface (UI) for admin login and Figure 12, depicts the code implementation for the validation.

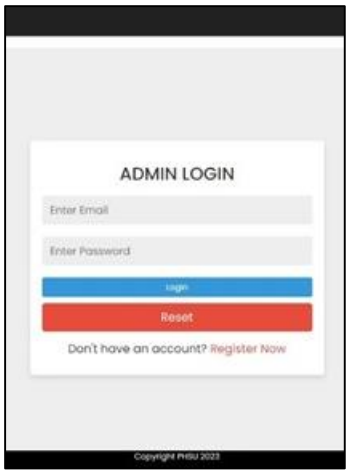


Figure 11: Admin Login UI

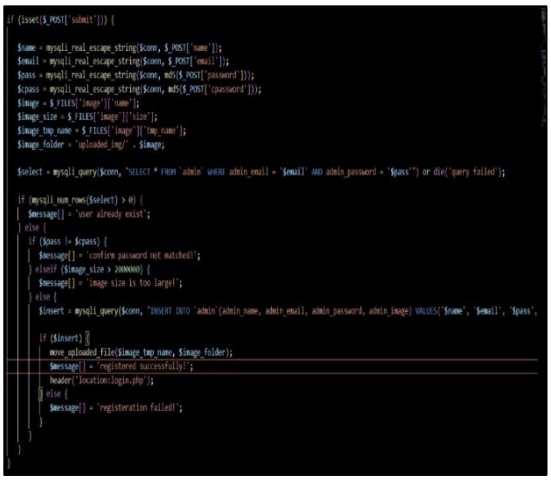


Figure 12: Code to execute validation for login.

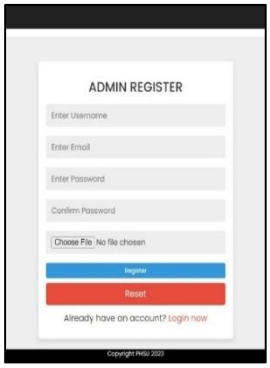


Figure 13: Admin Register UI

Figure 14: Code to execute validation for register.

Registration modal for new user (Admin) is depicted in Figure 13 while Figure 14 shows how the data of user is stored where *md5* password hashing and the input validation has been implied to prevent SQL Injection. The data of the administrator details and information is also stored with *mysqlirealstring()* method which enables extra protection to the administrator details protection and prevents any SQL injection from any hackers. SQL injection refers to statements that will serve as an inline view and replace each instance of the table that needs to be protected [10].

4.1.2 Manage Profile Module

For the manage profile there are two users involved, one is the customer for and for admin where they able to update the details such as their name, email address, contact and more. For customers they were able to edit every detail specifically. Figure 15 shows the implementation where it uses *SET* query to update the user information on the update profile and Figure 16 shows the layout used for customers to update their information.

Figure 15: Source to achieve manage profile.

Figure 16: Manage Customer User Interface.

4.1.3 Manage Product Module

Admin able to make amendments to the product details and make new registry for new products. The product details will be updated in the database by using *UPDATE* SQL query meanwhile for inserting new product data and deleting product data will be using *INSERT* and *DELETE* query to perform individual action. Figure 17 depicts the product inventory where the products are shown in the table. Figure 18 shows the picture of how the product has been displayed.

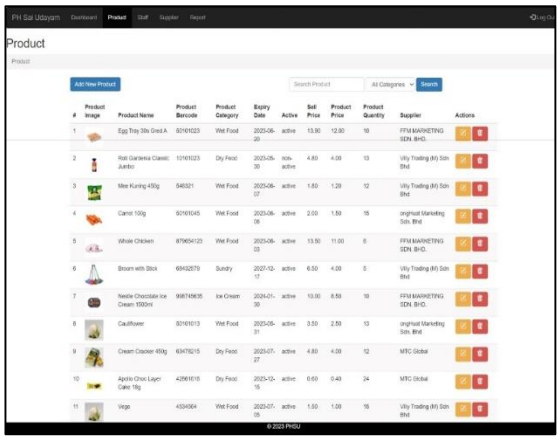


Figure 17: Product Table UI

Figure 18: Implementation of product table

Figure 19 shows the Update product detail and the source of the implemented part in Figure 20**.** The figure is represented to showcase that admin able to make changes to each respective product and the source code suggests that it uses the *UPDATE* query to mark the change in the database. The *UPDATE* query enables users to make amendments to the existing product details like change the cost price, selling price and quantity once new order been received from the supplier. On the same page, admin is privileged with functionality of deleting any registry of product form the system if the product is not valid for current market or not available selling purpose. Before executing the *DELETE*, function user will need to confirm selection via a confirmation box before executing the query.

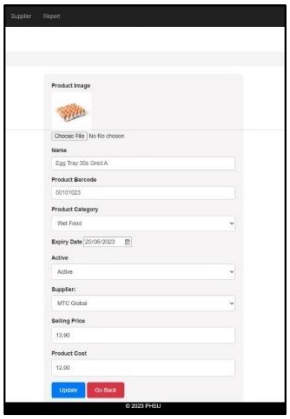


Figure 19: Update Product UI

Figure 20: Source code for update Product

4.1.4 Manage Supplier Module

Admin will be able to view the information of individual suppliers and make changes to their information from the supplier table. In the same module the admin is able to edit or delete the supplier information. The user will be able to view the dashboard for supplier information to view the invoices and purchase order store for the corresponding supplier. Figure 21 suggests the layout for admin information, Figure 22 portrays the source code for managing supplier information. Figure 23 portrays the layout for PO generation, Figure 24 shows the code implementation using FPDF extension to generate the PDF file.

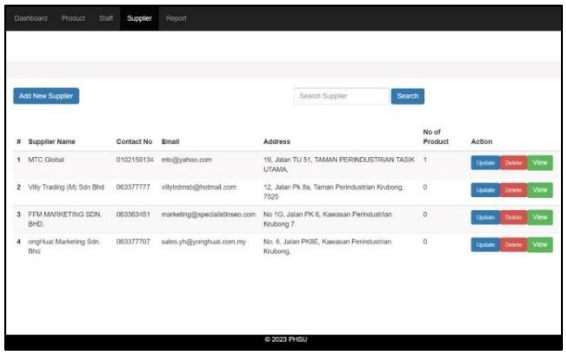


Figure 21: Tab to suppliers' information.

Figure 22: Source code to manage supplier details.

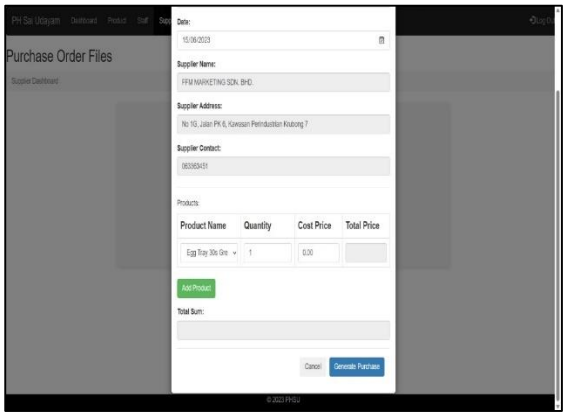


Figure 23: Layout for generate PO.

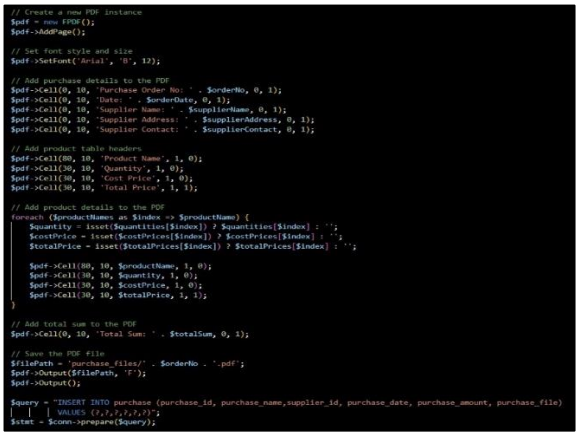


Figure 24: Code snippet for generate PO.

4.1.5 Manage Sales and Assign Payment Module.

The sales module allows users to carry out the sale process by inputting the barcode for the product and it will display the product information in the sales table. Once the all the product been inputted user proceed to payment and assign the method of payment chosen by customer. The query is implemented by using Ajax JSON to parse the data and input it inside the database. Figure 25 shows the layout for sales process in the system followed by the source code in Figure 26. Figure 27 assures the layout for assign payment method. Figure 28 depicts the source for the assign payment method. The layout for assign payment method was induced with JavaScript function to show modal and input amount of money for the cash payment and show thank you message for non-cash payment method.

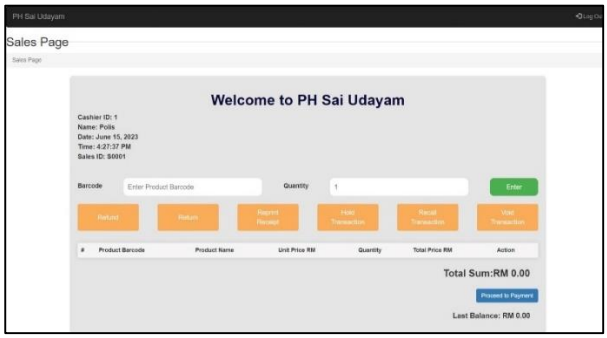


Figure 25: Sales process layout

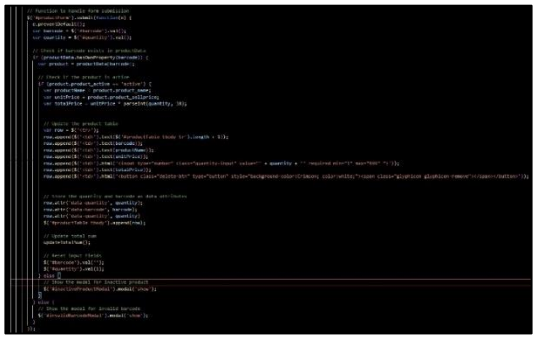


Figure 26: Sales process implementation code.

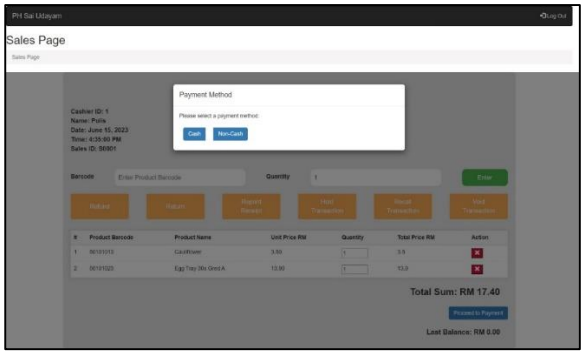


Figure 27: Assign payment method UI

Figure 28: Code implementation for assign payment

4.1.6 Manage Online Order Module

The customer can view the status of the online order placed in the manage order tab in the system Figure 29 shows the layout for managing order customer side and the source code the implementation where SELECT query is used to retrieve the data in Figure 30.

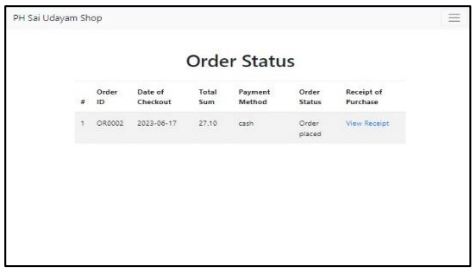


Figure 29: Order Status UI Customer

Figure 30: Order Status Implementation code.

4.1.7 View Report Module

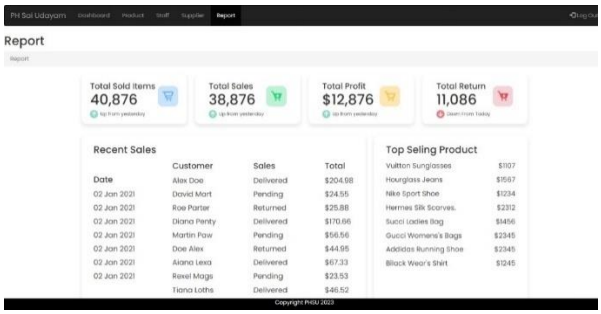


Figure 31: View Report Layout.

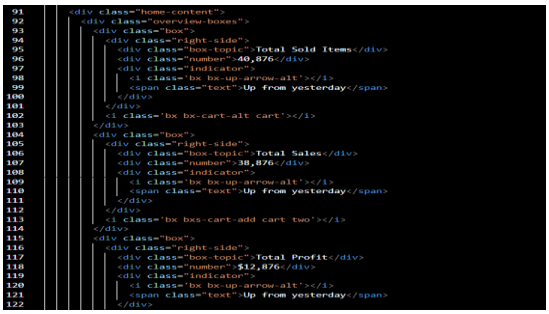


Figure 32: Source code for view report.

Figure 31 introduces the layout for the view report in the admin part of the layout. The user able to view the information on the view report. The module helps the user to print the details and make hard copies to use as analytical study in the hope of boosting the shop's performance and all. The source code for the implementation is presented in Figure 32.

4.2 Testing

Each module's functioning will be tested in this part to determine its usability. To conduct testing, a User Acceptance Test (UAT) methodology is used. The confirmation through testing that the delivered system satisfies all requirements, operates in accordance with design specifications, and meets the needs of all business, technical, and management stakeholders is known as user acceptance [11]. A UAT technique is used to test if the PH Sai Udayam Management System meets with the software requirement specification (SRS) and whether users find it easy to use and understand. Requirement engineering requires effective tools and techniques for the documentation of customer needs from the source specifications in a modelling environment for allocating them to architectural elements which complies to make sure it satisfies the SRS [12]. The primary objective of UAT is to confirm that the programme meets the user's requirements and expectations. This testing is often done by end-user representatives, replicating actual situations to ensure the system functions as intended. The tests primarily focus on the user interface, functionality, and usability of the system. Any issues, mistakes, or weaknesses that might negatively impact the user experience are discovered utilising the UAT outcomes. Table 5 presents all the test result achieved and indicating whether the test case for each module is passed or fail. There are a total of 17 test cases which includes 23 tests done to make sure system's main features are functioning as intended.

Table 5: Test Case Result for PH Sai Udayam Management System

Summarization (Test Design for PH Sai Udayam Management System)		
Main Features	Total Number of Test Cases	Pass / Fail
Login and Account Registration Module	5	Pass
Manage Product Module	3	Pass
Manage Profile Module	3	Pass
Manage Supplier Module	3	Pass
Manage Sales Module and Assign Payment Module	5	Pass
Manage Online Order Module	3	Pass
View Report Module	3	Pass

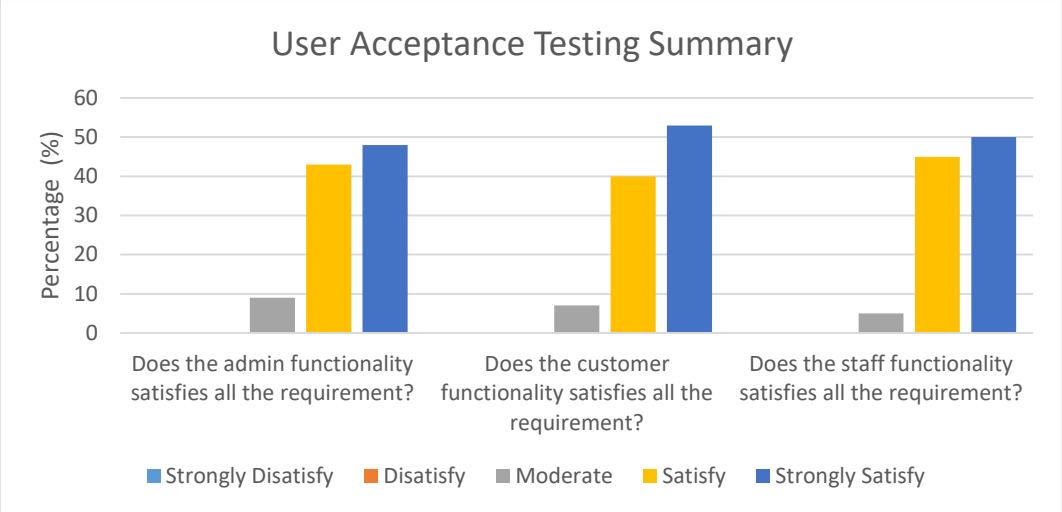


Figure 33: UAT Summary

Figure 33 describes that the UAT performed for PHSU Management system shows that the functionality based on the user role in the system previews the system been overall satisfies all the requirements and functionality works well. For the administrative functionality shows that overall, the user has been able to perform all the function as well as for the staff and customer modules.

5. Conclusion

In conclusion, this system was created for the management of PH SAI UDAYAM Shop. After analyzing the obstacles, they ran into during the daily operation of the shop, several modules were suggested and created as a solution. There are three different categories of users: administrator, staff, and customer. The product module, which enables administrators to create records in the database, will address the issue of manual way of managing stock in the shop. With the database's real information, they are also able to control the online delivery order in a more organized manner. In addition to the administrator can organize delivery orders, invoices, quotations, and credit notes, the database may also contain softcopy records of the payment bills to suppliers. Administrators can create and save invoices in the supplier tab as references after verifying the payment for ordered stocks.

Acknowledgement

The authors would like to thank the Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia for its support. The people in my family, whose love and wisdom are with me in everything I pursue, have been more significant to me in the pursuit of this project than anybody else. I would like to thank my siblings, who are the best role models. Most importantly, I would like to thank my Project Supervisor for her wonderful guidance and for always being there to correct me in accomplishing my project. Thank You DR Rabatul Aduni Binti Sulaiman, without your guidance the project would not be possible.

References

[1] G. Hanus, “CONSUMER BEHAVIOUR DURING ONLINE GROCERY SHOPPING.” *CBU International Conference Proceedings*, vol. 4, pp. 010-013, 2016, doi: 10.12955/cbup.v4.737.

[2] “Management system standards,” ISO, 25-Oct-2022. [Online]. [Accessed: 01-Nov-2022].

[3] Neha T (2020). Prototyping Model, Phases of Prototyping.

[4] Summers, J. D., Joshi, S., & Morkos, B. (2014, August). Requirements evolution: Relating functional and non-functional requirement change on student project success. In International

Design Engineering Technical Conferences and Computers and Information in Engineering Conference (Vol. 46346, p. V003T04A002). American Society of Mechanical Engineers.

[5] Alsaleh, S., & Haron, H. (2016). The Most Important Functional and Non-Functional Requirements of Knowledge Sharing System at Public Academic Institutions: A Case Study. Lecture Notes on Software Engineering, 4(2), 157.

[6] Gupta, T. (2020). Food Ordering Web Application for the Fitness freaks. *International Journal for Modern Trends in Science and Technology.*

[7] Maguire, M., & Bevan, N. (2002, August). User requirements analysis. In IFIP World Computer Congress, TC 13 (pp. 133-148). Springer, Boston, MA.

[8] Aleryani, A.Y., 2016. Comparative study between data flow diagram and use case diagram. International Journal of Scientific and Research Publications, 6(3), pp.124-126.

[9] Daoudagh, S., Marchetti, E., Savarino, V., Bernabé, J.B., García-Rodríguez, J., Moreno, R.T., Martínez, J.A., & Skarmeta, A.F. (2021). Data Protection by Design in the Context of Smart Cities: A Consent and Access Control Proposal. *Sensors (Basel, Switzerland), 21*.

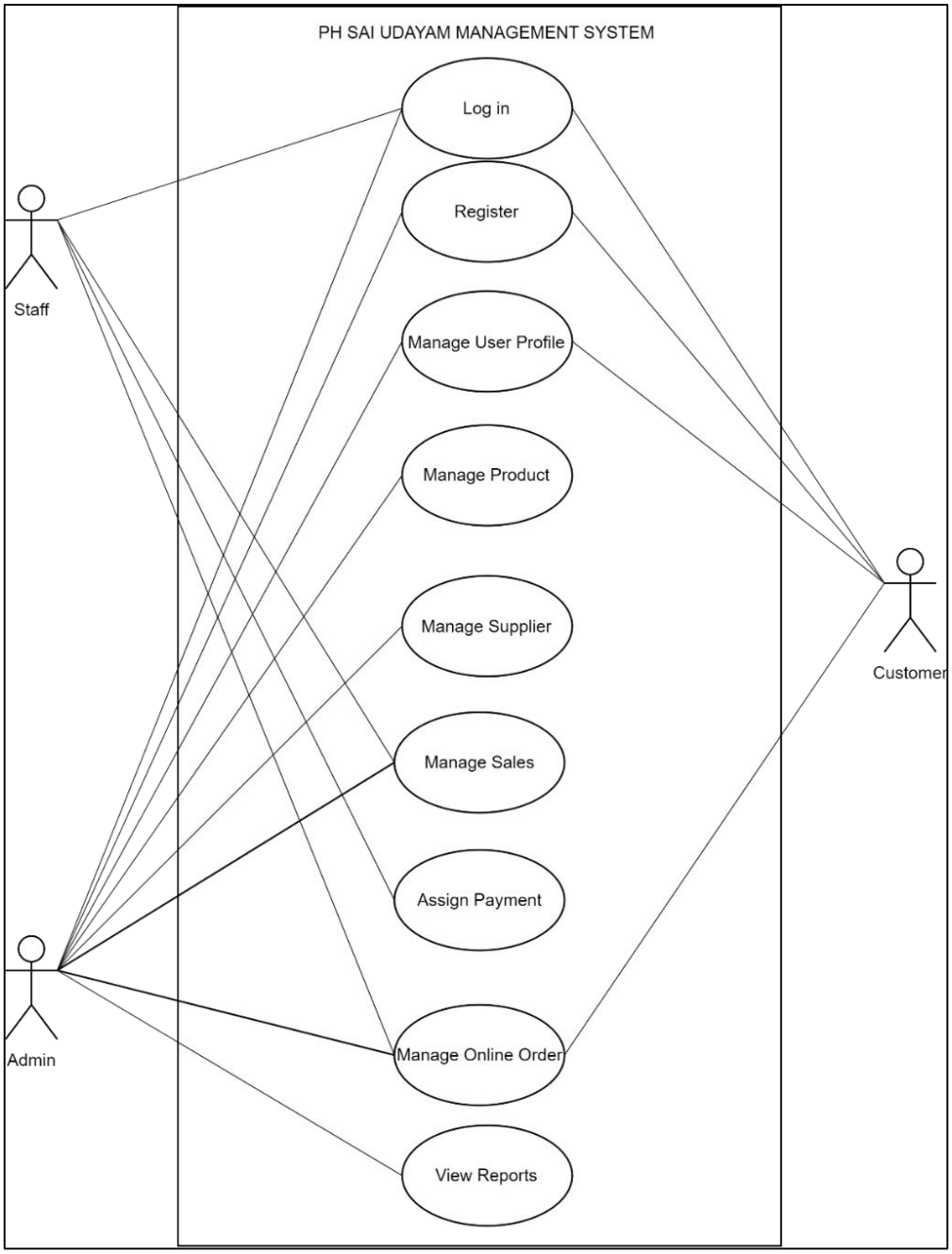
[10] Bruzzo, P. (2016). Inline Views: Protecting against SQL Injection Attacks while Providing Access to Aggregate Values.

[11] Pinto, A. (2021). Requirement Specification, Analysis and Verification for Autonomous Systems. *2021 58th ACM/IEEE Design Automation Conference (DAC)*, 1315-1318.

[12] Kit, E. (2020). Software Testing In Real World Edward Kit.

Appendix A

Use Case Diagram



Appendix B

Class Diagram