

Design and Development of a Web-based System for Ras Fragrance

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Abstract

The local perfume brands in Malaysia are getting recognition with their handcrafted and uniqueness of the products. The finest ingredients are being used carefully to create the scent that reflects the Malaysia's vibrant landscape and cultural. However, there are many local perfume brands that are still remain unknown including Ras Fragrance. The main objective of this project is to develop a system for Ras Fragrance that capable to help the customers find the suitable scents for them and afterwards perform the online purchasing of the perfume. Another features also include user registration, perfume purchasing management, secured payment, fragrance personalization, dashboard management, inventory management and educational content special made for perfume enthusiast. For the development of the project, prototype model which is the best fit for this web-based system. The technologies used in developing this project are PHP language, MySQL and Toyyibpay. This proposed system is fully-completed as it is expected to widen the brand widely in showcasing the product and helping in inventory management. The system also guarantee a smooth quiz perfume experience, a seamless shopping process and real-time synchronization with the inventory perfume updates.

1. Introduction

Nowadays, many local perfume brands in Malaysia becoming well-known for their superior and distinctive scents. Numerous local brands like SUKKA Perfume, Auphorie and BAFAMSN have been recognized for their distinctiveness and long-lasting scents. They are not only luxurious but also embody Malaysian craftsmanship and the culture. This makes the Malaysian became supportive to these brands due to their representative [1]. Unfortunately, there are many local artisans out there are still not being recognized. Ras Fragrance is one of the local perfume brands that faced the same problem. They lacking customers which is due to limited marketing resources. As they are low in recognition, they also struggle to make the name as customer more prefer stick to the famous brands. Not only that, they also handled the order manually leading to drop in sales and profits causes by missed orders and difficulty to keep the real-time records. Besides that, Ras Fragrance facing difficulty showcasing their products. They often rely on special events, local stores and word-of-mouth to promote their goods. The potential to gain the online customer is low as they missed this opportunity. Lastly, customer also find difficult to find ideal fragrances that fit with their taste [2]. The recommendation from others may be different for their preference making some people end up dislike the suggestion.

Therefore, this project is aim to develop a web-based system for Ras Fragrance having a platform by managing the products, adding e-commerce and quiz perfume to guide the customer to improve the quality of the brand. The features in the proposed system includes user registration, perfume purchasing management, secured

payment, fragrance personalization, dashboard management, inventory management and educational content related to perfume. Thus, the project is expected to enhanced visibility of Ras Fragrance to make the brand more recognizable to newcomers. Within this platform, it will act as a place for showcasing their products, stories and uniqueness in one place while promoting them so that customer will discover and aware with the brand. Then, it ensures a satisfying shopping experience that is easy to navigate, user-friendly and safe for payment which encourages repeat buying. Lastly, the proposed system added the inventory management that will maintain the ideal stock levels and quiz feature will assists customers in finding suitable scents based on their preferences.

The paper is organized into a few sections. The first section is the introduction to the project. Section 2 explains the related work such as the comparison with the existing system and the technology used while developing the project. Next, section 3 defines the methodology used during constructing the project to keep the flow is always aligned and organized. Then, for section 4, it explains the discussion regarding the analysis and design such as creating the flowchart, Context Diagram, Data Flow Management, Entity Relationship Diagram and related databases in the system. in section 5, it explains the implementation that has been made including testing the system. Lastly, the last section concludes the overall activities during developing the system and explain the future activity will be made after achieving the current outputs.

2. Related Work

This section provides a better understanding the web-based system for Ras Fragrance by analyzing the comparison between the existing system that similar to the proposed system and technology used while developing this project.

2.1 Study of the Existing Systems

The purpose of the studies is to evaluate the current system and develop an improved version for Ras Fragrance, a local perfume brand. A thorough comparison will easily recognize the strengths and weakness for both the current systems and the proposed system. The features and functionalities can be improved making it user-friendly and efficient to the new system. Hence, by offering a better system, it raises the customer satisfaction that led to positive comments, increased user engagement and loyalty. The three existing systems that are being studied are Noteworthy [3], Dossier [4] and Memo Paris [5].

Table 1 Comparison table between reviewed applications with the proposed system

System	Noteworthy	Dossier	Memo Paris	Proposed System
Features				
User Profile	Yes	Yes	Yes	Yes
Order History	Yes	Yes	Yes	Yes
Login and Register	Yes	Yes	Yes	Yes
Technology	Web-based	Web-based	Web-based	Web-based
Frag. Quiz	Yes	Yes	Yes	Yes
Quiz Result	Not shows suggested perfumes	Shows suggested perfumes	Not all options chosen generate the result	Shows suggested perfumes
Multiple Payment Methods	Yes	Yes	Yes	No
Shopping Cart Module	Yes	Yes	Yes	Yes
Educational Content	Yes	Yes	Yes	Yes
Languages	English	English	English and French	English

Based on Table 1, these are the features that have been evaluated focusing on user experience. User profile including order history, are present in all existing system and proposed system. Order history can be view in the user account. Same as login and registration, the modules are all available on all the websites as they are important part for user accounts. All the websites, including the proposed system, are web-based. Next, all the systems including proposed system have fragrance quiz that guide the user to find the suitable scents. However, for Noteworthy's quiz results are unclear and not giving perfume suggestions while Dossier provides the recommendation products based on quiz result. On the other hand, if user chooses an unmatched option, Memo Paris will not produce the results which limiting the selection of answers. Due to that case, the proposed system will produce clear recommendations, similar to Dossier, using decision tree rules. The shopping cart and educational content features are available in all websites including proposed system. Since all the websites and proposed system are having e-commerce, adding shopping cart in important. Lastly, all websites are in English, except for Memo Paris which targets French-speaking user and also offers French. The proposed system will use English, as it is widely understood as the second language in Malaysia.

2.2 Technology Used

For this project, a numerous of tools and software have been used to implement the system. The tools and software include the use of Hypertext Preprocessor (PHP) language, MySQL and Toyyibpay. PHP is an open-source scripting language that mainly use to create a HTML content as it functions as server-side scripting for dynamic content, command-line scripting and client-side Graphical User Interface (GUI) applications [6]. Due to popular demands, PHP compatible with all the operating systems, speed processing and easy to modify [7]. For phpMyAdmin, it is a user-friendly too for web development. It manages database operations such as creating, modifying and removing databases, tables and records. Next, MySQL also an open-source database system that is known for its incredible speed that being invented by Michael "Monty" in 1995 [8]. It became popular for faster and easy to use, supports the latest query language, capable of using multiple databases simultaneously, supports almost all programming languages, can be access everywhere on the internet and use Secure Sockets Layer (SSL) for security [9]. In developing web application, MySQL is an ideal choice in terms of capable to support large-scale applications with high transaction rates. It also works on most of the operating system such as Windows, Linux and macOS. Moreover, Toyyibpay tools which a payment solution that help companies to manage cash flow, automate payouts and efficiently collect payments. It supports payment methods such FPX for local usage in Malaysia. Toyyibpay is known for its user-friendly interface, strong security and seamless integration. Not only that, it also saves the card details securely for user plus its faster transactions.

2.3 Decision Tree Rule

A decision tree rule is used to produce the generate the quiz result on the proposed system. It is a structured of the decision-making. This rule allows user to pick a selection based on various conditions. For Ras Fragrance, this rule will be implemented to perform the quiz result that will be based on user's preference.

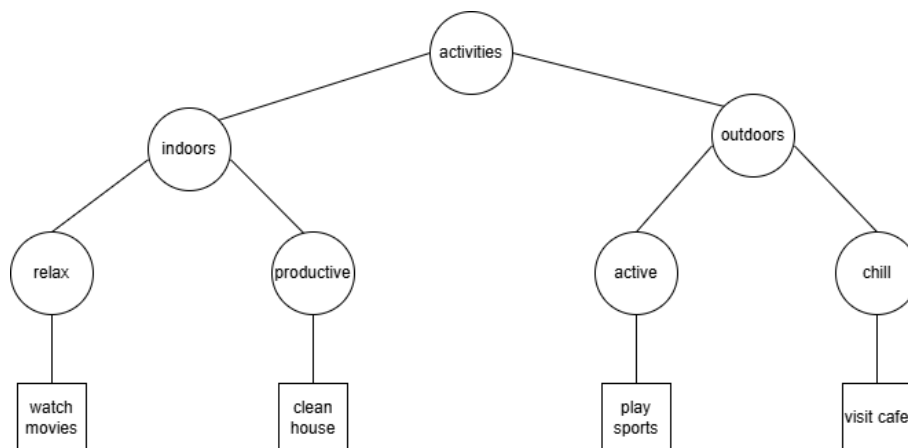


Fig. 1 Example of Decision Tree Rule Diagram

Based on Fig. 1, this is one of the examples of the decision tree rule implementation. The figures show the scenario what decision can be made if we choose indoors or outdoors activities. If indoors is chosen, they can choose either to relax or productive. If they choose to relax, they can proceed to watch the movies while being productive can clean the house. Same as outdoors, they can choose between being active or chill vice versa.

3. Methodology

In this section, the methodology model used to develop the system will be described which is a prototype model. This section outlines each of the phases involved while performing this methodology. Every phase plays a crucial role to ensure the web application is scalable, effective and easy to use. This methodology involves building, testing and refining prototypes until the working version is obtained as foundation for the final system [10]. The design process sometimes referred to as evolutionary design or incremental development utilized in software design, system development and electronics engineering. The general phases in the prototype methodology, are planning, analysis, design, implementation, system prototype and system.

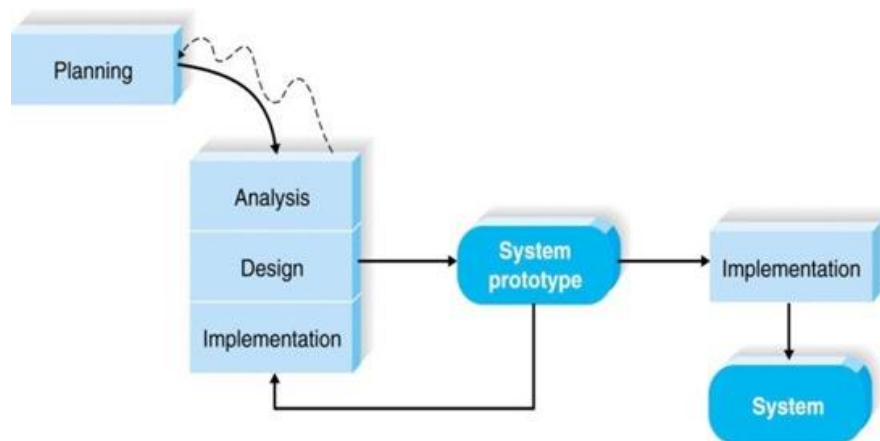


Fig. 2 Prototype Model [11]

3.1 Phases in Prototype Model

The phase start with the planning phase where all requirements, goals and objectives are being set to outline the scope and timeline. A Gantt chart in Appendix A is created to outline all the activities to ensure they are always in track and organized. Next, analysis stage, the gathering data being made including interviewing the Ras Fragrance's stakeholder, Miss Syafiqah via Zoom Meetings to gather functional and non-functional requirements. During this phase, the problems such as missed some orders, manual order taking, low recognition being analysed to propose the solution. With that, the diagrams such as flowchart, Data Flow Diagram (DFD), Entity Relationship Diagram (ERD) are created to outline the system. Next, the design phase is where initial design is being sketched by using Figma. Adding clear action buttons will ensure a user-friendly system. This phase also can illustrate proposed system but not in complete design.

Then, the phase continues with implementation the prototype based on gathered data. It is expected to complete the working prototype that works on core functionalities. The use of HTML, CSS and JavaScript for front-end development to produce a working prototype. The prototype is being tested by 10 people. It functions to observe the user interactions towards the prototype and take note some issues and area of confusion. Then, the system prototype is focusing the user feedback and being collected to be reviewed and making some improvement with the given suggestions. Then, refining the prototype is important to make the improvement based on the user feedback. Some changes has to be done such as redesign elements, add features and enhance the functionalities. This phase is where the repetition step will occur. The implement and system prototype are being made numerous times until meet the user satisfaction. Lastly, the phase ends with system stage. In this phase, the final testing being conducted to test functionalities, security, performance and usability of the system. It also tests on the server load, response times, security and stability before being deployed for stakeholder use. To maintain the system, regular updates and maintenance are implemented to ensure ongoing functionality.

3.2 Summary of Activities

The tables below outline the summary of all the activities involved while performing the prototype methodology. Each of the phases includes all the tasks and the deliverables. Here is the summary of the activities documented in the Table 2.

Table 2 *Development Workflow*

Phase	Tasks	Deliverables
Planning	- Planning the scope, goals and objectives are being set to outline the scope and timeline - Interviewing Ras Fragrance employee	- Interview notes taking - Gantt chart - Requirements specification
Analysis	Gathering all the data such as existing problems, scope and objectives for Ras Fragrance web-based development.	- Flowcharts of the system - DFD - ERD
Design	- Creating user interface using Figma to represent the real-world of the proposed system. - The prototype is working well like browsing the products, viewing product details and adding items in the cart.	- HTML, CSS, PHP and JavaScript programming (front-end development) - SQL programming (database) - Wireframes - Design prototypes
Implementation	A Google Form user acceptance testing is being blasted	- User acceptance testing - Usability testing results
System Prototype	- Making improvements the prototype until the meet the user requirements - Multiple testing will be made	- Refined prototype - Updated prototype design
System	- The completed final version of Ras Fragrance web based. - Performing thorough testing and regularly maintenance	- Final codebase - Final completed system for Ras Fragrance - Quality assurance reports

4. Result and Discussion

This section will discuss on the analysis and design that has been conducted to develop the proposed system. Throughout the analysis and design phase of the system development, all the requirements including functional, and non-functional established to specify the expected capabilities and performance standards of the system. The structured approach is chosen as Context Diagram providing high-level overview of the system, Data Flow Diagram (DFD) break down system processes into more specific level and Entity Relationship Diagram (ERD) defines the relationship between the entities. In addition, the data dictionary structures data architecture and database design, while User Interfaces (UI) visualize the proposed system to meet user expectations.

4.1 System Analysis

This is the process to understand the documentation of a standard system. It involves analyzing a system's functioning and its components how they interact. All the requirements including functional and non-functional requirements are being documented in the tables to picture the expected system. The goal is to ensure the system

satisfies the demands of its stakeholder and users. In this process where Context Diagram, DFD and ERD are being created. Table 3 and 4 below shows the requirements needed to the proposed system.

Table 3 *Functional Requirements*

No	Modules	Descriptions
1.	User Management	• The system allows user to register the account by inserting email, username and password while login is required to fill in the username and password. • The system only allows user to log in with a valid username and password. • The system gives an alert when the wrong input is being filled by user. • The system should allow user to edit, add or remove personal details in account settings. • The system should allow user to manage the user account.
2.	Perfume Quiz	• The system should allow user to answer the quiz smoothly. • The system should generate the result (perfume recommendations) based on the chosen answer by the user. • The system should save the perfume result for user in the profile account.
3.	Inventory Management	• The system should allow administrator to add, update, edit or remove the perfume. • The system should allow administrator to restock or update the perfume stocks in the inventory. • The system should allow administrator to update the stocks in the inventory system. • The system should allow administrator to add and delete the items in the inventory system. • The system should maintain the accurate records of all the inventory levels and support real-time updates.
4.	Purchasing	• The system should allow user to add the perfume to their cart for later purchase. • The system should allow user to remove the item from their cart. • The system should allow user to view all the perfume list in their cart. • The system should allow administrator to make a confirmation of the order being placed by the user. • The system should allow administrator to update the order status like pending, completed or removed to notify the user.
5.	Payment	• The system should allow user to make a payment securely. • The system should allow user to make a payment by online banking.
6.	Order Management	• The system should allow administrator to make a confirmation of the order being placed by the user. • The system should allow administrator to update the order status like pending, completed or removed to notify the user.

Table 4 *Non-Functional Requirements*

No	Non-Functional Requirement	Description
1	Performance	• The system should be running smoothly without crash. • The system should be in good response time within maximum for two or three seconds.
2	Security	• The system can handle multiple transactions without having a problem. • The system should be highly secured to protect the data from authorized access.
3	Usability	• The system should be able to ensure user data especially in payment information is encrypted during transmission and storage. • The system should be user-friendly for user for its interface design, easy to navigate and accessibility. • The system should be responsive across all devices including smartphones, tablets and desktops.
4	Reliability	• The system should ensure the data is consistent and accurate to prevent data loss or corruption.

4.1.1 Flowchart

Flowchart is a visual representation of a process or workflow that shows order of steps and decision points. By having a flowchart, it helps to illustrate the flow of decisions, actions, inputs and outputs using symbols such as ovals, diamonds, rectangles and arrows.

Based on Fig. 3, the flowcharts illustrate the user flow in the proposed system. It begins with a login page, where existing users can log in and new users can register. After logging in, the homepage appears, showcasing recommended perfumes, bestsellers and quiz for finding suitable perfumes, and more. Users can take the quiz to get perfume recommendations, add items to their cart or favorites, and proceed to checkout by entering payment details. The system also includes user profile management for updating information and viewing purchase history. Finally, users can log out of their accounts.

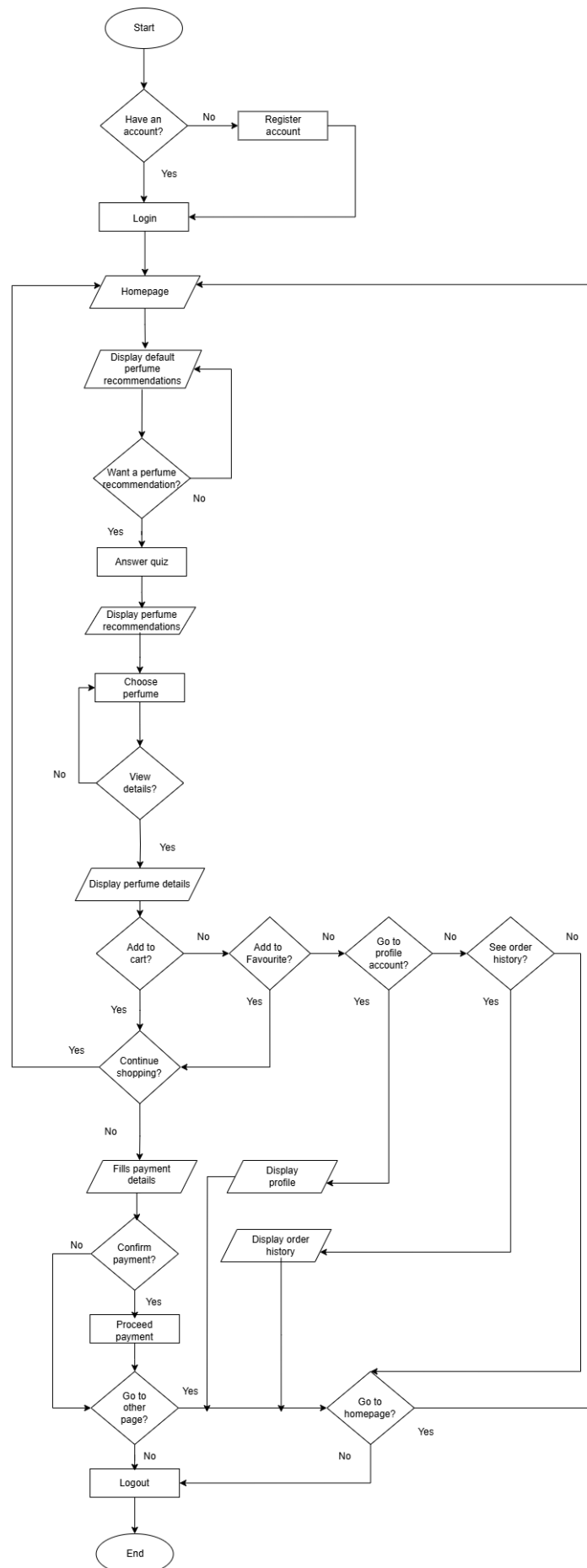


Fig. 3 User Flowchart

4.1.2 Context Diagram and Data Flow Diagram (DFD)

For Ras Fragrance proposed system, the Context Diagram shows how users, administrator and the system interact. For administrator, they manage the backend operations such as product, order, stock and quiz details. User needed to log in first, in order to buy perfumes or take a scent quiz. The perfume recommendation will be display as soon as the end of the quiz. If user interested with the suggestions, they can proceed to payment and all the billing details are being accepted by the administrator. After receiving the payment from the user, administrator can proceed to ship the order and user can view the status order from the system.

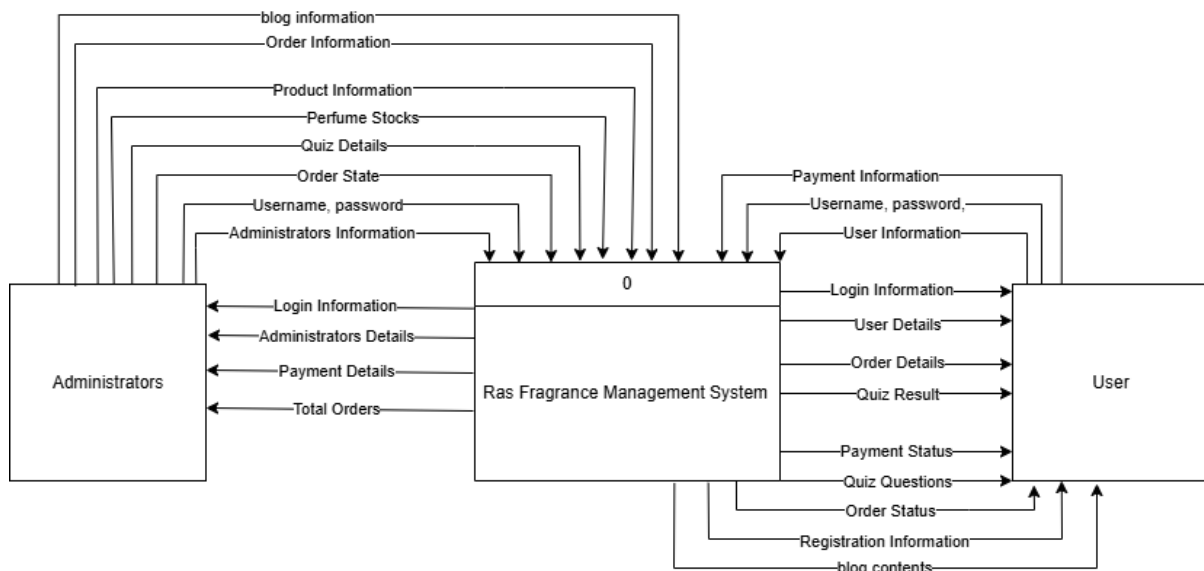


Fig. 4 Context Diagram for the Proposed System

DFD is a graphical representation of the flow data through a system. It displays input and output flows, data stores and different data transformation processes to show how the data is processed. By understanding and analyzing the flow of information moves through a system, DFDs illustrates into a better form to identify inefficiencies, redundancies and areas for improvement. Appendix B illustrates the DFD level 0 for the proposed system. The diagram shows all the processes involved in the system. It includes register, log in, manage quiz, manage perfume, manage user profile, purchase, manage order and manage blog processes in a whole system. In this diagram also shows all the involved data store includes account, quiz, perfume, payment, order, inventory, invoice, cart, favorite and blog data store.

4.1.3 Entity Relationship Diagram (ERD)

Entity Relationship Design (ERD) is a visual representation of the data model that lists the entities in the system along with their relationships. ERD helps in database structure design and comprehension which is crucial for web application development and maintenance.

According to Fig. 5, user has attributes like user_id, username, email, address, phone number, password and created_at that relate to other entities such as administrator, quiz, cart, favorite and order. Each of the relationship has its purposes. For a relationship between the administrator, user is being managed by them such as valid the user account. Next, user can answer the quiz, so it has attributes like quiz_id, question, answer, question_type and next_question_id. For cart and favorite, user can add the items there for later purchasing. Both of them includes similar attributes such as the cart or favorite_id, user_id, perfume_id and quantity in the list. While for order, user is engage with it as it has order_id, customer_name, perfume_id, status, order_date, total and others related attributes. Not only that, order also related to payment entity which has payment_id, order_id, payment_status and payment_details attributes. Then, the payment generates the receipt. Then, perfume being managed by the administrator in terms of add, edit or remove them into the inventory list. Lastly, administrator also manage blog post that includes attributes such as blog_id, title, content, created_at and image.

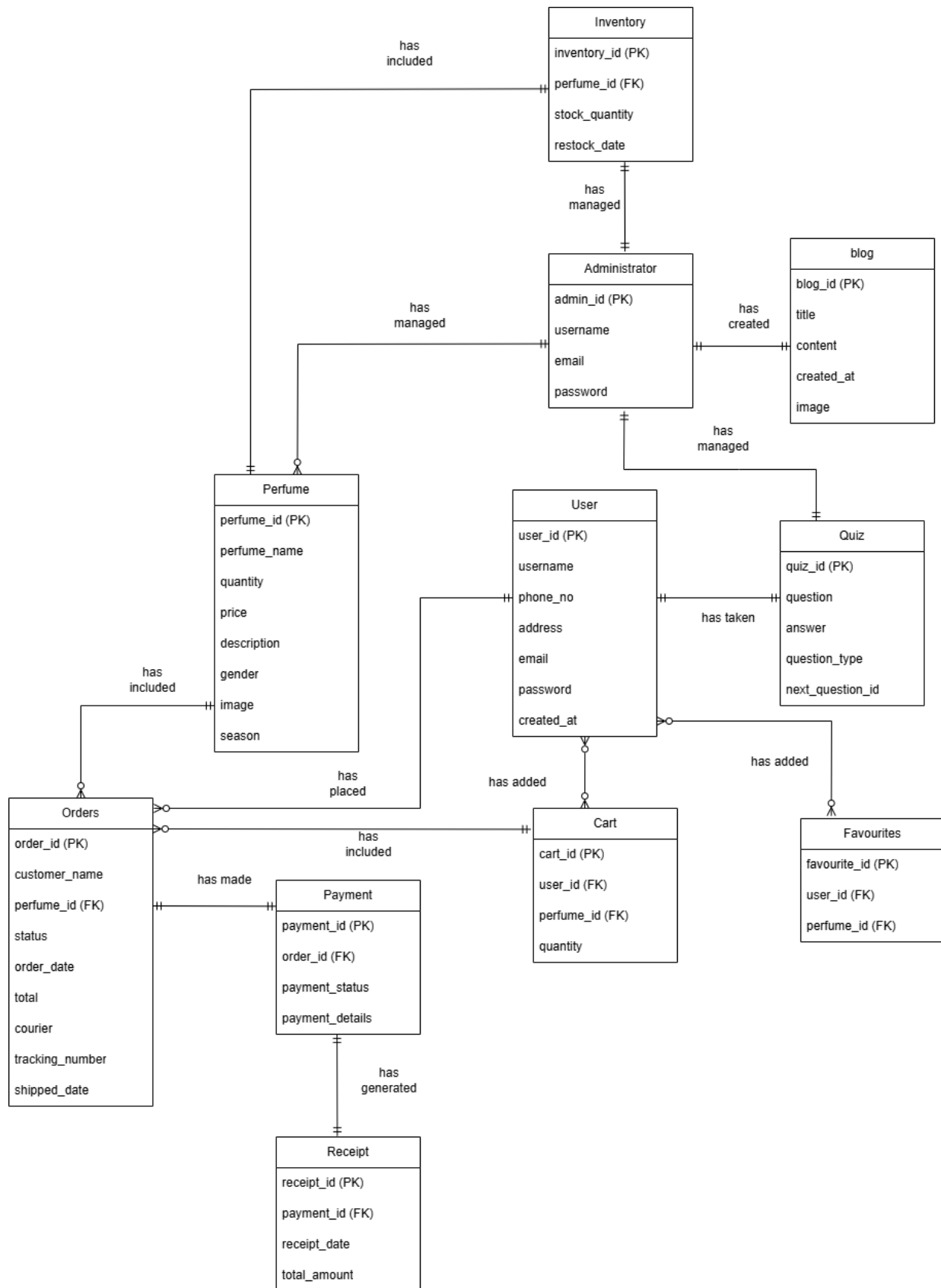


Fig. 5 Entity Relationship Diagram for the Proposed System

4.2 System Design

This section is the process of defining the architecture, components, modules, interfaces and data for a system to align with the requirements. It consists of developing a thorough plan for system structure's behavior, operations while ensuring all the parts work together as a whole.

4.2.1 Database Design

Designing database is crucial for developing a web application. By creating the database design will make the system to be more organized, effective and scalable for managing, retrieving and storing data. It is essential to ensure the web application is functioning well, maintain data integrity and accommodate future growth. The database include user that store user_id, username, phone_no, address, email, password and created_at attributes. Same as other like perfume, cart, orders, quiz, inventory and etc., store the important details to complete the system.

4.2.2 User Interface Design

The User Interface (UI) is used for user to interact with the system. Icons, menus, text and buttons are designed to be user-friendly and ease the user to navigate the system effortlessly. Below Fig. 6 (a) the quiz page shows the quiz questions such as; How you usually spend your weekends. The selection include the images that adding the appealing of the quiz interface. After the quiz is completed, the quiz will generate the perfume recommendation. The interface will be appeared based on Fig. 6 (b).

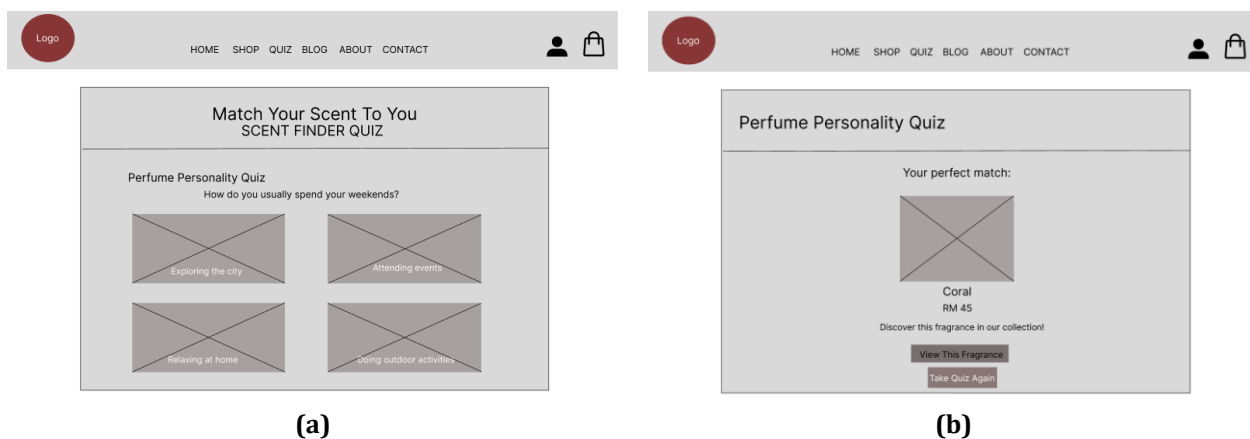


Fig. 6 User Interface; (a) quiz question; (b) perfume recommendation

5. System Implement and Testing

In this section outlines the development and testing of Ras Fragrance web application. There are a few modules that has been highlighted in this section. The focuses modules are generating the perfume result, inventory management and implementation of payment gateway. By maintaining these modules, testing has been made to ensure a smooth shopping experience to both user and administrator.

5.1 System Implementation

System implementation is the process of launching a developed system that user can interact with it. During this phase, it involves testing and resolving any technical issues before the full deployment. The implementation in Ras Fragrance system includes, user login, quiz perfume, inventory and payment gateway.

5.1.1 User Login

For a better experience, user needed to login first to the system. It requires username and password to login the system. Below, Fig. 7 shows the login page for Ras Fragrance.

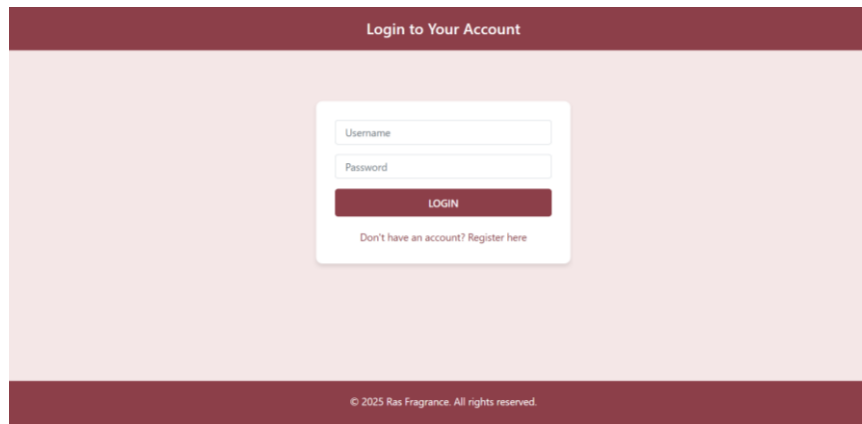


Fig. 7 User Login Page

In Fig. 8, after successfully login, the system will display the homepage indicating the login is success.



Fig. 8 Homepage

The code segment below in Fig.9, shows that the functions on how login process is made. The validation also specified for high security purposes. The code also shows that after successfully login, it will redirect to homepage.

```
<?php
session_start(); // Ensure session is started at the beginning
include 'db_connection.php';

$message = "";

if ($_SERVER['REQUEST_METHOD'] == 'POST') {
    // Fetch input values
    $username = isset($_POST['username']) ? $conn->real_escape_string(string: $_POST['username']) : '';
    $password = isset($_POST['password']) ? $conn->real_escape_string(string: $_POST['password']) : '';

    if (!empty($username) && !empty($password)) {
        // Query the database for the username
        $query = "SELECT * FROM `User` WHERE username = ?";
        $stmt = $conn->prepare(query: $query);
        $stmt->bind_param(types: "s", var: &$username);
        $stmt->execute();
        $result = $stmt->get_result();

        if ($result->num_rows > 0) {
            $user = $result->fetch_assoc();

            // Redirect to home.php
            header(header: 'Location: home.php');
            exit;
        }
    }
}
```

Fig. 9 Code Segment for login page

5.1.2 Quiz Perfume

To implement the quiz perfume, there are few functions and rule have to be done to make them fully function. User need to answer all the quiz questions (Fig.10) in order to generate the perfume result. To make the perfume result accurate, the decision tree rule has been implemented in this features.



Fig. 10 Quiz questions (User's view)

After completing the quiz, the perfume recommendation (result) will be generated. Then, user can just simply clicked on the perfume and it will redirect to its perfume details such as price, description (can add to cart or favorite too). Not only that, user also can retakde the quiz. All the perfume recommendation will be recored in the profile account.

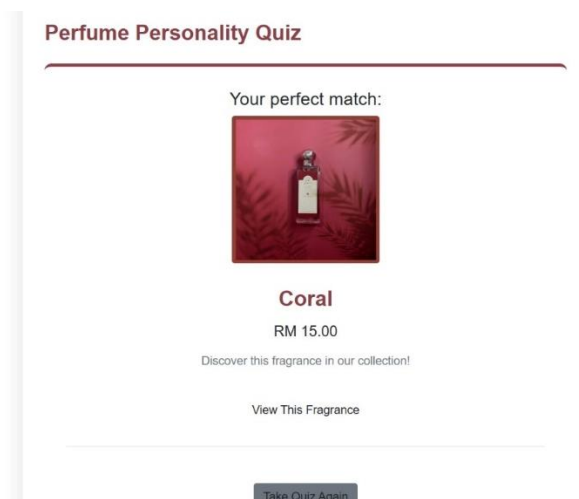


Fig. 11 Perfume Recommendation (User's View)

Administrator is responsible to set the question in order to get the perfume result. In Fig.12, administrator can add, edit or delete the questions to fit with the perfume's information.

Add/Edit Question

Question Text
What is your gender?

Question Type: Root Question
Next Question (default): Q55: What is your age range?...
Sort Order: 42

Answers

Answer	Text	Perfume name	Quiz ID
A	Male	Perfume name	quiz/68489b071d583_mali
B	Female	Perfume name	quiz/68489b071e13d_fem

Fig.12 Quiz Manager (Administrator's view)

5.1.3 Inventory

For inventory, this is where administrator edit, update, add or delete perfume details. This is the place where administrator can see the perfume stocks. With that, they can restock the perfume to avoid understock for the e-commerce side. In this code, there are a few perfumes that has variety of sizes. Due to that, the total stocks will be updated for all the perfume sizes for its perfume.

Perfume Inventory (Administrator's view)

Perfume	Description	Price	Stock	Total Stock
Amber	This perfume is for fun and fresh women suitable to be worn on a sunny day. It opens with delicious ...	RM 45.00	Stock: 32	Total Stock: 32
Amethyst	A sweet and floral fragrance with pear, blackcurrant, iris, jasmine, and orange blossom, balanced by...	RM 45.00	Stock: 1	Total Stock: 1
Coral	Coral is a timeless and elegant floral fragrance that embodies femininity and sophistication. It fea...	RM 45.00	Stock: 2	Total Stock: 2

Fig. 13 Perfume Inventory (Administrator's view)

5.1.4 Payment Gateway

Payment gateway is important to confirm the order by user to be placed. In this system, the cart page will show the total payment has to be paid. In terms of online perfume selling, online banking is the best option.

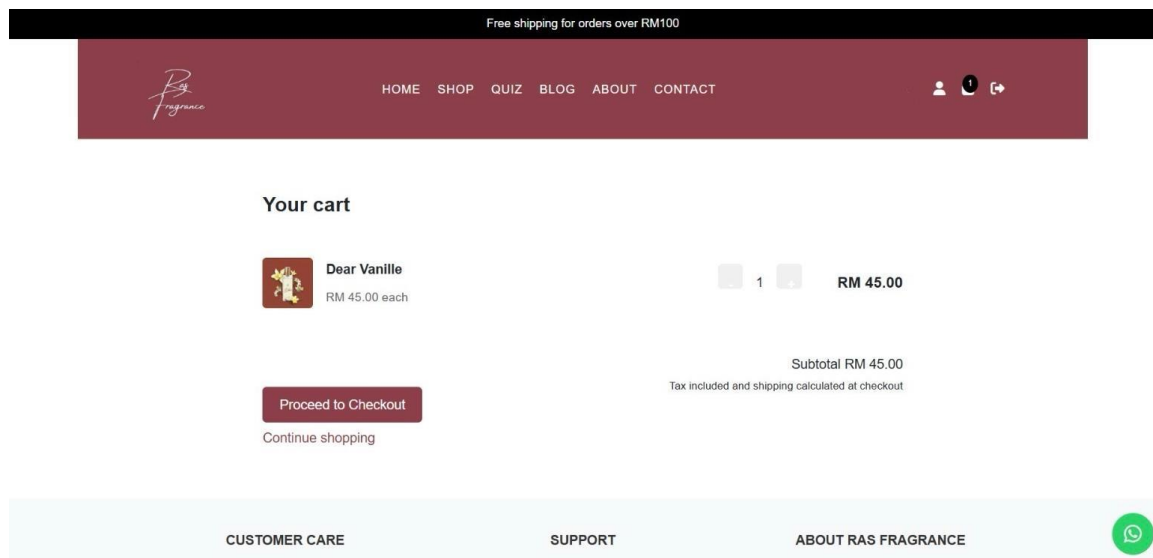


Fig. 14 Cart page

To implement the payment gateway, Toyyibpay is being integrated to enable the online banking by the user. Based on Fig. 15, this is order that has to be paid that being generated by Toyyibpay. When online banking is chosen, it will redirect to its Toyyibpay payment gateway.

Scroll down and complete all necessary information

Order #52

Payment for order #52

RM 45.00

Email *
faradilla@gmail.com

You will receive the transaction receipt here.
More information

Select payment method
Online Banking

Select account type
Personal Banking

*Minimum Transaction is RM1 and Maximum Transaction is RM30,000 (depends on your Internet banking transaction limit).

Fig. 15 Toyyibpay's Payment Gateway

In Fig. 16, this is the code segment where it will redirect to Toyyibpay when online banking is used. It will call the Toyyibpay API to integrate the payment gateway.

```

// Handle payment based on method
if ($payment_method === 'online_banking') {
    // Process ToyyibPay payment
    require_once 'toyyibpay_config.php';

    // Create bill data
    $bill_data = [
        'userSecretKey' => 'ddvmm5ef-rjev-7cfv-6v2u-ti302s7b3m9m',
        'categoryCode' => '80ylxoxj',
        'billName' => "Order #{$order_id}",
        'billDescription' => "Payment for order #{$order_id}",
        'billPriceSetting' => 1,
        'billPayorInfo' => 1,
        'billAmount' => $total * 100,
        'billReturnUrl' => (isset($_SERVER['HTTPS'])) ? 'https://' : 'http://' . $_SERVER['HTTP_HOST'] . '/ras_fragr',
        'billCallbackUrl' => (isset($_SERVER['HTTPS'])) ? 'https://' : 'http://' . $_SERVER['HTTP_HOST'] . '/ras_fra',
        'billExternalReferenceNo' => 'ORD' . $order_id,
        'billTo' => $customer_name,
        'billEmail' => $email,
        'billPhone' => $phone,
        'billContentEmail' => "Thank you for your order #{$order_id}",
    ];

    // Call ToyyibPay API
    $ch = curl_init();
    curl_setopt(handle: $ch, option: CURLOPT_URL, value: 'https://toyyibpay.com/index.php/api/createBill');
    curl_setopt(handle: $ch, option: CURLOPT_RETURNTRANSFER, value: true);
    curl_setopt(handle: $ch, option: CURLOPT_POST, value: true);
    curl_setopt(handle: $ch, option: CURLOPT_POSTFIELDS, value: $bill_data);

```

Fig. 16 Code Segment Toyyibpay's Payment Gateway

5.2 System Testing

After completing the system, testing phase is crucial to ensure the system run smoothly and meet the expected requirements. The testing has been made by 10 respondents from both of user and administrator. The respondents are needed to fill the Google Form that includes questions regarding the system. The form being divided into three sections; interface design, usability and functionality. With all these gathering data, the improvement can be made during this phase.

5.2.1 Functional Testing

In this stage, functional testing is more focused on user experience and backed components of the web application system work as intended.

5.2.2 Test Plan

Test plan is important as it acts as a strategy, scope, objectives and approach for testing purposes. This outlines the functionalities are verified before deployment being made. It ensures all the critical features and functionalities working smoothly without any error. Not only that, it also improve efficiency so it will reduce redundant work and save time.

Table 5 Test Plan for Quiz Perfume Module

Function	Test Case	Expected Result	Actual result
Quiz Accessibility (User)	User can answer the quiz from the homepage that include quiz section in header	Quiz loads without delays and user interface display correctly	Pass
Answer Quiz (User)	User answer the quiz without interruptions	User answer the quiz smoothly	Pass
Generate Perfume Result (User)	System provides result based on answer	Changes are saved and reflected in account	Pass
Save Quiz Result (User)	System stores recommendations in the user profile	Results are correctly saved for future reference	Pass
Retake Quiz Functionality (User)	User can start the quiz again after completing one	The previous results stored separately	Pass
Making Quiz Questions (Administrator)	Add, Update and Remove Quiz Questions	All the changes successfully saved	Pass

5.3 User Acceptance Testing (UAT)

This testing is the final stage of development. This is where user experience with the system at the same time evaluate them to confirm it meets the requirements. This testing is important to ensure the system is user-friendly, reliable and ready for launch.

5.3.1 User UAT

User is huge role to define the system being accepted or not in terms of user experience, flow of the system and etc. This Fig.17 gave summary of what user has reviewed about the proposed system.

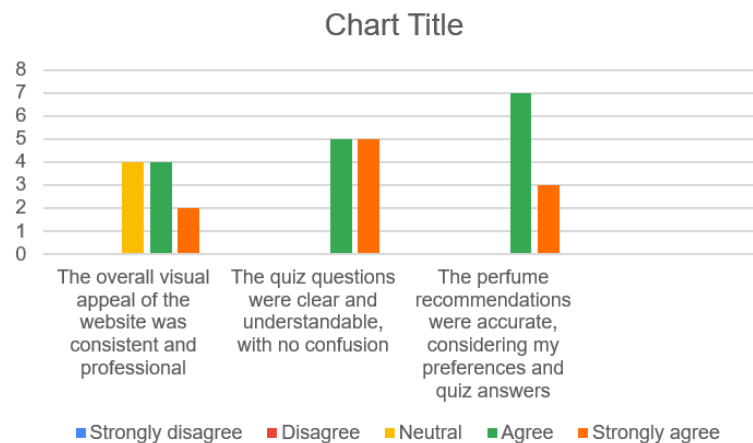


Fig. 17 Bar Chart User UAT

Based on the bar chart, user found the website as consistent and professional due to the design elements, color scheme, branding were well executed and visually engaging. Next, they understand the quiz clearly without any confusion as the result answered only in agree and strongly agree. Then, the perfume suggestions considered as accurate and aligned with the user preferences.

5.3.2 Administrator UAT

Administrator is responsible to know what the best for their system. So, their opinion is crucial to know the system meet their needs or not. This Fig. 18 show how satisfaction administrator with the system.

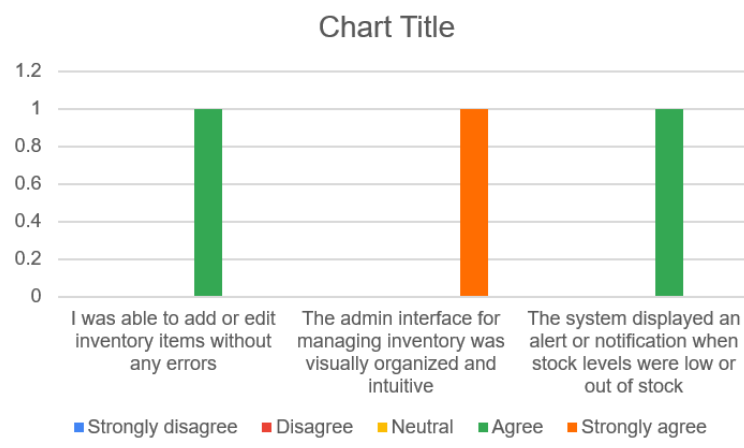


Fig. 18 Bar Chart Administrator UAT

Based on this bar chart, for error-free inventory editing and the low-stock alerts are in agree. While the admin interface usability is voted as strongly agree.

6. Conclusion

In conclusion, Ras Fragrance Management System is specially made for perfume enthusiast to enjoy the shopping experience including secured payment, guiding to know suitable scents and more educational contents fitted in the proposed system. Within all the features, such as inventory management, e-commerce, quiz perfume and educational hub are expected to fulfill all the requirements that has been discussed with the Ras Fragrance itself. The system finally develops completely, to help Ras Fragrance to manage the inventory, perfume, quiz and many more efficiently. Hence, the perfume quiz is accurate, the inventory management is efficient, purchasing and cart functionality worked well and payment gateway is reliable by using Toyyibpay. At the other hand, this system has limitations such no email notification for order status that only been updated at the profile account. Other than that, there is no search tools that can be used by user to search the perfume by just entering some keywords. Because Ras Fragrance is still new in the industry, hoping in the future the brand will be recognized across the globe.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

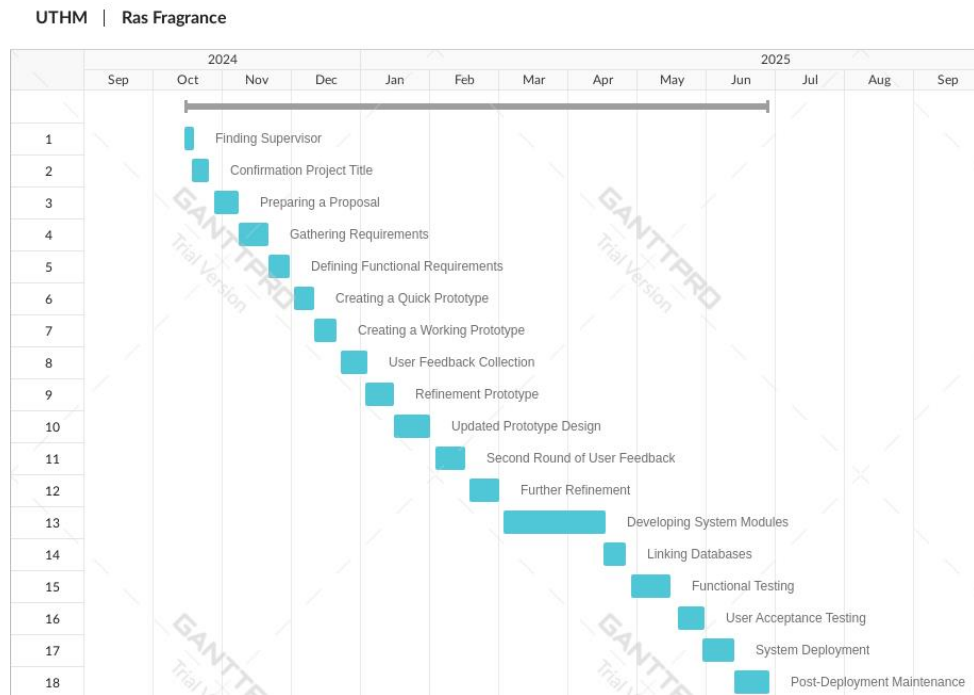
This journal requires that all authors take public responsibility for the content of the work submitted for review. The contributions of all authors must be described in the following manner:

*The authors confirm contribution to the paper as follows: **study conception and design:** Auni Fawwaz Ismail, Norfaradilla Wahid; **data collection:** Auni Fawwaz Ismail; **analysis and interpretation of results:** Auni Fawwaz Ismail, Norfaradilla Wahid; **draft manuscript preparation:** Auni Fawwaz Ismail, Norfaradilla Wahid. All authors reviewed the results and approved the final version of the manuscript.*

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Appendix A: Gantt Chart



Appendix B: DFD Level 0

