

Web-Based Student's Recipe E-Book System

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Abstract: The Web-based Student's Recipe E-book system has been successfully implemented, effectively fulfilling user requirements, and offering a convenient solution for discovering recipes and maintaining a healthy lifestyle. Developed using CSS, HTML, PHP, JavaScript, and Visual Studio Code, the system features a user-friendly interface that facilitates recipe exploration and promotes healthy cooking choices. Thorough testing was conducted to ensure the system's functionality, usability, and performance, resulting in a valuable resource for students and individuals seeking nutritious meal options. Based on the testing that involved seven students, feedback confirmed the system's usability, and user satisfaction, and identified areas for improvement, such as search functionality, recipe categorization, and bookmarking features. Overall, more than 90 percent of the test passed successfully, with a few exceptions. Despite the presence of certain flaws, such as limited customization options, insufficient community interaction, and irregular updates, the Web-based Student's Recipe E-book system has the potential for further improvement.

Keywords: Recipe, cooking, tutorial, structured approach

1. Introduction

Recipe books are wonderful companions that provide a wealth of culinary knowledge, including ingredient lists and step-by-step instructions for preparing various delectable dishes. Recipe books are grouped into different categories, considering factors such as the author, the role of cooking in people's lives, and the impact of food on our well-being and bodies. These books cover an array of topics, ranging from specific ingredients and cooking techniques to regional cuisines and international flavors, offering a diverse selection to satisfy any palate [1]. For those embarking on a journey to learn the art of cooking, recipe books become trusted companions. They not only provide access to a wide range of ingredients but also inspire creativity and encourage the exploration of new culinary horizons. For many who are uncertain about their cooking skills, recipe books act as patient guides, offering clarity and inspiration along the way. In a world where unhealthy food options seem to dominate, leading to detrimental eating habits and rising obesity rates, the significance of cooking at home cannot be overstated [2]. By

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preparing meals using recipe books as our guides, we gain control over the ingredients and nutritional composition of our food, fostering healthier choices and promoting overall well-being. Learning to cook becomes an empowering endeavor, allowing us to craft delicious, nourishing meals that contribute to our long-term health and vitality [3]. These resources empower us to make informed decisions about our meals, supporting our growth, development, and lifelong well-being [4].

This web-based Student's Recipe E-book system aims to simplify the process of finding recipes and developing a healthy nutritional plan. It recognizes that users often need to choose meals quickly, based on convenience and availability. The system incorporates various methods for learning to cook, including instructional videos, to enhance the user's understanding. The primary goal of this system is to provide users with a comprehensive learning experience. Through reading the instructions and watching the provided videos, users can explore and learn various recipes. This eliminates the need for purchasing expensive cookbooks and allows users to experiment and improvise with new dishes. The web-based Student's Recipe E-book system offers a range of features such as search functionality, recipe sharing, and the ability to save favorite recipes. It includes a diverse collection of dishes with detailed instructions, along with a search engine for easy exploration of different recipes. The system encompasses a wide variety of traditional foods, cooking styles, and techniques. To enhance user experience, the developed recipe system has been thoughtfully organized into multiple categories, making it easier for users to browse and discover recipes that align with their preferences. Overall, this web-based Student's Recipe E-book system provides a user-friendly platform that enables users to find, learn, and enjoy a wide range of recipes while fostering a healthy and nutritious culinary journey.

The objective of this web-based Student's Recipe E-book system is to design a user-friendly, dynamic, and responsive Web-based Student's Recipe E-book system for the target users. Next objective is to develop Web-based Student's Recipe E-book system using the web-based approach. Lastly, to test the functionality of the Web-based Student's Recipe E-book system.

2. Related Work

2.1 Foodie Book [11]

Foodie Book is a recipe book online system implemented by Clive Wigan. Foodie books were created to provide recipe materials for kids who are enthusiastic about learning to cook. Clive Wigan hopes that others will learn new skills and love cooking and eating by following his inventive recipes. The index of the Foodie Book displays all the cookbook categories. The administrator has already created the category and cuisine where users can easily locate the recipe depending on the cuisine from the country they wish to prepare. It will save the user time from searching one by one. These benefits will be included in the created system, where users will be able to find recipes by cuisine using only the search button. The search engine appears inconspicuous, but it is quietly changing the structure of our lives [5]. The search engine will direct someone to a page that contains correct information that the user believes is the best directed first to a computer.

2.2 Resepi Che Nom [12]

Resepi Che Nom is a platform in Malaysia that serves as a hub for collecting recipes contributed by users. It allows individuals to share their recipes, receive feedback and ratings, leave comments on existing recipes, and engage with other users. Established in 2012 as IResepi.com, the platform was initiated because of the owner's research. The primary objective was to curate a comprehensive collection of the finest Malaysian recipes through user input, feedback, and trial and error. Resepi Che Nom comprises various modules, including Home, About, Article, Find Recipe, Category, and Contact, offering users a range of viewing options. One notable advantage of this system is that the administrator has created a multitude of instructional videos on YouTube, guiding viewers through recipes step by step. Watching videos can reduce the percentage of making mistakes while learning [6]. The use of

videos as a learning tool supports increasing students' willingness to learn, improving students' knowledge and understanding of the lesson, and raising students' achievement [7].

2.3 Simply Recipe [13]

In 2003, Elise Bauer founded Simply Recipes as a personal home cooking website, where she documented her cherished family recipes. Over time, Simply Recipes has grown into a reliable resource for home chefs, attracting over 15 million monthly visitors from around the globe. Supported by a diverse team of recipe creators, food journalists, evaluators, photographers, and other talented individuals, Simply Recipes offers a wealth of recipes and culinary guidance shared by fellow home cooks. It aims to empower and inspire home cooks to prepare exceptional meals with reduced stress and increased enjoyment. Simply Recipes strives to help users achieve "kitchen wins" by providing the necessary tools and knowledge for culinary success.

Table 1: Comparison Table of Existing System and Web-Based Student's Recipe E-Book System

Features/System	Foodie Book	Resepi Che Nom	Simply Recipe	Web-Based Student's Recipe E-Book System
User Login and Logout	√	X	√	√
Web-based	√	√	√	√
Users can search the recipe by ingredient	√	√	√	√
Users can search for the recipe by uploading a picture	X	X	X	√
Users can watch videos on the system	X	X	X	√
User can like the recipe	X	X	√	√
Administrator can CRUD recipe	√	√	√	√
User able to download the recipe from the system	√	X	√	√
System dynamic and responsive	√	√	X	√
Users can rate and review the recipe	X	X	√	√
Designer can manage recipe	X	X	√	√
Designer can manage feedback	X	X	X	√
Admin can generate report	X	X	X	√

3. Methodology/Framework

The Waterfall Model is an iterative approach to software development that visualizes the sequential flow of phases, including requirements analysis, design, implementation, testing, and maintenance. It draws an analogy to a waterfall, where each phase cascades smoothly into the next. [8]. The Waterfall Model would not have any phases that overlap as a result [9]. The Waterfall Model has the benefit of

being appropriate for projects with extremely clear needs. In a waterfall model, it is also basic and straightforward to use [10].

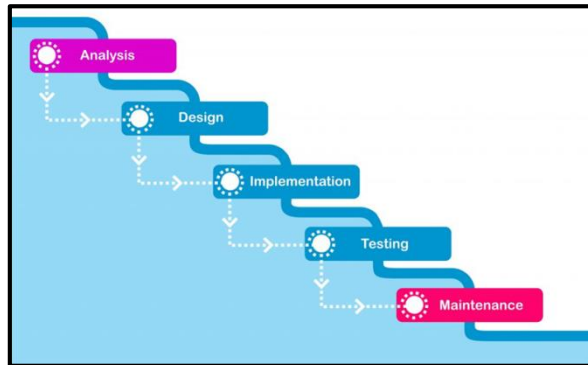


Figure 1: Waterfall Model

3.1 Analysis Phase

In the Waterfall Model of system development, the initial primary phase is analysis. This phase plays a crucial role in defining the required system specifications, which serve as the foundation for determining the project's scope. The objective of the analysis phase is to identify and document the essential requirements of the proposed system, encompassing both functional and non-functional aspects. It involves a comprehensive examination of various factors, such as user types, modules, technologies, and functionalities, within the existing Recipe E-book system. Functional requirements and non-functional requirements for the proposed system are outlined in Table 2 and Table 3, respectively.

Table 2: Functional Requirement

Modules	Functionalities	Descriptions
Registration and Login	Login and Logout	<ol style="list-style-type: none"> 1. Administrator can login to their account 2. Administrators can log out from the system. 3. Users need to register the account. 4. User can login to their account 5. User can logout the system 6. Designer can login to their account 7. Designer can logout the system
Recipe Management	Add New recipe and delete recipe	<ol style="list-style-type: none"> 1. Administrators can add new recipes and delete recipes. 2. Designer can add new recipe and delete recipe
	Recipe List	<ol style="list-style-type: none"> 1. Administrator can view the recipe list. 2. Designer can view the recipe List
	Edit Recipe	<ol style="list-style-type: none"> 1. Administrators can edit and update the recipe. 2. Administrator can add the videos of the recipe. 3. Designer can edit and update the recipe. 4. Designer can add the videos of the recipe
User Management	Edit Profile	<ol style="list-style-type: none"> 1. User can update profile
	View Like recipe	<ol style="list-style-type: none"> 1. User can view the recipe they like
Designer Management	Edit profile	<ol style="list-style-type: none"> 1. Designer can update their profile
	Update recipe	<ol style="list-style-type: none"> 1. Designer can update and add recipes videos

	View feedback video	1. Designer can view the feedback from user
Recipe	View recipe List	<ol style="list-style-type: none"> All users can view and click the recipe list. Users can search for the recipe by using keywords or ingredients. Users can search for the recipe by uploading the photo. User can watch the video along the recipe after login the system
	Print Recipe	1. User can print the recipe.
	Like and save Recipe	1. User can like the recipe and open it again once user want to use recipe
	Rate and review section	<ol style="list-style-type: none"> Admins generate rates and review forms. Users can rate and review the rating from other users. User need to login the system to rate and review the comments.
Suggestion and feedback	Add suggestion and feedback	<ol style="list-style-type: none"> Users can provide suggestions and feedback to the system. Administrator can view the feedback and suggestions.
	View contact information	1. Users can view the contact information.

Table 3: Non-Functional Requirement

Requirements	Explanations
Performance	1. Response time for web-based system should be less in 10 seconds
Usability	<ol style="list-style-type: none"> Web-based system are user-friendly, dynamic, and responsive for user. Web-based system user icons, buttons and font that are easily understand for user to use.
Availability	<ol style="list-style-type: none"> Web-based system should be available 24hours. Requirements of internet connection
Localization	1. Language used in this system is Malay and English.
Security	<ol style="list-style-type: none"> Users need to enter correct username and password to login the system. User cannot access the system if enter wrong username and password. Guest can view the recipe but unable to view video or review.

3.2 Design Phase

In the Waterfall methodology, the second stage is the design phase. During this phase, the specifications, features, and processes required to achieve the functional objectives of the proposed system are determined. This involves creating storyboards that illustrate the user interface, page layout, and available functionality of the proposed system. Additionally, an Entity Relationship Diagram (ERD) is used to establish the database structure and assess the system's requirements. Various design artifacts, including flowcharts, context diagrams, data flow diagrams, and database designs, are developed in this phase. Figure 2 depicts the flowchart on the user side, while Figure 3 illustrates the flowchart on the admin side. These visual representations aid in understanding the system's flow and interactions.

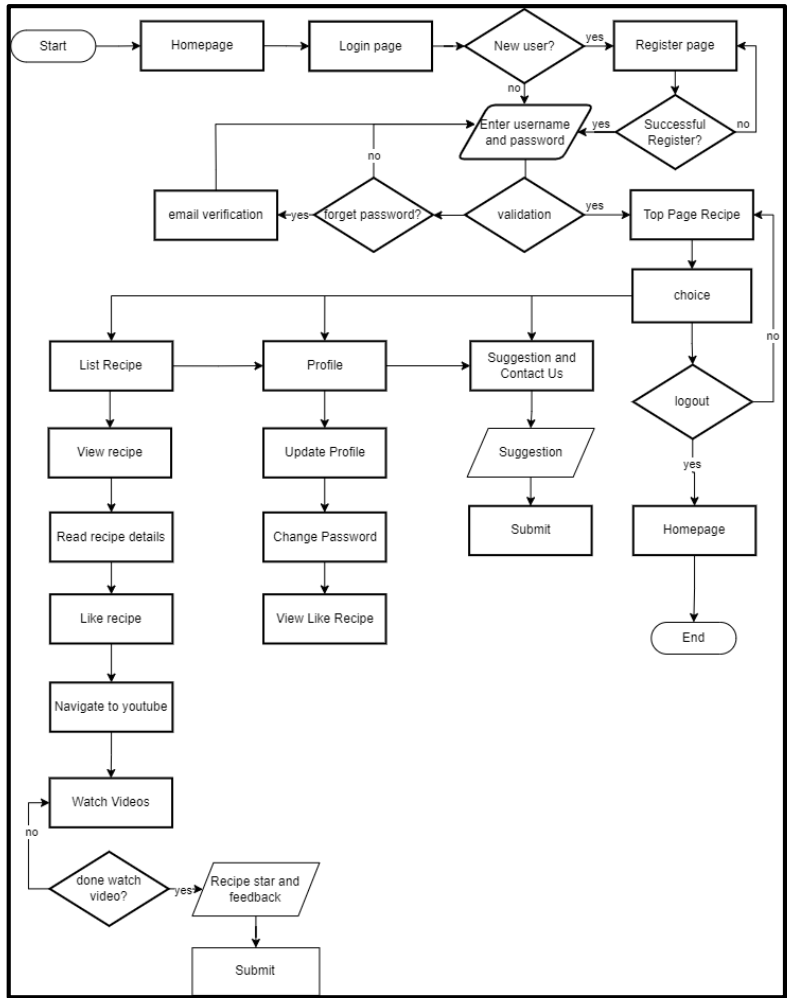


Figure 2: Flowchart in User Side

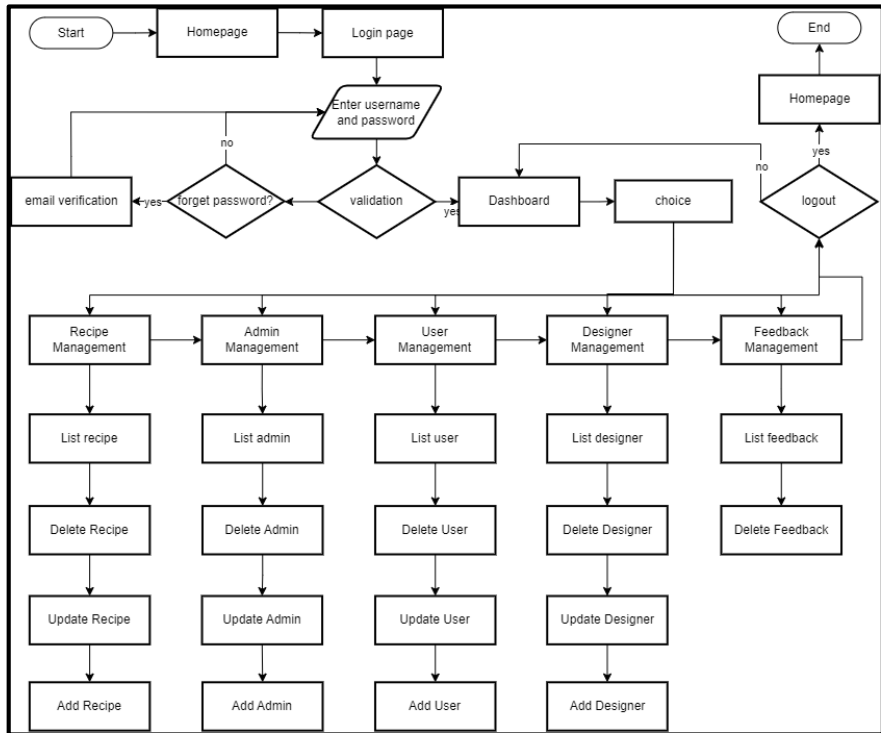


Figure 3: Flowchart in Admin side

Context Diagram

Figure 4 shows context diagram for Web-Based Students Recipe E-Book System.

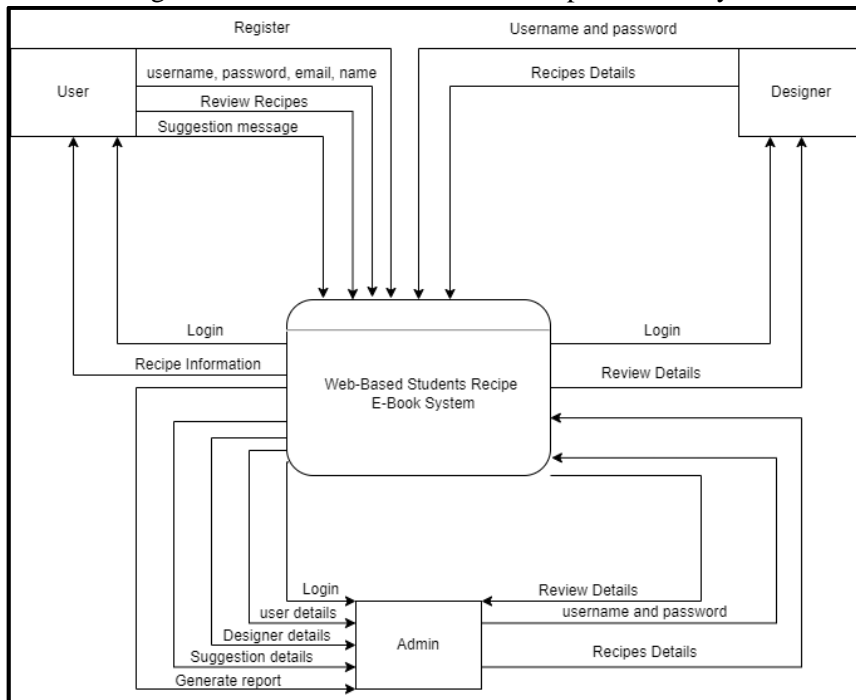


Figure 4: Context Diagram

Data Flow Diagram (DFD)

Figure 5 shows data flow diagram level 0 for Web-Based Students Recipe E-Book System.

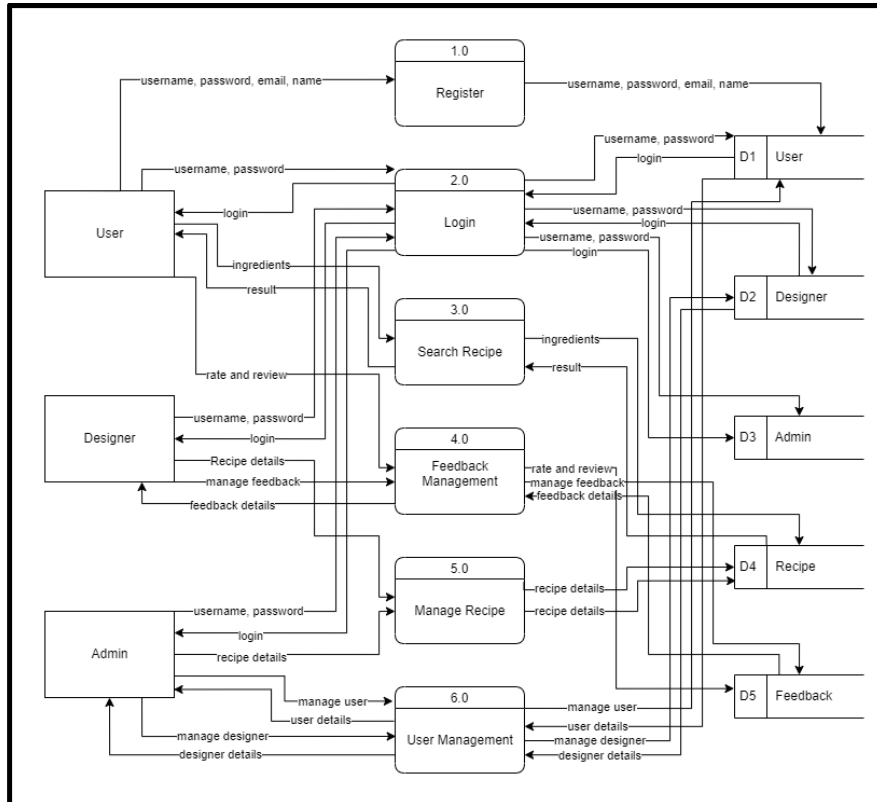


Figure 5: Data Flow Diagram Level 0

Entity Relationship Diagram (ERD)

Figure 6 shows entity relationship diagram (ERD) for Web-Based Students Recipe E-Book System.

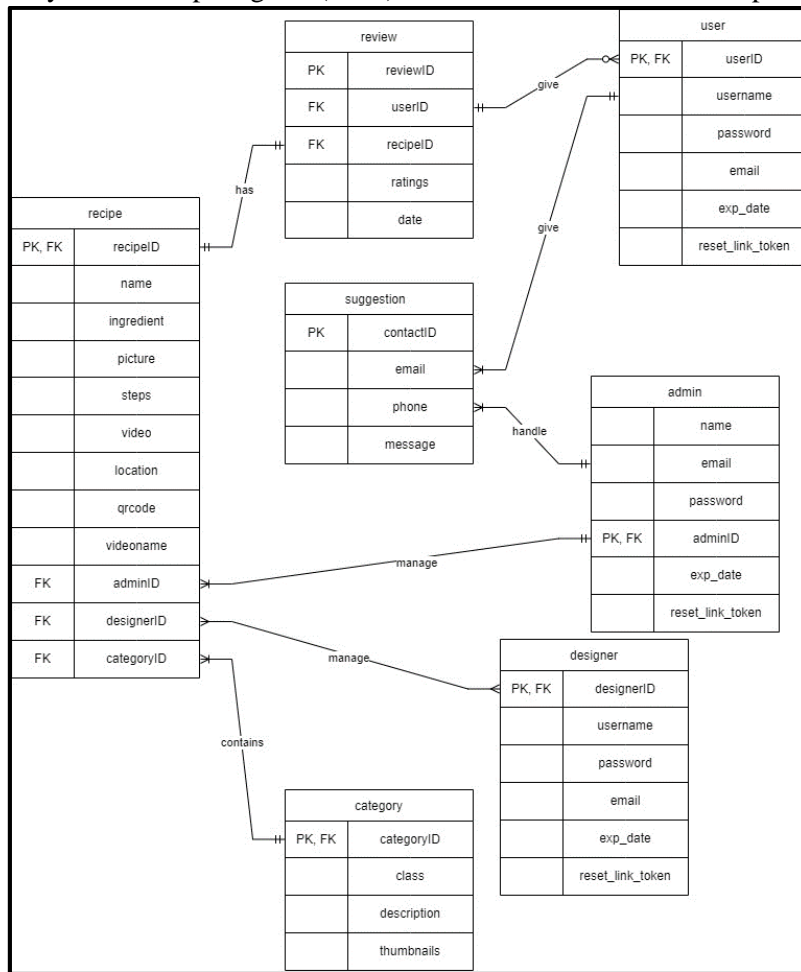


Figure 6: Entity Relationship Diagram (ERD)

Data Dictionary

The data dictionary of Web-Based Students Recipe E-Book System is user, designer, admin, review, recipe, category and suggestion. The attribute is shown below:

- i. user (userID, username, password, email, exp_date, reset_token_link)
- ii. designer (designerID, username, password, email, exp_date, reset_token_link)
- iii. review (reviewID, userID, recipeID, ratings, date)
- iv. admin (adminID, username, password, email, exp_date, reset_token_link)
- v. recipe (recipeID, name, ingredient, picture, steps, video, location, qrcode, adminID, designerID, categoryID)
- vi. category (categoryID, class, description, thumbnails)
- vii. suggestion (contactID, email, phone, message, date)

Interface Design

Figure 7 shows the wireframe for login page and register page, Figure 8 shows User Profile Page and Designer Dashboard page for Web-Based Students Recipe E-Book System

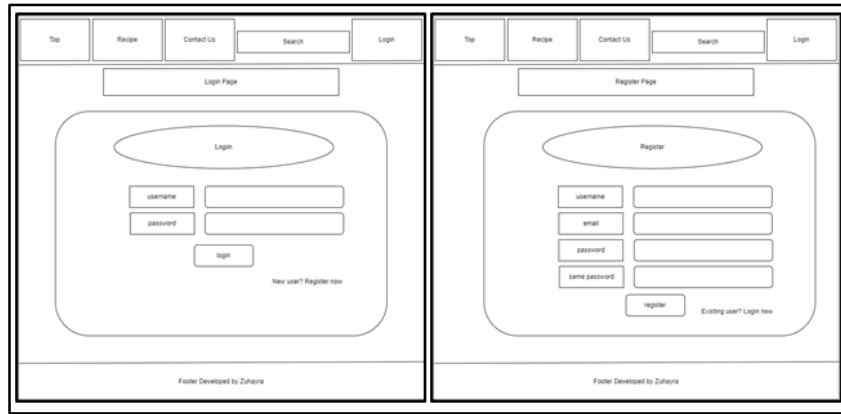


Figure 7: Login and Register Interface

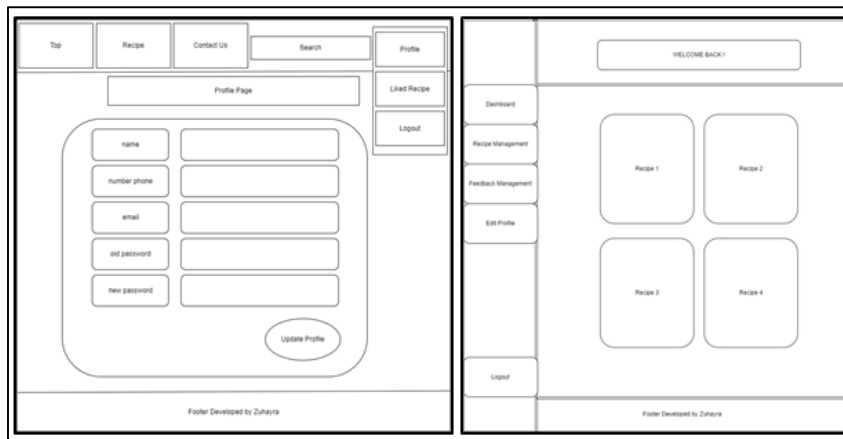


Figure 8: User Profile and Dashboard Interface

3.3 Implementation Phase

During this phase, the development of modules for the proposed system will take place based on the specifications and designs determined in the earlier stages. The coding and construction of the database will be carried out using the integrated development environment (IDE) software called Bracket. The back end of the proposed system will be developed using the PHP programming language, and it will be connected to the MySQL database. For the front-end user interface of the proposed system, JavaScript, Cascading Style Sheets (CSS), and Hypertext Markup Language (HTML) will be utilized. Figure 9 illustrates the interface design for the login page and register page of the system.

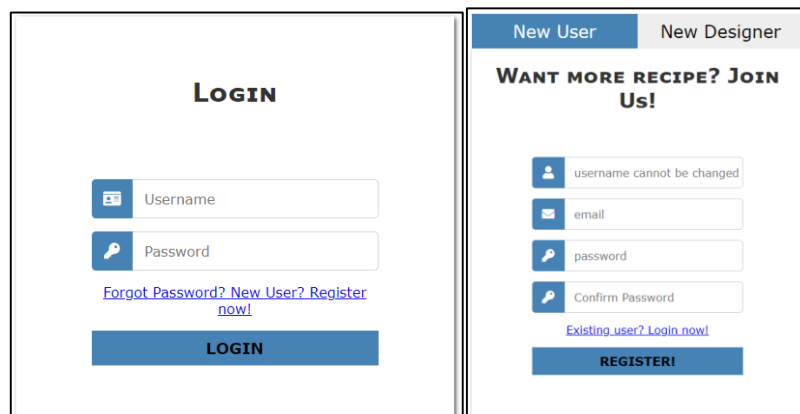


Figure 9: Login and Register Interface

Figure 10 shows forgot password and recover email pending interface. Figure 11 shows the code segment to generate the link to change the password.

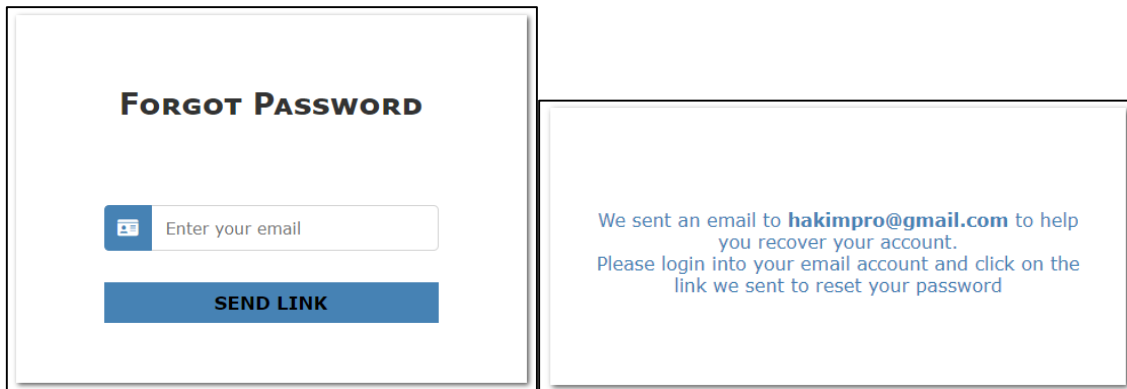


Figure 10: Forgot Password and Pending Interface

```

if ($result->num_rows == 1) {
    // Reset token is valid and not expired
    // Proceed to password reset step
    if (isset($_POST['new_password'])) {
        $newPassword = $_POST['new_password'];
        $hashedPassword = password_hash($newPassword, PASSWORD_DEFAULT);

        $user = $result->fetch_assoc();
        $userId = $user['userID'];

        $updateQuery = "UPDATE `user` SET `password` = '$hashedPassword', `reset_token` = NULL, `reset_token_expiry` = 
        $conn->query($updateQuery);

        // Password has been successfully reset
        // Redirect the user to a login page or display a success message
        echo "Password has been reset successfully.";
    } else {
        // Display the password reset form
        echo "
        <form action='' method='post'>
            <input type='password' name='new_password' placeholder='New Password' required<br>
            <input type='submit' value='Reset Password'>
        </form>
        ";
    }
}
    
```

Figure 11: Code segment for Forgot Password

Figure 12 shows the top page interface where it shows all the recipe on the website.

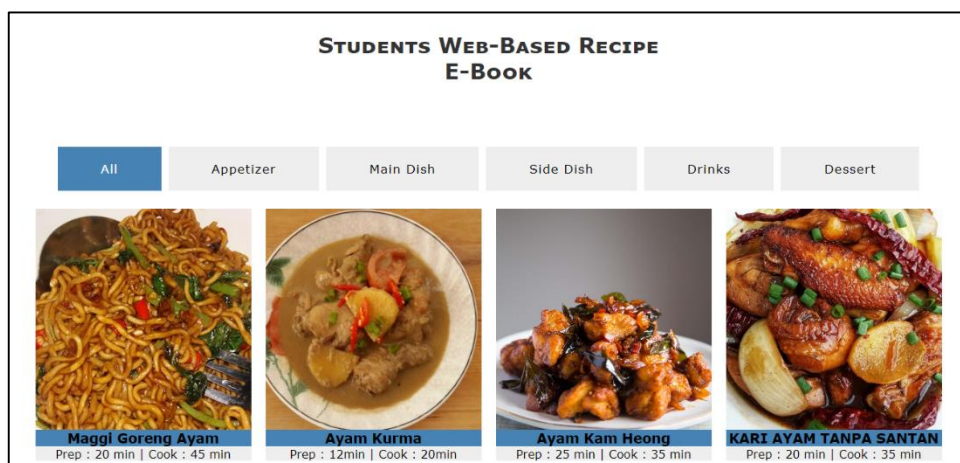


Figure 12: Top page Interface

Figure 13 and Figure 14 shows interface for searching by photo page. Users can search recipes by uploading the image by clicking the camera button, search after put image and the result is in Figure 14.

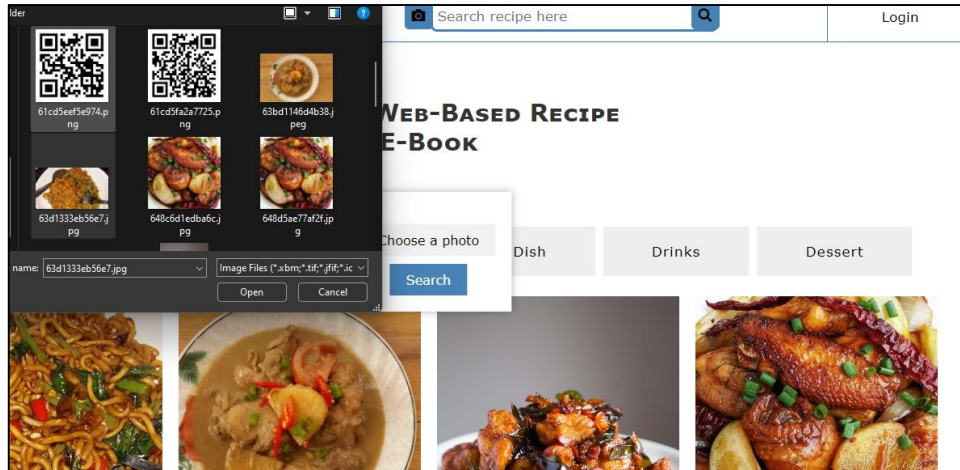


Figure 13: Searching by photo Interface.

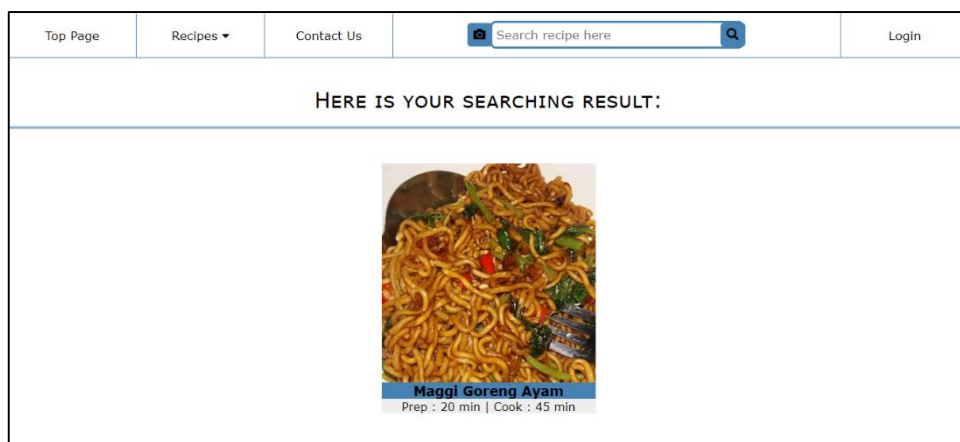


Figure 14: Searching result by photo interface.

Figure 15 shows the code segment for Photo Mirror to search for pictures.

```

<?php
function findDuplicatePhotos($directory)
{
    $fileHashes = array();
    $duplicates = array();

    $iterator = new RecursiveIteratorIterator(new RecursiveDirectoryIterator($directory));

    foreach ($iterator as $file) {
        if ($file->isFile()) {
            $filePath = $file->getPathname();
            $fileHash = md5_file($filePath);

            if (isset($fileHashes[$fileHash])) {
                $duplicates[] = array($filePath, $fileHashes[$fileHash]);
            } else {
                $fileHashes[$fileHash] = $filePath;
            }
        }
    }

    return $duplicates;
}
    
```

Figure 15: Code segment for Photo Mirror

Figure 16 shows the result if user wants to search recipe by typing.

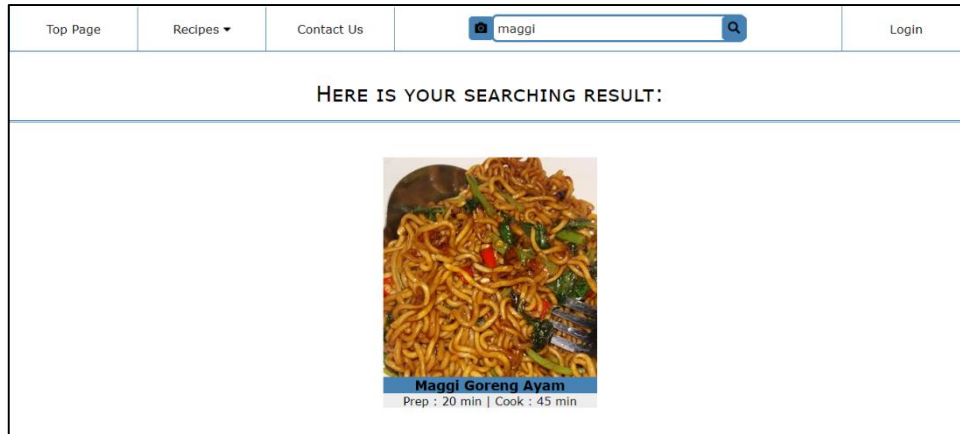


Figure 16: Searching result by typing interface.

Figure 17 shows interface for recipe details. In this page, shows name of recipe, details of recipe, video and image of recipe and a rate and review section for user.

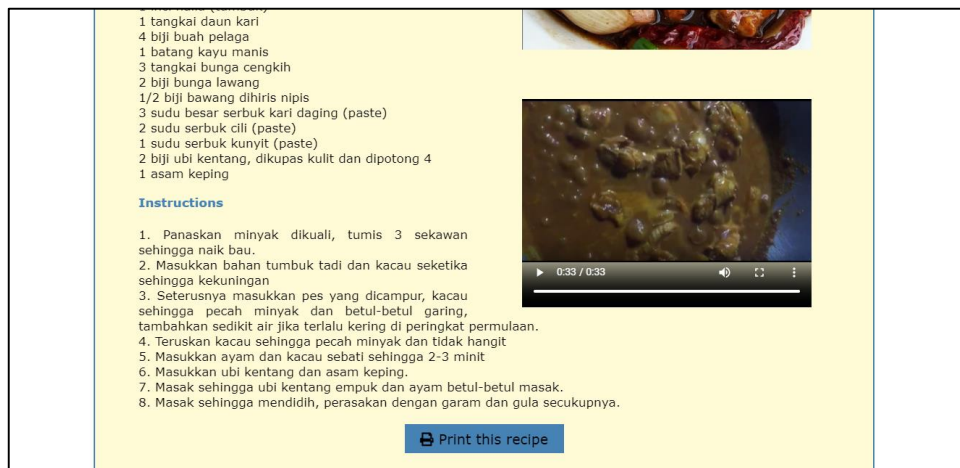


Figure 17: Recipe Details Interface

Figure 18 shows profile management, where all the users, including admin and designer can update the profile. In profile management has change password and deleted account.

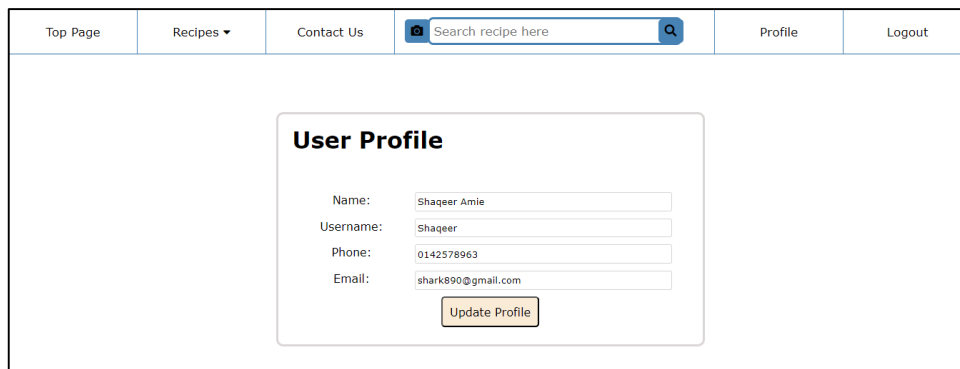


Figure 18: Profile Interface

Figure 19 shows Recipe Management Interface where all the data of recipe are shown in this page. Admin and Designer can manage recipes by sorting the recipe based on their name, ingredient, cooking time and preparation time. Admin and Designer can add new recipes, edit, and delete recipes. Feature of searching can ease admin and designer to search any recipe.

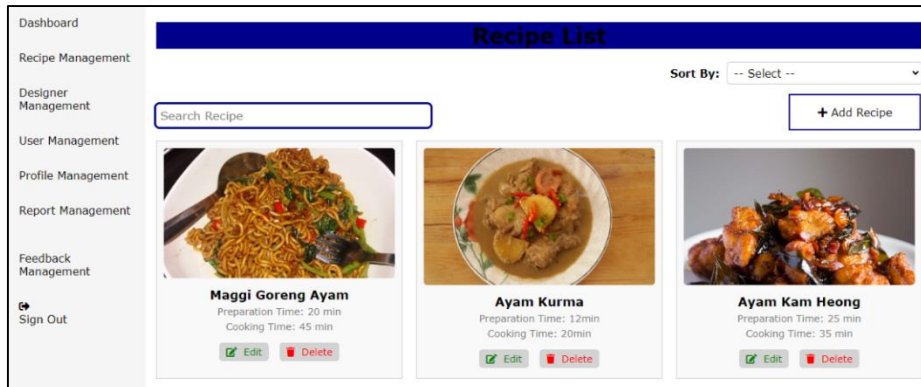


Figure 19: Recipe Management Interface

Figure 20 shows Designer Management Interface where all the data of designer are shown on this page. Admin can manage designers by sorting the designer based on their username, number phone, name, and email. Admin can add new designer, edit, and delete designer. The feature of searching can ease admin to search any designer.

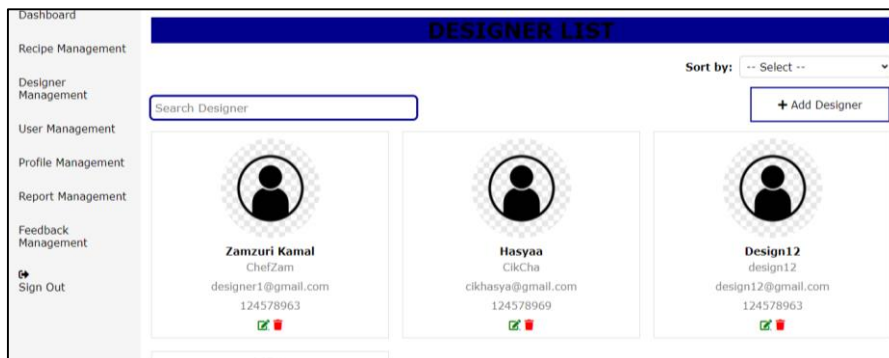


Figure 20: Designer Management Interface

Figure 21 shows User Management Interface where all the data of user is shown on this page. Admin can manage User by sorting the user based on their username, number phone, name, and email. Admin can add new users, edit, and delete users. Feature of searching can ease admin to search any user.

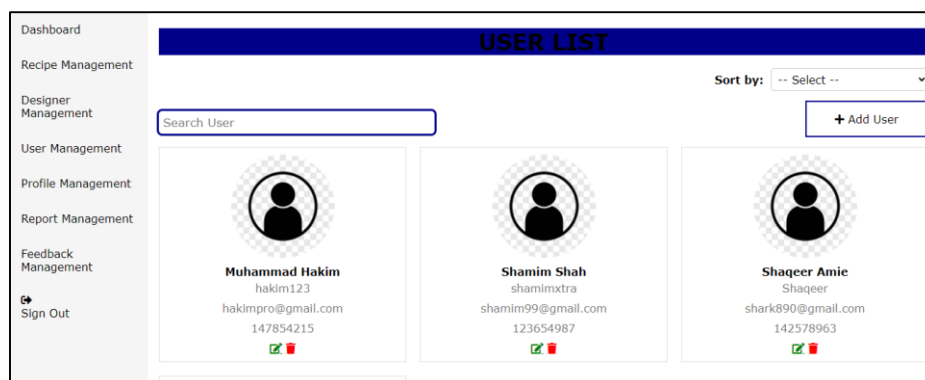


Figure 21: User Management Interface

Figure 22 shows interface for report management. In this page Admin need can see the data of recipe and dashboard. To generate graphs, admin needs to click the button generate report. Figure 23 shows code segment for report management.

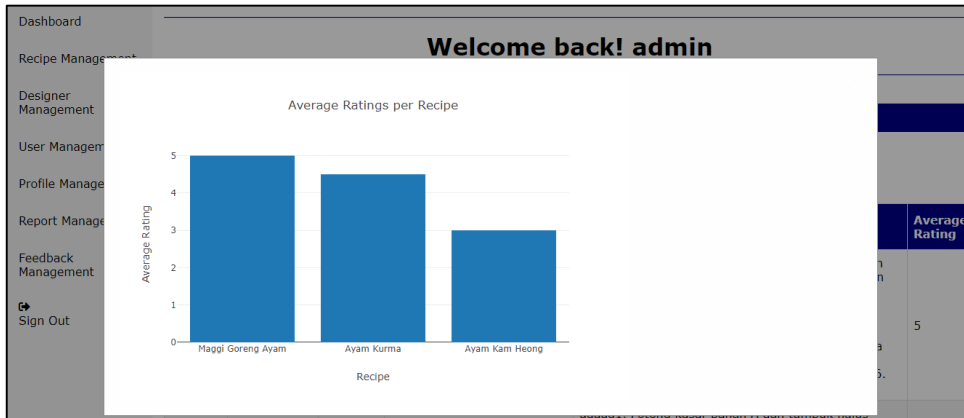


Figure 22: Report Management Interface

```
function openGraphPopup() {
    // Fetch the recipe names and average ratings from the table
    var recipeNames = [];
    var averageRatings = [];
    <?php
    $result->data_seek(0);
    while ($row = $result->fetch_assoc()) {
        echo 'recipeNames.push("' . $row['name'] . '");';
        echo 'averageRatings.push(' . $row['avg_rating'] . ');';
    }
    ?>

    // Generate the graph using Plotly.js
    var data = [{
        x: recipeNames,
        y: averageRatings,
        type: 'bar'
    }];

    var layout = {
        title: 'Average Ratings per Recipe',
        xaxis: {
            title: 'Recipe'
        },
        yaxis: {
            title: 'Average Rating'
        }
    };
};
```

Figure 23: Code Segment for Graph

Figure 24 shows interface for Feedback and Review. All the Feedback and Review and shown in one page so that admin can handle it easily.

The screenshot shows a dashboard with a sidebar on the left containing menu items: Dashboard, Recipe Management, Designer Management, User Management, Profile Management, Report Management, Feedback Management, and Sign Out. The main content area is titled 'FEEDBACK AND REVIEW LIST' and contains a search bar and a table. The table has columns: No., Review ID, Username, Review Star, Message, Date, and Actions. Below the table is another search bar and a table with columns: No., Email, Name, Phone No, Feedback/Messages, and Sent At.

No.	Review ID	Username	Review Star	Message	Date	Actions
1	28	hayra	5	dah cuba sedap gilaaa	Friday, June 16, 2023	
2	29	user1	5	sangatt mudah nak belajar	Tuesday, May 9, 2023	
3	30	design1	5	dahh cuba and senang	Saturday, June 17, 2023	
4	31	design1	3	Video tak clear	Saturday, May 17, 2023	
5	45	Clark	4	Dah cuba sedapnyaa	Saturday, May 3, 2023	

Figure 24: Feedback and Review Interface

4. Result and Discussion

Before the final release of the proposed system to the users, a series of tests will be conducted to ensure its proper functioning. These tests will validate whether the proposed system successfully meets all the functional requirements that were defined during the analysis phase. The testing process for the suggested system will primarily focus on functional testing, which aims to assess the system's compliance with the specified functional requirements. This rigorous testing phase guarantees that the proposed system operates as intended and delivers the expected functionality to the users.

4.1 System Testing

System testing plays a vital role in software development by thoroughly examining the entire system. It aims to ensure that the software meets the desired requirements, operates flawlessly, and delivers optimal performance in diverse situations. By identifying any flaws or glitches early on, system testing ensures that the final product is of high quality and reliability before it reaches the users.

Table 4: System Functionality Testing

Section	Description	Expected Result	Actual Result
Register	Empty the register form	Error message: Username is empty	Pass
		Error message: Password is empty	Pass
		Error message: Password does not match	Pass
		Error message: Email is empty	Pass
		Error message: Name is empty	Pass
	Enter confirm password with different password	Error message: Password does not match	Pass
	Enter confirm password with same password	Messages appear: Your password is match	Pass
Enter email without @	Error message: Email not valid	Pass	
Register with correct input	Message appears: Successfully register!	Pass	
Login	Enter correct username and wrong password	Error message: Username or password is wrong	Pass
	Enter wrong username and wrong password	Error message: Username or password is wrong	Pass
	Enter wrong username and correct password	Error message: Username or password is wrong	Pass
	Enter correct username and correct password	Login successful	Pass
Forgot Password	Enter wrong email	Error message: No account exists!	Pass
	Enter correct email	Email to recover account successful	Pass

Top Page	Users click top recipe button	Show top recipe	Pass
	Users click All Recipe button	Show All Recipe	Pass
	Users click categories of recipe	Show categories of recipe	Pass
	User Search recipe	Show Search recipe	Pass
	User Search Recipe by Uploading Photo	Show Search recipe	Pass
	Users click Login button	Show Login page	Pass
Recipe	User selected the recipe	Show recipe details	Pass
	Users click the picture of recipe	Show recipe picture	Pass
	Users click videos tutorial to watch	Show recipe videos	Pass
	User rate and review the recipe	Show's ratings from other users	Pass
	Users click the print button	Navigate to print page	Pass
	Users click the like button	Show liked recipe into like page	Pass
Suggestion	Empty the form	Error message: Empty form	Pass
Edit profile	User able to edit profile	Messages appear: Your profile is updated	Pass
	Designer able to edit profile		Pass
Recipe Management	Admin can add recipe	Recipe shows in dashboard	Pass
	Designer can add recipe		Pass
	Admin can update recipe	Existing recipe in updated	Pass
	Designer can update recipe		Pass
	Admin can delete recipe	Recipe is deleted	Pass
	Designer can delete recipe		Pass
	Admin can search recipe	Recipe shows in table	Pass
	Designer can search recipe		Pass
Feedback Management	Admin can view feedback	Feedback show in dashboard	Pass
	Designer can view feedback		Pass
	Admin can delete feedback	Feedback is deleted	Pass
	Designer can delete feedback		Pass
	Admin can search feedback	Feedback show in table	Pass
	Designer can search feedback		Pass
Report Management	Admin can generate graph for report	Graph shows in page	Pass

4.2 User Acceptance Testing

During User Acceptance Testing (UAT), seven students get to explore and test a web-based Student's Recipe E-book system. These students perform tasks like searching for recipes, following instructions, and sharing feedback on the system's usability. User Acceptance Testing ensures that the system meets their needs, is easy to use, and provides an enjoyable experience. The valuable input helps improve the system and create a user-friendly platform for all students. Figure 25 shows the result after 7 students use the system.

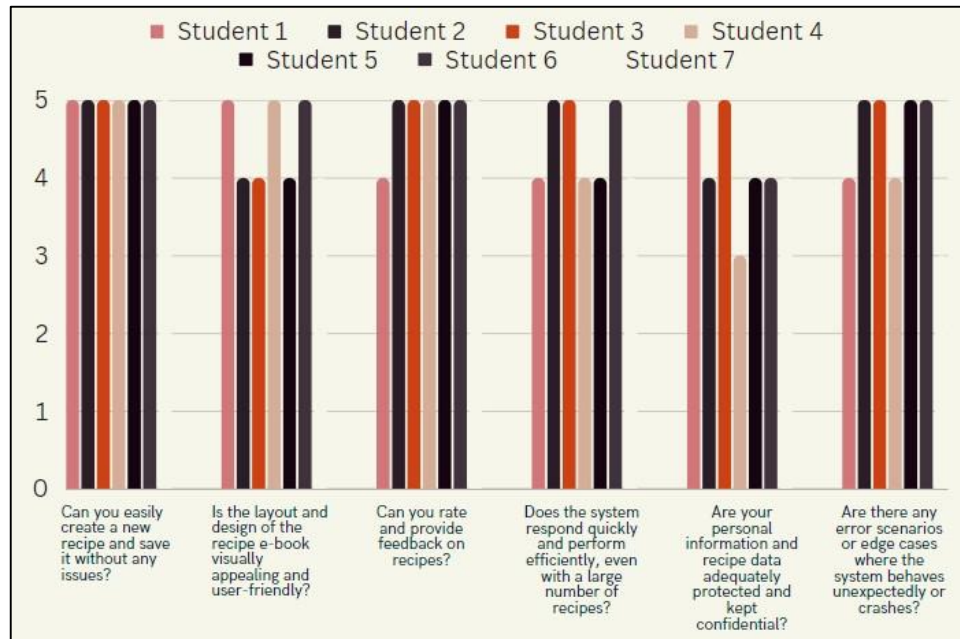


Figure 25: User Acceptance Testing

5. Conclusion

In conclusion, the web-based Student's Recipe E-book system is designed to cater to the needs of students who are looking for an accessible and comprehensive platform for recipes. The User Acceptance Testing (UAT) process, involving seven representative students, played a crucial role in ensuring that the system meets their expectations. Valuable feedback from the students helped in identifying areas that required improvement, such as search functionality, recipe categorization, and bookmarking features. The development team diligently addressed these issues and made the necessary enhancements to enhance the user experience. With the UAT process completed, the Student's Recipe E-book system is now ready to be deployed, offering students a convenient and enjoyable way to explore and experiment with various recipes.

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APPENDIX A

User Acceptance Test

Gender	Age	Do you typically use we	Can you easily create a r	When you edit a recipe, Have you encountered a	
Man	21 - 25	Yes	5	5	4
Woman	26 - 30	Yes	5	5	5
Man	21 - 25	Yes	5	5	5
Man	31 - 35	Yes	5	5	4
Woman	21 - 25	Yes	5	5	5
Woman	26 - 30	Yes	5	4	4
Man	21 - 25	Yes	5	5	5
Woman	21 - 25	Yes	5	5	4
Woman	<= 20	Yes	5	4	4
Woman	21 - 25	Yes	5	4	5

Does the recipe e-book's	Do the buttons and men	Can you find and filter r	Are you able to add reci	Can you successfully pri	Can you rate recipes and
5	5	4	4	5	5
4	4	5	5	4	5
5	5	4	5	3	5
4	4	4	4	5	5
5	5	5	5	5	5
5	5	4	5	4	5
5	4	5	4	5	4
5	4	4	5	4	5
5	4	4	5	4	5
5	5	5	4	5	4

Can you leave comment	Does the system respon	Does it function well on	Do you feel that your pe	Do you understand the €	Have you experienced a
5	5	5	5	4	4
5	4	5	5	4	4
3	4	5	4	5	4
4	4	5	4	4	5
4	5	5	4	4	5
4	4	5	4	4	4
4	5	5	4	4	5
4	5	4	4	4	5
5	4	4	5	5	4
5	5	4	4	4	5

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