



Design and Development of Photography Studio Appointment Web Application

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DOI: <https://doi.org/10.30880/aitcs.2023.04.02.102>

Received 24 June 2023; Accepted 27 October 2023; Available online 30 November 2023

Abstract: The web-based Photography Studio Appointment System is proposed and developed for Folkway Photography that currently uses manual method to handle all operations. The manual method results in great waste of time and energy, data redundancy and inconsistency, and the possibility of information being misplaced. Hence, the proposed project is intended to ease the appointment process for customers and management operation for the studio. Waterfall methodology is used in the project development, and the main languages used are HTML, CSS, and PHP. The developed system is expected to be an easy-to-use system that all users can easily access and navigate the system. Besides, the developed system is expected to reduce the workload of customers and administrator of the photography studio.

Keywords: Appointment, Photography, Web-based

1. Introduction

Photography is the art, practice, and application of making long-lasting images by chemically or electronically capturing light using a light-sensitive medium such as photographic film or an image sensor [1]. An online appointment system is a software that allows individuals to manage service bookings [2]. All service organisations may easily manage their phone and in-person appointments with the help of an online appointment system that accepts bookings, appointments and payments online. An online appointment system enables a potential customer to reserve and pay for a service online that ease the process.

The owner of Folkway Photography currently uses manual methods such as Microsoft Excel and Google Sheets to keep track of information databases and make decisions about bookings. Nevertheless, there are a number of issues that both administrator and customers have when managing and ordering photography studio services respectively, starting with no system in place that makes the ordering process harder because appointments may only be placed in person, via WhatsApp, phone calls or go to studio by themselves. Besides, using manual methods to record all appointments may cause duplicate appointments on the same date and time, which confuse both administrator and customers. Other than that, poor data management results in missing essential data since all the information is stored in hard copy.

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Therefore, Photography Studio Appointment Web Application is proposed. This developed system is intended to allow customers to choose several services, such as make appointments, make payments and give feedback in the system. In addition, the administrator is able to manage all the activities of the photography studio, including user management, services management, and report generation.

Based on the several problem statements, several objectives are identified. The objectives of the project include:

1. To design an attractive and user-friendly interface to ensure all users can easily access the system.
2. To develop photography studio appointment system using web-based approach.
3. To test the performance and efficiency of the developed system.

Overall, in section 1, the background of study and problem statement will be explained briefly. In section 2, the similar systems are investigated, and a comparison is made from aspect of feature and functionalities. In section 3, the methodology used is defined. Section 4 discusses the analysis and design, implementation, and functional testing results. Section 5 concludes the summary of this paper.

2. Related Work

2.1 Services Appointment System

In general, online booking systems allow users to book a service. Additionally, they can pay for the service via the website. The more sophisticated software will enable bookings via social media and mobile devices. This means that bookings can be made from any location and at any time. This makes scheduling appointments easier. Everything is done online, from when a customer decides they want to book appointment for the service, either it is in-person or an online booking by selecting a date, choosing a time, and paying for the booking [3]. Therefore, it significantly lessens the administrator' burden and avoid the possibility of duplicate bookings. Hence, the online appointment system is one of the most efficient instruments for distributing service products to seize more significant opportunities in the market [4].

2.2 Study on Existing Related Systems

The three existing related systems that are involved in this study are Kiki Photo Studio, West 70 Photography, and Michigan Photography.

Kiki Photo Studio is a web-based and Android-based application that allows users to register for new accounts and login into the system. Users can add their desired packages services to the Wishlist page. Kiki Photo Studio also provides a booking feature in the Google Form format that can be found on the website. Instead of using Google Form booking, users can also make appointments manually through phone calls, WhatsApp or go to the studio directly. Apart from that, Kiki Photo Studio also offer a feedback feature where all the users can write and view testimonials. There is a map integration feature, where the users who visit the website can scan the QR code that will directly go to Google Maps and find the specific location of the physical studio.

West 70 Photography is a web-based system. To book an appointment, users do not need to log in to the system as this website does not offer login, logout, and registration feature. They are required to select a date and time followed by filling in their personal information. Additionally, they must choose the payment method from the two options: credit/debit or exact cash at the photo shoot time or pay with a gift voucher. For the gift voucher, users can either purchase it for themselves or someone else. Moreover, West 70 Photography also provides feedback forms for the users. Despite that, this website also provides a contact form to enable users to send questions or messages. Also, this website provides a collection of previous pictures taken in the photography studio. This allows the users to view the collections before making an appointment.

Michigan Photography is a web-based system that specially developed for University of Michigan. To request the appointments, users must fill in the form on the website and send the appointment request. In this context, there is another special type of appointment for the passport photo service only. This service allows the users to pay with electronic pay, debit or credit card only. To book an appointment, users can choose the appointment date and time through Google Calendar embedded on the website. The Google Calendar will show the available date and time for the users to avoid the duplication of appointments on the same date and time. Also, Michigan Photography offers the downloading and order collections of the photographers' team.

Table 1 shows the comparison between the existing systems and the developed system.

Table 1: Systems' Comparison

Feature	Kiki Photo Studio	West 70 Photography	Michigan Photography	Developed system
Login and logout	✓	×	×	✓
Registration	✓	×	×	✓
Appointment	✓	✓	✓	✓
Payment	×	×	×	✓
Collection	✓	✓	×	✓
Gift voucher	×	✓	×	×
Feedback	✓	✓	×	✓
Contact Us	✓	✓	×	×
Google map integration	✓	✓	✓	×
Service management	×	×	×	✓
User management	×	×	×	✓
Report generation	×	×	×	✓
Web-based	✓	✓	✓	✓
Android-based	✓	×	×	×

3. Methodology

The methodology is used to address any issues that may arise and to guarantee that the project will progress as planned, allowing it to be finished within the allotted time frame [5]. The chosen methodology is the Waterfall model. This methodology was selected since it is simple to comprehend and apply. The waterfall model depicts the software development process as a sequential, linear process [6]. The stages of the waterfall model include planning, analysis, design, implementation, testing, and maintenance as shown in Figure 1.

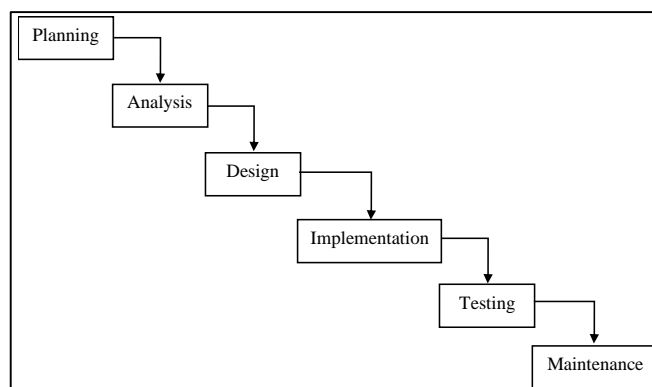


Figure 1: Waterfall Model

In the planning phase, the author defines the problem statements, set the objectives, and plan the project scopes. All these requirements are important to be clearly defined to ensure that the author had a clear mindset on the development of the developed system. The project scope includes the study location, the target users, the techniques used, and also the system modules that will be developed. Also, the expected results and project significance are defined. Since the tasks in the waterfall model depend on the previous tasks, it requires a lot of forethought. The author then set a plan by scheduling a Gantt chart to list down all the activities with the durations that will be carried out throughout the project development, as discussed in Figure 2. Gantt chart helps guide the author in completing the tasks so that the author will not be rushing in the last minute.

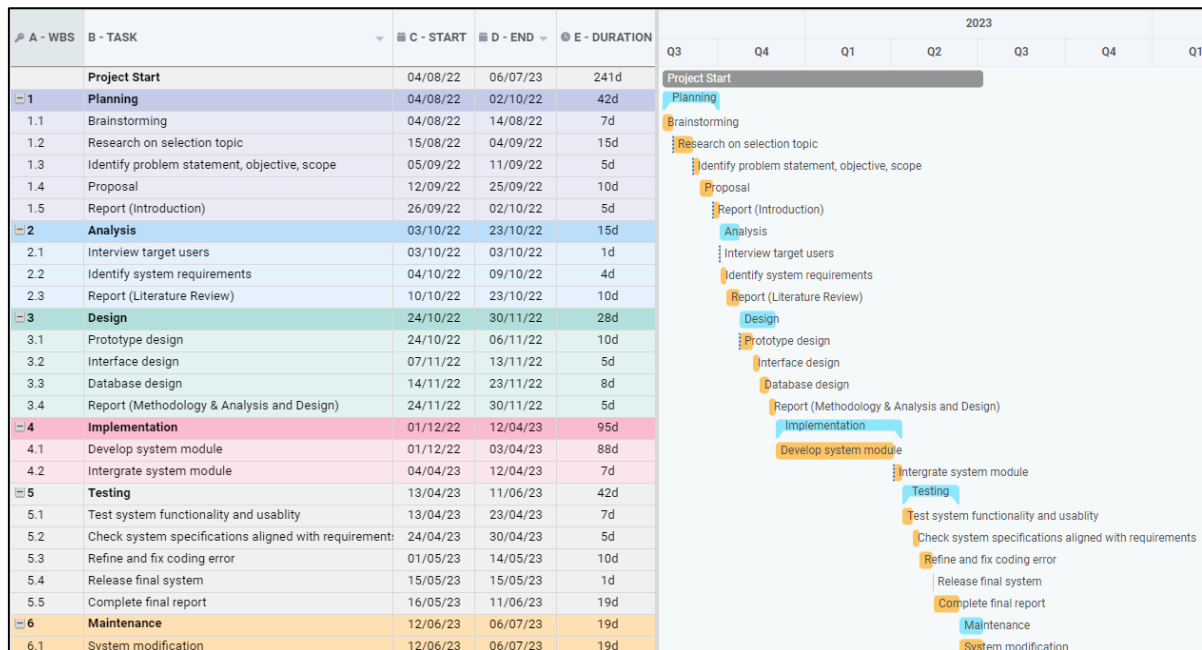


Figure 2: Gantt Chart

In the analysis phase, the author read lots of journal articles that are related to the project title to have a better understanding of the workflow of the system’s development. Also, the author reviews the existing systems and makes a comparison with the developed system. In this context, the author also conducts an interview with the owner of Folkway photography to understand the workflow of the studio. Other than that, the hardware and software requirements, and requirement analysis are outlined to ensure that all requirements and related tasks are compatible with the system [7].

To perform the developed system's process flow, the design phase includes several diagrams illustrating process of the system will function. The three design categories used for this project includes process design, database design, and interface design. Interface design requires elements such as the design of input forms and outputs. In this context, the user interface must be determined. The appearance and features of the system must be appropriate. Additionally, the system's colour scheme ought to be appropriate and representative of the system. The consistency must always be upheld in the placement of web elements, colour, font size, and layout. The entire diagram and the items described above serve as a user's guide to the developed system's operational flow.

In the implementation phase, code is used to convert the information from the previous phases into the actual system. The developed system is a web-based system that was built using multiple programming languages. Hypertext Markup Language (HTML), Cascading Style Sheets (CSS), and JavaScript are used for front-end development, while Hypertext Preprocessor (PHP) is used for back-end development. In this project, MYSQL will be used to manage the database.

When implementation is complete, the completed system will be tested and evaluated to identify any issues that may affect its performance. Before beginning the testing procedure, it is necessary to develop a test plan. During this phase, problems are also resolved. At this stage, the system will also be evaluated to determine if it meets the requirements. At the end of the testing phase, the developed system's ultimate version will be released.

In the maintenance phase, users will utilise the system and provide feedback regarding modifications or enhancements. Any alterations or modifications are made based on user feedback to ensure that the system meets all requirements. The subsequent step is to provide support and maintenance by ensuring the system operates as intended. This step's primary objective is to address any issues, defects, or problems that users may encounter while utilising the process. Furthermore, enhanced modifications of the system are issued.

4. Results and Discussion

This section discusses the results and discussion of the project, which are the system analysis and design, implementation, and system testing results.

4.1 System Analysis and Design

System analysis and design deal with planning the development of information systems by outlining in detail what a system should perform and how its components should be implemented and interact. The information discussed included the system architecture design, system requirement analysis, data flow diagram (DFD), entity relationship diagram (ERD), and interface design of the developed system.

4.1.1 System Architecture Design

The system architecture diagram that abstracts the relationships, constraints, and boundaries between software system components [8] is designed as shown in Figure 3. It provides a complete overview of the physical deployment and development roadmap for the software system.

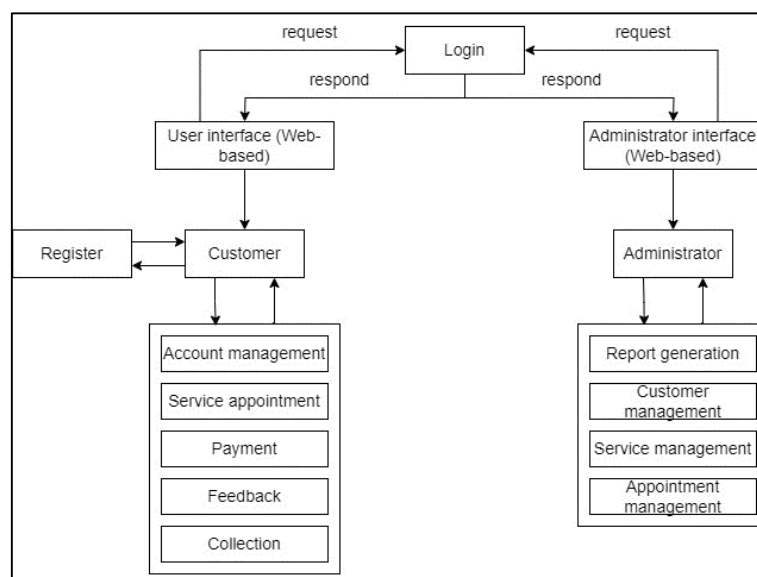


Figure 3: System architecture diagram

4.1.2 System Requirement Analysis

Requirements analysis is the process of analysing, documenting, validating, and managing software or system requirements. The functional requirement of the developed system is analysed as shown in Table 2.

Table 2: Functional requirements

Main module	Requirements
Registration	<ol style="list-style-type: none"> 1. Customers can register accounts by filling in required information. 2. The developed system alerts for any wrong input formats.
Login and logout	<ol style="list-style-type: none"> 1. All types of users login with correct username and password to the developed system. 2. The developed system alerts for any wrong input formats. 3. All types of users logout of the system.
Customer site	<ol style="list-style-type: none"> 1. Customer can view services available. 2. Customers can make appointments for the services provided by selecting the available date and timeslot. 3. Customers can make payment for the appointments. 4. Customers can write and submit their feedback. 5. Customers can manage the appointments and collections. 6. Customers can view, update, or delete account information.
Admin site	<ol style="list-style-type: none"> 1. Administrator can manage the customers' information, services, appointments, and feedback. 2. Administrator can generate and view on the report generated.

4.1.3 Data Flow Diagram

For the process designs, it includes the Context Diagram that illustrates the interactions between external entities and internal system software [9] as shown in Figure 4. There are two main entities represent the types of users in the developed system, which are administrator and customers. The major functions of the developed system for customers include registration of an account, login and logout, managing an account, viewing a list of services and appointments, booking appointments, making payments, and giving feedback. For administrator of the developed system, they are able to login and logout, manage users, manage photography studio services, view list of appointments, view list of feedback, and generate report for the developed system.

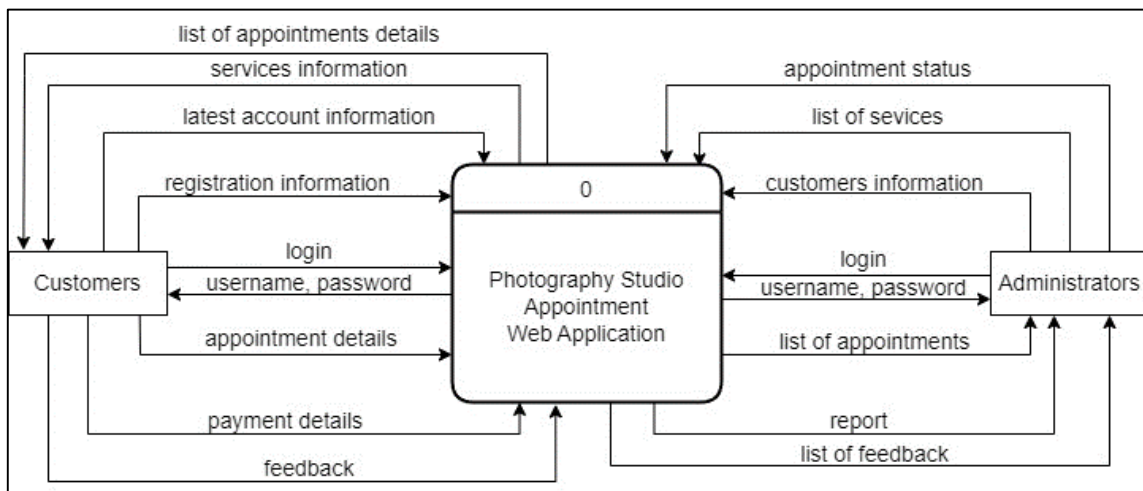


Figure 4: Context diagram

Data Flow Diagram (DFD) depicts the information flow inside a system or process. DFD level 0 demonstrates all activities at the first level of numbering, as well as data stores, external entities, and data flows between them as shown in Figure 5. The objective of the level 0 DFD is to illustrate the relationships between the system's primary high-level processes. There are seven processes included in the development of the developed system, which are register (process 1.0), login (process 2.0), manage

services (process 3.0), book appointments (process 4.0), make payments (process 5.0), send feedback (process 6.0), and generate report (process 7.0).

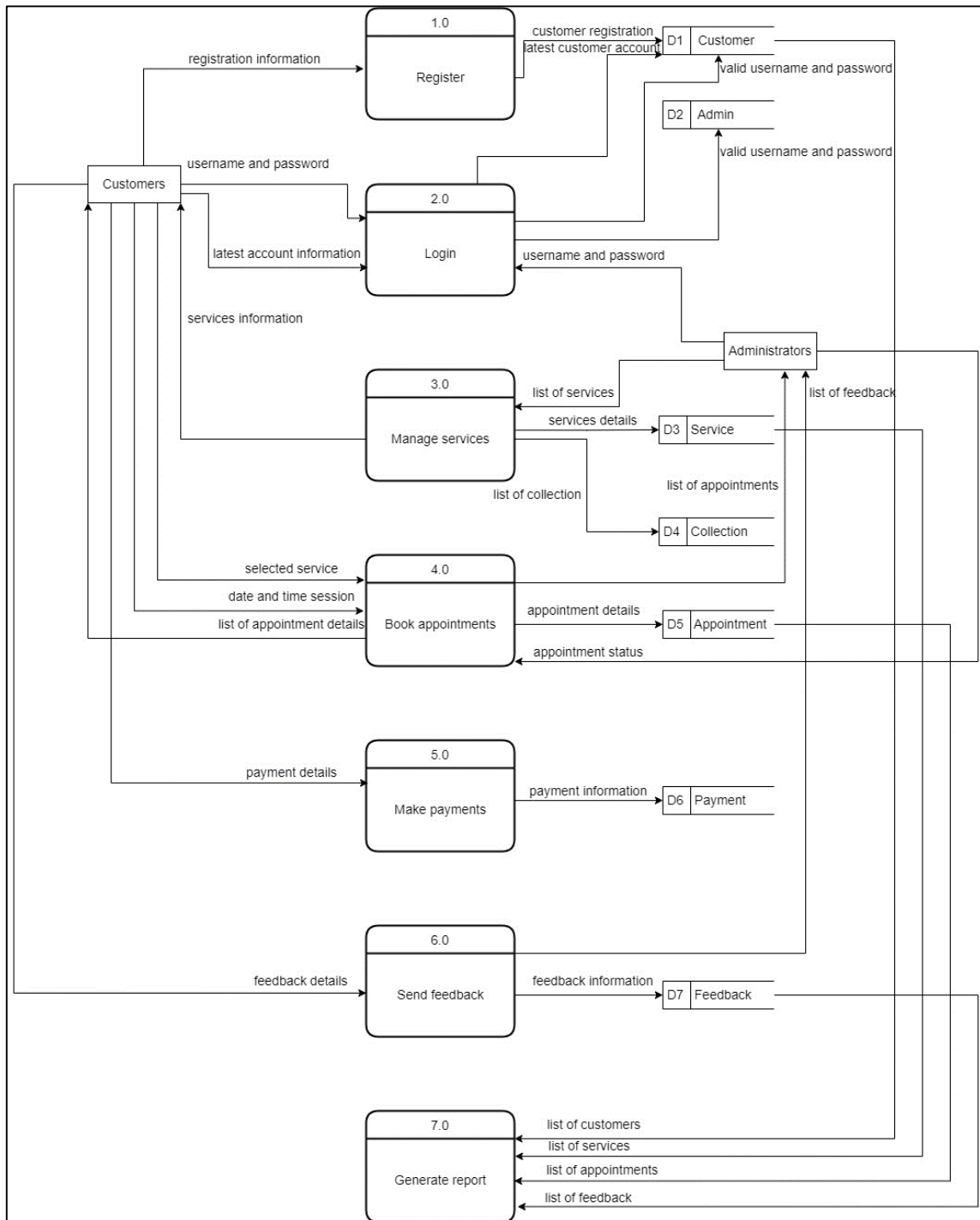


Figure 5: DFD level 0

4.1.4 Entity Relationship Diagram

Entity Relationship Diagram (ERD) is a common type of structure diagram. There are a variety of symbols and connectors in an ERD that help to visually represent the primary entities and their relationships within the context of the system as a whole as shown in Figure 6. There are seven data dictionaries for the developed system.

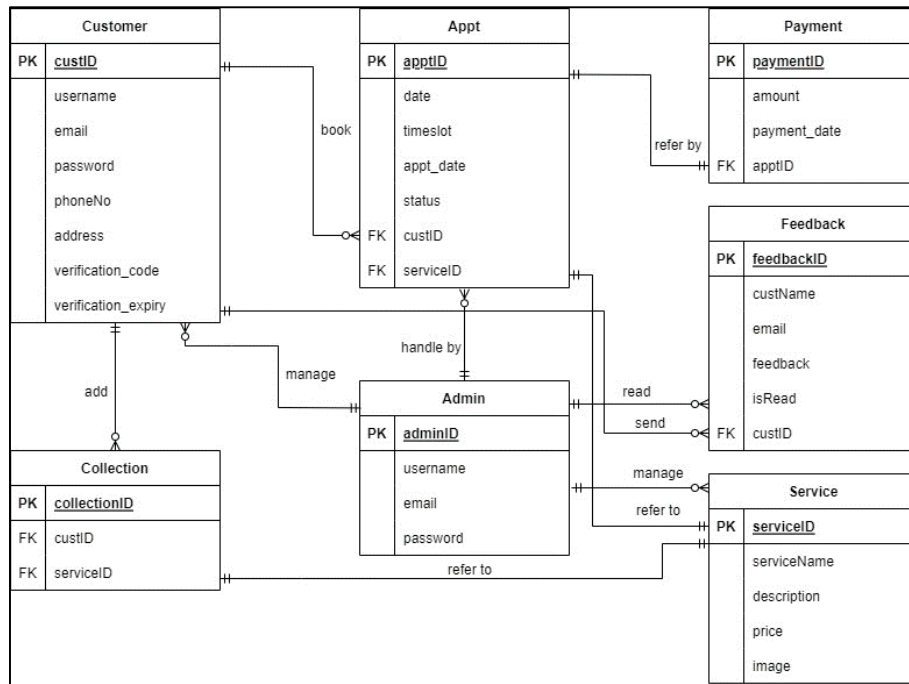


Figure 6: ERD diagram

4.1.5 User Interface Design

User interface design refers to the visual layout of the components with which a user can interact with a website or technological product. This could refer to the buttons on a radio or the graphic layout of a website. The user interface design of an application can significantly impacts its utility and user experience.

Figure 7(a) and Figure 7(b) show the main interface for the customer’s site. Figure 7(a) shows the Services page. Customers can view all the services provided by the website. Figure 7(b) shows the service’s detail interface. On this page, customers can view all the descriptions about the service. They can choose the available date and time session to book an appointment. After that, they can click on the “Book” button that will redirect them to the payment page.

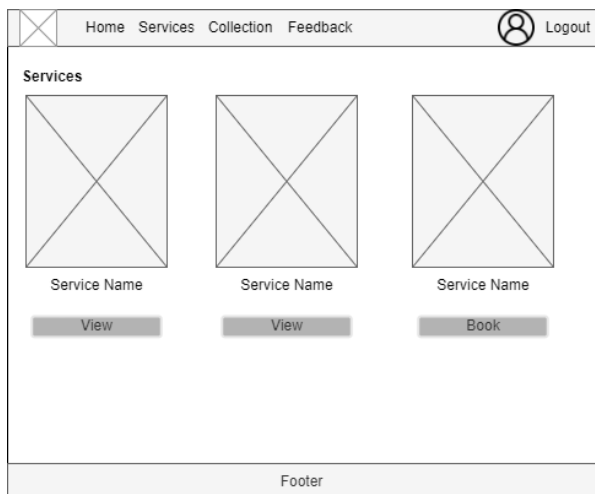


Figure 7(a): Service page

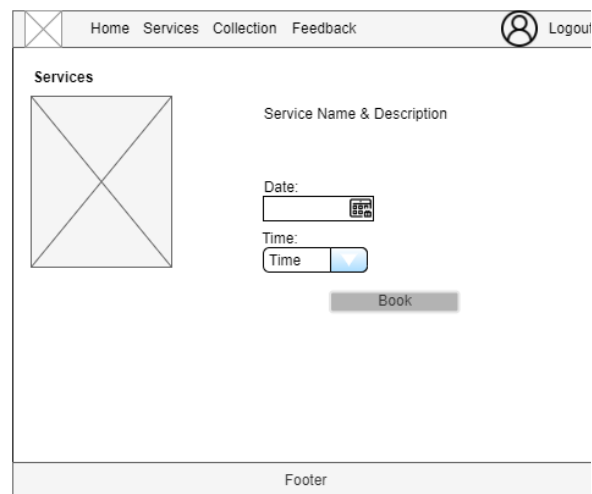


Figure 7(b): Service detail page

Figure 8 shows the main interface for the administrator’s site. The administrator can manage the customers’ information, services’ details, appointments’ status, and generate reports for the developed system.

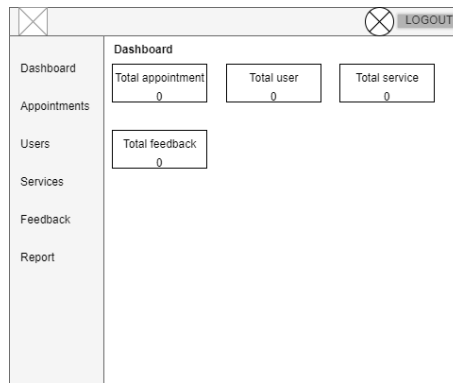


Figure 8: Main interface for administrator site

4.2 Implementation

Implementation refers to the phase in the project development process where programming codes are written based on the system design. It involves the actual coding and creation of the project according to the specified design. The developed system is coded using HTML, CSS, JavaScript, PHP, and MySQL acts as the database to connect with the system [10]. Figure 9 shows the code segment that is used to connect the database of the developed system, which is named fyp.

```
<?php
$con=mysqli_connect("localhost", "root", "", "fyp");
if(mysqli_connect_errno()) {
    echo "Connection Fail".mysqli_connect_error();
}
?>
```

Figure 9: Database connection code segment

4.2.1 Implementation of Login and Logout Module

Figure 10(a) and Figure 10(b) shows the interface for the customers and administrator to log in to the developed system. They are required to enter the username and password correctly.

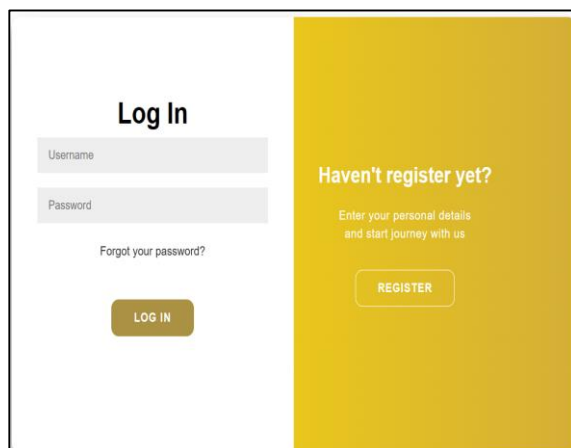


Figure 10(a): Customer login page

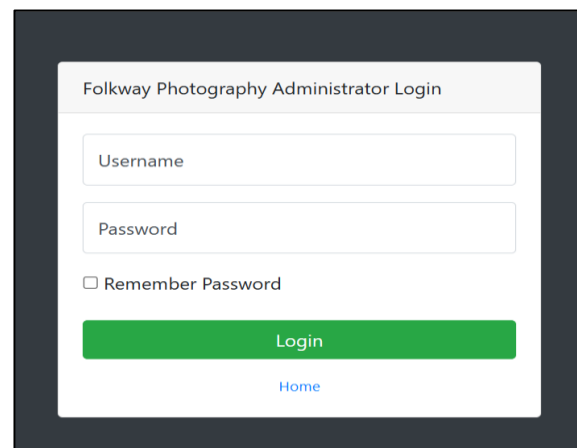


Figure 10(b): Administrator login page

4.2.2 Implementation of Profile Management Module

In this module, to register new accounts, customers are required to enter all personal details, such as the username, email, password, and password confirmation as shown in Figure 11. The database will check whether a username has been registered.

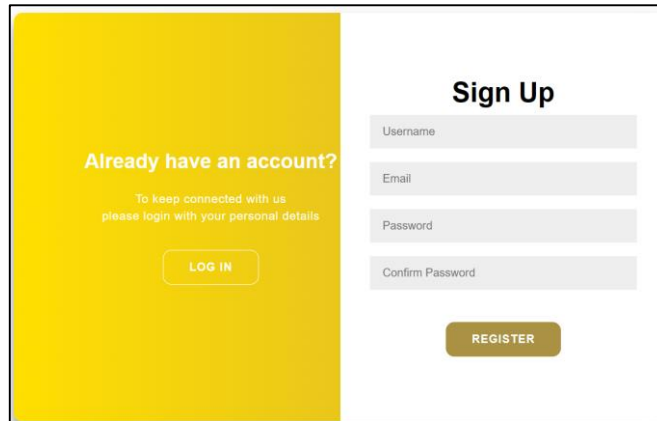


Figure 11: Sign up page

Besides, customers can update their personal information. The personal information that can be updated, including email, phone number, and address as shown in Figure 12(a). Also, customers can edit their password by entering their current password first, new password and new password confirmation later as shown in Figure 12(b).

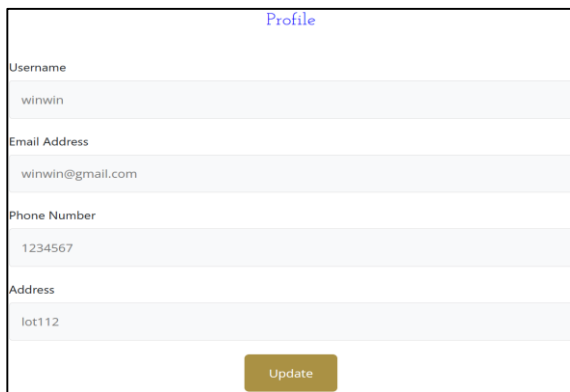


Figure 12(a): Profile page

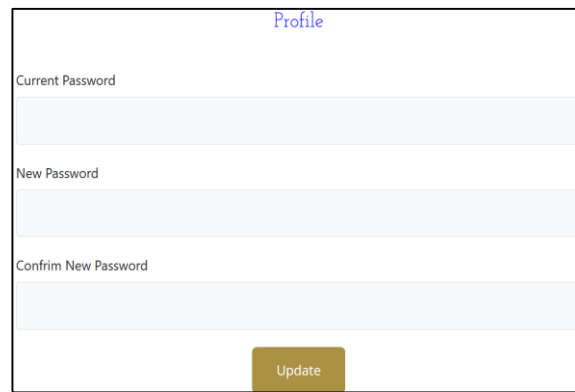


Figure 12(b): Change password page

Other than that, customers can manage on the collection page as shown in Figure 13. The main purpose of the collection is to allow customers to save the services that are interested in for future reference. They can click on the delete button that will remove the collection from the list.

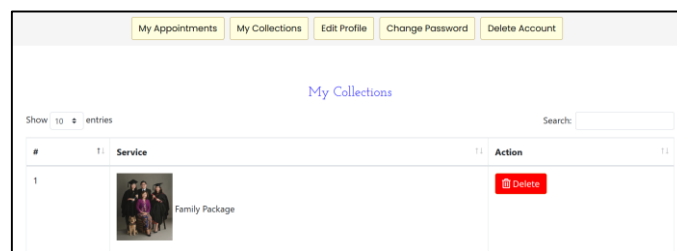


Figure 13: Collection page

4.2.3 Implementation of Appointment Module

In the appointment module, customers are able to choose the available services. Customers are required to select the available date and timeslot for the service chosen as shown in Figure 14 and Figure 15. Once the timeslot is booked, the timeslot turns red, indicating the customers cannot choose the timeslot anymore. In this context, the customers are also restricted from choosing the past timeslots in the current date.

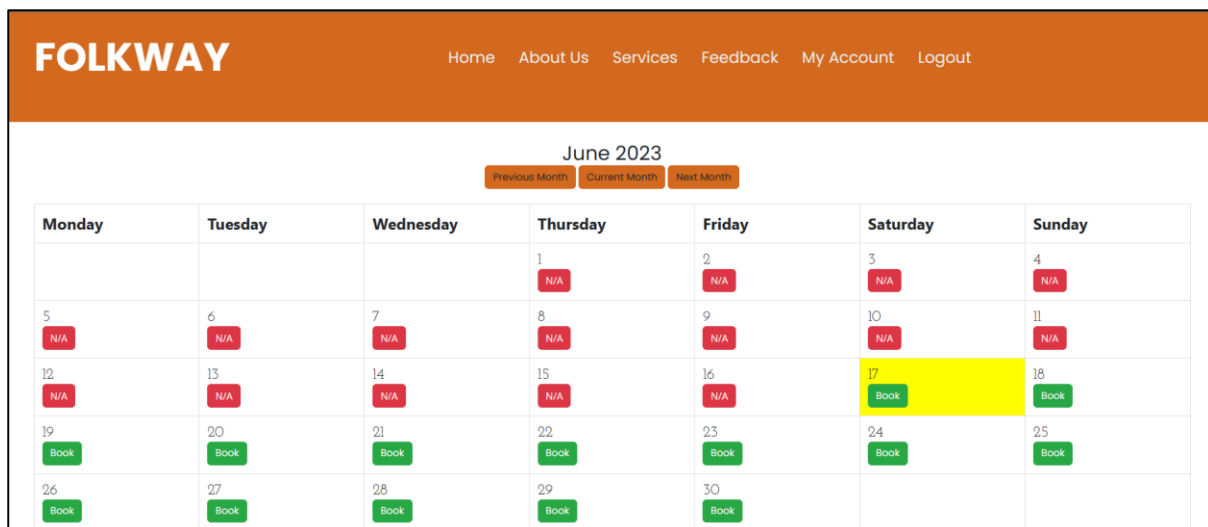


Figure 14: Appointment select date page

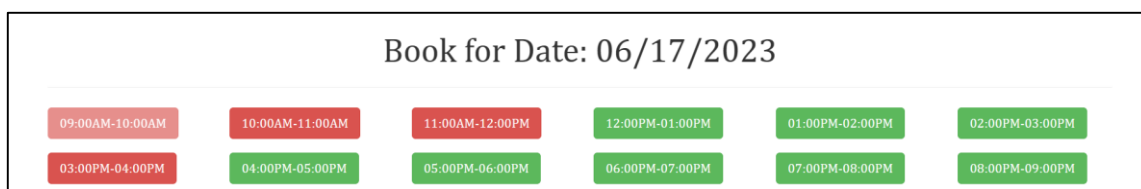


Figure 15: Appointment select timeslot page

After customers book successfully, the appointment with the details will show on the My Appointments page as shown in Figure 16. In this page, customers can view the appointment details for all the appointments, including the latest status. Also, customers can perform edit and delete actions for the appointment’s details such as date and timeslot for the future appointments only, and there is view action only for the past appointments.

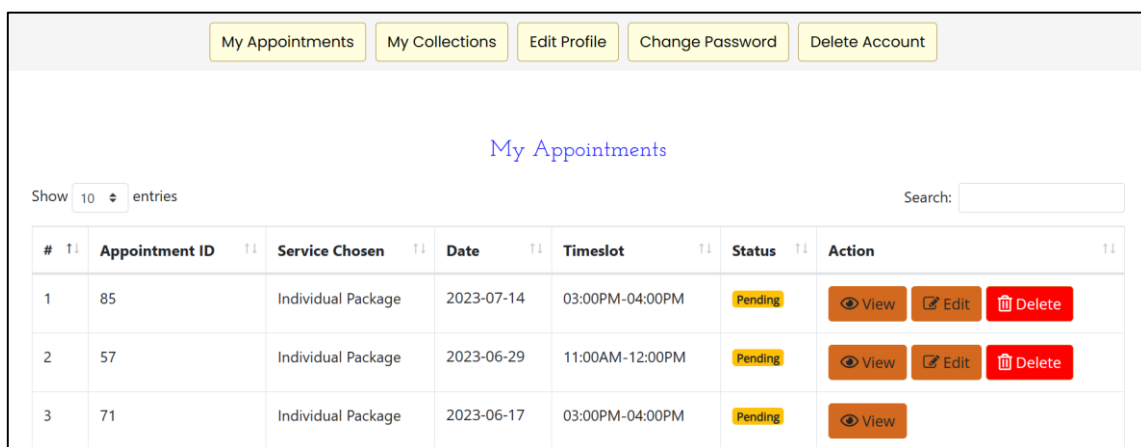


Figure 16: My Appointments page

4.2.4 Implementation of Payment Module

There are two types of payment options, where customers can choose to pay with Stripe or QR code as shown in Figure 17. If customers choose to pay with Stripe, it will redirect to the Stripe checkout page as shown in Figure 18, else if customers choose to pay with QR code, they will redirect to the page as shown in Figure 19.

Your Appointment Details

Username
winwin

Email Address
winwin@gmail.com

Service chosen
Individual Package

Service Price
RM50

Date
2023-06-17

Timeslot
12:00PM-01:00PM

Payment method

Pay with Stripe

Pay with QR Code

Checkout

Figure 17: Payment options page

Folkway TEST MODE

Individual Package
MYR 50.00

Pay with card

Email

Card information

1234 1234 1234 1234

MM / YY CVC

Name on card

Country or region
Malaysia

Securely save my information for 1-click checkout
Pay faster on Folkway and everywhere Link is accepted.

Pay

Powered by stripe Terms Privacy

Figure 18: Stripe payment page

FOLKWAY

Home About Us Services Feedback My Account Logout

Scan QR code to make payment:

Your Appointment ID: 114
Total amount to pay: RM80

Note: Your appointment status will updated soon once your payment is confirmed by admin. Thank You.
Click here to check your appointment status.

Figure 19: QR code payment page

4.2.5 Implementation of Feedback Module

In the feedback module, only the login customers can submit the feedback as shown in Figure 20.

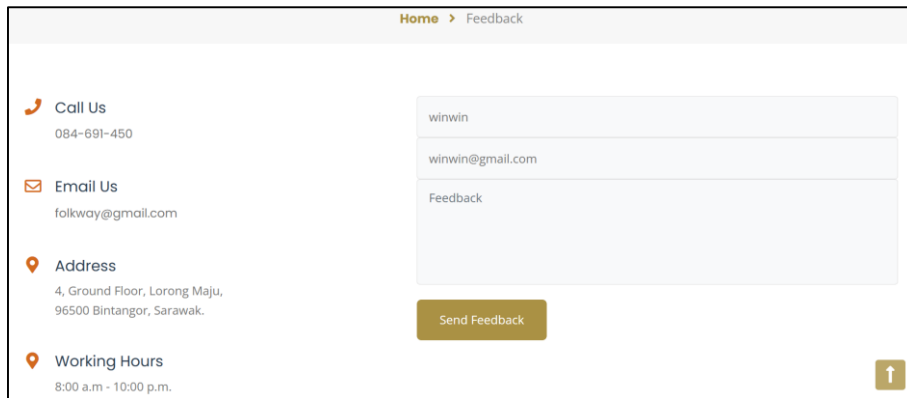


Figure 20: Feedback page

4.2.6 Implementation of User Management Module

Figure 21 shows the user management page for the administrator. The administrator can perform create, read, update, and delete action on the customers information, including the username, email, phone number, and address.

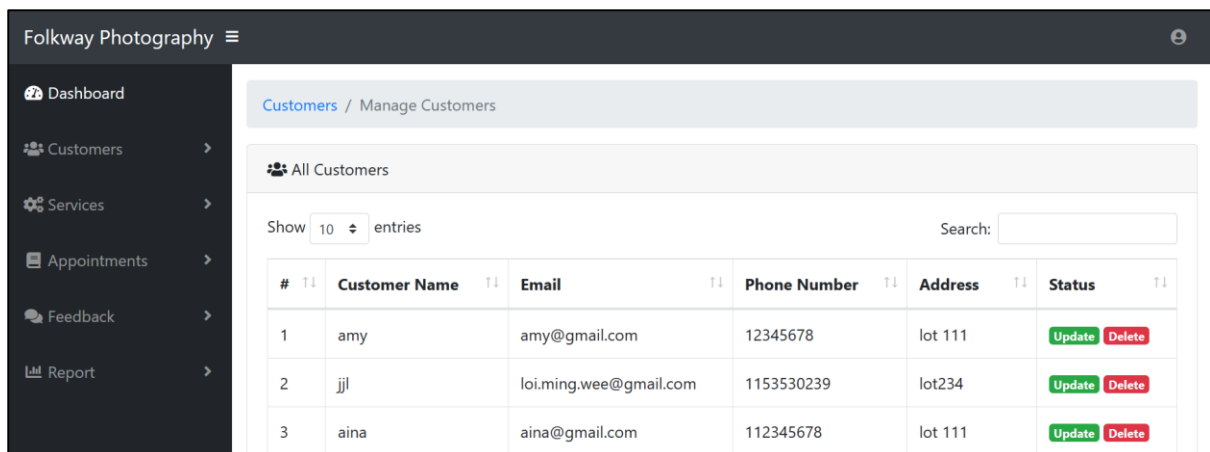


Figure 21: Customer management page

4.2.7 Implementation of Services Management Module

Figure 22 shows the service management page. The administrator may manage the services by updating the service description, price, image and adding new services.

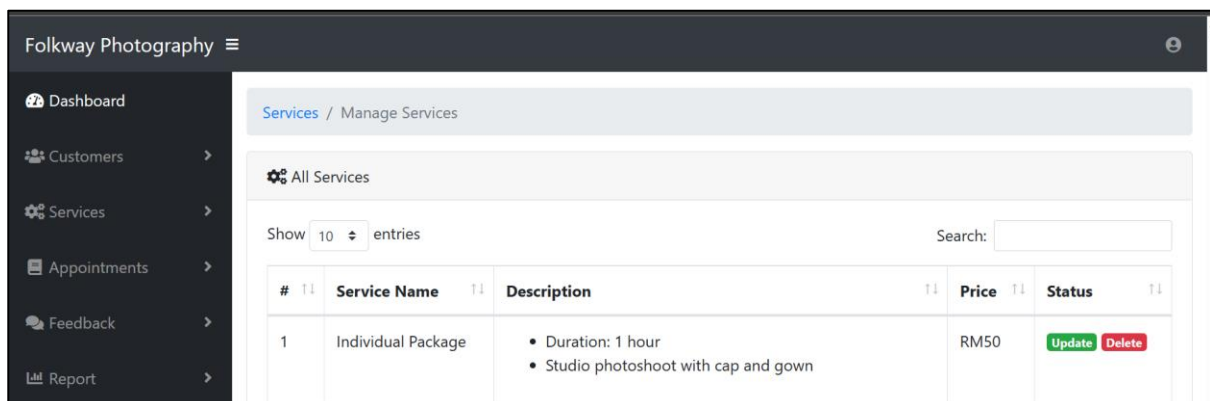


Figure 22: Service management page

4.2.8 Implementation of Report Generation Module

Figure 23 shows the generating report interface. Administrator can generate reports by clicking the generate button only after choosing the start and end date. The result list is displayed as shown in Figure 24.

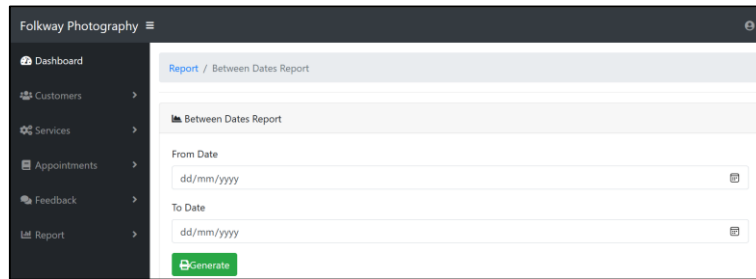


Figure 23: Report generation page

Folkway Photography

4, Ground Floor, Lorong Maju, 96500 Bintangor, Sarawak
Phone: 084-691 450
Email: folkway@gmail.com

Appointment List - From 2023-06-01 to 2023-06-30

Generated at: 2023-06-17 11:07:35

ID	Username	Service Chosen	Date	Timeslot
72	winwin	Individual Package	2023-06-15	11:00AM-12:00PM
76	winwin	Individual Package	2023-06-15	12:00PM-13:00PM
93	winwin	Individual Package	2023-06-16	01:00PM-02:00PM
86	winwin	Individual Package	2023-06-16	04:00PM-05:00PM
88	winwin	Individual Package	2023-06-16	05:00PM-06:00PM
91	winwin	Individual Package	2023-06-16	06:00PM-07:00PM

Figure 24: Result of report generation

Besides, the administrator can generate the sales report. There are two request types, which are monthly and yearly as shown in Figure 25.

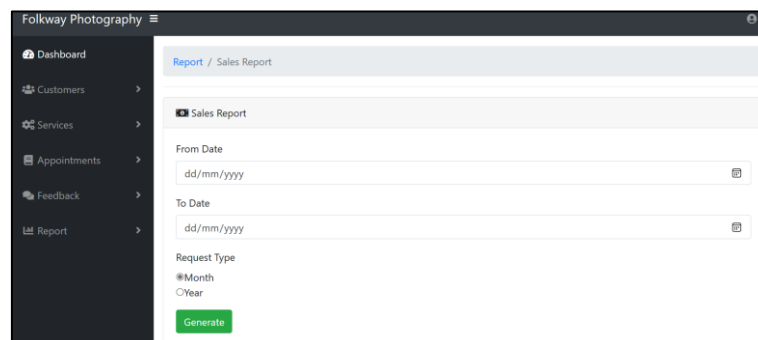


Figure 25: Sales report generation page

4.3 System Testing

System testing is a type of software testing that is concerned with ensuring the proper operation of the developed web application. Its purpose is to verify that the system meets all of the necessary functional and otherwise conditions. In this section, there are two types of testing that are carried out, functional testing and user acceptance test.

4.3.1 Functional Testing

Functional testing is a critical component of the software testing process that tries to analyse the functioning of a system or application. Functional testing is critical in ensuring the software performs effectively, conforms to user requirements, and delivers a seamless and efficient user experience. Table 3 show the test result for the developed system.

Table 3: Functionality test result

Function	Test Case	Expected Result	Result
Login/logout	Valid username and password.	A successful message will be prompt out, user will be redirect to the homepage of the website.	Pass
	Invalid username and password.	An alert message display, user is required to input the login credentials again.	Pass
	Logout.	Redirect to login page.	Pass
Registration	Complete registration details.	A successful message will be prompt out, customer will be redirect to the login page.	Pass
	Incomplete data input.	An alert message will display, customer is required to input all the required information.	Pass
	Incorrect data format.	An alert message will display, customer is required to input the correct format.	Pass
Forgot password	Enter email address and verification code will be sent.	An email contain verification code has been sent successfully.	Pass
	Reset password.	Password has been reset successfully.	Pass
Appointment	Available date.	Available date for the services indicates green colour, show "Book" button; else indicates red colour, show "N/A" button.	Pass
	Available timeslot.	Available time session for the services indicates green colour, pop up window to double confirm timeslot; else indicates red colour.	Pass
	Appointment history for the customer is displayed on My Appointments page.	List of appointments with the details are displayed.	Pass
	When click "View" button, appointment details display.	Details of the selected appointments is displayed.	Pass
	Edit the appointments that has not passed by choosing the available date and timeslot.	A successful message will be prompt out, redirect to My Appointments page.	Pass
	Delete the appointments that has not been passed.	A successful message will be prompt out, appointment deleted from My Appointments page.	Pass
	Payment	Select "Pay with Stripe" payment method.	When click "Checkout" button, redirect user to the Stripe checkout page in test mode.
Stripe checkout page show chosen service and service's price.		The selected service with its price display on the checkout page.	Pass
Select "Pay with QR Code" payment method.		When click "Checkout" button, redirect user to the QR code page, with the appointment information, appointment ID and amount to pay.	Pass

Table 3: (cont.)

Function	Test Case	Expected Result	Result
Feedback	Complete information.	feedback A successful message will be prompt out.	Pass
	Incomplete information.	feedback An alert message will display, user is required to input all the required information.	Pass
Profile management	Update personal details.	Information is updated.	Pass
	Change password with wrong current password.	An alert message will display, update password failed.	Pass
	Change password with correct current password.	Password is updated.	Pass
	Collection list.	Service added show in collection list.	Pass
	Delete collection.	A successful message will be prompt out, collection remove successfully.	Pass
	Delete account.	A successful message will be prompt out, account deleted successfully.	Pass
User management	View/ add/ update/ delete customer.	Customer list with the latest information will display.	Pass
Service management	View/ add/ update/ delete service.	Service list with the latest information will display.	Pass
Report generation	Select start date and end date.	Date selected shown in input bar.	Pass
	Click “Generate” button.	A list of summaries in PDF will display.	Pass
	Select request type, month or year.	A sales report display.	Pass

4.3.2 User Acceptance Test

The User Acceptance Testing (UAT) phase focuses on users or clients testing the developed system to determine its acceptability. This section presents an analysis of the UAT form used to evaluate the test cases for the developed system. The testing involved 10 respondents, and the collected results are evaluated and presented in graph. The respondents are requested to complete a survey form designed to assess their acceptance and satisfaction with the developed system. Figure 26 shows the UAT based on user interface, while Figure 27 shows the UAT based on system functionalities.

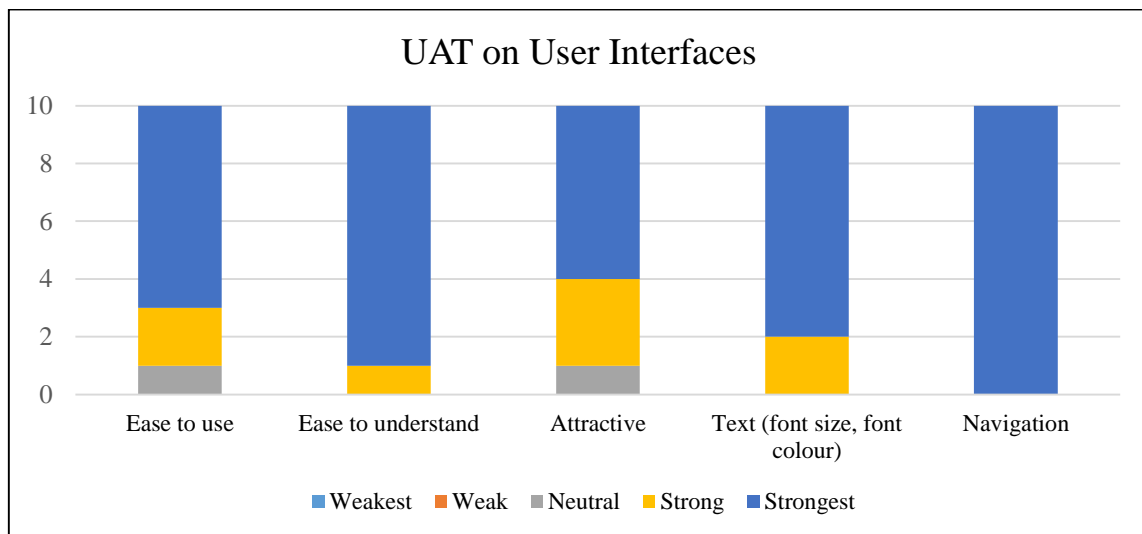


Figure 26: UAT result based on user interface

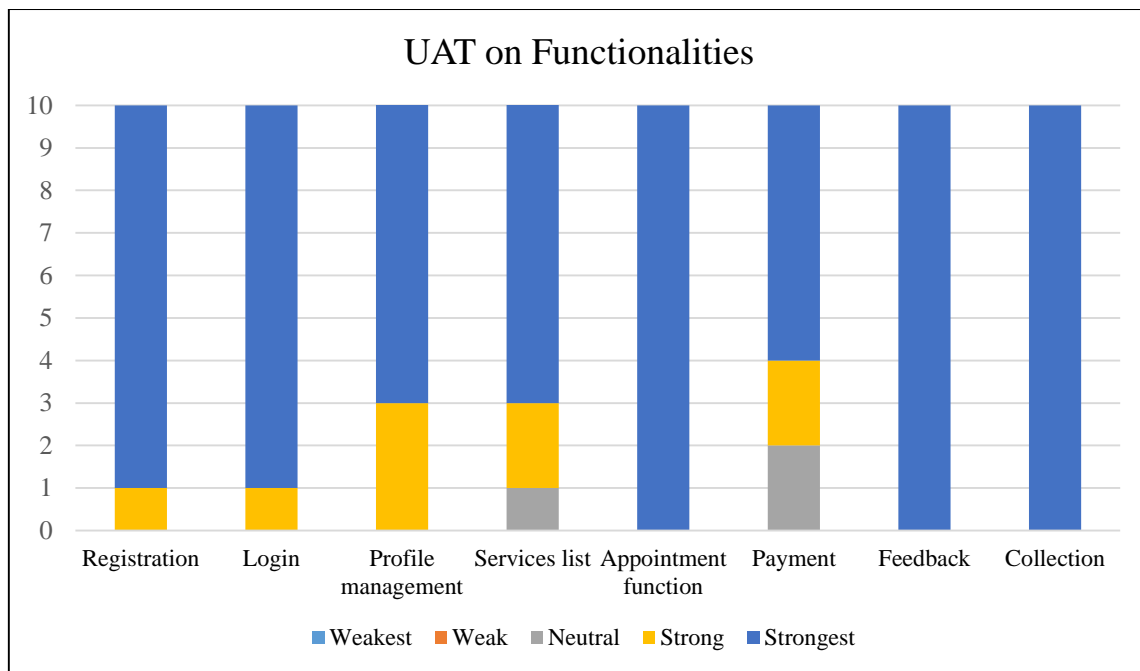


Figure 27: UAT result based on system functionalities

5. Conclusion

In conclusion, the development of the photography studio appointment web application is completed successfully. With the developed system, it has helped to ease the work of both customers and the manager of Folkway Photography. The customers can book appointments by choosing the available date and time slot and make payments using Stripe or QR code. Besides, the administrator can manage the operations of the studio easily for better data management. However, there are some limitations in the developed system. The system's limitations include limited payment methods, lack of review and rating features, lack of reminders, and web-based only accessibility.

To improve the usability of the system, some improvements can be made. Firstly, integrating popular payment gateways such as PayPal, credit or debit cards would cater to a wider range of preferences and increase the accessibility of the system. Secondly, incorporating a review and rating system would allow customers to provide feedback on their experiences and help future customers make informed decisions. Furthermore, implementing a reminder system for upcoming appointments would be beneficial. This can be done by sending automated reminders to customers via email or SMS a day or two before their scheduled appointments. Lastly, expanding the system's capabilities by building a dedicated mobile application would allow customers to easily access and manage their appointments on their smartphones.

Acknowledgment

The authors would like to thank the Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia for its support.

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