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Design and Development of a Web-based Temple Appointment System

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Abstract: Temple Appointment System is a web-based system for visitors to make an appointment for prayer. Currently, visitors contact the temple by phone to make an appointment but it is not very effective as sometimes the staff missed the call due to insufficient of staff. The aim of this project is to ease all the Buddhists in making a new booking to the temple and also enable the staff of Tham Sen Temple to create a new event on a certain day for visitors to make prayer appointments. The project is implemented using Prototype model. The system is developed using Visual Studio Code and XAMPP, which used PHP language as the back-end. After the implementation phase, functional testing and user acceptance testing are performed. System testing showed that the actual results of the test plan for each module were successful. All respondents are satisfied with the user interface and system functionalities.

Keywords: Temple, appointment, prayer, booking

1. Introduction

Malaysia is a special country formed by various ethnic groups such as Malays, Chinese, Indians, Kadazan Dusun, Iban and others. Everyone has different religion and beliefs. For example Islam, Buddha, Hinduism, Christianity and others. In Malaysia, religion is not owned by one race. For instance, there are some Chinese and Indians who are Buddhists and also there are Kadazan being Muslims even though Islam is majorly practised by Malays. For each religion, there is its own way and place to pray. There are many different religious places in Malaysia such as Muslims praying in mosques, Buddhists praying in Buddhist temples and Christians praying in churches. A Buddhist temple is the place of worship for Buddhists, the followers of Buddhism [1].

Tham Sen Temple is a temple for Buddhists that is situated in Kampung Baru Gunung Hijau, Pusing, Perak. It is the only temple in the Pusing area. Therefore, many Buddha practitioners that live around this place go to Tham Sen Temple to offer their prayers. The temple is managed by three staff members and they do not have a system currently. Buddhists visit Tham Sen Temple to pray and ask

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the staff about the prayers. Currently, they call Tham Sen Temple to schedule appointments. However, only a minority of Buddhists make bookings before going to Tham Sen Temple. As a result, Tham Sen Temple often becomes crowded, especially on occasions such as Chinese New Year. Moreover, the staff of Tham Sen Temple sometimes misses visitors' appointments. This is because when visitors call to make appointments, no one answers the phone due to a lack of staff.

Therefore, this project is proposed to develop a web-based system which allows Buddhists who wish to pray to schedule a date and time for going to Tham Sen Temple for prayer. The objectives of this project are:

1. to analyze and design a web-based system for visitor management at Tham Sen Temple.
2. to develop a system for Tham Sen Temple which will allow visitors to book a date and time for going to Tham Sen Temple for praying.
3. to perform testing on the developed system to identify whether it has fulfilled all the requirements.

This proposed system involves two users which are the staff and the visitors of Tham Sen Temple. This system has several modules such as user management, prayer appointment and event management, enquiry, pre-book prayer services, pre-order items, feedback, and report analysis generation.

The rest of the paper will be organized as follows. The related work will discuss in Section 2 which shows the comparison of the existing systems with the proposed system. The methodology model is discussed in Section 3. Furthermore, Section 4 will discuss the results and discussion of the project which includes system analysis and design and also implementation and testing. Lastly, a conclusion will be given in Section 5.

2. Related Work

2.1 Temple Prayer Booking

For the time being, there is no visitor management system in place at Tham Sen Temple. To book a date and time for prayer, it is done by making calls Tham Sen Temple. The staff will record the clients' booking details on a piece of paper or in a book. Next, if clients have any questions regarding prayer, clients usually come to Tham Sen Temple to ask their questions physically or call Tham Sen Temple to query to get answers to their questions. Figure 1 shows the process flow of the visitors booking for prayer.

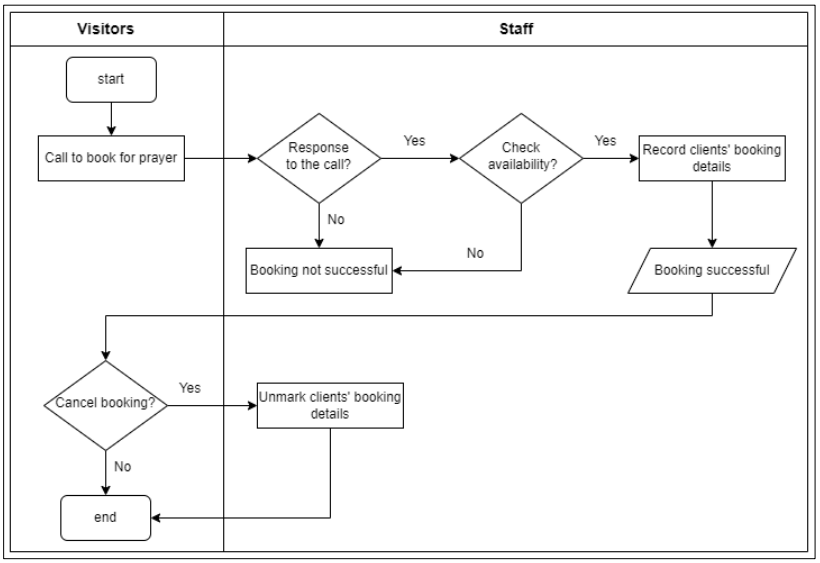

Figure 1: Process flow of current booking approach for prayer

2.2 A study on similar system

This section is to study the features and functionality of the existing systems and makes a comparison with the proposed system. A comparison between the selected existing systems and the proposed system is discussed based on specific features. Three similar systems chosen are the Church of Jesus Christ system [2], the Selangor Islamic Religion Department (JAIS) system [3], and the Tsz Shan Monastery system [4]. Table 1 shows the comparison between the selected existing systems and the proposed system.

Table 1: Comparison between the selected existing system and the proposed system

Feature	Church of Jesus Christ System	JAIS System	Tsz Shan Monastery System	Proposed system
Religion	Christianity	Islam	Buddha	Buddha
Technology	Web-based	Web-based	Web-based	Web-based
Registration and login	✓	×	×	✓
Latest event update	✓	✓	✓	✓
Make appointment	✓	✓	✓	✓
Contact us	×	✓	✓	✓
Pre-book prayer service	×	×	×	✓
Guidelines to attend praying place	×	×	✓	✓
List of pre-order items	×	×	×	✓
List of services available	✓	✓	✓	✓
Frequently asked questions (FAQs)	✓	✓	×	✓
Feedback	✓	✓	✓	✓
Map	✓	✓	×	✓
Switch language	✓	✓	✓	×
Payment method	✓ (Online banking, e-wallets)	×	×	✓ (Credit card)

In general, the selected existing systems and the proposed system are web-based systems for different religions, i.e., Christianity, Islam and Buddha. From the table, it shows that the system of the Church of Jesus Christ and the proposed system require users to register and login to the system prior to making an appointment, while the other systems do the opposite. All systems, including the proposed system, have a contact us function except the Church of Jesus Christ system. Furthermore, the Tsz Shan Monastery system and the proposed system provide guidelines for attending places of prayer, while the others do not. All systems except the Tsz Shan Monastery system have Frequently Asked Questions (FAQs).

The similarities between the selected existing systems and the proposed system are all of the systems have a page for latest event update. Also, users can make appointments, access to a list of available services and give feedbacks. There are two special features that only the proposed system has which are the list of pre-order items and pray on behalf of clients according to the details they provided. The proposed system also does not have the ability to switch languages because the system will be developed in Chinese and English language together for some pages such as register page. The system of the Church of Jesus Christ has the payment method for donating to the system via online banking

and e-wallets and for the proposed system, it will have the pre-book prayer services payment via credit card, while the other two systems do not have this.

3. Methodology

The prototype model is the methodology model selected for this project. The prototype model simultaneously performs analysis, design, and implementation to produce a simplified version of the proposed version quickly. The final architecture or application can be developed using this model as a foundation. This method works well when project specifications are not clearly understood [5]. Prototyping requires more user interaction to assist them in seeing and engaging with the prototype, offering better and more complete comments and requests [6]. The prototype model consists of four main phases which are planning, analysis, design, and implementation, as shown in Figure 2.

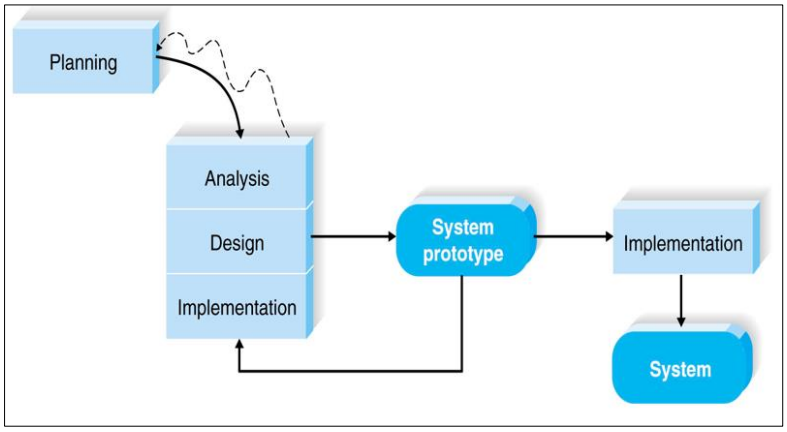

Figure 2: Prototype model [5]

The prototype model begins with the planning phase. Before development of the project can begin, a suitable title must be chosen for the project. Consequently, a meeting with supervisor is conducted online. After the title has been confirmed, the problem statement, objectives and scopes of the project are defined. Next, the creation of the project plan and the project schedule is involved in this phase. A Gantt Chart is prepared to ensure the project is completed in phases and on time. Each phase is given a few days to follow the schedule and complete the tasks within a set time frame. This will ensure that the project is progressing on the right track. Moreover, the background of the related field is studied to gain a clear understanding of the project.

In the analysis phase, all gathered information is analyzed. Three existing systems similar to the proposed system have been selected for comparison. The project objectives are transformed into defined system functions for new developments and improvements. An informative interview was carried out with the staff of Tham Sen Temple to determine the requirements of the proposed system. The technical method of analyzing and designing the proposed system is a structured approach. Thus, the flow chart, context diagram, data flow diagram, and entity relationship diagram are produced to represent the flow of the proposed system.

In the design phase, the desired features and operations of the system were described. The logical design created during analysis is converted into a physical structure. User interface design and database design have both been included in this phase. The system database is designed to determine the types of data that must be stored and how the data elements relate to each other. Through this phase, the Entity Relationship Diagram (ERD) is constructed. Draw.io online tool is used to draw the wireframe of the user interfaces, which acts as a guideline to develop the proposed system. The data dictionary and user interface designs also have been done in this phase as mentioned in Table 2. However, due to the limitations of the paper, data dictionary and user interface designs could not be included in the paper.

The implementation phase begins after the requirements of the system are determined. All the documents and plans from the previous phase are transformed into the actual system. The Temple Appointment System is developed using Visual Studio Code and XAMPP, which used JavaScript as the front-end and PHP language as the back-end with Hypertext Markup Language (HTML), and Cascading Style Sheet (CSS) to design the interface. Initially, a simple prototype of the system will be developed. It is impossible to provide software with quality without testing. Once the prototype of the system is completed, testing is conducted to evaluate its capabilities and functionality in relation to expected or unpredicted problems. Errors and bugs that happened will be fixed. The basic system prototype is then rebuilt based on the feedback until an acceptable prototype is implemented. This phase does not end until all the requirements specified by the user have been met. The prototype is further improved to address the issues once the user has identified them. To ensure that the finalized proposed system satisfies the functional and non-functional requirements, it will be put through testing. A user acceptance test was also performed to allow users to review and engage with the proposed system. Table 2 shows the system development workflow for the proposed system.

Table 2: System development workflow for the proposed system

Phase	Activity	Deliverables
Planning	1. Identify problem statements, objectives, and the scope of the project. 2. Create a project plan. 3. Study domain background.	1. Project proposal. 2. Gantt Chart.
Analysis	1. Data gathering. 2. Analyse and compare the existing systems. 3. Interview with the staff of Tham Sen Temple. 4. Analyze hardware and software requirements. 5. Generate structured diagrams.	1. Literature review. 2. Comparison between existing systems and proposed system. 3. Gather user requirements. 4. Hardware and software requirements. 5. Flow chart, context diagram, and data flow diagram (DFD).
Design	1. Design the user interface. 2. Design the database.	1. Wireframe. 2. Database specification. 3. Entity Relationship Diagram (ERD). 4. Data dictionary.
Implementation	1. Develop system. 2. Connect with the database. 3. Test the prototype. 4. Perform testing. 5. Identify the area of improvement.	1. Proposed system. 2. Fix bugs and errors. 3. Released final system.

4. Results and Discussion

This section includes system analysis and design such as flow chart, context diagram, data flow diagram, and entity relationship diagram to represent the flow of the system. Besides, it also discusses the outputs from the implementation phase such as user interface with coding, as well as the results of functional testing and user acceptance testing (UAT).

4.1 System Analysis

System analysis is about determining the entire system process. The technical model chosen is the structured approach. It is an illustration of how each action flows and how the system functions in specifics.

4.1.1 Flow Chart

A flow chart is a graphical representation that illustrates the decisions and steps that must be made in a specific order for a process to be completed. Each process flow has its own functions and procedures. Appendix A shows the flow chart of the user side.

4.1.2 Context Diagram

The context diagram shows each process model's top-level data flow diagram (DFD) [7]. Figure 3 shows the Temple Appointment System context diagram. There are two entities involved in the context diagram, which are administrators and the users.

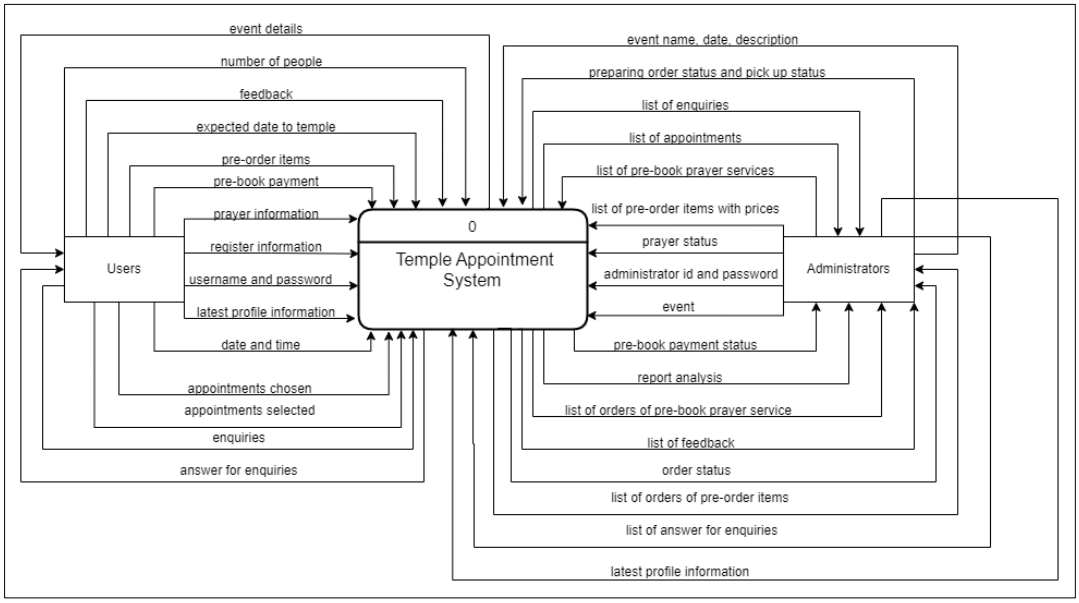

Figure 3: Temple Appointment System context diagram

4.1.3 Data Flow Diagram

A data flow diagram (DFD) is a visual depiction of how data moves or "flows" through an information system [8]. DFD illustrates the data handling process in terms of output and input. Entity, process, data flow, and data store are the components included in the data flow diagram. There are nine processes, and two entities are involved in the DFD. The DFD level 0 of the proposed system is shown in Appendix B.

4.1.4 Entity Relationship Diagram (ERD)

An entity relationship diagram (ERD) displays the relationships of entities within the database. An ERD will frequently depict the characteristics of these entities. The entities in ERD refer to the data stores used in the DFD. Thus, there are total ten entities in the ERD. There are all one to zero or one to many relationships in this system. For example, a user can schedule zero or many appointments while an administrator can manage zero or many appointments. Figure 4 shows the ERD of the system.

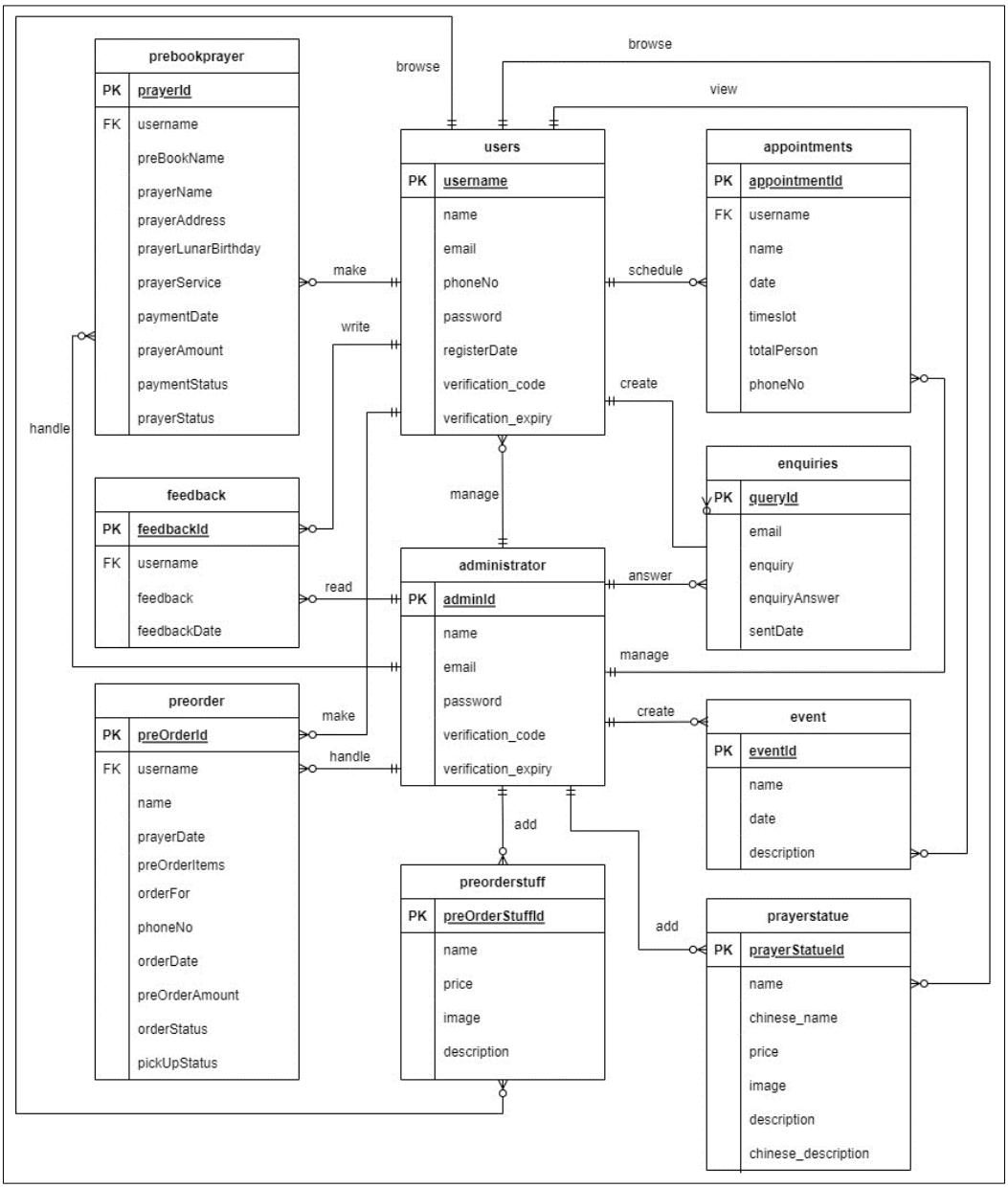

Figure 4: ERD of the system

4.2 System Design

The objective of user interface (UI) design is to what users will need to perform and ensuring that the interface offers features that are easy to use, access, and comprehend. Wireframes blueprint the page architecture, layout, message, and functionality. Thus, this helps the users have a clear understanding of how the system UI works and is represented visually. Figure 5 shows the wireframe for users to make appointment for prayer. It displays the information about the appointments below the header. Users can choose their preferred date in this page to make appointments for prayer.

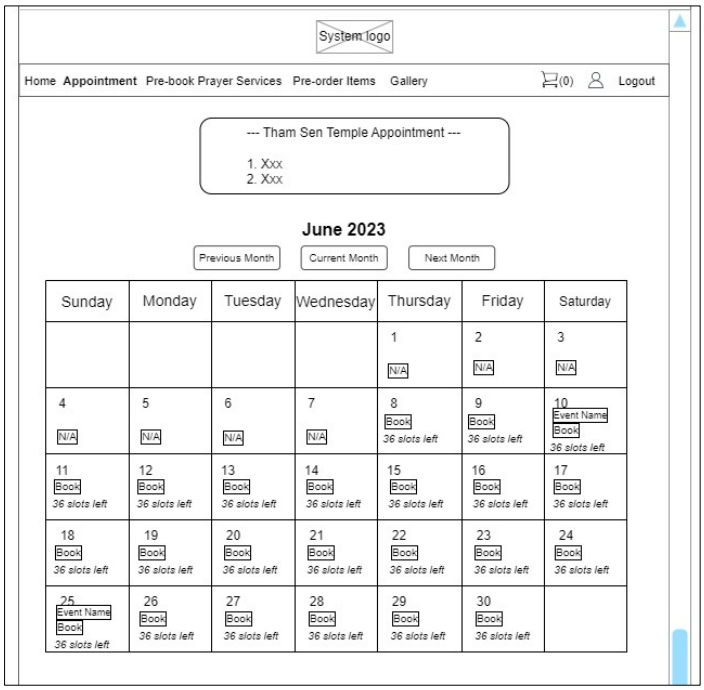

Figure 5: Wireframe for users to make appointment

4.3 Implementation

Implementation is the process of putting into action a plan that has been developed. Testing is the process of identifying possible errors and bugs before the final product is delivered. The system is developed using Visual Studio Code. It uses the PHP programming language for the back-end and JavaScript, HyperText Markup Language (HTML), and Cascading Style Sheets (CSS) for the front-end. XAMPP is the software used to connect the system to the database, using MySQL to store and retrieve information. Figure 6 shows the login interface for users. The login interface for administrators is similar to users. Users need to enter username and password while administrators need to enter administrator ID and password to login to the system. Figure 7 shows the code segment of the login process for users. The code segment for the administrator login process is similar to the user login process.

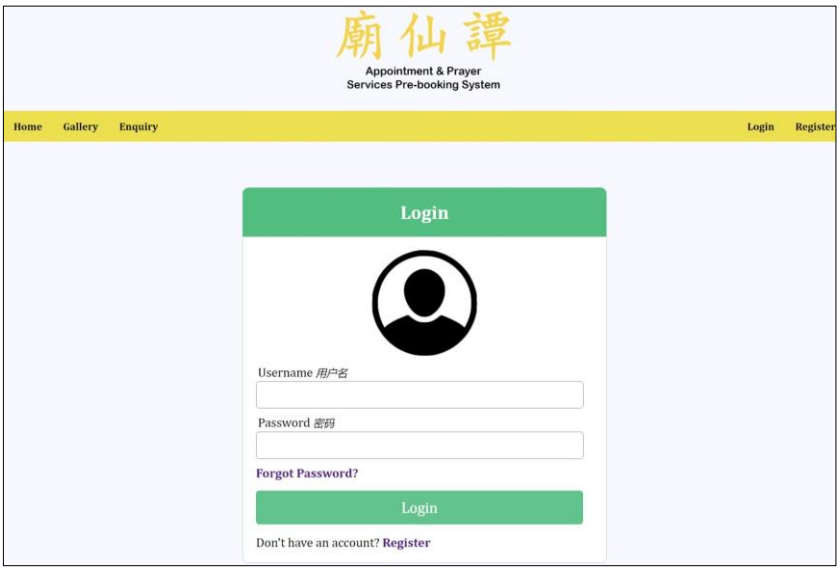

Figure 6: Login interface for users

```php
        else {
            $row = mysqli_fetch_assoc($result);
            $stored_password = $row['password'];
            $salt = substr($stored_password, 0, 32);
            $hashed_password = hash('sha256', $salt . $password);

            if ($stored_password === $salt . $hashed_password) {
                $_SESSION['username'] = $username;
                $_SESSION["login_time_stamp"] = time();
            } else {
                echo "<script>alert('Wrong username or password! Please try again!')</script>";
            }
        }
    }

    if(isset($_SESSION['username'])){
        header('location:index.php');
    }

?>
```

Figure 7: Code segment for the login process

Figure 8 shows the interface for administrators to create an event. Administrators must insert the event name, date, and description to create an event. Figure 9 shows the list of events created by the administrators and they can edit the event if needed by clicking on the "Edit" button. In addition, the administrator can delete events by clicking on the "Delete" button. An alert dialogue box will be displayed to confirm the administrators' action.

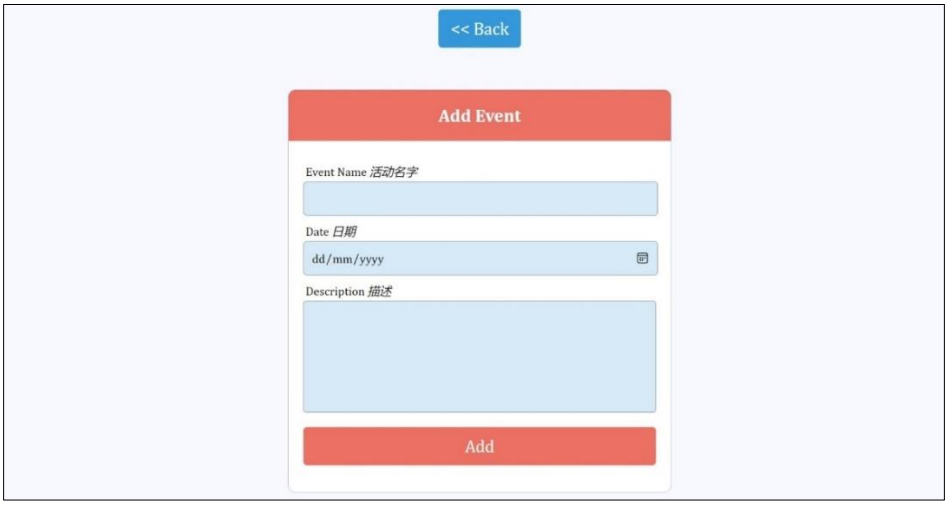

Figure 8: Interface for administrator to create an event

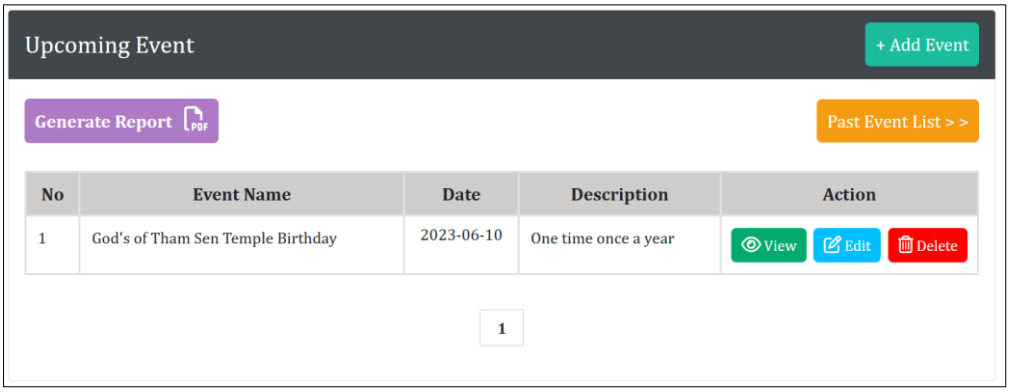

Figure 9: List of events

Figure 10 shows the interface for users to make appointment according to the design in Figure 5. Users can view the events created by administrator in the calendar like "Chor Yat" on 18 June as shown in Figure 10. Besides, the appointment calendar shows the total number of time slots left in each day

below the “Book” button. Users can make an appointment to pray at Tham Sen Temple by selecting a date in the calendar and clicking on the “Book” button. Then, it will redirect users to the appointment time slot page as shown in Figure 11. The event name and description are shown in Figure 11. For example, the event name is “Chor Yat” and below is its event description in Figure 11. By default, a maximum of three bookings and five people can be accepted in a time slot. As shown in Figure 11, a green time slot means it can accept appointments, an orange time slot means it has been booked once or twice but can still accept appointments, and a red time slot means it cannot accept appointments because it has been fully booked. Figure 12 (a) and (b) shows the code segment for users to make appointment.

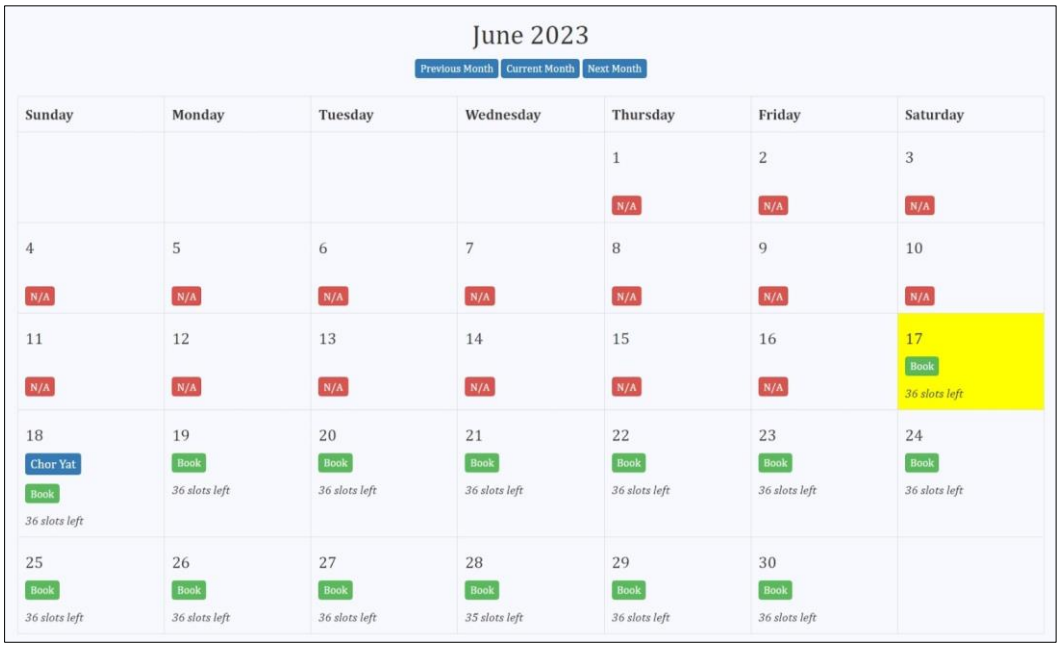

Figure 10: Interface for users to make appointment

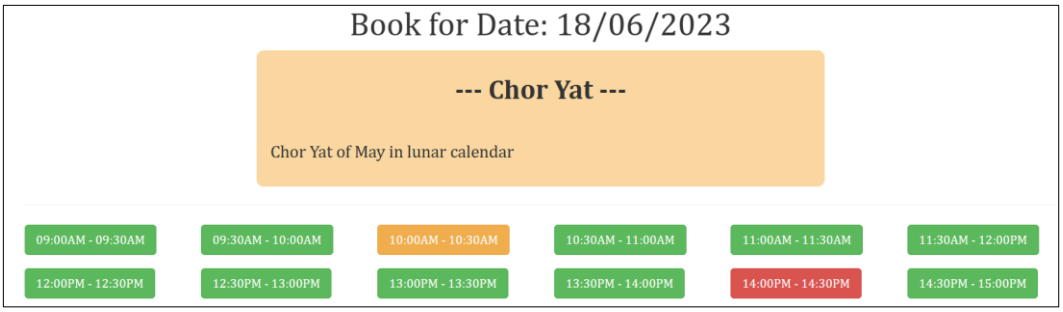

Figure 11: Appointment time slot page

```
$stmt = $con->prepare("select * from appointments where date = ? AND timeslot=?");
$stmt->bind_param('ss', $date, $timeslot);
if($stmt->execute()){
    $result = $stmt->get_result();
    if($result->num_rows>0){
        $stmt2 = $con->prepare("SELECT COUNT(*) as count FROM appointments WHERE date = ? AND timeslot = ?");
        $stmt2->bind_param('ss', $date, $timeslot);
        $stmt2->execute();
        $result2 = $stmt2->get_result();
        $row = $result2->fetch_assoc();
        $count = $row['count'];
        if ($count >= 3) {
            $msg = "<div class='alert alert-danger'>Sorry, this timeslot has already reached the maximum number of bookings.</div>";
        } else {
            $stmt = $con->prepare("INSERT INTO appointments (username, name, timeslot, totalPerson, date, phoneNo) VALUES
            (?,?,?,?,?,?)");
```

Figure 12(a): Code segment for users to make appointment

```
                $stmt->bind_param('ssssss', $username, $name, $timeslot, $totalPerson, $date, $phoneNo);
                $stmt->execute();
                $bookings[]=$timeslot;
                $stmt->close();
                echo'<script type = "text/javascript">';
                echo 'alert("Booking successful!");';
                header("Refresh: 0");
                echo '</script>';
            }
        } else {
            $stmt = $con->prepare("INSERT INTO appointments (username, name, timeslot, totalPerson, date, phoneNo) VALUES (?,?,?,?,?,?)
            ");
            $stmt->bind_param('ssssss', $username, $name, $timeslot, $totalPerson, $date, $phoneNo);
            $stmt->execute();
            $bookings[]=$timeslot;
            $stmt->close();
            echo'<script type = "text/javascript">';
            echo 'alert("Booking successful!");';
            header("Refresh: 0");
            echo '</script>';
        }
    }
```

Figure 12(b): Code segment for users to make appointment

Figure 13 shows the appointment history interface of users that divided into three categories which are previous, today, and upcoming. Users only can edit or delete the upcoming appointments as shown in Figure 13. For the previous and today appointments, users only can view the appointments. When users click on the "Edit" button in Figure 13, it will redirect the users to the appointment editing page as shown in Figure 14. Users can edit and update the date, time slot and the total number of people going to Tham Sen Temple. When users want to delete or cancel an appointment, users can click on the "Delete" button in Figure 13. An alert dialogue box will be displayed to confirm the users' action.

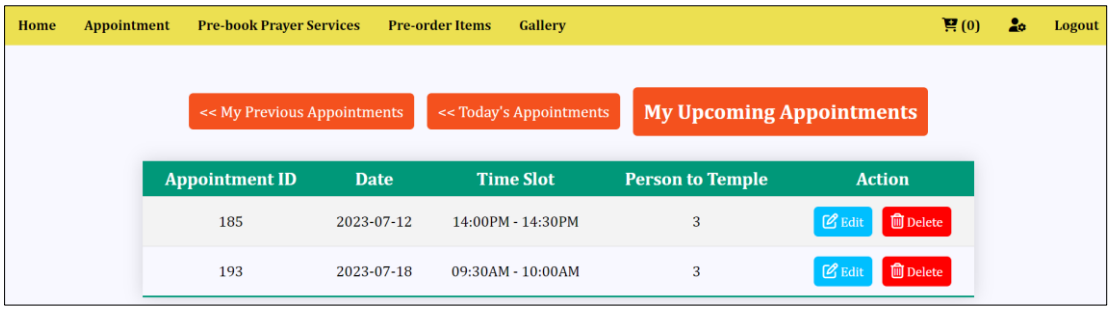

Figure 13: Appointment history interface of users

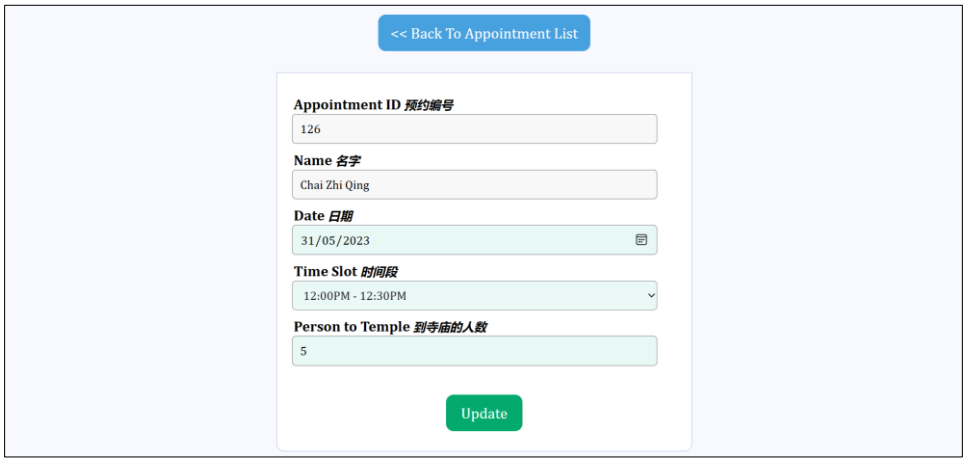

Figure 14: Appointment editing page

Figure 15 shows the interface for the administrators to check the appointments from users. The appointments list display in a table and divide into three groups which are past, today, and upcoming. Administrator can view the appointments details from users by clicking "View" button.

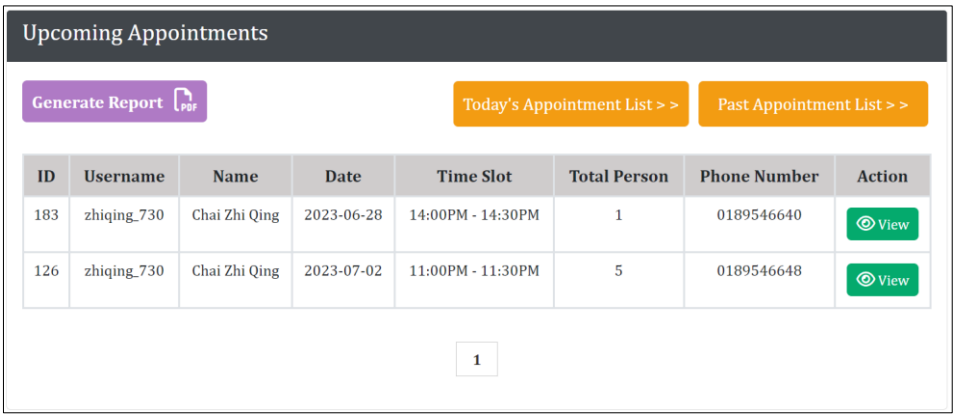

Figure 15: Appointments from users in administrator panel

Figure 16 shows the interface of pre-book prayer services. Users can pre-book by clicking on "Pre-book Now!". It will then redirect users to the checkout page and need to fill in the required information such as prayer name, address, and lunar birthday as shown in Figure 17. After filling in the information, users can click on "Pay with Card". A window will pop up for users to insert email, card number, expiry date, and CVC number to make the payment as shown in Figure 18. An alert message will be displayed if the transaction is successful and the users will be redirected to the payment details page as shown in Figure 19.

Figure 16: Interface of pre-book prayer services

Figure 17: Checkout page

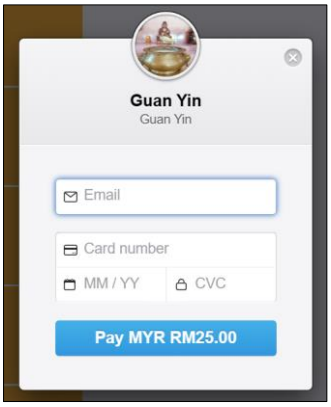

Figure 18: Pop up window to make payment

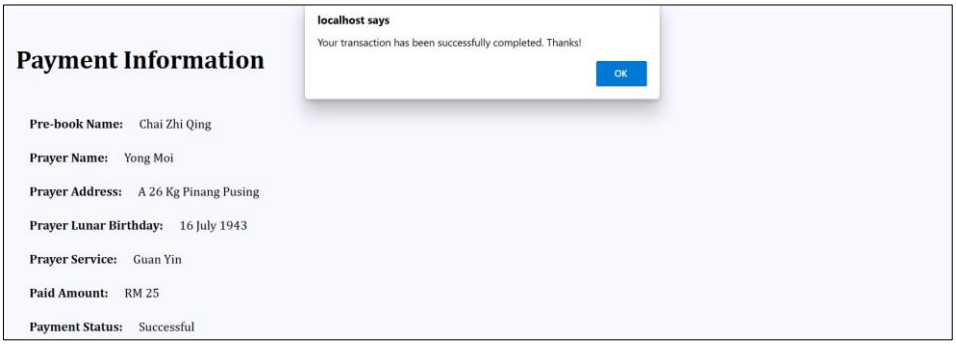

Figure 19: Payment details page if transaction successful

Figure 20 shows the interface of pre-order items page. Users can add their desired items to cart by clicking “Add to Cart”. It will then redirect the users to the shopping cart page, where the users will need to select the expected date to temple before placing the order as shown in Figure 21. If the users want to place an order for someone else, they can tick the checkbox for “Order for others” and fill in their name and phone number as shown in Figure 21. Then, the users can click on the “Place Order” button. An alert dialogue box will be displayed to confirm the actions of the users when users want to place order for the pre-order items. If the order is successfully placed, an alert message will be displayed.

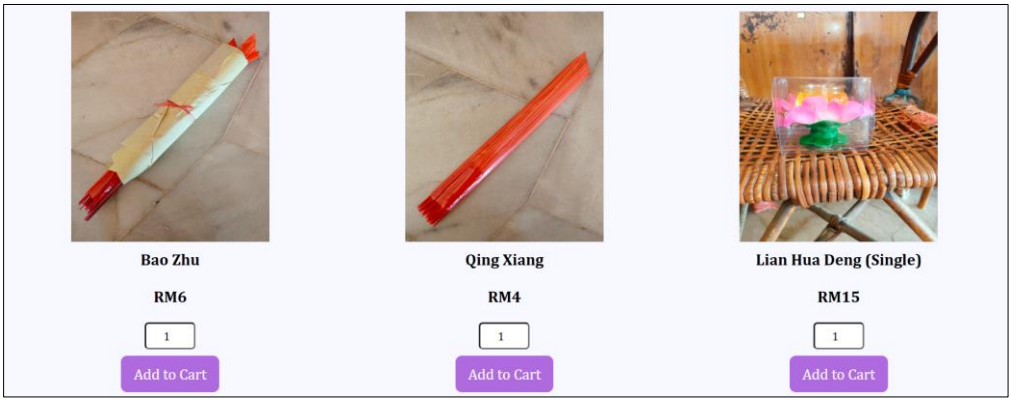

Figure 20: Pre-order items page

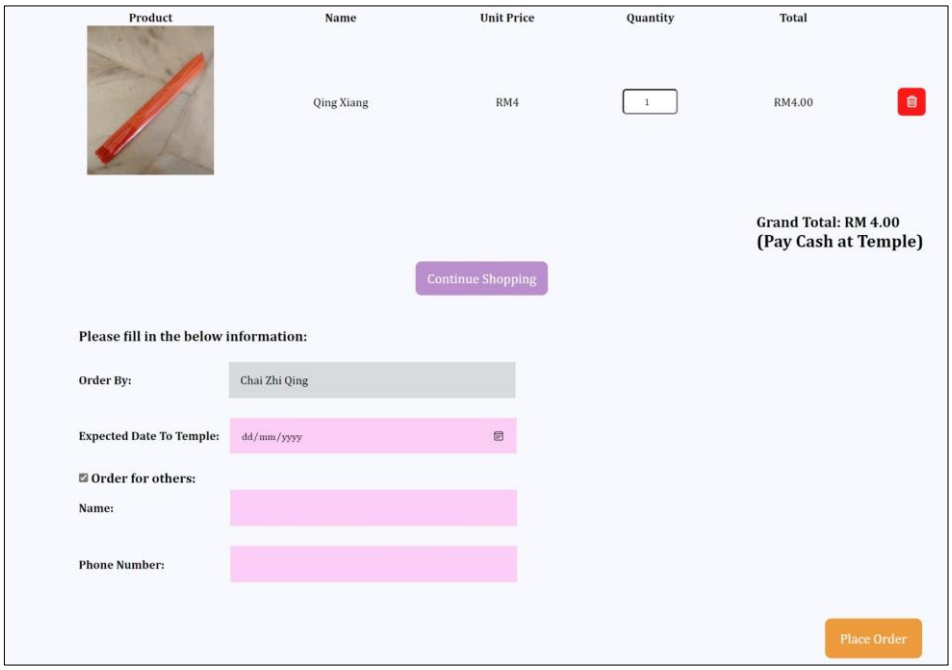

Figure 21: Cart page

4.4 System Testing

4.4.1 Functional Testing

The aim of the functional testing is to examine the main input functions, the functions that are necessarily available, and the flow of the screen graphical user interface (GUI). It tests the display of error messages in order to allow the user to navigate the entire application with ease. Due of the limitation of this paper, only four test cases tables will be shown. Table 3 and Table 4 shows the test cases for register and login function and appointment function, Table 5 and Table 6 shows the test cases for pre-book prayer service module and pre-order items module. In general, the actual results of the test plan for each module and function were successful.

Table 3: Test cases for register and login function

No.	Functions	Test Case	Expected Output	Actual Output
1.	Registration	Unique username and email address	If already exist in the database, an alert message will be displayed.	Pass
		Incomplete data input	If the input field is empty, an alert message will be displayed asking the user to fill in all the fields.	Pass
		Complete registration form	The user registration process is completed successfully and users are redirected to the login page.	Pass
2.	Login	Incomplete data input	If the input field is empty, an alert message will be displayed asking the users to fill in all the fields.	Pass
		Complete input with the wrong information	An alert message will be displayed and the login will be unsuccessful.	Pass
		Complete login form	Successfully logged into the system and redirected to the home page.	Pass

Table 4: Test cases for appointment function

No.	Functions	Test Case	Expected Output	Actual Output
1.	Make appointment	Incomplete data input	If the input field is empty, a required message will be displayed.	Pass
		Complete appointment form	If the appointment is successfully made, an alert message will be displayed.	Pass
2.	Appointment history	Check appointment history	Show all appointments based on three categories, i.e., previous, today, and upcoming appointments.	Pass
		Edit appointment details	The users are only allowed to edit and update the date, time slot, and person to temple with upcoming appointments.	Pass
		Delete appointment	A confirmation dialogue will be displayed. If the OK button is clicked, the appointment will be deleted. If an appointment is successfully deleted, an alert message will be displayed.	Pass

Table 5: Test cases for pre-book prayer service module

No.	Functions	Test Case	Expected Output	Actual Output
1.	Pre-book	Select pre-book prayer service and pre-book it	Redirected to the checkout page and need to fill in the required information.	Pass
2.	Checkout	Make payment	A window will pop up for user to insert card number, expiration date, and CVC number to make payment. If the payment is successful, an alert message will be displayed and the user will be redirected to the payment details page.	Pass

Table 6: Test cases for pre-order items module

No.	Functions	Test Case	Expected Output	Actual Output
1.	Add item to shopping cart	Adjust quantity of item and add to shopping cart	Items are successfully added to the cart and users is redirected to the shopping cart page.	Pass
2.	Shopping cart	Adjust and update quantity of item	The total price of the item and the grand total will be updated.	Pass
		Delete item in cart	A confirmation dialogue will be displayed. If the OK button is clicked, the item will be removed from the shopping cart.	Pass
3.	Payment	Correct amount	The grand total will be updated when the user adjusts the quantity of items in the shopping cart or removes an item.	Pass
4.	Place order	Incomplete data input	If the expected date to temple input field is empty, an alert message will be displayed.	Pass
		Complete place order form	A confirmation dialogue will be displayed. If the OK button is clicked, the order will be placed successfully.	Pass

4.4.2 User Acceptance Testing

User Acceptance Testing (UAT), also referred to as application testing or end-user testing, is a crucial phase in software development where the software is evaluated by its intended users before it is officially launched. Due to time constraints, only 10 users took part in this test which are three administrators and seven users. After collecting data from the users and administrators, the results are evaluated and presented in graphical form as shown in Figure 22 to Figure 25.

In terms of the system interface, majority of the users and administrators were satisfied and gave it a ranking of 3 to 5. In addition, most users rated the system's functionality as 4 to 5 out of 5, with only one or two users rating it as 3 out of 5. For the administrator's system features, only one person rated the create event function 3 out of 5. This means that the administrators were satisfied with the functionality of the system.

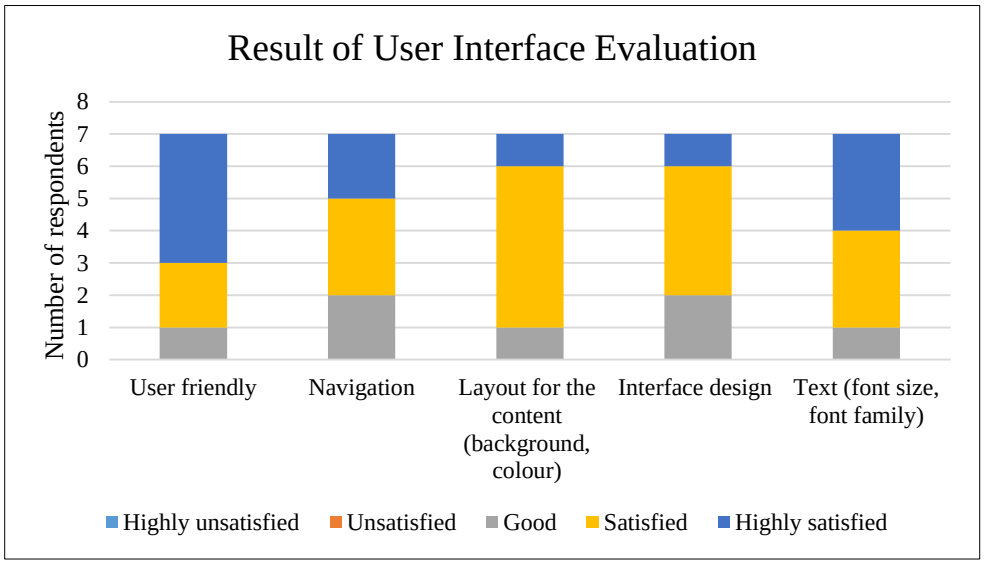

Figure 22: Result of user interface evaluation

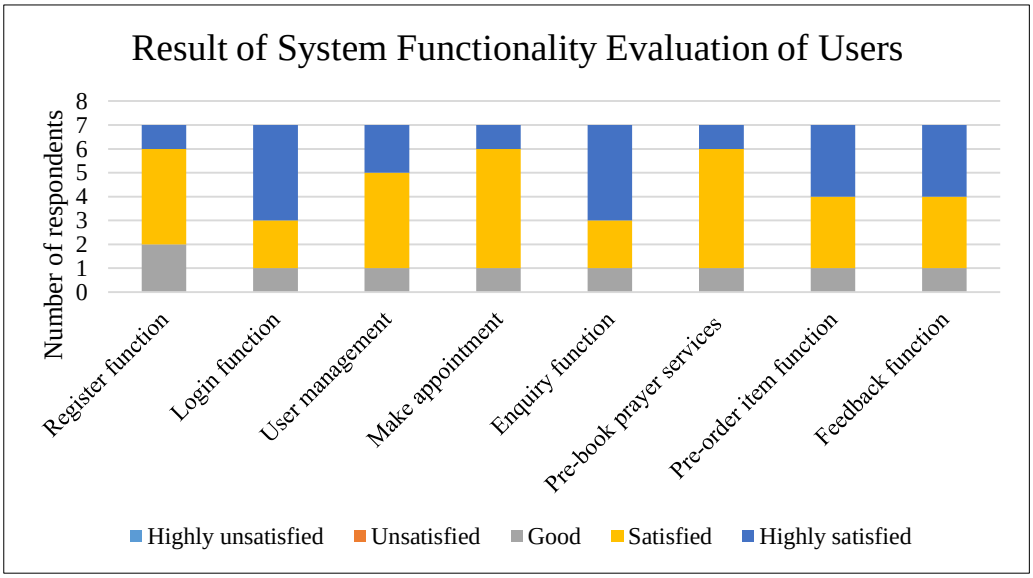

Figure 23: Result of system functionality evaluation of users

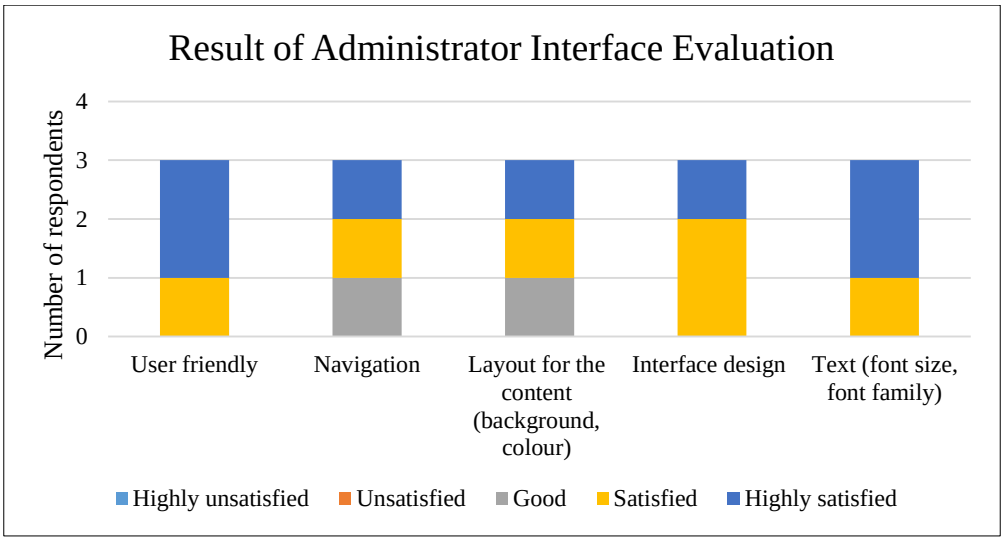

Figure 24: Result of administrator interface evaluation

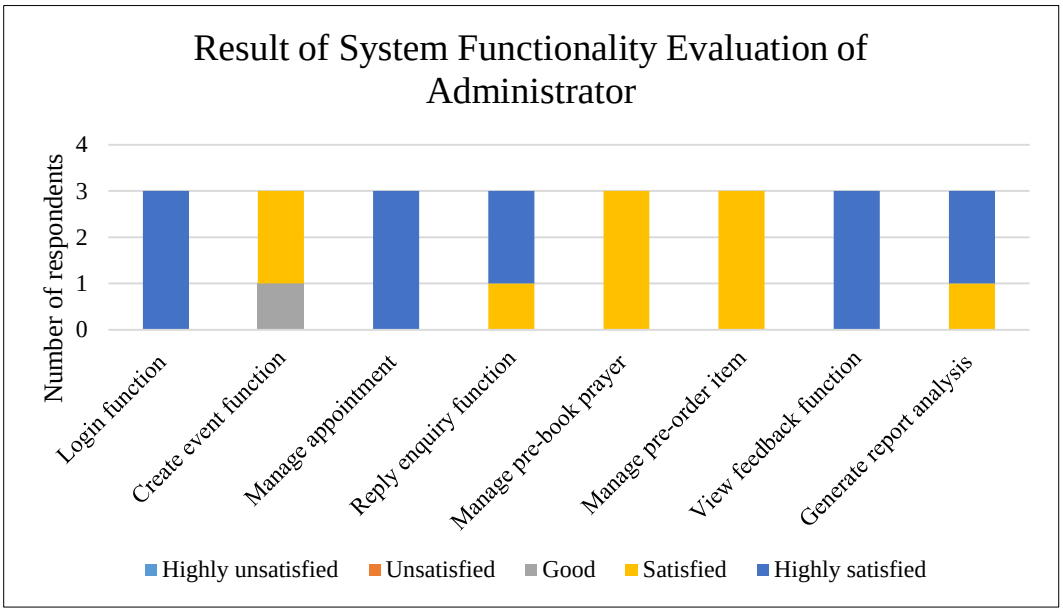

Figure 25: Result of system functionality evaluation of administrator

5. Conclusion

In conclusion, Temple Appointment System have been developed successfully to offer a specific platform for Buddhists who wish to pray at Tham Sen Temple to make appointments before going to the temple, especially on occasions. All functional requirements stated have been fulfilled. However, the proposed system has a number of limitations. The proposed system has limited functionality in terms of payment methods. The system has only two payment methods, namely pre-book prayer services by credit card and pre-order items by cash. Moreover, the proposed system does not provide push notifications for appointments, orders of pre-book prayer services and pre-order items. Besides, the system does not have a search function on the pre-book prayer services and pre-order items pages. In addition, the system only enables the administrator to answer enquiries from users and visitors. For appointment, a maximum of three bookings and five people per time slot can be accepted.

Improvements could be made to the proposed system to increase its functionality. Firstly, more payment methods such as online banking and e-wallets should be developed in the system to offer users with more options when making payment. Furthermore, it is recommended that push notifications can be developed in the system to remind the administrator of the appointments, orders of pre-book prayer services and pre-order items. Additionally, the system should develop a search function on the pre-book prayer services and pre-order items pages. It is suggested that an automatic response to enquiries from users and visitors can be included in the system. Lastly, the capacity of the appointments can be expanded to more than three appointments per time slot to accommodate more people.

Acknowledgement

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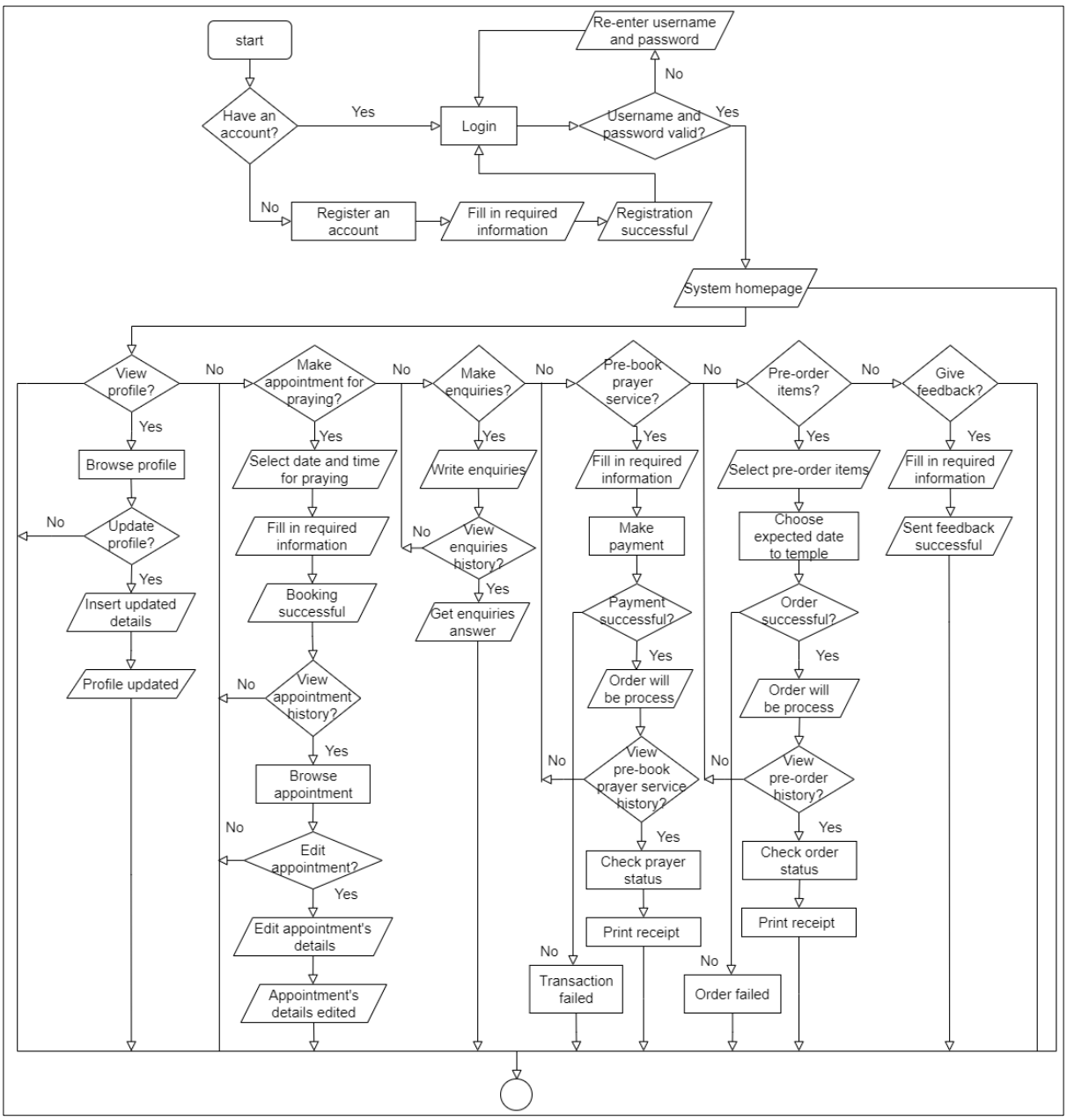
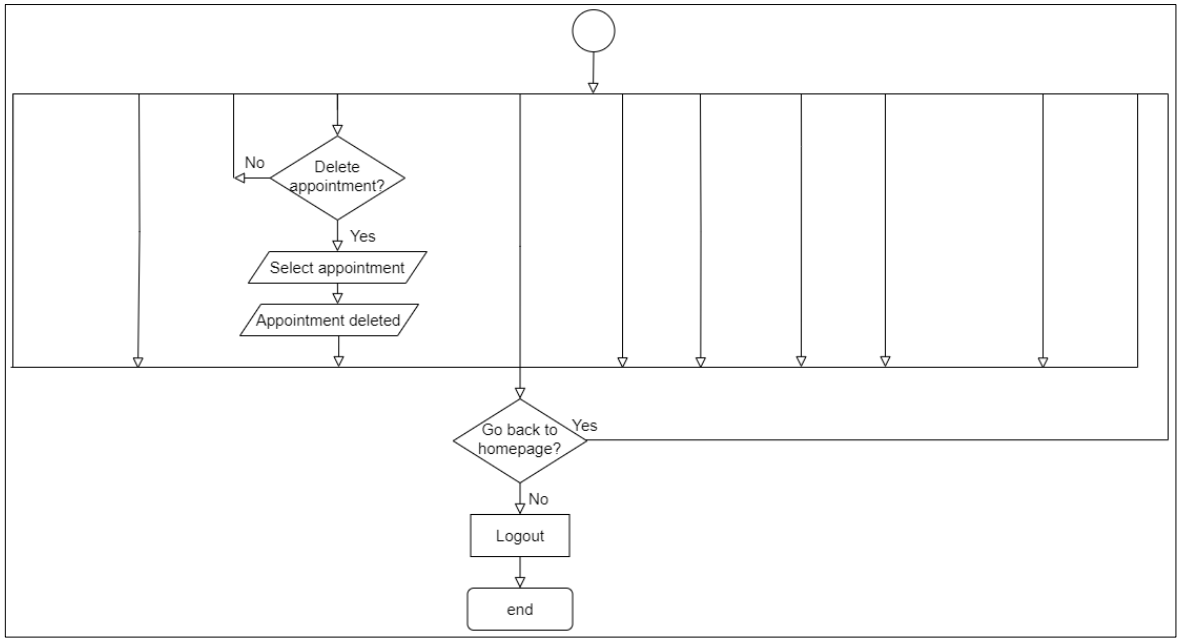
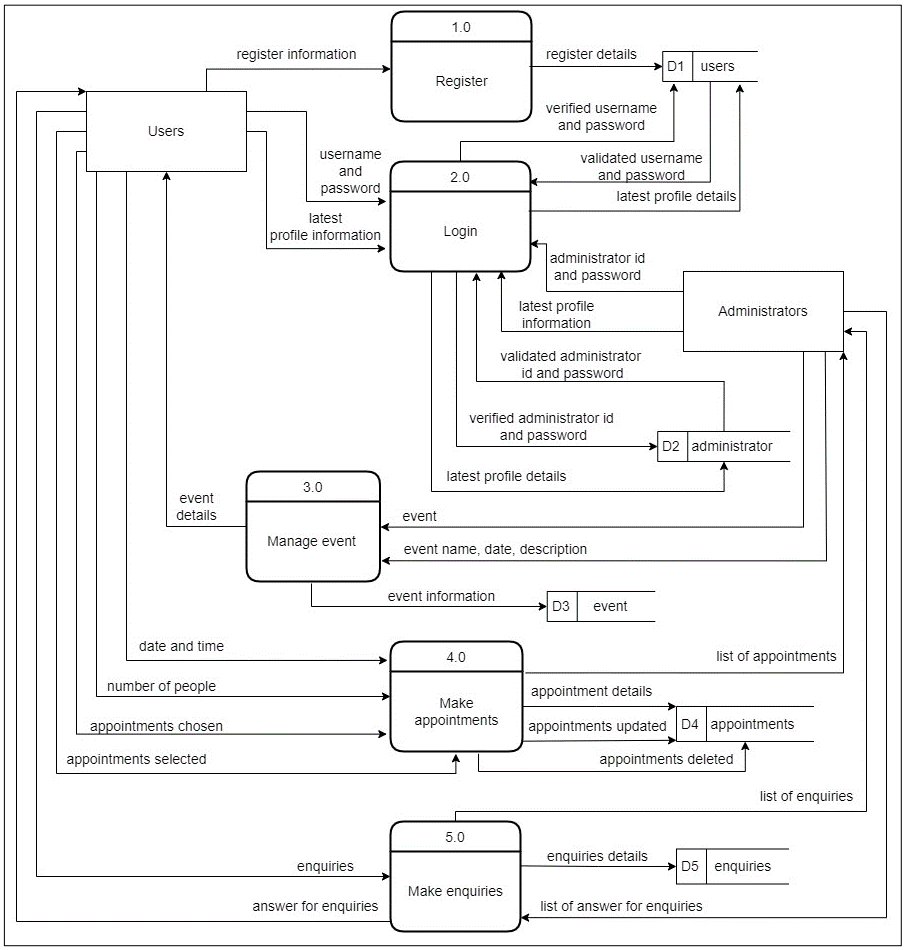
Appendix A (Flow Chart of the User Side)



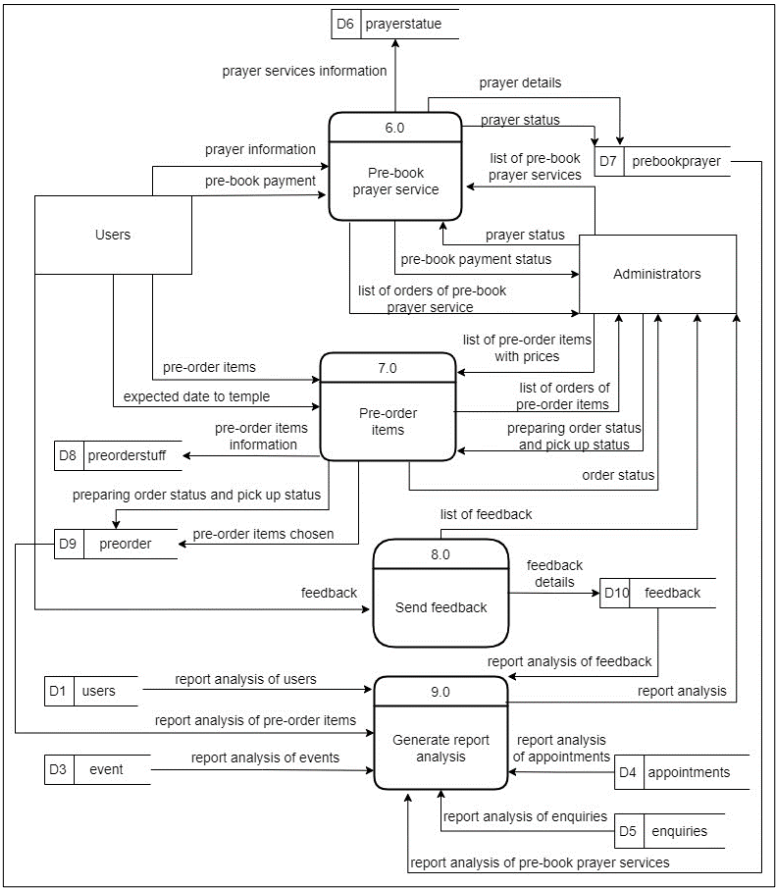
Appendix A (cont)



Appendix B (DFD Level 0 of the Proposed System)



Appendix B (cont)



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