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Event Attendance System for SIRIM Berhad

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Abstract

SIRIM Berhad is an industrial research and technology organization in Malaysia. The organization is currently using the manual method in taking attendance for events. However, the current method is prone to errors and time-consuming. Event attendance management is a critical aspect for organizations to ensure efficient operations. The event attendance system for SIRIM Berhad is an event management system to manage attendance for all its attendees. This project focuses on the development of a QR based event attendance system for SIRIM Berhad. Thus, this web-based system was developed to facilitate event managers to track attendance during events. This system is designed into one section which is an administrator section and 6 modules which are user authentication module, event creation and management module, attendance recording real-time module, registration management module, reporting and analytics module, payment module and notifications and reminder module. This project is implemented using Prototype Model methodology, MySQL as the database, PHP as the server-side scripting and HTML to create pages. The event attendance system will be an ideal way to handle attendance issues because it will allow attendance to be taken by scanning the QR code. By enabling attendees to check-in using QR code scanning, the system reduces manual workload and user's experience and streamlining the check-in process.

1. Introduction

Every organization can improve their performance and operations by developing web-based technology in general. Computers have replaced most of the operations in the work industry such as attendance and reservation activities. According to Bouchon, Hussain and Konar [1], event management combines disciplines that consists of business, communication and hospitality schools. An event attendance system is a system where it records employee attendance which is implemented in every agency including government agencies [2]. The event managers and people who oversees the event will manage the attendance system by analyzing the employees' details such as name and phone number which are maintained in the system [3]. According to Malah, Sumual and Rianto [4], the event attendance system is a system where it will record company employee's absence and presence. From the event attendance system, the event manager can analyze the attendance. SIRIM is a leading industrial research and technology organization in Malaysia, owned by the Minister of Finance Incorporated. With over 40 years of experience, it drives research, technology development, and quality standards. According to SIRIM Berhad [5], SIRIM supports the private sector, especially SMEs, by developing new technologies and offering solutions for technology adoption and upgrades. The event attendance system at SIRIM Berhad is primarily manual. Event managers and coordinators record employees' attendance by using online forms such as Google

Forms. The online form will consist of the attendee's personal details such as name, company name, date of event and time. The number of replies shows the number of people who attended the event.

The current method that they are using is a manual way of taking attendance prior event starts. Attendees will have to arrive at the event and scanned a QR code that was printed out at the registration counter, and they will be directed to an online form to key in necessary information such as name and telephone number or fill in their details on paper that consists of list of attendees. Based on the current method that they have been implementing, there are a few errors that arise. First, it is time-consuming and prone to human error where employees must scan a QR code and key in all their necessary details. Besides that, inaccuracy in attendee records such as wrong number of attendees. Lastly, decentralized storage of information in online forms presents challenges in accessing and sharing the data which leads to delay and inefficiency.

The proposed solution is to build a web-based event attendance system for SIRIM Berhad in which it can lessen the issues that have arisen with the current manual method in taking attendance. This event attendance system will ease the process by providing a QR code that was generated by the event manager in which consists of the employee's details such as name and phone number. With the QR code, employees just open the QR code that was given, and the event manager will scan them, and their attendance will be recorded as present. A report will be generated by the end of the event, and it will show all the names that attendee. From this proposed solution, it will ease in taking the attendance process and event managers can see who attended the event or otherwise.

This paper contains 5 sections. Section 1 tells the importance of web-based technologies in event attendance systems, highlighting the current method and the proposed solution with QR code technology. Section 2 reviews previous research explains the QR code technology and comparing the existing systems with proposed systems. Section 3 describes the use of Prototype Model in system development. Section 4 is the result and discussion. Lastly, Section 5, where the system's achievements are summarized highlighted the benefits such as real-time updates and acknowledging its limitations.

2. Literature Review

2.1 Comparison with existing systems

The three existing systems are studied and compared to the features of the proposed system. This comprises all the modules for the Event Attendance System for SIRIM Berhad. The comparison results are shown in Table 1.

Table 1 *Comparison Between Existing Systems and Proposed System*

Features/System	CVENT OnArrival	EVENTLEAF	EVENESIS	Event Attendance System for SIRIM Berhad
Online Payment Collection	X	√	√	√
Registration Events	X	X	X	√
Contactless CheckIns	X	√	√	√
Real-Time Reporting	√	√	√	√
Reminder Notifications	X	√	√	√
Attendee Management	X	√	√	√
Comprehensive Reports	√	√	√	√

According to Table 1, all these systems can be compared based on several functions such as Online payment collection, Contactless check-ins, Registration Events, Real-time reporting, Reminder notifications, Attendee management and Comprehensive reports. EVENTLEAF, EVENESIS and Event Attendance System for SIRIM Berhad collects online payment, contactless check-ins, real-time reporting, reminders notifications, comprehensive reports and attendee management. Only CVENT Onarrival does not support online payment collection, registration events, contactless-check ins, reminder notifications and attendee management features. EVENTLEAF, EVENESIS and CVENT Onarrival do not have Registration Events module. Only Event Attendance System for SIRIM Berhad has a Registration Events module.

3. Methodology

This section describes the stages of developing a system, covering the chosen model and its phases and the workflow of the project. The chosen model is Prototype Model.

3.1 Prototype Model

A prototype model is a software development method where a prototype is built, tested and refined until it meets the user requirements [4]. Developers will create a prototype and show it to the user to get feedback. If there are any changes that must be made, it will be implemented in the prototype, then delivered to the customer back and accepting any feedback. After the user is satisfied with the prototype, the developer will begin work on the final system. A high-quality system can be developed in a short time without affecting its efficiency. The reason why this methodology is chosen is to build a model that fully satisfies the requirements needed. The prototype model has six steps which are requirement gathering, quick design, building prototype, customer's feedback, refining prototype and engineer product. Figure 1 shows the Prototype Model phase.

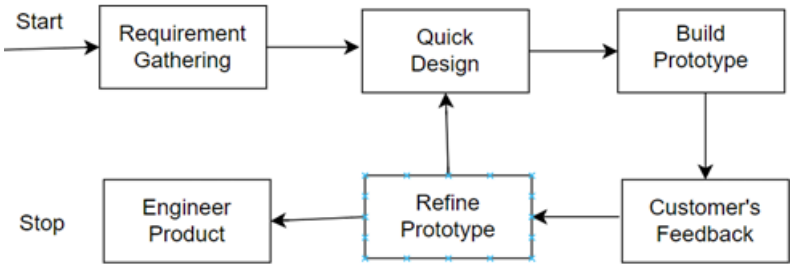

Fig.1 *Prototype Model phase*

3.2 System Development Workflow

The system development workflows give a framework for ensuring the delivery of high-quality system while serving the procedure for the entire process. The prototype model consists of 6 phases which each of phases has its own task and deliverables. Table 2 shows the system development workflow

Table 2 *System Development Workflow*

Phase	Task	Output
Requirement Gathering	• Selection and determination of the project title • Identifies the project's objectives, problem statements and project scope • Present the project plan for the Coordination Panels project • System implementation preparation and preliminary assessment to define the current method problems, benefits and weaknesses • Analysis information obtained • Analyze software and hardware requirements • The web-based information system programming language • Methodological selection • Take account the business workflows to design the system • Identify the entities, attributes and their relationships	• Event Attendance System for SIRIM Berhad project proposal • System's objectives and system's scope • Authorization and approval for the requested title • Gantt Chart • Gather information about the current method and study the problems to be solved by the Event Attendance System • List of the type of software and hardware requirements • Using PHP for server-side scripting, SQL and Javascript • Using prototype model methodology • Flow chart was developed • Entity Relationship Diagram (ERD) of the system

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Table 2: (cont.)

Phase	Task	Output
Quick Design	• Early phase of design, the system was sketched • The interface of the system can be illustrated • Design schema and schema creation	• The system architecture was developed • User Interface (UI) design for the system • Database schema and Data Dictionary
Build Prototype	• Prototype of Event Attendance System for SIRIM Berhad	• Prototype of Event Attendance System for SIRIM Berhad
Customer's Feedback	• Perform user evaluation and quickly evaluate on how they can navigate the system while performing a task	• A full report of user evaluation to refine the prototype
Refining Prototype	• Refine the prototype model of the Event Attendance System for SIRIM Berhad	• Prototype of the Event Attendance System for SIRIM Berhad
Engineer Product	• Perform system testing • Launch the Event Attendance System for SIRIM Berhad, always monitor the system and keep the system up to date with the current trends	• Functionality testing is conducted to evaluate the compliance of a system or component with functionality requirements • Full system and document processing system test documentation can be produced

3.3 System Requirements Functional and Non-Functional Requirements Tables

Functional requirement tells the functions the software must perform which includes input, behavior and output. Table 3 shows functional requirements. Non-functional requirements define the quality attributes that enable the software to function effectively. They represent a set of requirements to judge the system's operations in terms of performance, security, usability and cultural and political. Table 4 shows the non-functional requirements.

Table 3 *Functional requirements*

No	Module	Description
1	User Authentication	• Allow the administrator to send a QR code to attendees through their email account • Allow attendees to receive their own QR code to scan their attendance during events
2	Attendance recording	• Allow event managers to scan their attendance using the QR code given to them • Allow attendees to get their attendance recorded and a report will be generated on the time and date they attended the event
3	Registration management	• Allow the administrator to facilitate, retrieve and updating the attendance record such as correcting entries or adding as needed • Allow the administrator to ensure the data is organized and can be accessed easily for efficient management and retrieval of information
4	Reporting and analytics	• The system be able to generate a detailed report and provide analytics on attendance trends which includes the details of the event such as date and names of those who attended the event or otherwise
5	Create and Updates Events	• Allow administrators and event managers to create and updates events which include the date, time, location and description
6	Payment	• Allow users to make payments • through payment gateway for paid events

No	Module	Description
7	Notification and Reminder	• Administrators can notify attendees about upcoming events, the event has reached its maximum number of attendees

Table 4 *Non-functional requirements*

No	Requirement	Description
1	Performance	The system should be always usable
2	Usability	The loading time required for a website is no more than 1 minute
3	Security	The system should be user friendly
4	Cultural and political	The system should be able to work on any web browser

3.4 Systems Analysis

System requirements are a detailed description of the functionalities that a system must possess to meet the expectations of its users. It portrays the system functionality into graphical diagrams according to the specific requirements. An object-oriented approach is used to generate the UML diagrams, which are Use Case Diagram, Activity Diagram, Entity Relationship Diagram and Flowchart.

3.4.1 Use Case Diagram

It represents the methodology that was used in system analysis to identify, clarify and organize all system requirements of the proposed system. The actors or users are Admin, Event Manager, Attendee, and Walk- In Attendee who perform the different types of use case. Figure 2 shows the Use Case diagram of Event Attendance System for SIRIM Berhad.

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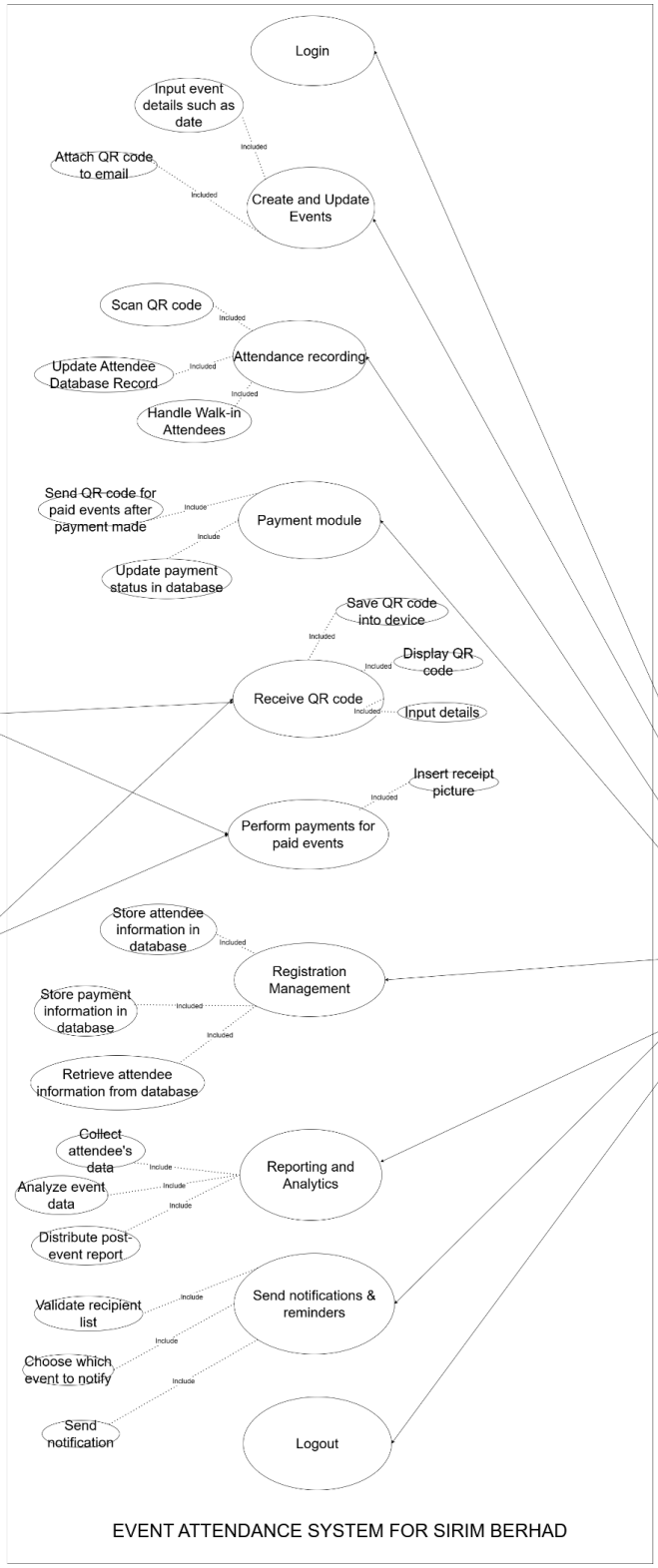

Fig.2 *Use Case diagram*

3.4.2 ERD Diagram

An Entity Relationship Diagram (ERD) is a visual representation of how different entities relate to each other in a system. ERDs are commonly used in database design to model the structure of a database and ensure data integrity. An ERD is a picture that shows the information created, stored and used by the system [6]. In this system, 4 tables have been identified which are USERS, NOTIFICATIONS, EVENTS and ATTENDEES. Figure 3 shows the Entity Relationship Diagram of the developed system.

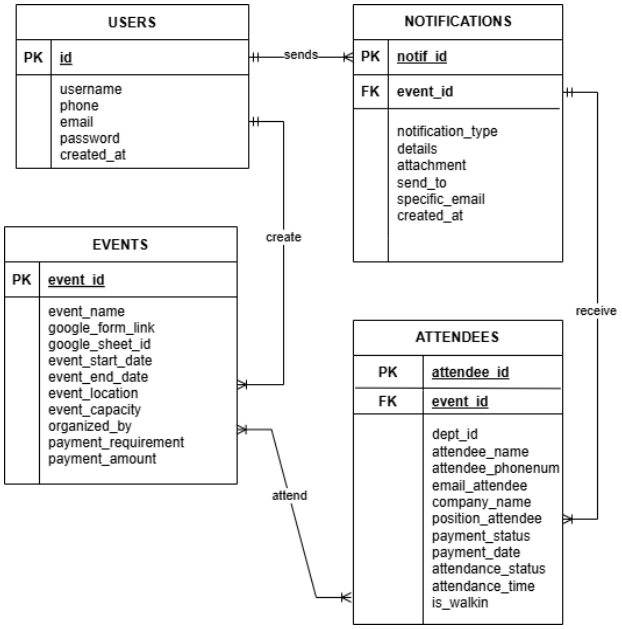

Fig.3 *Entity Relationship Diagram of the developed system*

3.4.3 Flowchart

A flowchart is a diagram that shows the steps in a process. It's used to visualize, analyze, and communicate processes. Figure 4 shows a flowchart for the developed system for the admin.

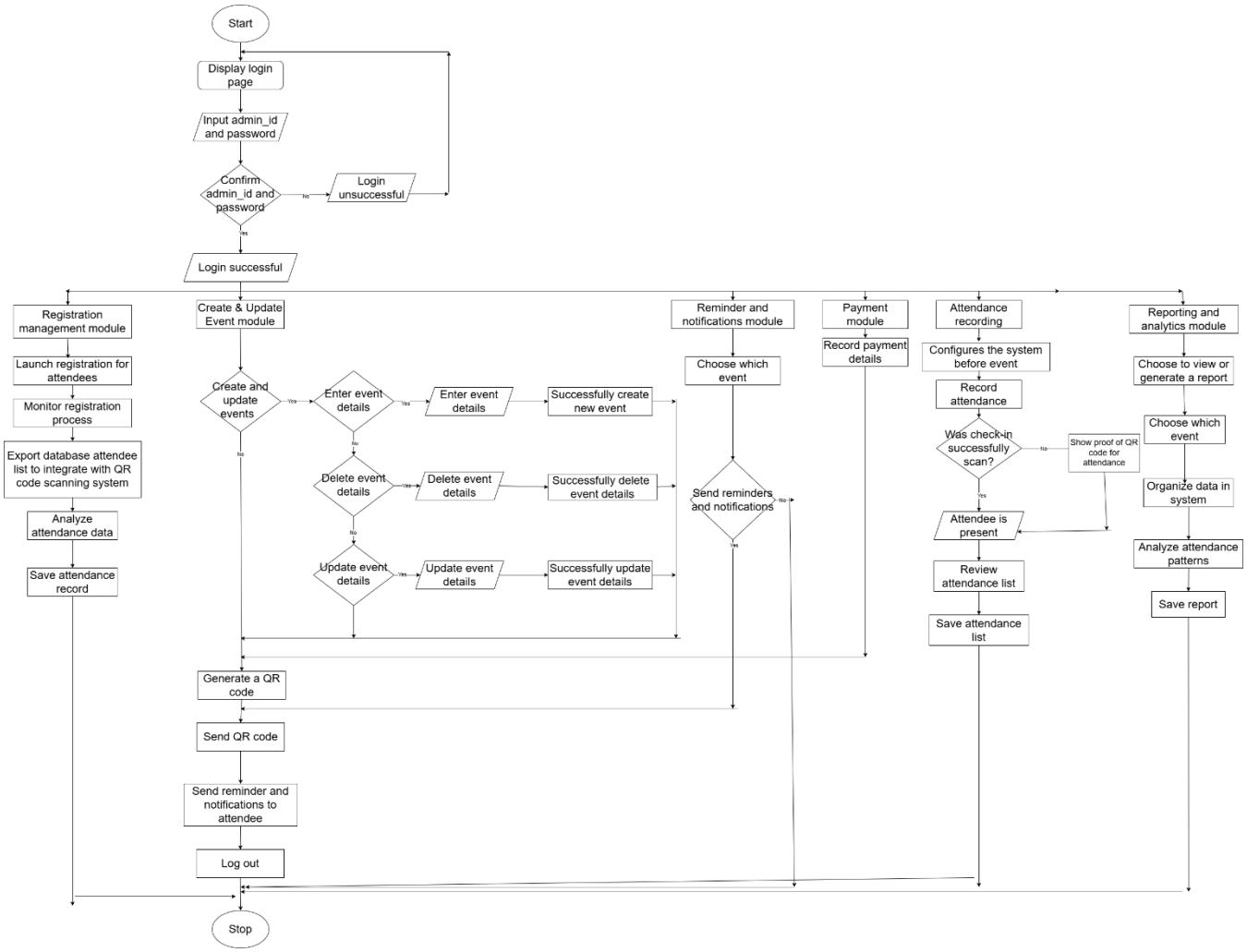

Fig.4 *Flowchart for the admin*

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3.5 System Design

3.5.1 System Architecture

The system architecture serves as a visual presentation to illustrate both the structure and functionality of the system. Figure 5 below shows the system architecture of Event Attendance System for SIRIM Berhad.

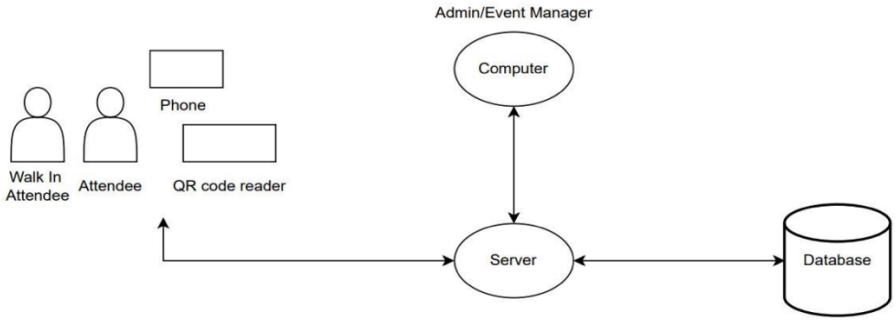

Fig.5 *System Architecture*

3.5.2 Relational Schema

A database schema shows how the data is stored in the database. It is implemented to define the organization data and the relationship between the tables in the database. A database scheme is designed to determine which components are required and how they will link.

i) Users (id, username, phone, email, password, created_at)
ii) Events (event_id, event_name, google_form_link, google_sheet_id, event_start_date, event_end_date, event_location, event_capacity, organized_by, payment_requirement, payment_amount)
iii) Attendees (attendee_id, event_id, dept_id, attendee_name, attendee_phonenum, email_attendee, company_name, position_attendee, payment_status, payment_date, attendance_status, attendance_time, is_walkin)
iv) Notifications (notif_id, event_id, notification_type, details, attachment, send_to, specific_email, created_at)

3.5.3 UI Design

Event Attendance System for SIRIM Berhad is developed using the Visual Studio Code while PhpMyAdmin is used to operate the database. In the implementation process, MySQL, HTML, JavaScript, PHP and CSS are used as programming language to develop the system in terms of interface and functionality. Additionally, the system also integrates the Google Sheets API to automatically and retrieve attendee's data that was submitted through Google Forms which streamlines the registration and attendance process. Figure 6 to Figure 14 shows the user interface design using Moqups.

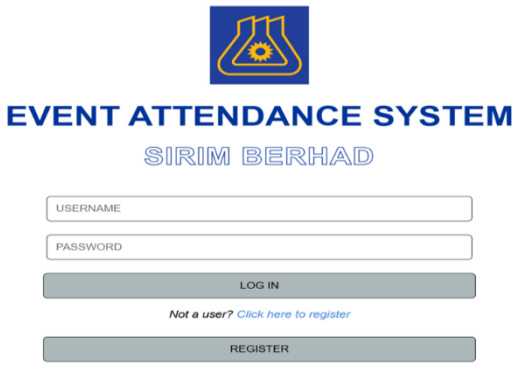

Fig.6 *Login Interface*

Fig.7 *Register Interface*

Fig.8 *Homepage Interface*

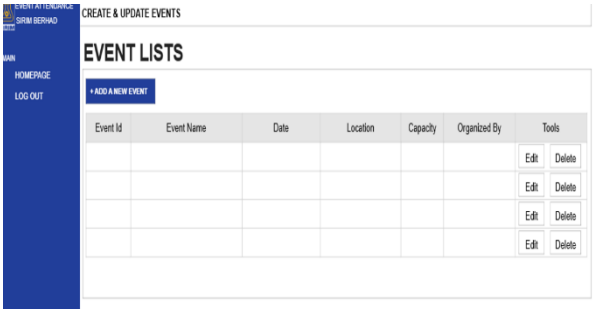

Fig.9 *Create and Update Events Interface*

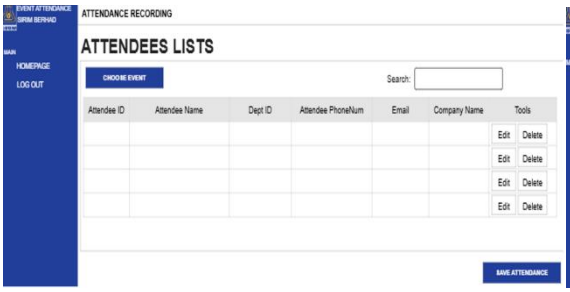

Fig.10 *Attendance Recording Interface*

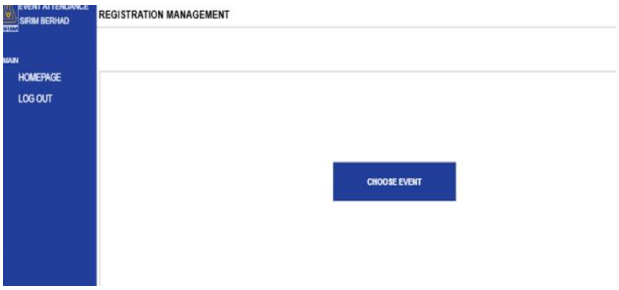

Fig.11 *Registration Management Interface*

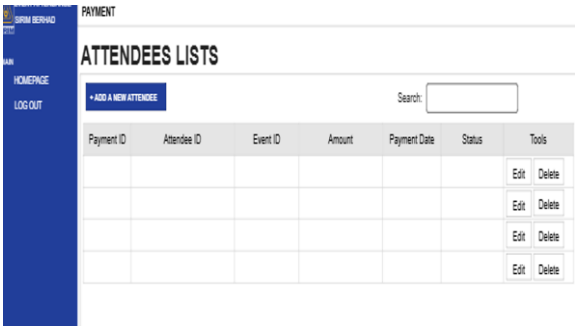

Fig.12 *Payment Interface*

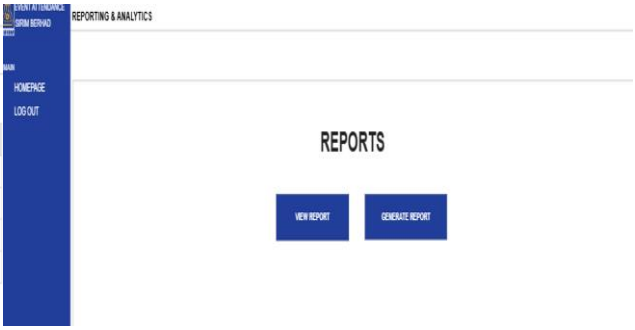

Fig.13 *Reporting and Analytics Interface*

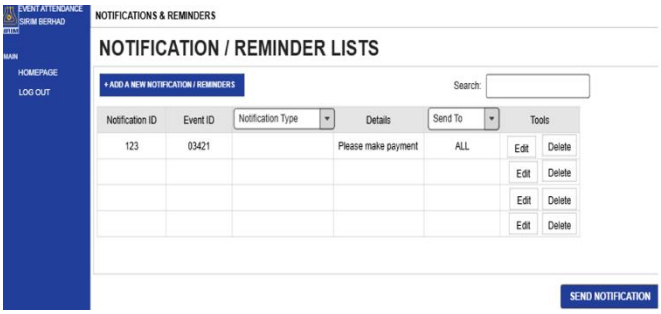

Fig.14 *Notifications and Reminders Interface*

4. Results and Discussion

A proposed system's result user expectations are determined through the process of system requirements analysis. It combined all the necessary requirements, evaluates the difficulties that occurred during the system design process and ensures that the proposed system achieved all the goals to enable users to take their attendance and event managers to manage the event's attendance efficiently.

4.1 Module

4.1.1 Create and Update Events Module

The create and update events module allows administrators to create a new event and update the details if it is needed. It will show all the events that have been created. Users will create a new event by creating a new

Google Form so attendees can fill in their details. After that, a QR code will be generated, and it will be blasted to everyone. If it is a paid event, the attendee will have to key in the payment receipt. Administrators could edit the event details by clicking the "EDIT" button.

4.1.2 Registration Management Module

The registration management module allows users to manage attendees when they receive their registration. Users will have to choose which event to priorly manage attendee list. It will display a list of attendees of the event and their details such as their name and company name. Users can update the attendee's details by clicking the "EDIT" button. If it is paid event, it will display their payment status as well.

4.1.3 Payment Module

In the payment module, the administrator can see the list of attendees that has made their payment and the amount. The user will have to choose an event prior checking the list. If the administrator wants to update the attendee's details such as payment status as the attendee wants to pay using cash, the administrator can click the "EDIT" button.

4.1.4 Attendance Recording Module

In this module, there are "CHOOSE EVENT", "SCAN QR" and "WALK-IN" button. On the day of the event, the administrator can use this module to record their attendance. The user must choose which event by clicking on the "CHOOSE EVENT" button. Then, the administrator can click the "SCAN QR" button and the attendee's QR code can be scanned. For walk-in attendees, the administrator can manage by clicking the "WALK-IN" button and a modal will appear, and the walk-in attendee will key in manually their details.

4.1.5 Notification and Reminder Module

The reporting and analytics module will enable users to send notification or reminder to attendees. Users will have to click the "ADD NEW NOTIFICATION OR REMINDER" button first. There are four types of notifications that can be made which are QR Pass, Payment, New events or Reminders. Administrators can add details of the notification. All notifications and reminders that are made will be sent to the attendee using email. Administrators can choose to send a notification to a specific attendee or all attendees.

4.1.6 Reporting and Analytics Events Module

The reporting and analytics module will enable event managers to see the report of an event. It will enable users to choose whether to view reports, generate a report or view monthly dashboard. If user clicked the "VIEW REPORT" button, it would display an attendance chart of an event, and it will display the "Present attendee" and "Absent Attendee" table. The user can print the chart and the attendance table. If user click the "GENERATE REPORT" button, it will display the report of an event with the percentage of attendance, the number of present and absent attendees and which company they are from, date generated and the attendance table. If user clicked the "MONTHLY DASHBOARD" button, it would display the dashboard page on events that has occurred such as total payments and number of events that has occurred.

4.1.7 User Management Module

In the user management module, it allows new users to create an account and login. If "user has not registered yet, they can click the "REGISTER" button. After they registered, they can login by clicking the '"LOGIN" button. When the user has successfully logged in, it will lead the homepage. The homepage will display all the modules are available which are "CREATE AND UPDATE EVENTS", "PAYMENT", "REGISTRATION MANAGEMENT", "ATTENDANCE RECORDING", "NOTIFICATION AND REMINDERS" AND "REPORTING AND ANALYTICS".

4.2 System Testing

Implementation and testing process involves developing the system according to the specifications and evaluating its functionality to ensure it meets the required goals and operates correctly.

4.2.1 User Acceptance Testing

User Acceptance Test was conducted to verify user's feedback based on the system functionality and user experience on Event Attendance System for SIRIM Berhad. The purpose of testing to identify issues in the system. The user test was conducted and a total of 9 respondents were involved, and their feedback was recorded through questionnaires using Google Form. Table 5 shows the User Experience Evaluation Result which includes the

questions that were asked and user's feedback. Figure 15 shows the chart of User Experience Evaluation Result according to the Likert scale that has been set namely 1(Strongly disagree), 2(Disagree), 3(Moderate), 4(Agree) and 5(Strongly Agree). Table 6 shows the System Functionalities Evaluation Result which includes the questions that were asked and user's feedback. Figure 16 shows the chart of System Functionalities Evaluation.

Table 5 *User Experience Evaluation Result*

No	Features	Scale					Total
		1	2	3	4	5	
1	The system able to create and update events easily					5	5
2	The modules are displayed clearly and straightforward					5	5
3	The developed system is user-friendly					5	5
4	The system is easy to navigate					5	5
5	The overall user interface design of the system is attractive					5	5
6	How satisfied are you with the Event Attendance System overall?					5	5

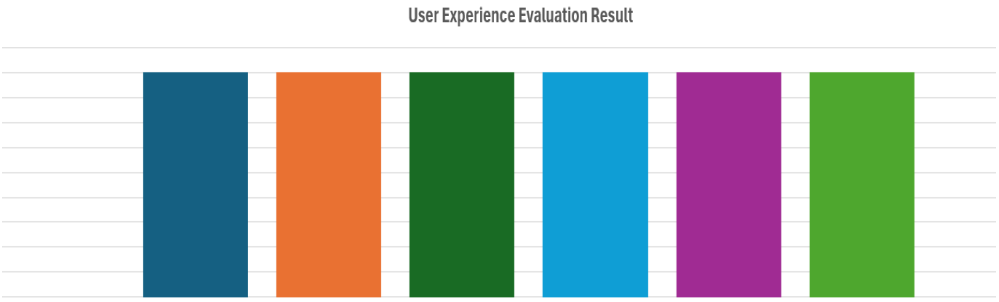

Fig.15 *Chart of User Experience Evaluation Result*

According to Figure 15, the X-axis is the questions that were asked while the Y-axis is the Count for scale in each question that was asked in Table 5. The dark blue bar chart is the first question, the orange bar chart is the second question, the dark green bar chart is the third question, the light blue bar chart is the fourth question, the purple bar chart is the fifth question, and the light green bar chart is the sixth question. Based on the result, it can be seen vividly that users are satisfied with the system interface as each question gets scale of 5.

Table 6 *System Functionalities Evaluation Result*

No	Features	Result (Yes or No)
1	The system able to create new events without errors	Yes
2	The system is easy to use	Yes
3	The system able to immediately reflect any changes	Yes
4	The system able to update attendee's status in real time after scanning	Yes
5	The system able to send email notifications with QR codes attached	Yes
6	The system able to provide a report list of present and absent attendees	Yes

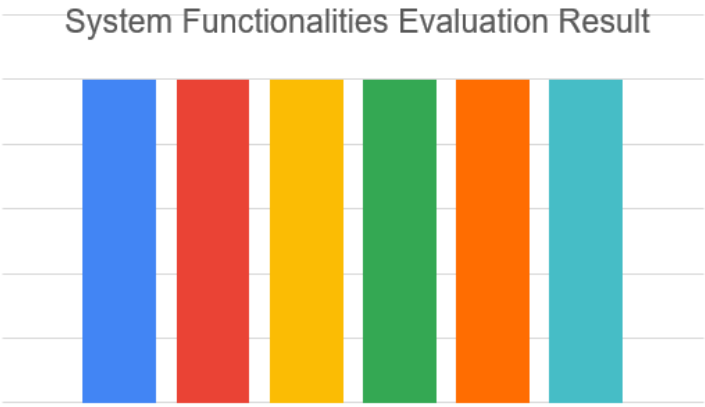

Fig.16 *Chart of* System Functionalities Evaluation Result

According to Figure 16, the X-axis is the questions that were asked while the Y-axis is the Count for Yes based on the number of respondents in each question that was asked in Table 6. The dark blue bar chart is the first question, the red bar chart is the second question, the yellow bar chart is the third question, the green bar chart is the fourth question, the orange bar chart is the fifth question, and the light blue bar chart is the sixth question. Based on the result, it can be seen vividly that the system performs its intended function as all features gets "Yes" answers.

5. Conclusion

In conclusion, the Event Attendance System for SIRIM Berhad using Prototype Model has been developed with complete functionality. The system successfully fulfils its objectives that were defined in the project scope, system requirements and user requirements. The Event Attendance System offers advantages such as enhancing efficiency in attendance taking methods where it reduces the waiting time for everyone and manual entry errors. Next, this system enhances accuracy in which automated data entry and attendance tracking will ensure accuracy in recording the employee's information. Besides that, real-time updates where the event manager can monitor the attendance in real-time, allowing for immediate updates. However, there are downsides to this system such as it must be connected to the Internet. This system cannot function if it does not connect to the Internet. Besides that, the events that were registered cannot have the same date as others. Based on the analysis of the system's advantages and disadvantages, there are the following improvements that can be made to the Event Attendance System for SIRIM Berhad such as allowing two or more events to have the same date. Besides that, making the system can be run offline.

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Conflict of Interest

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

Author Contribution

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

The authors confirm contribution to the paper as follows: **study conception and design**: Sofiya Shukri, Nazri Mohd Nawi; **data collection**: Nazri Mohd Nawi; **analysis and interpretation of results**: Sofiya Shukri, Nazri Mohd Nawi; **draft manuscript preparation**: Nazri Mohd Nawi.

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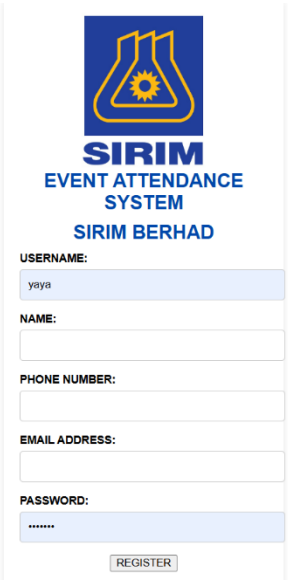
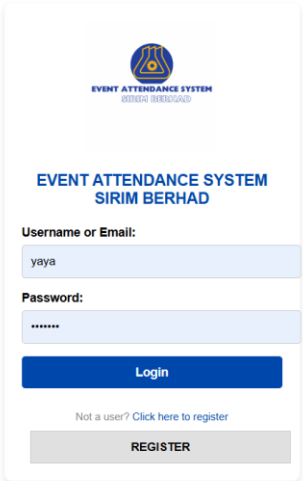
Appendix A:

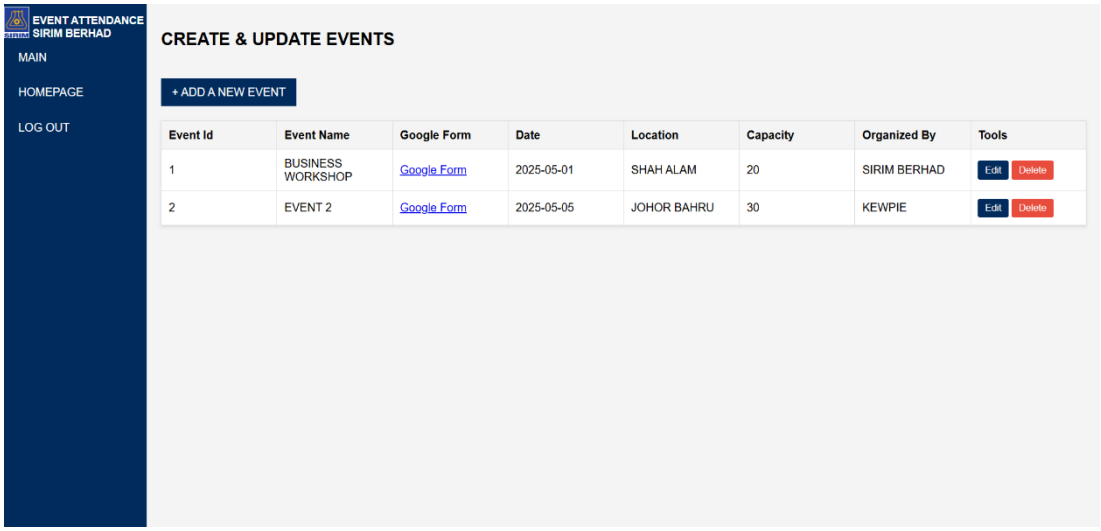
A1: User Registration Module



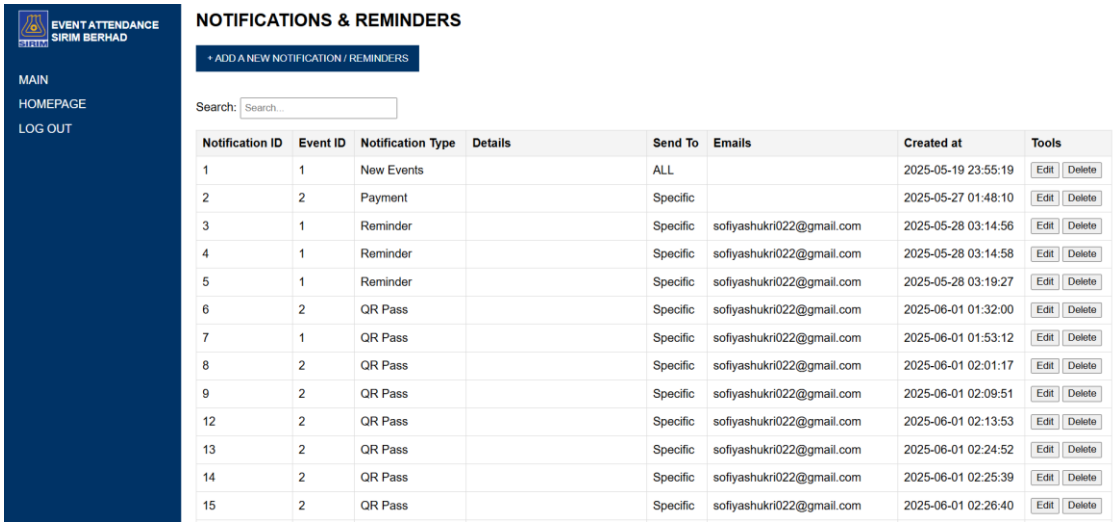
A2: User Login Module



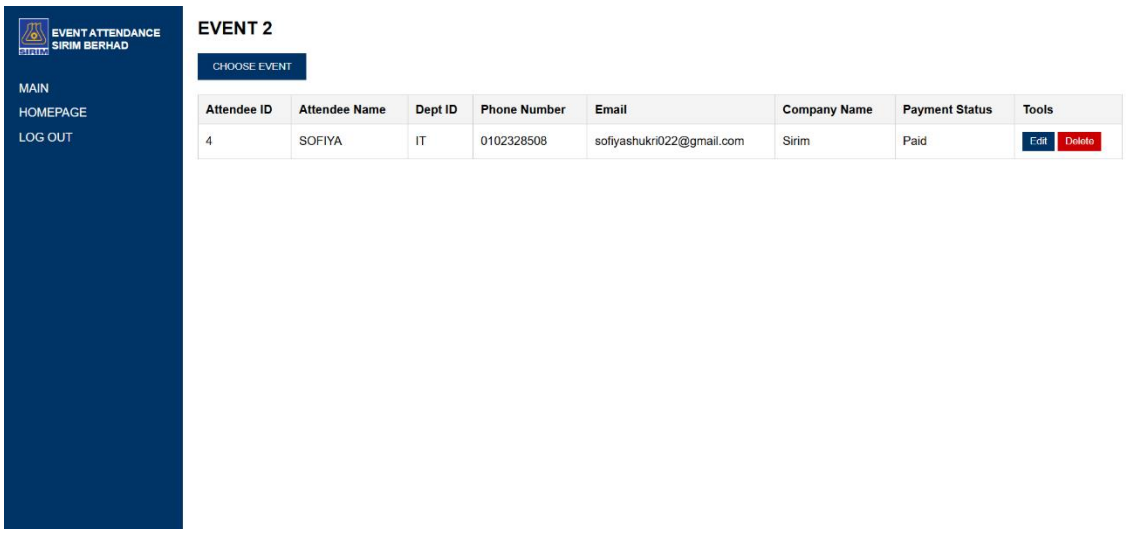
A3: Create and Update Events Module



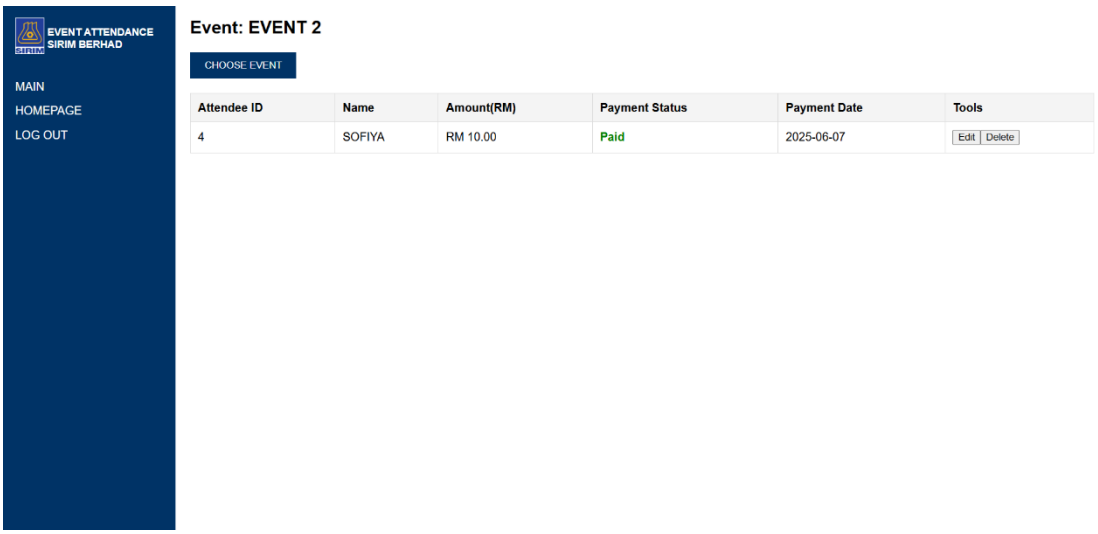
A4: Notification and Reminder Module



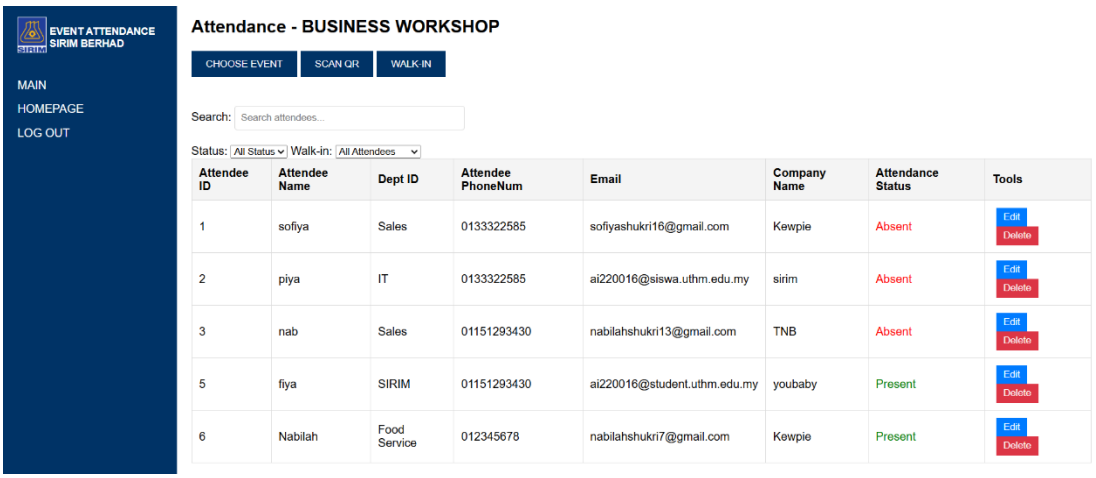
A5: Registration Management Module



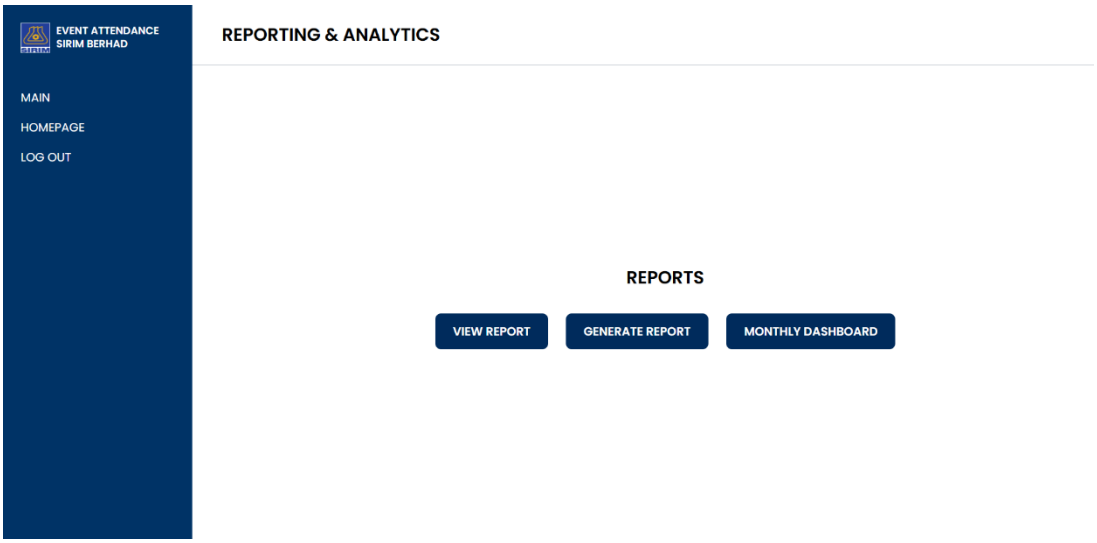
A6: Payment Module



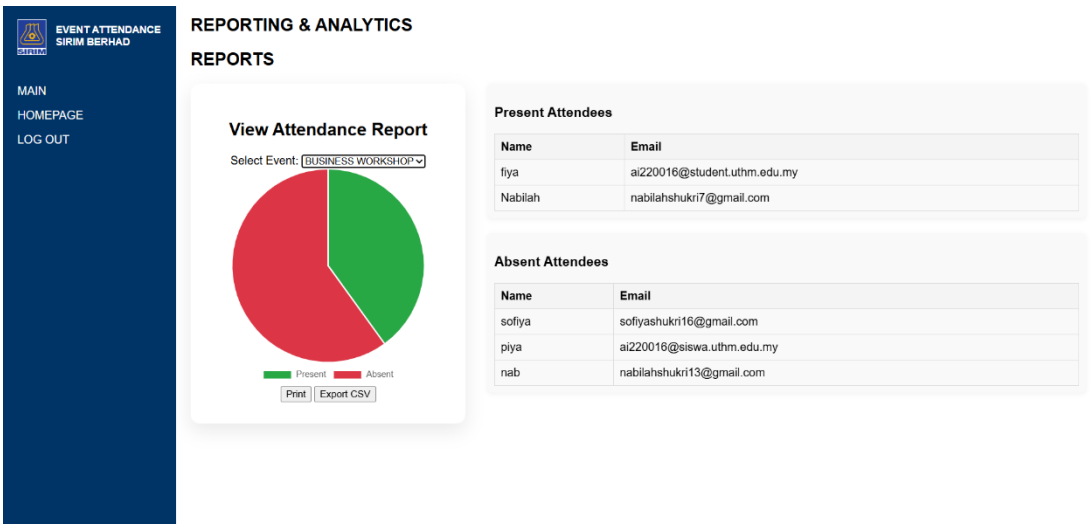
A7: Attendance Recording Module



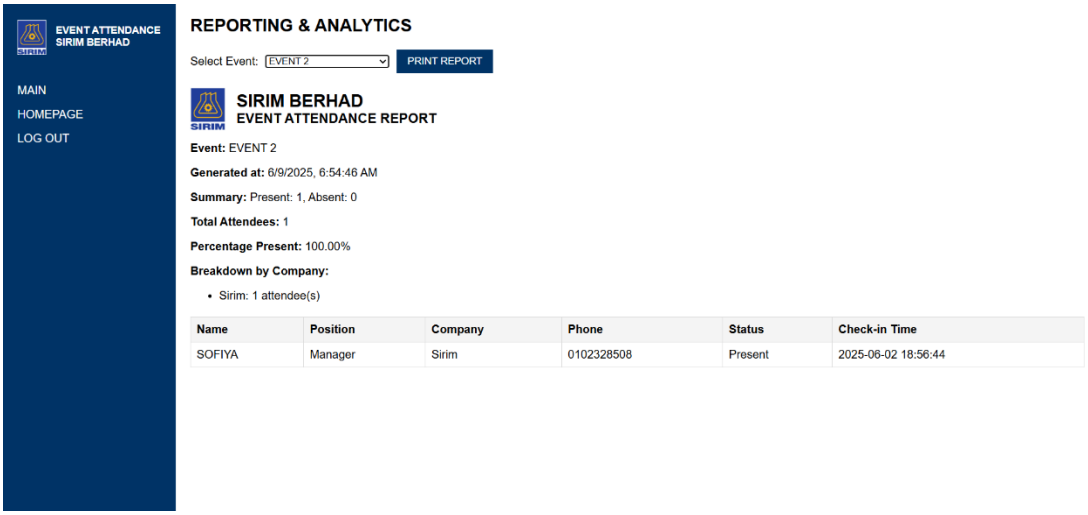
A8: Reporting and Analytics Module



A9: View Report Interface



A10: Generate Report Interface



A11: Monthly Dashboard Interface