

## Foreign Workers' Management System

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### Abstract

The Foreign Workers' Management System aims to improve the organization's efficiency and compliance with managing foreign labor. The existing process depends on manual methods like spreadsheets, which creates difficulties in real-time compliance monitoring, visa processing, and decentralized document management. The objectives include developing a web-based system using an object-oriented approach and testing it through user acceptance testing. The scope of this project includes stakeholders such as the human resource department. The methodology used for implementing the Foreign Workers' Management System is the Rapid Application Development (RAD). The abstract concludes that the system can significantly improve operational efficiency through centralized data, reducing errors, and facilitating faster processes.

## 1. Introduction

The Foreign Workers' Management System (FWMS) is a comprehensive framework designed to oversee and control the employment of foreign workers, with Aluputer Industrial Human Resources Management playing a crucial role. Aluputer, based in Pasir Gudang, Johor, and Singapore, manages foreign labor recruitment, onboarding, paperwork, and compliance, contributing to both its workforce stability and the host country's economic growth. However, the current manual data management using Microsoft Excel presents challenges, necessitating a more advanced Foreign Workers' Information Management System.

The challenges in the current foreign workers' management system include difficulties in real-time compliance monitoring, labor-intensive manual processing of visas and work permits, and the decentralized nature of document management, leading to administrative overhead and data loss risks.

The objectives of the proposed system are to design a Foreign Workers' Management System using an object-oriented approach, develop a web-based system, and conduct user acceptance testing for effectiveness.

The study focuses on Aluputer Sdn Bhd in Pasir Gudang, Johor, with the Human Resources department playing a pivotal role in implementing the Foreign Workers' Management System. The system's key modules include Registration and Login, Foreign Workers' Information, Attendance, Applicant, Payroll, Rent, and Generate Report.

The implementation of the Foreign Workers' Management System aims to create an efficient platform, enhancing the management, monitoring, and compliance of foreign workers. The expected outcomes include improved efficiency, reduced administrative overhead, and compliance with laws and regulations, creating a cohesive and integrated platform.

The system's centralization of data and processes improves efficiency by reducing manual paperwork, mitigating errors, and expediting crucial processes. Its modular design ensures scalability, allowing easy adjustments to evolving organizational and regulatory needs, making it a valuable long-term asset for the

organization. The system's impact is immediate operational efficiency gains and long-term adaptability, significantly improving foreign workers' management within the organization.

## 2. Related Work

A literature review is a method of collecting information from scholarly sources such as books, journals, articles, newspapers, and other sources appropriate for this study. The information collected is usually related to the title of the study being conducted

### 2.1 Case Study: Foreign Workers' Management System

The literature review highlights the importance of information management systems (IMS) and human resource management systems (HRMS) in the organizational context and provides a comprehensive overview of both. The IMS dates to IBM's database and records management system in 1968 and was introduced as a tool for managing information in organizations [2]. It highlights the central role of automation in human resource management, especially the transition from paper-based to web-based technologies to improve organizational efficiency. However, the literature review lacks a thorough examination of the potential drawbacks or challenges associated with implementing these systems, particularly in the context of managing a multicultural and international workforce.

The literature review highlights the transition from paper-based to web-based HR applications and emphasizes the benefits of automation, such as reducing costs and increasing productivity. It discusses the shift in responsibilities of managers and employees with the introduction of self-service applications. It emphasizes the importance of electronic document management over manual systems, including the integration of HRIS for strategic initiatives and workforce planning. However, the literature lacks a comprehensive examination of the potential drawbacks of implementing IMS and HRMS, particularly in the context of international HR management, indicating a knowledge gap.

The study is to analyze the implementation of a management system for foreign workers at Aluputer Sdn. Bhd in Pasir Gudang, Johor, to contribute to the existing knowledge. The study aims to fill gaps in the literature and explore the challenges faced by organizations in managing foreign workers and provide insights into developing effective solutions and strategies for this specific context.

### 2.2 Technology

The web-based application model of the Foreign Workers' Management System consists of HTML, CSS, PHP, and SQL. These solutions provide a versatile, user-friendly framework for managing foreign workers. HTML and CSS are responsible for creating a visually appealing and intuitive user interface, while PHP handles the server-side programming for dynamic content and database interactions. SQL is used to efficiently organize, retrieve, and store data.

### 2.3 Study of Existing Related System

The study was conducted on three existing related systems on the background study. The three existing related systems are peopleHum[3], HR2eazy[4], Swingvy[5]. In addition, this study was conducted to collect important information for the proposed system, Foreign Workers' Management System.

### 2.4 Comparison with the Existing System

Based on the studies and comparisons conducted, there are parallels and differences between the analogous system and the proposed system. This comparison is conducted by comparing the attributes of the equivalent and proposed systems. Table 1 shows the comparison of features in the existing employee system and the proposed system

**Table 1** Comparison of Features in the Existing Employee System and the Proposed System

Features/System	peopleHum	HR2eazy	Swingvy	Foreign Workers' Management System
Registration and Login Module	Yes	Yes	Yes	Yes
Employee Module	Yes	Yes	Yes	Yes

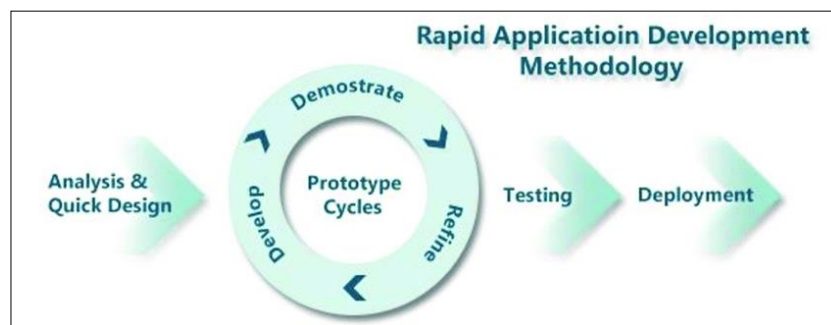
**Table 1** Comparison of Features in the Existing Employee System and the Proposed System (continued)

Attendance Module	Yes	Yes	Yes	Yes
Applicant Module	Yes	Yes	Yes	Yes
Payroll Module	Yes	Yes	Yes	Yes
Rent Module	No	No	No	Yes
Report Module	No	No	No	Yes
System Type	Web-based Application	Web-based Application	Web-based Application	Web-based Application

Based on the comparison of features in Table 1, The comparison of web-based HR management solutions reveals that while peopleHum, HR2eazy, and Swingvy all provide essential modules such as registration and login, foreign workers and information, attendance, applicant management, and payroll, the proposed Foreign Workers' Management System offers unique features like the Rent Module and Generate Report Module. These additional capabilities make it a more specialized solution for managing foreign workers. This analysis underscores the importance of evaluating specific organizational needs and the comprehensive feature set of a system when choosing an HR management solution for foreign worker management.

### 3 Methodology

According to [6], the system of methods, principles, and procedural rules used within a particular discipline. In research and experimental design, for example, the term refers to the techniques used to collect information, and in statistics to the procedures used to analyze that data. The Rapid Application Development Framework for managing the development of software applications is based on the continuous involvement of users in the process of requirements elicitation, commonly referred to as prototyping. The RAD model is a rapid and iterative development technique that requires feedback from the product owner before the final version is released [7]. Fig. 1 shows the representation of the rapid application development process model.

**Fig.1** Rapid Application Development (RAD) Process Model

#### 3.1 Analysis & Quick Design Phase

During the Analysis and Quick Design Phase, the project team thoroughly examined material received from an interview session with HR management, which was enabled via a Google Meet. This phase involves a thorough examination of the client's (HR Management) objectives, goals, and expectations, allowing for the speedy construction of the Foreign Workers' Management System. This phase allows for fast changes depending on changing project requirements.

#### 3.2 Prototype Cycles Phase

The system prototype for the company's HR perspective and the main concept for how the system should be built are drawn throughout the design process. The second step is a quick design, often called a preliminary design. The fundamental architecture of the system is now complete. However, it is not a fully developed design. It provides a brief rundown of the system for the user. Rapid design helps in the development of the prototype.

##### 3.2.1 Develop Phase

The Development phase of the RAD approach for the Foreign Workers' Management System focuses on the actual development of the system based on the requirements and designs created in previous phases. The goal of

this step is to turn the prototypes into a workable software model. Sub-activities include coding, database development, and component integration. In the first cycle, core components like Registration and Login are developed. The second cycle focuses on the Employee, Applicant, and Rent modules. The third cycle includes Attendance, Payroll and Generate Reports like foreign workers' details and their attendance. Technologies like PHP, HTML, CSS, JavaScript, and MySQL are used in Visual Studio Code for development.

### 3.2.2 Demonstrate Phase

The Demonstrate phase of the RAD process is used to demonstrate the built prototype to stakeholders, particularly end users, for feedback and validation. Sub-activities include demos, walkthroughs, and gathering user feedback on the working prototype. User interviews, for example, will be utilized to collect qualitative insights on the built system. In Cycle 1, the Registration and Login modules are demonstrated. Cycle 2 Employee, Applicant, and Rent modules are presented to stakeholders for feedback on integration and satisfaction, while Cycle 3 includes Attendance, Payroll and Generate Reports modules for comprehensive feedback collection.

### 3.2.3 Refine Phase

The Refine phase of the RAD is critical for fine-tuning the program based on user input obtained during the demonstration phase. This iterative procedure is motivated by a desire to improve the system's operation and cooperatively resolve recognized flaws. Sub-activities during this phase include making necessary changes to the code to incorporate improvements proposed by users, updating the database to reflect these changes, and addressing any difficulties or concerns highlighted during the demonstration. Techniques such as incremental development are used, enabling the program to be improved gradually and methodically. Cycle 1 focuses on refining the Registration and Login modules. Cycle 2 Employee, Applicant, and Rent modules while integrating new features with existing ones. Cycle 3 finalizes improvements to Attendance and payroll, and Generates Reports, ensuring prototypes represent the final system accurately.

### 3.3 Testing Phase

The testing step of the Rapid Application Development (RAD) technique for the Foreign Workers' Management System is critical for guaranteeing the software's stability, functionality, and performance. This phase's major goal is to test and verify the system against defined requirements, finding and correcting any errors or inconsistencies. The design and execution of test cases, performance testing, security testing, and user acceptability testing (UAT) are all sub-activities in the Testing phase.

### 3.4 Deployment Phase

In the Rapid Application Development (RAD) approach for the Foreign Workers' Management System, the Deployment phase is the last step of the development life cycle, focused on the methodical release and installation of the program into the production environment. The Deployment Phase guarantees the smooth transition from development to production, allowing Aluputer to capitalize on the advantages of the recently deployed Foreign Worker Management System.

## 4 Analysis and Design

This section will explain the analysis and design of the Foreign Workers' Management System based on a web-based application. All the diagrams are built based on object-oriented.

### 4.1 System Requirement Analysis

In system requirements analysis for the Foreign Workers' Management System, there are two categories of requirements which are functional requirements and non-functional requirements.

#### 4.1.1 Functional and Non-functional Requirements

The functional and non-functional requirements of the Foreign Workers' Management System are listed in Table 2. The functional requirements are specifications that detail the system's features and functionalities. As for the non-functional requirements Table 3, will describe the performance and behavior of the system that needed to be implemented so that the system can work efficiently. This requirement can help improve the user experience when using the system.

**Table 2** *Functional Requirements for the System*

No	Functional Requirements	Description	Users
1.	Registration and Login Module	The HR and Company Owner should be able to register for an account. The system must authenticate users through a login process.	HR Staff, HR Manager
2.	Foreign Workers Information Module	The system should maintain an up-to-date contains the foreign worker details such as name, ID, contact number, and mail address.	HR Staff
3.	Attendance Module	The system is designed to track and management for foreign employees, ensuring accurate recording of working hours, leave, and absences.	HR Staff
4.	Applicant Module	The system Automated notifications for updates on visa application status.	HR Staff
5.	Payroll Module	The system can view the employee's salary and record it.	HR Staff
6.	Rent Module	The system will update the renting place of workers and their respective hometowns.	HR Staff,
7.	Report Module	The system can the employee details and attendance in a pie chart	HR Manager

**Table 3** *Non-functional Requirements for the System*

No	Non-functional Requirements	Description
1.	Performance	The system must be responsive and efficient, ensuring quick response times for user interactions.
2.	Usability	The system should be user-friendly. Navigation and interaction should be straightforward.
3.	Operation	The system can be used only in web-based. The system will have a database to store all the data.

#### 4.1.2 User Requirements

The user requirements analysis for the Foreign Worker Management System thoroughly assesses the needs and expectations of the system's end-users through questionnaires, feedback sessions, and interviews are explain in table 4.

**Table 4** *User Requirement Analysis*

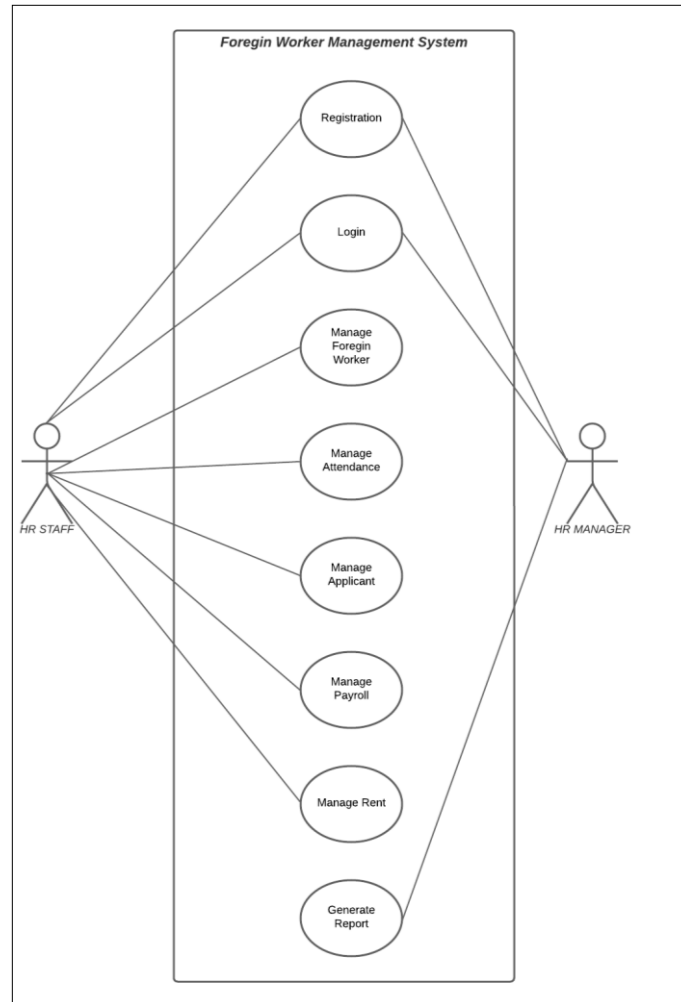
No	User Requirements
1.	Users (HR Staff and HR Manager) should be able to input their full name, role, username, and password to register into the system.
2.	Users (HR Staff and HR Manager) should be able to input the user's name and password to log into the system.
3.	Users (HR Staff) can input details about individual Foreign Workers' full name, working ID, phone number, address, gender, date of birth, salary, nationality, passport number, department, and contract period.
4.	Users (HR Staff) should be able to update, delete, search, and view details of the

**Table 4** *User Requirement Analysis (continued)*

	Foreign Workers.
5.	Users (HR Managers) can generate monthly reports on foreign worker details and attendance.
6.	Users (HR Staff and HR Manager) should be able to log out of the system.

### 4.1.3 Use Case Diagram

Fig. 2 shows the use case diagram for the Foreign Workers Management System representing the interactions between two main actors: HR Staff and the HR Manager. There are a total of eight use cases in this system.



**Fig. 2** *Use Case Diagram for Foreign Workers' Management System*

### 4.1.4 Class Diagram

Fig.3 shows the Class Diagram for the Foreign Workers' Management System representing the system's core classes and their interactions. The major classes include Admin, Employee, Attendance, Applicant, Rent, and Payroll.

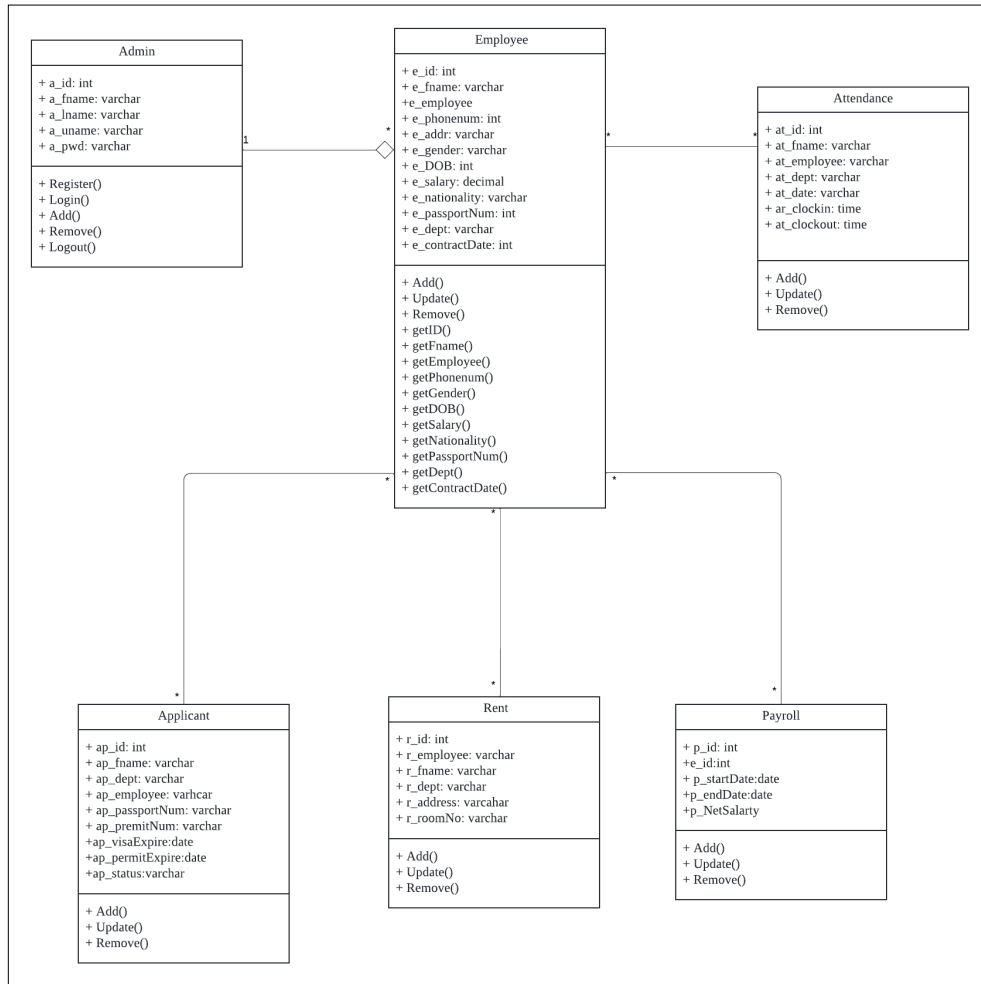


Fig. 3 Class Diagram for the Foreign Workers' Management System

### 4.2 System Design

Fig 4 shows the system architecture of the Foreign Worker Management System, which is a Multi-Tier Architecture. The diagram illustrates the relationship between the client, Front-End Server, Back-End Server, and the cooperating database to perform certain functions. The client is a device user, such as a web browser, that communicates with the system. The Front-End Server is responsible for displaying information and receiving input from users. The technologies used for the Front-End servers in this system are HTML, CSS, JavaScript, and Bootstrap. PHP is used as the programming language for the Back-End Server, which handles logic and data storage. The Database is a storage system that stores system data, with MySQL being the database used by the system. The Back-End Server communicates with the database to retrieve, update, and store data. The advantage of using multi-tier architecture is that each component is separated into different layers, allowing different parts of the system to be updated independently without interfering with other parts of the system.

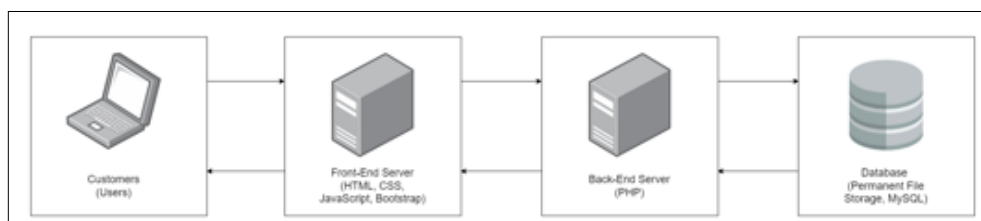


Fig. 4 System Architecture

### 4.3 Database Design

The purpose of the database is to store and manage the data of the system. The database structure represents the entities that hold different types of data within the database.

- i. **Admin** (a\_id, a\_fname, a\_lname, a\_role, a\_pwd).
- ii. **Employee** (e\_id, e\_fname, e\_employee, e\_phonenum\_addr, e\_gender, e\_DOB, e\_salary, e\_nationality, e\_passportNum, e\_dept, e\_contractDate)
- iii. **Attendance** (at\_id, at\_fname, at\_employee, at\_dept, at\_clockin, at\_clockout, at\_date)
- iv. **Applicant** (ap\_id, ap\_fname, ap\_employee, ap\_dept, ap\_passportNum, ap\_passportExpire, ap\_permitNum, ap\_visaExpire, ap\_visaimg, ap\_passportimg, ap\_status)
- v. **Payroll** (p\_id, p\_employee, p\_startDate, p\_endDate, p\_deduction, p\_OThours, p\_Nettsalary)
- vi. **Rent** (r\_id, r\_employee, r\_fname, r\_dept, r\_address, r\_roomNo)

## 5 Result and Discussion

The Results and Discussion section presents the findings of the study or project, interpreting them within the context of the research questions or objectives. It discusses the significance of these results, and their implications for the field, and suggests potential avenues for further research or application.

### 5.1 Implementation

The front end is built using HTML, CSS, JavaScript, and Bootstrap to create responsive and attractive user interfaces. Bootstrap is a CSS framework that offers a different approach, providing many ready-made CSS classes to speed up the system development process without needing to write CSS code from scratch for HTML elements. The back end is developed using PHP to provide server-side functionality. PHP offers the capability to create a server that can process HTTP requests from clients. Additionally, TCPDF is used for generating PDF documents, ApexCharts for creating interactive charts, and jQuery for simplifying HTML document traversal and manipulation, event handling, and animation. Thus, this system can be developed efficiently and is easier to maintain due to its clear and organized code structure.

The registration interface for new users for HR Staff and HR Managers. In this user registration process, the user initiates the registration process by entering details such as first name, last name, role, username, and password. The system will then validate the provided information. If successful, the system registers the user, redirecting to the main interface. Validation failures prompt error messages, guiding users to correct issues before resubmitting. Fig. 5 shows the interface for registering HR Staff and HR Managers and Fig.6 shows the code segment for registering HR Staff and HR Managers.

**Fig. 5** Register Interface

```

<?php
$connection = mysqli_connect("localhost", "root", "", "fwms");

if (!$connection) {
    die("Connection failed: " . mysqli_connect_error());
}

if (isset($_POST['submit'])) {
    $a_fname = $_POST['a_fname'];
    $a_lname = $_POST['a_lname'];
    $a_uname = $_POST['a_uname'];
    $a_pwd = $_POST['a_pwd'];
    $a_role = $_POST['a_role'];

    $sql = "INSERT INTO admin (a_fname, a_lname, a_uname, a_pwd, a_role) VALUES ('$a_fname', '$a_lname', '$a_uname', '$a_pwd', '$a_role')";

    if (mysqli_query($connection, $sql)) {
        echo '<script>
            alert("successfully added!");
            setTimeout(function() {
                window.location.href = "login.php";
            }, 2000); // Wait for 2 seconds before redirecting
        </script>';
    } else {
        echo "Something went wrong: " . $connection->error;
    }
}
?>

```

**Fig. 6 Register Code Segment**

Fig. 7 shows the login interface for the HR Staff and HR Manager. HR Staff and HR Manager need to enter a username and password into the input fields. If the username and password are valid, the users will be allowed to log in to the system. If they are not valid, the system will display a message indicating that the username and password are incorrect.

**Fig. 7 Login Interface**

```

<?php
include('config/constants.php');

// Initialize the message array
$message = array();

if (isset($_POST['submit'])) {
    $a_uname = $_POST['a_uname'];
    $a_pwd = $_POST['a_pwd'];

    $select_users = mysqli_query($conn, "SELECT * FROM `admin` WHERE a_uname = '$a_uname' AND a_pwd = '$a_pwd'" or die('query failed'));

    if(mysqli_num_rows($select_users) > 0){
        $row = mysqli_fetch_assoc($select_users);
        $_SESSION['a_uname'] = $row['a_uname'];

        // Check the user's role and redirect accordingly
        if ($row['a_role'] == 'HR Staff') {
            header('Location: index.php'); // Redirect HR Staff to index.php
        } else if ($row['a_role'] == 'HR Manager') {
            header('Location: report.php'); // Redirect HR Manager to report.php
        }
        exit(); // Ensure that no further code is executed after redirection
    } else {
        $message[] = 'Incorrect Username or Password!';
    }
}
?>

```

**Fig. 8 Login Code Segment**

Fig. 9 shows the Employee interface for adding new Foreign Workers. HR Staff needs to enter Foreign Worker details (full name, Mobile Number, Address, Gender, DOB, Salary, Nationality, Passport Number, Department, Contract Date) into the input fields. If the details are valid, the page will redirect to the employee interface. If they are not valid, the system will display a message indicating that the details are incorrect.

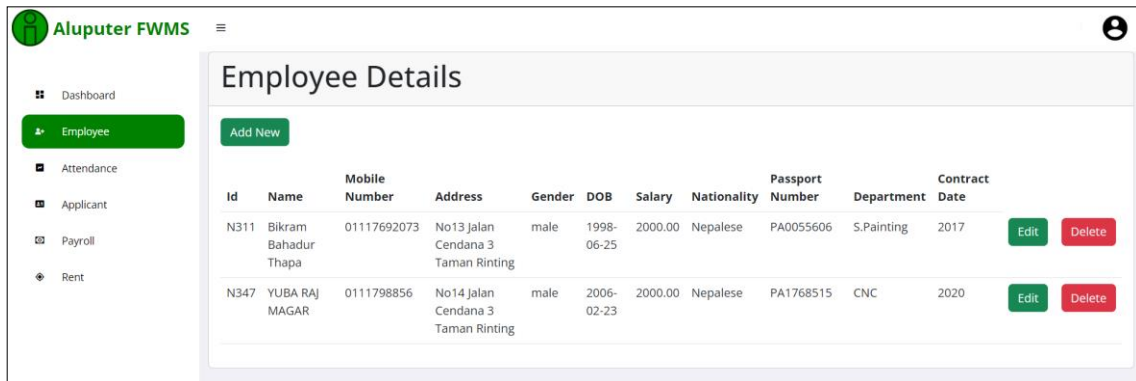


Fig. 9 Employee Interface

Fig. 10 shows the Attendance interface. HR Staff needs to enter Foreign Worker details (date, clock in, and clock out) into the input fields. If the details are valid, the page will redirect to the attendance recorded interface. If they are not valid, the system will display a message indicating that the details are incorrect.

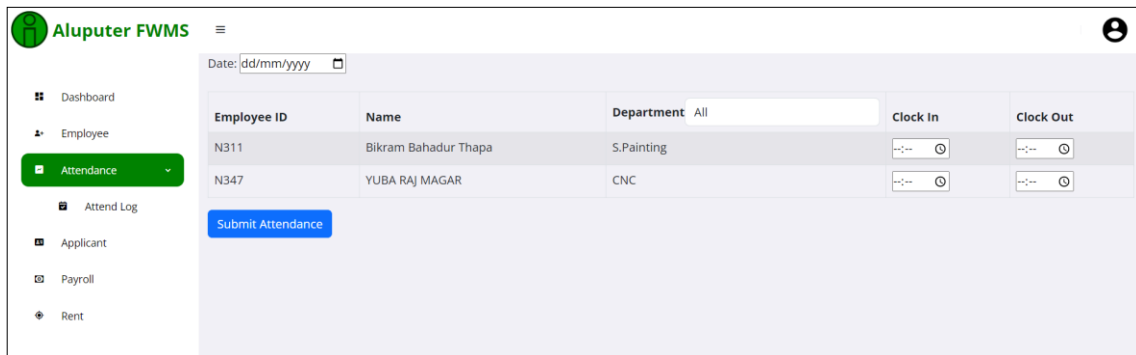


Fig. 10 Attendance Interface

Fig. 11 shows the Applicant interface. The HR Staff records employees' permit numbers, passport expiration, and visa expiration. If the details are valid, the page will be redirected to the Applicant interface. If they are not valid, the system will display a message indicating that the details are incorrect.

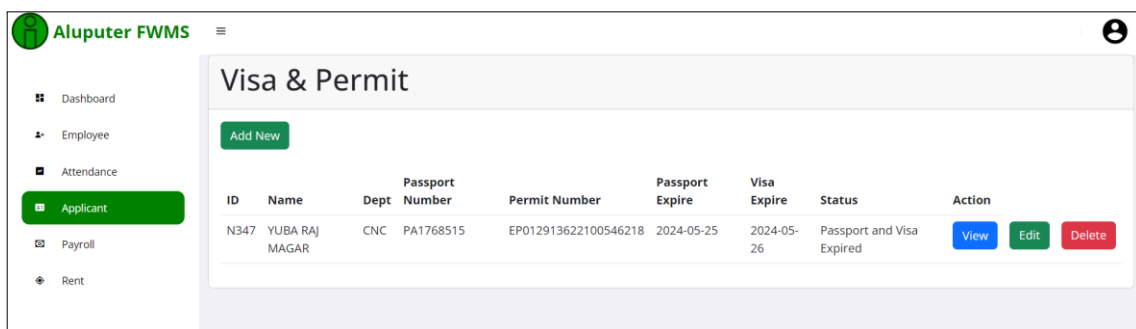


Fig. 11 Applicant Interface

Fig.12 shows the Payroll interface. The HR Staff records the start date, end date, and net salary. If the details are valid, the page will redirect to the Payroll interface. If they are not valid, the system will display a message indicating that the details are incorrect.



Fig. 12 Payroll Interface

Fig. 13 shows the Rent interface. The HR Staff records the address and room no. If the details are valid, the page will redirect to the Rent interface. If they are not valid, the system will display a message indicating that the details are incorrect.

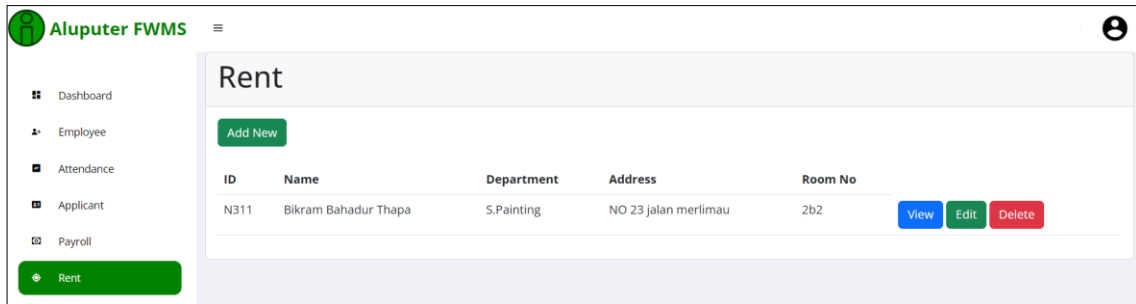


Fig. 13 Rent Interface

Fig. 14 shows the generated report interface. The HR Manager views the employee details and attendance pie chart. These interfaces provide comprehensive reports on Foreign Workers.

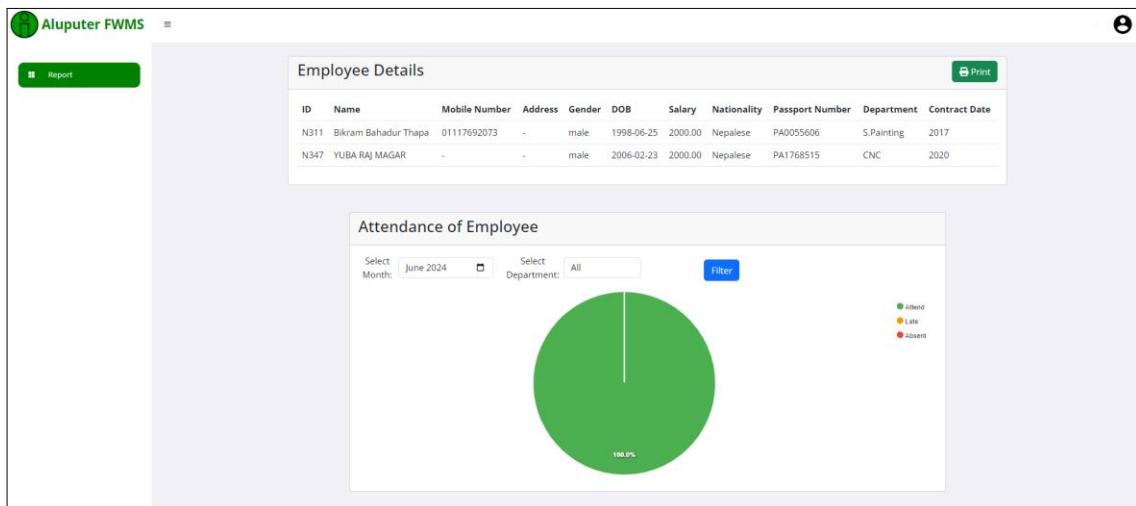


Fig. 14 Generate Report Interface

## 5.2 Testing

The testing phase is an important process for evaluating the performance and quality of the system. It involves functional testing and user acceptance testing to provide a comprehensive evaluation. The main objective of system testing is to improve the reliability and usability of the system while minimizing risks and meeting all user needs. The overall test case results are presented in Table 5.

**Table 5 Requirement Traceability Matrix**

No	Test Cases	Description	Test Result (Pass/Fail)
<b>TEST_100 Register</b>			
1.	TEST_100_001	Verify the system allows the user access to the registration page.	Pass
2.	TEST_100_002	Verify the user can input first name, last name, role, username, and password.	Pass
3.	TEST_100_003	Verify the system stores users' information in the database once registration is successful.	Pass
4.	TEST_100_004	Verify the system redirects to the Login page after successful registration.	Pass
5.	TEST_100_005	Verify the system detects that no input has been entered and displays an error message.	Pass
6.	TEST_100_006	Verify the system displays an error message when mandatory fields (first name, last name, role, username, password) are missing.	Pass
7.	TEST_100_007	Verify the system prevents registration if the username is already taken and displays an appropriate error message.	Fail
8.	TEST_100_008	Verify the system requires a strong password (e.g., minimum length, special characters) and displays an error message if criteria are not met.	Fail
9.	TEST_100_009	Verify the system handles and displays a system error message if an error occurs during registration.	Pass
<b>TEST_200 Login</b>			
1.	TEST_200_001	Verify the system provides the ability to enter username and password.	Pass
2.	TEST_200_002	Verify the system identifies the correct username and password.	Pass
3.	TEST_200_003	Verify the system handles exceptions appropriately.	Pass
4.	TEST_200_004	Verify the system is only available for HR Staff.	Pass
5.	TEST_200_005	Verify the system returns to the previous state when an exception occurs.	Pass
6.	TEST_200_006	Verify the system displays the login page.	Pass
7.	TEST_200_007	Verify the system redirects to the dashboard after successful login.	Pass
8.	TEST_200_008	Verify the system navigates to the registration page if the user selects the "Register" button.	Pass
<b>TEST_300 Manage Employee</b>			
1.	TEST_300_001	Verify the system provides a form to enter foreign worker details.	Pass
2.	TEST_300_002	Verify the system validates the entered foreign worker details.	Pass
3.	TEST_300_003	Verify the system saves the foreign worker's details to the database.	Pass
4.	TEST_300_004	Verify HR Staff can view and edit foreign worker details.	Pass
5.	TEST_300_005	Verify the system redirects HR Staff to the foreign worker details list page.	Pass
6.	TEST_300_006	Verify the system displays the details of the selected foreign worker in an editable form.	Pass
<b>TEST_400 Manage Attendance</b>			
1.	TEST_400_001	Verify the system shows the foreign worker details in the attendance.	Pass
2.	TEST_400_002	Verify the system validates the entered attendance details.	Pass
3.	TEST_400_003	Verify the system saves the attendance details to the database.	Pass

**Table 5 Requirement Traceability Matrix (continued)**

1.	TEST_400_004	Verify HR Staff can view and edit attendance details.	Pass
2.	TEST_400_005	Verify only HR Staff have access to manage attendance details.	Pass
3.	TEST_400_006	Verify the system redirects HR Staff to the attendance records list page.	Pass
4.	TEST_400_007	Verify the system displays error messages next to the invalid fields.	Pass
<b>TEST_500 Manage Applicant</b>			
1.	TEST_500_001	Verify the system fetches foreign worker details from the manage foreign worker details module.	Pass
2.	TEST_500_002	Verify the system provides a form to enter applicant details, including permit number, visa expiration date, and permit expiration date.	Pass
3.	TEST_500_003	Verify the system saves the applicant's details to the database.	Pass
4.	TEST_500_004	Verify HR Staff can view and edit applicant details.	Pass
5.	TEST_500_005	Verify the system monitors visa and permit expiration dates and sends alert messages to HR Staff.	Pass
6.	TEST_500_006	Verify only HR Staff have access to manage applicant details.	Pass
7.	TEST_500_007	Verify the system displays error messages next to the invalid fields.	Pass
<b>TEST_600 Manage Payroll</b>			
1.	TEST_600_001	Verify the system provides a form to enter rent details, including room number and address.	Pass
2.	TEST_600_002	Verify the system fetches foreign worker details from the manage foreign worker details module.	Pass
3.	TEST_600_003	Verify the system validates the entered rent details.	Pass
4.	TEST_600_004	Verify the system saves the rent details to the database.	Pass
5.	TEST_600_005	Verify HR Staff can view and edit rent details.	Pass
6.	TEST_600_006	Verify only HR Staff have access to manage rent details.	Pass
7.	TEST_600_007	Verify the system displays error messages next to the invalid fields.	Pass
8.	TEST_600_008	Verify the system redirects HR Staff to the rent details list page.	Pass
<b>TEST_700 Manage Rent</b>			
1.	TEST_700_001	Verify the system provides a form to enter rent details, including room number and address.	Pass
2.	TEST_700_002	Verify the system fetches foreign worker details from the manage foreign worker details module.	Pass
3.	TEST_700_003	Verify the system validates the entered rent details.	Pass
4.	TEST_700_004	Verify the system saves the rent details to the database.	Pass
5.	TEST_700_005	Verify HR Staff can view and edit rent details.	Pass
6.	TEST_700_006	Verify only HR Staff have access to manage rent details.	Pass
7.	TEST_700_007	Verify the system displays error messages next to the invalid fields.	Pass
<b>TEST_800 Generate Report</b>			
	TEST_800_001	Verify the system fetches foreign worker details and attendance records based on the selected criteria.	Pass
1.	TEST_800_002	Verify the system generates a report based on the fetched data.	Pass
2.	TEST_800_003	Verify the system displays the generated report to the HR Manager.	Pass
3.	TEST_800_004	Verify only the HR Manager has access to generate reports.	Pass
4.	TEST_800_005	Verify the system identifies that no data is available for the selected month.	Pass
5.	TEST_800_006	Verify the system displays a message indicating that no data is available.	Pass

Fig.13 shows a pie chart indicating the percentage of the pass and fails for the overall test case. For Login (TEST\_200), Manage Employee (TEST\_300), Manage Attendance (TEST\_400), Manage Applicant (TEST\_600), Manage Rent (TEST\_700), and Generate Report (TEST\_800), all test cases achieved a 100% pass rate, demonstrating flawless performance in these areas. However, the Registration (TEST\_100) module has a lower success rate, with 78% passing and 22% failing, indicating areas for improvement. Overall, the system performs well, with one minor exception, assuring robust and stable functionality across the majority of its functions

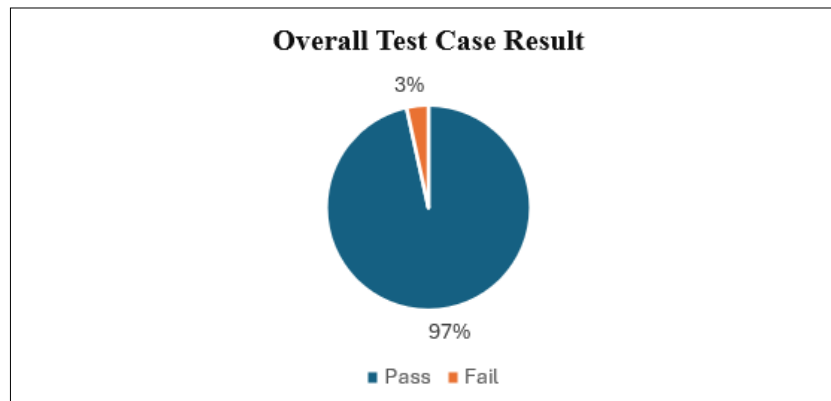


Fig. 13 Overall Test Case Result

Next, User Acceptance Testing is a phase in the process of testing a system conducted by users to ensure its suitability before it is widely used. The purpose is to ensure that the system meets user requirements, functions correctly, is easy to use, and provides the expected results. User Acceptance Testing was carried out with six (6) users including HR Manager, and 2 HR Staff.

Fig. 14 shows feedback for the registration module, where most users chose "strongly agree" with using the new method to register foreign workers online. HR Staff are already proficient in filling out the required information for registration.

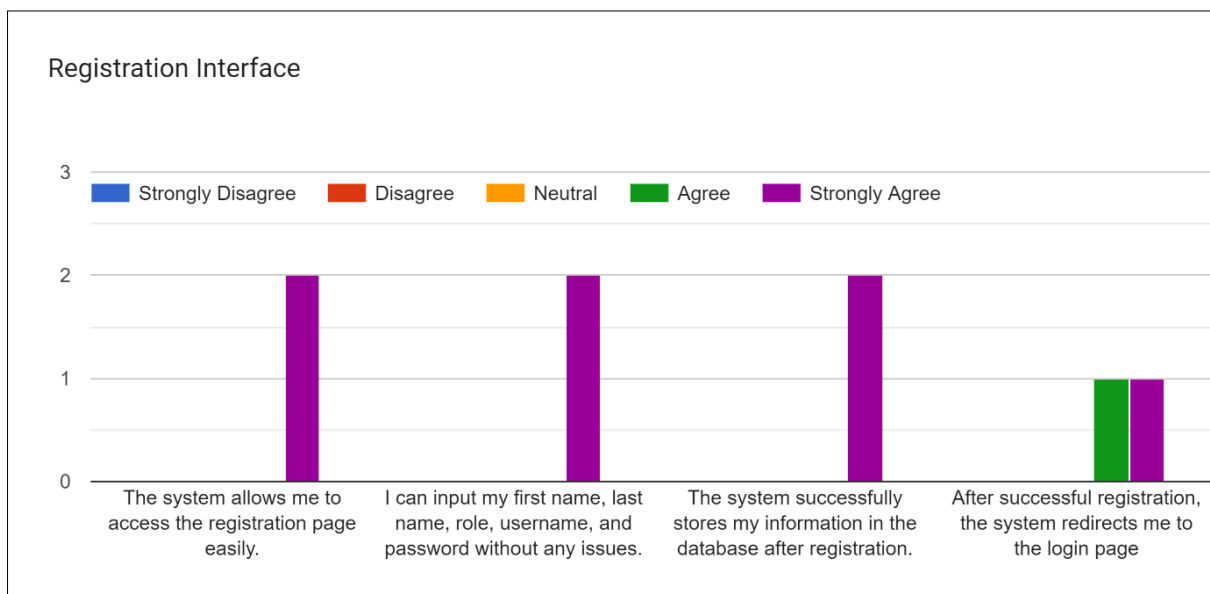


Fig. 14 Feedback for the Registration Module

Fig. 15 shows feedback for the login module where most users chose "strongly agree" that using a username and password as a method for logging in makes it easier for them to use the system.

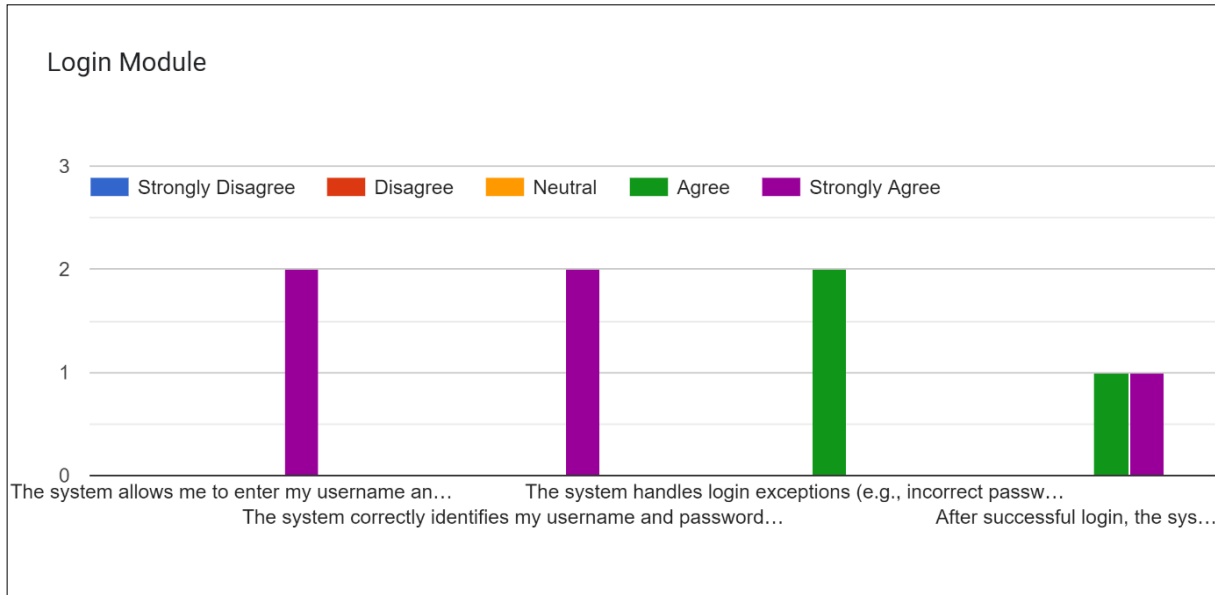


Fig. 15 Feedback for the Login Module

Fig. 16 shows feedback for the manage employee module where most users chose "strongly agree". The system allows HR Staff to manage foreign worker details including add, view, edit, and delete efficiently.

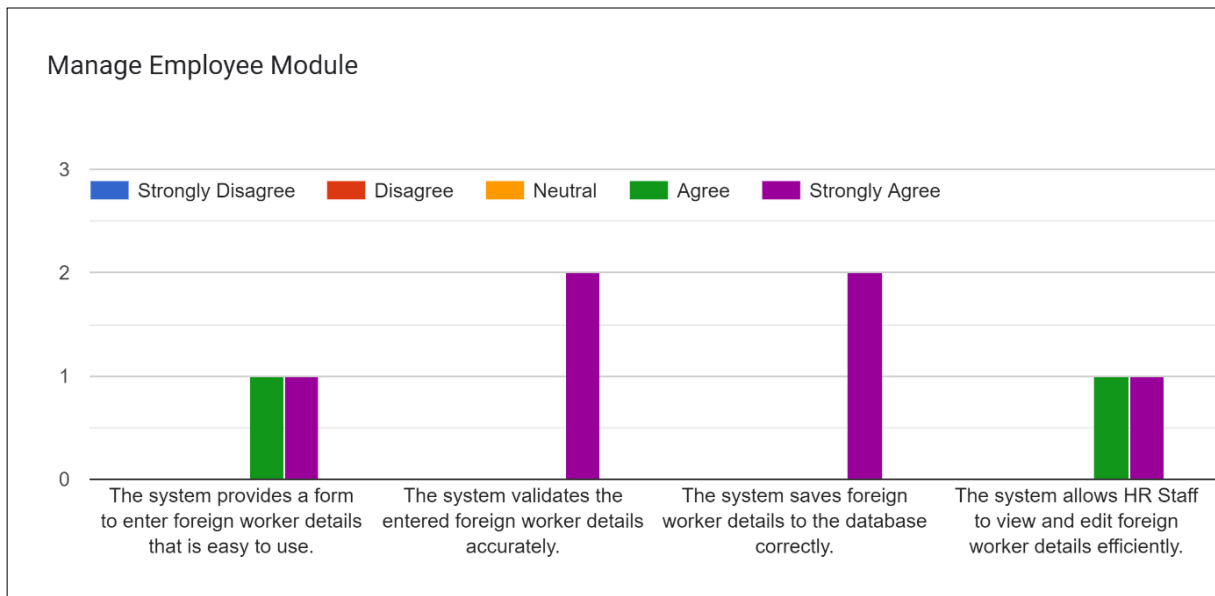
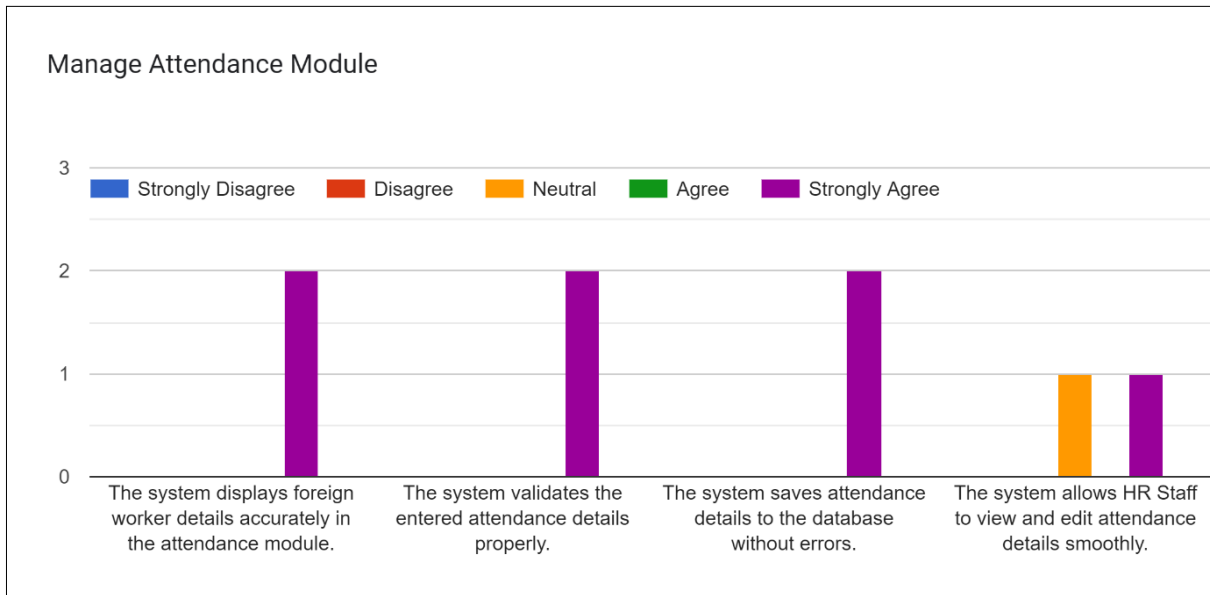


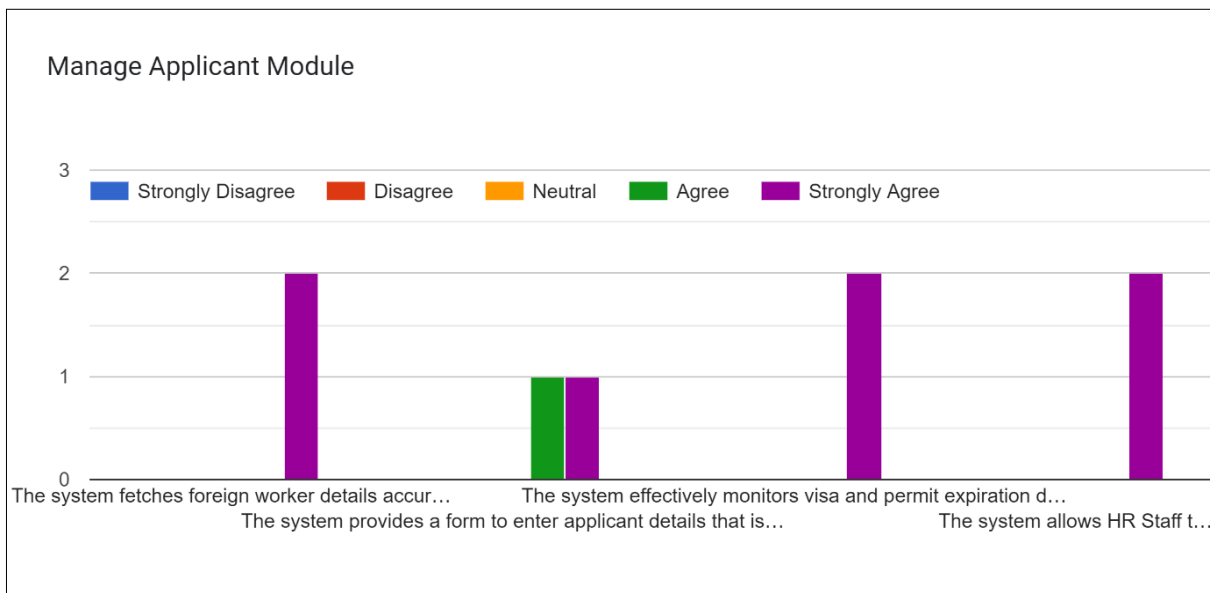
Fig. 16 Feedback for the Manage Employee Module

Fig. 17 shows feedback for the manage attendance module where most users chose "strongly agree". The system allows HR Staff to take attendance of foreign workers efficiently.



**Fig. 17** Feedback for the Manage Attendance Module

Fig. 18 shows feedback for the manage applicant module where most users chose "strongly agree". The system allows HR Staff to manage applicants of foreign workers including add, view, edit, and delete efficiently.



**Fig. 18** Feedback for the Manage Applicant Module

Fig. 19 shows feedback for the manage payroll module where most users chose "strongly agree". The system allows HR Staff to manage the payroll of foreign workers including add, view, and delete efficiently.

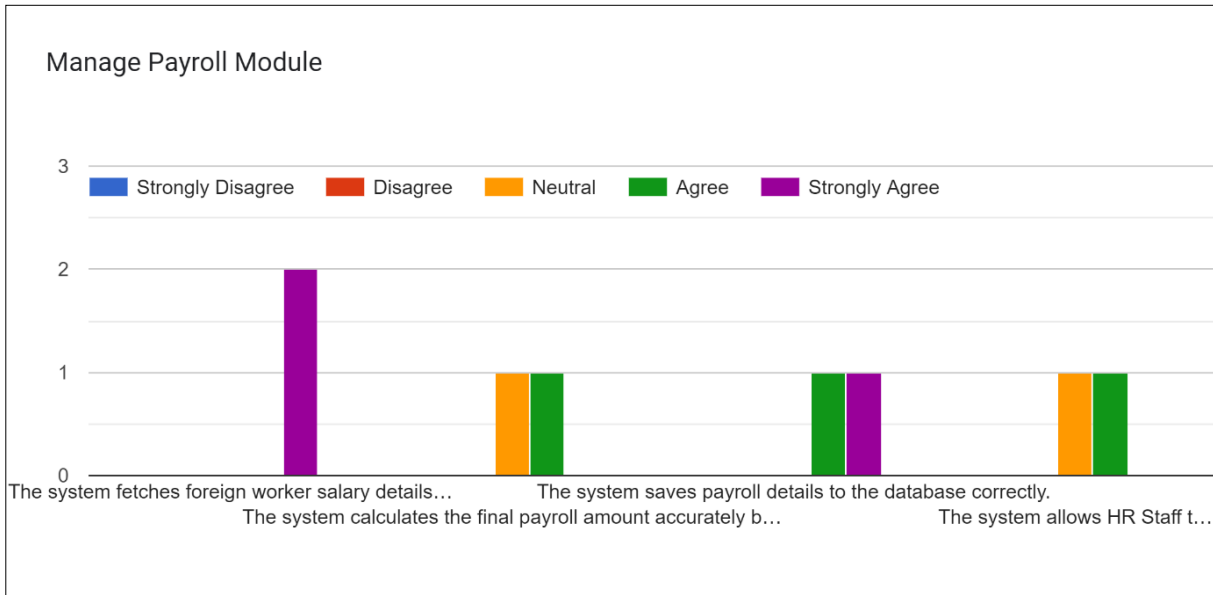


Fig. 19 Feedback for the Manage Payroll Module

Fig. 20 shows feedback for the manage rent module where most users chose "strongly agree". The system allows HR Staff to manage the rent of foreign workers including adding, viewing, editing, and deleting efficiently.

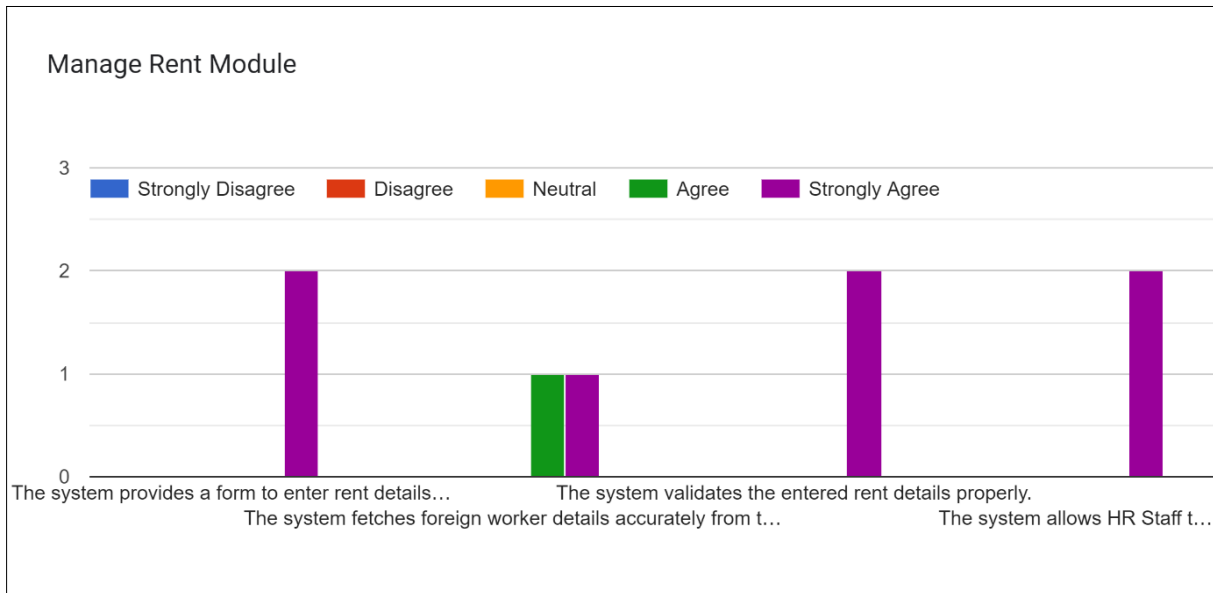
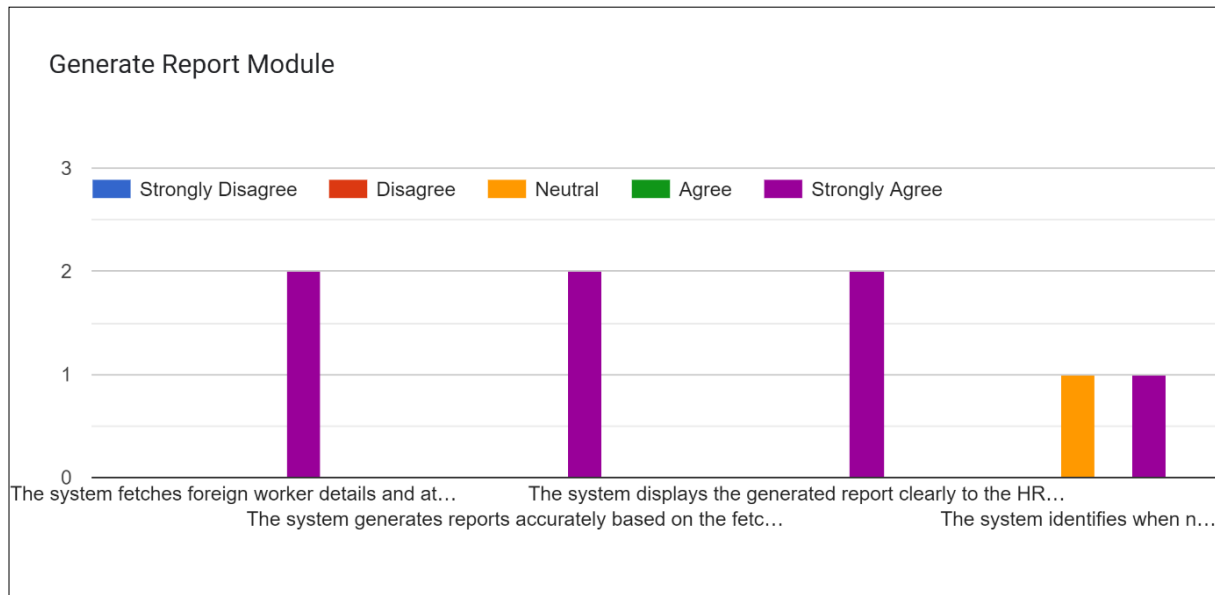


Fig. 20 Feedback for the Manage Rent Module

Fig. 21 shows feedback for the generate report module where most users chose "strongly agree". The system allows the HR Manager to get the record of employee details and attendance.



**Fig. 20** Feedback for the Generate Report Module

## 6 Conclusion

The Foreign Worker Management System has successfully achieved its goals through a modular, scalable, and maintainable object-oriented strategy, a user-friendly web interface, and user acceptance testing. These achievements highlight the user-centered design and longevity of the system.

The benefits of the system include robust user management capabilities, detailed foreign worker management, attendance and payroll integration, and proactive monitoring of visa and permit expiration. However, the system also has drawbacks, such as potential security risks due to constant logging in, failure to detect duplicate IDs, and reliance on accurate data entry for functions such as registration and payroll.

Recommendations for future improvements include the introduction of a session timeout warning, the introduction of a real-time duplicate ID alert system, and the addition of real-time data verification mechanisms to further improve the functionality of the system. Overall, the web-based foreign labor management system is beneficial and functional, with further improvements planned for the future to further enhance performance.

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## Conflict of Interest

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

## Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** Ivan A/L Raju, Norhanim Binti Selamat; **data collection:** Ivan A/L Raju, Norhanim Binti Selamat; **analysis and interpretation of results:** Ivan A/L Raju, Norhanim Binti Selamat; **draft manuscript preparation:** Ivan A/L Raju, Norhanim Binti Selamat; All authors reviewed the results and approved the final version of the manuscript.

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