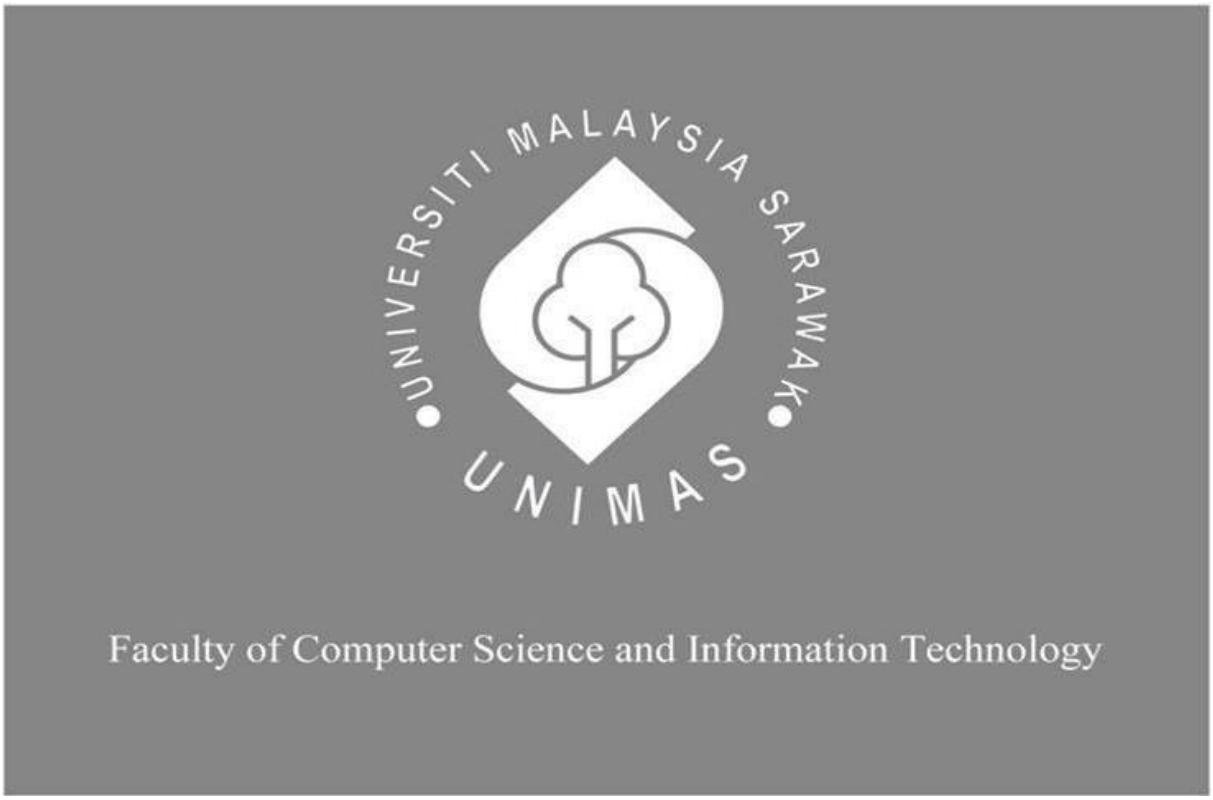

Puff Lab Portal: An Employee Management System

Emily Elisa binti Johny

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Bachelor of Software Engineering with Honours

2025

PUFF LAB PORTAL: AN EMPLOYEE MANAGEMENT SYSTEM

EMILY ELISA BINTI JOHNY

This project is submitted in partial fulfillment of
the requirements for the degree of
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ABSTRACT

Puff Lab currently lacks a reliable system to manage employee attendance, payroll, and shift schedules. Currently, employees manually clock in and out by sending photos in a Telegram group, which is inefficient and can lead to errors or delays in payroll processing. This has caused challenges for the business owner in managing staff records and schedules effectively. A Puff Lab Portal is necessary to resolve conflicts or other difficulties of these issues. Puff Lab Portal aims to simplify the employee management using QR code-based attendance scanning, automated payroll calculations, and shift management. The web-based development utilizes programming languages such as HTML, PHP, CSS, and JavaScript, with MySQL as the database. Additionally, Puff Lab staff shared their insights in an interview. Based on the interview, 100% of the interviewee agreed that technology such as QR code attendance, payroll systems, and shift scheduling could improve their work efficiency. This indicates readiness and support for adopting such tools, which could streamline operations and improve overall productivity at Puff Lab. Therefore, Puff Lab Portal can help to improve the employee management and reduce the workload for both staff and business owner at Puff Lab.

ABSTRAK

Puff Lab kini menghadapi kekurangan sistem yang boleh dipercayai untuk mengurus kehadiran pekerja, penggajian, dan jadual bekerja. Pada masa ini, pekerja merekod kehadiran secara manual dengan menghantar gambar melalui Telegram, yang tidak cekap dan boleh menyebabkan ralat atau kelewatan dalam pemprosesan gaji. Situasi ini telah menyukarkan pemilik perniagaan dalam menguruskan rekod pekerja dan jadual dengan berkesan. Puff Lab Portal diperlukan untuk menyelesaikan konflik dan cabaran ini. Portal ini bertujuan untuk mempermudahkan pengurusan pekerja melalui pengimbasan kehadiran menggunakan kod QR, pengiraan gaji secara automatik, dan pengurusan jadual bekerja. Portal ini akan dibangunkan sebagai sistem berasaskan web menggunakan bahasa pengaturcaraan seperti HTML, PHP, CSS, dan JavaScript, dengan MySQL sebagai pangkalan data. Selain itu, kakitangan Puff Lab telah berkongsi pandangan mereka melalui temu bual. Berdasarkan temu bual tersebut, 100% daripada responden bersetuju bahawa teknologi seperti kehadiran berasaskan kod QR, sistem penggajian, dan penjadualan syif dapat meningkatkan kecekapan kerja mereka. Ini menunjukkan kesediaan dan sokongan terhadap penggunaan teknologi ini, yang mampu memperkemaskan operasi dan meningkatkan produktiviti keseluruhan di Puff Lab. Oleh itu, Puff Lab Portal boleh membantu memperbaiki pengurusan pekerja serta mengurangkan beban kerja untuk kakitangan dan pemilik perniagaan di Puff Lab.

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admin	administrator
QR	Quick Response
CSS	Cascading Style Sheets
FK	Foreign Key
FYP	Final Year Project
GB	Gigabyte
GHz	gigahertz
HTML	Hypertext Markup Language
HDD	hard disk drive
ID	identification
MySQL	My Structured Query Language
PDF	Portable Document Form (PDF)
PHP	Hypertext Preprocessor
PK	Primary Key
CPU	Central Processing Unit
RAD	Rapid Application Development
ROM	random-access memory
SSD	solid-state drive
UML	Unified Modelling Language
UNIMAS	Universiti Malaysia Sarawak

CHAPTER 1: INTRODUCTION

1.1 Introduction

As technology continues to evolve and influence our daily lives, managing employee attendance and work schedules using technology has become a critical part of running a business. Many businesses now have flexible work hours, so they need systems that can accurately track attendance and handle different schedules. Puff Lab, a small business in Kuching, is always looking for ways to improve its operations and enhance employee satisfaction. However, their current method of using Telegram to track attendance has shown several weaknesses, such as inaccuracies and a negative impact on employee morale. This has made it clear that Puff Lab needs a more efficient and reliable solution to better manage its workforce and create a more positive work environment.

Moreover, businesses in Malaysia are also becoming more open to adopting innovative technologies in human resource management. A study by Hussein et al. (2023) highlighted how companies were now more willing to embrace systems that simplify processes and improve employee experiences. For Puff Lab, this presents a valuable opportunity to implement a system that not only solves current issues but also ensures that employees feel recognized and appreciated for their contributions.

Research indicates that automation is vital in enhancing operational efficiency by reducing manual workload and human error, as highlighted in Ajiga et al. (2024). These technologies help streamline repetitive tasks and improve data accuracy, which is essential for payroll and attendance management. Similarly, Alimova et al. (2021) discusses how integrating IT into personnel systems can foster better communication and transparency, ultimately building employee trust and loyalty. Therefore, implementing the Puff Lab Portal, an all-in-one platform that includes attendance, payroll, and scheduling management, would be a significant step forward for the organisation. This approach would enhance accuracy and transparency, benefiting management and employees by reducing payroll errors and ensuring everyone is fairly compensated for their hard work.

Hence, implementing the Puff Lab Portal, an integrated system for attendance, payroll, and scheduling, will enable the company to overcome the challenges it currently faces. This system will not only enhance accuracy and reduce payroll errors but also ensure employees are paid fairly for their work. The portal will also foster a transparent and supportive work environment where employees feel valued and motivated.

1.2 Problem Statement

Puff Lab faces significant challenges with its current method of tracking employee attendance. The current method, where employees send photos on Telegram to clock in and out, is inefficient and lacks real-time accuracy. This manual process creates the potential for errors and places a heavy burden on administrative staff, who must manually process attendance data for payroll. As a result, tracking overtime, ensuring accuracy, and maintaining transparency in employee work hours becomes difficult.

Moreover, the business currently lacks an integrated solution to manage employee shifts, which often leads to scheduling conflicts, miscommunications, and reduced productivity during busy periods. The absence of an automated system means the company relies on separate, disconnected systems for attendance, payroll, and scheduling. This lack of integration leads to administrative delays and can negatively impact both employee morale and overall business performance.

Puff Lab needs a more advanced and cohesive system to manage these tasks in today's fast-paced work environment. Without a comprehensive system that connects attendance, payroll, and scheduling, the company risks ongoing inefficiency, payroll errors, and disruptions in employee management. Modernising and automating these processes is essential for Puff Lab to operate smoothly, grow efficiently, and meet the demands of its expanding workforce.

1.3 Aim and Objectives

The main aim of this project is to develop a web-based QR attendance, payroll calculation, and shift scheduling for Puff Lab to reduce the workload of business owners and improve accuracy in tracking employee hours and payroll. The objectives of the project include:

a) To design an attendance tracking system using QR codes for clocking in and out, automating payroll calculations and employees' shift schedules for improved efficiency.
b) To develop a web-based attendance system that integrates attendance tracking, payroll processing, and shift scheduling into a cohesive platform for ease of use.
c) To test the usability and functionality of the developed system meets the needs of employees and business owners in tracking attendance, processing payroll and managing schedules.

1.4 Project Methodology

The Puff Lab Portal adopts Rapid Application Development (RAD) as its approach to building a practical and efficient system tailored to the needs of the business. RAD is a software development method that emphasizes speed, flexibility, and continuous user involvement (Singgalen, 2024). Unlike traditional development methods such as the Waterfall model, RAD allows for adjustments throughout the process, ensuring that the system remains aligned with user needs (Anaking et al., 2023). This makes it an ideal choice for addressing Puff Lab's requirements, where employee attendance, payroll management, and scheduling are central components.

In today's digital age, businesses like Puff Lab require systems that can quickly adapt to their evolving needs. The previous method of managing attendance through Telegram messages often resulted in inefficiencies and errors. By adopting RAD, Puff Lab can transition to a streamlined system that is not only faster to develop but also highly responsive to user feedback. This approach ensures that the final system addresses the company's key pain points, such as improving attendance tracking accuracy through QR code functionality, automating payroll calculations, and simplifying flexible scheduling. RAD's iterative nature also allows the system to evolve alongside the company, making it a future-proof solution. The four stages of the RAD methodology are shown in Figure 1.1 below.

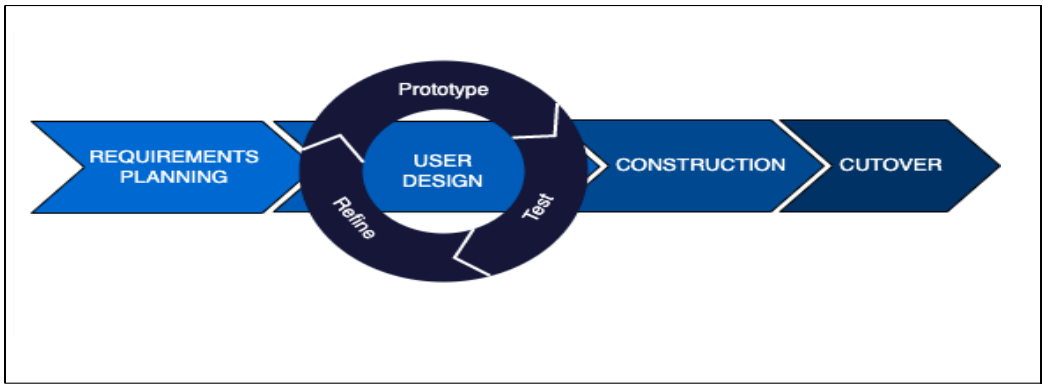


Figure 1.1 Rapid Application Development

The first stage is requirement planning, which focuses on gathering information about what Puff Lab needs from the new system. This involves identifying issues with the existing Telegram-based attendance method, such as errors in manual entries and delays in payroll calculations. During this stage, key features such as QR code attendance tracking, automated payroll processing, and shift scheduling are defined. This step lays the foundation for building a system that addresses these challenges effectively.

In the second phase, developers collaborate closely with Puff Lab's management and staff to create a prototype of the system. This involves using tools such as Figma to design an interface layout. During this phase, various diagrams will be developed, including use case diagrams, activity diagrams, system sequence diagrams, and Unified Modelling Language (UML) class diagrams. These diagrams will help visualize the interface of the proposed web-based system and illustrate the system's workflow. Employees and managers will actively test the prototype, providing immediate feedback on its features. For instance, they might suggest improvements to the layout of the attendance history page or adjustments to the payroll summary section. This collaborative approach ensures that the system functionalities are defined based on user requirements collected previously, making the final product user-friendly and aligned with Puff Lab's operational needs (Anaking et al., 2023).

The third phase, Construction, involves the full-scale development of the system based on the feedback from the user design stage. This is where the system's key components—such as QR code attendance, automated payroll calculations, and shift scheduling—will be built and tested. At this stage, testing is essential to ensure the system functions smoothly and fulfills the user needs.

The final phase, Cutover, marks the transition from the existing system to the new one. At this stage, the old Telegram-based method will be retired, and the Puff Lab Portal will be fully deployed. Staff will be trained on using the system, and existing attendance data will be migrated to ensure a smooth handover. This phase also includes post-launch support, ensuring that any remaining bugs are resolved and the system runs as expected in a live environment.

1.5 Project Scope

The goal of the Puff Lab Portal is to keep track of attendance for the Kuching-based small firm Puff Lab. Employees and the company administrator will be the two primary users of the system. The administrator can track employee attendance history, open QR code scanner for clocking in and out, control staff attendance, and compute payroll using attendance data. The admin can also manage employee shift schedules, add manual attendance entries, and track late arrivals. On the employee side, employees can have unique QR codes to clock in and clock out, view their attendance history, and access shift schedules. Employees can also track their salary history by viewing previous payroll records.

1.6 Significance of Project

The Puff Lab Portal is a significant step in improving how the business handles employee attendance, payroll, and shift scheduling. This project is significant because it can replace outdated, manual methods with a more efficient and reliable automated system (Nasution et al., 2022). Instead of relying on Telegram messages or manual tracking, the new system ensures that attendance is recorded accurately, payroll is calculated without errors, and shifts are scheduled smoothly.

One key benefit is that the system helps Puff Lab comply with Malaysia's labour laws, which require accurate tracking of working hours, overtime, and fair pay. This reduces the risk of mistakes and legal issues while ensuring all employees are paid correctly. The system also increases transparency, giving managers and employees a clear view of their working hours, shifts, and wages, fostering trust and fairness in the workplace.

QR codes for clocking in and out make attendance tracking fast and accurate, saving time and reducing errors. This allows managers to focus on more critical tasks, while employees benefit from having easy access to their schedules and payroll information. Ultimately, the significance of this project extends beyond mere automation—it will help Puff Lab run more efficiently, boost productivity, and create a better work environment, making it easier for the business to grow and succeed in Malaysia's competitive market.

1.7 Project Schedule

Final Year Project 1 or FYP 1 starts on 10 October 2024 and is estimated to be completed on 12 January 2025, which is approximately 94 days or 13 weeks and 3 days. Meanwhile, Final Year Project 2, or FYP 2, is estimated to start on 17 March 2025 and will be completed on 29 June 2025, which is for 104 days or 14 weeks and 6 days. Hence, the Final Year Projects 1 and 2 will start on 10 October 2024 and continue until 29 June 2025, approximately 262 days or 37 weeks and 3 days. The project schedule is shown in Table 1.1.

Table 1.1 Project Schedule

Agenda	Start Date	End Date
Brief Proposal	14/10/2024	20/10/2024
Full FYP Proposal	22/10/2024	25/10/2024
Chapter 1: Introduction	22/10/2024	1/11/2024
Chapter 2: Literature Review	2/11/2024	29/11/2024
Chapter 3: Requirement Analysis and Design	29/11/2024	24/12/2024
Phase 1.0 (Requirement Gathering): Interview with Puff Lab staff	29/11/2024	3/12/2024
Phase 1.1 (Requirement Gathering): Distribute online survey via Google Forms	30/11/2024	9/12/2024
Phase 2.0 (Design): System Design	9/12/2024	24/12/2024
Submission of FYP 1 report	25/12/2024	2/1/2025
FYP 1 final report modification and amendment	3/1/2025	10/2/2025
Submission of Final FYP 1 report	11/2/2025	21/2/2025
Iteration 1	7/3/2025	14/4/2025
Chapter 4: Implementing	7/3/2025	9/4/2025
Phase 3.0 (Development): Initial coding and testing	7/3/2025	9/4/2025
Chapter 5: Testing	10/4/2025	14/4/2025
Phase 4.0 (Quality Assurance): User testing	10/4/2025	14/4/2025
Iteration 2	15/4/2025	20/5/2025
Chapter 4: Implementing	15/4/2025	16/5/2025
Phase 3.0 (Development): Enhanced coding and testing	15/4/2025	16/5/2025
Chapter 5: Testing	17/5/2025	20/5/2025
Phase 4.0 (Quality Assurance): User testing	17/5/2025	20/5/2025
Iteration 3	21/5/2025	25/6/2025
Chapter 4: Implementing	21/5/2025	21/6/2025
Phase 3.0 (Development) : Final coding and		
testing	21/5/2025	21/6/2025
Chapter 5: Testing	22/6/2025	25/6/2025
Phase 4.0 (Quality Assurance): User testing	22/6/2025	25/6/2025
Chapter 6: Conclusion and Further Work	26/6/2025	27/6/2025
Phase 5.1 (Deployment): Maintenance	1/7/2025	4/7/2025
Submission of final FYP report	1/7/2025	8/7/2025

1.8 Expected Outcome

A Puff Lab Portal's expected outcome is significant changes to improve how the business owner operates and manages the team. Firstly, the automated attendance tracking system will significantly reduce the administrative burden associated with manual attendance records, allowing employees to clock in and out quickly and accurately using QR codes. This will also help ensure that payroll calculations are precise, as the system integrates attendance tracking with payroll processing. As a result, employees will be paid accurately for their hours, reducing the chances of errors and discrepancies. The shift scheduling feature will allow managers to easily create, edit, and assign shifts. This will enhance overall workforce management and give employees clear visibility into their schedules, making it easier for everyone to plan their time. The user-friendly web-based platform will facilitate easy access to attendance records, payroll information, and shift schedules for both employees and managers.

Furthermore, the system will generate insightful reports on attendance patterns, payroll expenses, and shift coverage. This information will empower the business owner to make informed decisions. Overall, this project will contribute to a more organised, efficient, and transparent employee management process at Puff Lab. It will improve their daily operations and support the business's overall growth and success.

1.9 Summary

Chapter 1 introduces the Puff Lab Portal, a new system that simplifies and enhances how Puff Lab staff manage attendance, payroll, and shift scheduling. Currently, the team faces several challenges, primarily due to their reliance on Telegram to clock in and out and handle various management tasks. This manual approach has resulted in inaccuracies and inefficiencies that the Puff Lab Portal aims to address. Moreover, the aims and objectives of the proposed approach are required to design a suitable system to manage the attendance, payroll and scheduling at Puff Lab. The project methodology is the Rapid Application Development method. The five phases are planning, design, construction and cutover. This structured yet flexible methodology allows for adaptation and refinement of the system as development progresses, ensuring it meets the unique needs of Puff Lab. In the project scope, the overview of the proposed system features is explained to explain what the system will deliver. Additionally, the significance of the Puff Lab Portal is discussed to ensure the system improves operational efficiency at Puff Lab. The project schedule includes a table showing the phases and task list. Lastly, the expected outcomes of this proposed system are explained to improve the accuracy of attendance, payroll and scheduling processes.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter will review similar systems with functionality, such as the proposed system for this project, Puff Lab Portal. Three similar systems are chosen based on their functionality, with the ability to manage them quickly being the most crucial factor. This chapter will also discuss the comparison between the existing systems and go through the tools and technologies required to build the proposed system.

2.2 Review of Similar Existing Systems

This section aims to evaluate existing systems that share similar functionalities to the Puff Lab Portal. By analysing these systems, it is possible to identify their strengths, weaknesses, and features that could influence the design and functionality of the system. This review will focus on systems that address attendance tracking, payroll management, and shift scheduling, such as, UNIMAS QR Code Application, 7shifts, and Hr.my. This comparative analysis will also provide insights into industry best practices and potential areas for innovation to guide the development of the Puff Lab Portal.

2.2.1 UNIMAS QR Code Application

The UNIMAS QR Code Application is an attendance-tracking tool designed specifically for UNIMAS students and staff. Before the introduction of the QR attendance, UNIMAS used smart cards to track staff and student attendance manually (Sibat, 2019). This process was often slow, tedious, and prone to errors due to equipment issues. Staff had to organize attendance data manually which leads to inconsistencies and inaccuracies. In January 2018, the UNIMAS QR Code Application was introduced to streamline attendance tracking for staff, students, and university events such as meetings and workshops. Attendance reporting is now easier where it is accessible through the official UNIMAS mobile app, UNIMAS Now. The system is integrated with both the Student Management System and the Human Resource Management System which enables real-time tracking of student attendance and staff performance. Additionally, it provides detailed records of university activities, streamlining the process of assessing attendance and performance across various levels within the university.

UNIMAS uses a single ID for all IT systems, which is extended to the CloQin application (Sibat, 2019). CloQin is integrated with the UNIMAS system, where each user is assigned a unique ID tied to a specific device. This approach simplifies user management and ensures that each student or staff member has one consistent identity across all platforms, streamlining the login process and improving security. It also ensures that the attendance data

from CloQin is accurately tied to the correct user. The login page for the system is shown in Figure 2.1.

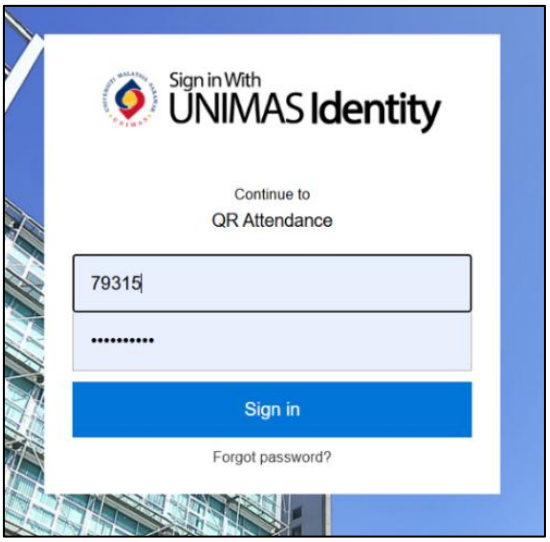


Figure 2.1 Login Page for UNIMAS QR Code Application

Figure 2.2 shows the main page of the system from the student's view. The system displays the current calendar, a button to add activity for QR attendance, and the list of activities that have been attended. The interface offers smooth navigation for students to generate a QR code attendance for their event and also track their participation in various activities.

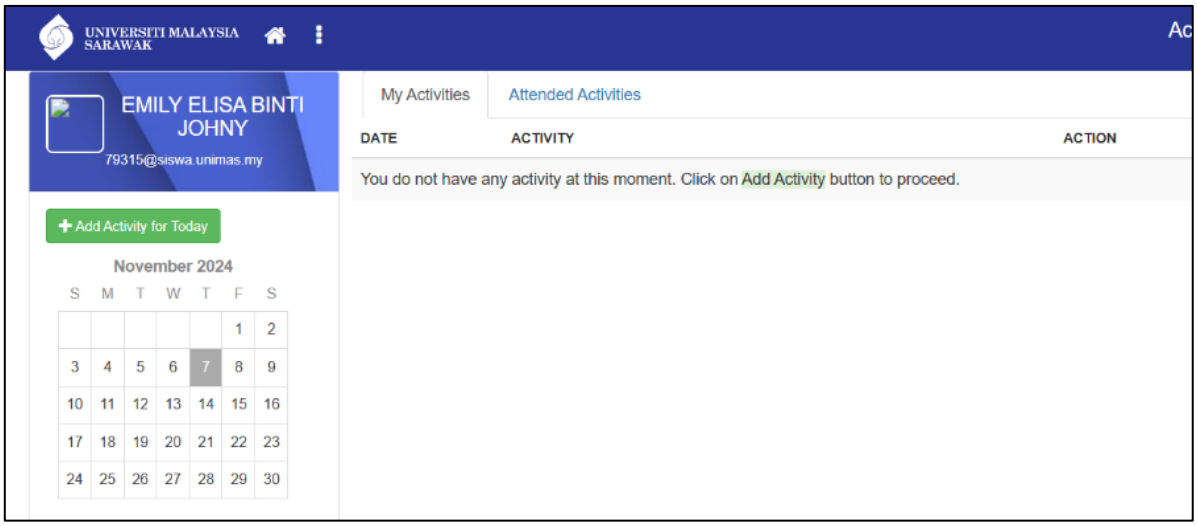


Figure 2.2 UNIMAS QR Code Application

Figure 2.3 displays the form used to generate the QR code. The form includes fields for event name, activity type, location, date, start time, and end time. Additionally, there is an

option to check if checkout is required for the event. The interface is providing a clear and detailed setup for QR code generation.

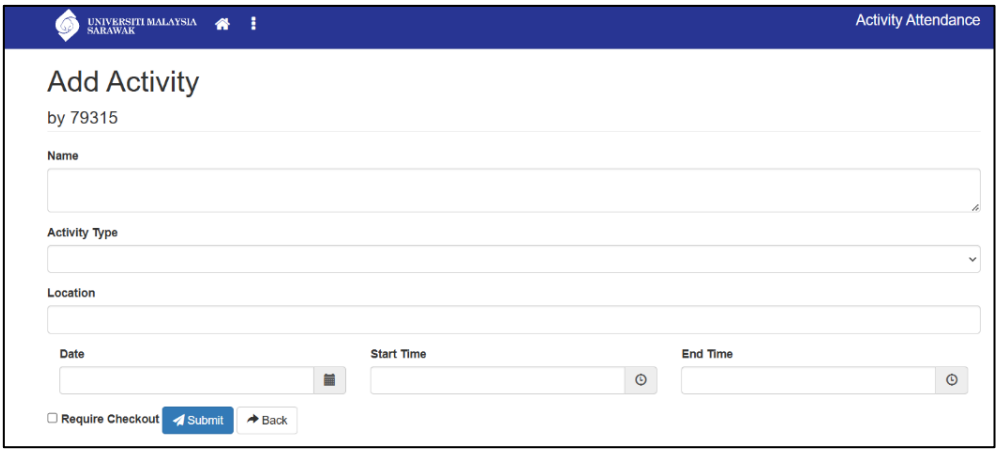


Figure 2.3 Add activity form

Figure 2.4 displays a table listing attended activities. It includes columns for the date, activity name, and the check-in and check-out times. This feature allows users to easily track their participation and attendance history. Moreover, Figure 2.5 shows the QR code generation screen. On the right, the generated QR code is displayed, which students can scan to register attendance. The left side lists students who have already scanned the code, offering an organized view of students as they check in. This layout allows for easy monitoring and enabling staff to verify attendance in real-time as students continue to scan the code. One potential drawback is that the QR code technology also has limitations when it comes to security. In cases of academic dishonesty, students could potentially share screenshots of the QR code with others and allowing individuals who are not physically present to register attendance. While some systems might attempt to counteract this by refreshing QR codes periodically, it still poses a risk, especially in large lectures or events where monitoring can be challenging.

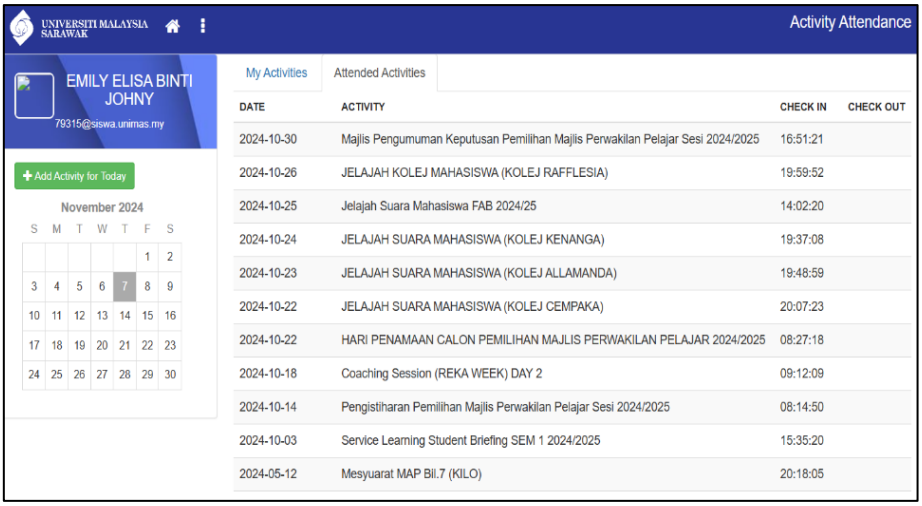
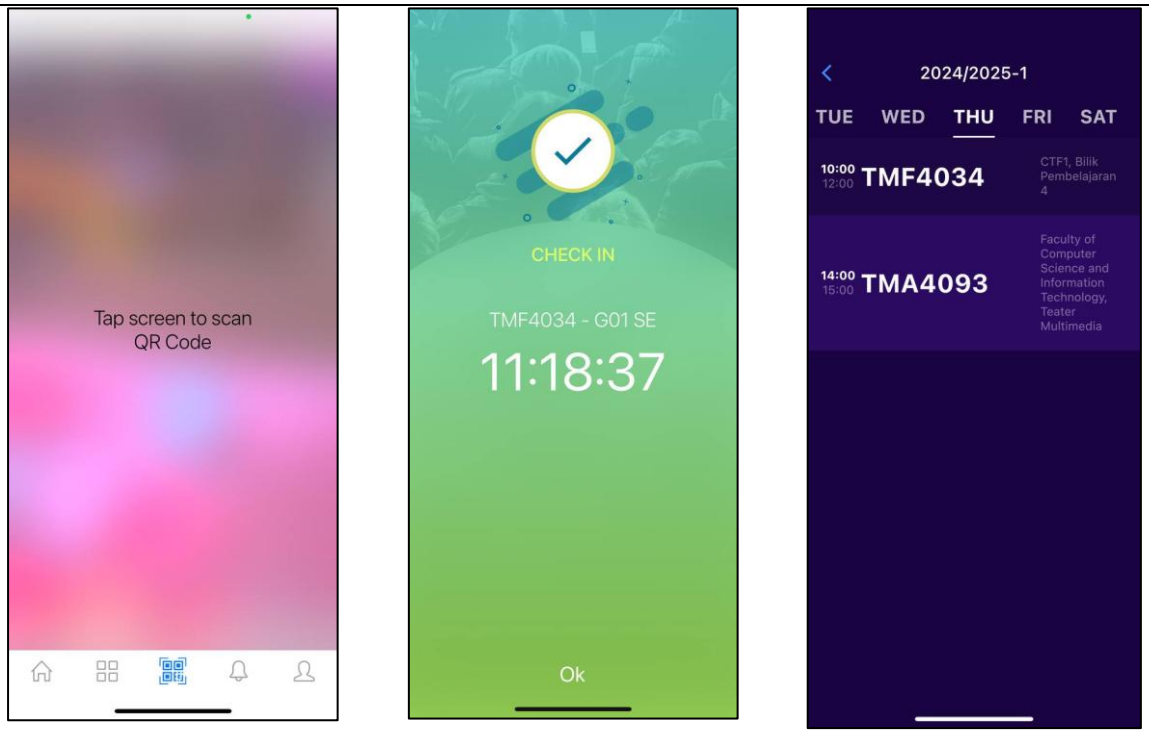


Figure 2.4 Attended activities list

Figure 2.5 QR code for attendance

In Figure 2.6a, the UNIMAS Now app interface displays multiple features, with a primary focus on QR code scanning for attendance. After scanning, students receive confirmation that their check-in was successful, as seen in Figure 2.6b. The app also enables students to review recent attendance records for quick reference. Additionally, the app includes a timetable feature as shown in Figure 2.6c, Figure 2.6c helps students keep track of their class schedules and shows when and where their classes are held.



a. QR code scanning

b. Example of successfully check in

c. Timetable

Figure 2.6

The staff management page provides lecturers with a user-friendly interface to manage student attendance. On this page, lecturers can review attendance records and see which students missed the class. If needed, they can also manually enter attendance by keying in a student ID and making it convenient to update records accurately when students encounter technical issues or other valid reasons for missing the QR scan. This feature is particularly useful for ensuring attendance data is complete and supports the reliability of attendance tracking for university activities.

Overall, the UNIMAS QR Attendance system introduces a modern and efficient way to track attendance for both students and staff. By allowing users to scan the QR attendance, it eliminates the need for manual data entry, reducing errors and saving time on administrative tasks. Through the UNIMAS Now app, students can easily monitor their attendance records and view their schedules, all in one convenient place. This system makes it easier for everyone to keep track of attendance and simplifying the process for both students and staff. It is also a great way in enhancing the university's attendance management process.

2.2.2 7shifts

7shifts is a workforce management system designed primarily for restaurants, but it can be applied to various industries (7shifts, n.d.). The platform provides tools for setting up company details, managing shift schedules, tracking employee availability, and managing time-off requests. 7shifts aims to make the lives of restaurant owners, managers, and staff easier by simplifying the often-complex tasks of scheduling and communication. With 7shifts, managers can quickly create and adjust shifts ensure that the right employee are in the right place at the right time. This not only helps to keep operations running smoothly but also brings a positive work environment where employees feel valued and engaged.

In Figure 2.7, the login page for the 7shifts system serves as the secure entry point for managers and employees to access the system. The access is restricted to authorized employees and managers of business using the system. Each user must have an account set up by the organization in order to access the platform. This ensures that sensitive data such as schedules, labour costs, and employee information remain secure and private.

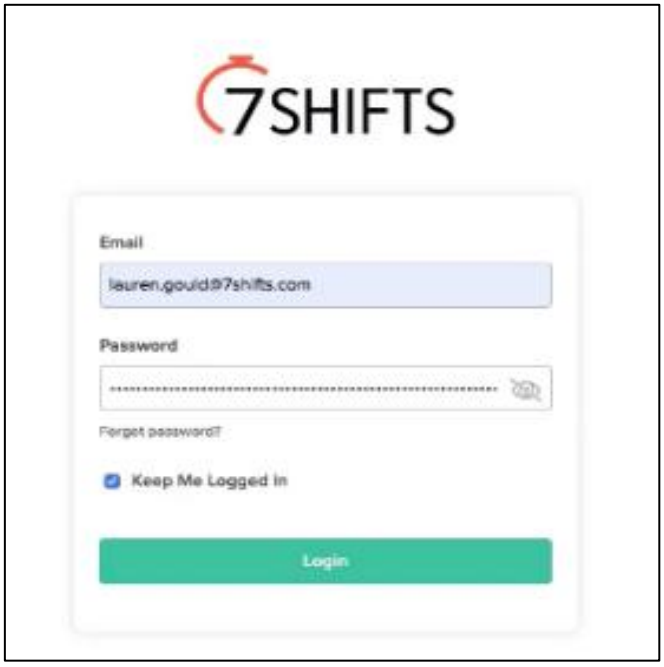


Figure 2.7 Login page of 7shifts

Figure 2.8 displays the manager dashboard of the 7shifts platform. The dashboard provides an overview of key metrics and actionable insights, such as upcoming shifts, labour costs, employee attendance, performance, activity pending request and activity log. This feature is particularly advantageous for businesses aiming to manage labour costs proactively while effectively handling employee management. However, the advanced dashboard features

such as business intelligence tools, forecasting, or real-time analytics are often exclusive to higher-priced plans in which might not be cost-effective for small businesses.

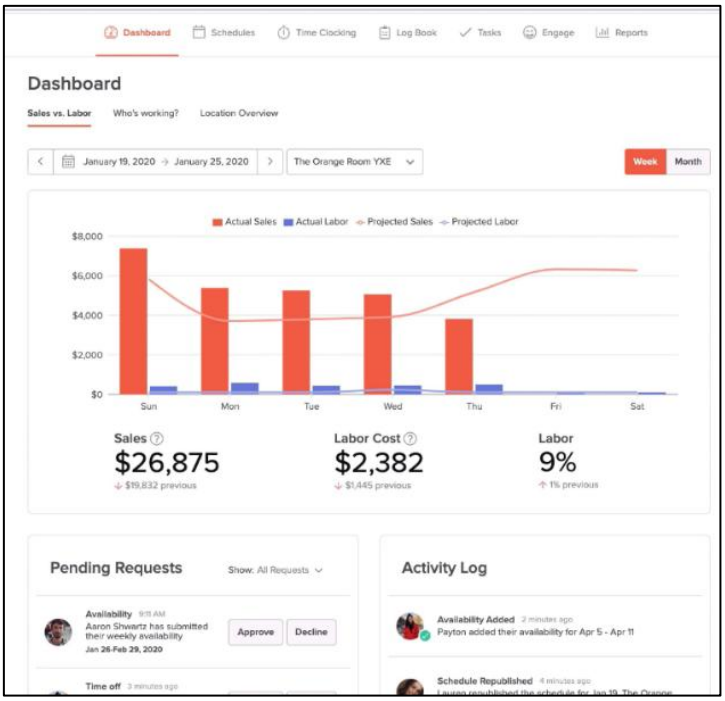


Figure 2.8 Manager dashboard

Figure 2.9 shows the company account page in the 7shifts system. It is a critical step for managers to define and configure the organizational structure effectively. This feature helps businesses to input company details and configure settings based on their operational needs. Managers can establish labour settings relating to overtime and breaks as well as advanced settings to help stay compliant in specific jurisdictions. Additionally, advanced options are available for managing employee availability, shift pools, scheduling rules and time-off requests. This feature offers flexibility and customization to align with specific business needs. In spite of that, company account setup can be complex for large organizations with diverse roles, departments and multiple locations.

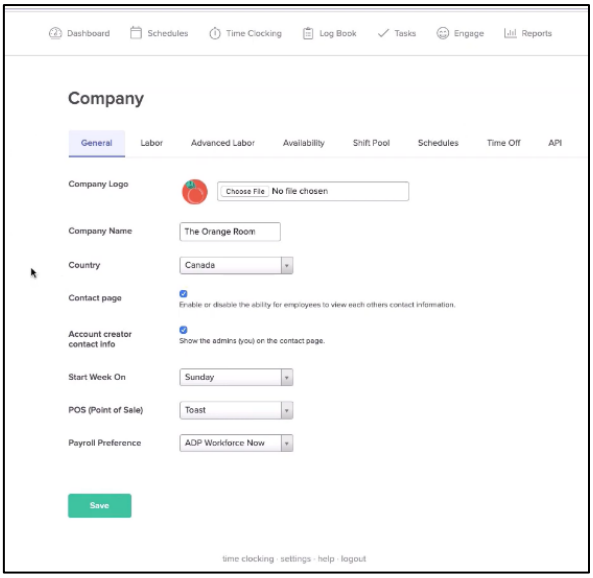


Figure 2.9 Company account setup

Figure 2.10 highlights the employee management page. In this page, managers can view and edit the employee details so that they are up-to-date and accurate records. Besides, the managers can manually add new employee by clicking the "+" button or import the file if there a larger list of a new employee.

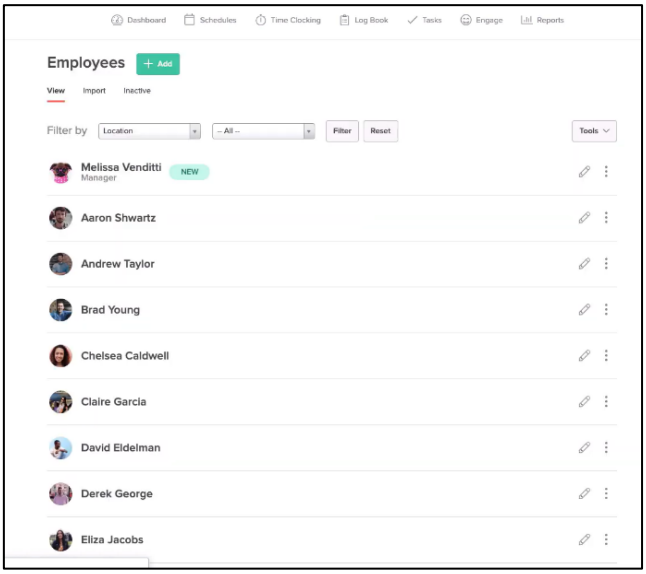


Figure 2.10 Employee management page

Meanwhile Figure 2.11 shows the editing employee details. The page includes multiple sections such as basic information, location, departments, and roles and HR/Payroll information. The basic information section allows managers to input or update fundamental details about employees, such as their name, email address, phone number, and start date. For

the locations, departments, and roles section, managers can assign employees to specific locations, departments, and roles. This is to ensure that employees are properly categorized based on their work environment and responsibilities. HR/payroll information section includes fields for critical HR and payroll details, such as hourly rates, employment type, and hire date. These details are essential for automating payroll calculations and ensuring compliance with labour regulations. Managers can also track payroll codes for integration with external payroll systems, streamlining salary disbursements and record-keeping. One weakness of this system is that, the employees cannot update their own profiles which consequently increase the manager workload.

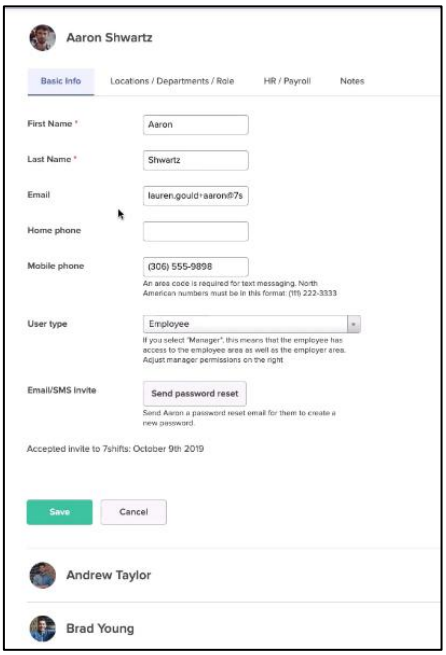


Figure 2.11 Editing employee details

The Availability feature as shown in Figure 2.12 allows employees to set their preferred working hours and specify when they are unavailable. This enables managers to create schedules that accommodate employees' needs. By integrating availability directly into the scheduling process, this feature minimizes conflicts and reduces the need for rescheduling. However, it requires employees to keep their availability up to date for accurate scheduling.

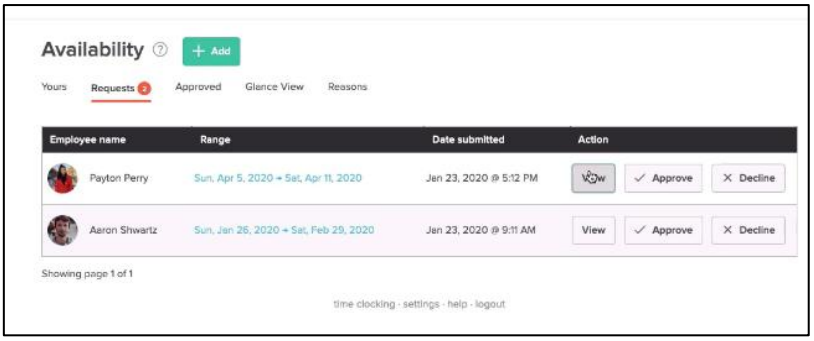


Figure 2.12 Availability feature

Figure 2.13 shows the Shift Pool feature. It is designed to facilitate the reassignment of shifts among employees. If a worker cannot attend their scheduled shift, they can use the shift pool to make it available for others. Co-workers can then pick up these shifts subject to managerial approval. This system empowers employees by giving them more control over their schedules and reduces the administrative burden on managers. However, if the shift remains unclaimed, the unclaimed shift can lead to operational challenges and requiring managers to step in and reassign shifts manually.

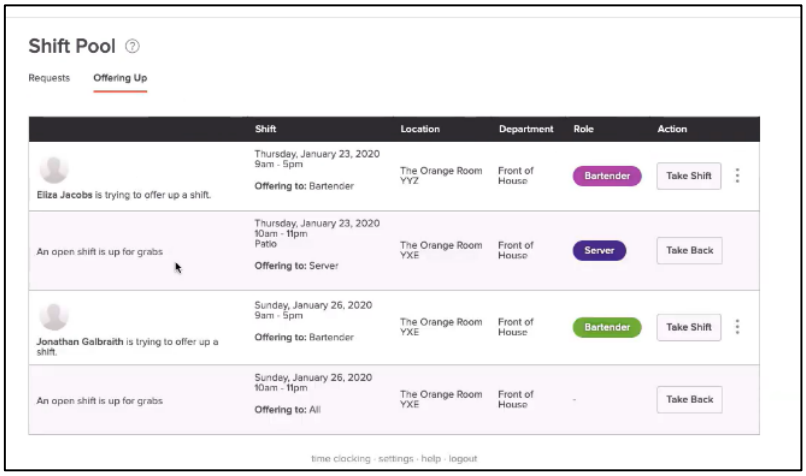


Figure 2.13 Shift Pool feature

Figure 2.14 highlights the Time-off feature for requesting and managing employee absences. Employees can submit their time-off requests directly through the platform, which managers can then review and approve, or decline based on staffing requirements. This feature directly connected with the scheduling tool in ensuring there is no conflicts arise from approved time-off periods.

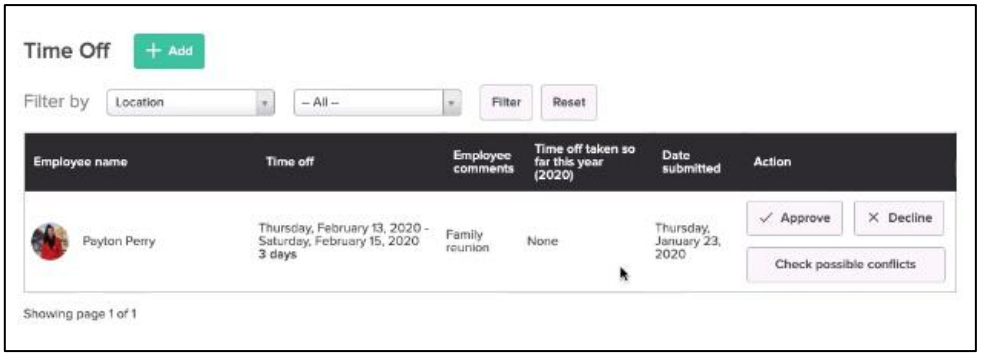


Figure 2.14 Time-off feature

Figure 2.15 shows the Schedules functions where it helps create and manage employee work schedules based on the employees' availability, time-off requests, and shift requirements. The platform offers a visual layout for easy drag-and-drop scheduling and helps maintain transparency, as employees can view their shifts in real-time. Managers can also add the employee manually in the schedule as shown in Figure 2.16.

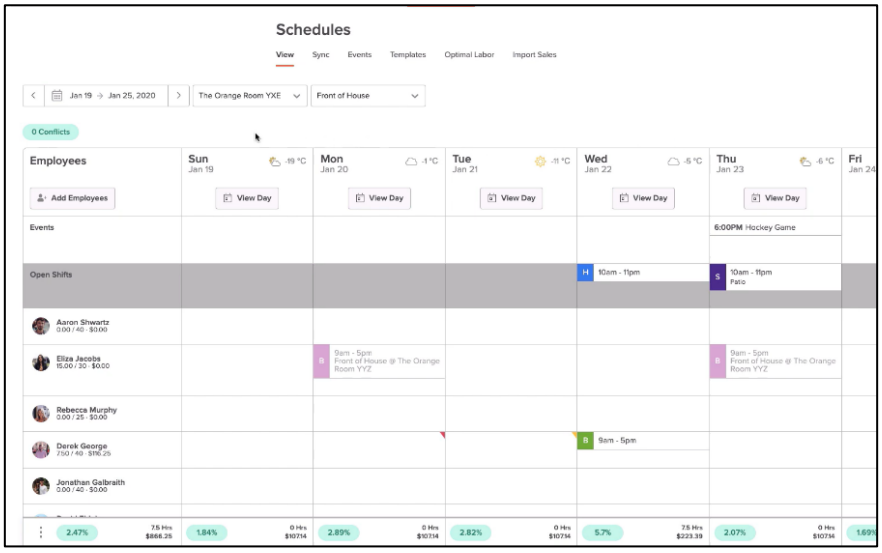


Figure 2.15 Schedules function

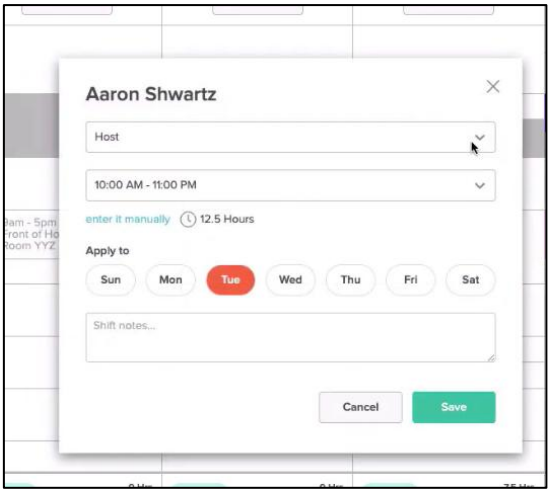


Figure 2.16 Adding employee to the schedule

Figure 2.17 displays the Open shift feature. This feature allows managers to post available shifts that need to be filled, typically due to an employee's absence or a shift in business demand. Employees can view these open shifts and claim them based on their own availability. This feature reduces the need for managers to manually fill shifts and offering flexibility to both employees and managers. However, its effectiveness depends on employees being available and willing to pick up the shifts, and it may not work well for businesses with very specific staffing requirements. While this feature increases operational efficiency, managers still need to ensure proper coverage by monitoring shift fulfilment.

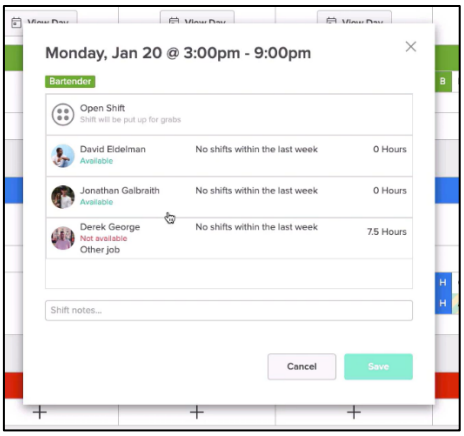


Figure 2.17 Open shift feature

The Event feature as shown in Figure 2.18 allows managers to schedule and manage special events, such as promotions, seasonal spikes, or unique shifts. Managers can set event details, including dates and staffing requirements, integrating this information with the regular

schedule. This helps prevent scheduling conflicts during busy periods and ensures adequate staffing.

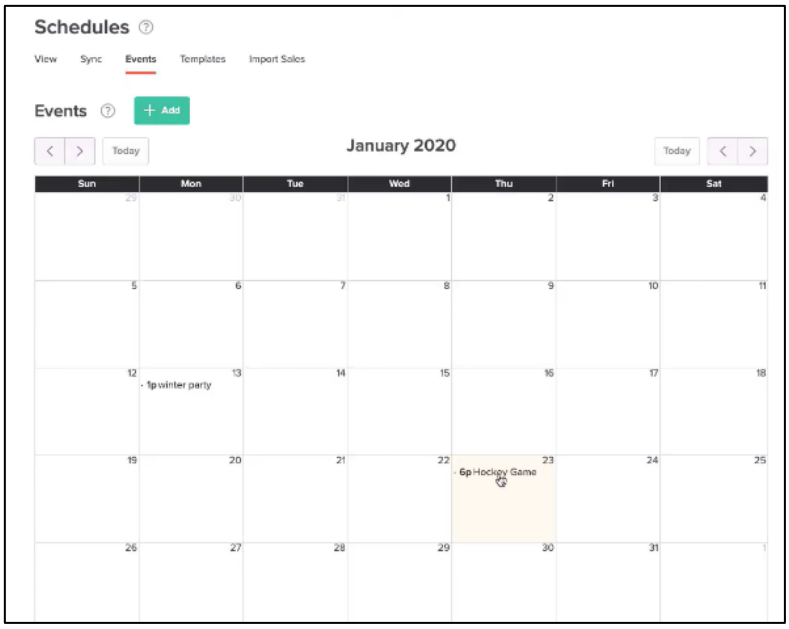


Figure 2.18 Event feature

In Figure 2.19, Manager Logbook displays and it allows managers to keep track of important daily activities and notes related to their workforce management. This feature serves as a digital log where managers can record observations, shift changes, and any special occurrences during a shift, helping to maintain a clear history of operational events. It also serves as a communication tool between managers, allowing them to note any issues or updates that may affect future scheduling or staff interactions. The logbook keeps everything clear and consistent and making sure that all important details are recorded and easy to access whenever managers need to review them.

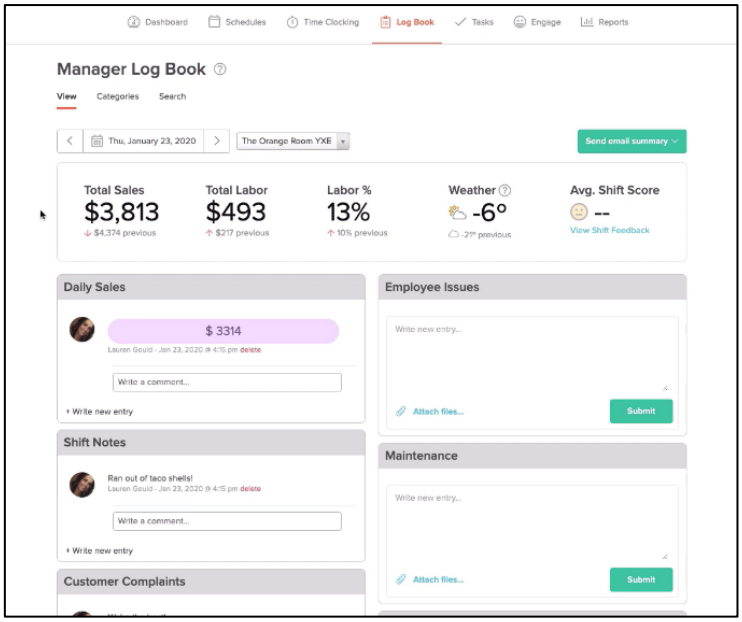


Figure 2.19 Manager Logbook

Figure 2.20 shows the Engage feature. This feature allows managers to track how employees are interacting with their shifts, time-off requests, and work schedules, offering a clearer picture of workforce satisfaction and potential areas for improvement. Managers can use this feature to see which employees might need additional support or recognition, contributing to a more positive work environment.

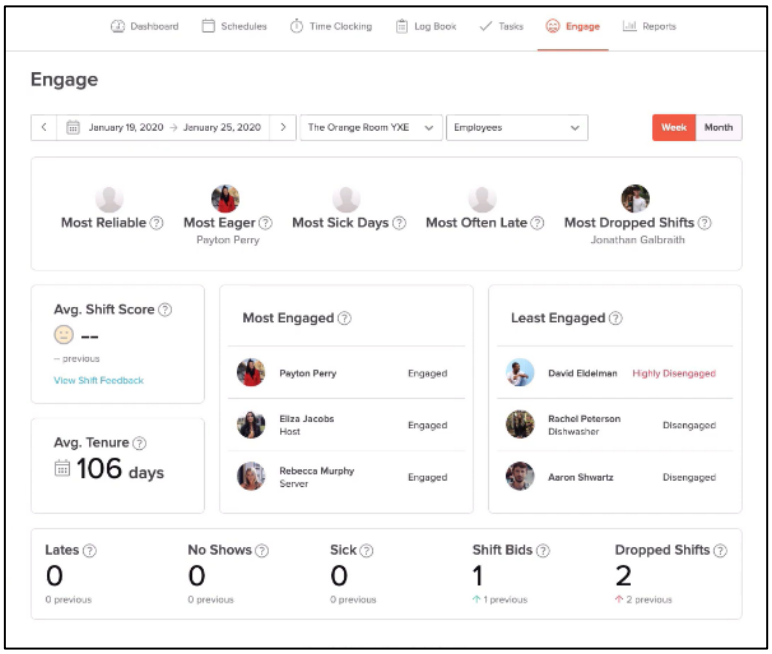


Figure 2. 20 Engage feature

The Report feature as shown in Figure 2.21 provides managers with detailed insights into key performance metrics such as labour costs, employee attendance, and overall scheduling efficiency. This tool helps managers generate customized reports that can analyse trends, track expenses, and assess the effectiveness of scheduling practices over time. However, the accuracy of the reports depends on the quality of the data entered, and if not regularly updated or monitored, managers might miss important trends or discrepancies in the data. The ability to export and share these reports also enhances communication and accountability within the organization.

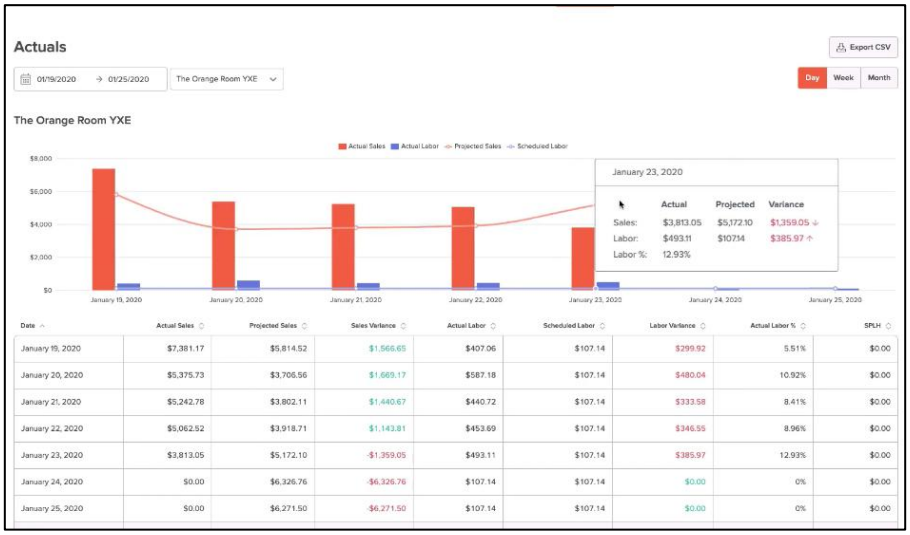


Figure 2.21 Report

To conclude, the 7shifts system is a useful workforce management to simplify scheduling, time-off management, payroll calculations, and communication. Its manager dashboard highlights key metrics, such as labour costs, attendance, and shift assignments, enabling managers to make informed decisions quickly. However, the system can be a bit complex during the initial setup, particularly for businesses with multiple locations, which might make it challenging for smaller businesses to access. Additionally, the reliance on managers for consistent updates, particularly in features like the manager logbook and employee profile management, could lead to underutilization. Despite these challenges, 7shifts provides a powerful tool for businesses looking to optimize workforce operations and improve communication.

2.2.3 HR.my

HR.my is an online human resources software that helps businesses manage their employee information in one secure place (Hr.my, n.d.). It allows employers to add an unlimited number of employees, who can also access their own information through a web portal. The system streamlines HR tasks like tracking employee data, managing attendance, and handling payroll, making it easier for companies to stay organized and efficient (Hr.my, n.d.). The system is particularly beneficial for small to medium-sized enterprises (SMEs) that may not have the resources for a dedicated HR department. One of the standouts features of HR.my is its accessibility: being cloud-based means that both employers and employees can access the system from anywhere with an internet connection. This flexibility allows for real-time updates and communication, making it easier for teams to stay informed and engaged. Moreover, HR.my emphasizes transparency and empowerment by giving employees direct access to their own information, such as attendance records and personal details (Hr.my, n.d.). This approach fosters a sense of ownership and accountability among staff, which can lead to improved morale and productivity.

Figure 2.22 shows the Login page. The page allows users to login as either an “Administrator” or “Employee.” Users are required to enter their email address and password to login. There is a toggle button labelled "HR Role," which allows users to switch between roles. The page also includes a link to reset forgotten passwords. Moreover, the blue colour scheme is consistent with the overall design of the website, and it is easy to understand and navigate for new user.

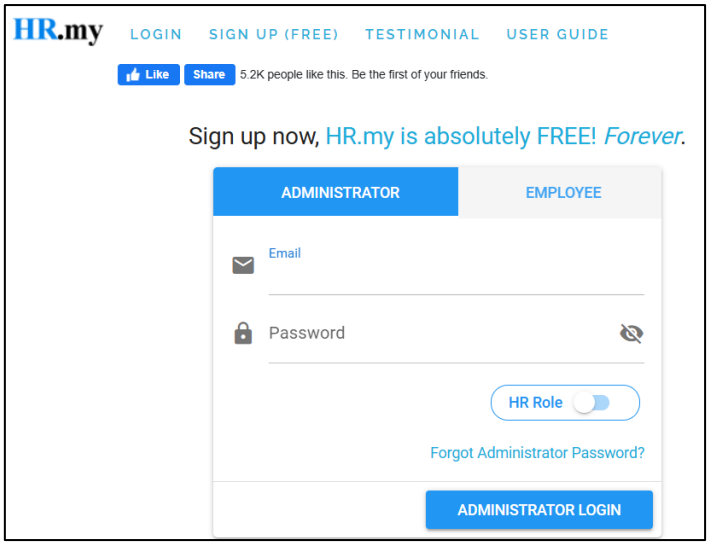


Figure 2.22 HR.my Login page

Figure 2.23 displays a dashboard for HR.my. The left panel shows different modules that are part of the HR system, such as Employee, Leave, Attendance, Document Workflow, Payroll, Employer, and many more. The panel also shows "File Storage" usage with a visual representation of the remaining space. On the bottom right panel, shows an "Overview" section with details about the organization's employees, such as the last login, the number of active employees, and web accounts. There is also an "HR.my News" section, which provides information about new features and updates.

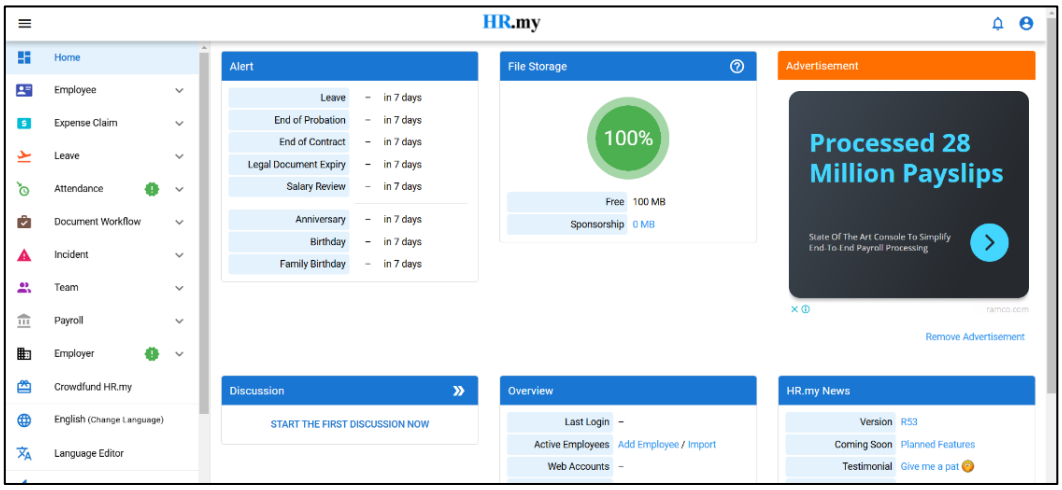


Figure 2.23 Administrator Dashboard

Figure 2.24 shows a menu from Employee function. It offers different sections for managing employee information, including their employment terms, education, experience, training, and legal documents. It also allows for managing custom roles and web accounts. The

right side of the screen is the data entry or displayed area. The current message "No data" indicates that there is no information currently available to display. The "+" yellow button is where the user adds new employee data. The search bar icon and the upload and download buttons provide functionality for searching and managing data. Upon clicking the “+” yellow button, the input field for the employee information will be shown in Figure 2.25. This form allows for the creation and maintenance of employee profiles. Once the administrator filled in the form, the employee detail will be shown as in Figure 2.26.

Figure 2.24 Employee function

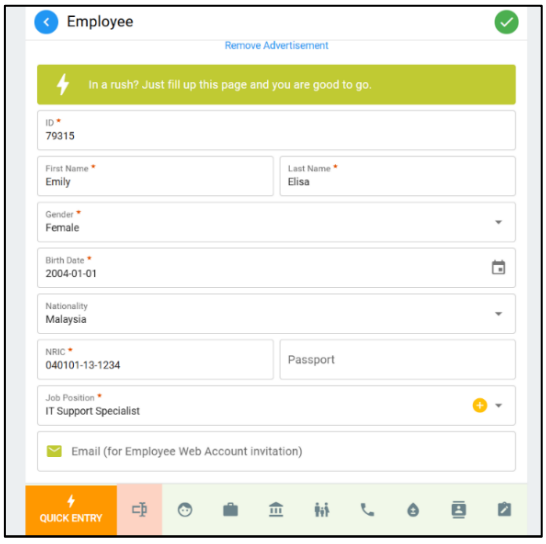


Figure 2.25 Add new employee form

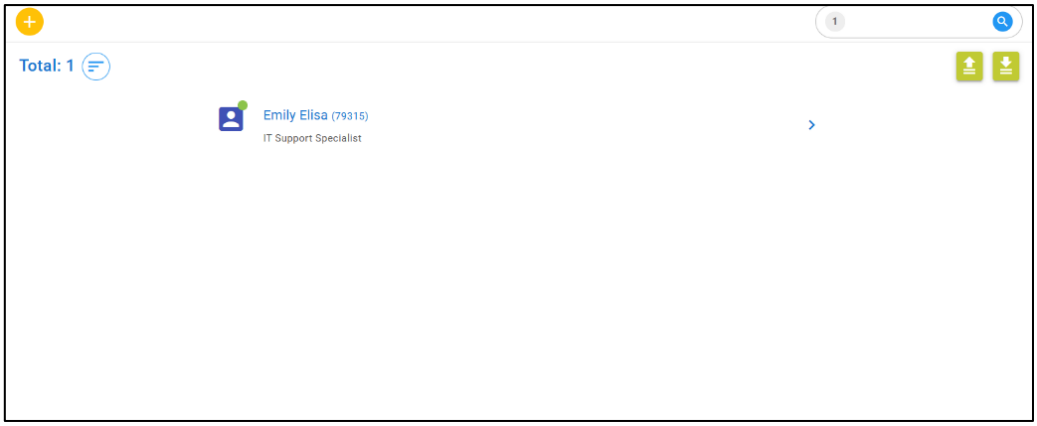


Figure 2.26 Employee details

HR.my's Expense Claim Management feature as shown in Figure 2.27 allows employees to submit work-related expense claims online with attaching supporting receipts for proof (see Figure 2.28). Managers can review, approve, or reject claims through an intuitive approval workflow. The system keeps a detailed record of all claims, providing visibility into their status—whether pending, approved, or rejected as shown in Figure 2.29. Additionally, approved claims can be seamlessly integrated into the payroll system, making reimbursement efficient and error-free. This feature reduces administrative burden and ensures accurate and streamlined expense handling.

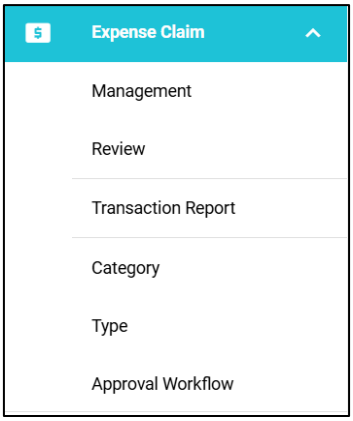


Figure 2.27 Expense claim management feature

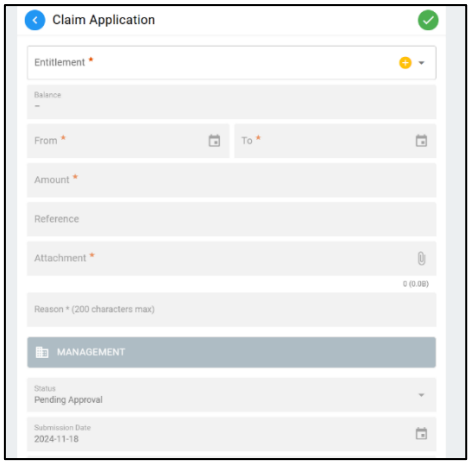


Figure 2.28 Claim application form

Figure 2.29 The expense claim record

Figure 2.30 shows the Leave Application form. Employees can submit leave requests with details such as type of leave, duration, and supporting documentation if needed. Managers can review these requests, approve or reject them, and ensure compliance with leave policies. The system automatically updates leave balances and maintains a comprehensive history of all leave activities.

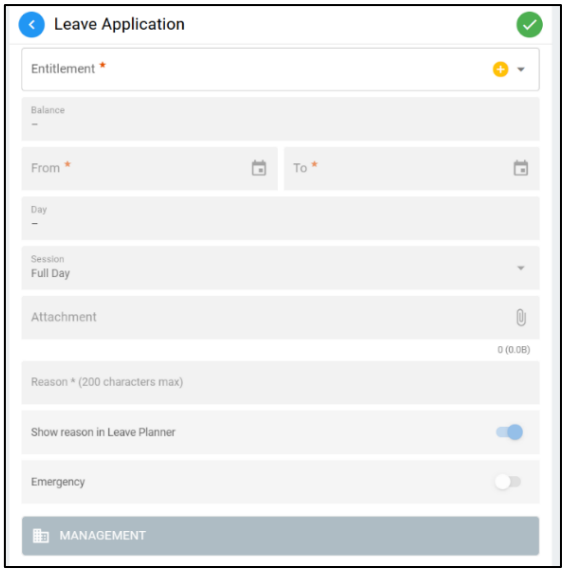


Figure 2.30 Leave application form

Figure 2.31 displays the schedule feature in the HR.my system. It helps businesses manage employee work schedules efficiently. Administrators can create, edit, and assign shifts while ensuring compliance with operational needs. The system supports customizable schedules and allowing flexibility for businesses with diverse or rotating shifts. Employees can view their assigned shifts in real time, ensuring clarity and reducing scheduling conflicts.

Figure 2.31 Schedule

HR.my's Attendance Management feature enables precise tracking of employee work hours. In Figure 2.32, the administrator can manually fill the absence form for the employees and the attendance transaction will be displayed as shown in Figure 2.33. Employees can clock in and out using a time clock system, which records attendance in real-time (see Figure 2.34). As shown in Figure 2.35, administrators can monitor attendance records, including absences,

tardiness, and overtime, ensuring accurate workforce data. The system also supports integration with payroll, allowing automatic calculations based on attendance. This feature improves transparency, reduces manual errors, and simplifies compliance with attendance policies, making it ideal for businesses needing a reliable workforce management tool.

Figure 2.32 Absence form

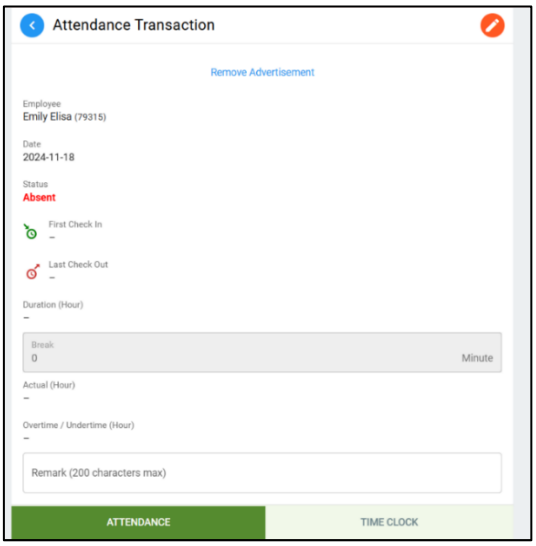


Figure 2.33 Attendance transaction

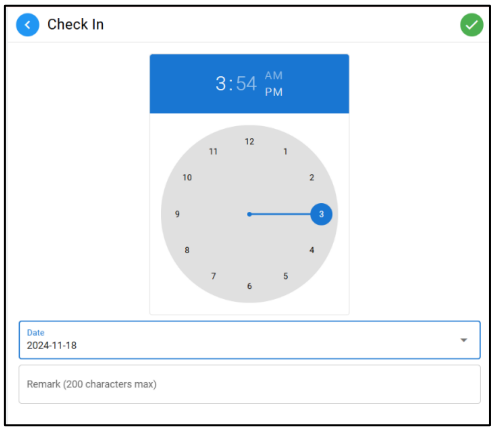


Figure 2.34 Clock in System

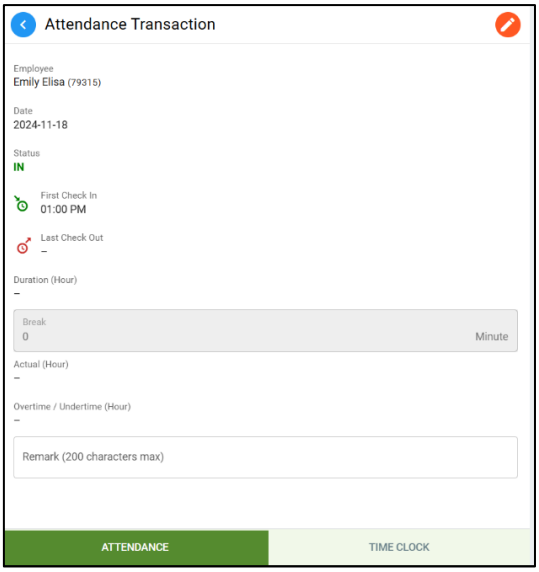


Figure 2.35 Attendance record

Other than that, HR.my also offer a Workdays feature as shown in Figure 2.36. This feature allows businesses to define their standard working days, holidays, and rest days based on operational needs. This setup integrates with the attendance and payroll systems to calculate hours worked, overtime, or deductions accurately. Businesses can configure custom schedules for departments or individual employees, ensuring flexibility and adherence to labour laws. The feature supports businesses with diverse operations by automating workday management and minimizing manual adjustments.

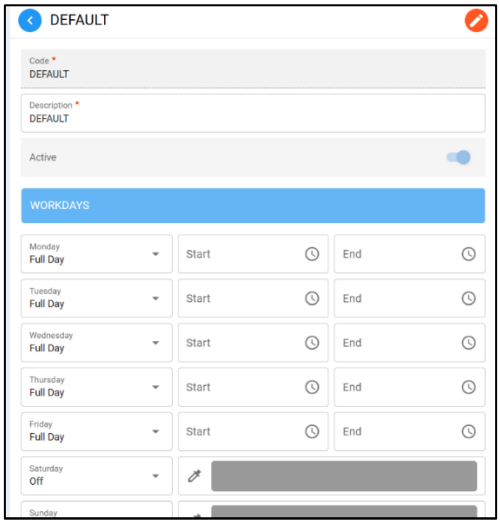


Figure 2.36 Workdays feature

In the Payroll feature as shown in Figure 2.37, there are many other options which includes salary adjustment, annual salary statement and bonus. Figure 2.38 shows the form for salary adjustment. This feature is to simplify the salary management by automating payroll

calculations based on attendance, overtime, and deductions. It supports multiple pay cycles and handles compliance with tax, EPF, SOCSO, and other statutory contributions. Administrators can customize pay components, generate payslips, and export payroll reports for record-keeping.

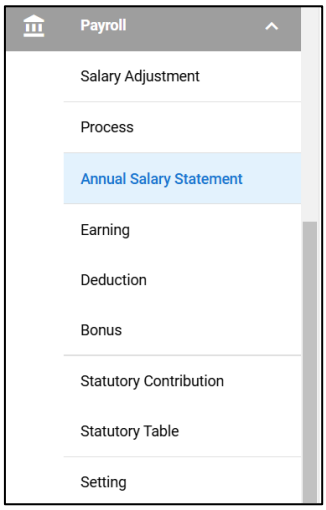


Figure 2.37 Payroll feature

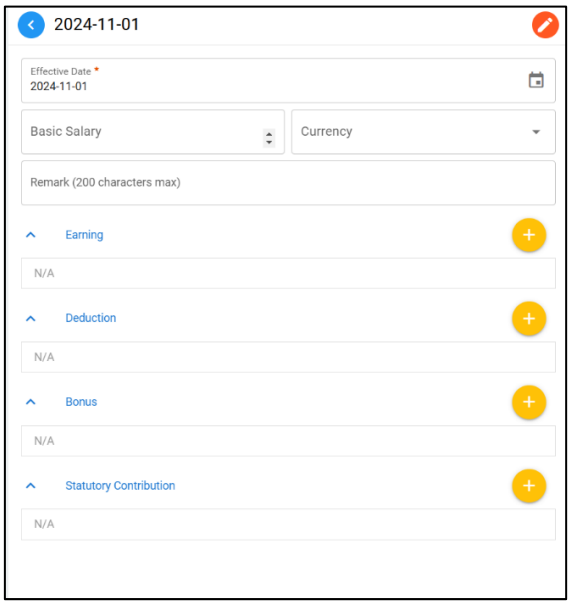


Figure 2.38 Salary adjustment

Figure 2.39 shows the company setup page. In this page, administrators can define company details, create departments, and set up employee roles and permissions. This feature also supports configuring working hours, holidays, and statutory compliance settings such as tax, EPF, and SOCSO contributions.

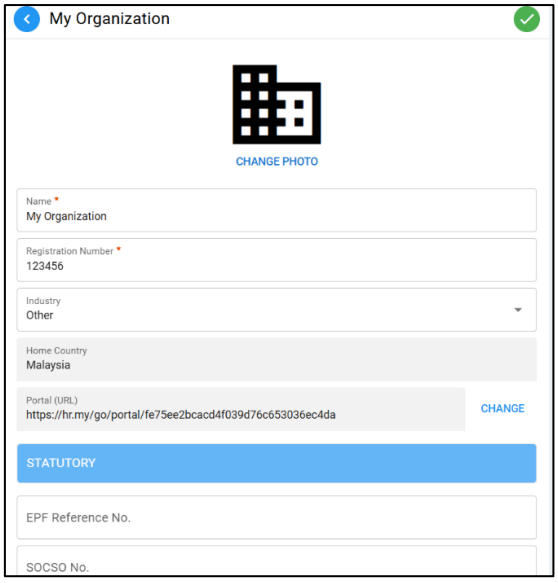


Figure 2.39 Company setup page

HR.my is a free, all-in-one HR and payroll management system designed for small to medium-sized businesses. It offers key features such as leave management, attendance tracking, payroll, expense claims, and scheduling, which are suitable for the HR use. However, while the system is highly functional, it could benefit from greater customization options to accommodate more complex business needs. The user interface could be modernized to improve aesthetics and usability, and the mobile app experience could be enhanced for better accessibility. One downside is that the presence of numerous ads can be distracting, which may detract from the overall user experience. While it has some areas for improvement, such as customization options and the user interface, its core functionalities make it a useful tool for small to medium-sized businesses.

2.3 Comparison Between Existing Systems and Proposed System

While analysing the existing systems related to the proposed system, each system's unique features and functionalities were identified, as discussed in the previous section. The similarities and differences between these systems were analysed to understand them better. This comparison highlights the key features of each system, and the key functionalities have been summarized in tables to make it easier to see how they stack up against one another.

Table 2.1 Comparison between existing systems and proposed systems

Features	UNIMAS QR Attendance	7shifts	HR.my	Puff Lab Portal (Proposed System)
Sign up and log in page	Single Login ID across all UNIMAS platform	Designed exclusively for registered employee and administrator. Sign up page only for the administrator role.	Free sign-up for businesses. Employees can access using company-provided login credentials.	Admin and employees log in through a secure portal. No sign-up required for employees.
Scheduling	Not applicable	Scheduling for employees, easy shift creation, drag-and-drop	Simple scheduling for employee shifts	Admin can add/edit shifts for employees.
Employee Management	Not applicable	Attendance tracking, profile edits, set availability, performance, and messaging.	Comprehensive HR features	Attendance tracking, payroll history, user profile edits
Payroll management	Not applicable	Detailed payroll integration	Free payroll system with tax compliance	Based on attendance record
Attendance taking	QR-based system for students and staff	Attendance taking using their mobile app or via the system's integrated time clock	Supports attendance tracking with check-in/out options.	QR code scanning for clock-in/out
Report generation	Attendance reports based on QR code scans	Detailed analytics and reporting for attendance, payroll, and scheduling.	Generates comprehensive HR reports.	Attendance and payroll report available for admin use.
User interface	User-friendly and easily accessible	Modern, intuitive design optimized for mobile and desktop use.	Straightforward and professional interface	User-friendly design and easily accessible for small business needs.

Table 2.1 shows each system serves different purposes and offers different level of functionality. The Puff Lab Portal is designed for a small business environment, emphasizes simplicity and practicality with features such as secure login, flexible shift scheduling,

employee and payroll management, and QR code-based attendance tracking. In contrast, UNIMAS QR Attendance focuses on academic institutions for QR-based attendance tracking. UNIMAS QR Attendance uses a single login ID across all UNIMAS platforms make it very convenient for users. However, unlike the other system, UNIMAS QR Attendance lacks key functionalities such as scheduling, payroll management, or detailed reporting, which limits its use to attendance purposes only. 7shifts excels in scheduling with advanced features such as drag-and-drop functionality, and integration with time clocking systems. These capabilities make it ideal for larger organizations that require precise and flexible scheduling solutions. Additionally, it excels in employee management by tracking availability, performance, and attendance. Meanwhile, HR.my provides a free and comprehensive set of HR tools such as payroll with tax compliance, basic scheduling, and attendance tracking. It is highly versatile and suitable for various businesses, but it lacks specialization in any single area. The platform also features a straightforward and professional user interface which ensures an ease of use for both admins and employees.

2.4 Summary

Chapter 2 reviewed three existing systems similar to the proposed Puff Lab Portal. The systems are UNIMAS QR Attendance, 7shifts, and HR.my. These systems' features and user interfaces help guide the creation of the proposed system. A table further explains the comparisons between the three existing systems and the proposed system, Puff Lab Portal. These comparisons are crucial for identifying the limitations of existing systems and potential features that the proposed system can improve or implement. Analysing the strengths and weaknesses of existing systems helps the proposed system offer more efficient and reliable solutions than the current systems.

CHAPTER 3: REQUIREMENT ANALYSIS AND DESIGN

3.1 Introduction

Puff Lab Portal is a web-based application designed to improve employee management at Puff Lab. The application is being developed to be highly user-friendly and accessible for Puff Lab staff. The RAD methodology was used to design this application (Singgalen, 2024). RAD is particularly effective for projects requiring quick delivery, iterative feedback, and continuous user involvement (Singgalen, 2024). This methodology emphasizes speed and flexibility the system to evolve based on real-time feedback and user needs.

RAD primarily follows four key phases which are requirements planning, user design, construction, and cutover. The requirements planning phase focuses on gathering user needs and understanding the overall scope of the project. This is followed by the user design phase, where system prototypes are developed, refined, and improved based on iterative feedback from users. The next stage, construction, emphasizes collaborative system development in an iterative manner to ensure the product meets user requirements effectively. Finally, the cutover phase involves finalising the system through thorough testing, user training, and deployment for real-world use.

In this chapter, further details for the first two phases of the RAD methodology—Requirements Planning and User Design—are discussed. User requirements were collected through interview sessions with Puff Lab staff to ensure that the practical challenges and needs they face were thoroughly understood. The information gathered was then analysed to define the system design, features, and functionalities that align with user expectations.

3.2 Rapid Application Development (RAD) Methodology

RAD is a software development methodology that emphasizes quick development and iteration of prototypes over rigorous planning and testing. The primary goal of RAD is to produce high-quality software quickly by involving users in the development process and allowing for frequent feedback and adjustments (Gananjaya et al., 2022). This approach contrasts with traditional methodologies, such as the Waterfall model, which typically follow a linear and sequential process.

One of the key components of RAD is the use of prototypes. Prototyping allows developers to create a working model of the software early in the development process, which can then be tested and refined based on user feedback. This iterative process helps to ensure that the final product aligns closely with user needs and expectations. Another important aspect

of RAD is user involvement. In traditional development methodologies, users may only interact with the software at the beginning and end of the process. In contrast, RAD encourages continuous user engagement throughout the development cycle (Gananjaya et al., 2022). This collaboration helps to identify potential issues early and allows for adjustments to be made in real-time, ultimately leading to a product that better meets user requirements. The emphasis on user feedback not only enhances the quality of the software but also increases user satisfaction and acceptance.

3.2.1 Analysis Phase and User Requirements

The brainstorming or requirement analysis phase involves acquiring and analysing information gathered from users. Identifying user requirements is essential to developing a system with features and functionalities that will satisfy them. This phase ensures that the system's design aligns closely with user expectations and operational needs.

An interview with Puff Lab staff was conducted to gather their opinions, insights, and input regarding current employee management processes at Puff Lab. Key areas of focus include existing challenges with attendance tracking, shift scheduling, and payroll calculations. The staff’s feedback will highlight the potential improvements, and desired system features to ensure that the proposed Puff Lab Portal successfully addresses current inefficiencies.

The interviews are designed to be open-ended and interactive to allow participants to express their thoughts freely. This method ensures that the requirements reflect with the business needs. Before the interview session started, the Puff Lab staff has read and signed the consent form (a sample form is attached in Appendix A).

3.2.2 Analysis of Interview Questions

Below are the interview questions for business owner and staff at Puff Lab. The questions are divided into two parts. The first part is demographic profile, which focuses on gathering basic background information about the respondents while the second part is open-ended questions, which aims to gain insights into current challenges, user requirements, and suggestions for the proposed system. For clarity, P1, P2, P3, P4 will refer to the person being interviewed.

Part one: Demographic Profile

Table 3.1 Demographic Profile

Questions	P1	P2	P3	P4
1. How old are you?	24 years old	25 years old	24 years old	23 years old
2. What is your current role at Puff Lab?	Baker assistant	Chief Executive Officer	Baker and Store Manager	Baker Assistant
3. What is your employment status?	Full-time study	Full-time inside this busines	Full-time employement	Part-time Job
4. Are you a student?	Yes	-	-	Yes
5. What is your current year of study and from which faculty?	Master's degree Second Year from FCSIT	-	-	Year 4, FSSK
6. How many hours per week do you typically work at Puff Lab?	3-5 hours per week	25 hours per week	50 hours per week	49 hours per week
7. How many months or years of work experience in Puff Lab do you have in total?	2 months	5 years	1.5 years	4 years

Question 8: How satisfied are you with your role at Puff Lab?

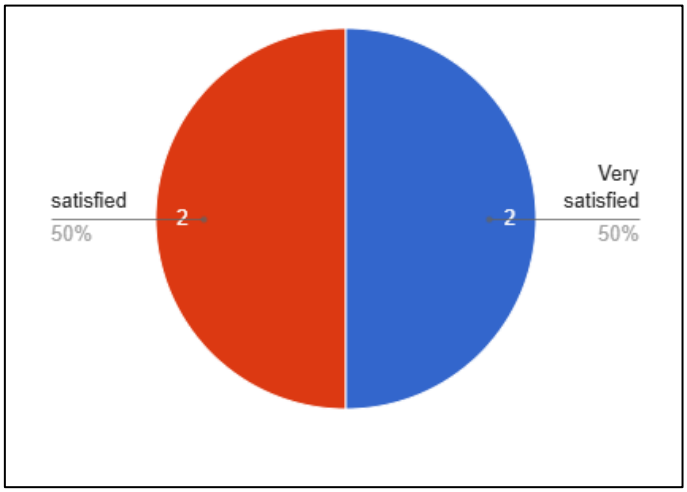


Figure 3.1 Levels of role satisfaction among employees at Puff Lab

Figure 3.1 represents the levels of satisfaction among employees at Puff Lab, as gathered from the interview. The chart is divided into two equal segments: 'Very Satisfied' and 'Satisfied,' each accounting for 50% of the total responses. Half of the respondents (50%) indicated they are 'Very Satisfied' with their roles, showing a high level of job satisfaction. The remaining 50% chose 'Satisfied,' indicating that while these employees are content, their satisfaction level does not reach the highest category. There are no responses for 'Neutral,' 'Unsatisfied,' or 'Very Unsatisfied,' which demonstrates a complete absence of dissatisfaction among employees.

Question 9: How often do you use digital tools in your current role?

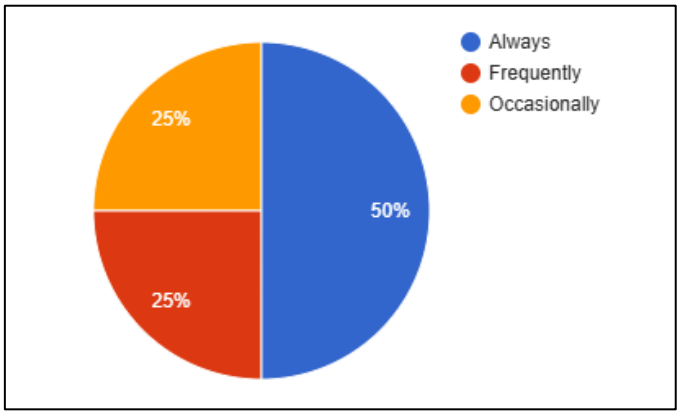


Figure 3.2 Frequency of digital tool usage

Figure 3.2 shows how frequently employees at Puff Lab use digital tools in their current roles, based on the interview responses. The chart is divided into four segments: 'Always,' 'Frequently,' 'Occasionally,' and 'Never.' Each segment represents the percentage of employees selecting each category. 'Always' constitutes 50% of the chart, indicating that half of the employees use digital tools consistently in their work. 'Frequently' accounts for 25%, showing that one-quarter of employees use digital tools often but not all the time. 'Occasionally' represents the remaining 25%, suggesting that some employees only use digital tools on a limited basis. There are no responses for 'Never,' which confirms that all employees utilize digital tools to some extent.

Question 10: Do you feel that technology such as QR code attendance, payroll systems, and shift scheduling could improve your work efficiency?

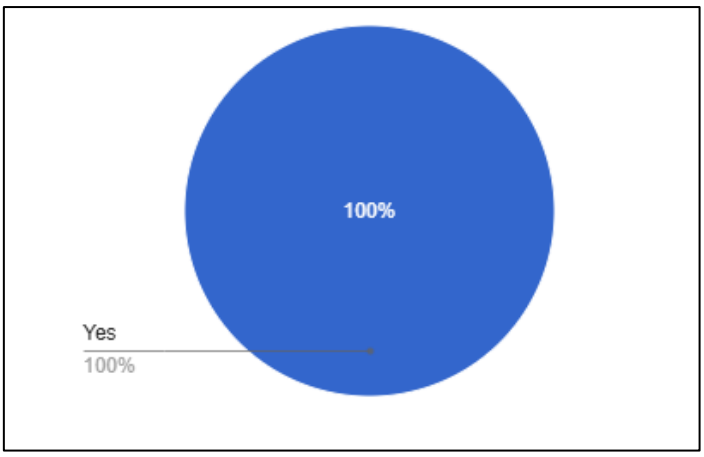


Figure 3.3 Efficiency with technology

Figure 3.3 illustrates employees' responses to whether technology, such as QR code attendance, payroll systems, and shift scheduling, could improve their work efficiency at Puff Lab. The chart is divided into three segments: 'Yes,' 'No,' and 'Maybe,' representing the proportion of employees selecting each response. 'Yes' occupies 100% of the chart, indicating unanimous agreement among employees that technology could enhance their work efficiency. There are no segments for 'No' or 'Maybe,' as none of the respondent expressed uncertainty or disagreement regarding the potential benefits of technology. Figure 3.3 shows a strong consensus among employees that implementing technologies such as QR code attendance and payroll systems would positively impact their work efficiency.

Part Two: Open-ended Questions

Question 1: How satisfied are you with the current attendance tracking at Puff Lab? What specific challenges have you faced using it?

P1, P3, and P4 all expressed dissatisfaction with the current Telegram-based attendance system. P1 often forgets to clock in and out, impacting their payroll. P3 finds it difficult for HR to track attendance accurately which leads to errors. P4 struggles with the manual process, making it hard to focus on work while ensuring accurate attendance records.

Question 2: Would a QR code-based attendance system improve the clock-in/clock-out process for you? Why or why not?

P1, P3, and P4 all agreed that a QR code-based attendance system would improve the clock-in and clock-out process. P1 compared it to taking attendance in a lab class, where scanning the code upon arrival and departure would confirm attendance. P3 believes it would prevent staff from forgetting to clock in and out. P4 emphasized the convenience of using smartphones to scan QR codes, making the process more efficient than manually entering attendance details.

Question 3: How would you feel about a QR code feature that confirms successful clock-ins or clock-outs in real-time? Would it make the process more reliable for you?

P1, P3, and P4 all expressed positive views about a real-time confirmation QR code feature. P1 emphasized that since everyone has a phone, this feature would make tracking attendance more reliable. P4 mentioned that, compared to the Telegram-based system, a QR code feature would securely store attendance history, ensuring data is not lost if the Telegram group is deleted. This would enhance the overall reliability of the system.

Question 4: Do you think the current shift scheduling process is easy to follow? Why or why not?

P1 finds the shift scheduling process easy but suggests improvements, such as setting attendance hour limits and pinning schedules in Telegram for easier access. P3 feels the process is not easy due to last-minute changes and the schedule often getting lost in the chat feed. P4 believes the process is somewhat easy to follow, depending on staff availability. While shifts are provided, manual coordination through Telegram for replacements can be time-consuming.

Question 5: How would you feel about a system that allows you to easily view and manage your shift schedules?

P1 thinks such a system would be helpful, as it would serve as a reminder for upcoming shifts and assist in managing replacements when necessary. P3 would feel happy and less stressed, as it would reduce daily concerns about scheduling. P4 agrees, stating that it would make planning and organizing shifts easier, improving convenience and efficiency.

Question 6: Would a feature to request shift changes or view available shifts through the system would make the process more efficient?

P1 agrees, referencing their earlier point. P3 supports the feature, suggesting that it could automatically alert other staff to cover shifts when needed. P4 also agrees, but expresses concern about internet reliability potentially affecting the system's accessibility.

Question 7: Would a system that tracks your hours and calculates your payroll based on attendance be beneficial to you? How?

All participants agreed that a system that tracks hours and calculates payroll based on attendance would be very beneficial. P1 emphasized how convenient it would be to estimate pay and accurately keep track of both working hours and salary. P3 pointed out that it would promote fairness by preventing issues such as underpayment or overpayment, making payroll calculations more reliable. P4 mentioned that automating these calculations would reduce manual errors, making the process more accurate and efficient, and would lessen the reliance on Excel spreadsheets.

Question 8: How would you feel if you could access your payroll details and attendance history directly from the system?

Participants were all in favour of being able to access their payroll details and attendance history directly from the system. P1 mentioned that it would be very helpful for applying for loans or checking for any payroll mistakes by comparing it with attendance records. P3 mentioned that it could make financial planning easier, especially for those juggling work and studies, as it would help them manage their budgets better based on their tracked working hours. P4 pointed out that this feature would reduce the need to rely on management for updates while also allowing employees to check their own salary and attendance.

Question 9: Would a feature that sends notifications about upcoming shifts or reminders for clocking in or out be helpful to you? Why?

Participants all agreed that having a feature to send notifications about upcoming shifts and reminders for clocking in and out would be very helpful. P1 pointed out that it would be practical for preventing forgotten shifts and missed clock-ins and outs, and they preferred pop-up notifications because they are more noticeable. P3 suggested that these notifications should go to all employees, not just HR, so everyone stays aware and accountable for their attendance and work hours. P4 mentioned that notifications could really help busy staff manage their schedules better, comparing it to calendar alerts from popular apps such as Shopee, which help people remember important tasks.

Question 10: If you could suggest any improvements to the proposed system for attendance, payroll, or shift scheduling, what would they be?

Participants provided several practical suggestions to enhance the proposed system for attendance, payroll, and shift scheduling. P1 recommended adding a notification feature to remind staff about shift selections, thereby minimizing missed opportunities. P3 emphasized the need for a minimalist design using natural colour such as khaki or brown to create a user-friendly interface, while also advocating for reduced system errors and the addition of pop-up notifications for improved alerts. Meanwhile, P4 suggested allowing multiple edits for shift changes, similar to the functionality of Google Forms, which would grant staff the flexibility to easily update and resubmit their shifts without restrictions.

Question 11: What prompted you to look for a new system for employee management at Puff Lab?

P2 highlighted the need for a streamlined employee management system to effectively track staff attendance, including clock-ins, clock-outs, and absences. They emphasized that such a system would ensure accountability, particularly among part-time staff, by identifying those who fail to show up for work without prior notice. P2 also mentioned past issues with absenteeism, which impacted operations.

Question 12: What are the key challenges you face with employee management at Puff Lab?

P2 identified attendance management as a major challenge in employee management at Puff Lab. They explained that inconsistencies in staff arrival times make it difficult to maintain accurate records. A systematic clock-in and clock-out system was suggested as a

solution, which could not only streamline attendance tracking but also integrate with payroll processes.

Question 13: How do you track employee attendance, and how does the process work for you?

P2 explained that employee attendance is currently tracked using Telegram, where staff clock in and out. However, the process has several limitations. Attendance data is manually transferred to Excel for payroll calculations, which increases the risk of errors. P2 shared an instance where missed attendance entries led to wage miscalculations for multiple staff members. Such mistakes not only could strain relationships between the company and its employees, but it could also harm the company's reputation.

Question 14: How do you currently calculate and manage payroll?

P2 shared that payroll is currently managed using Excel and Word. Attendance data, including clock-in and clock-out times, is manually entered into Excel, where calculations for total working hours, overtime, and wages are performed. Payroll slips are then manually created using Word. While this method works, it is time-consuming and prone to errors due to the manual processes involved.

Question 15: Would you like a system that automates payroll calculations based on attendance and shifts? Why?

P2 expressed strong interest in a system that automates payroll calculations. They envision a system where staff clock in and out, and their working hours, including overtime (calculated after 8 hours), are automatically tracked and converted into wages. The system could also account for additional payments, such as participation in special events, and generate payroll slips automatically.

Question 16: How do you currently manage employee schedules?

P2 explained that employee schedules are currently managed using Telegram, where the manager posts shift details in advance. While the manager does a good job of posting the schedule, P2 mentioned that it can be difficult for staff to stay fully engaged with the schedule through Telegram. They expressed hope that implementing a new system would help streamline and simplify the scheduling process by making it easier to manage weekly shifts and improve overall efficiency.

Question 17: Do you think having the ability to request shift changes or view available shifts through the system would make the process more efficient? Why?

P2 agreed that having the ability to request shift changes or view available shifts through the system would improve efficiency. They explained that if a shift change were made, an automatic alert would notify staff. This would reduce the need for additional announcements and make it easier for management to fill in empty schedules by allowing other staff members to pick up shifts.

Question 18: How important is it for you to have reporting features (e.g., detailed reports on employee attendance or payroll)?

P2 emphasized the importance of reporting features, as they would allow for tracking total working hours and calculating labour costs. With these reports, they could identify areas to optimize, such as reallocating resources or cutting unnecessary expenses. Having access to such data would provide valuable insights and enabling more systematic and informed decision-making to improve overall business operations.

Question 19: Would you want to allow employees to view their own payroll data and attendance history? How would this feature benefit the business?

P2 agreed that allowing employees to view their own payroll data and attendance history would promote transparency and honesty. This feature would give employees a clear understanding of their working hours and wages. Additionally, if any discrepancies occur, employees could easily review their data and clarify any missed attendance records or errors to ensure that their actual work hours are accurately reflected in the system.

Question 20: Are there any specific features or customizations that you would want to see in the proposed system to make it fit your business needs better?

P2 highlighted the importance of notifications as a key feature. They emphasized the need for automatic alerts to notify management when a staff member misses their shift. This would enable management to quickly contact the employee and address the issue, either by asking for clarification or ensuring the shift is covered. Such a feature would enhance communication and streamline the process of handling attendance issues in real-time.

3.3 System Design

In this section, various features that comprise the proposed application will be discussed, along with an exploration of different design aspects in further detail using UML diagrams.

Furthermore, the interface design will provide a detailed visual representation of the proposed application's design. The first part will delve deeper into UML diagrams, utilizing the Use Case Diagram, Activity Diagram, Class Diagram, and Sequence Diagram to illustrate these concepts.

3.3.1 Use Case Diagram

Figure 3.4 shows the use case diagram for the proposed web-based system, Puff Lab Portal.

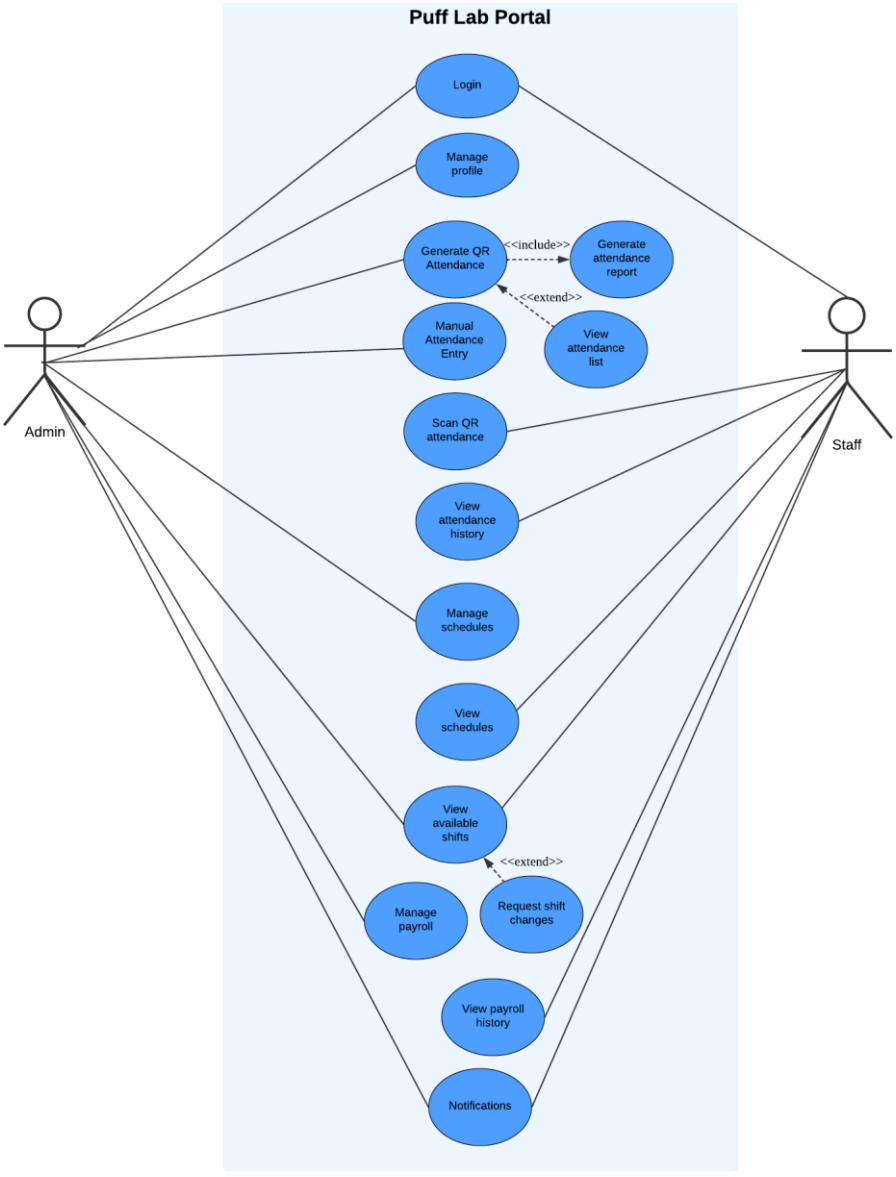


Figure 3.4 Use case diagram

3.3.2 Activity Diagram

Activity diagram visually represents the flow of the working system. Figure 3.5 shows the activity diagram for the staff and Figure 3.6 shows the activity diagram for the administrator.

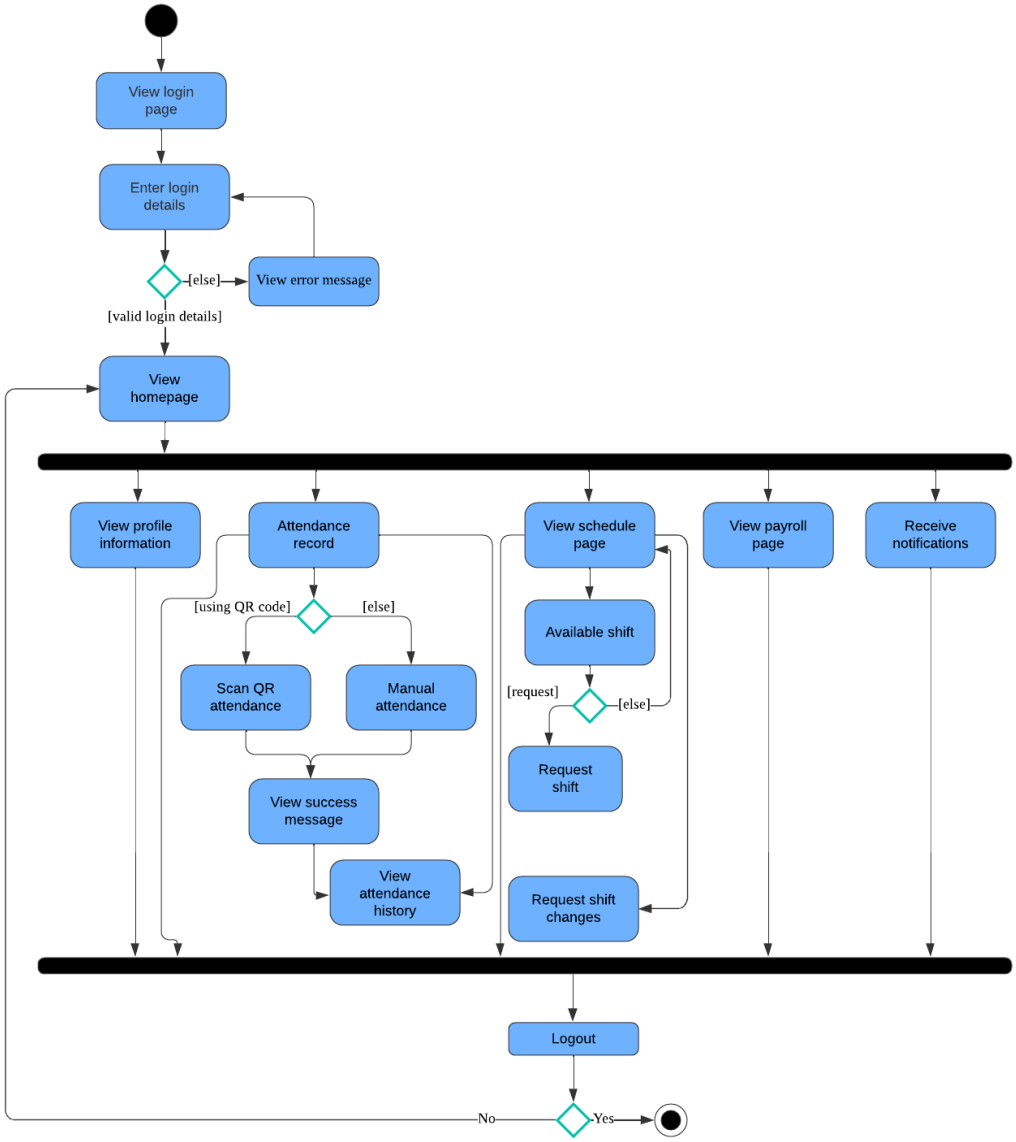


Figure 3.5 Activity diagram for staff

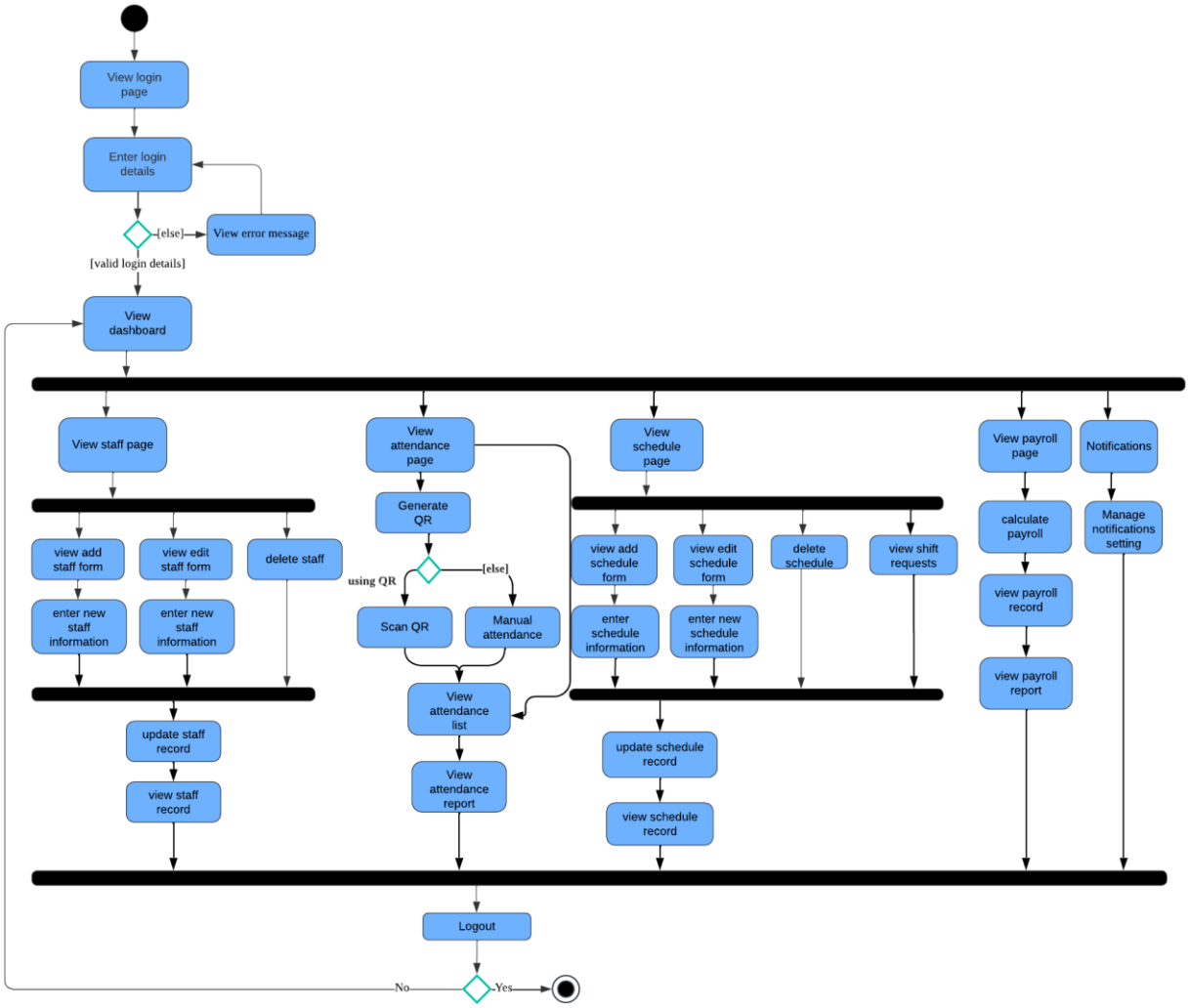


Figure 3.6 Activity diagram for admin

3.3.3 Class Diagram

Figure 3.7 shows the class diagram for the proposed system, Puff Lab Portal.

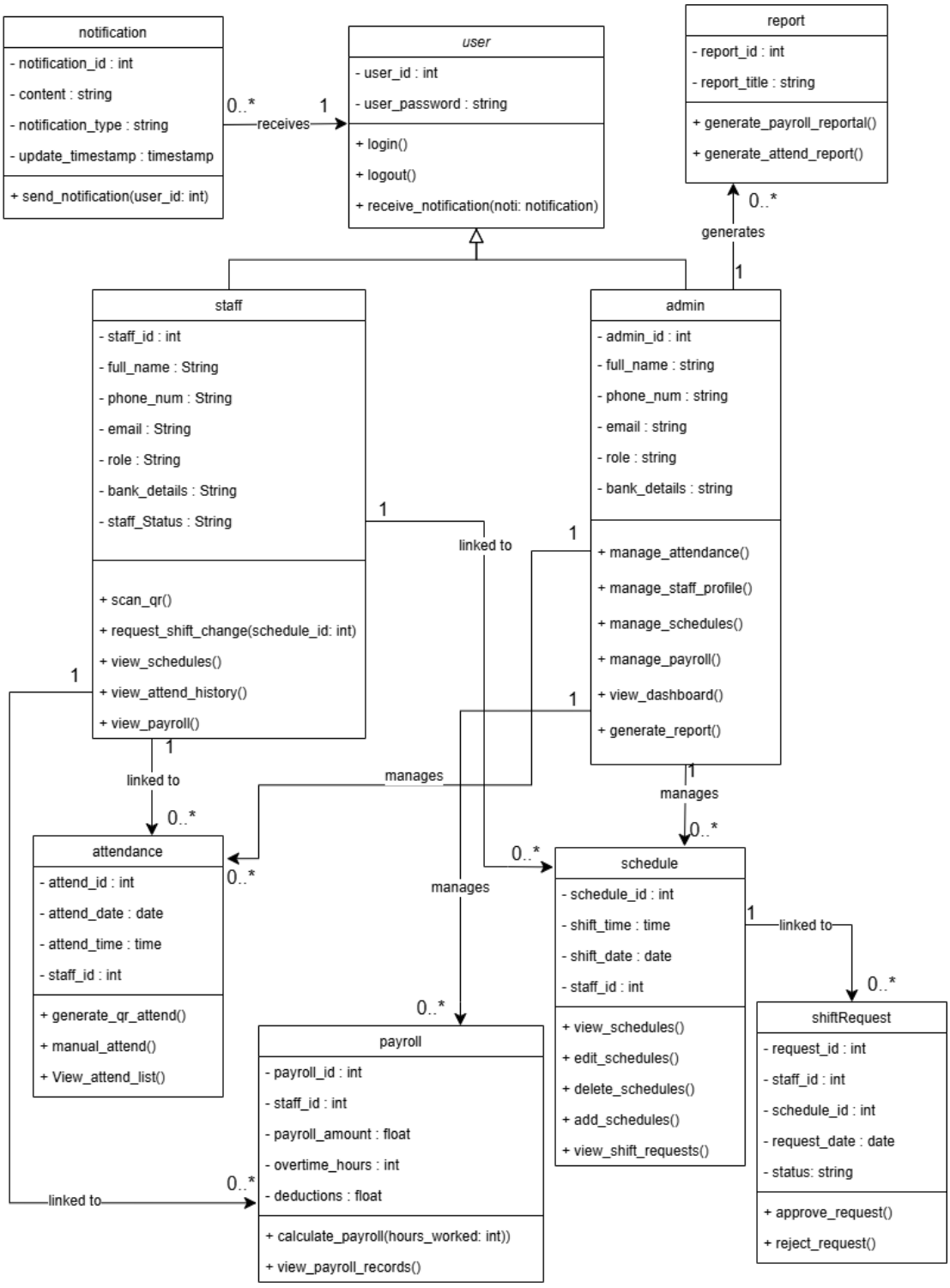


Figure 3.7 Class diagram

3.3.4 Sequence Diagram

Sequence diagram depicts the time line objects and roles the actors play and it shows their interaction with each other in a proper time frame. In the proposed system, the sequence diagram has two actors namely admin and staff.

A. Login for user

Figure 3.8 shows the sequence diagram for user login process. The user includes staff, administrator. The user needs to input correct login details to successfully login into the system. The system will show an error message if the user login details are invalid.

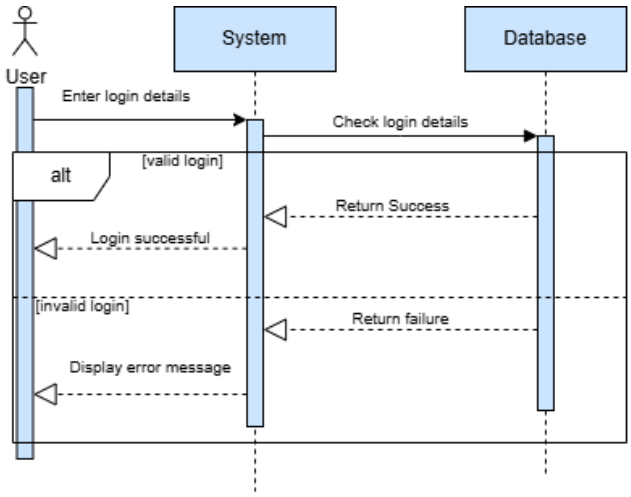


Figure 3.8 User login sequence diagram

B. Attendance page

Figure 3.9 illustrates the sequence diagram of staff marking their attendance using the system. The staff member scans a QR code using their device and trigger a request for camera access. The system processes the QR code and verifies the information against the database. If the information in valid, the attendance is marked. If the information is invalid, an error message is displayed to the staff member. The system also allows staff member to view their attendance history, which involving retrieving records from the database and displaying them to the staff.

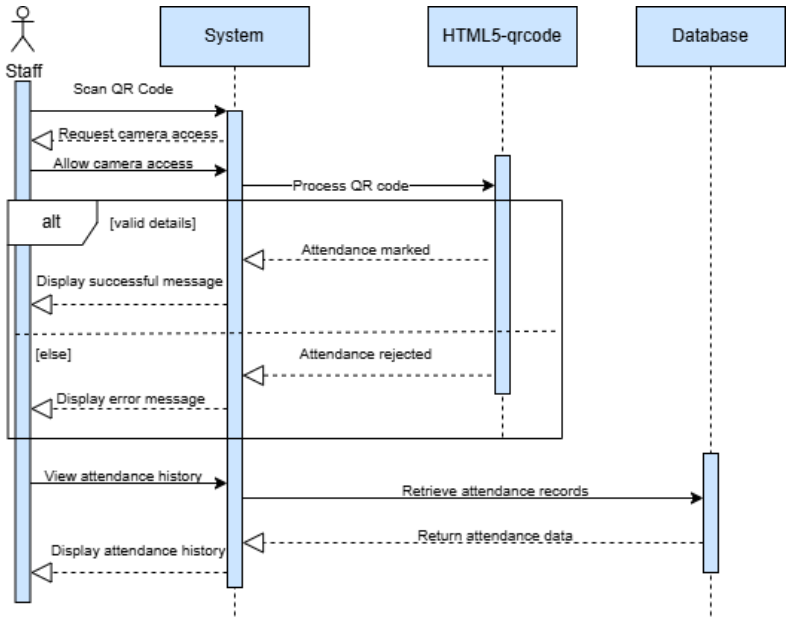


Figure 3.9 Attendance sequence diagram for staff

Figure 3.10 shows the sequence diagram for the attendance management process for the administrator. The administrator generates QR codes for attendance tracking. The system then creates and returns the QR code. The administrator can also view the attendance list and generate attendance reports. The system retrieves the attendance records from the database, compiles the data, and returns the report.

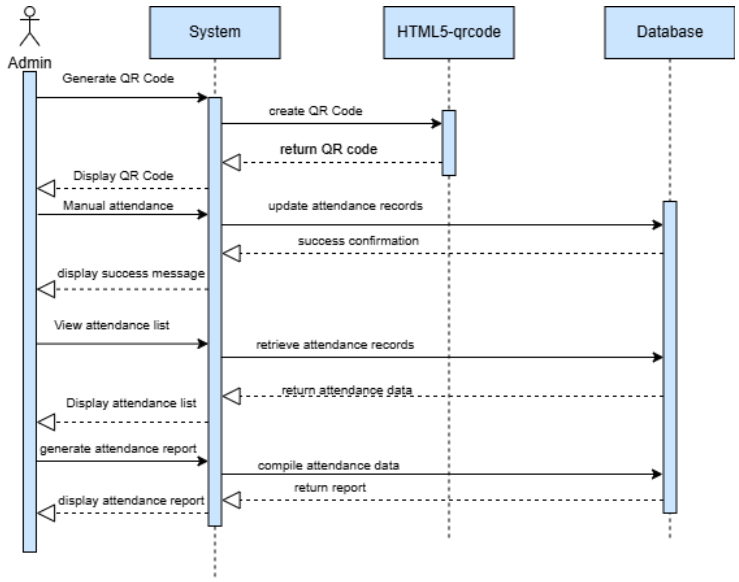


Figure 3.10 Attendance sequence diagram for admin

C. Schedule page

Figure 3.11 shows the sequence diagram for the staff schedule management process. The staff member can view the schedule, see available shifts, and request a shift change. The system retrieves the schedule data and available shifts from the database, saves the shift change request, and confirms the change request.

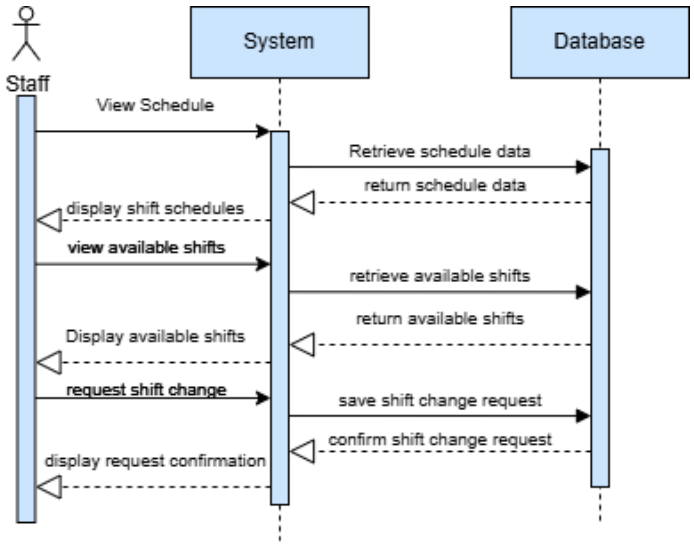


Figure 3.11 Schedule sequence diagram for staff

Figure 3.12 shows the sequence diagram for schedule management for an admin user. The admin user can add, edit or delete shift schedules. They can also view change requests and approve or reject them. The system updates the schedule data in the database and displays confirmation messages to the admin user.

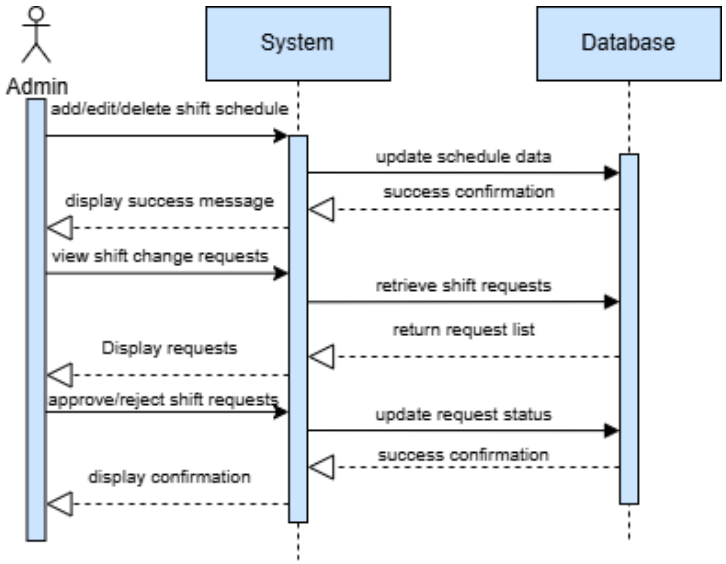


Figure 3. 12 Schedule sequence diagram for admin

D. Payroll page

Figure 3.13 shows the sequence diagram for payroll history viewing for a staff user. The staff user can view their payroll history by requesting it from the system. The system then retrieves the relevant data from the database and returns it to the staff user.

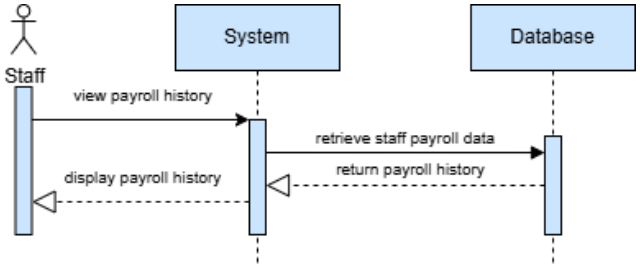


Figure 3.13 Payroll sequence diagram for staff

Figure 3.14 shows the sequence diagram for payroll calculation for an admin user. The admin user initiates the payroll calculation process. The system then retrieves the relevant employee data from the database and performs the calculations using a payroll processor. The system saves the calculated payroll data in the database and generates a payroll report using a report generator. Finally, the system displays the report to the admin user.

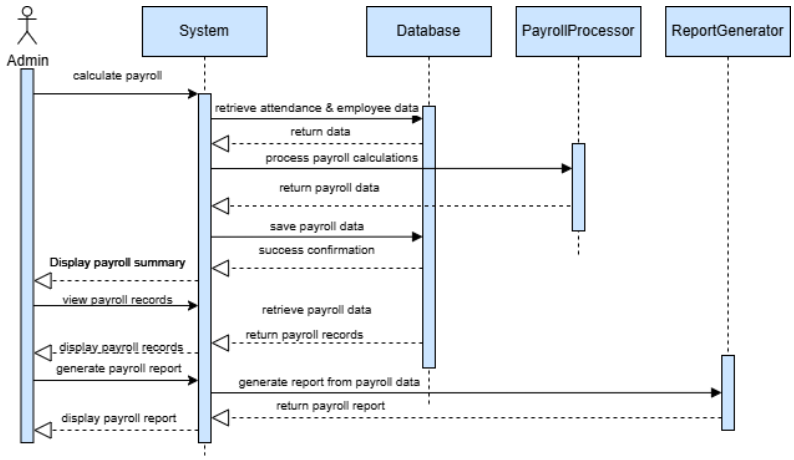


Figure 3.14 Payroll sequence diagram for admin

E. Logout for user

Figure 3.15 depicts the sequence diagram for user logout. The process begins when the user clicks the logout button, triggering the system to display a confirmation message. The user confirms the logout, and the system sends a logout request to the database. The database accepts the request, and the system then displays the login page to the user.

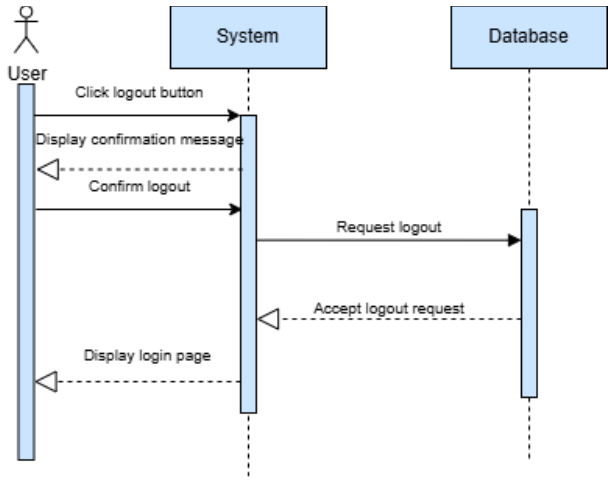


Figure 3.15 Logout for user

3.4 System Requirements

3.4.1 Hardware Requirements

Table 3.2 shows the recommended specifications of hardware for the proposed system.

Table 3.2 Hardware requirements

Hardware	Specifications
Computer	Processor: Intel Core i5 or AMD Ryzen 5 (quad-core or higher) Minimum clock speed: 2.5 GHz Storage: 256 GB SSD or higher Memory (RAM): 8 GB or higher Display: Minimum: 1024x768 resolution
Smartphone	Processor (CPU): Octa-core processor Internal storage: 32 GB or higher Memory (RAM): 4 GB or higher

3.4.2 Software Requirements

Table 3.3 shows the software requirements for the proposed system.

Table 3.3 Software requirements

Software	Requirements
Code editor	Visual Studio Code
Web hosting and domain	Hostinger
Programming languages	Hypertext Markup Language (HTML), Hypertext Preprocessor (PHP), Cascading Style Sheets (CSS), JavaScript
Backend framework	Laravel 11
Database	My Structured Query Language (MySQL)
Diagram design tool	draw.io
User interface design tool	Balsamiq Wireframes
Documentation tool	Microsoft Office 365, Portable Document Form (PDF)

3.5 System Functionalities

The aim of the interview is to gather insights and feedback from the Puff Lab staff to design a system that caters to their specific needs and requirements. Two tables contain the system features. Table 3.4 shows the system functionalities for the staff. Table 3.5 shows the system functionalities for the admin.

Table 3.4 System functionalities for staff

System functionalities	Description
Login to the Portal	Staff can securely access the system using their assigned username and password. This ensures only authorized personnel can access their personal and work-related data.
QR Code for attendance	Staff can use their smartphones or other devices to scan a QR code provided by the system. Scanning the code automatically records their clock-in or clock-out time for attendance purposes.
View attendance history	Staff can view a detailed log of their attendance records through the system. This log includes the exact dates and times they clocked in and out.
View schedules	Staff can access their assigned work schedules, including information about upcoming shifts, working hours, and any changes made by the admin.
View payroll history	Staff can view a detailed breakdown of their past payroll records, including salary amounts, payment dates, and any deductions or bonuses.

Table 3.5 System functionalities for admin

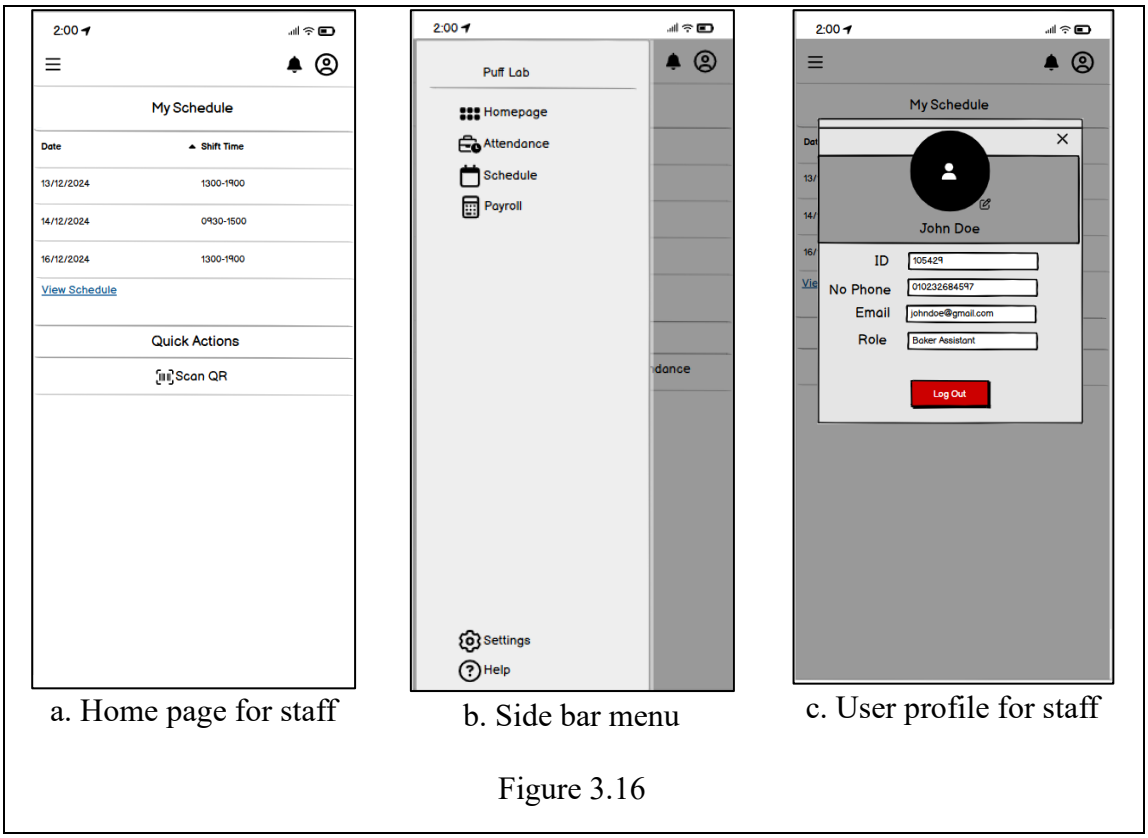
System functionalities	Description
Login to the Portal	Admins can securely access the system using their assigned username and password. This ensures only authorized personnel can access their personal and work-related data.
Manage Staff Profiles	Admins have full control over staff details. They can create new staff profiles, edit existing information, delete profiles of resigned employees, and view details such as roles, contact information, and employment status.
Display a QR code scanner	Admins can display a QR code scanner for attendance tracking.
Manual Attendance Entry	Admins can manually input or adjust attendance data if necessary. For example, this can be used to record attendance for staff who forgot to clock in or out, or to correct mistakes in the automated tracking system.
View Attendance List	Admins can view a detailed attendance list that includes all staff members' clock-in and clock-out times for specific dates.
Generate Attendance Reports	Admins can generate reports summarizing attendance data, such as total working hours, absences, late arrivals, and early departures. These reports can be exported in formats like PDF or Excel for further analysis.
Manage Shift Schedules	Admins can create, edit, or delete staff shift schedules. This includes defining working hours, assigning staff to specific shifts, and adjusting for holidays or overtime.
Manage Payroll	Admins can calculate staff salaries by integrating attendance data. The system can handle salary calculations, including deductions for absences, bonuses for overtime, and taxes.
View Payroll Records	Admins can access detailed payroll records for all staff members, including gross salary, deductions, net salary, and payment dates.
Generate Payroll Reports	Admin can create reports summarizing payroll for analysis or records.
View Analytics Dashboard	Admin can access a dashboard to view analytics on attendance, payroll, and shifts.

3.6 Interface Design

In this section, the designing of UI of the proposed system will be discussed. The interface section would be divided into two parts: one for mobile layout and the other one for web system interface design respectively.

3.6.1 Mobile Interface Layout

Figure 3.16a shows the mobile home page for staff of Puff Lab portal. The layout consists of a top navigation bar with icons for notifications and profile settings. On the left side of the page, a sidebar menu is displayed as shown in Figure 3.16b. Upon clicking the profile icon, the employee's profile and a logout button will be displayed as shown in Figure 3.16c. The content of home page is divided into two sections: "My Schedule" and "Quick Actions". "My Schedule" displays staff's upcoming schedule with dates and shift times. A "View Schedule" button allows viewing the entire schedule. The other section provides a quick action button to "Scan QR".



a. Home page for staff b. Side bar menu c. User profile for staff

Figure 3.16

Figure 3.17 shows the edit user page for staff. In this page, user can update their information and update password.

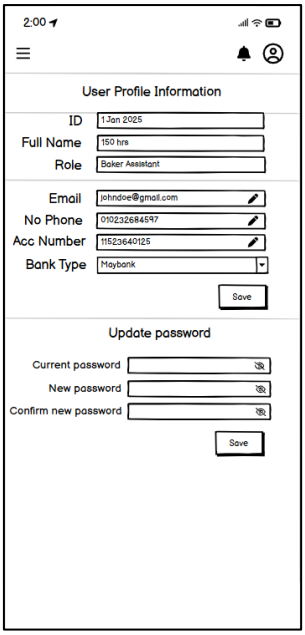


Figure 3.17 Edit user profile page

Figure 3.18 shows the detailed schedule page for staff. Staff can request for shift changes by clicking the "edit" button on their assigned shifts. If the staff cannot attend the shift, they can clik the “delete” button. Additionally, they can request available shifts by clicking the "request" button. The schedule page provides details of the date, shift time, and action options for each shift.

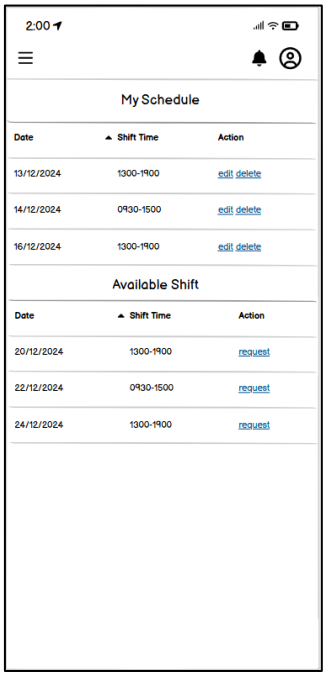
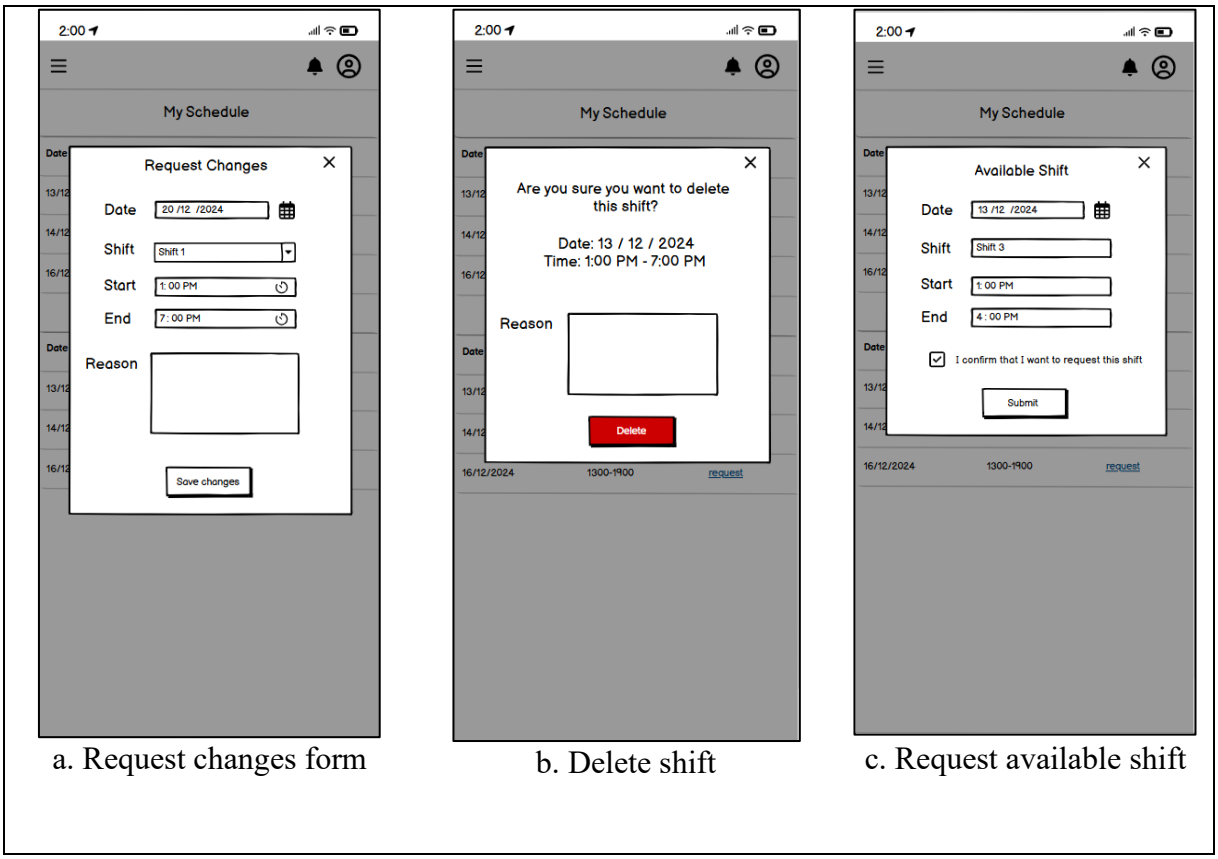


Figure 3.18 Schedule page

Figure 3.19a shows a form for requesting changes to a staff's schedule. This form allows staff to modify their schedule by entering the date, shift, start time, end time, and providing a reason for the change. Staff can then save changes to their schedule. Figure 3.19b shows a confirmation dialog for deleting a schedule entry. This dialog prompts user to confirm they want to delete the selected shift. User can see the date and time of the shift they are about to delete. They are also given an area to enter the reason for the deletion. Figure 3.19c shows a form for requesting a new available shift. This form allows user to choose a date, shift, start time, and end time for the new shift. The form also includes a checkbox for confirmation that user want to request this shift. Staff can then submit their request for the new shift.



a. Request changes form b. Delete shift c. Request available shift

Figure 3.19

Figure 3.20 depicts the Puff Lab Portal interface for viewing attendance history. The screen displays a list of attendance records, including the date, clock-in time, and clock-out time. This feature allows staff to track their attendance records easily.

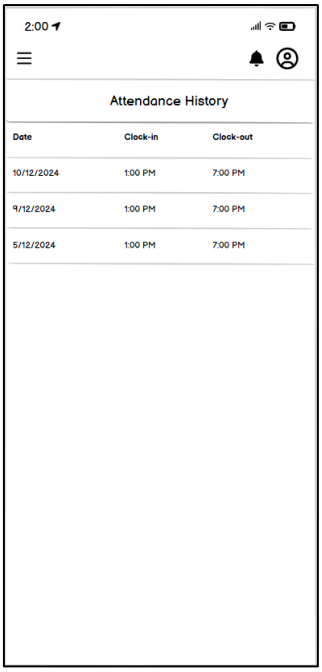


Figure 3.20 View attendance history

Figure 3.21 showcases the interface for QR codes. This feature allows users to scan QR codes for clock in and clock out.

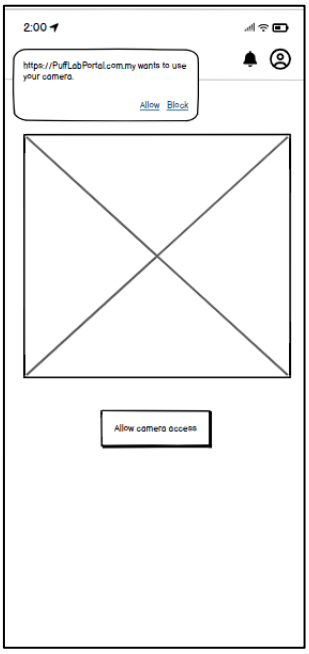


Figure 3.21 Scan QR code

Figure 3.22 shows a successful message after a staff has clocked in. This message is displayed an information about the successful clock-in time and date.

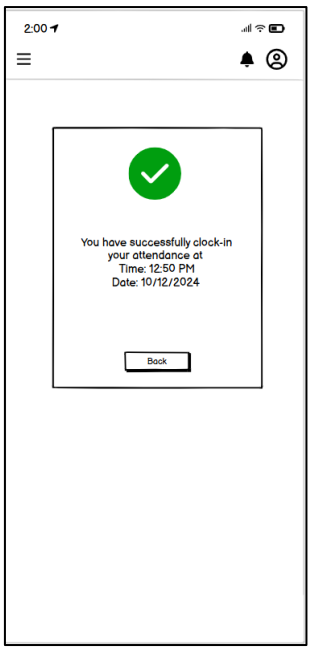


Figure 3.22 Successful message

Figure 3.23 displays the payroll information page for staff. The page provides details about the pay period, total hours worked, gross pay, deductions, net pay, payment method, and bank details. It also includes a history of payroll records for the previous dates, displaying the gross pay, deductions, and net pay for each date. A "Download Payroll" button allows staff to download their payroll information.

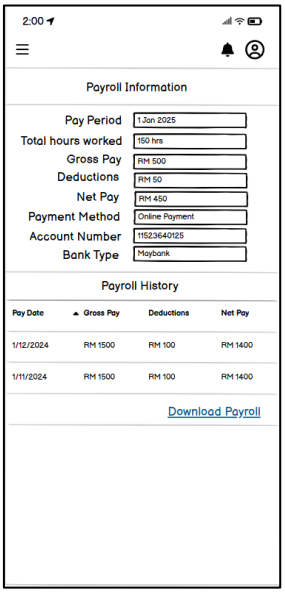


Figure 3.23 Payroll information page for staff

3.6.2 Web-Based System Interface Layout

Figure 3.24 shows the login page of the Puff Lab Portal for admin and staff. The login page has an input field for the user's ID, password, a checkbox for "Remember Me", a "Login" button and a "Forget password?" link. The user needs to input their ID and password and click the "Login" button to access the portal.

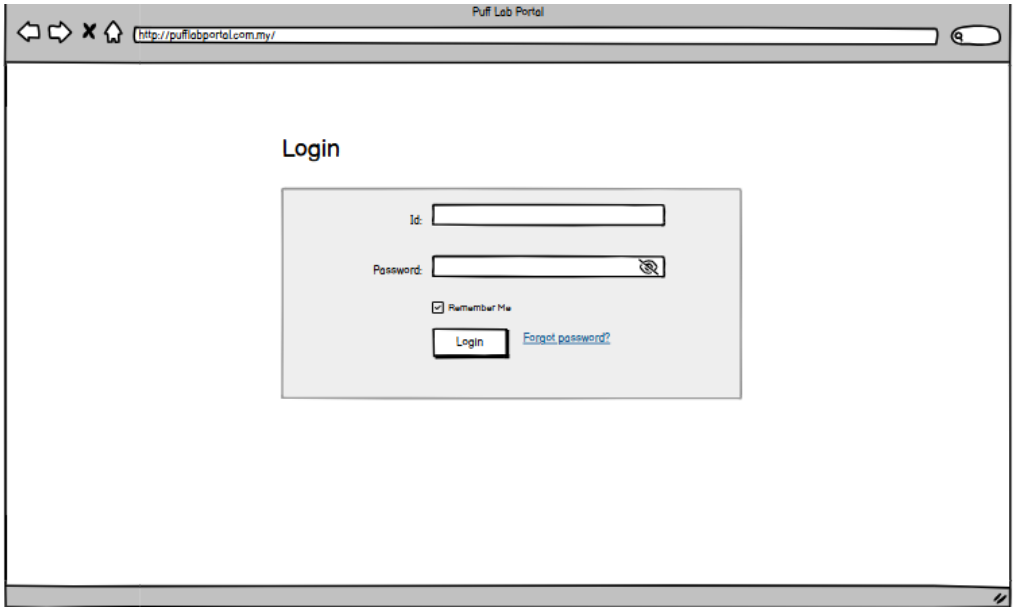


Figure 3.24 Login page for user

Admin can access the dashboard after logging in to the system. Figure 3.25 showcases the admin dashboard of the Puff Lab portal. The dashboard provides a centralized overview of key metrics and functionalities for managing employees and payroll. The left panel presents the navigation menu, which includes Dashboard, Attendance, Schedule, Payroll, and Employees, allowing admin to access different sections. On the dashboard page, the admin can view the total number of employees, total presents and total absents to work. The pending request section shows the list of employees seeking shift change requests, along with their employee ID, name, and requested shift details. Admin can view details of a request by clicking "View detail". The "Payroll Summary" section at the top right corner provides information about the current payroll period, total payroll cost, and the total number of employees for the period. Admin can access detailed information about the payroll by clicking "View detail". The dashboard also displays the employee list which includes the employee ID, name, phone number, email address, role, and status. This list provides a comprehensive overview of all employees and their details.

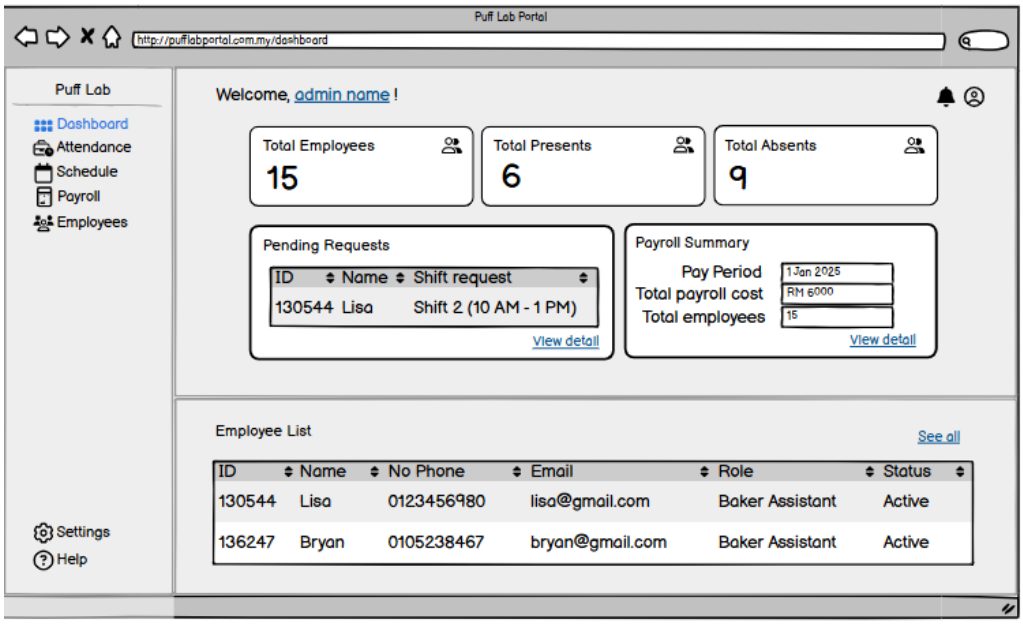


Figure 3.25 Admin dashboard

Figure 3.26 shows a user profile for an admin, who can access their personal information and log out of the system. The profile includes the admin's name, ID, phone number, email address, and role.

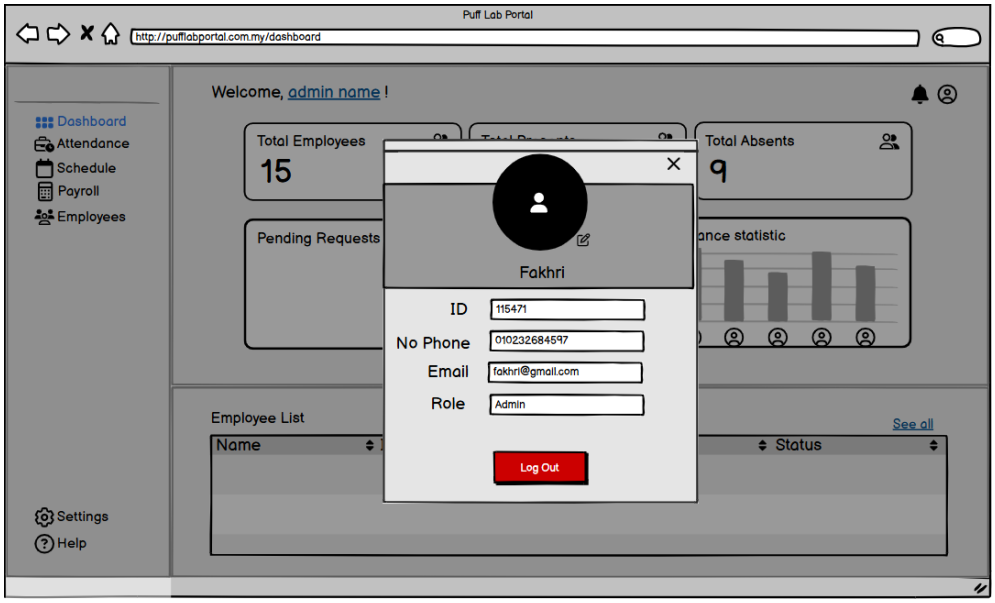


Figure 3.26 User profile for admin

Figure 3.27 shows the attendance records page of the Puff Lab Portal. The page displays the attendance records for the selected date. In this page, admin can add new attendance record for each attendance. Upon adding a new record, admin can open the QR code scanner by clicking the QR under the action column. Admin can view the attendance list and delete the attendance record.

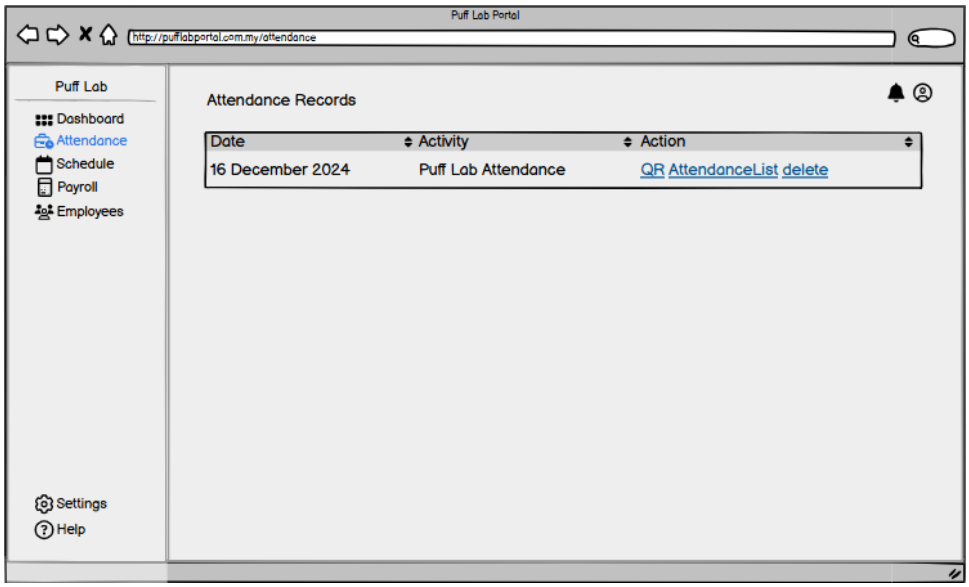


Figure 3.27 Attendance records page

Figure 3.28 shows the QR code scanner page for staff to scan as their attendance.

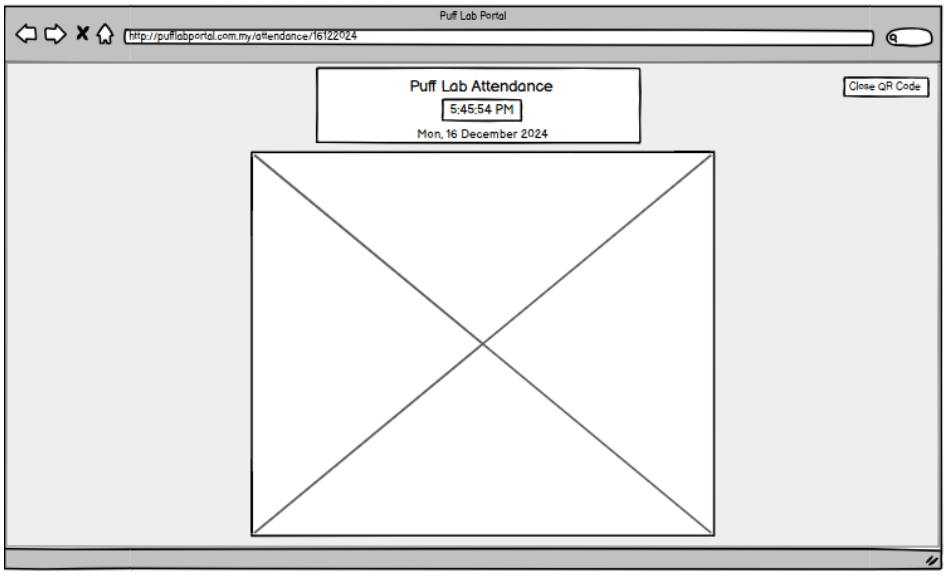


Figure 3.28 QR Scanner

Figure 3.29 displays the attendance list page for a Puff Lab Portal. The page displays a list of employees who already successfully scanned the QR Code.

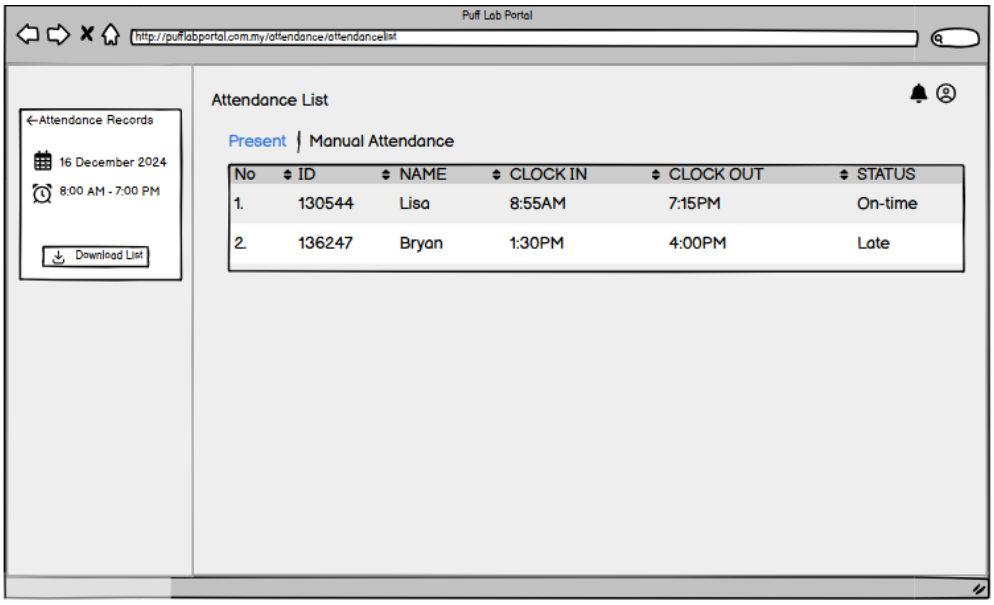


Figure 3.29 Attendance list page

Figure 3.30 shows the manual entry page for Puff Lab Portal. Staff can manually add entries into the attendance list by providing the employee's ID and the clock-in time.

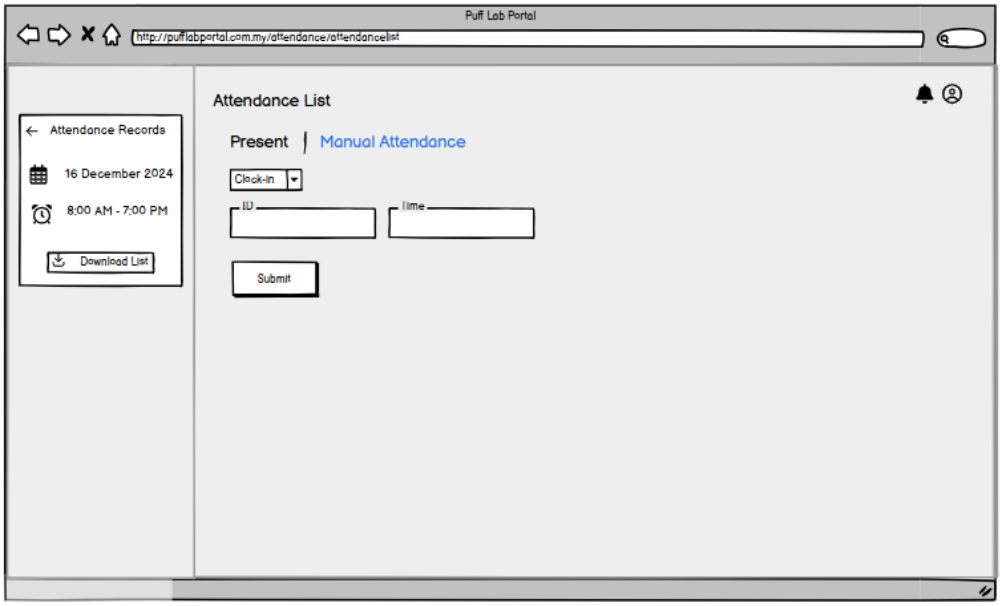


Figure 3.30 Manual entry page

Figure 3.31 shows the schedule page of Puff Lab Portal. The page displays a table with the schedule for the week. Admin can add new shift and edit the shift schedule.

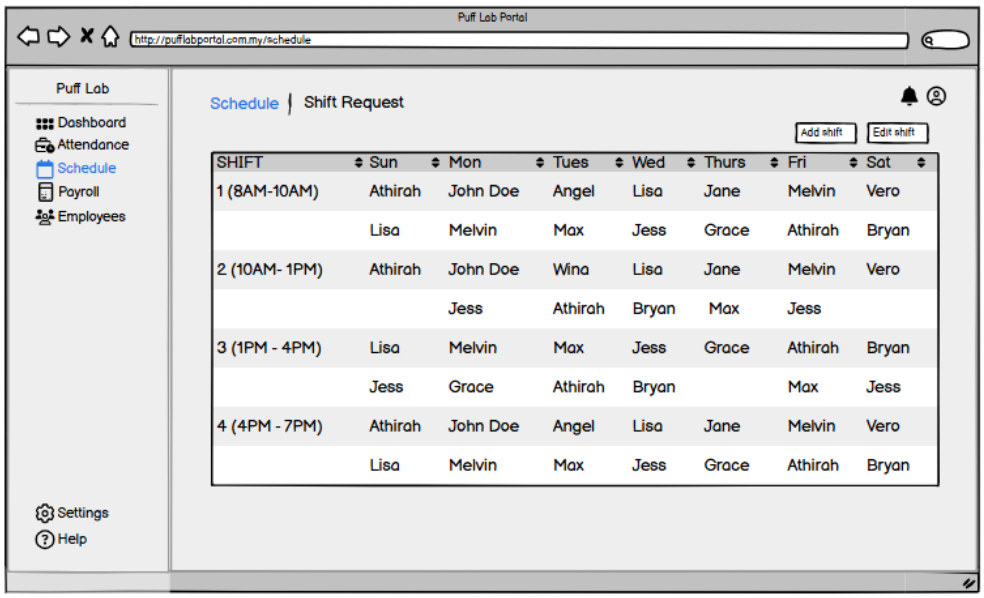


Figure 3.31 Schedule page

Figure 3.32 shows the "Add New Shift Form" that pops up when the "Add Shift" button is clicked in Figure 3.31. This form allows admin to create a new shift by entering the shift name, start time, and end time. Once the information is entered, the admin can submit the form to create the new shift.

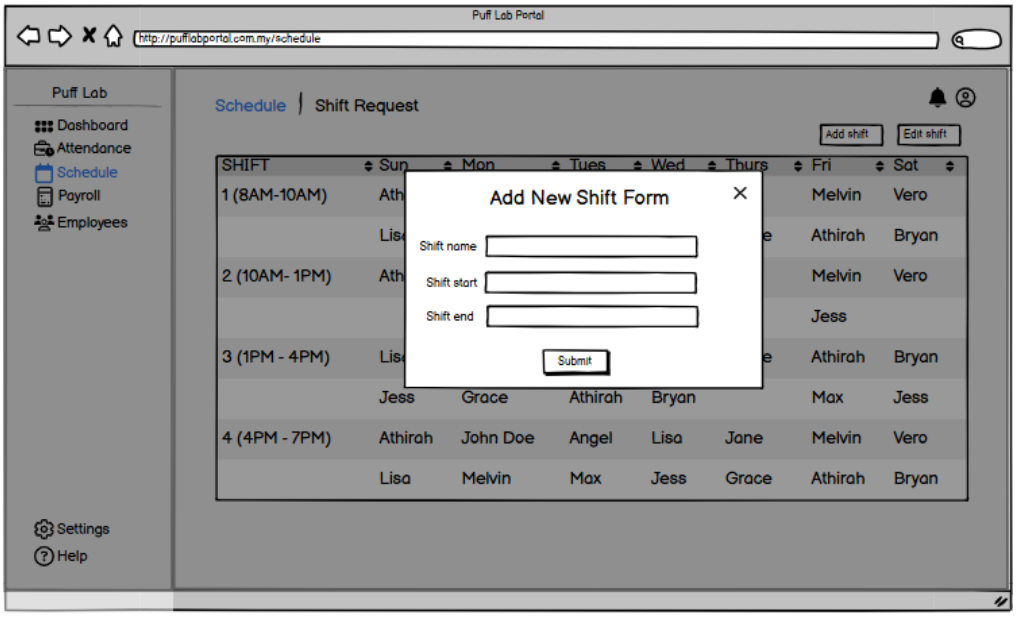


Figure 3.32 add new shift form

Figure 3.33 shows the pending shift request page of the Puff Lab Portal. It displays a list of pending shift requests, including the employee's name, shift requested, date submitted, and action buttons. This page allows admin to review and approve or decline the shift requests.

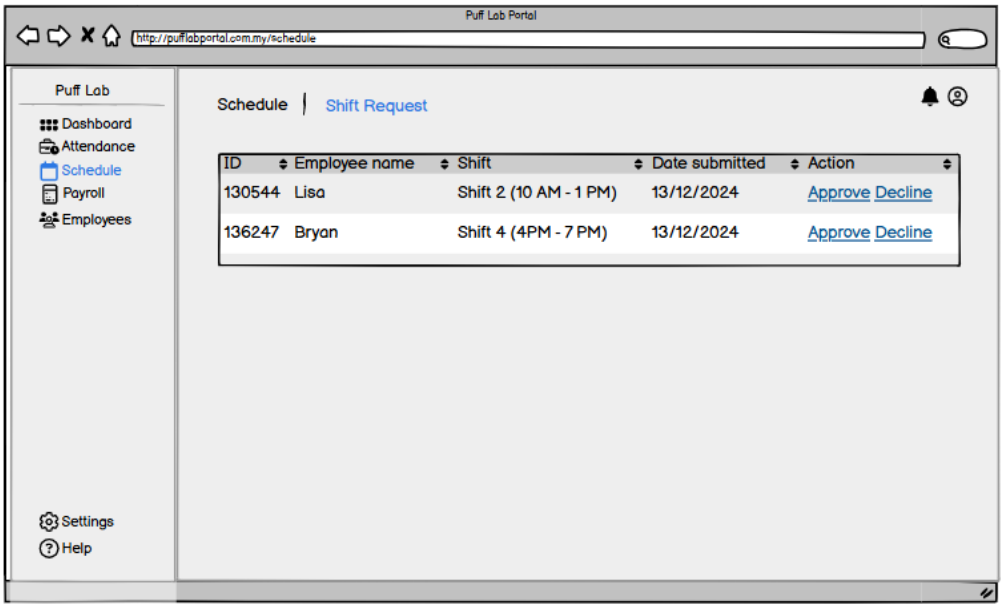


Figure 3.33 Pending shift request page

Figure 3.34 depicts the employee list page of the Puff Lab Portal. It presents a list of employees, showcasing their ID, name, contact number, email address, role, status, and actions that can be performed. The actions available include editing employee details and deleting employee records. This page enables efficient management and access to employee information within the portal.

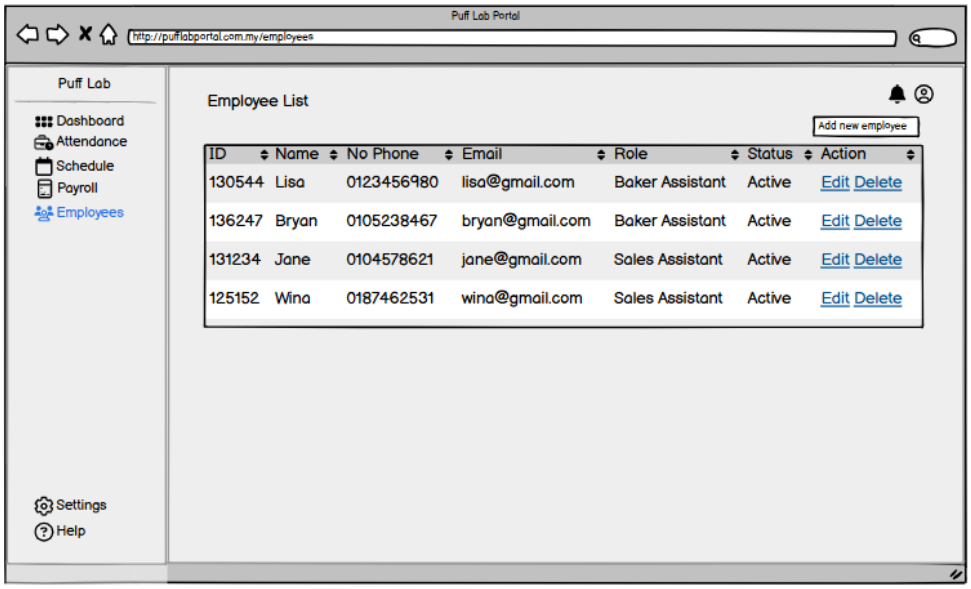


Figure 3.34 Employee list page

Figure 3.35 depicts the "Add New Employee" form, which allows admin to input new employee information. The form includes fields for ID, Name, No Phone, email, Role and bank details.

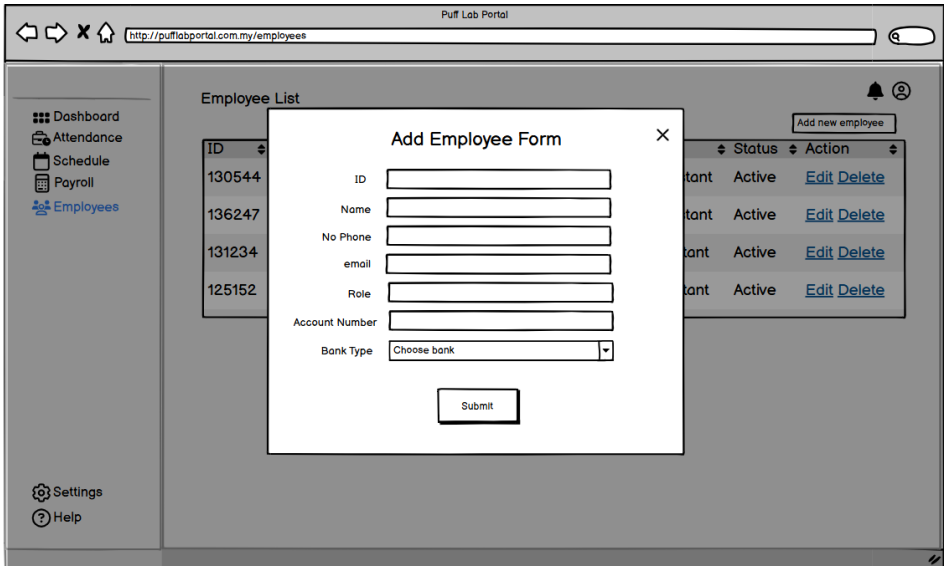


Figure 3.35 Add new employee form

Figure 3.36 shows the "Edit Employee" form, which enables admin to modify existing employee information. The form includes pre-filled fields for ID, Name, No Phone, email, Role, and bank details. Users can update these fields and save the changes.

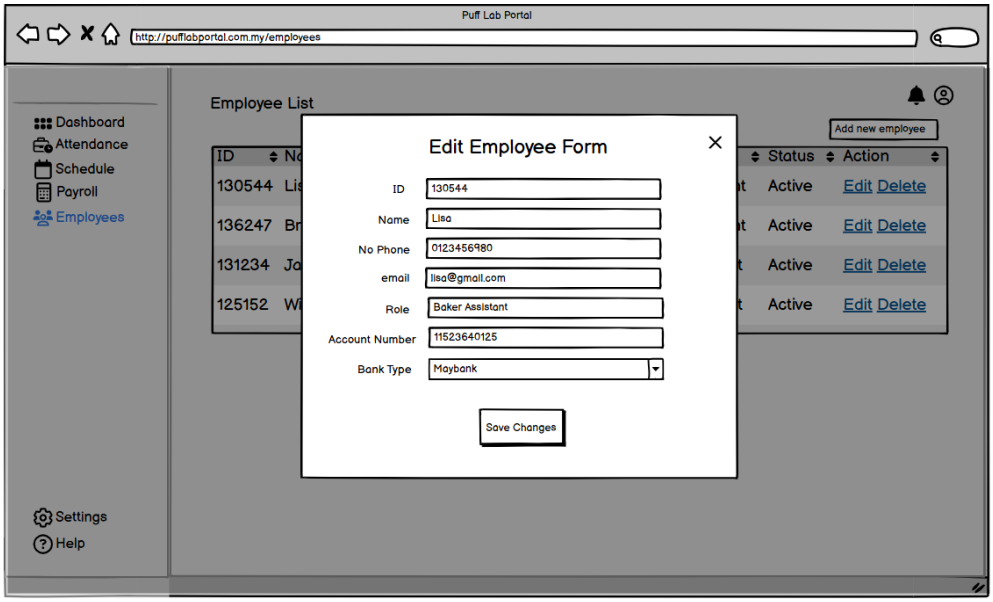


Figure 3.36 Edit employee form

Figure 3.37 depicts the process of deleting an employee from the system. Admin can view and edit the employee's information, including name, phone number, email, and role, before proceeding with the deletion. Clicking on the "Delete" button will remove the employee from the system

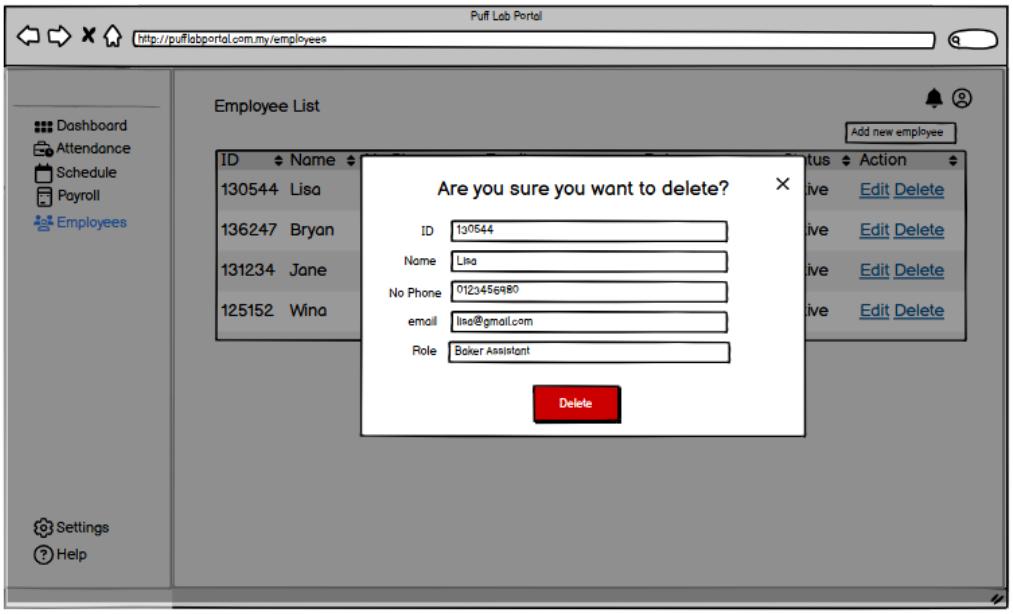


Figure 3.37 Delete employee

Figure 3.38 shows the payroll management section of the system. This page allows admin to view and manage employee payroll data, including their ID, name, role, total hours worked, pay rate, status, and action. Admin can filter payroll data by month and year.

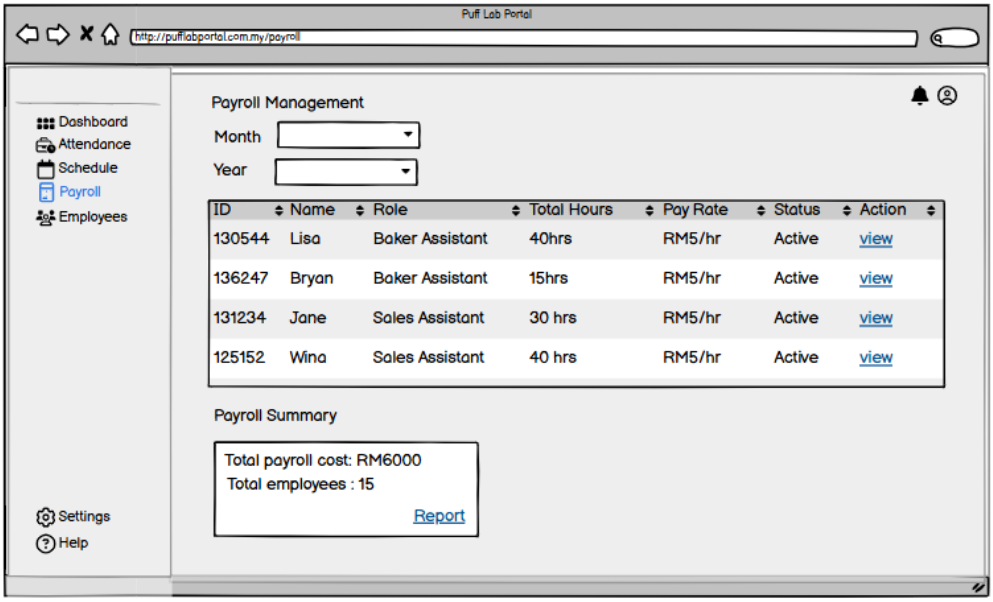


Figure 3.38 Payroll management

Figure 3.39 displays a payroll detail for a specific staff. This detail shows how the calculation of the payroll is made.

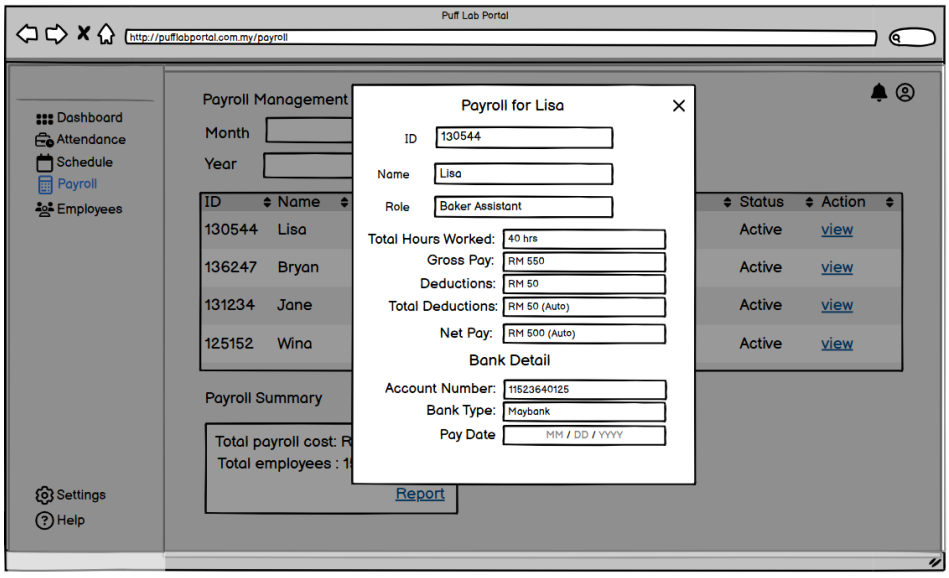


Figure 3.39 View payroll detail for specific staff

3.7 Summary

Chapter 3 provides a detailed introduction to the Rapid Application Development (RAD) methodology, which comprises four phases: requirements planning, user design, construction, and cutover. However, this chapter focuses primarily on the first two phases. Four participants from Puff Lab staff shared their opinions and insights in an interview. Gathering user requirements is essential to design the proposed system that fulfils user expectations.

Designing the proposed system architecture involves creating important diagrams such as use case, activity, class, and system sequence diagrams. The user requirements from the interview session determine the system's functionalities or features. Lastly, the user interface or mock-up design aims to illustrate the proposed system's flow.

CHAPTER 4: IMPLEMENTATION

4.1 Introduction

Chapter 4 focuses on discussing the system's development process and implementation phase. This chapter will show screenshots of the system's interface design, implementing the designs and features from the previous requirements and analysis. The configurations and installations required for the system's development are also discussed.

4.2 Installation and Configurations of Laravel 11

Laravel is a modern PHP web application framework widely used for building secure, scalable, and maintainable systems. For this project, Laravel 11 was selected due to its elegant syntax, robust built-in features, and active community support. The installation and configuration process were carried out systematically to set up the development environment for the Puff Lab Portal.

Before starting the development of the proposed system, it was necessary to download and install essential tools. One such tool is XAMPP as shown in Figure 4.1, which stands for cross-platform, Apache, MySQL, PHP, and Perl. XAMPP is a vital software package that supports server-side scripting with PHP and Perl, integrates a MySQL database server, and runs the Apache web server. This application allows developers to test their websites or web applications locally before deploying them to a live environment. Installing and configuring XAMPP ensures a stable local development environment, which is critical for running and testing PHP code efficiently throughout the development process.

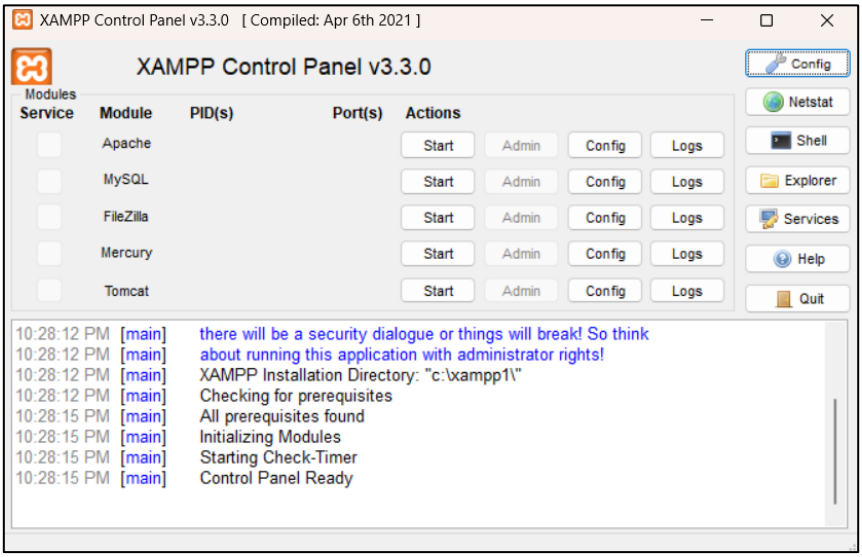


Figure 4.1 XAMPP Control Panel

Once XAMPP was installed and the Apache and MySQL services were running, Laravel was installed using Composer, the PHP dependency manager. Laravel 11 requires PHP version 8.2 or higher, along with Composer, Node.js, and NPM for managing frontend assets. The Laravel installer was installed globally via the command composer global require laravel/installer, and a new Laravel project was created using “laravel new puff-lab-portal”. After installation, the built-in Laravel development server was launched using “php artisan serve” as shown in Figure 4.2, allowing the application to be accessed locally at http://localhost:8000.

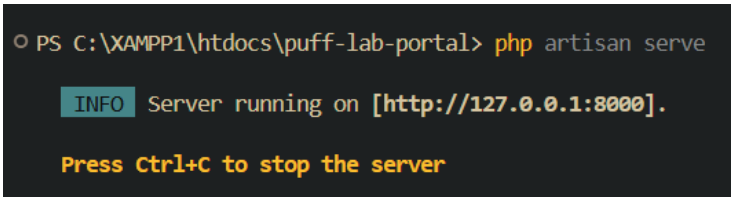


Figure 4.2 Laravel development server

As shown in Figure 4.3, the environment configuration was then carried out by editing the .env file. Key values such as APP_NAME, APP_URL, and database credentials were set, and the database connection was configured to match the MySQL setup provided by XAMPP. A new database named db_pufflab_portal was created through phpMyAdmin, and Laravel's migration command php artisan migrate was run to initialize the necessary tables.

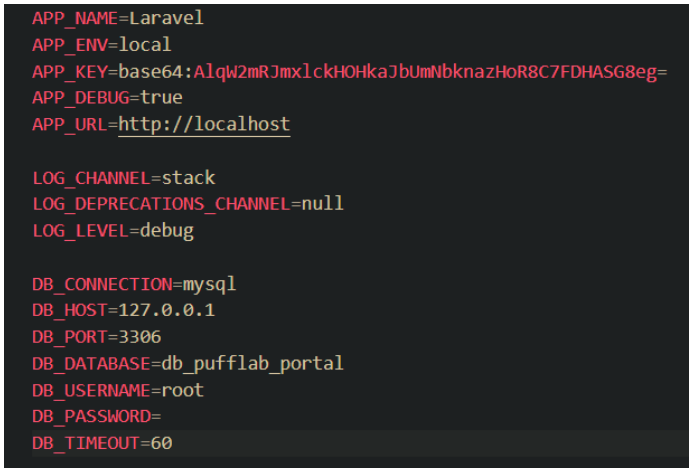


Figure 4.3 Environment configuration

4.3 Implementation of the Proposed System

There are two users for Puff Lab Portal, which are staff and administrator. The admin can view the dashboard, manage schedules, manage employee list, attendance records, and

payroll calculation. The employees can view their profiles, scan attendance, and view schedules, and payroll history via the system.

4.3.1 Login Page

The proposed system can be accessed at https://pufflabportal.space/. Figure 4.4 shows the login page for the admin and the employees. They are required to input their email and password. If the email and password entered are invalid, an error message will be displayed. After login, they will be redirected to the page based on their role. Figure 4.5 shows the snippet code to handle the redirect page.

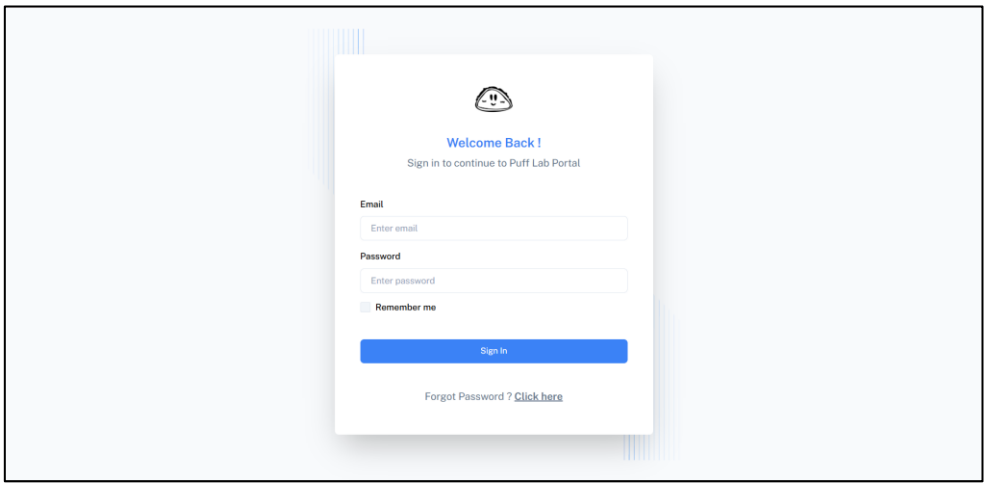


Figure 4.4 Login page

```
public function handle(Request $request, Closure $next):
Response
{
    Log::info('Admin middleware - Request path: ' . $request->path());
    Log::info('Admin middleware - User authenticated: ' . (Auth::check() ? 'Yes' : 'No'));

    if (!Auth::check()) {
        Log::info('Admin middleware - No authenticated user');
        return redirect('/login');
    }

    $user = Auth::user();
    Log::info('Admin middleware - User details:', [
        'id' => $user->id,
        'name' => $user->name,
        'role_name' => $user->role_name,
        'email' => $user->email
    ]);

    if($user->role_name != 'Admin')
    {
        Log::info('Admin middleware - Access denied, redirecting to employee dashboard');
        return redirect('/employee/dashboard');
    }

    Log::info('Admin middleware - Access granted');
    return $next($request);
}
```

Figure 4.5 A code snippet to handle the redirect page

4.3.2 Administrator

A. Dashboard for Administrator

Figure 4.6 shows the admin dashboard page of the Puff Lab Portal system. This page allows the admin to quickly view the total number of employees, the current attendance status (present or absent), and the corresponding attendance rate. The Weekly Attendance section highlights the attendance for each day of the week, with a color-coded system indicating the presence or absence of employees. On the right, the Payroll Summary provides an overview of the payroll for both the current and previous months, along with the total payroll amount and the number of employees has been paid. In addition, the dashboard includes an employee list that gives a quick view of all registered staff.

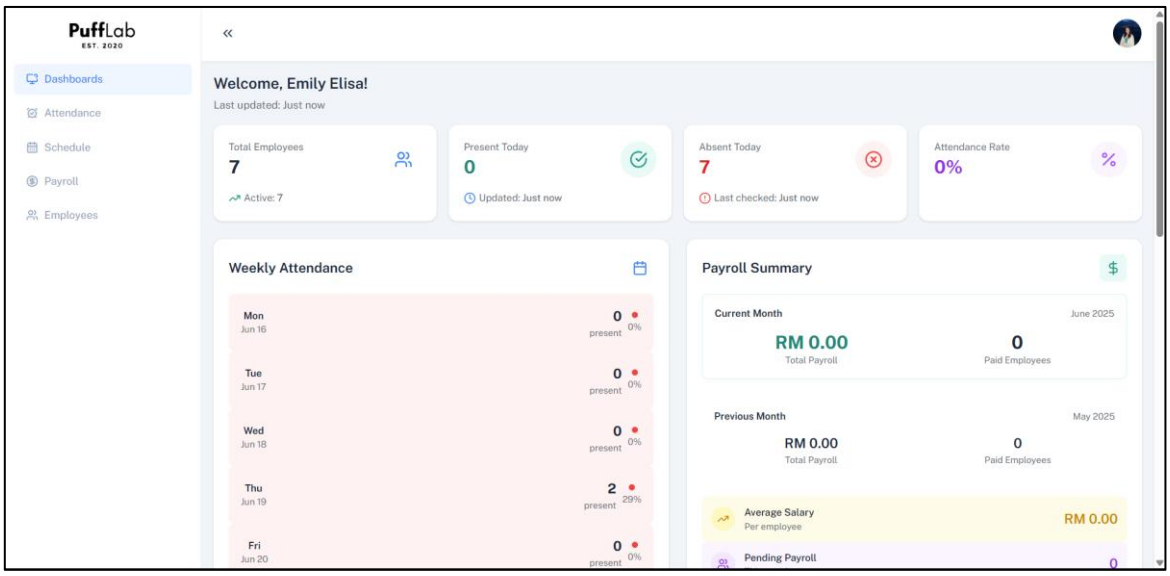


Figure 4.6 Dashboard for admin

B. Attendance Management

The attendance management page serves as the main page for managing employee attendance at Puff Lab as shown in Figure 4.7. On this page, the admin can access the attendance list grouped by date. Each entry displays essential information such as the date of the shift. At this point, the admin is able to take further actions such as open the scanner for attendance tracking, checking the attendance list, or deleting the attendance record. This page acts as a quick overview for admins to track daily attendance activities and navigate into specific sessions for further details. Figure 4.8 shows the Add Attendance modal. Admin can daily add new attendance details everyday by filling in the date, activity name and can mark whether the date is holiday or not.

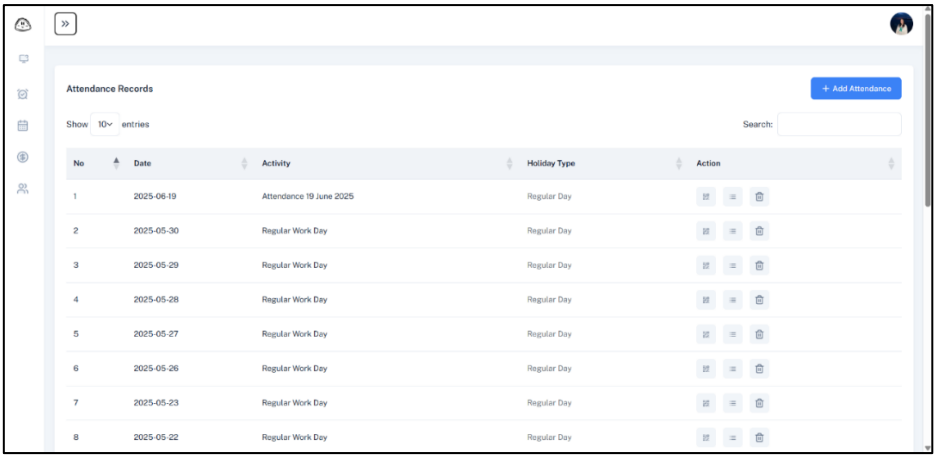


Figure 4.7 Attendance Management page

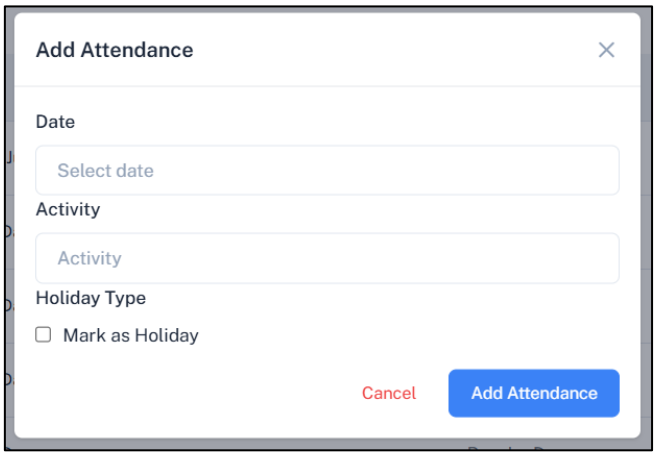


Figure 4.8 Add attendance modal

Figure 4.9 shows the QR Scanner for the employees to scan their QR code. This page utilizes a camera to scan and detect QR codes for attendance verification. The scanner is set up using the HTML5 QR code library, which allows admin to access the camera device and scan QR codes in real time. Figure 4.10 shows the snippet code of how the scanner is being set up. The JavaScript code begins by identifying the available camera devices using the Html5QrCode.getCameras() method. If a camera is found, it then initiates the camera feed with specific settings. The qrbox property defines the dimensions of the QR code scanning area (300x300 pixels), while the frames per second setting controls the scan speed to ensure accurate detection. The aspect ratio is set to 1.0 to maintain the square shape of the scanning area.

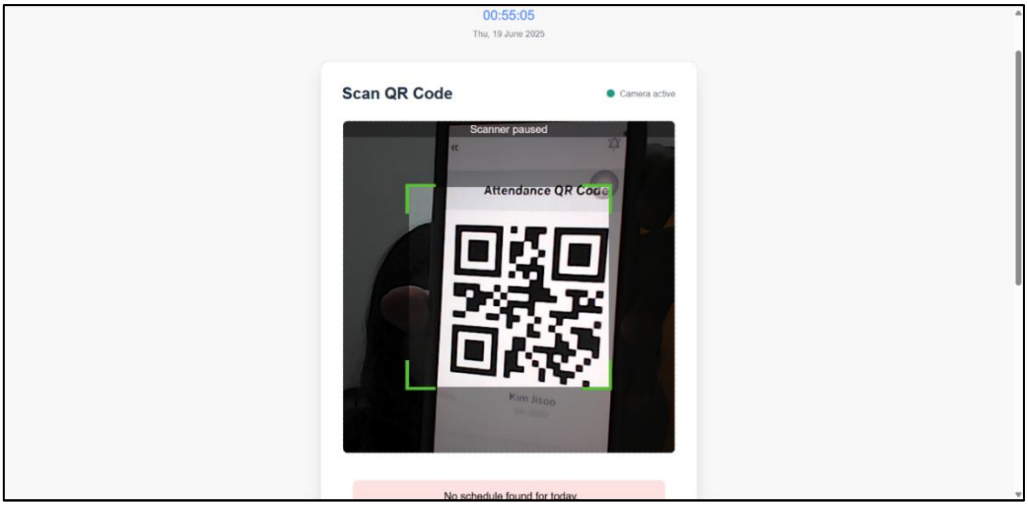


Figure 4.9 QR Code scanner

```
// Start the QR code scanner
Html5Qrcode.getCameras().then(function(devices) {
    if (devices && devices.length) {
        const cameraId = devices[0].id;
        html5QrCode.start(
            cameraId,
            {
                fps: 10,
                qrbox: { width: 300, height: 300 },
                aspectRatio: 1.0
            },
            handleScanSuccess
        ).then(() => {
            updateScannerStatus(true);
        }).catch(err => {
            console.error("Failed to start camera:", err);
            updateScannerStatus(false);
        });
    } else {
        console.error("No cameras found.");
        updateScannerStatus(false);
    }
}).catch(err => {
    console.error("Error getting cameras: ", err);
    updateScannerStatus(false);
});
```

Figure 4.10 A code snippet to start the QR code scanner

As soon as the camera begins, the handleScanSuccess function is triggered as shown in the Figure 4.11, which processes the QR code data when a successful scan occurs. If no camera is found or if an error occurs while accessing the camera, an error message is logged, and the scanner status is updated accordingly. The scanner is paused when no QR code is in the frame, which prevents false detections. If a QR code is detected, the scanner resumes automatically to process the data. This method ensures that the QR code scanning process is both efficient and user-friendly, making it an essential feature for real-time attendance tracking.

```
// Handle successful scan
function handleScanSuccess(decodedText, decodedResult) {

    html5QrCode.pause();

    // Show scanning animation
    const scanMessage = document.getElementById("scan-message");
    scanMessage.innerHTML = `
        <div class="animate-pulse flex items-center justify-center text-custom-500">
            <i class="fas fa-spinner fa-spin mr-2"></i>
            Scanning...
        </div>
    `;

    // Process the scanned data
    fetch("{{ route('employee.scan.process') }}", {
        method: "POST",
        headers: {
            "Content-Type": "application/json",
            "X-CSRF-TOKEN": "{{ csrf_token() }}"
        },
        body: JSON.stringify({ qr_data: decodedText.trim() })
    })
```

Figure 4.11 A code snippet to handle successful scan

The Attendance List page shows the daily attendance records for each employee. Based on Figure 4.12, it displays the list for 19 June 2025. Each row includes the employee's ID, name, clock in and clock out time, and status. The status displays the employee's punctuality (on time or late). At the top right, there is a button to download the attendance list as a report in PDF format. The Figure 4.13 shown is the attendance report. It is automatically generated from the Attendance List page. It shows the same data in a simple table format, which includes name, clock in, clock out, and status. Below the table, a summary section gives a quick overview such as how many employees were present, how many were on time, and how many were late.

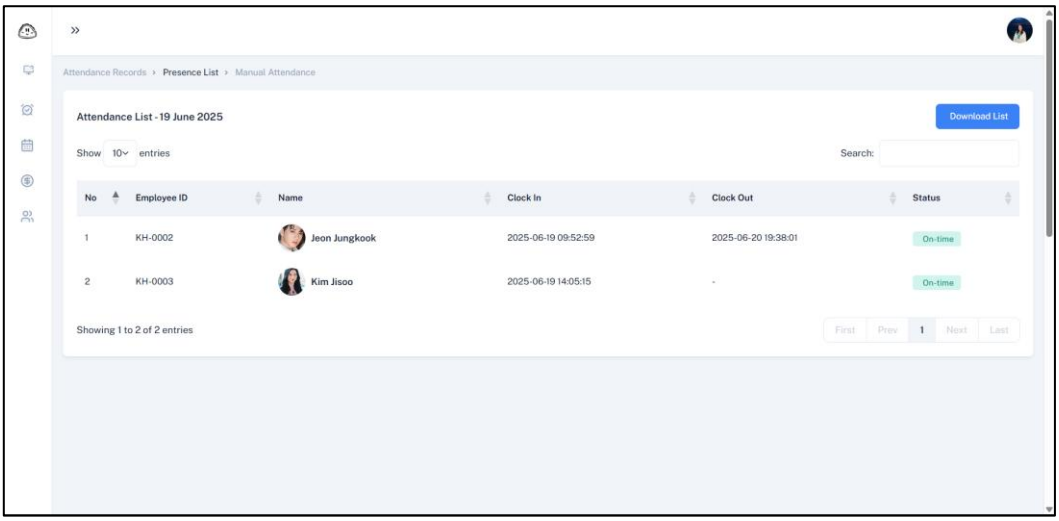


Figure 4.12 Attendance list page

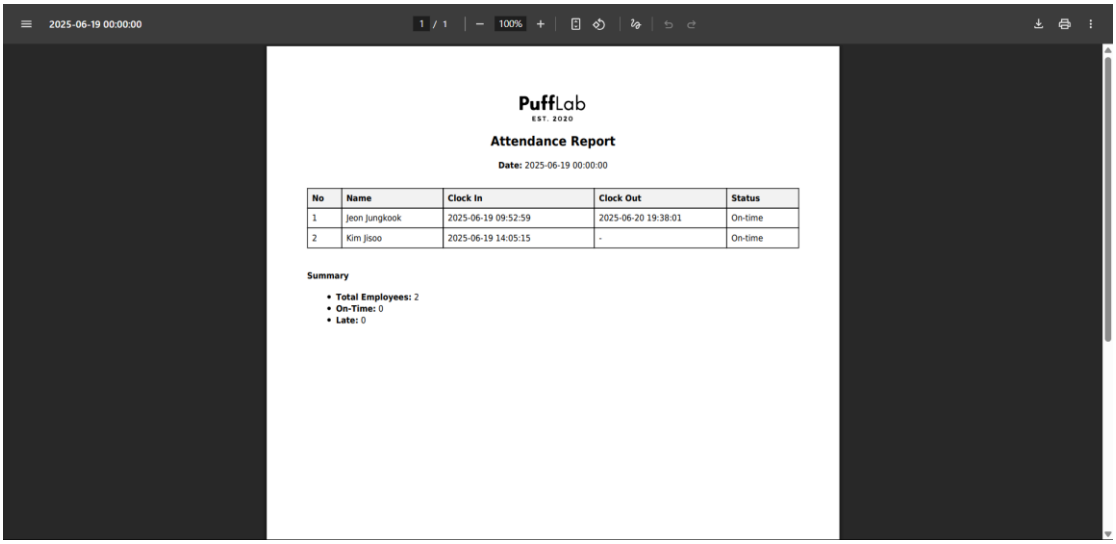


Figure 4.13 Attendance report

The Manual Attendance page as shown in Figure 4.14 is where admin can manually manage attendance records. It shows each employee's clock in and clock out time for a specific date. If the employee has completed their attendance (both clock in and clock out), it shows a green label saying, "Attendance Completed". If only clock in is recorded, it shows a pending status and a red button to allow the admin to manually clock the employee out. This page helps fix or complete attendance records easily when the employee's QR code has issue or when other issues occurred.

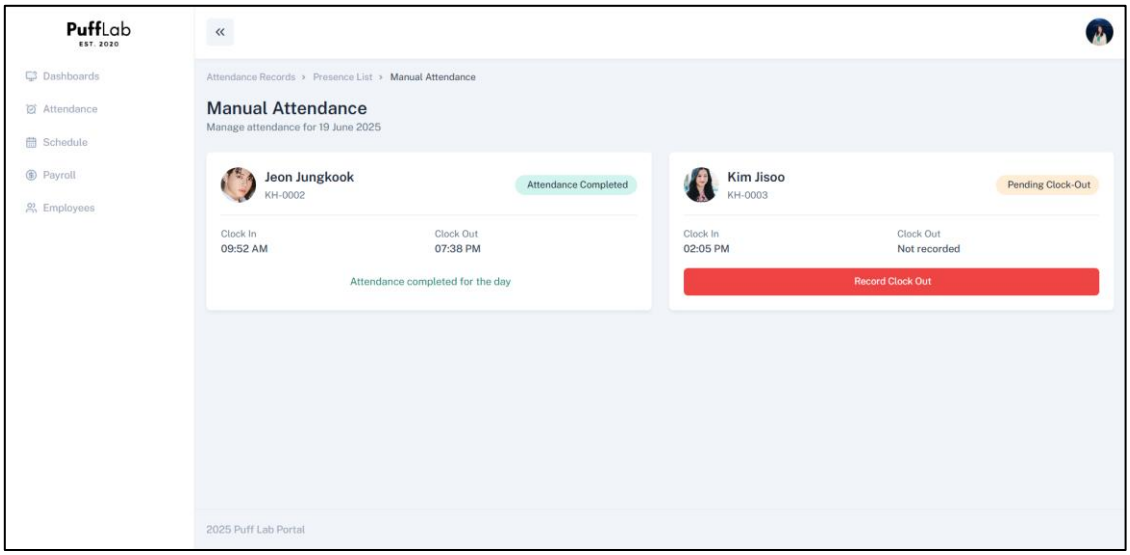


Figure 4.14 Manual attendance page

C. Employee List page

Figure 4.15 shows the Employee List page in the Puff Lab Portal where admin can see and manage all the employee information. It displays key details such as Employee ID, Name, Email, Phone Number, Experience, Join Date, Role, Employment Type, Bank Name, Account Number, and Status in a neat table. The table lets users search, sort, and navigate through pages easily, this is especially useful with a large number of employees.

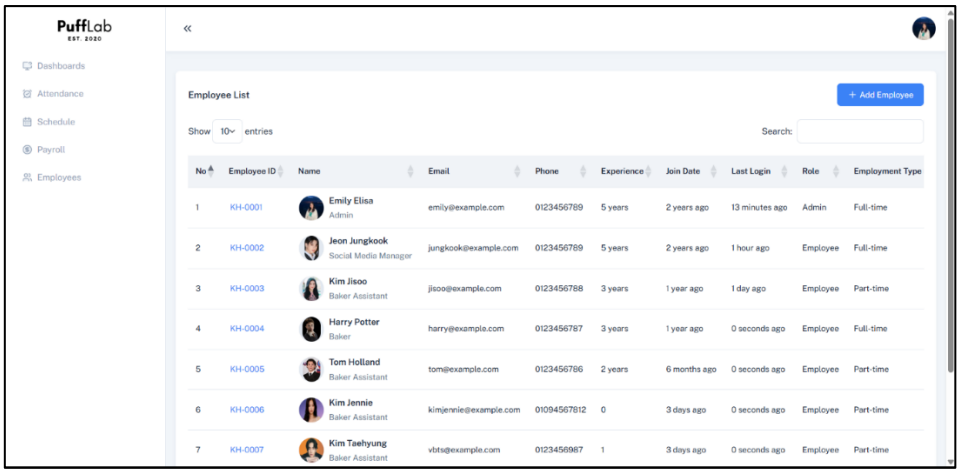


Figure 4.15 Employee List Page

There is also an “Add Employee” button that allows admin to add new staff quickly as shown in Figure 4.16. The table supports horizontal scrolling, making all columns viewable without issue. This page helps keep employee records organized and makes managing payroll and monitoring login activity easier for admins. Once the admin clicked the save button, new employees will receive a welcome email with their password for their initial login as shown in Figure 4.17. Admin can edit the existing employee information as shown in Figure 4.18.

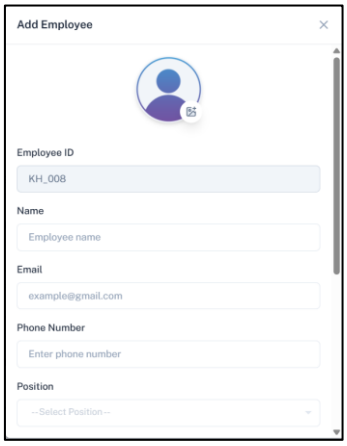


Figure 4.16 Add employee

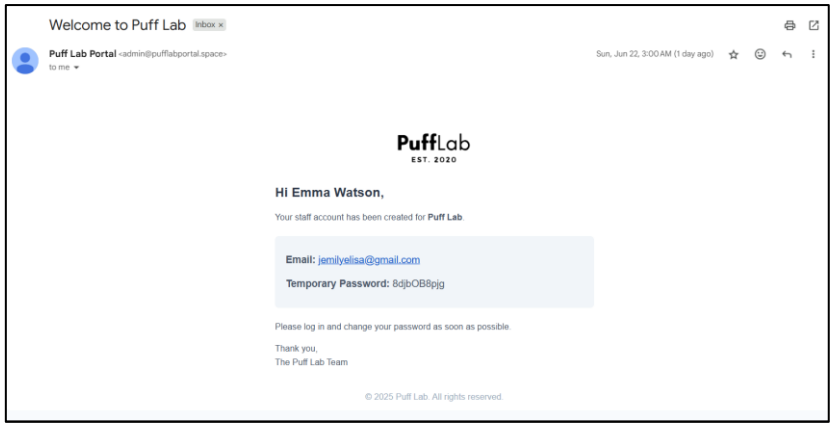


Figure 4.17 Employee welcome mail

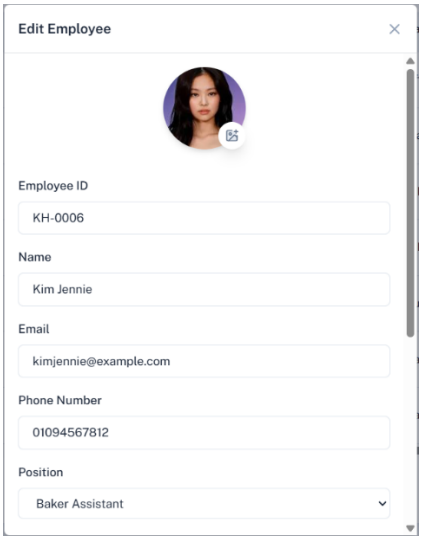


Figure 4.18 Edit employee details

D. Schedule Page

The calendar view in the Figure 4.19 shows a month grid with employee names assigned to shifts. The shift timeline, as shown in Figure 4.20, allows for detailed shift management. On this page, the admin can add and edit shifts.

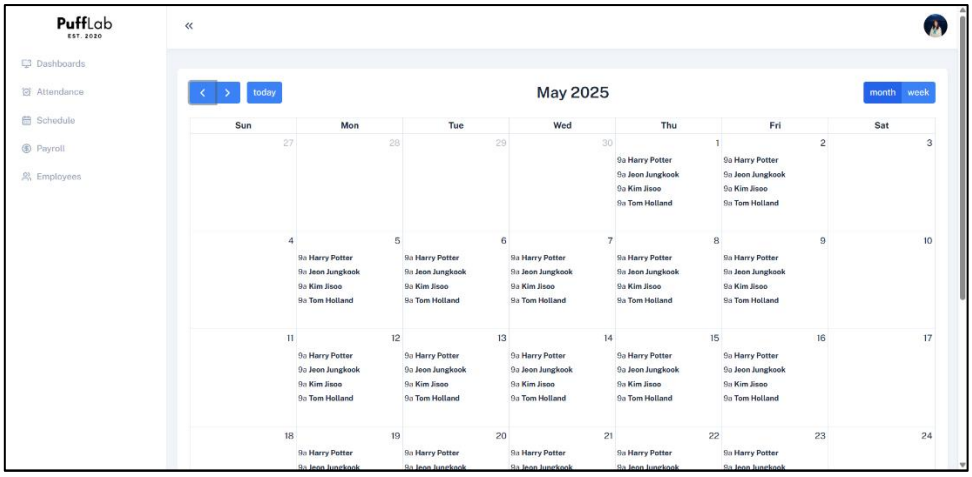


Figure 4.19 Main schedule page

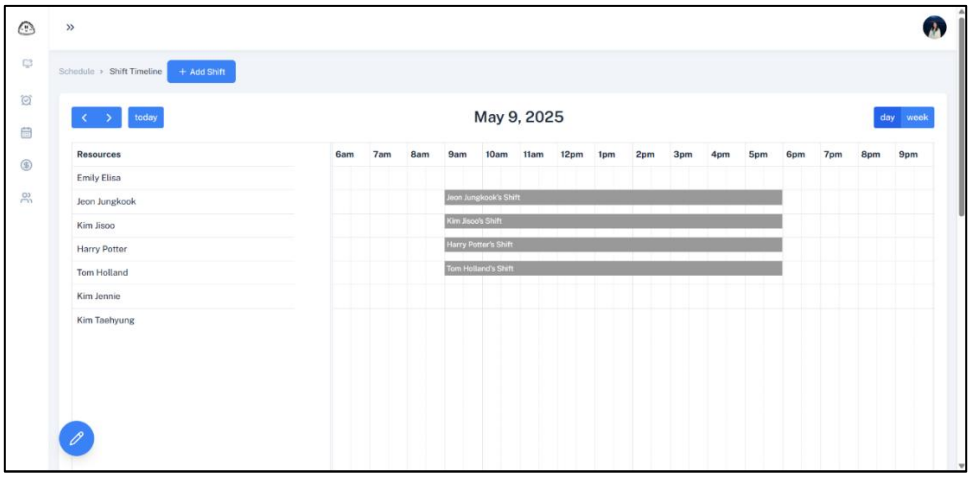


Figure 4.20 Shift timeline

In the ‘Add Shift’ modal, the admin can assign employees and set start and end times as shown in Figure 4.21. Validation is applied based on employment type: full-time staff must work for 9 hours per day, and cannot be assigned fewer than 9 hours, while part-time staff must work a minimum of 3 hours per day. In the 'Edit Shift' modal, the admin can select the assigned employee and choose the shift to edit for that day as shown in Figure 4.22. The admin also has the option to delete the selected shift.

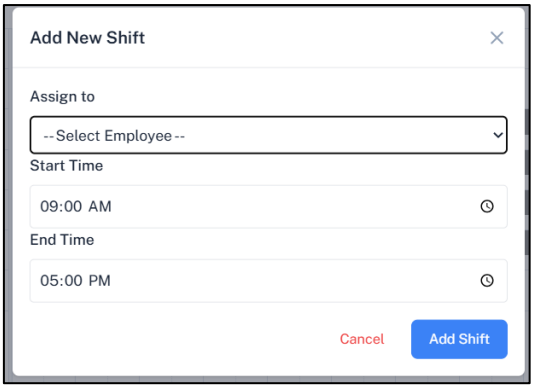


Figure 4.21 Add new shift

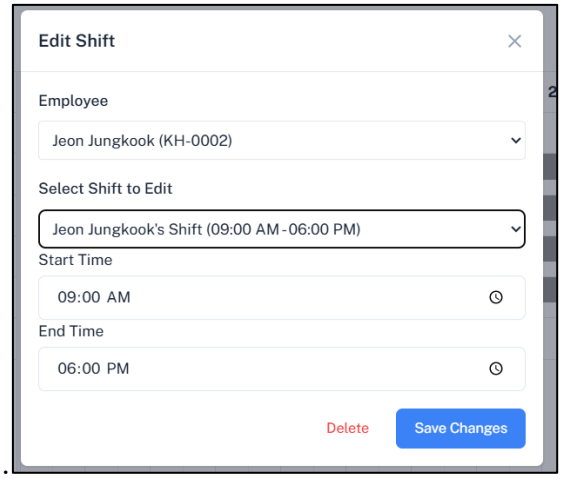


Figure 4.22 Edit shift

Figure 4.23 shows how this system integrates the FullCalendar and Tippy.js plugins to manage and display employee shifts effectively. FullCalendar is used to render an interactive calendar and allow users to view employee schedules in a month or week format. Tippy.js, on the other hand, is used to provide helpful tooltips when hovering over specific elements within the calendar or shift interface. This enhances the user experience by offering additional context without cluttering the interface.

```
@section('script')
<!-- FullCalendar CSS and JS -->
<link href="https://cdn.jsdelivr.net/npm/fullcalendar@6.1.17/index.global.min.css" rel="stylesheet" />
<script src="https://cdn.jsdelivr.net/npm/fullcalendar@6.1.17/index.global.min.js"></script>
<script src="https://cdn.jsdelivr.net/npm/axios/dist/axios.min.js"></script>

<!-- Tippy.js CSS & JS -->
<link rel="stylesheet" href="https://unpkg.com/tippy.js@6/dist/tippy.css" />
<script src="https://unpkg.com/@popperjs/core@2"></script>
<script src="https://unpkg.com/tippy.js@6"></script>
```

Figure 4.23 FullCalendar and Tippy.js plugins

E. Payroll Page

Figure 4.24 shows the main payroll page. This page displays a list of employees along with their employee ID and name. It includes the option to create a payroll for each employee with the "Payroll" button. This view gives the admin easy access to manage and create payroll for each employee.

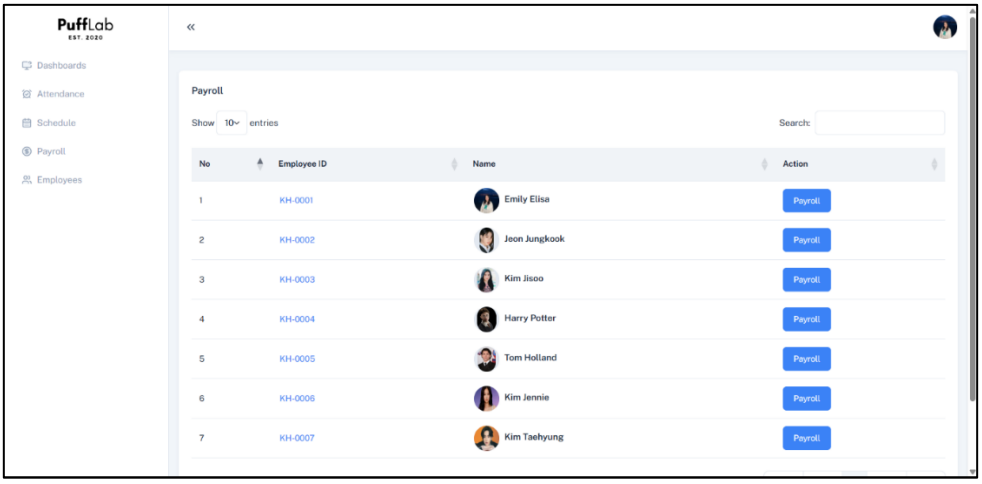


Figure 4.24 Main payroll page

Once the admin clicks on the "Payroll" button for a specific employee, they are redirected to a detailed payroll page where the admin can view or edit payroll data for that employee as shown in Figure 4.25.

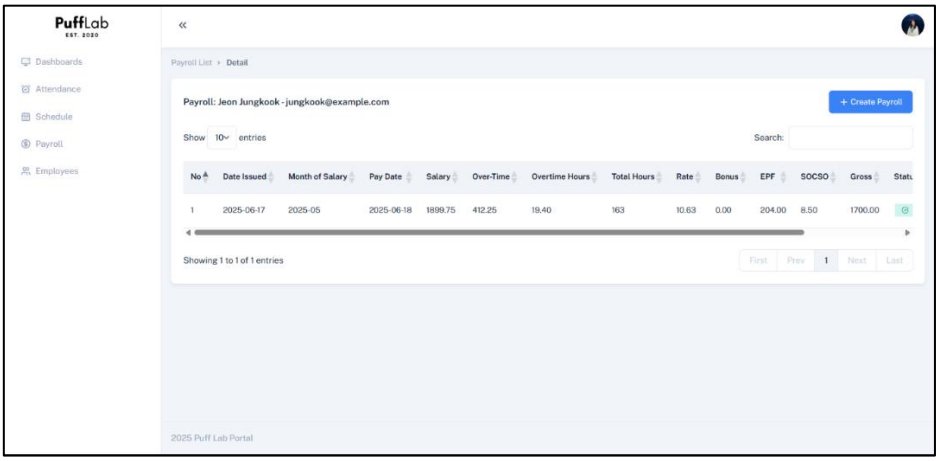


Figure 4.25 View detailed payroll

The "Add Payroll" modal in Figure 4.26 let the admin input essential payroll information such as Date Issued, Month of Salary, Pay Date, Salary, Regular Hours, Overtime,

Total Hours, and Deductions. This form will be automatically populated based on the employee's attendance and working hours.

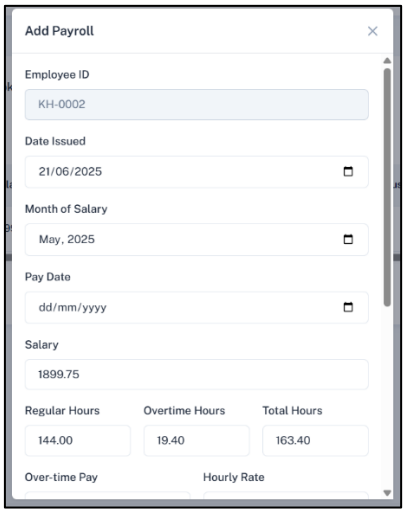


Figure 4.26 Add payroll modal

The admin can also print the payslip, which provides a detailed breakdown of the employee's earnings and deductions. The payslip includes information such as the employee's basic salary, overtime pay, bonuses, and deductions like EPF and SOCSO. It also shows the net salary that the employee will receive after all deductions are applied. This feature allows for easy access to a formal, printable record of the employee's payroll for the month, as shown in Figure 4.27.

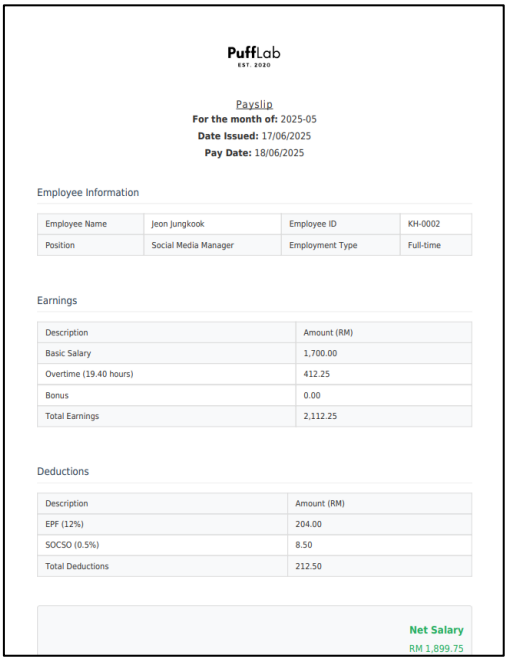


Figure 4.27 Payslip

F. Profile Information

Figure 4.28 shows the Profile Information page for admin. The admin can modify their full name, phone number, email address, and bank account details. This form provides fields for entering the phone number, bank name, and bank account number. Once the changes are made, the admin can click the "Update Profile" button to save their updates. On the right side of the page, there is the profile summary, which includes the user's employee ID, name, email, position, phone number, work experience, join date, last login time, and bank information. This section is for viewing only.

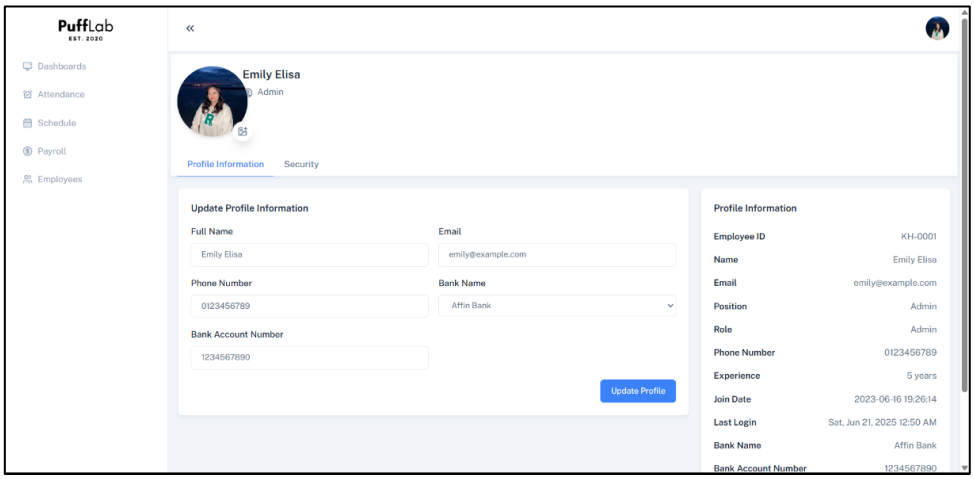


Figure 4.28 Profile information

4.3.3 Employee

A. Dashboard for Employee

Figure 4.29 shows the dashboard for the employee layout. In this page, employees can view their upcoming schedules, recent attendance and payroll summary.

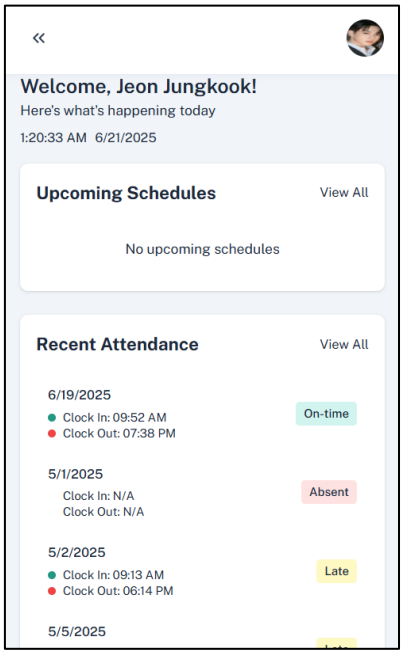


Figure 4.29 Dashboard for employee

B. QR Attendance Code

The QR Attendance page allows employees to scan a unique QR code for attendance purposes. On the page, the employee's name and employee ID are displayed along with their QR code as shown in Figure 4.30. The QR code is generated based on the employee's ID, which is unique for each user. This ensures that each employee has a specific code for marking attendance.

Figure 4.30 QR code

In the code snippet provided in Figure 4.31, the current logged-in user's details, such as the employee ID and name, are retrieved using Laravel's Auth::user() method. The code checks if the employee ID exists, and if it does, the QR code is generated using the QrCode library, displaying the employee's ID. If the employee's ID is missing or invalid, a fallback message "Employee ID not set" will be shown. The code fetches the employee ID from the logged-in user's data, and then the QR code is created for that employee. This process is done to ensure that each user has a personalized and unique QR code tied to their identity for attendance tracking.

```php
public function scan()
{
    // Get the currently authenticated user (Tom Holland in this case)
    $user = Auth::user();

    // Retrieve the employee ID and name of the logged-in user (Tom's ID in this case: KH-0002)
    $qrContent = $user->user_id;  // This will be 'KH-0002' for Tom Holland
    $employeeName = $user->name;      // Assuming 'name' is the field in your users table

    // Check if qrContent is null, and provide a fallback value if necessary
    if (!$qrContent) {
        // Fallback if employee_id is not set
        $qrContent = 'Employee ID not set';
    }

    // Use the existing employee_id (e.g., KH-0002) and employee name (e.g., Tom Holland)
    $employeeId = $user->user_id;  // Directly pass the logged-in user's employee_id
    $employeeName = $user->name;       // Get the employee's name

    // Generate the QR code for the current employee's ID or content
    $qrCode = QrCode::size(250)->generate($qrContent);

    // Return the view with employee data, QR code, employee ID, and employee name
    return view('employee.scan', compact('user', 'qrCode', 'employeeId', 'employeeName'));
}
```

Figure 4.31 A code snippet to handle the QR scan process

C. Attendance History

The "Attendance History" page shown in the Figure 4.32 allows employees to view their past attendance records. It displays a list of attendance entries, where each record is organized by date, along with the status of the staff member's workday.

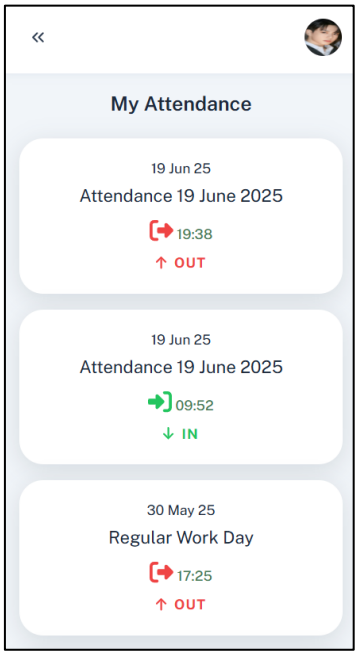


Figure 4.32 Recent attendance page

D. Schedule Page

The schedule page for employee shows a calendar view where they can view the shifts as shown in Figure 4.33. The displayed interface provides a week view, allowing the admin to quickly check which employee is assigned to a particular shift on a given day. The calendar view is responsive and automatically adjusting depending on the screen size, so it can switch to a different layout for smaller screens.

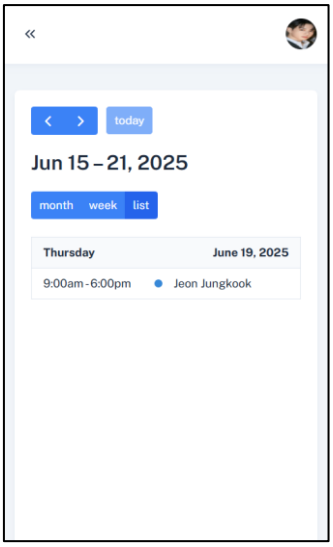


Figure 4.33 Schedule page for employee

The calendar is integrated with a backend system that dynamically loads shift data (events) through a JSON object. In the code snippet shown in Figure 4.34, the calendar object is initialized and set to display different views based on the user's device width. For larger screens, the 'dayGridMonth' view is shown, displaying the entire month and the shifts for each day. When the page is resized to smaller screens, the calendar switches to the 'listWeek' view, showing the shifts in a weekly list format for better accessibility. The windowResize function in the script listens for window resizing events and adjusts the calendar's view accordingly. The events property is populated with the data for each shift, which is dynamically fetched from the backend using a JSON format. This makes it easy to update the schedule and reflect real-time changes in the shift assignments.

```
@section('script')
<!-- FullCalendar CSS and JS -->
<link href="https://cdn.jsdelivr.net/npm/fullcalendar@6.1.17/index.global.min.css" rel="stylesheet" />
<script src="https://cdn.jsdelivr.net/npm/fullcalendar@6.1.17/index.global.min.js"></script>
<script src="https://cdn.jsdelivr.net/npm/axios/dist/axios.min.js"></script>

<script>
    document.addEventListener('DOMContentLoaded', function () {
        const calendarEl = document.getElementById('calendar');

        const calendar = new FullCalendar.Calendar(calendarEl, {
            initialView: window.innerWidth <= 768 ? 'listWeek' : 'dayGridMonth',
            height: window.innerWidth <= 768 ? 'auto' : 650,
            contentHeight: window.innerWidth <= 768 ? 'auto' : 'auto',
            expandRows: true,
            headerToolbar: {
                left: 'prev,next today',
                center: 'title',
                right: 'dayGridMonth,timeGridWeek,listWeek'
            },
            events: @json($events),
            windowResize: function() {
                // Adjust the view on window resize
                if (window.innerWidth <= 768) {
                    calendar.changeView('listWeek');
                } else {
                    calendar.changeView('dayGridMonth');
                }
            }
        });

        calendar.render();
    });
</script>
```

Figure 4.34 A code snippet to integrate calendar with backend system

E. Payroll History

Figure 4.35 shows the Payroll Overview for employee based on the month. In this page, the employees can view the detailed breakdown of their earnings and deductions for a specific month. It includes multiple elements, such as the net balance, a pie chart showing the distribution of gross salary and deductions, and a button to download the payslip. At the top of the page, the net balance is displayed, which represents the total amount the employee will receive after deductions. The Download Payslip button allows the employee to download a detailed payslip document that outlines the various components of the payroll. Below these key elements, a pie chart is displayed, visually representing the distribution of income and deductions. This chart gives the employee an immediate understanding of their gross earnings and deductions briefly.

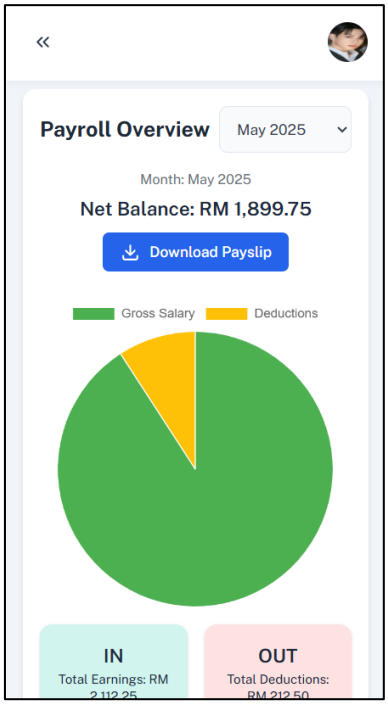


Figure 4.35 Payroll overview page for employee

The pie chart is created using Chart.js, a JavaScript library for rendering charts. The chart's purpose is to visually represent the employee's income and deductions. Based on Figure 4.36, it uses a canvas element to display the chart and assigns it the ID netBalanceChart. The data is passed into the chart, with labels representing "Gross Salary" and "Deductions", while the datasets array contains the actual values for income and deductions. These are visualized using background colors: green for income and yellow for deductions. The chart is made responsive so that it adjusts according to the screen size, ensuring usability across different

devices. Additionally, tooltips are used to display the value of each section when the user hovers over the pie chart, with the values formatted as Malaysian Ringgit (RM) to two decimal places.

```
// Chart.js Pie Chart
let chart;
function renderChart(income, outcome) {
const ctx = document.getElementById('netBalanceChart').getContext('2d');
    if (chart) chart.destroy();
    chart = new Chart(ctx, {
    type: 'pie',
    data: {
            labels: ['Gross Salary', 'Deductions'],
        datasets: [{
            data: [income, outcome],
            backgroundColor: ['#4CAF50', '#FFC107'],
            borderWidth: 1,
        }]
    },
    options: {
        responsive: true,
        plugins: {
                legend: { position: 'top' },
            tooltip: {
                callbacks: {
                    label: function(tooltipItem) {
                        return `${tooltipItem.label}: RM ${tooltipItem.raw.toFixed(2)}`;
                    }
                }
            }
        }
    }
});
```

Figure 4.36 A code snippet of pie chart

Figure 4.37 shows the backend code for retrieving the payroll data and calculating the employee's income and deductions. This piece of code first checks whether the payroll data exists for the employee. If payroll data exists, it proceeds to calculate the income and deductions. The income is set to the gross salary of the employee, which is stored in the variable $payroll->gross. The outcome, which represents the total deductions, is the sum of the EPF deduction and the SOCSO deduction, which are retrieved from the payroll data. This calculation is crucial for accurately populating the pie chart, as the income and outcome values are used to determine the distribution of the chart. These values are dynamically updated based on the specific payroll data for the employee.

```
// Calculate IN and OUT values only if payroll is found
if ($payroll) {
    $income = $payroll->gross;
    $outcome = $payroll->epf_deduction + $payroll->socso_deduction;
}
```

Figure 4.37 Backend code for retrieving payroll data

4.4 Summary

Chapter 4 explains the installation and configuration of Laravel 11, a necessary step before developing the proposed system. The chapter then outlines the implementation phase of the system, highlighting key design elements and functionalities. The Puff Lab Portal can be accessed locally after installation, offering a variety of features for both administrators and employees. For administrators, the system provides a comprehensive dashboard where they can manage employee attendance, view payroll summaries, and track employee schedules. Employees, on the other hand, have their own dedicated dashboard where they can view their schedules, attendance history, and payroll details. They can scan their unique QR code to register attendance, view their previous attendance records, and track payroll information. The system includes validation checks for all form submissions, ensuring that the data entered by both administrators and employees is accurate. Additionally, the user interface has been designed to be intuitive and responsive, providing an improved user experience for both administrators and employees. This streamlined design ensures the system is both functional and easy to navigate.

CHAPTER 5: TESTING

5.1 Introduction

Chapter 5 focuses on the testing phase of the proposed system. This phase includes both functionality testing and usability testing to ensure that all specified requirements and features are met. Employees and the owner of Puff Lab Portal are given a survey to gather feedback on the system's functionality and usability. The results from this survey will be analysed to assess the functionality and overall user experience of the portal. Additionally, testing is essential to identify and resolve any errors, ensuring that the system is fully prepared for final deployment.

5.2 Functional Testing

The purpose of system functionality testing is to check the system's logical workflow. During functional testing, the tester thoroughly examines the system to ensure that its features align with the predefined requirements. The tester must input appropriate user inputs and compare the results with the expected outcomes If the results align with expectations, the test is considered successful. However, if there are discrepancies between the actual and expected results, the test is deemed a failure, and the developer must resolve the issues to ensure the system meets the specified requirements. This type of testing not only ensures that each function performs as required by the end-user, but it also helps assess the overall usability and navigation of the system. Unit testing, often performed in isolation, is commonly employed to conduct this functionality testing, focusing on individual components to validate their correctness.

5.3 Unit Testing

Unit testing focuses on a minor part of an application's functions and tests each function separately to determine if the result matches the expected outcomes. The objective is to promptly identify and fix errors to ensure a fully functioning system. If there is an error, the developer must debug the errors promptly to provide a working system.

These are the modules for testing:

1. Login
2. Forgot password

These are the modules for testing for admin:

1. Dashboard
2. Navigation bar
3. Attendance management (view, add, delete, download report)
4. QR code scanner
5. View presence list
6. Manual attendance entry
7. Shift Scheduling (view, add, edit, delete shift)
8. Payroll management (generate payroll, download payslip)
9. Employee management (view, add, edit, delete)

These are the modules for testing for employees:

1. Edit profile
2. Change password
3. Scan QR Code
4. View attendance history
5. View shift schedule
6. View payroll overview

5.3.1 Functional Test Cases of General Modules (Employee and Admin)

Table 5.1 Test Case for Login Module

Module Name: Login **Test Case Description:** Testing user-related functionalities including authentication and password recovery. **Testing Objective:** Ensure user access features work as intended. **Remarks:** Covers features shared by both admin and employee roles								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/Fail**	**Severity Failure**	**Notes**
LGN-001	Login with valid credentials	1. Go to login page 2. Enter valid email and password 3. Click login	Email: emily@example.com Password: password	User is redirected to the dashboard based on their roles.	The user is redirected to the dashboard based on their roles.	Pass	Low	-
LGN-002	Login with invalid credentials	1. 1. Go to login page 2. Enter wrong password 3. Click login	Email: emily@example.com Password: 1234568	Error message: “Invalid credentials” appears	Error message displayed correctly	Pass	Low	-
FPW-001	Forgot password with valid email	1. Go to Forgot Password 2. Enter registered email 3. Submit	Email: emily@example.com	Password reset link is sent to email.	The user received the email to reset their password.	Pass	Low	-
FPW-002	Forgot password with unregistered email	1.Go to Forgot Password 2.Enter unregistered email 3. Submit	Email: emily@gmail.com	Error message displayed correctly.	Show the “Email not found” message	Pass	Low	-
RST-001	Reset password with valid token	1. Open email 2. Click reset link 3. Enter new password 4. Submit	Token and new password	Password is reset and user is redirected to login page.	Password is reset and user is redirected to login page.	Pass	Medium	-
RST-002	Reset password with expired token	1. Open expired reset link 2. Try to reset password	Expired token	The system will show the error message.	Error message: “Token expired”	Pass	Medium	-

5.3.2 Functional Test Cases of Modules for Admin

Table 5.2 Test case for Dashboard

Module Name: Dashboard **Test Case Description:** Testing the accessibility and content display of the admin dashboard. **Testing Objective:** Ensure admin can view dashboard data after login. **Remarks:** Only accessible to admin role								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/Fail**	**Severity Failure**	**Notes**
DASH-001	Access dashboard after login	1. Login as admin 2. Redirect to dashboard	Email: emily@example.com Password: password	Dashboard with the attendance summary and payroll summary appear.	Dashboard loads with correct widgets.	Pass	Low	-
DASH-002	Unauthorized access to dashboard	1. Login as employee 2. Try to access /admin/dashboard via URL	-	System blocks access and redirects to 404 Page or employee dashboard.	The system redirects to employee dashboard.	Pass	Medium	Should not allow bypass by URL

Table 5.3 Test case for navigation bar module

Module Name: Navigation Bar **Test Case Description:** Testing the accessibility and content display of the admin dashboard. **Testing Objective:** Ensure admin can view dashboard data after login. **Remarks:** Only accessible to admin role								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/Fail**	**Severity Failure**	**Notes**
NAV-001	Access dashboard after login	1. Login as admin 2. Check the visibility of the navigation bar.	Email: emily@example.com Password: password	Navigation bar is visible and functional.	Navigation bar is displayed with all the correct links.	Pass	Low	-
NAV-002	Navigation bar links are functional	1. Click on each navigation link (Dashboard, Attendance, Payroll, Schedule and Employee)	-	Correct page loads according to the selected link.	Pages load correctly for each navigation link.	Pass	Medium	-

Table 5.4 Test case for attendance management module

Module Name: Attendance Management **Test Case Description:** Testing the functionality of viewing, adding, deleting, and downloading attendance reports. **Testing Objective:** Ensure admin can manage attendance data efficiently. **Remarks:** Only accessible to admin role								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/ Fail**	**Severity Failure**	**Notes**
ATT-001	View Attendance Records	1. Login as admin 2. Navigate to attendance records page	Admin credentials	Attendance list is displayed with correct records	Records displayed correctly	Pass	Low	-
ATT-002	Add Attendance	1. Click on "Add Attendance" button 2. Fill in date, activity, and holiday type 3. Click "Add Attendance"	Date: 2025-06-20 Activity: Attendance 11 June Holiday Type: null	New attendance record is added and displayed in the attendance list	Attendance added successfully	Pass	Medium	Ensure all fields are correctly populated
	Add Attendance with empty or invalid fields	1.Click on "Add Attendance" 2.Leave the required fields “Date” empty 3.Click "Add Attendance"	Date: Activity: Attendance 11 June Holiday Type: null	The system should display an error message indicating that the required fields cannot be empty.	The error message “Please fill in all fields” is shown.	Pass	Medium	This ensures that all mandatory fields are filled before the attendance is added.
ATT-003	Delete Attendance	1. Click the delete icon on an attendance record	Attendance record from the list	The selected attendance record is removed from the list	Attendance deleted successfully	Pass	Medium	Make sure the deletion is permanent
ATT-004	Download Attendance Report	1. Click "Download List" button 2. Choose the format (PDF/CSV)	-	Attendance report is downloaded in the selected format	Report downloaded successfully	Pass	Low	Ensure correct file format is provided

Table 5.5 Test case for QR Code Scanner module

Module Name: QR Code Scanner **Test Case Description:** Testing the functionality of the QR code scanner for attendance tracking. **Testing Objective:** Ensure QR code scanning works accurately for attendance marking. **Remarks:** Only accessible to employees for scanning.								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/Fail**	**Severity Failure**	**Notes**
QR-001	Scan QR Code for Attendance	1. Open the scanner 2. Align the QR code with the scanner frame 3. The scanner should detect the QR code and mark attendance	QR Code Image	Attendance is marked and recorded with the correct date and time	Attendance marked successfully	Pass	High	Ensure scanner activates automatically
	Scan an invalid or expired QR code	1. Open the QR code scanner 2. Scan a QR code that is invalid or expired	QR Code Image	The system should display an error message indicating that the QR code is invalid or expired.	The message “Invalid OR code” is displayed.	Pass	High	Ensures that the system handles invalid QR codes gracefully.

Table 5.6 Test case for view presence list module

Module Name: View Presence List **Test Case Description:** Testing the presence list functionality for the admin to monitor employees' clock-in and clock-out times. **Testing Objective:** Ensure presence data is accurate and up to date. **Remarks:** Only accessible to admin role.								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/Fail**	**Severity Failure**	**Notes**
PRES-001	View Employee Presence	1. Login as admin 2. Navigate to the "Presence List" section	-	Employee clock-in and clock-out times are displayed correctly	Presence data displayed correctly	Pass	Low	Ensure data is updated in real-time
PRES-002	Filter Attendance List	1. Use search or filter options to find specific employee or date	Employee name or date	The list filters accordingly to show the correct data	List filtered correctly	Pass	Medium	Check for accurate filtering functionality

Table 5.7 Test case for manual attendance entry module

Module Name: Manual Attendance Entry **Test Case Description:** Testing the manual attendance entry functionality for admins to record attendance without QR scanning. **Testing Objective:** Ensure manual attendance can be entered accurately. **Remarks:** Only accessible to admin role.								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/Fail**	**Severity Failure**	**Notes**
MANUAL-001	Record Manual Attendance	1. Login as admin 2. Navigate to "Manual Attendance" section 3. Search for the employee that needs to use the manual attendance entry. 4. Click "Record Clock-In" when applicable	Employee Name: Kim Jisoo Clock-In Time: 14:05:15	Manual attendance is recorded successfully for the selected employee	Attendance recorded successfully	Pass	High	Ensure correct clock-in can be manually added

Table 5.8 Test case for shift scheduling module

Module Name: Shift Scheduling **Test Case Description:** Testing the functionality of shift scheduling (view, add, edit, and delete shifts) **Testing Objective:** Ensure that the shift scheduling features work as expected for both full-time and part-time staff. **Remarks:** Only accessible to admin role. Validations to ensure full-time staff are scheduled for a maximum of 8 hours per shift and part-time staff for a minimum of 3 hours.								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/ Fail**	**Severity Failure**	**Notes**
SHIFT-001	View schedule for a given date	1. Log in as an admin. 2. Navigate to the "Schedule" section. 3. Select the desired date (e.g., May 9, 2025). 4. Verify that all assigned shifts for employees are displayed.	May 9, 2025	The calendar and the shift timeline correctly display the shifts for all employees.	Shift data is displayed accurately.	Pass	Low	Ensure that all shifts are correctly displayed for the selected date.
SHIFT-002	Add a shift to an employee	1. Log in as an admin. 2. Navigate to the "Schedule" section. 3. Click on "Add Shift." 4. Select an employee from the dropdown 5. Set the start time to 9:00 AM and end time to 5:00 PM. 6. Click "Add Shift."	Employee: Jeon Jungkook, Start Time: 9:00 AM, End Time: 5:00 PM	The shift is added to the schedule. The employee's shift appears on the timeline for the selected date.	Shift is added and appears in the timeline.	Pass	Medium	Ensure the employee's name and shift details are accurately recorded.
SHIFT-003	Delete an existing shift	1. Select an existing shift from the timeline (e.g., Jeon Jungkook's shift from 9:00 AM to 6:00 PM). 2. Click "Delete." 3. Confirm the deletion.	-	The shift is deleted from the timeline, and the employee is no longer scheduled for that shift.	Shift is successfully deleted.	Pass	High	Ensure that the shift is permanently removed from the system.

SHIFT-005	Validate shift duration for full-time staff	1. Add a shift for a full-time employee 2. Verify that the total duration of the shift is 8 hours.	Employee: Full-time staff, Start Time: 9:00 AM, End Time: 5:00 PM	Full-time employees should only be scheduled for shifts of 8 hours maximum.	Shift duration is correctly restricted to 8 hours.	Pass	High	Ensure that the system enforces the 8-hour maximum for full-time staff.
SHIFT-006	Validate minimum shift duration for part-time staff	1. Add a shift for a part-time employee (e.g., 9:00 AM to 12:00 PM). 2. Verify that the total duration of the shift is at least 3 hours.	Employee: Part-time staff, Start Time: 9:00 AM, End Time: 12:00 PM	Part-time employees should only be scheduled for shifts of at least 3 hours.	Shift duration is correctly restricted to a minimum of 3 hours.	Pass	High	Ensure the system validates that part-time staff work at least 3 hours per shift.
SHIFT-007	Unauthorized access to shift scheduling	1. Log in as an employee. 2. Attempt to access the "Schedule" section for admin.	Employee credentials	Employee should not be able to access or make any changes to the schedule.	System blocks access and redirects to the employee dashboard.	Pass	Critical	The system must prevent employees from accessing the admin scheduling features.

Table 5.9 Test case for payroll management module

Module Name: Payroll Management **Test Case Description:** Testing the functionality of payroll generation and payslip download. **Testing Objective:** Ensure that the system can generate payroll correctly and allow employees to download their payslips. **Remarks:** Accessible to admin only.								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/ Fail**	**Severity Failure**	**Notes**
PAY-001	Generate payroll for employee	1. Login as admin. 2. Navigate to Payroll page. 3. Click on "Create Payroll". 4. Enter the details for the employee. 5.Click "Generate".	-	Payroll is generated with correct details.	Payroll generated successfully, and showing the correct salary and overtime calculation.	Pass	High	-
PAY-002	Validate payroll details before generation	1. After click “Generate”, ensure that the fields in the table are correctly filled in.	Employee ID: KH-0001 Salary: 1800 Overtime: 20 hrs	Payroll details should match the employee's records.	All fields (Salary, Overtime, Total) filled in correctly before generating payroll.	Pass	Medium	-
PAY-003	Check if payroll calculations are correct	Validate the total salary by calculating it	Employee ID: KH-0003 Overtime: 15 hrs	Total salary should match Basic Salary + Overtime calculation.	The total salary calculation matched the sum of Basic Salary and Overtime.	Pass	High	-
PAY-004	Download payslip for employee	1. Navigate to Payroll page. 2. Find the employee. 3. Click on "Download Payslip" button next to the employee's record.	-	Payslip for the employee is downloaded in PDF format.	Payslip downloaded successfully, displaying employee information and earnings.	Pass	Medium	-
PAY-005	Check for unauthorized access to payroll	1. Login as employee. 2. Attempt to access the payroll page via URL or dashboard link.	Employee credentials	System should block access and redirect to the employee dashboard.	System blocked access and redirected to the employee dashboard.	Pass	Critical	-

Table 5.10 Test case for employee management module

Module Name: Employee Management **Test Case Description:** Testing the functionality of viewing, adding, editing, and deleting employee records. **Testing Objective:** Ensure admin can efficiently manage employee data. **Remarks:** Only accessible to admin role								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/Fail**	**Severity Failure**	**Notes**
EMP-001	View Employee Records	1. Login as admin 2. Navigate to "Employee Records" 3. Validate list rendering (ID, Name, Email, etc.)	Admin credentials	Employee list loads correctly with all columns populated	Employee list displayed correctly	Pass	Low	Confirm that list pulls fresh data from DB
EMP-002	Add Employee (Valid Data)	1. Click "Add Employee" 2. Fill all required fields 3. Click "Save" 4. Verify the new entry appears in the list	Name: John Doe Email: johndoe@example.com Phone: 0123456789 Role: Baker Type: Full-time Experience: 3 years Join Date: 2023-01-01	Employee is added and shown in the list	Employee added successfully	Pass	Medium	Validate backend insert and UI refresh
EMP-003	Add Employee (Missing Mandatory Fields)	1. Click "Add Employee" 2. Leave Name and Email blank 3. Click "Save"	Name: (empty) Email: (empty) Phone: 0123456789	System should show validation error like “Please fill in all required fields”	Error message displayed: "Please fill in all required fields"	Pass	Medium	Prevents incomplete record from saving
EMP-004	Edit Employee Record	1. Click "Edit" next to a record 2. Change phone number/role 3. Click "Save" 4. Validate changes in the list	ID: KH-0003 New Phone: 0129876543 New Role: Senior Baker	Updated info is saved and displayed correctly	Changes reflected instantly	Pass	Medium	Consider logging changes (audit trail)

EMP-005	Delete Employee	1. Click "Delete" next to a record 2. Confirm deletion popup	Employee ID: KH-0005	Employee record is removed permanently from the list	Deleted successfully	Pass	High	Ensure deleted data cannot be retrieved via refresh
EMP-006	Add Employee with Duplicate Email	1. Click "Add Employee" 2. Use an existing email 3. Submit	Email: emily@example.com	Error message appears: “This email is already registered”	Duplicate detected and error displayed	Pass	High	Must maintain email uniqueness constraint

5.3.3 Functional Test Results of Modules for Employee

Table 5.11 Test case for profile editing module

Module Name: Profile Editing **Test Case Description:** Testing the functionality of editing employee profiles. **Testing Objective:** Ensure users can edit their profile details such as name, email, and phone number. **Remarks:** Accessible to all users, but changes are saved only for their own profile.								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/Fail**	**Severity Failure**	**Notes**
PE-001	Edit Profile	1.Login as an employee 2.Navigate to the profile page 3.Click on the "Edit Profile" button 4.Modify the name, email, and phone number 5.Click "Save"	Name: Emily Elisa Email: emily_new@example.com Phone: 0123456789	The profile is updated with the new details	Profile updated successfully	Pass	Medium	Ensure that only the user's profile can be edited.
EMP-002	Edit Profile with Duplicate Email	1.Login as an employee 2.Navigate to the profile page 3.Click on the "Edit Profile" button 4.Modify the email to an already existing email	Name: Emily Elisa Email: emily@example.com Phone: 0123456789	The system should display an error message indicating that the email already exists.	Error message shown: "This email is already in use"	Pass	High	Prevent users from entering duplicate emails.

Table 5.12 Test case for change password module

Module Name: Change Password **Test Case Description:** Testing the functionality of changing the password. **Testing Objective:** Ensure users can change their password securely. **Remarks:** Accessible to all users, but only for their own accounts.								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/ Fail**	**Severity Failure**	**Notes**
CP-001	Change Password	1.Login as an employee 2.Navigate to the password change page 3.Enter the current password, new password, and confirm the new password 4.Click "Save"	Current Password: password123 New Password: newpassword456 Confirm Password: newpassword456	The password is changed successfully, and the user is logged out to prompt for login with the new password.	Password updated successfully	Pass	High	Ensure the password change is successful and the new password is applied.
CP-002	Change Password with Mismatched Confirmation	1.Login as an employee 2.Navigate to the password change page 3.Enter the current password, new password, and a mismatched confirmation password 4.Click "Save"	Current Password: password123 New Password: newpassword456 Confirm Password: newpassword789	The system should display an error message indicating that the new password and confirmation password do not match.	Error message shown: "Passwords do not match"	Pass	Medium	Ensure confirmation passwords are correctly matched.
CP-003	Change Password with Invalid Current Password	1.Login as an employee 2.Navigate to the password change page 3.Enter an incorrect current password, new password, and confirm the new password 4.Click "Save"	Current Password: incorrectpassword New Password: newpassword456 Confirm Password: newpassword456	The system should display an error message indicating that the current password is incorrect.	Error message shown: "Current password is incorrect"	Pass	High	Ensure that the system properly checks the current password for correctness.

Table 5.13 Test case for scan QR code module

Module Name: Scan QR Code **Test Case Description:** Testing the functionality of scanning the attendance QR code for clocking in and clocking out. **Testing Objective:** Ensure employees can use the QR code to clock in and clock out effectively. **Remarks:** Accessible to employees for clocking in and out during their shifts.								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/ Fail**	**Severity Failure**	**Notes**
QR-001	Clock In Using QR Code	1. Login as an employee. 2. Navigate to the attendance page. 3. Scan the displayed QR code. 4. Confirm the clock-in time.	QR Code: "KH-0002"	Employee is successfully clocked in, and the system logs the clock-in time.	Clocked in at 10:05:52	Pass	High	Ensure clock-in time is recorded accurately.
QR-002	Clock Out Using QR Code	1. Login as an employee. 2. Navigate to the attendance page. 3. Scan the displayed QR code. 4. Confirm the clock-out time.	QR Code: "KH-0002"	Employee is successfully clocked out, and the system logs the clock-out time.	Clocked out at 17:15:13	Pass	High	Ensure clock-out time is recorded accurately.
QR-003	Invalid QR Code Scan	1. Login as an employee. 2. Navigate to the attendance page. 3. Scan a non-valid QR code (e.g., expired, wrong code).	Other QR Code	The system displays an error message: "Invalid QR Code. Please try again."	Error message: "Invalid QR Code"	Pass	High	Ensure invalid codes do not allow clocking in or out.
QR-004	Scan QR Code When No Schedule Exists	1. Login as an employee. 2. Navigate to the attendance page. 3. Scan the displayed QR code when no schedule is available.	QR Code: "KH-0002"	The system displays an error message: "No schedule found. Please check your shift schedule."	Error message: "No schedule found"	Pass	High	Ensure that employees cannot clock in or out when there is no assigned schedule.

Table 5.14 Test case for view attendance history module

Module Name: View Attendance History **Test Case Description:** Verify that the employee can view their past attendance records (clock-in and clock-out), including dates, times, and status (IN/OUT). **Testing Objective:** Ensure accurate and user-friendly display of individual attendance history, with correct status labels, timestamps, and ordering. **Remarks:** This module enhances transparency and allows employees to verify their attendance logs independently.								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/ Fail**	**Severity Failure**	**Notes**
ATT-HIS-001	Access attendance history page	1. Login as employee 2. Click "My Attendance" from sidebar	Valid employee login credentials	Attendance history page loads successfully with relevant entries shown	Attendance history page loads with data for 30 May and 19 June 2025	Pass	Medium	Route is authenticated
ATT-HIS-002	Display correct attendance date & time	1. Check entries shown on screen 2. Cross-reference with attendance DB	Sample data: 19 Jun 2025, 09:52/19:38	Dates and times are shown correctly for clock-in and clock-out per record	Times displayed correctly as 09:52 and 19:38; matched with backend records	Pass	High	Accurate timestamps confirmed
ATT-HIS-003	Display correct attendance status	1. Verify IN and OUT icons and labels for each record 2. Ensure color coding and icon alignment	Status: IN (Green), OUT (Red)	IN status displays with green icon and timestamp OUT status displays with red icon and timestamp	IN status shows green arrow + label; OUT shows red arrow + label, both correctly labeled	Pass	High	Matches UI design and meaning
ATT-HIS-004	Chronological order of entries	1. Observe the order of records shown 2. Compare with attendance log timestamps	Logs with mixed dates	Latest attendance records should appear at the top (descending by date/time)	Entries are correctly ordered: 19 Jun (latest), followed by 30 May	Pass	Medium	-
ATT-HIS-005	Edge Case: Same day multiple scans	1. Clock-in and clock-out multiple times on same day 2. View attendance history	2 INs and 2 OUTs on same day	All scans should be shown in correct sequence with separate IN and OUT icons	Both IN and OUT for 19 June are displayed as separate cards; each has accurate timestamp & label	Pass	High	Supports multiple scans per day
ATT-HIS-006	Edge Case: Missing IN/OUT	1. Clock-in only without clocking out 2. View attendance history	IN only	IN status should show without OUT System must not crash or misformat	Display still works for IN-only or OUT-only, no crash or UI error	Pass	Medium	Handled gracefully

Table 5.15 Test case for view schedule module

Module Name: View Schedule
Test Case Description: Verify that employees can view their assigned shift schedules in various calendar formats (month, week, list) with accurate dates, times, and assigned names.
Testing Objective: Ensure the schedule display reflects accurate shift data from the backend and supports switching between views.
Remarks: Critical for ensuring employees know their assigned shifts and avoid confusion or missed workdays.

Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Pass/Fail	Severity Failure	Notes
SCH-VW-001	Access schedule page	1. Login as employee 2. Click on “Shift Schedule” in sidebar	Valid employee login	Schedule page loads with current week’s shift	Page loads with schedule for Jun 15–21, 2025	Pass	Medium	Confirm route requires authentication
SCH-VW-002	Display correct date and shift timing	Observe date, time, and assigned employee for shift	Sample data: 19 Jun 2025, 9:00am–6:00pm	Date and time for shift displayed correctly	Date shows "June 19, 2025 – 9:00am–6:00pm" with assigned employee	Pass	High	Match backend record exactly
SCH-VW-003	Show assigned employee name	View who is assigned to a shift and verify correct name appears	Employee: Jeon Jungkook	Assigned employee’s name appears alongside shift	"Jeon Jungkook" shown as scheduled on 19 June	Pass	High	Employee name visible, format is clean
SCH-VW-004	Switch between calendar views	Click on “month”, “week”, “list” to toggle between different schedule views	-	Schedule updates according to selected view	Switching between views (week to list) updates layout as expected	Pass	Low	Ensure all buttons are clickable
SCH-VW-005	Edge Case: No shift assigned	View schedule on a week with no assigned shifts	Dates: June 10–14	Schedule should display a blank state or a message like “No shifts scheduled”	Empty state shown properly; no crash or UI error	Pass	Medium	Important for user trust

Table 5.16 Test case for view payroll module

Module Name: View Payroll **Test Case Description:** Verify that employees can accurately view their payroll summary, salary breakdown, and securely download their payslip for a selected month. **Testing Objective:** Ensure all payroll information displays accurately and securely, and the payslip download works properly. **Remarks:** Payroll information must reflect actual backend calculations and employee-specific data. Download functionality should return a valid PDF.								
Test Case ID	**Test Scenario**	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/Fail**	**Severity Failure**	**Notes**
PAY-VW-001	Access payroll overview page	1. Login as employee 2. Click "Payroll Overview" from sidebar	Valid login	Payroll page loads with net balance, gross salary, and deductions summary	Payroll overview loads correctly for May 2025 with net balance RM 1,899.75	Pass	High	Route is protected with auth
PAY-VW-002	Display correct net salary amount	Check that "Net Balance" = Gross Salary – Deductions	Gross: RM 2,112.25 Deduct: RM 212.50	RM 1,899.75 shown as net balance	Calculation matches backend — gross RM 2,112.25, deductions RM 212.50, net RM 1,899.75	Pass	Critical	Match backend record exactly
PAY-VW-003	Month dropdown visibility	1. Login as employee 2. Go to Payroll Overview page 3. Observe the dropdown menu	Employee with payroll for May	Dropdown appears with only months that have payroll history, for example, May 2025	" Dropdown is visible and contains only "May 2025"	Pass	Medium	No dropdown shown if no payroll exists
PAY-VW-004	No dropdown for employees without payroll history	1. Login as employee with no payroll history 2. Go to Payroll Overview	Employee with no payroll data	Dropdown should not appear Message or empty state shown instead	Dropdown not rendered; screen shows "No payroll history available"	Pass	Medium	Graceful fallback UI is important

5.4 Usability Testing

Usability testing is the last phase of testing which is conducted to assess whether the completed system can be effectively used in the environment it was designed for. It also determines if the intended users find the user interface, its content, and functionality easy to navigate and efficient. This process helps identify areas that need improvement based on actual user feedback. The evaluation focused on key components, including usability, functionality, interface design, and navigation flow, from both the employee and admin perspectives.

The usability testing was conducted by distributing a survey to Puff Lab employees and owner to conduct usability testing for the proposed system. The survey aimed to collect feedback on features such as the dashboard interface, attendance management, shift scheduling, and payroll management after respondents interacted with the Puff Lab Portal. Additionally, it is also aims to give a clearer picture of how users experience the system and whether its design and usability meet their expectations. Feedback collected was used to validate the system's objectives and ensure it effectively supports both employees and admin.

The consent form and the survey questions are shown in Appendix C. The respondent must read and fill out the consent form before continuing to answer the questionnaire. The survey was divided into two sections, one for the employee and one for admin to effectively gather feedback from each user role.

5.4.1 The Analysis for Usability Testing

The survey consists of three sections. Section A is for the respondent's personal information. Section B gathers the rating for system usability. Section C collects the overall user experience and suggestions for the system's improvement. Fourteen employees and one business owner of Puff Lab participated in the online survey. The collected data from the survey is analysed to determine whether the proposed system meets all requirements in terms of functionality and usability.

Section A: Demographic Form

Question 1: What is your age?

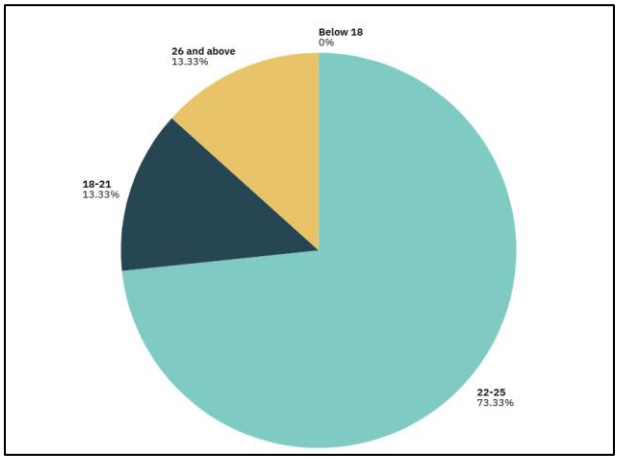


Figure 5.1 The age range of the respondents

Figure 5.1 shows the age range of the respondents. Most respondents are between the ages of 22 and 25, accounting for 73.3%. There is an equal distribution between the age ranges 18-21 and 30 and above, with both representing 13.3% of the respondents. The respondent from the 26 and above age category is the business owner, who was tested in the role of admin.

Question 2: What is your gender?

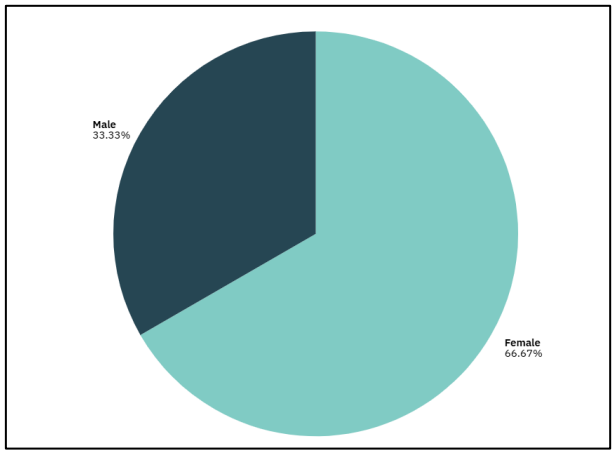


Figure 5. 2 The gender of the respondents

Figure 5.1 shows the pie chart for the respondents' gender. Many of the respondents were female, which is 66.7%, and the rest were male, which is 33.3%. In total, ten female

participants participated in the survey, while there were five male participants. The survey had a higher number of female respondents compared to male respondents.

Question 3: Please select your role while testing the system

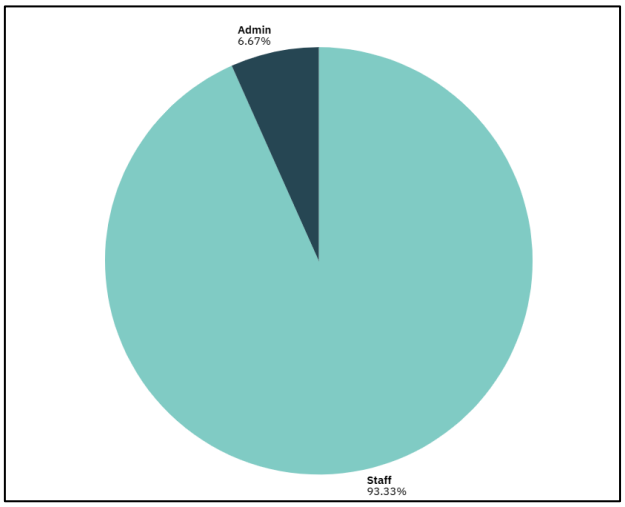


Figure 5.3 The role of testers for respondents

Figure 5.3 shows the pie chart for the tester roles chosen by the respondents. Most respondents, 93.3% or fourteen people, chose the tester role as a staff. Only one person selected the administrator role, which is a specific role for the business owner of Puff Lab.

Section B: System Usability Scale (SUS) Evaluation

This section contains the ten System Usability Scale (SUS) questionnaires. Questions 1 to 10 are linear scale questions, where the respondents are required to choose options ranging between 1 and 5, with option 1 meaning 'Strongly disagree' and option 5 meaning 'Strongly agree.' Table 5.17 shows the overall results of the ten questions in section C for employees and the admin.

Table 5.17 Overall results of the ten questions in Section B

No.	SUS question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
		1	2	3	4	5
1	I could see myself using this system more often in the future.	0	0	2	4	9
2	I thought the system was too complicated.	8	3	3	1	0
3	I found the system to be user-friendly.	0	0	0	5	10
4	I think I would need help from a technical expert to be able to use this system.	8	3	3	0	1
5	I found this system's functionalities effectively integrated.	0	0	2	5	8
6	I found this system to be very inconsistent.	6	6	1	0	2
7	I think that most individuals can quickly learn how to use this system.	0	0	1	4	10
8	I felt awkward when I was using the system.	11	2	1	1	0
9	I felt very confident when I was using the system.	1	0	1	3	10
10	I needed to learn a lot of things before I could start using this system.	8	3	1	2	1

Table 5.18 presents the detailed SUS scores and corresponding grades for all fifteen respondents. The table outlines the score for each SUS question answered by each respondent. Column X reflects the sum of the scores from the odd-numbered questions, while Column Y shows the total scores from the even-numbered questions.

Column X0 represents the value of Column X minus 5. To compute this, each odd-numbered question, which is positive in tone, must have 1 subtracted from its score. Since there are five odd-numbered questions (SUS items 1, 3, 5, 7, 9), the total score in Column X for each row is reduced by 5, and the result is stored in Column X0.

For the even-numbered questions (SUS items 2, 4, 6, 8, 10), which are phrased negatively, Column Y0 is calculated by subtracting the total score of Column Y from 25. Each even-numbered question is adjusted by subtracting its value from 5 to determine the contribution score. Therefore, the formula for Column Y0 is 25 minus the sum of the values in Column Y, and the resulting value is stored in Column Y0.

The final SUS score for each respondent is determined by adding the values in Columns X0 and Y0 and multiplying the sum by 2.5. This yields a score out of 100, which represents the overall usability perception for each respondent.

Finally, the Sauro-Lewis curved grading scale is applied to the SUS scores to assign letter grades. This grading scale, developed by Sauro and Lewis (2018), is used to categorize the SUS scores based on a range of percentile values. Figure 5.4 illustrates the formula used in Microsoft Excel for calculating and mapping the usability scores to letter grades.

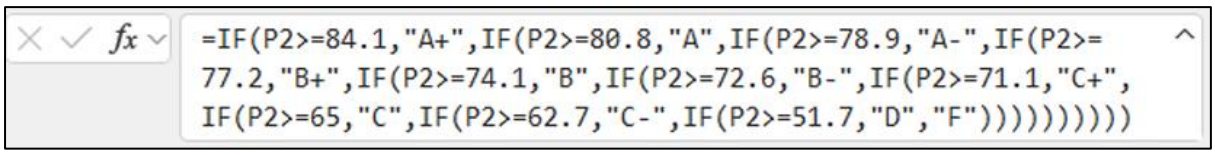


Figure 5.4 Formula to identify the grade for the usability score in Excel

Table 5.18 The SUS scores and grades for all respondents

Respondent ID	SUS1	SUS2	SUS3	SUS4	SUS5	SUS6	SUS7	SUS8	SUS9	SUS10	X	Y	X0	Y0	SUS score	Grade
1	5	1	5	1	5	1	5	1	5	1	25	5	20	20	100	A+
2	3	3	5	3	3	3	5	3	5	4	21	16	16	9	62.5	D
3	4	4	4	5	4	5	4	4	1	5	17	23	12	2	35	F
4	5	1	5	1	5	2	5	1	5	1	25	6	20	19	97.5	A+
5	5	3	4	2	5	5	5	1	5	3	24	14	19	11	75	B
6	5	3	4	3	4	2	3	1	3	4	19	13	14	12	65	C
7	4	2	5	1	5	2	5	1	5	1	24	7	19	18	95.5	A+
8	5	1	5	1	5	1	5	1	5	1	25	5	20	20	100	A+
9	4	1	4	1	4	1	4	1	5	1	21	5	16	20	90	A+
10	3	1	5	2	5	1	4	1	4	1	21	6	16	19	87.5	A+
11	5	1	5	1	4	2	5	1	5	1	24	6	19	19	95	A+
12	4	2	5	2	4	2	5	2	4	2	22	10	17	15	80	A-
13	5	2	4	3	3	2	4	2	4	2	20	11	15	14	72.5	C+
14	5	1	5	1	5	1	5	1	5	2	25	6	20	19	97.5	A+
15	5	1	5	1	5	1	5	1	5	1	25	5	20	20	100	A+

Table 5.19 shows the summary of the overall SUS scores and their corresponding grades. The mean SUS score recorded was 83.53, which falls in the A category. This indicates that the respondents considered the system as very user-friendly generally. According to Lewis and Sauro (2018), a SUS score of 80 signifies an above-average user experience, which is considered strong in relation to the industry standard. The SUS score range extends from 0 to 100, where a higher score indicates better usability. Based on this benchmark, the system demonstrates high usability and largely aligns with the expectations of its users.

The standard deviation for the SUS scores is 18.67816, indicating that there is relatively little variation in users' perceptions of the system's usability. While most users found the system useful, there are some differences in how individuals assess its ease of use, functionality, and design. Reducing the standard deviation would help to minimize these discrepancies, thereby improving the overall user experience and ensuring a more consistent and positive perception of the system across all users.

Table 5.19 Summary of the SUS scores and grades

Summary for the mean, standard deviation, minimum, and maximum SUS score	
Mean	83.53333
Standard deviation	18.67816
Minimum score	35
Maximum score	100
Summary for SUS grade	
Grade	Frequency
A+	9
A	0
A-	1
B+	0
B	1
B-	0
C+	1
C	1
C-	0
D	1
F	1

Section C: Overall User Experience and Suggestion for System's Improvement

This section aims to identify users' problems and collect their thoughts and suggestions for improving the Puff Lab Portal.

Question 1: Did you encounter any bugs or technical issues? If yes, please describe them.

Most respondents reported no issues with the system, indicating a high level of user satisfaction. However, a few minor technical problems were mentioned. These included changes in the display format within the schedule section, particularly when switching between weekly and monthly views. Additionally, some users suggested that the attendance history feature could be improved by allowing users to filter records by date range, reducing the need to scroll through long lists. These issues are minor and do not significantly impact overall system usability but addressing them could improve the user experience.

Question 2: What improvements would you suggest for the Puff Lab Portal to enhance its usability or functionality?

While many respondents expressed satisfaction with the portal, they also provided helpful ideas for making it even better. Several users suggested the addition of a notification system to alert users of important updates, such as changes in payroll processing or attendance status. This feature would keep users informed in real-time and enhancing the portal's efficiency. Additionally, there was a call for a mobile-friendly version or app, which would make accessing the portal more convenient for employees on the go. Other suggestions included integrating new functions, such as banking connectivity for easier payroll management or performance tracking to monitor employee progress and work performance.

These suggestions reflect a strong interest in increasing the portal's functionality, particularly in terms of mobility, real-time updates, and enhanced employee tracking.

5.5 Summary

Chapter 5 provides an explanation of functional and unit testing, which are crucial for evaluating the system's logical workflow. These tests focus on examining individual components of the system to ensure that each function works as expected. The chapter also includes the test modules for both the admin and employee parts of the system. These modules were tested, and the generated results were compared against the expected outcomes. Additionally, usability testing was carried out through a survey involving Puff Lab employees and the business owner. The objective of this testing was to assess the overall user experience, the design of the interface, and its ease of use. The feedback collected indicated that the Puff Lab Portal is user-friendly, intuitive, and effectively supports employee management for both the staff and the business owner. While the feedback was generally positive, a few minor suggestions were made for future improvements.

CHAPTER 6: CONCLUSION AND FUTURE WORK

6.1 Introduction

Chapter 6 outlines the project's conclusion, which includes a detailed assessment of objective achievements, project limitations, and future works of the Puff Lab Portal. The objective achievements section contains an analysis of the primary project's objectives to determine whether each objective has been effectively fulfilled to meet user requirements and expectations. This evaluation is important in understanding the system's performance and alignment with user requirements.

Moreover, the project limitations and constraints are listed to identify the system's weaknesses. Knowing the weaknesses of the current system is important for identifying potential improvements for future updates and maintenance. The future work section lists potential enhancements for the project. These improvements are necessary to ensure the project's maintenance and to improve the system's functionalities.

6.2 Objective Achievement

This section includes assessing Puff Lab Portal objectives and evaluating whether each objective has been met to determine the level of achievement. Table 6.1 shows the objective achievements for Puff Lab Portal.

Table 6.1 Objective achievements

Objective	Achievement
To design an attendance tracking system using QR codes for clocking in and out, automating payroll calculations and employees' shift schedules for improved efficiency.	The portal successfully integrates a QR code-based attendance system, which allows employees to clock in and out efficiently. This not only automates the attendance tracking process but also eliminates the potential for errors in manual entries. Additionally, the system automatically calculates payroll based on the recorded hours and employee shifts. By automating these processes, the portal has improved efficiency in attendance tracking, payroll calculations, and scheduling, ultimately saving time and reducing human error.
To develop a web-based attendance system that integrates attendance tracking, payroll processing, and shift scheduling into a cohesive platform for ease of use.	The Puff Lab Portal has effectively created a web-based platform that integrates all three core components: attendance tracking, payroll processing, and shift scheduling. The platform's user-friendly interface allows both administrators and employees to easily access and manage their schedules, track attendance, and view payroll details. This integration helps streamline operations, providing a seamless experience for both users, improving overall workflow management.
To test the usability and functionality of the developed system, meets the needs of employees and business owners in tracking attendance, processing payroll and managing schedules.	The system has undergone rigorous testing to ensure that it meets the requirements of both employees and business owners. Feedback from users has been positive, as the portal provides intuitive navigation, reliable attendance tracking, and accurate payroll calculations. The shift scheduling feature also meets the needs of the business by allowing easy adjustments and ensuring that employees are assigned the correct hours. The system's functionality and usability have been validated, confirming that it fulfills the needs of the target users effectively.

6.3 Project Limitations

The system has met all user requirements and received positive feedback from the employees and admin. However, some limitations in the system should be considered to prepare the system for future modifications. The limitations of Puff Lab Portal are listed in Table 6.2.

Table 6.2 Project limitations

Limitations	Description
Basic Payroll Computation	The payroll module calculates wages based on preset formulas, but it lacks flexibility in handling complex scenarios such as dynamic tax regulations, statutory deductions (e.g., EPF, SOCSO in Malaysia), and automatic updates in line with government regulations. This reduces the system's adaptability to future changes in payroll management.
Static Scheduling Logic	The scheduling functionality relies on fixed rules for shift assignments, such as requiring full-time employees to work a minimum of 9 hours per day. This rigid structure does not account for more flexible or hybrid work models, potentially limiting the system's applicability to businesses with diverse scheduling needs.
Absence of Advanced Reporting and Analytics	While the portal provides basic payroll and attendance summaries, it lacks a comprehensive reporting and analytics module. Detailed reports on employee performance, payroll trends, or attendance patterns, as well as the ability to export data to formats like Excel or PDF, would enhance the system's usability for administrators and provide better insights for decision-making.
Lack of Notification for Schedule Updates	The system currently does not send notifications to employees when their schedules are updated. As a result, employees must manually check the schedule page to view any changes to their shifts. This can lead to delays in communication and may result in missed shifts or confusion regarding schedule modifications. Implementing an automatic notification system would enhance communication and ensure employees are promptly informed of any changes.

6.4 Future Work

Several improvements can be implemented in Puff Lab Portal to increase the quality of the system and its efficiency in managing attendance, schedule and payroll. The future work or updates for Puff Lab Portal include:

Table 6.3 Future work

Future Work	Description
Enhanced Payroll System with Dynamic Calculations	One major improvement would be to make the payroll module more flexible by incorporating dynamic tax rules and statutory deductions like EPF and SOCSO in Malaysia. This would allow the system to automatically update in line with changes in government regulations, making payroll management more efficient and accurate. By doing so, the system would be better equipped to handle diverse payroll scenarios, ensuring compliance with local laws.
Flexible Scheduling System	Future updates could introduce more flexibility, allowing for hybrid work models, part-time shifts, and shift rotations. This would make the system more adaptable to businesses with a variety of employee work patterns and help improve employee satisfaction by offering better scheduling options.
Comprehensive Reporting and Analytics Module	In order to provide deeper insights into employee performance, attendance trends, and payroll data, an advanced reporting and analytics module could be integrated into the system. This would allow administrators to generate detailed reports, track performance, and identify trends in attendance or payroll. Additionally, enabling data export options to formats like Excel or PDF would enhance the system's functionality and provide valuable data for decision-making.
Automated Notifications for Schedule Changes	A future enhancement could be the implementation of automated notifications to alert employees whenever there are changes to their shifts. This could include email, SMS, or in-app notifications, ensuring that employees stay informed in real-time, reducing the chance of missed shifts and improving overall communication within the system.
Shift Request Feature Implementation	Although the system currently does not support a feature for employees to request shifts, it is a valuable enhancement for future development. The Shift Request feature would allow employees to request available shifts based on their availability and preferences. This would improve scheduling flexibility, reduce conflicts, and give employees more control over their work hours. Implementing this feature would also streamline shift management for administrators, providing them with a system to approve or deny shift requests and ensure fair allocation of work hours.

6.5 Summary

In conclusion, this chapter provides an overview of the objectives achieved in the Puff Lab Portal project. The primary goal of developing a web-based attendance tracking system was successfully accomplished. The system integrates attendance tracking, payroll calculations, and shift scheduling, providing a user-friendly interface for both administrators and employees. Usability testing confirmed that the system meets the needs of the users, with positive feedback regarding its functionality and ease of use. Despite meeting user expectations, there are some limitations in the system that need to be addressed. These include basic payroll computation, static scheduling logic, a lack of advanced reporting and analytics, and the absence of notifications for schedule updates. These areas will be the focus of future improvements.

Overall, the project successfully delivered a functional and efficient attendance, payroll, and scheduling system that enhances administrative and employee experiences. The integration of QR codes for attendance, automation of payroll calculations, and the web-based platform that combines all these elements significantly improves operational efficiency.

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APPENDIX A

CONSENT FORM

TITLE OF STUDY

Puff Lab Portal

RESEARCHER NAME

Emily Elisa binti Johny

SUPERVISOR NAME

Dr Amelia Jati

PURPOSE OF STUDY

You are invited to take part in an interview as part of a Final Year Project. Before deciding to participate in this study, it is important that you understand why the research is being done and what it will involve. Please read the following information carefully. Please ask the researcher if there is anything that is unclear or if you need more information.

The purpose of this interview is to provide insights into employee management systems specifically for Puff Lab's current practices. Your input will contribute to the development of a proposed system designed to improve attendance tracking, payroll management, and shift scheduling at Puff Lab.

STUDY PROCEDURES

During this interview, you will be asked a series of questions related to employee management at Puff Lab. The procedures for this study include:

1. Interview Process:

- The interview will be conducted in a conversational format, either in person or via an online platform, based on your preference.
- It is expected to take approximately 15 minutes to 30 minutes.

2. Recording:

- With your consent, the interview will be audio-recorded to ensure accurate transcription and analysis. The recordings will be kept confidential and used solely for research purposes.
- You may request to review or delete specific parts of the recording if desired.

Participation is entirely voluntary, and you may withdraw at any point during the interview without any consequences.

CONFIDENTIALITY

Your responses to this interview will remain completely anonymous. No identifying information will be collected, and no names or personal details will be linked to your responses. Data will be recorded without any reference to your identity.

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CONTACT INFORMATION

If you have any questions about this study or experience any issues related to your participation, please contact the researcher at :

Phone : 010 5146418

Email : jemilyelisa@gmail.com

CONSENT

I have read and understood the information provided and had the opportunity to ask questions. I understand that my participation is voluntary, and I may withdraw at any time without providing a reason and at no cost. I also acknowledge that I will receive a copy of this consent form. By signing below, I voluntarily agree to participate in this interview and consent to the audio recording of the interview session for research purposes.

Participant Name :

Signature :

Date :

APPENDIX B

Data dictionary Table

Database table name	Name of Attribute	Description	Primary Key (PK) or Foreign Key (FK)	Type	Field Length	Required
user	user_id	Unique identifier for user	PK	int	10	Yes
	user_password	Password of user		varchar	255	Yes
staff	staff_id	Unique identifier for staff	PK	int	10	Yes
	full_name	Full name of staff		varchar	255	Yes
	phone_num	Phone number of staff		varchar	15	Yes
	email	Email of staff		varchar	255	Yes
	role	Role of staff		varchar	50	Yes
	bank_details	Bank details of staff		varchar	255	Yes
	staff_status	The status of staff activation		varchar	50	Yes
admin	admin_id	Unique identifier for admin	PK	int	10	Yes
	full_name	Full name of admin		varchar	255	Yes
	phone_num	Phone number of admin		varchar	15	Yes
	email	Email of admin		varchar	255	Yes
	role	Role of admin		varchar	50	Yes
	bank_details	Bank details of admin		varchar	255	Yes

Database table name	Name of Attribute	Description	Primary Key (PK) or Foreign Key (FK)	Type	Field Length	Required
attendance	attend_id	Unique identifier for attendance	PK	int	10	Yes
	attend_date	The attendance date		date	-	Yes
	attend_time	The attendance time		time	-	Yes
	staff_id	Unique identifier for staff	FK	int	10	Yes
payroll	payroll_id	Unique identifier for payroll	PK	int	10	Yes
	staff_id	Unique identifier for staff	FK	int	10	Yes
	payroll_amount	The payroll amount received		decimal	10,2	Yes
	overtime_hours	The overtime hours of staff		int	10	Yes
	deductions	The deductions of staff		decimal	10,2	No

Database table name	Name of Attribute	Description	Primary Key (PK) or Foreign Key (FK)	Type	Field Length	Required
schedule	schedule_id	Unique identifier for schedule	PK	int	10	Yes
	shift_time	The shift time in schedule		time	-	Yes
	shift_date	The shift date in schedule		date	-	Yes
	staff_id	Unique identifier for staff	FK	int	10	Yes
shiftRequest	request_id	Unique identifier for shift request	PK	int	10	Yes
	staff_id	Unique identifier for staff	FK1	int	10	Yes
	schedule_id	Unique identifier for schedule	FK2	int	10	Yes
	request_date	The request date in shift request		date	-	Yes
	status	The approval status in shift request		time	-	Yes

Database table name	Name of Attribute	Description	Primary Key (PK) or Foreign Key (FK)	Type	Field Length	Required
notification	notification_id	Unique identifier for notification	PK	int	10	Yes
	content	Content of the notification		varchar	255	Yes
	notification_type	Type of notification		varchar	50	Yes
	update_timestamp	Timestamp of the last update		datetime	-	Yes
report	report_id	Unique identifier for report	PK	int	10	Yes
	report_title	Title of the report		varchar	255	Yes

APPENDIX C

Consent Form for Participation in the Puff Lab Portal Usability Survey

Introduction

Thank you for your willingness to participate in the Puff Lab Portal usability survey. Before you begin, I would like to provide some important information regarding the survey and how your data will be used.

Purpose of the Survey:

This survey is being conducted to assess the usability of the Puff Lab Portal. Your responses will help me understand how user-friendly the portal is and how I can improve its design and functionality.

Voluntary Participation:

Your participation is entirely voluntary. You may withdraw from the survey at any time without any consequences. You can also skip any questions you are not comfortable answering.

Confidentiality:

All information you provide will be kept strictly confidential. Your responses will remain anonymous, and no personally identifiable information will be shared with others. The data will be used only for the purpose of improving the Puff Lab Portal.

Duration:

The survey will take approximately **5-10 minutes** to complete.

Contact Information:

If you have any questions or concerns about the survey or your participation, please feel free to contact me at:

Phone: 010 5146418

Email: 79315@siswa.unimas.my

CONSENT

By signing below, you acknowledge that you have read and understood the information provided above and agree to participate in this survey.

Participant Name:

Signature:

Date:

Section A: Personal Information

Please provide your personal information below. This information will help us understand the different user groups taking part in this survey.

1. **Age:**
   - A. Below 18
   - B. 18-21
   - C. 22-25
   - D. 26 and above
2. **Gender:**
   - A. Male
   - B. Female
3. **Tester Role:**
   - A. Staff
   - B. Admin

Section B: Rating for System Usability Scale (SUS)

Please rate the following statements about your experience using the Puff Lab Portal. Choose a response that best reflects your agreement with each statement.

For each statement, select the option that best reflects your opinion:

No.	SUS question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
		1	2	3	4	5
1	I could see myself using this system more often in the future.					
2	I thought the system was too complicated.					
3	I found the system to be user-friendly.					
4	I think I would need help from a technical expert to be able to use this system.					
5	I found this system's functionalities effectively integrated.					
6	I found this system to be very inconsistent.					
7	I think that most individuals can quickly learn how to use this system.					
8	I felt awkward when I was using the system.					
9	I felt very confident when I was using the system.					
10	I needed to learn a lot of things before I could start using this system.					

Section C: Overall User Experience and Suggestions for Improvement

Please answer the following questions based on your overall experience using the Puff Lab Portal.

1. Do you encounter any problems when using the system? If yes, please describe them.

2. What improvements would you suggest for the Puff Lab Portal to enhance its usability or functionality?