An Agentic HR System Empowering Borderless Flexibility and Intelligent Attendance Management

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DOI: https://dx.doi.org/10.47772/IJRISS.2025.908000547

Received: 14 August 2025; Accepted: 20 August 2025; Published: 20 September 2025

ABSTRACT

The rapid advancement of digital technologies has heightened the need for intelligent, scalable, and automated solutions in human resource management. This paper presents WorkIQ, a cloud-based, multi-organization workforce management system designed to modernize traditional practices. Many organizations still depend on outdated, manual, or fragmented systems for attendance tracking, payroll processing, and employee human resource (HR) inquiries, resulting in inefficiencies, errors, and increased administrative workload. WorkIQ integrates GPS and QR code-based attendance tracking, automated payroll computation, AI-powered HR support, and real-time workforce analytics to address these challenges. Employees securely check in and out via mobile GPS verification or QR scanning, with attendance data automatically linked to payroll modules. A key innovation is the integration of an AI chatbot, powered by OpenAI, to handle routine queries regarding payroll, attendance, leave, and company policies reducing HR workload and improving response efficiency. The system is implemented using Firebase and Google Cloud technologies for real-time synchronization, high availability, and secure storage, with role-based access control and organizational data separation through Firestore subcollections. Developed using the Agile methodology, the system underwent iterative planning, development, testing, and refinement based on user feedback. Evaluation results demonstrate significant improvements in administrative efficiency, data accuracy, and employee satisfaction. With its focus on automation, security, and scalability, WorkIQ offers a cost-effective solution for organizations aiming to digitize and optimize workforce operations in line with Industry 4.0 standards.

Keywords: Workforce Management System, AI Chatbot, GPS Attendance Tracking, Cloud Computing, Industry 4.0

INTRODUCTION

Effective workforce management is crucial for enhancing organizational productivity, fostering employee satisfaction, and optimizing operational efficiency. However, many organizations still rely on outdated manual processes or fragmented digital solutions for attendance tracking, payroll management, and human resources (HR) support. The traditional method was characterized by the use of old-fashioned punch clocks, signatures on paper sheets, or other manual systems that required human oversight [1]. These traditional approaches often result in data inconsistencies, delayed payroll processing, and increased administrative burden. Payment delays and employee dissatisfaction are further contributed to by this manual process [2].

The rapid development of Industry 4.0 technologies, particularly cloud computing, artificial intelligence (AI), and mobile applications, has created new opportunities to modernize HR operations. Cloud-based systems provide scalable infrastructure for secure data storage and seamless access across devices, while AI-powered tools enable automation of repetitive HR tasks such as leave requests, payroll queries, and policy guidance where it has the potential to enhance the effectiveness of modern human resource management [3]. Cloud computing also enables efficient use of resources, easy scalability, removes the need to maintain hardware and

software, and ensures reliable data recovery [4]. GPS-enabled and QR code-based attendance tracking methods have been increasingly adopted due to their ability to reduce time fraud, enhance data accuracy, and offer location-aware verification for mobile workforces. Combining QR code scanning with location verification offers a strong solution to efficiently and securely manage and verify student attendance where this also can be apply for staff attendance tracking [5].

Furthermore, recent studies highlight the growing adoption of AI Chatbot in HR systems, which can significantly improve employee engagement and reduce HR service response times. This AI Chatbot is expected to bring significant changes to HR tasks, especially in candidate interviews and hiring decisions, driven by rapid and ongoing technological advancements. [6]. Moreover, integrating workforce analytics into staff management systems allows organizations to monitor performance trends, identify inefficiencies, and make data-driven decisions. The findings show that AI is being used in many HR processes like recruitment, training, performance reviews, and managing talent. The biggest benefits people mention are better decision-making, smoother operations, more personalized HR practices, and a stronger competitive edge for organizations [7]. Despite these advancements, there remains a need for integrated platforms that combine attendance tracking, payroll automation, AI-powered HR assistance, and real-time analytics into a single, scalable solution particularly for small and medium-sized enterprises that lack dedicated IT resources. With HR Analytics and AI, organizations now have transformative technologies that can fundamentally change HR processes and decision-making for the better [8].

The aim of this study is to design, develop, and evaluate a cloud-based smart staff management system that integrates GPS and QR code-based attendance tracking, automated payroll processing, AI-powered HR support, and real-time workforce analytics. The proposed system leverages cloud infrastructure to ensure scalability, security, and high availability, providing a cost-effective solution for organizations seeking to modernize their workforce management in line with Industry 4.0 standards.

Related Works

Section II presents an overview of existing workforce management systems and a comparison of key solutions to highlight their strengths and limitations.

A. Overview of Existing Systems

The current landscape of staff management systems is dominated by a combination of traditional and digital solutions, many of which still suffer from limitations that impair operational efficiency, scalability, and security. Traditional attendance systems, such as biometric scanners, RFID cards, and manual logbooks, remain prevalent across organizations. As example in education, traditional attendance taking, often done manually, can be quite time-consuming and exhausting for educators, especially when handling large classes [9]. As addition, this traditionally method for attendance was usually tracked manually through roll calls or sign-in sheets; where these ways are susceptible to mistakes and can be slow, particularly when dealing with large classes [10].

Although biometric technologies like fingerprint or facial recognition can mitigate proxy attendance, they entail inherent disadvantages. These systems necessitate physical presence, rendering them unsuitable for remote or hybrid working models, and they remain vulnerable to tactics like “buddy punching” in larger workplaces. Many workers feel pressured by biometric systems due to concerns about salary deductions if they are late [11]. Biometric systems also incur high costs and maintenance demands, aligning with broader concerns about data security and bias in biometric authentication systems. As example, in the tourism and hospitality world, hotels, airlines, and other service providers hold a lot of sensitive information, which unfortunately makes them attractive targets for cyberattacks [12].

Additionally, workforce management systems that utilize GPS tracking raise important ethical and legal considerations regarding employee privacy. In outdoor settings, the Global Positioning System (GPS), a type of Global Navigation Satellite System (GNSS), is predominantly used for tracking purposes [13]. Ensuring data privacy, obtaining user consent, and complying with data protection regulations such as GDPR and PDPA

are critical challenges faced by many existing solutions. Configurable privacy settings, anonymized reporting, and secure data access mechanisms are necessary to balance operational transparency with employee rights.

On the other hand, with the global economy evolving through digitalization, HR needs to use tech tools to drive better results for their organizations [14]. Many organizations have adopted fragmented digital HR tools. For example, businesses may separately use Zoho for attendance, QuickBooks for payroll, and standalone portals for leave management. This fragmentation leads to data silos, requiring HR teams to rely on manual reconciliation an error-prone and time-consuming process that can impair payroll accuracy and affect staff satisfaction. Thus, to get the best results from HR analytics, organizations must seriously assess its advantages and challenges, and promptly complete all essential preparations [15].

Moreover, the integration of advanced technologies like cloud computing and AI remains limited in current staff management solutions. While enterprise-level platforms such as Oracle HCM and SAP SuccessFactors offer cloud and AI capabilities, their cost and complexity often render them inaccessible to Small and Medium Enterprises (SMEs). They also typically lack multi-tenant architecture, which hinders serving multiple organizations from a single instance. Their AI features tend to be rule-based chatbots with limited adaptability to context-specific or dynamic HR queries. Supporting this, Gartner reported in early 2024 that only 38% of HR leaders were piloting, planning, or already implementing generative AI, with many still at exploratory stages [16].

B. Workforce Management Systems Comparison

Existing workforce management systems range from traditional manual methods and standalone digital tools to large enterprise platforms such as SAP SuccessFactors and Oracle HCM. Traditional methods like biometric scanners and manual logs are often slow, error-prone, and unsuitable for remote work. Fragmented digital HR tools provide more flexibility but result in data silos and inefficiencies due to poor integration. Enterprise platforms offer advanced cloud and AI capabilities but are expensive and complex, limiting adoption by SMEs.

WorkIQ differentiates itself with an integrated, cloud-native, multi-tenant platform that supports GPS/QR-based attendance, automated payroll, and AI-driven HR support. Unlike traditional or fragmented systems, WorkIQ is scalable and adaptable to organizations of various sizes and supports hybrid and remote work. Its AI delivers intelligent, context-aware assistance beyond basic rule-based chatbots. This combination improves efficiency, reduces administrative burden, and enhances accessibility for diverse users. The following table shows the key differences between these systems and clearly highlights the strengths and capabilities of WorkIQ.

Table 1 Comparison between Existing Workforce Management Systems and WorkIQ

Category	Existing Systems	Proposed Smart Staff Management Application (WorkIQ)
Attendance Tracking	Biometric, RFID, manual logs. Requires on-site presence [17] [18]. Susceptible to buddy punching.	GPS-based mobile check-in with geolocation validation. Supports remote and hybrid work setups. ✔
Hardware Dependency	Requires physical devices (e.g., fingerprint scanners, RFID readers) [17]. High maintenance cost.	Cloud-based and mobile-first. Minimal hardware requirements. ✔
System Integration	Fragmented systems for HR, attendance, payroll (e.g., SAP HR, Oracle PeopleSoft). Manual data reconciliation required [19].	All-in-one integrated system: attendance, payroll, leave, profile management in one platform. ✔
Payroll Processing	Manual or semi-automated. Prone to errors due to data mismatches [20].	Automated payroll generation linked directly with attendance data and analytics. ✔
AI Chatbot Assistance	Rare, often rule-based and limited understanding of human context and nuances [21]. Limited self-service capabilities.	OpenAI-powered dynamic HR chatbot capable of answering personalized queries and guiding staff. ✔

Workforce Analytics	Basic or unavailable, limited knowledge in analytics [22]. No real-time insights or visual dashboards.	Advanced analytics and dashboards for productivity, salary trends, and workforce health. ✔
Scalability and Multi-Organization	Limited scalability and impact on employees [23]. Most systems serve a single organization only.	Cloud-hosted, multi-tenant platform supporting multiple organizations from one backend. ✔
Accessibility	Desktop-based or web-based [24], on-premise. Limited mobile support.	Fully responsive web and mobile applications accessible anywhere, anytime. ✔
Security and Cloud Infrastructure	On-premise or private servers [25]. Risk of data loss and unauthorized access.	Secure, scalable cloud infrastructure with role-based access control and encrypted data. ✔
Cost Efficiency	High setup and maintenance cost for hardware, software and licenses [25].	Cost-effective cloud solution. Pay-as-you-grow model suitable for SMEs and startups. ✔
Application design and UX	Client-Server (C/S) application, complex maintenance and compatibility issue [26].	Modern, user-friendly UI/UX with customizable organization branding and modular features. ✔

METHODOLOGY

For the development of WorkIQ, we have adopted agile methodology due to its iterative, flexible, and user-centric approach. Unlike traditional Waterfall models, Agile allows for continuous feedback, adaptive planning, and incremental delivery, critical factors for a complex, multi-module system like WorkIQ that integrates cloud computing, AI, and real-time workforce analytics. As additional, the survey and data collection related these HR components and case study have been conduct together with HR officer.

Agile is particularly suited for this project because:

1. Changing Requirements: HR and workforce management needs evolve rapidly; Agile allows us to pivot based on stakeholder feedback.
1. Modular Development: WorkIQ's components (attendance, payroll, chatbot) can be developed and tested independently in sprints.
2. Early and Continuous Testing: Reduces risks by detecting issues early (e.g., GPS drift in attendance tracking).
3. Stakeholder Collaboration: Regular demos ensure HR managers and employees align with the system's progress.

Proposed Solution Module

Section IV explains the WorkIQ proposed solution module including high-level design, proposed system design and graphical user interface (GUI) design.

A. High Level Design

The high-level design of WorkIQ: Smart Staff Management System adopts a modular and scalable architecture tailored for multi-organization deployment on a single cloud platform. The system automates routine HR operations, enhances payroll accuracy, increases process transparency, and supports remote or hybrid workforce management through mobile-enabled services. It consists of six core components:

1) Mobile Application (Employee Interface)

The mobile application serves as the primary interaction channel for employees, offering a user-friendly and secure interface. Key functionalities include GPS-based attendance check-in/check-out, QR code scanning for

attendance verification, salary history access, leave request submission, and AI Chatbot communication. GPS-based attendance includes geofencing to validate employee location within an authorized radius, effectively preventing fraudulent check-ins.

2) Web Dashboard (HR/Admin Interface)

The web-based dashboard functions as the administrative hub for HR managers and organizational administrators. It provides real-time monitoring of staff attendance, leave approval workflows, payroll processing, and organization-level configuration management. The dashboard also includes data visualization tools such as punctuality trend charts, overtime reports, and department-wise performance analytics facilitating data-driven decision-making.

3) Firebase Backend (Realtime Database and Firestore)

Firebase acts as the system's backend infrastructure, handling user authentication, role-based access control, real-time synchronization, and secure data storage. Operational data such as attendance logs, payroll details, user profiles, and organizational metadata are stored in Firestore. The use of subcollections enables data isolation between organizations, ensuring privacy and integrity within a multi-tenant environment.

4) AI Chatbot Module (OpenAI Integration)

A key innovation of WorkIQ is the AI-powered HR assistant integrated via OpenAI's API. This chatbot allows employees to retrieve personalized information regarding attendance records, leave balances, payroll status, and company policy details. Its context-aware functionality tailors responses based on user role and profile data, significantly reducing repetitive HR workload.

5) Attendance Tracking System (GPS and QR)

WorkIQ supports dual attendance methods: GPS-based location verification and QR code scanning. GPS tracking verifies employee proximity to designated work locations, while QR codes placed at entry points enable quick and secure attendance logging. These mechanisms prevent attendance manipulation (e.g., buddy punching) and are adaptable for field operations or hybrid work arrangements.

6) Payroll and Analytics Module

This module automates payroll computation using attendance records, working hours, overtime data, rest time, and applicable bonuses or deductions. Once payroll is processed, employees can download their payslips directly via the mobile application. The analytics feature provides HR managers with comprehensive metrics such as productivity scores, lateness frequency, and attendance compliance rates aggregated across departments or customizable timeframes.

B. Proposed System Design

WorkIQ adopts a multi-layered, cloud-based architecture that integrates mobile and web clients, real-time data synchronization, and AI-driven services. The architecture is designed to ensure high availability, modularity, and flexibility, enabling deployment for organizations of various sizes within a shared yet securely partitioned environment. The architecture is organized into five layers: Presentation Layer, Application Logic Layer, Data Layer, Integration Layer, and Security and Scalability Layer as shows in Fig. 1.

1) Presentation Layer

The presentation layer represents the system's user-facing interface and consists of two main components. The Mobile Frontend, developed using Flutter, enables employees to perform attendance check-in and check-out

via GPS or QR code, manage personal profiles, view payroll details, submit leave requests, and interact with the AI-powered chatbot. This application supports both Android and iOS platforms, prioritizing usability and secure access. The Web Frontend is a responsive, browser-based dashboard designed for HR personnel and administrators to manage daily operations, review analytics, and process payroll. It is developed using HTML, CSS, and JavaScript, with Firebase SDK integration for seamless real-time data interaction.

2) Application Logic Layer

The application logic layer executes the system's core business rules and manages workflow coordination. The Attendance Verification Module validates GPS coordinates or scanned QR codes before recording attendance events. The Payroll Computation Engine automatically calculates salaries, overtime, rest periods, bonuses, and deductions based on attendance records. The Chatbot Processing Module connects to OpenAI's API to process natural language queries, generating context-aware responses using data from Firestore. The Notification Dispatcher delivers real-time alerts, such as attendance confirmations or leave approval updates, via Firebase Cloud Messaging (FCM).

3) Data Layer

The data layer is responsible for secure data management and real-time synchronization across the system. The Cloud Firestore Database stores structured data, including user profiles, attendance logs, payroll records, and leave requests, with multi-tenancy implemented through organization-specific sub collections. The Firebase Cloud Storage service stores files such as profile images, payslip documents, and organizational resources like HR policies. Additionally, Realtime Listeners monitor database changes and instantly propagate updates to connected clients.

4) Integration Layer

The integration layer connects the system to external services for enhanced functionality. The OpenAI API powers the AI-driven HR chatbot, enabling natural language understanding and response generation. The Google Maps API validates GPS coordinates during attendance submissions. Firebase Authentication manages secure user authentication, account creation, and session control. Firebase Cloud Messaging (FCM) delivers push notifications for alerts and reminders.

While WorkIQ is designed with a modular, API-driven integration layer that offers flexibility to connect with external systems, integration with major enterprise platforms such as ERP and HRIS (e.g., SAP, Oracle, BambooHR) remains part of our future development plans and has yet to be implemented or tested. We recognize that seamless integration is crucial for larger organizations to adopt new solutions smoothly. Therefore, our next steps include developing middleware solutions and aligning with industry standards to enable easy and reliable data sharing. These planned improvements will help WorkIQ integrate smoothly into existing enterprise environments, making it a more versatile and scalable tool for diverse workforce management needs.

5) Security and Scalability Layer

The security and scalability layer ensure operational resilience, data protection, and system growth capability. Role-Based Access Control (RBAC) restricts data access according to predefined user roles, such as administrator, HR personnel, and employee. Data Encryption secures all communications and stored data using HTTPS and Firebase Security Rules. Scalability is achieved through Firebase's serverless infrastructure and Firestore's document-oriented model, allowing horizontal scaling to handle large volumes of concurrent users and real-time operations with minimal latency.

Data privacy and employee consent are integral parts of the system's security framework. WorkIQ enforces data encryption, role-based access controls, and privacy settings compliant with international data protection standards, ensuring that sensitive location and attendance data is protected and accessed only by authorized personnel.

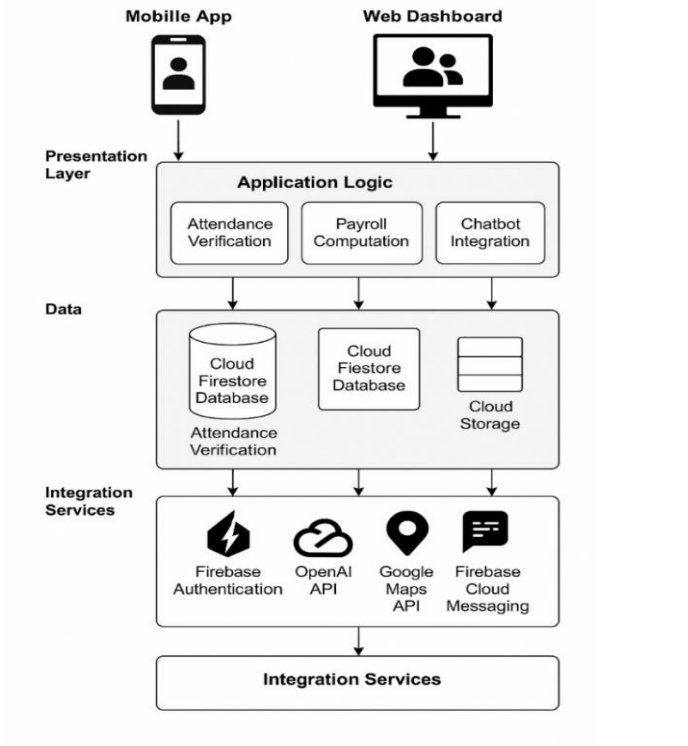


Fig1 Proposed System Design

C. User Interface Design

User Interface (UI) design refers to the process of creating and structuring the visual and interactive components of a system or application with which users interact. This WorkIQ application developed with the user interface functionality for Staff/User and Manager point of view.

1) Staff/User

Fig. 2.(a) and Fig. 2.(b) represent the graphical user interface (GUI) of WorkIQ application, which are Fig. 2.(a) shows the Welcome Page and Fig. 2.(b) shows Login Page. The staff required to be authorized by entering the login credentials or use the biometric fingerprint to log in into their respective accounts. For new staffs, they are required to register their own account by sign up the WorkIQ application.

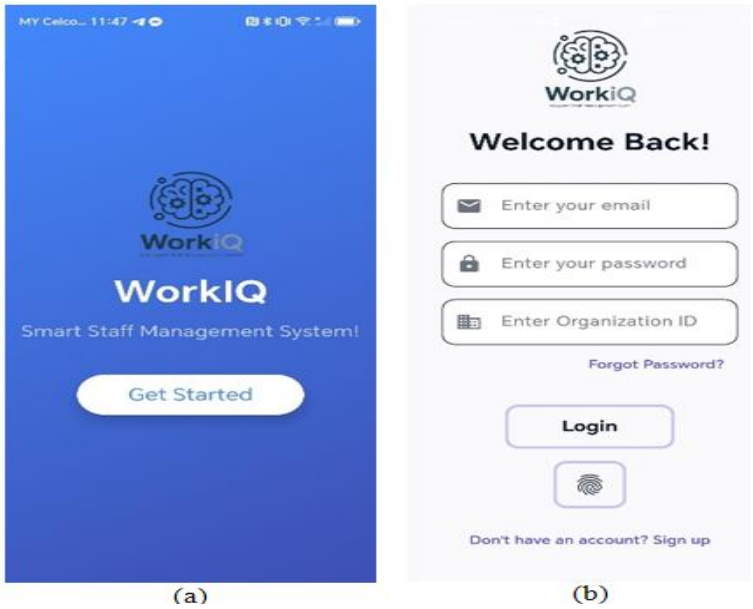


Fig. 2 (a)Welcome Page, (b)Login Page

Next, the Fig. 3.(a) below shows the GUI of Home Page of the staff after they successfully logged in into their account. There are multiple navigations to be choose from this Home Page. Staff also will do punch in for their attendance with the exact location place by pressing the update location features. While, Fig. 3.(b) shows the Payroll Page where it features the Latest Salary the staff received and comparison charts of each months salaries. The latest salary modal can be click to view a more detailed description of the payroll.

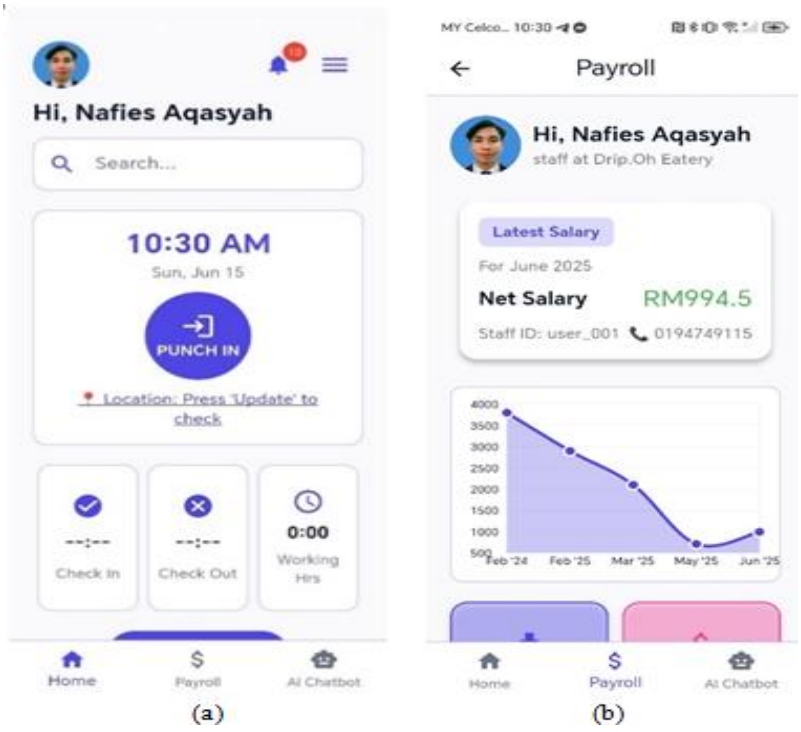


Fig. 3 (a) Home Page, (b) Payroll Page 1

Other than that, Fig. 4.(a) below shows the Payroll Page where the users has the options to either download current payslip, request for advance salary, view payroll history and report for dispute salaries. As example, Fig. 4.(b) shows the Payroll History Page where it display the summaries of each payroll in each months of the user wants to view a more detailed payroll data of a month, the user should tap on the down arrow button.

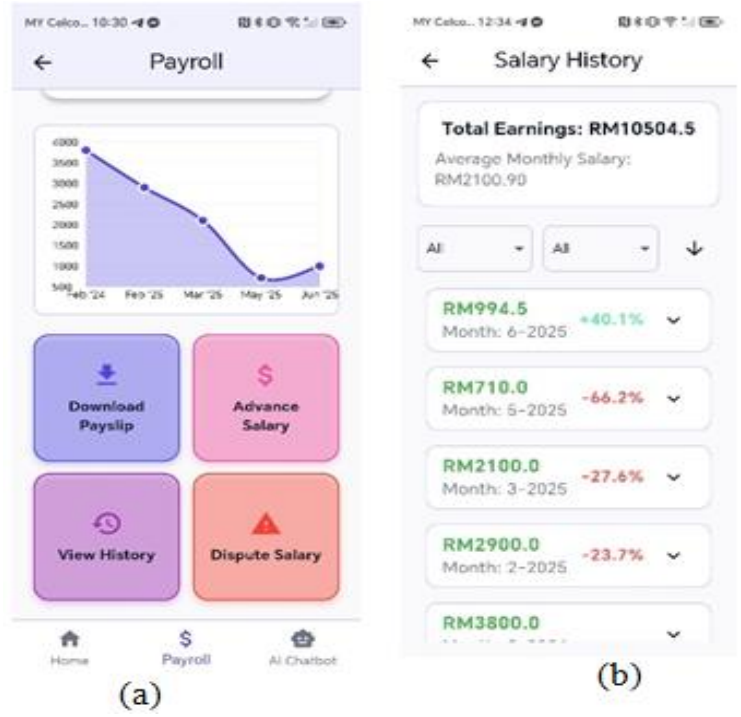
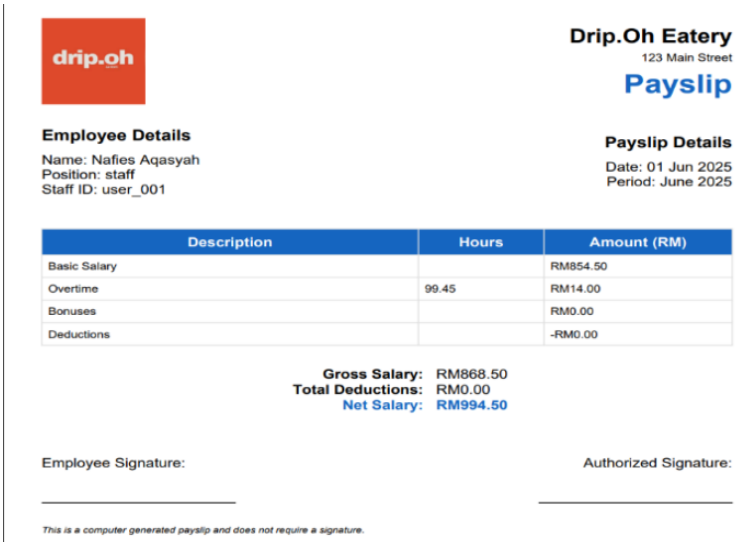


Fig. 4 (a) Home Page, (b) Payroll Page 1

Next, Fig. 5 below shows the detailed payroll history which displays all the necessary data of a selected payroll in a month. This detailed downward pop out will be display when the user clicks on the down arrow of payroll cards.

Fig. 5 Detailed Payroll History

Fig. 6 shows the Payslip PDF which is auto generated when the user clicks on the option “Download PDF” from the Payroll Page. It will display a formal payslip pdf of a staff of the latest payslip received.


drip.oh

Drip.Oh Eatery
123 Main Street

Payslip

Employee Details
Name: Nafies Aqasyah
Position: staff
Staff ID: user_001

Payslip Details
Date: 01 Jun 2025
Period: June 2025

Description	Hours	Amount (RM)
Basic Salary		RM854.50
Overtime	99.45	RM14.00
Bonuses		RM0.00
Deductions		-RM0.00

Gross Salary: RM868.50
Total Deductions: RM0.00
Net Salary: RM994.50

Employee Signature:

Authorized Signature:

This is a computer generated payslip and does not require a signature.

Fig. 6 Payslip PDF

2) Manager View

Fig. 7.(a) and Fig. 7.(b) represent the graphical user interface (GUI) of WorkIQ application for Manager functionality. Fig.7.(a) shows the Manager Dashboard Page where it includes manager tools including Team

Attendance Page, Approvals Page, Announcements Page and Location Management Page. For Fig. 7.(b), its shows the Team Attendance Page where it shows the current day team attendance data of each staff member where it also states whether the staff has check in attendance or not.

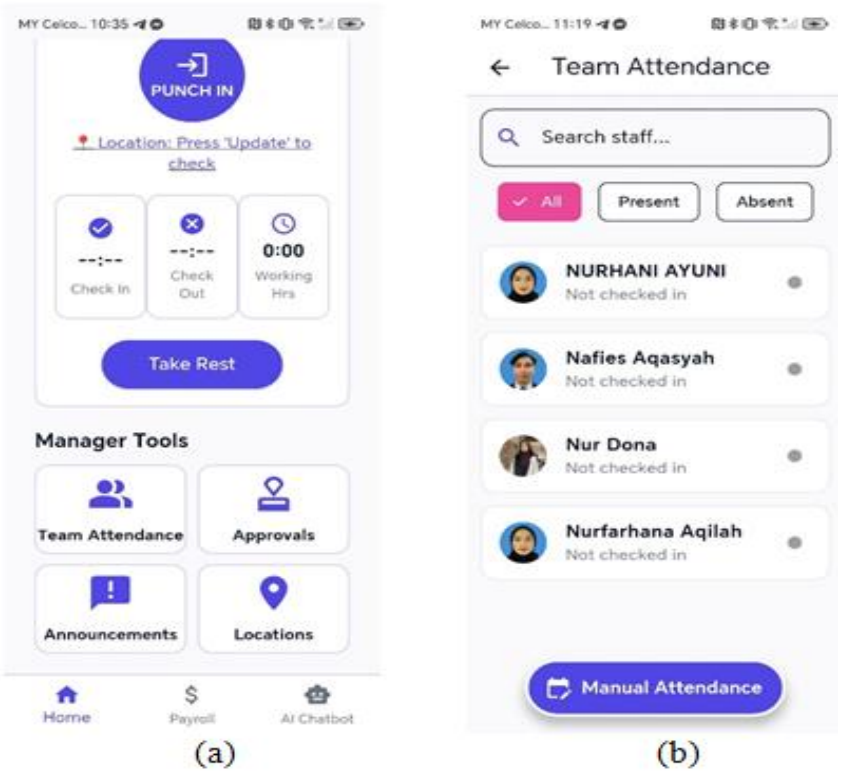


Fig. 7 (a) Manager Dashboard Page 2, (b) Team Attendance Page

Related to attendance, this application also has manual attendance functionality as shows in Fig. 8. below. This will conduct by the manager to input the attendance credentials of the staff who requires for manual attendance. All credentials need to be filled before submitting it.

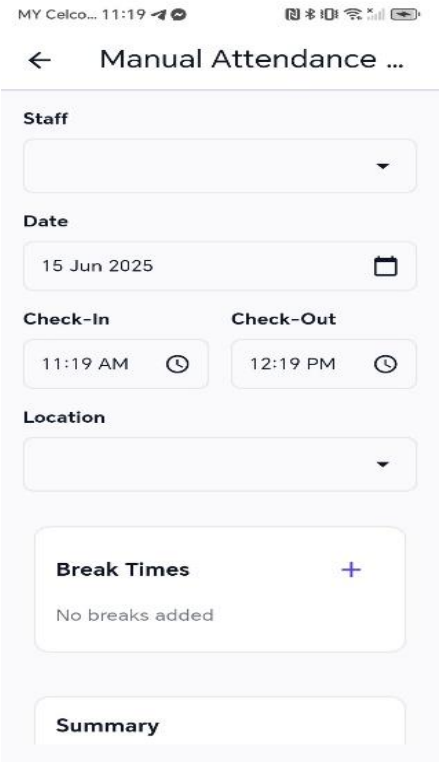


Fig. 8 Manual Attendance Page

Next, the Fig. 9.(a) below shows the Leave Approvals Page where in this page the manager can view pending leave requests by the staff and approved requests. It also includes the features to approve and update the status of each requests. While, for Fig. 9.(b) shows the Location Managements Page where it integrates Google Maps to view the pin points location of all the registered organizations locations in the map. It also includes the features for the manager to either delete or edit any existing locations.

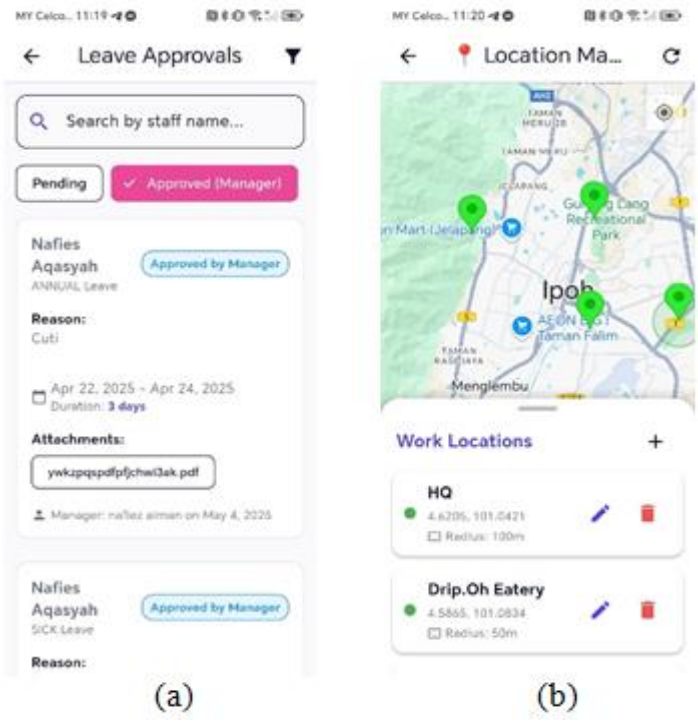


Fig. 9 (a) Leave Approvals Page, (b) Location Managements Page

3) HR/ Owner View

For HR/Owner view, it was developed using Web Application as shows in below figures. There are several User Interface that related for HR/Owner view. For Fig. 10, it shows the Home Page where it includes some HR/Owner Management Tools including Staff Management, Leave Request Approvals, Attendance Managements, Payroll managements and Company Policies Managements.

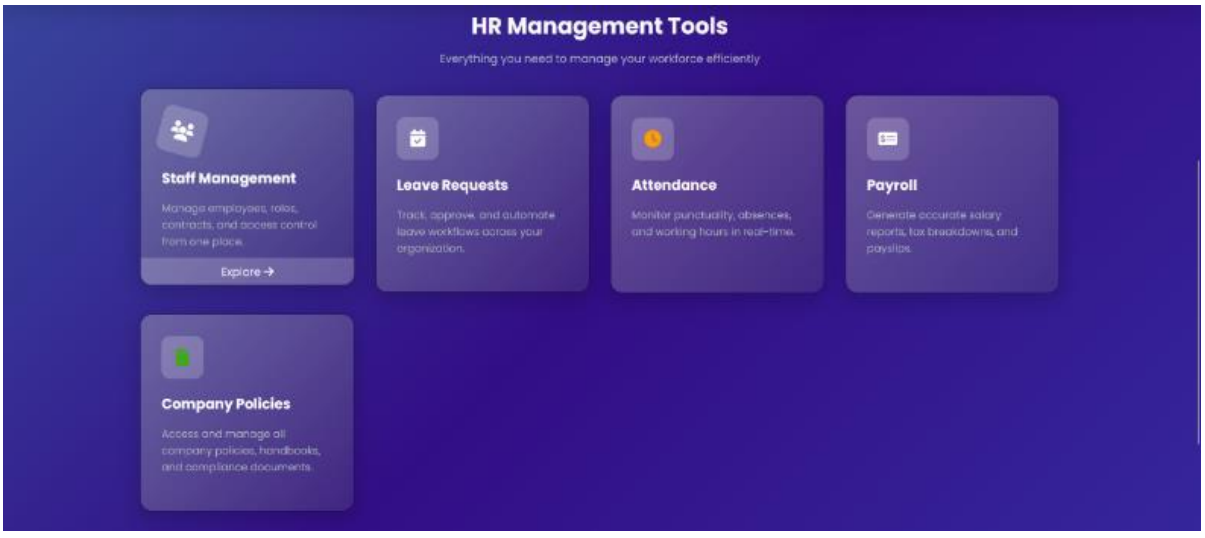


Fig. 10 Home Page 2

For Fig. 11. below shows the Staff Management Page where it first displays all the staff in summary cards. The user can view a more detailed staff informations by clicking on the staff cards.

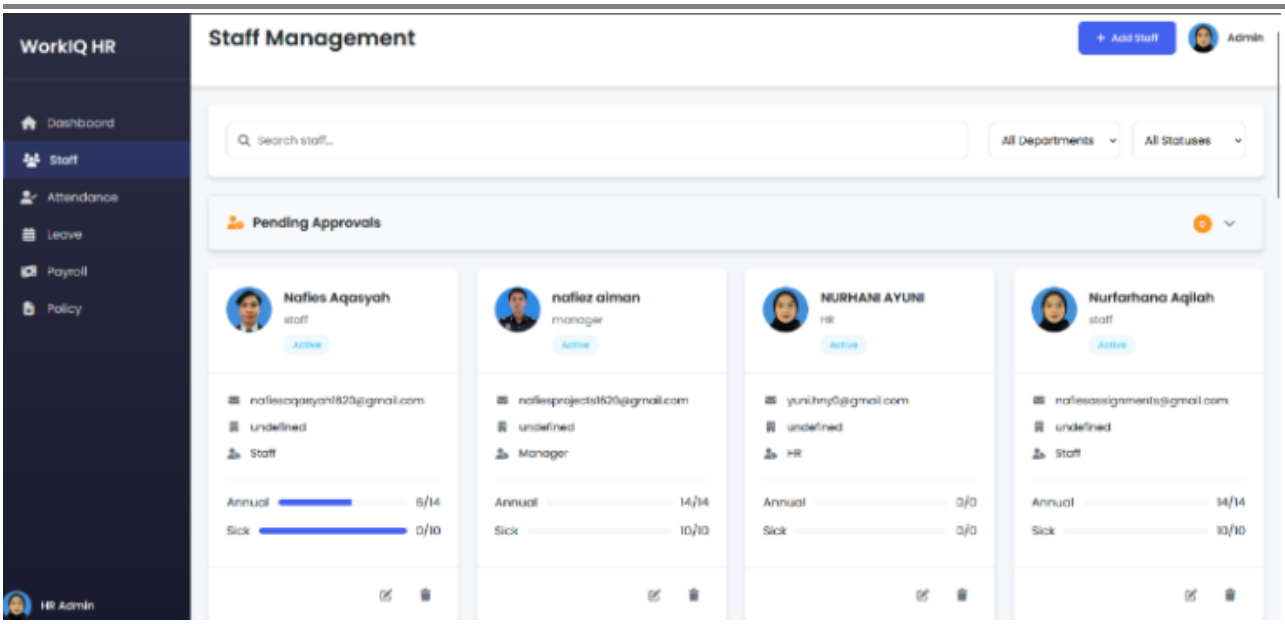


Fig. 11 Staff Management Page 1

User Acceptance Test

To ensure that the WorkIQ system effectively addressed real-world requirements for usability, functionality, and reliability, a comprehensive User Acceptance Testing (UAT) exercise was conducted from the perspective of actual end users. The participants represented key roles such as HR officers, general staff, and system administrators. Each was given test accounts and actively interacted with the system on a daily basis to perform a variety of HR-related tasks, including clocking in and out, submitting leave applications, reviewing salary history, generating payslips, updating personal profiles, and engaging with the AI-powered HR Chatbot. This practical, hands-on involvement offered meaningful insights into the system's performance and overall user experience, which are summarized in the UAT results below

A. Test Data for User Authentication

This section presents the test data and results for the Login and Register Account modules of the WorkIQ Mobile Application (Version V1), tested on 11/08/2025.

1) Login

System	**WorkIQ Mobile Application**
Version	V1
Module/Unit	Login
Revision	–
Tested By	Nafies Aqasyah
Date	11/08/2025

Table2 Login modules

Test Case ID	Test Scenario	Test Steps	Test Data	Results
UA-LOGIN-01	Login with valid credentials (staff)	1. Open app → Login screen 2. Enter registered staff email, correct password and organization ID 3. Click Login	Email: staff1@workiq.com Password: StrongPass!23 Organization ID: org_001	User is authenticated; redirected to staff home/dashboard; session token created; last login timestamp updated.

UA-LOGIN-02	Login with valid credentials (manager)	1. Enter manager email & password 2. Click Login	Email: manager@workiq.com Password: MgrPass2025	Manager is authenticated; redirected to manager dashboard and manager-only menu/options visible.
UA-LOGIN-03	Login with incorrect password	1. Enter registered email 2. Enter wrong password 3. Click Login	Email: staff1@workiq.com Password: wrong pass	Authentication fails; show error "Invalid email or password"; no session created; login attempts count incremented (if implemented).
UA-LOGIN-04	Login with unregistered email	1. Enter non-existent email and any password 2. Click Login	Email: nobody@workiq.com Password: whatever	Error "Account not found"; suggest register or contact admin.
UA-LOGIN-05	Empty email or password fields	1. Leave email blank and/or password blank 2. Click Login	Email: (empty) / Password: (empty)	Inline validation: required-field message(s) shown; login not attempted.
UA-LOGIN-06	Login while account is disabled/blocked	1. Enter credentials for account flagged disabled 2. Click Login	Email: suspended@workiq.com Password: Pass123	Show message "Account disabled / contact admin"; no session created.

2) Register Account

System	**WorkIQ Mobile Application**
Version	V1
Module/Unit	Register Account
Revision	–
Tested By	Nafies Aqasyah
Date	11/08/2025

Table3 Register Account modules

Test Case ID	Test Scenario	Test Steps	Test Data	Results
UA-REG-01	Login with valid credentials (staff)	4. Open app → Login screen 5. Enter registered staff email, correct password and organization ID Click Login	Email: staff1@workiq.com Password: StrongPass!23 Organization ID: org_001	User is authenticated; redirected to staff home/dashboard; session token created; last_login timestamp updated.
UA-REG-02	Login with valid credentials (manager)	3. Enter manager email & password 4. Click Login	Email: manager@workiq.com Password: MgrPass2025	Manager is authenticated; redirected to manager dashboard and manager-only menu/options visible.
UA-REG-03	Login with incorrect password	4. Enter registered email 5. Enter wrong password 6. Click Login	Email: staff1@workiq.com Password: wrongpass	Authentication fails; show error "Invalid email or password"; no session created; login attempts count

				incremented (if implemented).
UA-REG-04	Login with unregistered email	3. Enter non-existent email and any password 4. Click Login	Email: nobody@workiq.com Password: whatever	Error "Account not found"; suggest register or contact admin.
UA-REG-05	Empty email or password fields	3. Leave email blank and/or password blank 4. Click Login	Email: (empty) / Password: (empty)	Inline validation: required-field message(s) shown; login not attempted.
UA-REG-06	Login while account is disabled/blocked	3. Enter credentials for account flagged disabled 4. Click Login	Email: suspended@workiq.com Password: Pass123	Show message "Account disabled / contact admin"; no session created.

B. Test Data for User Leave Approval

Fig. 12. shows the Leave Approvals test where in this page the manager can view pending leave requests by the staff and approved requests. It also includes the features to approve and update the status of each requests.

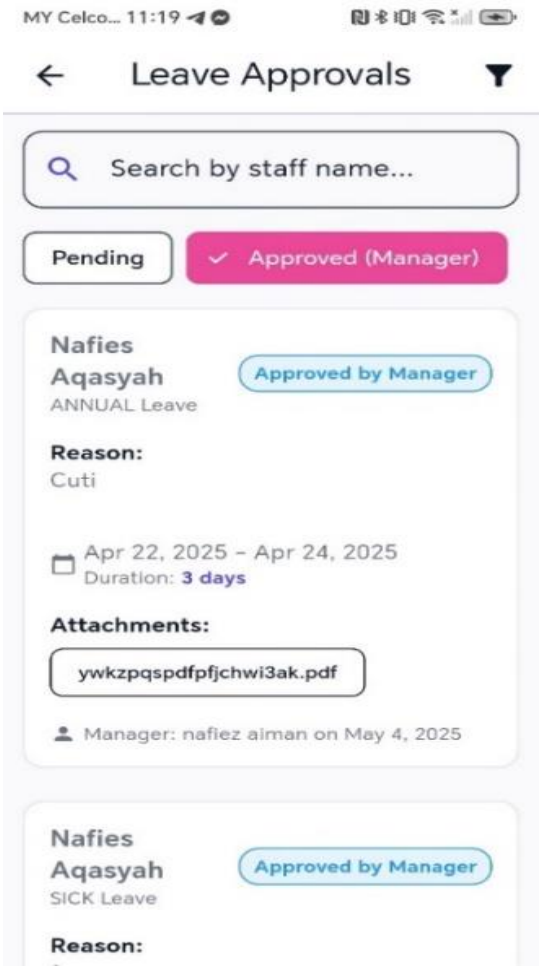


Fig. 12 Leave Approvals Test

C. Test Data for HR Administration Attendance Tracking

Fig. 13 shows the HR Administration Attendance Tracking where the user can view the total number of staff who present, absent, late and anomalies attendance today. It also features all the attendance data in tabulated format which can be filter.

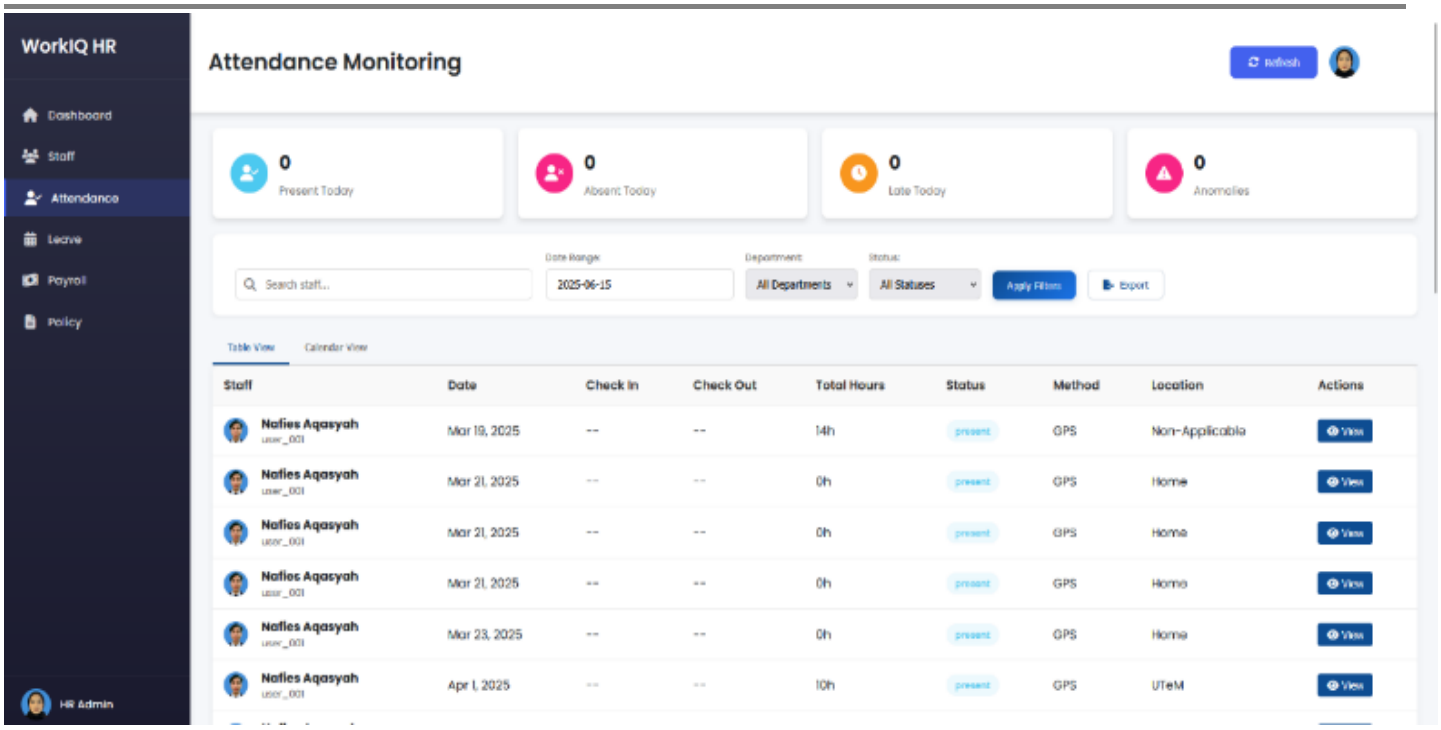


Fig. 13 HR Administration Attendance Tracking Test

D. Test Data for Payroll Management Test

Fig. 14 shows the Payroll Management Page where it includes the Monthly Payroll Summary, Salary Trends Analysis, Overtime Monitoring, Dispute Analysis and Advance Salary Requests reports in cards where it all includes different kinds of graphs and charts for a better decision making by HR/ Owner.

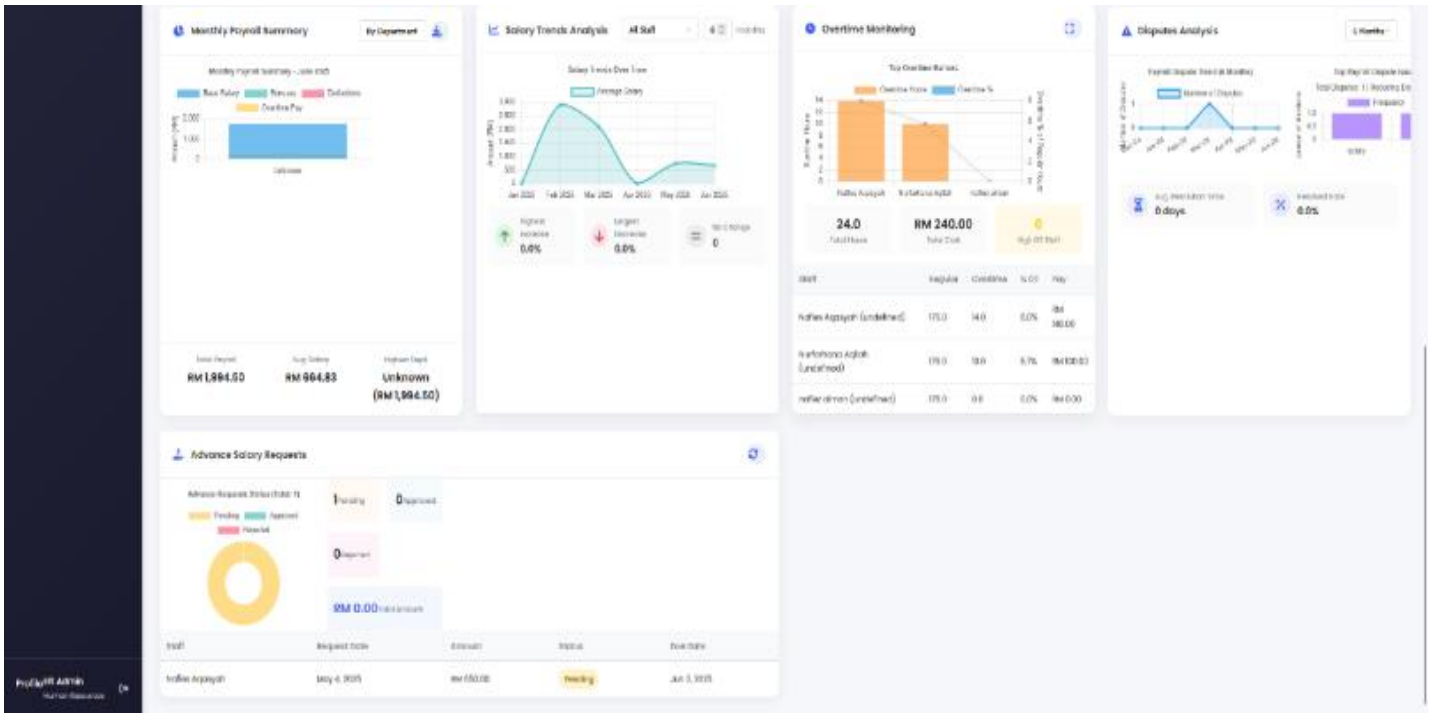


Fig. 14 Payroll Management Test

Overall, each module in the system was carefully designed to support workforce management automation, improve operational efficiency, and promote transparency. The active involvement of real users during UAT confirmed that the WorkIQ system meets their practical needs and expectations, demonstrating its readiness for real-world use.

CONCLUSION

This paper presented WorkIQ: Smart Staff Management System, a multi-tenant, cloud-based solution designed to automate and optimize workforce management processes for organizations of various scales. The system integrates GPS/QR-based attendance tracking, automated payroll computation, and AI-powered HR support, delivered through mobile and web interfaces with real-time synchronization via Firebase. By addressing the limitations of both traditional attendance systems and fragmented digital HR tools, WorkIQ improves operational efficiency, reduces administrative overhead, and supports hybrid as well as remote work environments. The modular and scalable architecture ensures adaptability, security, and performance, enabling the system to evolve alongside organizational needs.

LIMITATIONS

While WorkIQ leverages Google Cloud and Firebase to provide robust real-time performance and secure data management, this reliance introduces potential vendor lock-in concerns and scalability challenges. These issues may particularly affect deployment in regions with cloud service restrictions, possibly limiting the system's flexibility and accessibility for some organizations. We recognize these limitations as important considerations for broader adoption. Addressing them will be a key focus of future development, including exploring multi-cloud deployment strategies and containerization technologies to enhance portability, resilience, and compliance with various regional regulations.

FUTURE WORK

Future work and for further expand its capabilities, WorkIQ could incorporate advanced generative AI features to provide intelligent policy recommendations, predictive analytics, and sentiment analysis, potentially improving the quality of organizational decision-making. The addition of multi-language support could also make the platform more accessible and inclusive for a diverse, multinational workforce. Another suggested enhancement is the development of customizable analytics dashboards, allowing organizations to define, track, and visualize key performance indicators (KPIs) in ways that best fit their operational needs. In addition, to overcome challenges related to cloud vendor lock-in and scalability, future development will look into using multi-cloud approaches and containerization. These steps will help make WorkIQ more portable, resilient, and better able to follow regional rules, ensuring the system stays flexible and reliable across a variety of enterprise environments.

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