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RESEARCH ARTICLE

Design of The Employee Presence Application CV. Pramana Mukti Jaya Utilizes Extreme Programming Methods and Leaflet.JS Technology

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Abstract
Managing employee absences is an integral part of company operations. This research aims to develop an employee attendance web application at CV Pramana Mukti Jaya with the integration of Leaflet.js technology. This application enables efficient and accurate attendance reporting through a responsive web interface. The development method used is the Extreme Programming (XP) Method for fast iteration and active stakeholder participation. Analysis of functional and non-functional requirements is carried out in the initial phase. Employees can record attendance directly via a web form, with an interactive map from Leaflet.js making it easy to select an absence location. Testing was conducted to verify accuracy and ease of use. The result is an effective employee attendance web application at CV Pramana Mukti Jaya, with Leaflet.js providing significant visualization. It is hoped that this application will increase the efficiency and accuracy of attendance management, as well as introduce the benefits of Leaflet.js technology in web-based applications, providing a better user experience for employees.

Keywords
Employee Attendance; Web-based Applications; Extreme Programming Methods; Leaflet.JS Integration.

1 | INTRODUCTION

Attendance is a crucial process in managing employees in various companies. This process records the comings and goings of employees, which is an important indicator in monitoring the time they spend working. Traditionally, attendance is carried out manually using an attendance book or attendance card which must be filled in and signed by the employee. However, with advances in information technology, manual attendance systems increasingly appear inefficient and prone to errors. The use of manual attendance systems often results in inaccurate data, which can negatively affect employee management and payroll processes.

The development of an employee attendance application is crucial for modern organizations to streamline the attendance process and ensure accurate tracking of employee attendance. Several studies have focused on the design and implementation of attendance applications using various technologies such as Quick Response (QR) codes, fingerprint validation, geotagging, and mobile-based systems. For example, Kurniadi *et al*. (2022) emphasizes the development of an application that utilizes Quick Response Code for employee attendance, aiming to enhance the accuracy of attendance records and provide features for informing absences due to illness or permission (Kurniadi *et al*., 2022). Similarly, Umarjati & Wibowo (2020) proposed the implementation of a system that incorporates JWT for employee attendance, enabling seamless check-in and check-out data without location constraints, particularly for remote work scenarios (Umarjati & Wibowo, 2020). Moreover, the use of mobile applications for employee attendance, coupled with network filters and IMEI validation, has been explored to ensure proper monitoring while maintaining management integrity (Sasongko *et al*., 2020). Additionally, the integration of voice user interface (VUI) and speech recognition technologies has been considered to enhance the user experience and address attendance validation (Arisandy & Rudi, 2021). Furthermore, the utilization of Global Positioning System (GPS) and mobile-based systems has been highlighted to facilitate attendance monitoring and prevent the spread of viruses such as COVID-19 through attendance machines (Yusuf & Afandi, 2020). for students using technologies such as QR codes and Radio Frequency Identification (RFID) have been explored to simplify the attendance process and eliminate manual signature systems (Satrio *et al*., 2017; Kurniadi *et al*., 2020). These studies collectively underscore the significance of leveraging advanced technologies to design efficient and reliable employee attendance applications.

One of the main challenges faced by companies with manual attendance systems is data inaccuracy. Employees often make mistakes in recording check-in and leave times, which leads to inaccurate attendance information. This can have a negative impact on the proper calculation of total hours worked and payroll processing. Apart from that, manual attendance systems also face limitations in the transparency of attendance data management. Physical attendance books must be stored in a specific location, which results in limitations in data accessibility for management. This has implications for less efficient supervision and difficulties in tracking and managing employee attendance with the required transparency. Constraints in data processing efficiency are also a critical issue in manual attendance systems. Manual processes involving manual data entry and separate calculation of working hours take quite a long time. This disrupts the company's overall operational efficiency and impacts overall productivity. In the midst of such conditions, CV Pramana Mukti Jaya, a company that faces similar problems with the use of a manual attendance system, is considering adopting a more modern solution. In this digital era, technological developments have brought new innovations in employee attendance management, namely digital or online attendance systems. This system has proven itself to be an effective solution to overcome various challenges that arise with traditional attendance systems. Therefore, this research will explore various important aspects of digital attendance, including its benefits in increasing efficiency, transparency and accuracy in managing employee attendance.

2 | BACKGROUND THEORY

The design of employee presence applications is influenced by various aspects, including job design, affective presence, employee engagement, and empowerment. The design of such applications is influenced by psychological states resulting from job dimensions, individual growth need strength, and affective reactions of employees to the job and work setting. Additionally, the affect-as-information theory is applied to analyze the relationship between leader affective presence and employee proactive customer service performance in hospitality organizations. Furthermore, the design and development of employee presence applications involve needs analysis, job design, transformational leadership, and knowledge-sharing practices to enhance employee job satisfaction and innovative behavior. The application of psychological empowerment, structural empowerment, and resource dependency theories also plays a role in influencing innovative behavior and service design for employee-driven innovation. Moreover, the design of employee presence applications is influenced by the employer branding mix model,

environmental comfort-based methodology, and social influence theory, which impacts employee commitment, comfort, and usage of communication platforms. Additionally, the application of bio-design methodologies and field booking applications contributes to the development of innovative and user-centric employee presence applications .The theory regarding employee presence application design encompasses a multidisciplinary approach, integrating aspects of job design, affective presence, employee engagement , empowerment, leadership, and organizational behavior to create effective and user-friendly applications that cater to the needs and satisfaction of employees.

The Extreme Programming (XP) methodology has been successfully applied in various software development projects, such as the design of teaching workload calculation applications, blood donor search applications, food product information system development, and e-marketplace for in-game currency. These studies demonstrate the versatility of XP in different application domains, showcasing its effectiveness in developing diverse software systems. XP's iterative and collaborative approach, as evidenced in the aforementioned studies, can be beneficial in the design of an employee attendance application for CV. Pramana Mukti Jaya. The iterative nature of XP allows for continuous feedback and adaptation to changing requirements, ensuring that the application meets the specific needs of the organization. Additionally, the collaborative aspect of XP promotes active stakeholder involvement, which is crucial for understanding and addressing the unique attendance tracking requirements of CV. Pramana Mukti Jaya. Furthermore, the use of Leaflet.js technology can complement the XP methodology by providing interactive and user-friendly mapping features for location-based attendance tracking. Integrating Leaflet.js within the XP framework can enhance the application's functionality and user experience, aligning with the organization's goal of efficient employee attendance management. By drawing on the successful application of XP in various software development projects and integrating Leaflet.js technology, the design of the employee attendance application for CV. Pramana Mukti Jaya can benefit from a robust and user-centric approach, tailored to the specific needs of the organization. The combination of XP methodology and Leaflet.js technology provides a strong foundation for the design of an efficient and user-friendly employee attendance application for CV. Pramana Mukti Jaya.

The development of an employee attendance application for CV. Pramana Mukti Jaya can benefit from the application of Extreme Programming (XP) methodology. XP is a software development methodology that emphasizes customer satisfaction, flexibility, and continuous feedback. Ardiyansyah *et al*. (2021) demonstrated the successful application of Extreme Programming in developing a web-based cash income and disbursement application, showcasing the adaptability of XP in creating business-oriented applications. Additionally, Kurniawan *et al*. (2021) implemented a system for employee attendance using Quick Response Code, highlighting the potential for integrating modern technologies with XP practices to enhance the application's functionality and user experience. Furthermore, Azdy & Rini (2018) utilized Extreme Programming to build a web-based customer service complaint application for higher education institutions, indicating the versatility of XP in diverse organizational settings. By leveraging Extreme Programming, the development of the employee attendance application for CV. Pramana Mukti Jaya can benefit from its iterative and collaborative approach, ensuring continuous stakeholder involvement and adaptability to changing requirements. The use of modern technologies such as Leaflet.js can be integrated within the XP framework to provide interactive and user-friendly features for location-based attendance tracking. This combination can lead to the creation of a robust and user-centric employee attendance application tailored to the specific needs of CV. Pramana Mukti Jaya. The application of Extreme Programming and the incorporation of Leaflet.js technology can provide a solid foundation for the development of an efficient and user-friendly employee attendance application for CV. Pramana Mukti Jaya.

3 | METHOD

The object of this research is the development of a web-based employee attendance application that will be used by CV Pramana Mukti Jaya. This application aims to enable employees to record their attendance and departure efficiently, while providing accessibility for management to manage attendance data easily. This research will focus on analysis, design and implementation of applications that are effective and easy to use. This research will be carried out over a period of 5 months, starting from March 2023 to July 2023. The analysis and design phase will last for 2 months, followed by the implementation and application trial phase for 3 months, and the evaluation and completion phase for 1 month. The location of this research will be carried out at the CV Pramana Mukti Jaya head office which is located on Jl. Kalimulya Raya, Jl. H. Hamzah No.34, RT.004/RW.001, Pd. Rajeg, District. Cibinong, Bogor Regency, West Java 16914. Data and information regarding employee attendance and the attendance process will be collected from various departments and related sections. Application testing and validation will also be carried out in a

distributed manner only around the office location area which is in a separate location. The research method used is a combination approach between literature study, needs analysis and software development. A literature study was conducted to collect information about web-based attendance systems, Leaflet.js technology, and software development methodologies, especially Extreme Programming (XP). A needs analysis will be carried out to understand the functional and non-functional requirements of the application to be developed. Software development will use an XP approach to ensure rapid iteration and active participation from stakeholders. The development process will include analysis, design, implementation, testing and evaluation stages to ensure optimal application quality and performance.

4 | RESULT

The results of this research produced a prototype application display design designed to increase efficiency and accuracy in employee attendance management at CV Pramana Mukti Jaya (PMJ). Prototype User:
The user login prototype displays a login page user interface with an identity logo, an input column for the Employee Identification Number (NIK), a password input column, and a "Login" button. The logo provides a visual identity, while the NIK and password input fields allow users to enter personal information. The "Login" button serves as an entry point for processing information and starting a user session. The dashboard prototype displays the employee's profile photo and name at the top, followed by several navigation buttons such as "Out" to exit the application, "Profile" to access employee information, "Permissions" to apply for permission, "History" to view history, and "Presence" to record attendance. At the bottom of the interface, you can see the time display when employees are absent and absent from leaving. This prototype provides a rough idea of the layout and main functions in the employee management application. The history form prototype displays the "History" interface in the presencePMJ web application with several important elements. The "Out" button in the top left corner allows the user to exit this view. At the top of the interface, there are "Month Input" and "Year Input" buttons to select a specific time period to view history, as well as a "Search" button to search for specific data. In the main part of the interface, a display of the data searched by the user is displayed based on the previously selected month and year criteria. The attendance form prototype depicts the "Presence" interface in the PMJ presence web application with important features. The interface features a camera view that displays the user's photo in real-time, an "Absence Login" button to record attendance, and relevant user location information. Through this interface, users can view live images from the camera, perform attendance, and monitor location information related to their attendance activities. The permission/leave form prototype visualizes the “Presence” interface in the application with key elements. In the upper left corner, there is an "Out" button to exit this page. In the main part of the interface, information is displayed regarding the permit or leave applications that have been submitted by the user, as well as the "Add Permit/Leave Application" button to apply for new permits or leave. Through this interface, users can manage their permit or leave applications easily. The profile form prototype depicts the "Profile" interface in a presence web application with important components. At the top left, there is an "Out" button to exit the profile view. In the main part of the interface, there are buttons "Input New Employee Name," "Input New Mobile Number," and "Input New Password" to update personal information, as well as an "Upload Photo" button to upload a new profile photo. Finally, there is an "Update" button to save the changes you have made. Through this interface, users can easily manage and update their profile information.

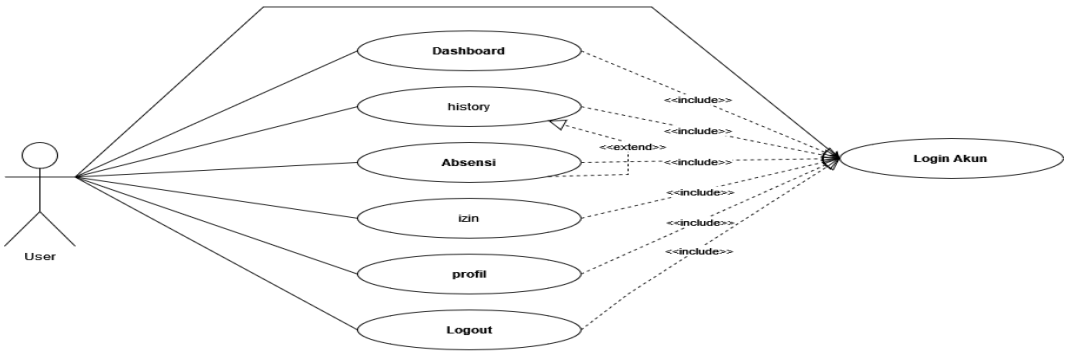


Figure 1. Use case user diagram

In Figure 1, in the usage scenario, the user is an employee who wants to use the employee attendance application. Use Case "Account Login" is the initial step where the user enters their email and password to log in to their account.

After logging in, users can access features such as the "Presence" Use Case to record daily attendance, the "Permit/Leave" Use Case to apply for permission or leave, the "Profile" Use Case to update personal information, and the "Logout" Use Case to log out of their account. Apart from that, there is a Use Case "History" to view the history of previous permits/leave. These use cases are connected to the "Account Login" Use Case, which functions as initial access to all application features. This allows users to carry out a number of important tasks such as recording attendance, applying for permits, managing profiles, and viewing and managing history, with easy access and navigation integrated.

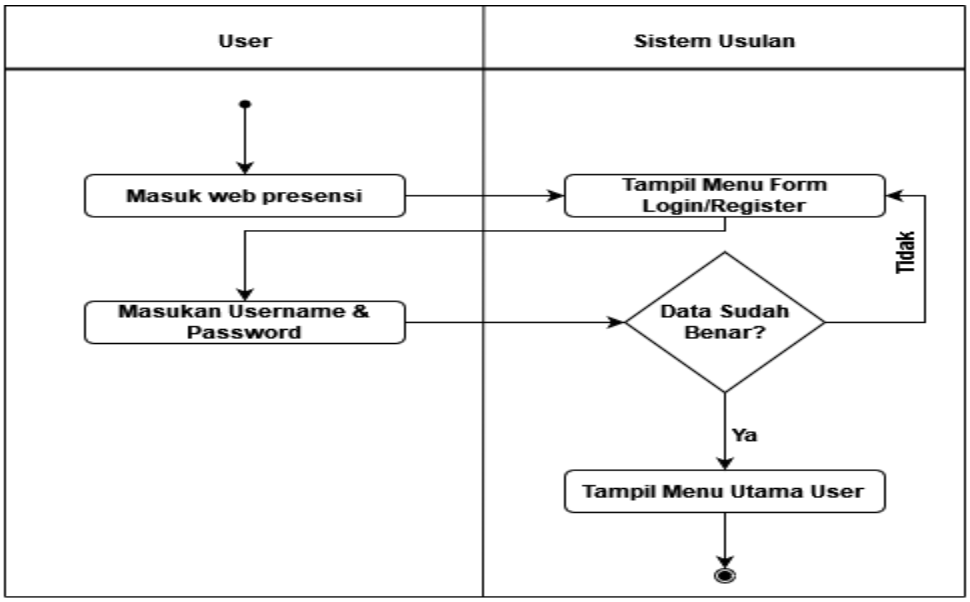


Figure 2. User login activity diagram

In diagram 1 above, the two main actors are the "user" and the "proposed system". The activity begins with the "login web presence" action, which is the first step when a user accesses the system. After that, the user will see the "user login form menu", which is a display for entering the username and password. After entering login information, the process continues to the decision node "is the data correct?" which tests whether the data entered by the user is correct. If the data is correct, then the activity flow will move the user to the "main menu," which is the main interface of the system, and they can continue with the available features. However, if the system determines that the data entered by the user is incorrect, then the activity flow will redirect the user back to the "user login form." This means the user must try again to enter the correct login information before the user can access the system main menu. This entire diagram reflects the user authentication process and illustrates how the system behaves in handling successful or failed logins.

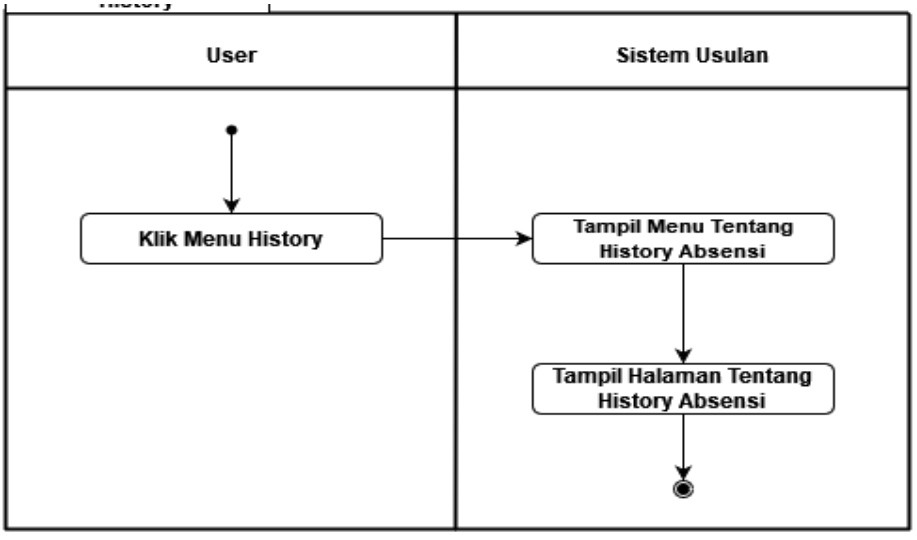


Figure 3. Activity history diagram of attendance data

In Figure 3 above, there are two main actors, namely "user" and "proposal system." The process begins when the user performs the action "click the history menu," which is the first step when the user wants to access historical attendance data. After carrying out this action, the system will display a "menu about absence history," which contains various options and information related to previous attendance data, such as filters by date, department, or employee. After viewing the menu, users can choose to "display a page about attendance history," which will display further information regarding historical attendance data.

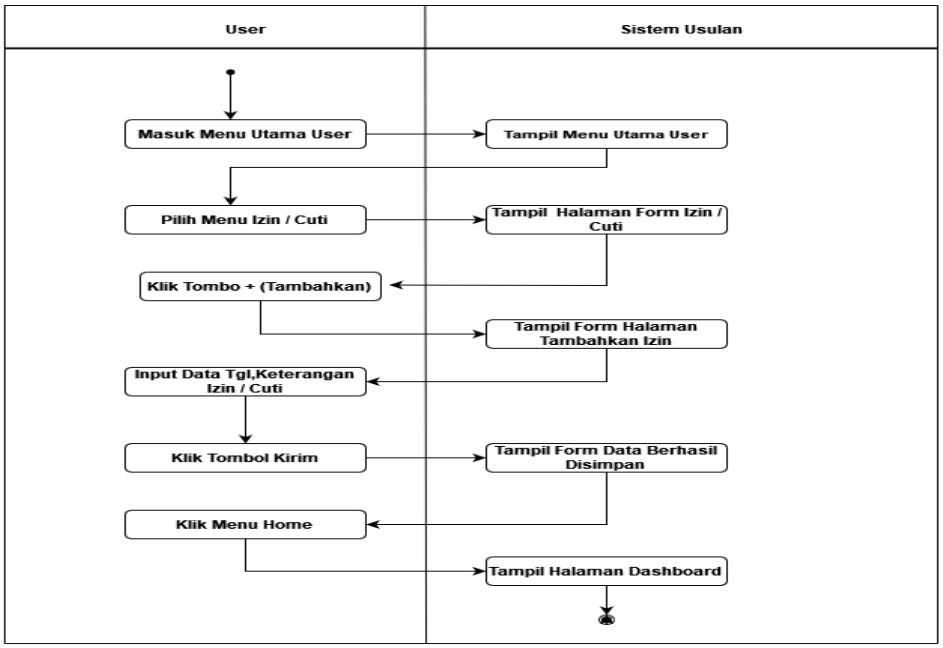
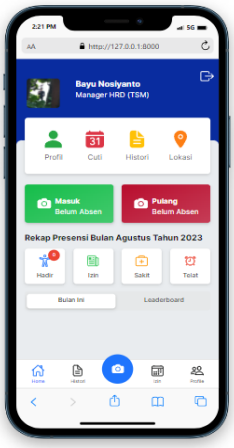


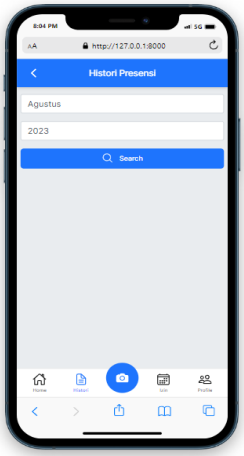
Figure 4. Activity diagram for leave permits

In Figure 4 above, there are two main actors, namely "user" and "proposal system." The process begins when the user performs the action "enter the main user menu," which is the first step when the user accesses the system main menu. After that, the system will display the "user main menu," which contains various options, including the option "permission/leave." When the user selects the "permission/leave menu," the system will display the "permission/leave form page." On this page, users can click the “add” button, which will open the “add permission/leave form page.” Here, users can enter data such as permission/leave dates and required information. After entering the permission/leave data, the user can click the “submit” button. When the data is successfully saved by the system, a notification will appear confirming that the data was successfully saved. Users can see a “successfully saved data notification” which provides confirmation. After completing the permit/leave application process, users can return to the "home menu" by clicking on the option. This will display a "dashboard page" that may contain information related to permits/leave, application history, or other relevant matters. Thus, this activity diagram depicts the flow of the permit/leave application process, starting from entering the main menu to the dashboard display after successfully applying for permission/leave. The implementation of this application interface design presents a series of displays designed to improve the user experience, both from the employee (user) and admin side. First, from a user perspective, there are various menus that can be accessed after the login process. The login menu view allows users to enter their credentials, while the dashboard menu view provides a visual overview of important information and relevant metrics. The history menu facilitates users in tracking their activity history, while the attendance menu allows them to record attendance and leave location traces. There is also a leave/permit application menu that makes it easier for employees to manage their time.

User login display

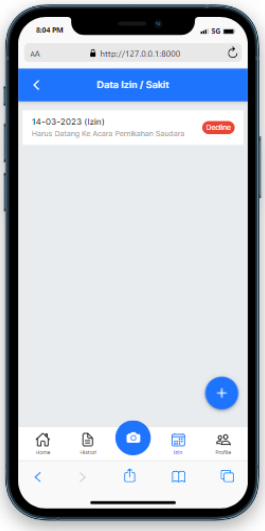


Dashboard menu display

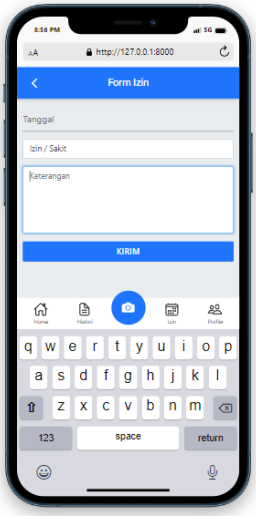


History menu display

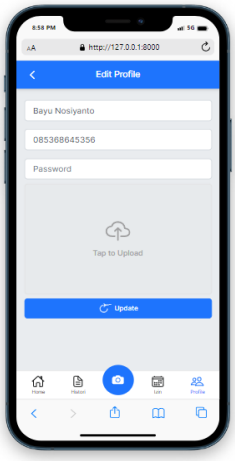
Presence menu display



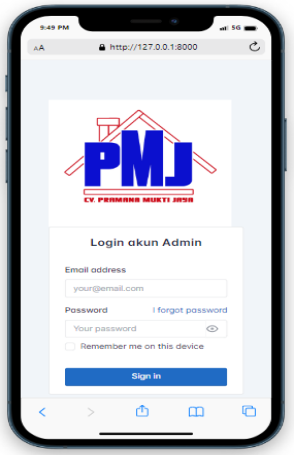
Display of sick leave data menu



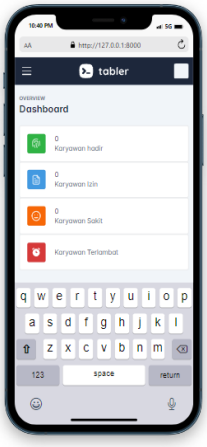
Menu display adds sick leave information data



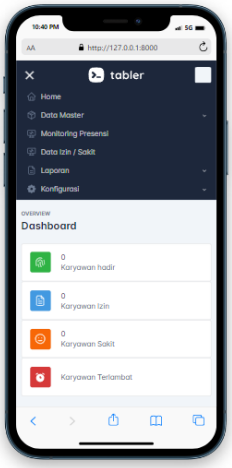
Display edit profile menu



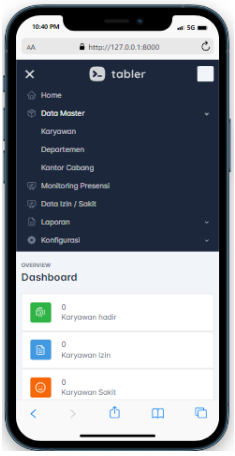
Admin login menu display



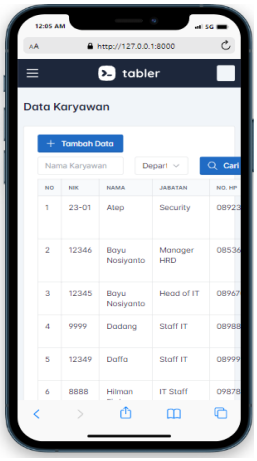
Admin dashboard menu display



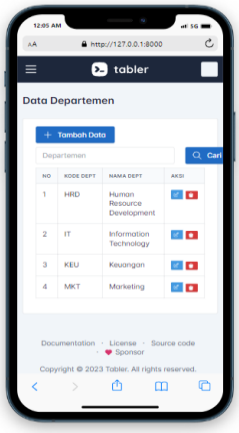
Admin dashboard menu display



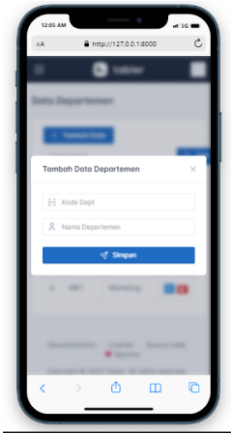
The dashboard menu displays if you click on master data



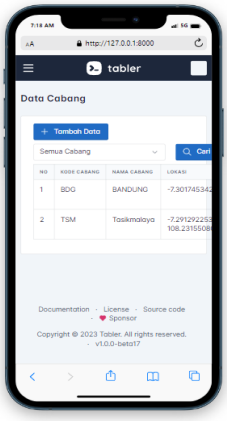
Menu display for adding employee data



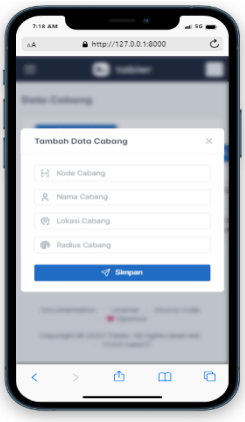
Department data menu display



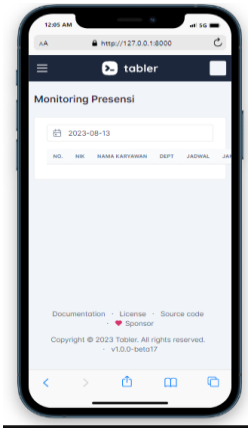
Add department data menu display



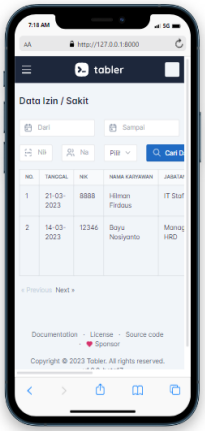
Branch office menu display



Menu display to add branch office data



Display of attendance monitoring menu



Display of permission/sickness data menu

Figure 5. Implementation of Mobile Application Interface Design

On the admin side, the admin login menu provides limited access according to their role. The admin dashboard menu display provides quick access to various important features, such as master data, attendance monitoring, permission/sick data, reports, and configuration. Master data allows admins to manage employee, department and branch office information. The attendance monitoring menu provides a concise view of employee attendance on that day, while the permit/sick data menu provides access to information about employee permit applications or illness. The attendance recap menu helps in printing and downloading attendance recaps, while the configuration menu allows admins to manage shift schedules and other configurations. The implementation of this application interface design aims to provide an intuitive, efficient and structured user experience for both employees and admins, so that the employee attendance management process can be carried out more effectively and efficiently.

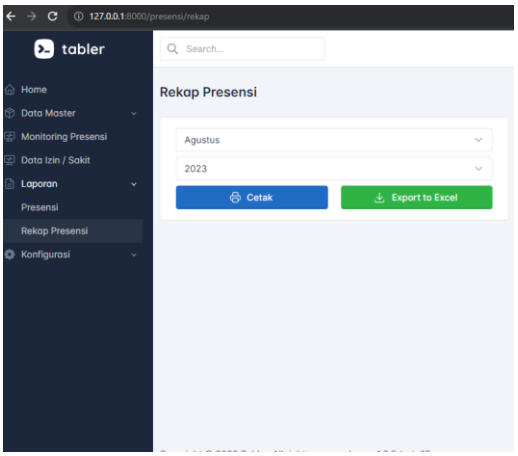


Figure 6. Attendance recap menu display

In the image above, the attendance recap menu displays the updated employee attendance data for this month. In the display in Figure 6 you can see that there is a down botton selection of month data, a down botton selection of year data, a botton cteak and a botton export to excel.

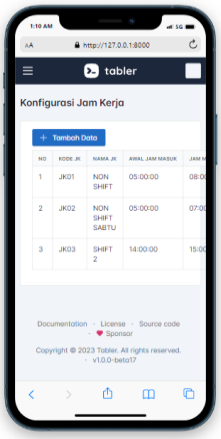


Figure 7. Configuration menu display

In Figure 7 you can see the configuration menu display, there is a data add button, and a display of shift schedule data that has been added.

5 | CONCLUSIONS

The conclusion of this research shows that the implementation of a website-based employee attendance application using the X Treme Programming method at CV Pramana Mukti Jaya has a significant positive impact. First, this application has succeeded in overcoming inaccuracies in attendance data which often arise due to errors in recording entry and departure times by employees in a manual attendance system using written attendance books. With this attendance application, the process of recording attendance becomes more structured and automatic, significantly reducing the possibility of errors in recording entry and departure times. Second, the use of an employee attendance application can overcome the limited transparency in managing attendance data caused by a manual attendance system with a physical attendance book that must be stored in a certain location. With a website-based application, attendance data can be accessed from anywhere and at any time, increasing transparency in managing employee attendance data. This helps companies to monitor employee attendance more efficiently and accurately. Lastly, the implementation of the employee attendance application is able to overcome inefficiencies in the attendance data processing process that occur due to manual methods, and can increase operational efficiency at CV Pramana Mukti Jaya. With this attendance application, the attendance data processing process becomes faster, more accurate and efficient, so that company time and resources can be better allocated to more strategic activities. Thus, it can be concluded that the implementation of the web-based employee attendance application has made a positive contribution to the operational efficiency and effectiveness of CV Pramana Mukti Jaya.

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