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Design and Build a Web-Based Attendance Information System with Location Validation in the Nasdem Fraction

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Abstract

Employee attendance management has an important role in supporting the discipline and effectiveness of organizational administration. However, the attendance process that is still carried out conventionally has the potential to cause problems, such as inaccurate data, delays in recording, and weak attendance validation. This study aims to design and build a web-based employee attendance information system with location validation in the Nasdem Faction to improve the accuracy and efficiency of attendance recording. The system development method used is the Software Development Life Cycle (SDLC) with the Waterfall model, which includes the stages of needs analysis, system design, implementation, testing, and maintenance. The system was developed using the PHP programming language and MySQL database and is equipped with GPS-based location validation features and photo capture as proof of presence. The system test was carried out using the Black Box Testing method. The results of the study show that the developed system is able to record attendance and exit digitally, validate attendance locations, and present attendance reports in a structured manner. This system is considered suitable for use and contributes to improving administrative efficiency and the reliability of employee attendance data.

Keywords: *Attendance Information System, GPS Validation, Web-Based Application, Location-Based Attendance, Waterfall Method*

1. Introduction

The development of information technology has prompted various organizations to switch from manual systems to digital systems to improve the efficiency and accuracy of data management [1]. One of the important aspects of human resource management is the attendance system, which serves as a basis for discipline supervision, performance evaluation, and managerial decision-making. In organizations with dynamic activities such as the Nasdem Faction, the accuracy and reliability of attendance data are very crucial needs.

However, the attendance system that is still applied conventionally, both through manual recording and attendance devices without advanced validation mechanisms, has various limitations. Problems that often arise include inaccuracy of data, delays in recording, difficulties in the recapitulation process, and the potential for fraud such as absenteeism or attendance manipulation [2]. This condition shows that the conventional attendance system is not fully able to guarantee the validity and transparency of employee attendance data.

Along with the development of web-based technology, the application of web-based attendance information systems is becoming widely used because of its ability to manage data in an integrated and real-time manner [3] The integration of Global Positioning System (GPS) technology allows validation of the user's presence location, so that attendance is not only recorded based on time, but also based on geographical position. [4] In addition, the use of taking photos as proof of attendance can strengthen the verification process and minimize the potential for fraud in attendance recording.

Several previous studies have discussed the development of both web-based and mobile-based attendance systems, but some are still limited to attendance recording without strict location validation or have not combined location validation with visual evidence simultaneously [5]. Therefore, this study aims to design and build a web-based employee attendance information system with location validation using GPS and taking photos as proof of presence in the Nasdem Faction. The main contribution of this research is to provide an integrated digital attendance system and have a higher level of data reliability to improve administrative efficiency and accountability in employee attendance management. [6].

2. Research Method

The research method used in this study is SDLC with the Waterfall model [7]. This method is used to develop a web-based attendance information system with location validation in the Nasdem Faction. Data collection techniques are carried out through observation, interviews, and literature studies. Observation was carried out by observing the attendance process that was running, interviews were conducted with related parties as users and system managers, while literature studies were carried out by reviewing relevant literature. The source of research data comes from the results of field observations, resource persons from the Nasdem Faction, and supporting documents

related to attendance. The Waterfall model was chosen because it has structured and sequential development stages, making it suitable for the development of systems with relatively clear needs.

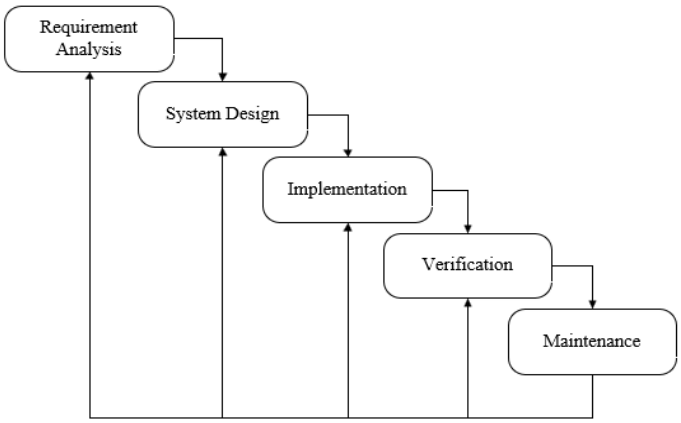

Fig 1. Flow Model Waterfall

Figure 1 shows the flow of system development with the waterfall method which consists of five stages, namely (requirements analysis) carried out to identify system needs. The system design stage includes designing databases, user interfaces, and system process flows using Unified Modeling Language (UML) [8]. The implementation phase is carried out by building a web-based attendance system using the native PHP programming language and MySQL database, including the implementation of GPS-based location validation and photo taking as proof of presence. The testing stage (verification) is carried out using the Black Box Testing method to ensure that the system's functionality runs according to needs. The last stage is maintenance to make repairs and adjustments to the system if necessary.

3. Result and Discussion

3.1. Requirement Analysis

The results of the needs analysis were obtained through observations, interviews, and literature reviews that have been carried out. From this analysis, the attendance information system to be built must be able to handle attendance data digitally and integrated. The functional needs of the system include the user login process, recording incoming and outgoing attendance, verifying the user's position during attendance, taking pictures as proof of attendance, and managing attendance data by administrators. The system also needs to provide attendance reports based on a specific period. The non-functional needs include ease of use, user data protection, and system accessibility through internet-connected devices. This needs analysis became the foundation for designing and building a web-based attendance system

3.2. System Design

3.2.1. Use Case Diagram

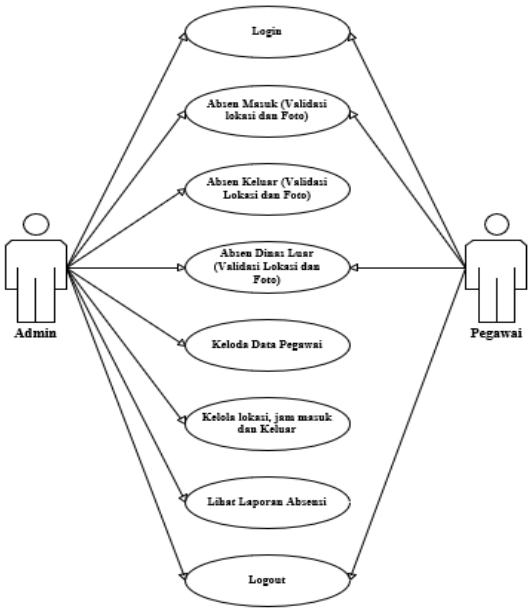

Fig 2. Use Case Diagram Attendance

Figure 2 shows the Use Case Diagram for a web-based attendance information system equipped with location validation, specifically designed for the Nasdem Faction. This diagram illustrates the interaction between the actor and the system according to the features provided. This system involves two main actors, namely Admin and Employee. Employees can access the system to log in, make attendance in and out by verifying location and taking photos as proof of attendance, as well as reviewing personal attendance history. On the other hand, Admins have broader authority, including managing employee data, setting the location and time of attendance, monitoring attendance data, and creating attendance reports based on specific periods. This Use Case Diagram provides a summary of the overall system functions and serves as a foundation for designing process and system architecture [9].

3.2.2. Activity Diagram

Activity Diagram is one of the UML diagrams used to illustrate the sequence of activities in a web-based attendance information system equipped with location validation. This diagram develops from the Use Case Diagram by describing the flow of activities and data movements within the system, thus helping the system development process to be more organized [10]]. In this system, the Activity Diagram outlines core processes such as user authentication, recording of incoming and outgoing attendance with location verification and image capture, management of employee data by administrators, and configuration of location and attendance schedules as benchmarks for validating attendance [11].

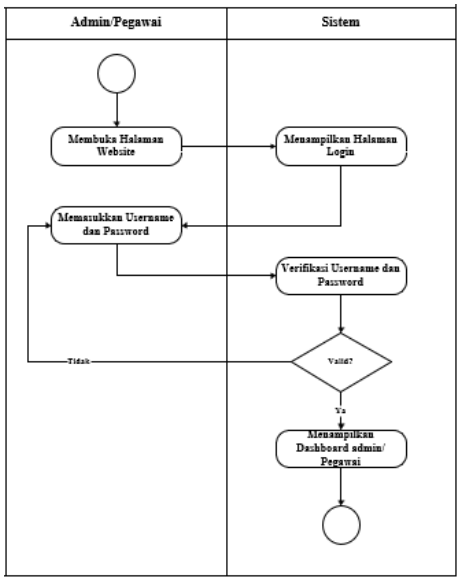

Fig 3. Activity Diagram Login

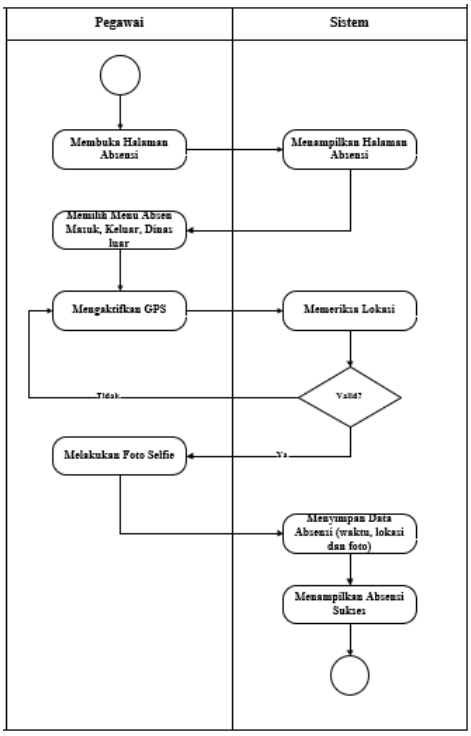

Fig 4. Activity Diagram Employee

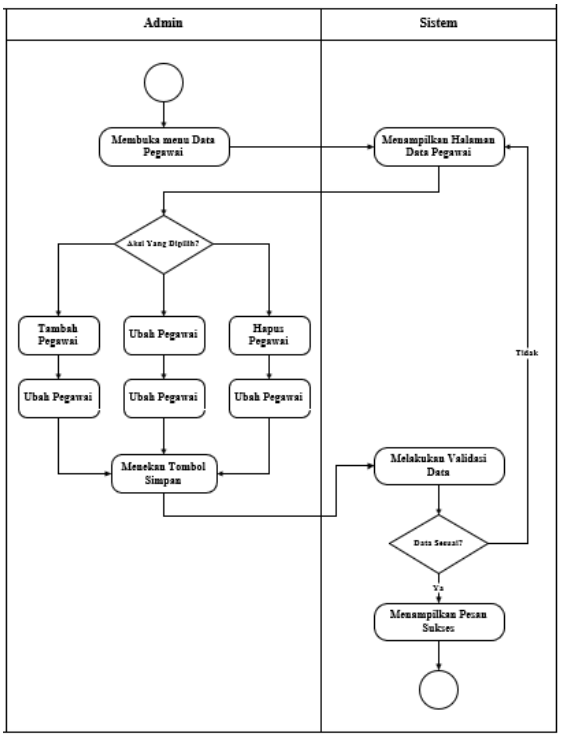

Fig 5. Activity Diagram Employee data management

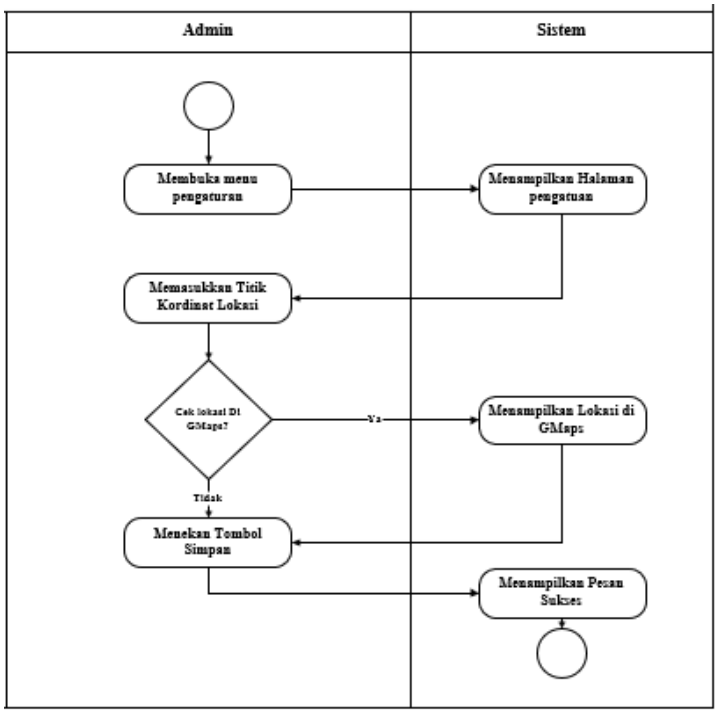

Fig 6. Activity Diagram Location and Clock Settings

3.2.3. Class Diagram.

A Class Diagram is a type of UML diagram that is used to illustrate the structure of a system through a representation of classes, attributes, methods, and relationships between classes [12]. This diagram is important in modeling the core components of the system and the interaction between classes, thus aiding in the planning and construction stages of the information system.

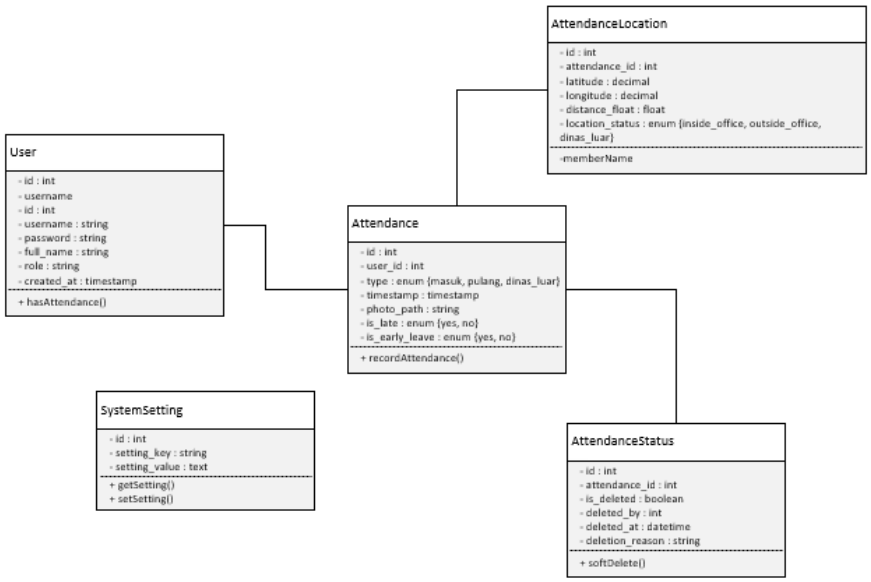

Fig 7. Class Diagram

Figure 7 illustrates the Class Diagram for a web-based attendance information system equipped with location validation. The diagram includes the main classes such as User, Attendance, AttendanceLocation, and AttendanceStatus. The User class represents the system user, while the Attendance class is in charge of storing attendance information. The AttendanceLocation class serves to verify the location of the attendance, and the AttendanceStatus class displays the user's attendance condition. Relationships between classes show the integration of attendance data with users, locations, and statuses, all of which are managed in an integrated manner by the system.

3.3. Implementation

The implementation stage involves translating the results of the analysis and design of the system into a practical application that can be operated by the user. This web-based attendance information system, which is equipped with location validation, is designed to simplify employee attendance recording and admin attendance data management [13].
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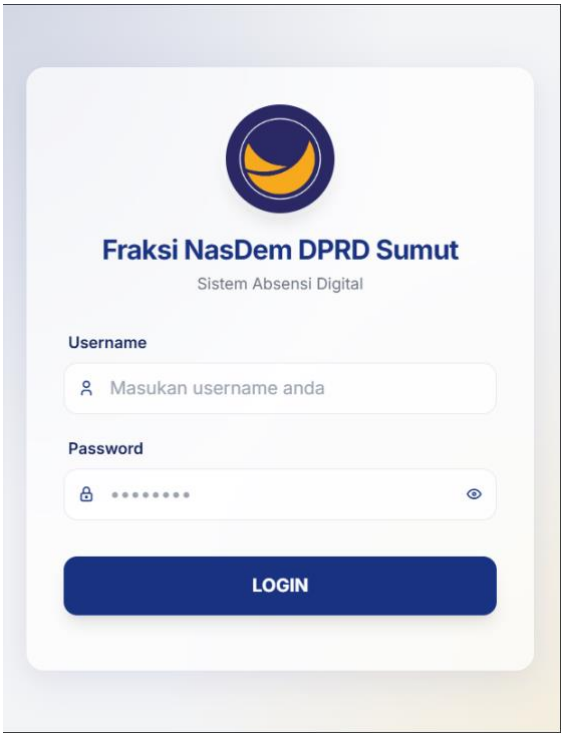

Fig 8. Login Page

The login page serves as initial access for employees and administrators to the attendance system. Users are required to enter valid credentials to access the feature according to their permission level.

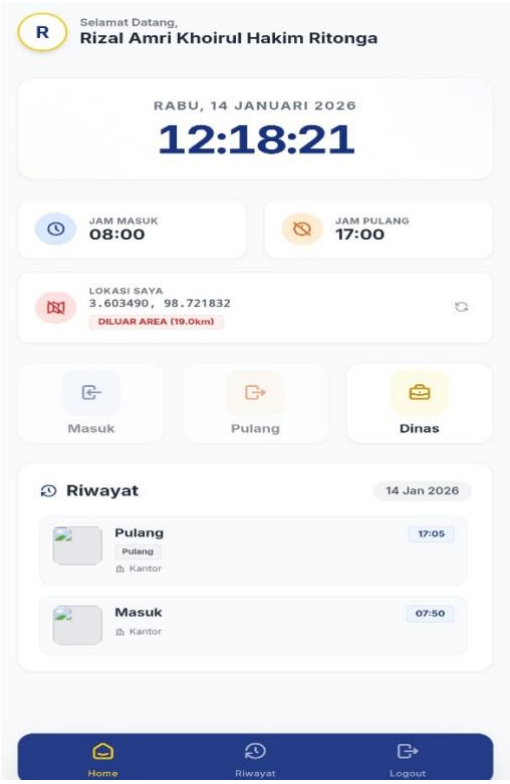

Fig. 9. Employee Dashboard Page

The employee dashboard page provides a brief overview of attendance conditions and attendance activities. From here, employees can use the check-in and check-out features, as well as view attendance records easily.

Fig 10. Employee Attendance Page

The attendance page allows employees to record attendance in and out. This process includes location verification and photo taking as attendance verification.

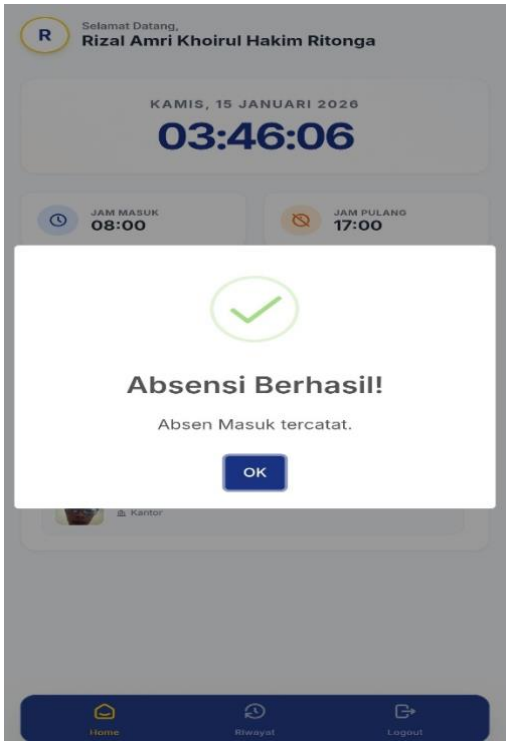

Fig 11. Succesful Absence Notification

This page provides a notification that the attendance has been successfully processed. The details displayed ensure that attendance data is stored accurately in the system.

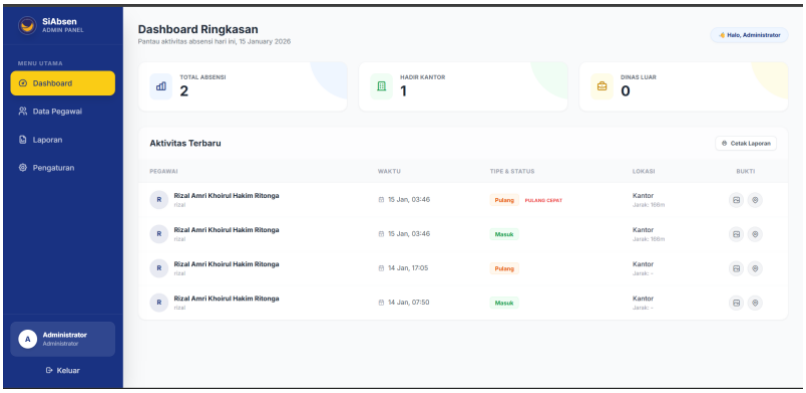

Fig 12. Admin Dashboard Page

The admin dashboard offers an overview of system data, including the number of employees and attendance summaries. This helps admins monitor employee attendance thoroughly.

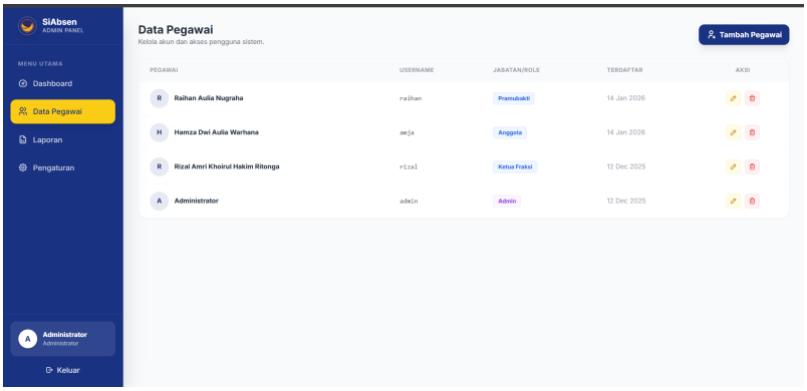

Fig 13. Employee Data Page

The employee data page is used by admins to handle employee information. Admins can add, edit, or delete data as the system needs.

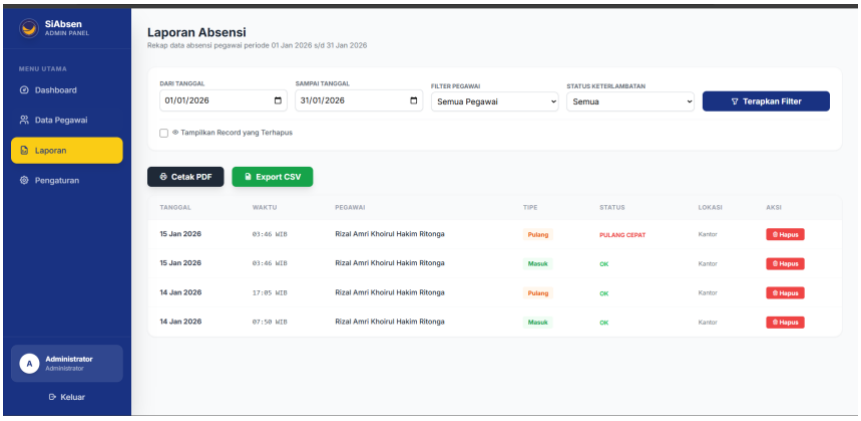

Fig 14. Report Page

The report page presents a summary of employee attendance data by specific period. This feature supports organized attendance evaluation and reporting.

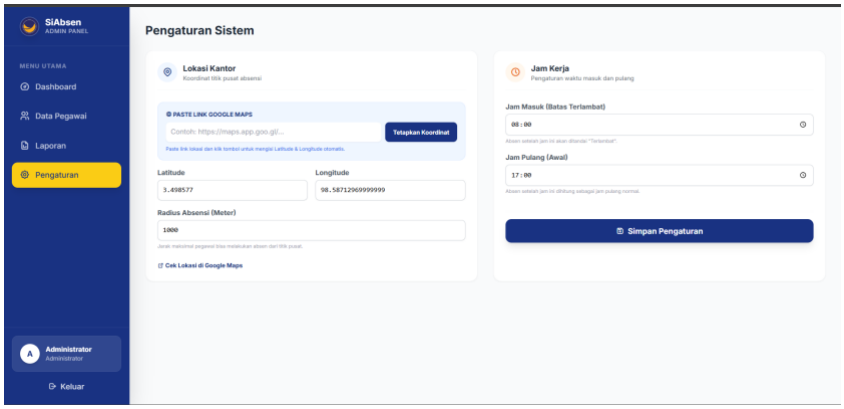

Fig 15. Settings Page

The settings page allows admins to configure location and attendance schedules. This configuration becomes the system benchmark for validating employee attendance.

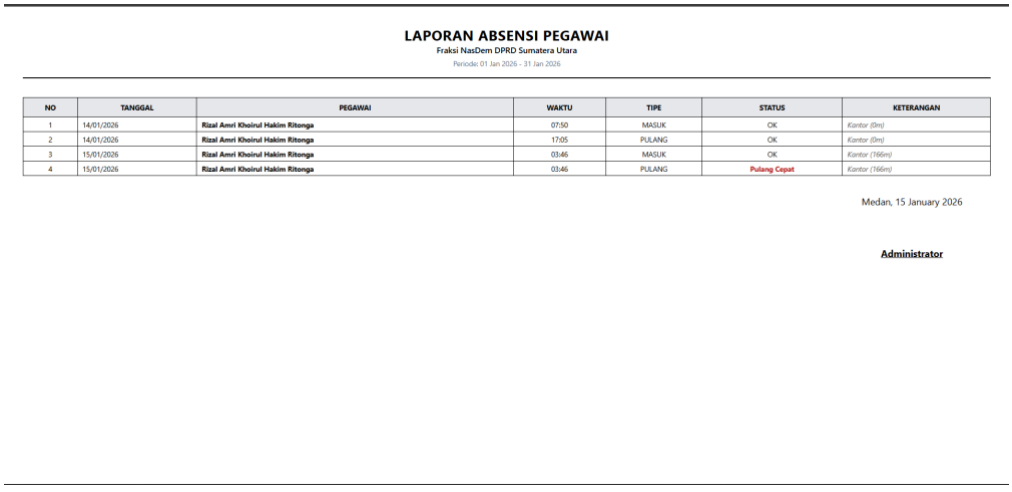

Fig 16. Attendance Report Printout

The print page of the report displays the attendance report in a print-ready form. It facilitates admins in documenting and delivering employee attendance data.

3.4. Verification

The system test was carried out using the Black Box Testing method on a web-based attendance information system with location validation [14]. This test aims to ensure that each system function runs according to the needs by testing the compatibility between the given input and the output produced without regard to the internal structure of the program. The test results show that all the main features of the system can function properly and according to the predefined test scenario.

Table 1: Test Results Using BlackBox Testing

No	Modul	Test Case	Expected Results	Test Results
1	Log In / Log Out	Enter the correct username and password	Succesfully login to the dashboard	✓
2	Log In / Log Out	Click logout	Return to the login page	✓
3	Dashboard	User login	Dashboard displayed	✓
4	Dashboard	Direct URL access	Redirected to the login page	✓
5	Admin – Employee data	Fill the entire field	Stored data	✓
6	Admin – Employee data	Field is blank	A validation messege appears	✓
7	Admin – Employee data	Access menu	Employee list displayed	✓
8	Attendance	Click Absentee login	Attendance data is stored	✓
9	Attendance	Click absent	Outbound absences data stored	✓
10	Attendance	Location validation	Validated locatoins	✓
11	Admin – Settings	Set locarions and hours	Saved settings	✓
12	Admin – Reports	Access the report menu	Report data displayed	✓
13	Admin – Reports	Print reports	Report printed successfully	✓

3.5. Maintenance

System maintenance is conceptually carried out after the implementation of a web-based attendance information system with location validation to keep the system operating optimally and meeting user needs. This stage involves fixing issues that arise during use, as well as adapting features in the event of changes in user needs [15]. Maintenance activities include bug fixes, system performance optimization, data security updates, and location and time of absence adjustments.
However, in this study, the author did not carry out the system maintenance stage directly. Research is limited to the system implementation stage, so the maintenance activities are only described conceptually as part of the information system development cycle. The next stage of maintenance, including the development of new features to improve the efficiency and continuity of the system in the long term, is recommended to be carried out by the system management or in advanced research.

4. Conclusion

This research succeeded in designing a web-based attendance information system with location validation aimed at supporting attendance management in the Nasdem Faction. The system developed is able to record attendance and exit digitally with the support of GPS-based location validation and photo taking as proof of attendance, so that it can improve the accuracy and reliability of attendance data.
The results of the test using the Black Box Testing method show that all the main functions of the system are running according to the predetermined scenario. This system provides benefits in improving administrative efficiency, simplifying the attendance management and reporting process, and minimizing the potential for fraud in attendance recording. In the future, this system can still be further developed with the addition of notification features, improved security aspects, and performance optimization to support long-term use..

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