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Design and Implementation of the Eleventwelfth Employee Attendance Website Using the Agile Method

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Abstract

This study aims to design and develop a web-based employee attendance system using the Agile methodology to improve the accuracy and efficiency of attendance records in the workplace. The system includes a location validation feature using Leaflet, an interactive mapping tool, to ensure that employees can only check in from approved locations. In addition, the system uses a webcam to capture a real-time photo of the employee during attendance as an extra layer of verification to prevent fraud. The development process includes requirements gathering, designing the user interface and database structure, building the application in stages, functional testing using the black-box method, and deploying the system in a real environment. The implementation results show that the system can accurately record real-time attendance, display user location on a map, and store attendance photos securely. This system supports a more transparent, secure, and accessible attendance management process. User feedback is collected for future improvements.

Keywords: Agile, attendance, Leaflet, system information, web-based, webcam

I. INTRODUCTION

T he development of information and communication technology in the last two decades has brought

fundamental changes in various sectors of life, including in the industrial and business world [1]. Digitalization of business processes is an essential need to maintain company competitiveness in a dynamic and competitive global environment [2]. One concrete form of adaptation to this development is the implementation of a web based information system, which is able to support various managerial and operational functions of the company more effectively and efficiently [3]. Web based systems offer advantages in terms of accessibility, speed, data integration, scalability, so they can accelerate data based decision making and increase transparency in organizational management [4]. In the context of human resource management the employee attendance recording system is a crucial element that demands high accuracy and efficiency, considering that conventional paper based methods or simple recording tools often cause various problems, such as data inaccuracy, opportunities for manipulation, delays in the recapitulation process, and the inability to provide real time attendance reports [5]. Along with the development of more flexible work models, such as remote work and hybrid work systems, the need for a digital attendance system that is responsive to employee mobility is becoming increasingly urgent and inevitable [6].

A website as a web based platform is a collection of pages that are connected to each other through one domain and are able to present information in various forms, from text, images, to sound [7]. The use of a website in attendance, but also supports direct data integration with the human resource management system, increases transparency, speeds up administrative processes, and reduces the risk of input errors that are common in manual methods [8].

However, the existence of a web based attendance system does not necessarily close the gap for potential misuse, especially regarding the possibility of manipulation of the attendance location by employees who record attendance from outside the work area [9]. To overcome this risk, the design of this system integrates a location validation feature based on leaflet technology, which functions to verify the geographic coordinates of the device during the attendance process, so that the system will only allow attendance recording if the user is truly within the radius of the location determined by the company [3]. This strategy is expected to strengthen the integrity of attendance data, increase management confidence in attendance reports, and minimize the possibility of fraud that can harm the company [10].

Eleventwelve, as a company that is currently trying to digitize its internal administration management, faces serious challenges related to its employee attendance system which is currently still semi manual, causing a number of obstacles such as slow monthly recapitulation process, low accuracy of attendance data, and limited ability to monitor attendance in real time, which ultimately hinders the effectiveness of data based decision making.

Based on these problems, this study proposes a solution in the form of designing and implementing the Eleventwelve employee attendance website using the Agile method approach, which was chosen because of its flexibility in dealing with changing needs during the development process, through an iterative cycle that allows for gradual system improvements based on end user feedback. This approach is considered capable of accelerating project completion, minimizing the risk of inconsistency between the system built and actual operational needs, and increasing collaboration between the development team and stakeholders through intensive and structured communication [11], [12], [13].

Overall, the main objective of this research is to produce a web based attendance system that not only supports digital attendance recording, but also ensures the validity of attendance through a strict location verification mechanism, so that it is expected to be able to increase the efficiency of personnel administration, reduce the opportunity for fraud, accelerate the data recapitulation process, and strengthen the basis for managerial decision making based on accurate and real time information in the Eleventwelve company environment.

II. LITERATURE REVIEW

The development of information technology has encouraged many institutions to abandon the slow and errorprone manual attendance system, switching to a more efficient and accurate web-based digital system. Several studies have shown how digitalization of attendance has a significant impact on increasing work efficiency and data transparency.

Research by [5] entitled "Attendance and Recapitulation System at SMP Negeri 1 Batujajar" developed a Laravel-based attendance system that replaces manual attendance recording. This system is able to automatically record student attendance, provide real-time reports, and improve the efficiency of teaching time and accuracy of school administration. This study emphasizes the importance of technology integration in the education process to support transparent supervision.

Meanwhile, [9] in a study entitled "Designing a Web-Based Attendance Application System at PT Muloska Pratama" raised the problem of attendance during a remote work system. By using the PHP programming language and the Agile method, the application developed is able to record online attendance, speed up the payroll process, and reduce errors. Intuitive interface design and data security are important elements in this system.

Another study by [13] in "Designing an Internship Student Attendance Management System at Diskominfo" targeted the recording of internship student attendance which was still done manually. With the Agile Scrum approach, the researcher designed a web-based system that makes it easier for supervisors to control attendance, while increasing the accountability of internship participants.

A more modern technological approach is shown by [14] in "Modeling the Employee Attendance System at PT Egref Telematika", which uses GPS. This system speeds up recording, increases the accuracy of attendance data, and minimizes manipulation. With UML modeling and an agile development approach, the system built is able to respond well to the company's needs.

In the study entitled "Implementation of Agile Method in Developing Web-Based Attendance Application with Geofencing", [3] added location features to the web-based attendance system. With geofencing, the system can ensure that attendance is only carried out at valid work locations. This approach is very suitable for companies with flexible working hours and high mobility.

In the field of basic education, [15] in "Design and Construction of Web-Based School Information System" designs an integrated information system that includes attendance data, grades, and student profiles. This system is a solution to the limitations of school communication with the community, while also increasing the efficiency of school management through the Agile development method.

From these various studies, it is seen that the digitalization of the attendance system not only provides administrative convenience, but also encourages a change in work and learning culture that is more transparent and efficient. Agile development methods, as well as the use of technology such as Webcams, Leaflets, are key elements in building a modern attendance system that is adaptive to the needs of the times.

III. RESEARCH METHOD

Research methodology is a systematic step used to obtain accurate and accountable information, in order to achieve the goals or results that have been set [16]. In this study, the development of the Eleventwelfth employee attendance system uses the agile method. The Agile Development method is an approach to software development that emphasizes an iterative process, where needs and solutions are developed gradually through independent teamwork consisting of various cross-functional roles [17]. The main principle in the agile method is to support the team to be able to work adaptively, produce solutions quickly and with quality, have clear direction in the development process, and be able to face changes agilely and efficiently [18].



fig 1. Agile Method Sumber: [19]

The following are the stages of the agile method:

A. Requirements

The first stage is requirements by identifying and collecting system needs from users. This information is obtained through direct observation. The goal is to find out the existing problems and determine what features need to be included in the system.

B. Design

After the requirements are collected, the next stage is to design the system which includes the user interface (UI), database structure, and system workflow. The design is made to be easy to understand and flexible, so that it can be further developed in the next stage.

C. Development

The system is built based on the previously created design, and is done gradually so that each feature can

be tested and improved more quickly. The technology used is adjusted to the needs of the user and the end goal of the system being created.

D. Testing

Each part of the system that has been developed will be tested for its function. Testing is done using the black-box testing method, which is by checking whether the system runs according to its purpose without looking at the contents of the code. If an error is found, it will be fixed immediately before entering the next stage.

E. Deployment

Once the system is tested and declared ready, the system will be implemented in the real environment. Users can start using the system, and the development team will monitor the application to ensure everything runs smoothly.

F. Review

The final stage is to evaluate the development results. Users provide feedback, the development team makes improvements or further developments based on the input. This process will continue to repeat itself for system refinement.

IV. RESULTS AND DISCUSSION

This section presents in detail the results from the design stage to the implementation of a website-based employee attendance system developed using the Agile methodology. Each stage of development is analyzed based on actual results in the field, both in terms of system functionality, user interface, and location validation mechanisms to prevent fraud when taking attendance. The results are then discussed critically by linking them to the theoretical framework that has been explained previously, in order to show the extent to which the system built is able to answer existing problems and meet the operational needs of related agencies.

A. Requirements

The initial stage of developing an employee attendance system begins with a needs analysis process.

1. Use Case Diagram

Employee attendance system use case describes the interaction between employees, admins, and the system in recording attendance. Employees take attendance using cameras and GPS, while the system validates and stores the data. Admins manage employee data, verify attendance, and create reports. The main scenarios include recording attendance, validating locations, managing users, and creating reports, ensuring the system runs efficiently and accurately. The following is a visualization of the Employee Attendance System use case:



2. ERD

Entity Relationship Diagram (ERD) is a graphical representation used in database design to describe relationships between data. ERD functions as a tool in the database development process and provides an illustration of how the database system will operate.



fig. 3. Entity Relationship Diagram

3. Class Diagram



fig. 4. Class Diagram

Figure 4 Class Diagram above illustrates the database structure of the employee attendance management system. There are six main entities, namely db_pegawai, db_users, db_jabatan,

db_presensi, db_ketidakhadiran, and db_lokasi_presensi. The db_pegawai table is the center of the relationship because it is directly connected to the user table (db_users), position (db_jabatan), presence location (db_lokasi_presensi), presence data (db_presensi), and absence data (db_ketidakhadiran). This system is designed to record employee attendance in and out, including photo documentation, and support absence permit applications with supporting information and evidence. GPS-based location information is also included to ensure attendance is carried out in the appropriate place.

B. Design



fig. 5. Design

Figure 5 shows the System Interface Design showing the appearance of the attendance system designed in Figma for two roles: admin and employee. Admin manages employee data, location, position, and attendance summary. Employees can view attendance, apply for permission, and manage profiles. The design is made simple and responsive for ease of use.

C. Development

At the development stage, the implementation process of the employee attendance system begins to be realized based on the design that has been prepared in the previous phase. Development activities are carried out gradually and systematically to ensure that each designed feature can be implemented properly, starting from the user interface, integration with the database, to the location validation function. This stage plays an important role in realizing a system that is in accordance with user needs and supports more efficient and accountable attendance operations.

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Username		
Password		
Password	۲	
Sign in		

fig. 6. Admin and Employee Login Page

Displays the login page to access the system. Users must enter a username and password to log in to their respective accounts, either as an admin or employee.

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	5 Mei 2025	\bigotimes	
	Masuk	Silahkan melakukan presensi masuk terlebih dahulu	

fig. 7. Home Employee

The homepage (dashboard) display for employees after successfully logging in. Displays time information and a button to check in. The check-out column shows a warning that check-in must be done first.

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	Copyright © 2025 ElevenTwetth All rights reserved.	

fig. 8. Home Admin

Dashboard display for admin. Admin can see statistical data such as the number of active employees, the number of employees who have come in, and the number of employees who have not taken attendance.

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No	NIP	Nama	Username	Jabatan	Role	Aksi			
1	PEG-0001	Elsa	elsa	Admin	admin	Detail Edit Hapus			
2	PEG-0002	Budi	budi	Marketing	pegawai	Detail Edit Hapus			
3	PEG-0003	fikri	fikri	IT Support	pegawai	Detail Edit Hapus			
4	PEG-0004	kayla	kayla	IT Support	pegawai	Detail Edit Hapus			
5	PEG-0005	asep	asep	Designer	pegawai	Detail Edit Hapus			
6	PEG-0006	fadlan	fadlan	Designer	pegawai	Detail Edit Hapus			
7	PEG-0007	amar	amar	Marketing	pegawai	Detail Edit Hapus			
8	PEG-0008	Mira	mira	IT Support	pegawai	Detail Edit Hapus			

fig. 9. Employee Page

Displays the employee data management page that can be accessed by the admin. On this page, the admin can see a complete list of employees along with information such as NIP, name, username, position, and role. There are action buttons to edit and delete data, as well as filters to display only admins, employees, or all employee data.

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No.	Tanggal	Jam Masuk	Jam Pulang	Total Jam	Total Terlambat			
1	24 February 2025	07:25:33	16:10:42	8 Jam 45 Menit	On Time			
2	21 February 2025	07:20:45	16:00:14	8 Jam 39 Menit	On Time			
3	10 February 2025	07:17:54	15:58:20	8 Jam 40 Menit	On Time			
4	08 February 2025	07:21:08	16:05:18	8 Jam 44 Menit	On Time			
5	05 February 2025	07:35:24	15:55:33	8 Jam 20 Menit	0 Jam 5 Menit			
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fig. 10. Employee Attendance Recap

Figure 10 displays the Employee Attendance Recap page, which contains data on the date, checkin time, check-out time, total working hours, and employee tardiness status. The data can be filtered by date and exported to Excel. Tardiness status is indicated by labels such as "On Time" or the number of minutes late.

D. Testing

After the development process was completed, testing was carried out using the BlackBox Testing method to ensure the system runs smoothly without errors or bugs [20]. This type of testing focuses on checking the system's functions based on inputs and outputs, without looking at the actual code. The main goal is to make sure each feature works as expected. The results of the testing are shown below.:

TABLE I

No	Feature Tested	Test Scenario	Test Data	Expected Result	Status
1	Login	Login with valid username and password	Username: elsa Password: 12345	Successfully logged into dashboard	Passed
2	Login	Login with incorrect password	Username: elsa Password: elsa1	Error message appears	Passed
3	Login	Login with empty username	Username: (empty) Password: 12345	Message appears: "Username is required"	Passed
4	Attendance Input	Clock-in with valid location and time	Valid location, time: 07.45	Attendance successfully saved	Passed
5	Attendance Input	Clock-in outside working hours	Valid location, time: 10.00	Warning appears that attendance time is invalid	Passed
6	Attendance Input	Clock-out	Click "Clock Out" button	Clock-out time data is saved	Passed
7	Attendance Input	Clock-in from outside allowed location radius	Location outside radius	Message appears: "Attendance failed out of location"	Passed
8	Leave Request	Leave request with complete data	Type: Sick, Description: Fever, Proof: file.jpg	Leave successfully saved and awaiting admin approval	Passed
9	Leave Request	Leave request without description	Description: (empty))	Message appears: "Description is required"	Passed
10	Leave Verification (Admin)	Admin approves leave request	Click "Approve" on leave list	Status changes to "Approved"	Passed
11	Leave Verification (Admin)	Admin rejects leave request	Click "Reject"	Status changes to "Rejected"	Passed
12	Daily Attendance Recap	Admin views today's attendance recap	Select today's date	All employees' attendance data is displayed	Passed

Black Box Testing

13	Monthly Attendance Recap	Admin views monthly recap	Select April 2025	Full recap table is displayed	Passed
14	Employee Data Management	Admin adds a new employee	Fill in full employee biodata form	Employee data successfully saved	Passed
15	Employee Data Management	Admin edits employee data	Change name or position	Data successfully updated	Passed
16	Position Management	Admin adds a new job position	Job Title: Supervisor	Job position data is saved	Passed
17	Attendance Location Management	Admin sets office location	Location name and GPS coordinates	Location successfully saved	Passed
18	View Attendance History	Employee views attendance history	Select specific date or month	History data displayed according to selected date	Passed

E. Deployment

At the deployment stage in developing a website-based employee attendance system, the first step taken is to prepare technical requirements such as server settings, databases, and the work environment required by the system. After that, the application will be run first in a test environment to ensure that each feature is functioning properly and without any problems. After the system is confirmed to be running well, the process continues with placing the application on the main server that will be used directly by the user. At this stage, a re-check is carried out to ensure that the application remains stable after being moved to the production server. If everything is running normally without any problems, then the application will be officially used in daily employee attendance activities. After the release, system monitoring and maintenance are still carried out routinely so that application performance remains optimal and can record employee attendance accurately, including in terms of location validation.

V. Conclusion

The implementation of a web-based attendance system at the Eleventwelfth company is one solution to the problems arising from the semi-manual attendance method, such as low data accuracy, late recapitulation, and limited real-time monitoring. By utilizing the Agile methodology, the system is developed iteratively to adjust to user needs and improve project efficiency. The Leaflet-based location validation feature and attendance documentation via webcam are the main innovations in ensuring the accuracy and validity of attendance data. Overall, this design not only improves the efficiency of personnel administration, but also strengthens transparency, accountability, and the basis for more precise and real-time managerial decision-making.

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