

Development Of Online Attendance Application With Time And Location Validation At Satpol Pp South Tangerang

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Abstract

In order to solve the inefficiencies and errors in manual attendance at the Satpol PP office in South Tangerang, this study creates a web-based attendance system. The Laravel framework is used to construct the system, GPS and reverse geocoding are incorporated to verify the locations of check-in and check-out. The system design is supported by UML diagrams, and structured attendance data is handled using a MySQL database. The Black Box Testing technique verifies that the system's essential features operate as planned. The outcomes demonstrate enhanced precision, real-time tracking, and simplified reporting. To improve system usability and dependability, future suggestions call for including mobile apps, facial recognition, and predictive attendance analytics in order to increase productivity, precision, and openness at the Satpol PP office in South Tangerang.

Keywords— *Web-Based Attendance, GPS Validation, Laravel Framework, Black Box Testing.*

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1. INTRODUCTION

Attendance is very important for human resource management, especially in government organizations with an organized work structure such as the Civil Service Police Unit (Satpol PP). However, until now, many government agencies still use a manually written attendance system. This not only has the possibility of recording errors, but also it is very easy to manipulate, which will make difficult for large and active agencies to recapitulate the data [1][2]. In such a situation, reports may be delayed, and the accuracy of employee performance evaluation may be compromised.

Web-based applications are created to manage employee attendance as time and information technology increase. In this situation, a digital system will automate the recording of attendance and ensure that all this happens in real time [3][4]. It will avoid errors and improve the efficiency of operations. One feature of attendance systems that is currently not very common is the integration of geolocation technologies such as GPS. A location confirmation system ensures that attendance data is more secure because it ensures that the transfer of attendance to the database only occurs if the user is within a certain radius of the authorized work location, either by mobile or physical [5][6].

By using a reverse geocoding algorithm, this system can convert geographic coordinates into addresses that can be understood by users. By using this technology, attendance records become more accurate and system administrators can view disciplines directly [7]. On the other hand, the Agile-based attendance system development method allows a faster and more flexible iterative process to meet user needs [8].

2. RESEARCH METHOD

Researchers use the well-known Agile method to develop software in this study. This method focuses on what the user wants and is done repeatedly [9]. We chose the Agile approach because it is very helpful in creating applications that require constant feedback. Each step in the Agile model starts with planning, creating the application's interface and database design, developing parts of the application, testing the system's performance, and improving according to recommendations from experts [8][10].

We use three important methods to obtain information: question and answer, direct observation, and searching from books or other records. We conducted careful interviews with Satpol PP South Tangerang officers, especially the head and staff who handle attendance. In other words, to get an accurate understanding of the manual absence method they have been using,

as well as potential problems. The results of the Q&A show that the old attendance method takes a lot of time, wrong records often occur, and it is impossible to immediately report who is present [1].

Researchers also visit the research location to observe how daily attendance is managed. The goal is to get information through interviews conducted on-site. Additionally, we document the manual check-in procedures, including how administrative staff compile attendance data in Excel each week. This information is valuable for developing a digital system that integrates location-based time tracking and automated features. [11].

Gathering all the user requirements starts with the process of designing the system. This design uses the Unified Modeling Language (UML), which provides various types of diagrams, such as use case diagrams, activity diagrams, and class diagrams. Here, other system requirements are also mapped out. This includes how the database tables are organized, how the user interface (UI) is created, and how to validate the location with GPS coordinates. The system is designed so that users can only take attendance if they are within a certain distance from the office [7].

Since Laravel version 11 is helpful with Model-View-Controller (MVC) architecture, this application was developed using it. This makes easier to differentiate data, views, and business rules. The implementation is done in a local development environment using Laragon and a MySQL database. We also incorporate a geocoding reversal API in the middle of development. The goal is to make location coordinate changes easier to understand. We also set up a user authentication system based on their respective roles, also known as role-based access controllers [12].

The system is tested using the Black Box Testing method, which focuses on testing existing functions without looking at how the program code is created. To ensure that the application can perform the check-in and check-out process correctly, validate the user's location, and record attendance according to predefined rules, each feature is tested with various inputs. The test results show that the system works well. It can record attendance automatically based on GPS radius and allows export of attendance data to Excel on a daily or monthly basis [13].

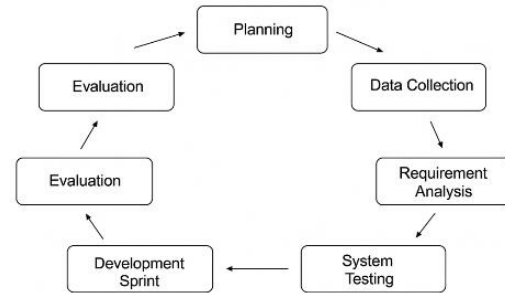


Figure 1. System Development Method

3. RESEARCH RESULTS

3.1. System Design

The Unified Modeling Language (UML) method was used to visually describe the system requirements. Use case, activity, and class diagrams are some of the diagrams used. The use case diagram shows how system users, such as members and administrators, interact with important features such as login, check-in, check-out, and export of attendance data. The activity diagram describes the logical flow of system activities, which starts from the login process and ends with the storage of attendance data. However, the class diagram shows the data structure and relationships between entities such as User, Employee, Office Location, and Attendance, each of which has corresponding attributes and methods [14].

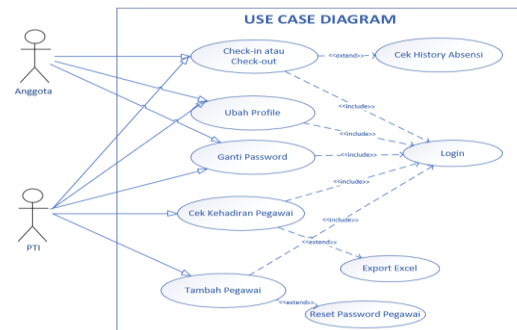


Figure 2. Use Case Diagram System

3.2. Application Interface

The user interface is created using user-centered design principles to ensure that the interface is easy to use, has a clear navigation flow, and is responsive across different types of devices. The various components include a login page, dashboards for members and admins, employee data management, and attendance records. The software is designed to display live attendance status information and make it easy to download data in Microsoft Excel format, which

is useful for recapitulation and performance assessment [15].

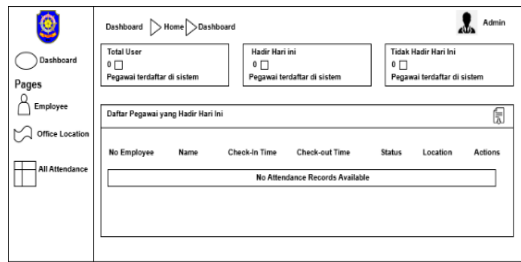


Figure 3. Admin Dashboard

In Figure 3 Describes that the image displays a wireframe for an employee attendance management system. At the top, there is a navigation trail that reads "Dashboard > Home > Dashboard," helping users understand their current location within the system. The left sidebar includes navigation options such as links to the Dashboard, Employee page, Office Location, and All Attendance pages. In the main section of the dashboard, key statistics are presented, including the total number of users, the number of employees present today, and the number of employees absent, each accompanied by appropriate icons. Below this, there is a section titled "Daftar Pegawai yang Hadir Hari Ini" (List of Employees Present Today), which is designed to display a table with details like employee ID, name, check-in/check-out times, attendance status, location, and available actions. Currently, it shows a message stating "No Attendance Records Available," indicating that there are no logs for today. Overall, the layout is clean, user-friendly, and effective for tracking attendance.

3.3. Database Design

The system includes not only display design but also database design using MySQL with a meticulous normalization method. Each table, such as user, role, employee, attendance, and office location, is designed to be connected to each other through primary and foreign key relationships. The goal is to ensure data integrity and consistency are maintained. This architecture meets the best standards for relational database development for small to medium-sized applications [16].

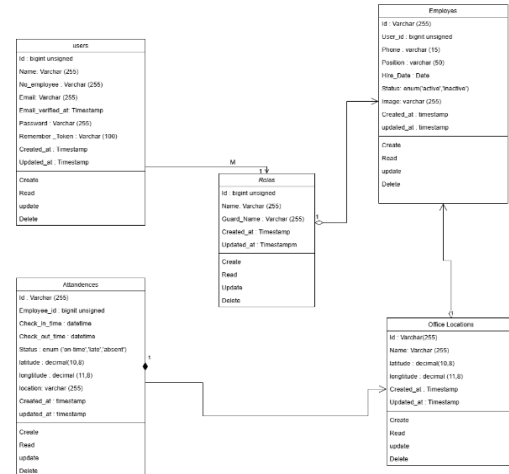


Figure 4. Entity Relation Diagram

Role-based authentication is to ensure secure access. This feature allows admins and regular members to share access rights, which ensures that authorized people can only access specific tasks. This way of working is becoming an essential component in the security design of contemporary information systems, especially for publicly accessible web applications.

Overall, the design stages in this research have followed modern software engineering principles and met user needs. The results of this design become a strong basis for the implementation stage and ensure that the system created will run well and in accordance with organizational goals.

4. DISCUSSION

The integration of GPS technology into the attendance app developed for this study is very important. It ensures that employee check-ins and check-outs are accurate and reliable. With GPS, the system can verify whether an employee is physically present at the office or their designated work location before recording their attendance. This significantly reduces the likelihood of false check-ins, such as one employee marking attendance for another who is not present. Additionally, GPS enables real-time tracking of field employees, simplifying team management. Therefore, in this study, the use of GPS not only enhances the functionality of the app but also aligns it with modern attendance system standards.

4.1 Implementation and Testing

A developed a web-based attendance app that incorporates GPS features through a simple development process, using modern web technologies and location services. The app is

launched on a secure web server, allowing access from any device with a web browser. During the setup, we configure GPS modules to capture real-time location data whenever employees check in or out. This ensures that attendance is recorded only when they are physically present in the office. We conduct thorough testing to verify the system's functionality without needing to examine the internal code. This testing assesses the accuracy of the location-based attendance records, the responsiveness of the user interface, and the proper synchronization of data between users and the server. The results confirm that the system accurately captured location data and effectively blocked unauthorized check-ins, demonstrating that it is ready for use.

4.1.1. Hardware and Software Implementation

Implementation of hardware and software is an implementation related to the devices used to design a Web-based Member Attendance Application.

- Processor : Intel 11th Gen i3
- RAM Memory : 8 GB
- Storage : SSD 512GB

The software used in making this attendance system :

- Operating System : Windows 11 Pro
- Language Programmings : PHP
- Text Editor : Visual Studio Code
- Database : MySql

A very important initial stage in the process of creating a web-based attendance application is installing and setting up the development environment. Researchers chose Laragon as a web server because it is lightweight, easy to use, and can run important components such as Apache, MySQL, and PHP simultaneously. In addition, Laragon has an auto virtual host feature that makes it easy to test projects locally using a special domain such as <http://absensi.test>, so that development can run more efficiently and more closely resemble the actual server environment. This section is an analysis of the results obtained. Avoid excessive citation and discussion of published literature. State the significance of the results and their implications.

Apache was installed as the main web server and used to manage users' HTTP requests, manage static and dynamic files, and run PHP scripts integrated in Laravel applications. The researcher changed the basic configuration, such as the default port, root directory, and supporting modules, such as `mod_rewrite`, during installation. This was done to ensure that URL

routing runs smoothly and dynamically. Apache is essential because it allows the system to work with a client-server model, where backend scripts on the server control the user interface accessed through the browser.

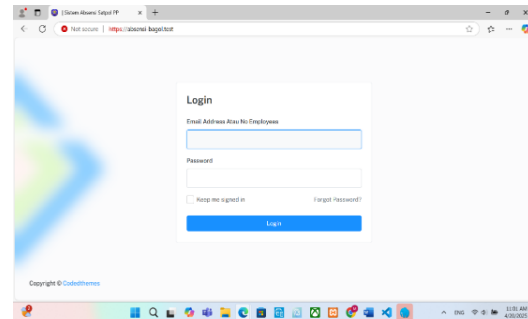


Figure 5. App Login Page

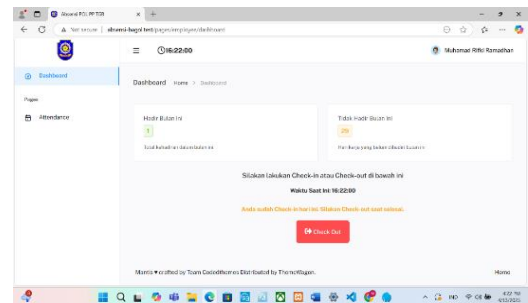


Figure 6. Attendance Page

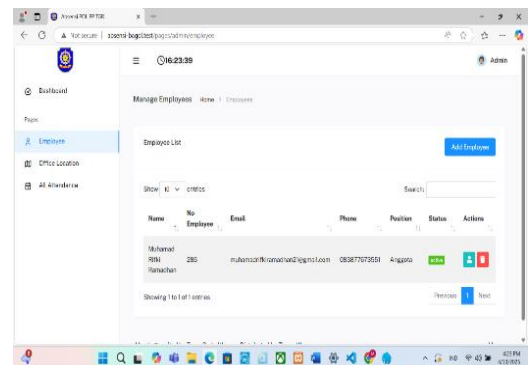


Figure 7. Attendance History

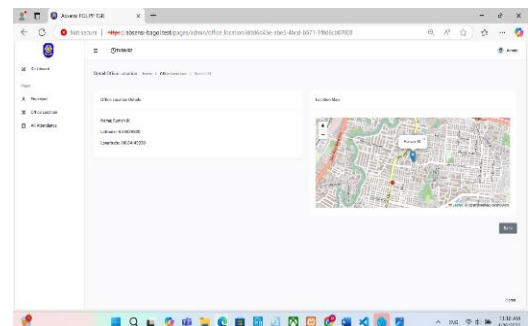


Figure 8. Absence location details

For now, the database is configured using MySQL through the phpMyAdmin interface provided by Laragon. Once created, the database is named `db_absence` and populated with the table structure as used in the previous design, such as users, roles, employees, attendances, and office_locations. To maintain data integrity and prevent duplicates, each table is linked with primary and foreign key relationships. Using the Laravel Artisan CLI, the database migration is automated. The CLI automatically creates table schemas based on the definitions given in the pre-built migration file.

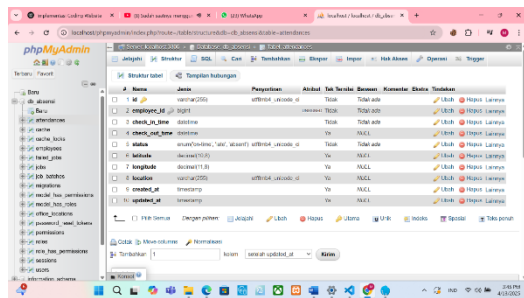


Figure 9. Manage Database

This step builds the foundation for storing attendance data and provides the flexibility to manage schemas, update tables, and integrate them into the application's business logic features. Installing and setting up Apache and MySQL correctly ensures the system can be run locally for testing or transferred to a production server with minimal changes.

4.1.2. Testing

The system testing process is carried out to ensure that each feature of the web-based attendance application works according to specifications and user needs. Black box testing is used; it tests system results based on specific inputs without looking at the code structure. This technique is useful for evaluating the system's ability to handle various usage scenarios, such as data validation, attendance processing, and additional functions such as data export.

The test results show that the main features of the application run well as expected. Six important scenarios were tested: login with correct data; check-in and check-out process with time and location checking; refusal to check-in outside the office radius; access by members to attendance history; and data export by admin. For each test, the system responded according to the scenario, with both warning and success messages. This shows that the business logic and

application security have been effectively implemented.

The successful testing of each feature shows that the system has met the principles of fit for use and fit for purpose. This means that the system can not only be used well, but also meets the organization's objectives-providing accurate, clear, and reliable attendance data. This supports the claim of Silitonga et al. (2023), which states that Black Box-based testing can ensure the quality and functional integrity of web-based systems [17].

5. CONCLUSION

1. This research creates and implements a web-based attendance application that improves the efficiency and accuracy of recording attendance of Satpol PP South Tangerang members. By using GPS technology and reverse geocoding for time and location validation, the system automates the attendance reporting process. As a result, the manual process of taking attendance, which is prone to many errors or even fraud, is now faster, more precise, and digitally documented in real time and continuously automated.
2. In addition, the developed attendance system is equipped with an interactive monitoring dashboard. This allows supervisors or administrators to access it quickly and provides clear information. The dashboard displays daily and monthly attendance history and attendance statistics. This simplifies supervision, report generation, and data-driven decision-making. The system not only increases the transparency and accountability of management reporting on e-Board services, but also allows data export to Excel files and categorizes data based on attendance status in real time (e.g., present, late, permission, sick).

6. SUGGESTION

The system can be expanded to include facial recognition features to improve the validity of the attendance system. In addition, it is necessary to test performance in a production environment, develop a mobile version that allows absence notifications, and thoroughly examine employee discipline.

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