LJISSEN-AI

Lovelace Journal of Information System, Security, Education and Network Artificial Intelligence

E-ISSN: XXXX-XXXX
P-ISSN: XXXX-XXXX

Research Article

Cross-Platform Digital Attendance System for Optimization of Attendance Management

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Abstract: Manual attendance recording today still faces significant challenges, such as inefficiency, potential data loss, and risk of manipulation. The purpose of this research is to design and develop a cross-platform digital attendance system that can improve the efficiency and accuracy of attendance data management. The contribution of this research is to design a prototype application that supports geolocation-based attendance recording, automatic notification delivery, and real-time data analysis that can be accessed via web and mobile devices. This system was built utilizing React for the frontend, Laravel for the backend, React Native for mobile applications, and MySQL as the database, as well as using an Agile Development approach to be adaptive to changing user needs. Testing is conducted using the Blackbox Testing method to ensure that the functionalities operate as expected. Research results indicate that the system is capable of enhancing attendance management effectiveness, accelerating data-driven decision-making, and is suitable for adoption.

Keywords: Agile Development; Attendance; Blackbox Testing; MySQL; React

1. Introduction

Manual attendance recording in the education sector [1]–[3] and industry often faces various challenges, such as data loss, time inefficiency, and the risk of data manipulation. Moreover, manual systems are still used in some places, which not only limits user flexibility but also hinders the data-driven analysis and decision-making process. [4]–[6].

In the era of digital transformation, cross-platform technology based on web and mobile has become a relevant solution to improve efficiency and accessibility [7]–[9]. One key factor in enhancing organizational productivity and effectiveness is the accuracy and efficiency of attendance recording. [10]. In this context, attendance data management requires an integrated system capable of meeting cross-sector needs. This includes the implementation of features that support the processes of recording, reporting, and integration with other systems such as payroll in the industrial sector or learning evaluation in the education sector.

React is a Frontend JavaScript Library created by Facebook/Meta [11]–[13] for web interface development. Then PHP Framework Laravel for Rapid Development of API Backend [14]–[16], as well as React Native for the development of responsive mobile-based clients that can be accessed from various platforms [17], Figma created for User Interface/User Experience (UI/UX) design [18], and MySQL which is now supported by Oracle as a Database Management System (DBMS) [19], the contributions of this research are:

1. Improvement of attendance data management efficiency.
2. Utilization of cross-platform technology for user accessibility and flexibility.
3. Proposed features available to meet user needs.

The purpose of this research are:

1. Provide an efficient and flexible digital attendance system solution.
2. Integrate features such as geolocation-based recording, automatic notifications, and real-time data analysis to support decision-making.

Received: February 15, 2025
Revised: March 10, 2025
Accepted: April 22, 2025
Published: May 30, 2025
Curr. Ver.: May 30, 2025

3. Utilize cross-platform technology to ensure accessibility through both web and mobile devices.

Through the implementation of innovative digital technology, this application is expected to enhance operational efficiency in attendance data management, improve the effectiveness of time and resources needed for attendance recording, and also increase the accuracy and transparency of data required for strategic decision-making.

Future prospect development is expected to produce a web and mobile-based digital attendance system application ready to meet the needs of the industry and education sector. This application will integrate real-time location-based attendance features, automatic notifications, and cross-platform accessibility to ensure usage flexibility. Furthermore, this prototype provides technical documentation that includes implementation guides, system configuration, and steps for integration with existing systems such as Human Resource Information Systems (HRIS) [20] or educational management platforms like Learning Management Systems (LMS) [21]. This documentation is designed to facilitate the adoption process by user organizations.

2. Proposed Method

The method used is the Agile Development approach. According to [22], as shown in the following figure 1.

Figure 1. Agile Development [23]

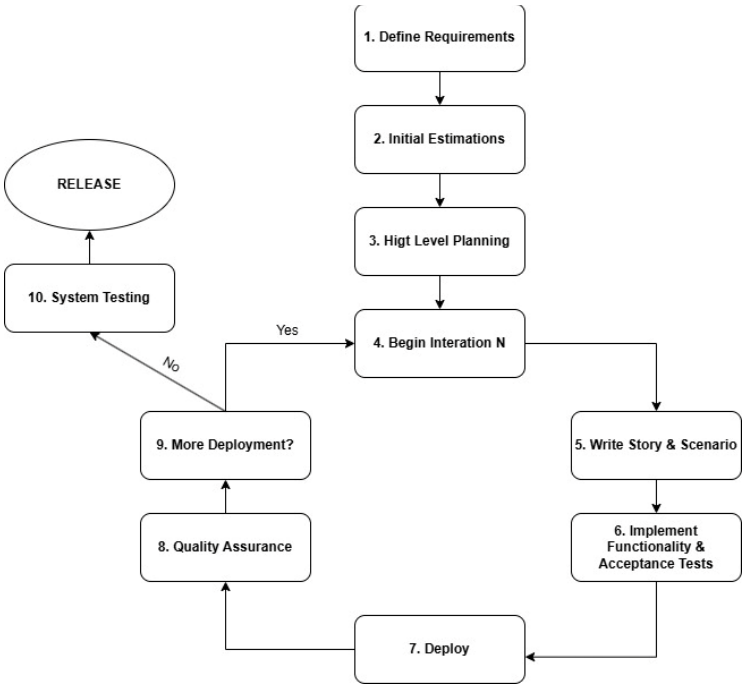

Figure 2. Flowchart Agile Development [23]

Agile Development is a flexible approach that allows companies to respond quickly to changes. The main focus of Agile Development is personal interaction, adequate documentation, collaboration with clients, and rapid response to changes, as well as the entire process and its supporting tools [24]. Therefore, Agile Development enables continuous iteration and adaptation to the needs of stakeholders. The choice of this method aims to enhance efficiency, flexibility, and collaboration with clients in software development [25], [26]. The stages of agile include requirements analysis, system design, development, testing, and implementation, which can be illustrated in figure 2 with the following explanation:

1. Requirement Analysis
    a. Conducting discussions with stakeholders to identify specific needs related to the attendance feature.
    b. Documenting the requirements in the form of user stories to ensure that the application feature includes the necessary functionality.
2. System Design
    a. Create use case diagrams and UI for web and mobile applications using Figma.
    b. Develop system architecture based on React (frontend), Laravel (backend), and React Native (mobile) with MySQL as the database.
3. Develop
    a. Using React to build responsive and interactive UI.
    b. Using Laravel for business logic, data processing, database integration, and creating RESTful API.
    c. Design a database structure that efficiently supports attendance data using MySQL.
    d. Developing mobile applications using React Native.
4. Testing
    a. Conduct unit testing for each feature.
    b. Perform comprehensive system testing to ensure the application runs smoothly on various devices and platforms.
5. Implementation
    a. Deploy the application on the server and test connectivity in educational and industrial environments.
    b. Provide technical documentation to assist with the installation process and user training.
6. Evaluation and Improvement
    a. Collecting feedback from users to identify potential improvements.
    b. Iterating on development based on input.

3. Results and Discussion

This prototype is designed based on user needs and rapid iteration. Figure 3 shows the specific requirements of the system through a use case diagram as explained below:

1. Actor
    a. The admin is responsible for managing the system, such as registering new users, managing attendance schedules, approving leave, and monitoring the list and history of absences.
    b. Users are system users who have access to clock in, check attendance history, and log out.
2. Use case
    a. Login

        Both Admin and User need to log in first to use the system. This login will verify the user's credentials so that the system can only be accessed by authorized users.

    b. User Registration

        Only the Admin can register new users in the system. This involves creating accounts for employees or other users.

c. Check Attendance List

The admin can see the attendance list that contains the presence of all users. This information is useful for monitoring overall attendance activities.

d. Leave Approval

The admin is responsible for approving or rejecting leave requests submitted by users through the system.

e. Attendance Schedule Management

The admin can manage attendance schedules, for example, determining shifts or working hours for users.

f. Attendance

Users can mark their attendance through the system. This process records the attendance time according to the specified location or time.

g. Check Attendance History

Admin and User can view attendance history. Admin can see all user attendance history, while users can only see their own history.

h. Logout

After finishing using the system, both Admin and User can log out to protect the security of their accounts.

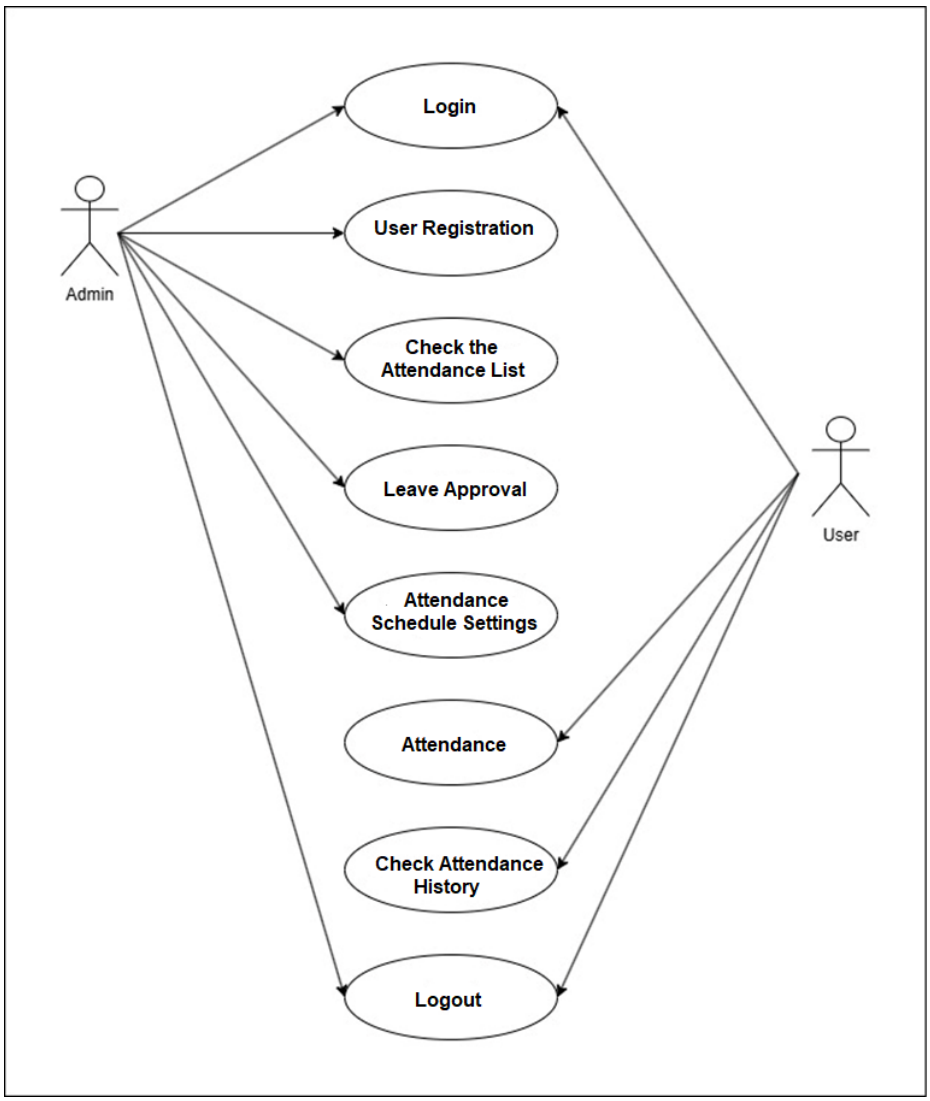

Figure 3. Use case diagram

Figure 4 shows the appearance of the prototype based on the UI/UX design. Next, the analysis of this prototype uses black box testing analysis as shown in the following table 1.

Table 1. Black box testing analysis

System Features	Blackbox Test Description	Type of Testing	Test Scenario and Expectations
Login	User Authentication	Input validation	1. If the input is correct, the login is successful. 2. If the input is incorrect, an error message appears.
User Registration	Registration by Admin	Access rights and form validation	1. Only admin can register new users. 2. Validate email and password according to the format.
Attendance	Recording attendance	Main functions of the system	User marks attendance so the data is recorded in the database and appears in the history.
Leave Approval	Leave permission by Admin	Flow processes and approvals	User submits leave, then the admin can approve/reject it and a notification is sent.
Attendance History	Displaying attendance data	Filter and visibility functions	1. Admin can see all users. 2. Users can only see their own history.
Schedule Settings	Admin manages the schedule	CRUD functions	1. Admin can create/edit/delete schedules. 2. The schedule is displayed and synced with attendance data.
Automatic Notifications	Reminder or system info	System notification functions	Reminders are sent according to events (such as approved leave or late absence).
Attendance Geolocation	Location during attendance	Location validation	The location during absence is recorded and the location zone validation is displayed.
Logout	Logout of the system	Session security	After logging out, access to the main page is denied without logging in.

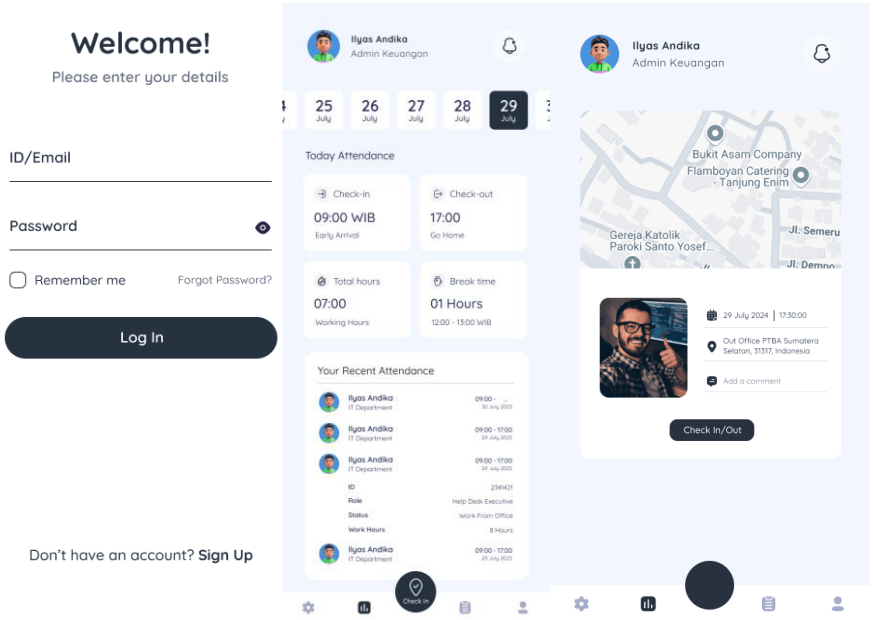

Figure 4. UI/UX display

4. Conclusions

The development of this cross-platform digital attendance system has successfully integrated modern technology to meet the needs for flexible and efficient attendance tracking. This system provides key features such as secure login, location-based attendance, automatic notifications, and schedule management that can be accessed via both web and mobile devices. Testing using the Blackbox method showed that the system works as expected across all designed features. With an Agile Development approach, the iterative process allows the system to be continuously developed based on user feedback. Overall, this solution has the potential to be widely adopted in both the education and industry sectors as part of digital transformation in attendance management.

Author Contributions: The contribution of each author in this manuscript, consisting of Ilyas Andika did the prototype design; Triani Purnama Sari analyzed and collected data; Yusuf Adi Winata analysed the prototype; all authors have approved the final version.

Acknowledgments: We would like to thank Universitas Siber Asia, hopefully this article will be published and become a consumption for scholars.

Conflicts of Interest: We certify that the submitted work was performed with no conflict of interest.

References

Abadi, S., Maseleno, A., Khumaidi, A., & Iskandar, M. N. (2022). Peningkatan kualitas sekolah digital melalui aplikasi absensi guru sekolah berbasis Android pada SMA Negeri 1 Sukoharjo. NEAR: Jurnal Pengabdian Kepada Masyarakat, 1(2), 116–121. https://doi.org/10.32877/nr.v1i2.435

Atim, S. B. (2024). Permodelan sistem informasi penjualan barang berbasis website menggunakan metode agile. Jurnal Artificial Intelligence dan Teknologi Informasi, 2(1), 14–25. https://doi.org/10.58602/jaiti.v2i1.104

Budiyanto, S., et al. (2021). The automatic and manual railroad door systems based on IoT. Indonesian Journal of Electrical Engineering and Computer Science, 21(3), 1847–1855. https://doi.org/10.11591/ijeecs.v21.i3.pp1847-1855

Budiyanto, S., Silalahi, L. M., Adriansyah, A., Darusalam, U., Andryana, S., & Rochendi, A. D. (2021). Development of Internet of Things based fertigation system for improving productivity of patchouli plantation. In 3rd International Conference on Research and Academic Community Services (ICRACOS) (pp. 230–233).

Budiyanto, S., Silalahi, L. M., Silaban, F. A., Muwardi, R., & Gao, H. (2021). Delivery of data digital high frequency radio wave using advanced encryption standard security mechanism. In International Seminar on Intelligent Technology and Its Application (ISITIA) (pp. 386–390). https://doi.org/10.1109/ISITIA52817.2021.9502262

Dalimunthe, M. M., Juma'adi, J., & Madiistriyatno, H. (2023). Pengaruh agile methodology dalam strategi digitalisasi di PT. Satoru Prima Internasional. Lentera: Multidisciplinary Studies, 2(1), 122–131. https://doi.org/10.57096/lentera.v2i2.67

Handayani, H., Ayulya, A. M., Faizah, K. U., Wulan, D., & Rozan, M. F. (2023). Perancangan sistem informasi inventory barang berbasis web menggunakan metode agile software development. Jurnal Testing dan Implementasi Sistem Informasi, 1(1), 29–40. https://doi.org/10.55583/jtisi.v1i1.324

Hijrasil, H., Maisharah, S., Widodo, Z. D., Darsono, D., & Manuhutu, H. (2023). Penerapan teknologi HRIS (Human Resource Information System) dalam meningkatkan efisiensi dan efektivitas manajemen SDM. Jurnal Pendidikan Tambusai, 7(2), 7074–7085. https://doi.org/10.31004/jptam.v7i2.7340

Iman, N., Hassolthine, C. R., & Sahara, R. (2024). Sistem monitoring topologi jaringan load balancing berbasis open source Zabbix. JIRE (Jurnal Informatika Rekayasa Elektronika), 7(1), 27–34. https://doi.org/10.36595/jire.v7i1.1137

Muhammad, F., Fitri, I., & Nuraini, R. (2022). Implementasi customer relationship management (CRM) pada sistem informasi pemasaran dengan menggunakan framework React.JS berbasis website. Jurnal JTIK, 6(1), 93–101. https://doi.org/10.35870/jtik.v6i1.392

Nurhasanah, Junniati, Handayani, P., & Jafar, M. U. A. (2024). Efektivitas sistem informasi absensi pegawai aparatur sipil negara (ASN) berbasis web pada BPBD Provinsi NTB. PEDAMAS: Pengabdian Kepada Masyarakat, 2(4), 954–960. https://pekatpkm.my.id/index.php/JP/article/view/355

Putri, Y. S., & Silalahi, L. M. (2020). Analysis performance long term evolution network on route of subway tunnel Mass Rapid Transit (MRT) Bundaran HI - Senayan. In 2020 International Conference on ICT for Smart Society (ICISS) (pp. 1–6). IEEE. https://doi.org/10.1109/ICISS50791.2020.9307595

Ramdani, U. P., Hoerudin, H., Diyahayuningsih, D., Nurhidayat, R., & Ilyas, D. (2023). Analisis kebutuhan sumber belajar LMS pada pendidikan sekolah. Seroja: Jurnal Pendidikan, 2(3), 1–10. https://doi.org/10.572349/seroja.v2i3.687

Sahara, R., Abdullah, S., Hassolthine, C. R., & Saputra, M. I. (2024). Evaluation of the use of online programming simulator to increase the participation rate of classroom student attendance. Jurnal PTK dan Pendidikan, 10(1), 21–30. https://doi.org/10.18592/ptk.v10i1.11699

Sahara, R., Abdullah, S., Saputra, M. I., & Hassolthine, C. R. (2023). Integration design of academic information systems and learning management systems using web services REST-based external database. Jurnal Ilmiah FIFO, 14(2), 205–215. https://doi.org/10.22441/fifo.2022.v14i2.010

Saied, M., & Syafii, A. (2023). Perancangan dan implementasi sistem absensi berbasis teknologi terkini untuk meningkatkan efisiensi pengelolaan kehadiran karyawan dalam perusahaan. Jurnal Teknik Indonesia, 2(3), 87–92. https://doi.org/10.58860/jti.v2i3.21

Samudra, Y., Nanang, N., & Suryaningrat, S. (2024). Penerapan design system dengan Figma pada proses UX design dalam pengembangan aplikasi Krealogi. LOGIKA: Jurnal Ilmu Komputer dan Pendidikan, 2(4), 728–745.

Saputra, M. A., Marhaini, M., & Dristyan, F. (2024). Implementasi teknologi absensi digital berbasis objek untuk meningkatkan kualitas proses belajar mengajar di perguruan tinggi. Fusion: Jurnal Research Engineering and Technology Applied Science, 1(2), 62–71. https://ejurnal.faaslibsmedia.com/index.php/fusion/article/view/35

Silaban, F. A., Elmianto, R., & Silalahi, L. M. (2021). Build smart home controls using Wemos microcontroller-based Telegram app. CCIT Journal, 14(1), 1–12. https://doi.org/10.33050/ccit.v14i1.802

Silalahi, L. M., & Amnesta, L. (2021). Application of the fuzzy method in the design of control and monitoring systems for flood canal pump houses. CCIT (Creative Communication and Innovative Technology) Journal, 14(2), 203–213. https://doi.org/10.33050/ccit.v14i2.1486

Silalahi, L. M., Budiyanto, S., Simanjuntak, I. U. V., Silaban, F. A., Rochendi, A. D., & Karimah, W. A. (2021). Real-time examination system for new students at pandemic time COVID-19 using fuzzy logic. In 10th IEEE International Conference on Communication, Networks and Satellite (Comnetsat) (pp. 219–224). https://doi.org/10.1109/COMNETSAT53002.2021.9530832

Supriadi, S., Pandia, H. B., Siahaan, K. F., Hendratno, W., & Nurhayati, N. (2023). Penggunaan React Native dalam pengembangan aplikasi media pembelajaran interaktif perakitan komputer untuk meningkatkan prestasi belajar siswa. JTePen: Jurnal Teknologi Dalam Pendidikan, 1(1), 4–8.

Susilo, A. E., & Abdurrahman, A. (2023). Manajemen sumber daya manusia untuk meningkatkan kinerja karyawan melalui absensi digital. Jurnal Educatio FKIP UNMA, 9(1), 318–326. https://doi.org/10.31949/educatio.v9i1.4629

Widiarta, I. M., Mulyanto, Y., & Sutrianto, A. (2023). Rancang bangun sistem informasi inventory menggunakan metode agile software development (Studi kasus Toko Nada). Digital Transformation Technology, 3(1), 133–143. https://doi.org/10.47709/digitech.v3i1.2549

Windiarti, I. S., Anggatama, J., & Qamaruzzaman, M. H. (2024). Mengoptimalkan pelayanan pendidikan melalui perancangan website sekolah berbasis web mobile (Studi kasus: SMP Negeri 3 Palangka Raya). PEDAMAS: Pengabdian Kepada Masyarakat, 2(1), 275–283. https://pekatpkm.my.id/index.php/JP/article/view/217

Zulfa, I., & Wanda, R. (2023). Rancangan sistem informasi akademik berbasis website menggunakan PHP dan MySQL. KLIK: Kajian Ilmiah Informatika dan Komputer, 3(4), 393–399. https://doi.org/10.30865/klik.v3i4.617