Journal of Computer Science Advancements, 2(3) - June 2024 121-135

Website-Based Employee Attendance Information System (Case Study: PT. Excelindo Karya Abadi)

Shabrina Husna Batubara[1], Willy Pramudia Ananta[2], Zulfahmi Indra[3]
[1,2,3]*Universitas Negeri Medan , Indonesia*

Corresponding Author: Shabrina Husna Batubara, E-mail; shabrinahusna1@gmail.com

Article Information:
Received June 24, 2021
Revised june 28, 2021
Accepted June 30, 2021

ABSTRACT

This research aims to develop a web-based employee attendance information system at PT. Excelindo Karya Abadi, overcoming inefficiencies in the manual attendance process. Using the Waterfall method, this research includes the stages of needs analysis, system design, implementation, testing, and maintenance. Data collection is carried out through interviews and direct observation so that it becomes the basis of a system that includes the function of recording attendance via selfie photos, managing employee data, and making reports. The system architecture is designed with front-end and back-end components, using technologies such as HTML, CSS, JavaScript, PHP, and MySQL. Testing involves black box techniques to ensure functionality and user feedback for system improvement. The implemented system demonstrated significant improvements in the accuracy and efficiency of attendance tracking, reducing the potential for data manipulation and errors. The transition to a web-based system allows for greater accessibility and integration with an organization's existing systems, thereby contributing to increased operational efficiency. The findings show that digital attendance systems can simplify administrative processes substantially, offer reliable solutions for employee attendance management, and align with technological advances to support company growth.

Keywords: *Attendance, Employee, Waterfall, Website*

Journal Homepage https://journal.ypidathu.or.id/index.php/jcsa

How to cite: Batubara, H, S., Ananta, P, W., & Indra, Z. (2024). Website-Based Employee Attendance Information System (Case Study: PT. Excelindo Karya Abadi). *Journal of Computer Science Advancements*, 2(3). 121-135
https://doi.org/10.70177/jsca.v2i3.1106
Published by: Yayasan Pendidikan Islam Daarut Thufulah

INTRODUCTION

In the era of globalization and digital transformation that continues to develop, Human Resource (HR) management is an important aspect that must be paid attention to by every organization. Effective HR management is very important not only for the operational success of an organization but also as a key factor in achieving set business

goals. One of the main approaches to improving HR management is the implementation of a web-based personnel data information system (Aldisa, 2024). Websites are information and marketing tools that enable companies to reach a global audience. Websites can be used to find information, provide advice, and promote businesses so they can be seen by anyone around the world (Arafat, 2022).

Leveraging website technology allows organizations to automate various administrative processes related to HR management, improve data accessibility, and support more timely and data-driven decision-making (Aldisa, 2024). Given that human resources are invaluable assets, companies must be able to utilize them optimally. A company's success in achieving its goals depends more on its workforce than on sophisticated machinery, complete facilities, or advanced infrastructure (Fauzan et al., 2024).

Attendance is an important thing in a government agency. With a good attendance system, it is hoped that it can help in controlling the work completion process so that maximum results are obtained by the goals that have been set. To achieve this, an attendance list form or attendance card is required which is filled in with a time-recording machine (Pratama et al., 2024).

Attendance involves collecting data on whether individuals are present or not. This process is usually carried out in educational and other institutions. Any activity that requires participant absence information will result in attendance being restricted. This also applies to the teaching and learning process at school, where absence indicates that someone is not present at their duties or work (Amelia & Solikhah, 2023).

An information system is a system in an organization that accommodates the needs of daily transaction management, supports the organization's managerial operational functions, and the organization's strategic activities. This system also provides necessary reports for certain external parties (Tri Yulianti & Tri Prastowo, 2021). The purpose of an information system is to provide information for planning, organizing and operational business activities of a company, fostering organizational synergy in the decision-making control process (Arifai et al., 2022).

One of the main approaches to evaluating employee performance is by monitoring their attendance. Manual attendance systems, where employees fill out attendance forms, are considered less effective as they are prone to manipulation, leading to the loss of authenticity of attendance data. Accurate and detailed attendance records are critical to successful operations and employee performance, especially in industrial environments. Managing employee absenteeism is a significant challenge for companies, as various factors such as tardiness, leave, and absenteeism can impact productivity and efficiency. In addition, ensuring fairness and accuracy in salary calculations is becoming increasingly important (E. A. Sitompul et al., 2024).

The effectiveness of an electronic attendance system is evaluated not only based on its technical aspects but also on its impact on employee attitudes and behavior. This system aims to offer positive incentives for employees to become more disciplined and adhere to attendance regulations. Moreover, implementing this technology is expected

to reduce the potential for fraud or manipulation of attendance records, which can undermine bureaucratic efficiency (Adhiati, 2024).

Previous research has explored various aspects of web-based attendance systems, biometric authentication, and their impact on HR management. For example, (Wati et al., 2021) examined the efficiency of facial biometric systems for attendance monitoring, highlighting increased accuracy and reduced fraudulent practices compared to traditional methods. Similarly, (Mamatnabiyev, 2021) discussed the development of an IoT-based intelligent attendance system, which significantly improves data accessibility and reliability. Another relevant study conducted by (Bah & Ming, 2020) focused on the application of facial recognition technology in attendance systems, which showed improvements in accuracy and user comfort.

The research method used is the Waterfall method which consists of several stages, namely Requirements Analysis, System Design, Implementation, Testing, and Maintenance. In this development system, the Waterfall method is used because of the nature of the project which has clear needs and goals from the start. This method allows structured development with clear stages starting from requirements analysis, design, implementation, to testing. The decision to use the Waterfall method is also supported by (Aulia et al., 2024) which shows that for projects with clear and stable specifications, this method can provide more predictable and measurable results.

Previous research by (Yudha et al., 2023) examines the use of the Waterfall Method in developing a Permanent Employee Payroll Information System. This research utilizes the Waterfall Method to build an information system that is capable of processing payroll data for both contract and permanent employees at PT. Self-Successful Absorption Image. The Waterfall Method process, the resulting information system results, as well as the main differences between contract and permanent employees are visualized to provide a clearer understanding of the research and its results. The author also found that this research shows similarities in the use of the UML model and the SDLC Waterfall design model to create a payroll information system.

Research by (Siswanto & Rosyani, 2021) designed an Employee Payroll Information System in Tb Blitar using the waterfall method, which was structured in several stages. This system aims to make it easier for administration to manage data on basic salary, overtime and deductions, as well as changing the manual system into a web application. This system is more efficient, easy to understand, accurate, and makes salary calculations easier. This research also shows similarities in the use of the UML model and the waterfall model SDLC design method for payroll systems.

With the development of technology, there is an urgent need to develop a more efficient and accurate whereabouts information system. “Can the development of a web-based attendance information system using selfie photos increase the efficiency of recording and the accuracy of employee attendance reports at the company?”.

This research aims to develop a web-based attendance information system that uses selfie photos that can be accessed via various platforms and devices. With this

system, it is hoped that it can increase efficiency in recording employee attendance, save user device storage, and simplify the process of recording attendance. The implementation of this system is expected to provide technological solutions that advance the company and increase the accuracy of employee attendance reports, thereby helping the company achieve its goals more effectively.

RESEARCH METHODOLOGY

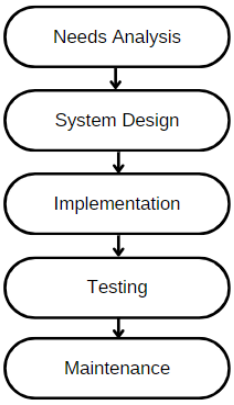

Figure 1. Steps Of The Waterfall Method

To carry out a needs analysis at PT. Excelindo Karya Abadi regarding the employee attendance system, the steps taken are:

Needs Analysis

At this stage, determine the goals and objectives or users of the application, and includes the initial steps in data collection, planning, and what is needed to produce the product (Irfan et al., 2023). Analyze needs by gathering relevant initial information. This will involve interviews with management and employees, as well as direct observation of the current attendance process. From the results of this data collection, the next step is to prepare a system requirements specification document. This document should cover various key expected features, such as attendance recording, employee data management, reporting, and integration with other existing systems.

System Design

The author conducted research using the Unified Modeling Language (UML) modeling design and a waterfall model development method approach. Unified Modeling Language, or UML, is an image-based language used to visualize, specify, build, and document object-based software development systems (Ropianto et al., 2022).

The following are the types of diagrams UML:

Use Case Diagram

Use Case Diagram is a diagram that describes the typical relationship between system users and the system itself, by telling how the system is used (Kurniawan & Syarifuddin, 2020).

Class Diagram

The specifications used to produce objects and are the core of class-oriented design development are called class diagrams. This class diagram displays the state of a system and the services provided by that state (Arianti et al., 2022).

Entity Relationship Diagram

ERD is used to describe the relationship between data stores or stores in the flowchart. Entity relationship diagrams utilize various notations or symbols to represent relationships between data (Von Emster et al., 2021).

Implementation

Implementation is the stage where the system is ready to operate in actual conditions. The purpose of implementation is to apply the design that has been made to the system, so that it can be seen whether the system is ready to achieve the desired goals and allows users to provide input for further development (Siswanto & Rosyani, 2021).

In the implementation phase, the web interface is developed using HTML, CSS, and JavaScript. Additionally, logic server and API development uses technologies such as PHP or Node.js. Database design is implemented using MySQL or PostgreSQL to ensure efficient and structured data management.

Testing

At the testing stage, the application is tested using the black box testing method. This testing is carried out by running the employee management information system and then checking whether the output produced is as expected (Venika & Hadinata, 2023). Black-box testing focuses on evaluating the functional specifications of the software being developed. With this method, testers can easily identify input conditions and assess program function based on predetermined specifications (Ramadhani et al., 2024).

Maintenance

Operation & Maintenance is the final stage in the Waterfall development method. At this stage, maintenance is required to avoid program errors during operation. However, in this research, researchers only reached the system integration and testing stage (Setiabudi & Wibowo, 2023).

RESULT AND DISCUSSION

Research shows that the development of a web-based attendance system has succeeded in increasing accuracy and efficiency in recording employee attendance. The manual method used previously often resulted in errors in recording, required a long time to recapitulate attendance data, and had security problems because it was vulnerable to fraud and manipulation by employees. These findings are based on previous research by (Viswanathan et al., 2024).

Need Analysis

a. Admin
1. Log in to the system
2. Manage employee information
3. Review employee absenteeism recaps
4. Review employee overtime attendance recaps
5. Exit the system

b. User
1. Login to the system
2. Take attendance
3. Review attendance history
4. Logout

System Design

Use Case Diagram

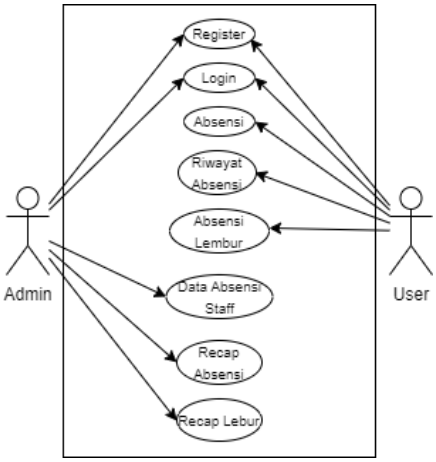

Figure 2. Use Case Diagram

A use case diagram is a type of UML (Unified Modeling Language) diagram that illustrates the interaction relationship between a system and its actors. Use cases can depict the types of interactions between users and the system. This type of diagram is relatively easy to understand. The initial step in modeling is to create a diagram that describes the actions of the actors and the system's actions, as demonstrated in a use case diagram in Figure 2 (H. Sitompul et al., 2024).

Tabel 1. Use Case Narrative Of User Access

Use Case Narrative Access User	
Goals	Actors can view and manage their own attendance and overtime data.
Description	This system allows perpetrators to access and manage their data, including absence history, attendance recording, and overtime recording.
Main Scenario	
Actor	User

Initial Conditions	The actor opens a web page to access the User.
Actor Action	Reaction System
1. Actor chooses to send attendance.	The system displays a form for filling in attendance data.
2. The actor chooses to view the attendance history.	The system will display information regarding the actor's presence
3. Actor chooses to add overtime	The system will allow the player to enter details of the overtime they wish to add
End Condition	If the command is correct, the system will display the desired result.

Table 2. Use Case Narrative Of Admin Access

Use Case Narrative Access Admin	
Goals	Actors can view existing data with Admin access
Description	This system allows actors to access and manage employee attendance data, absenteeism recaps, and overtime recaps
Main Scenario	
Actor	Admin
Initial Condition	The actor opens the Admin access web page
Acttor Action	The actor opens a web page to access Admin.
1. The actor chooses to manage employee attendance data.	This system displays information on managing employee attendance data
2. The actor chooses to recap attendance.	This system displays employee attendance recap information
3. Actor chooses to recap overtime.	This system displays employee overtime recap information
End Condition	If the command is correct, the system will display the desired result.

Class Diagram

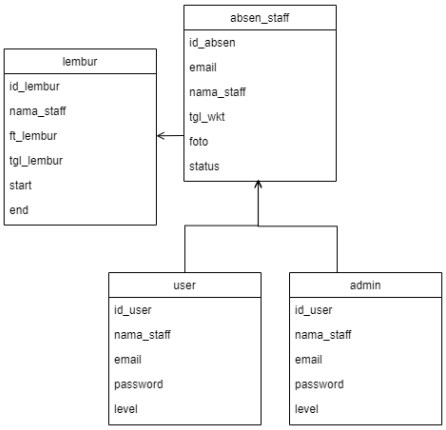

Figure 3. Class Diagram

Class Diagrams are utilized to define the static structure of a system. These diagrams illustrate the classes within the system, along with their attributes and methods. Additionally, Class Diagrams depict the relationships and associations between classes, aiding in modeling the interactions between components and the relationships between objects in the software (Akbar et al., 2024). The Class Diagram is shown in Figure 3.

Entity Relationship Diagram (ERD)

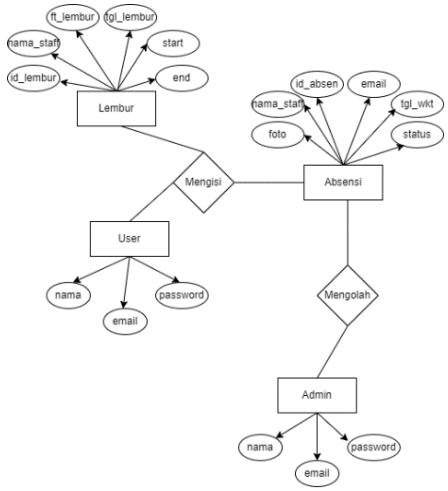

Figure 4. Entity Relationship Diagram (ERD)

Entity Relationship Diagrams (ERD) were developed to visually represent the structure of a database, including entities, attributes, and the relationships between them. After that, normalization is carried out to optimize the database structure by eliminating redundancy and minimizing data anomalies (Huawei Technologies Co., 2023). This approach enables efficient and systematic database design, ensuring that the database can store and manage data effectively according to business needs (Haris Setyawan, 2024). The Class Diagram is shown in Figure 4.

Implementation

The Implementation results show that the web-based attendance information system developed for PT. Excelindo Karya Abadi is valid, practical, and effective. The design of this web-based attendance information system can be seen in Figure 5, Figure 6, and Figure 7, Figure 8, Figure 9, and Figure 10.

Figure 5. User And Admin Login Display

The login display shown in Figure 5 is the interface for accessing the PT company attendance system. Excelindo Karya Abadi for users and admins. If the username and password do not match the data in the database, the user cannot log in to the next page.

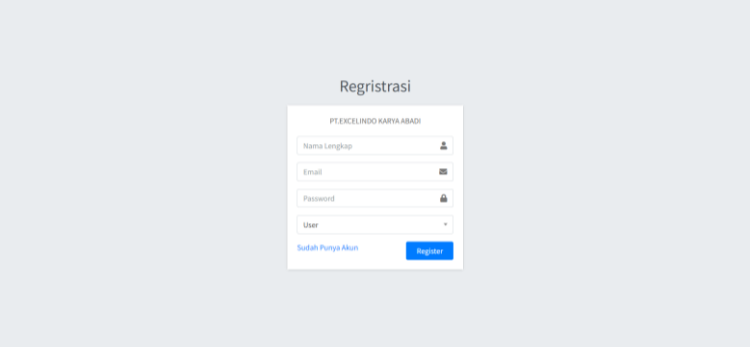

Figure 6. User And Admin Registration Display

The registration display in Figure 6 above is an interface designed to facilitate the process of registering a new account in the attendance system for PT users and admins. Excelindo Karya Abadi. For users who don't have an account, you need to register first via the form provided.

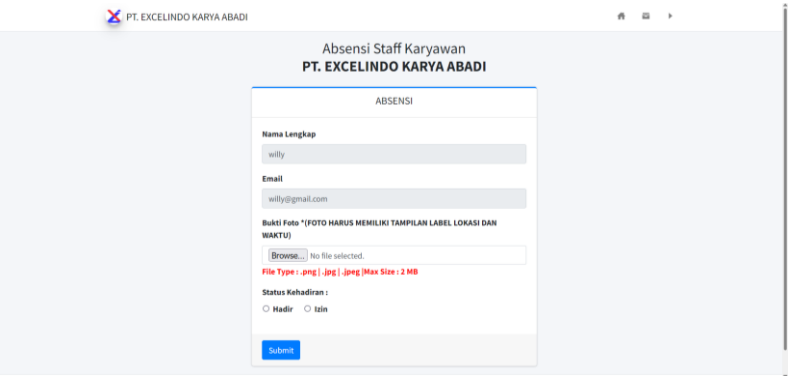

Figure 1. User View

Figure 7. displays the user interface that can be accessed after successful login. Here, users can upload photos as proof of workplace attendance. If the user is unable to attend or requires permission, they can upload proof of conversation via remote

conversation with the supervisor, indicating that they have requested permission for the absence or tardiness.

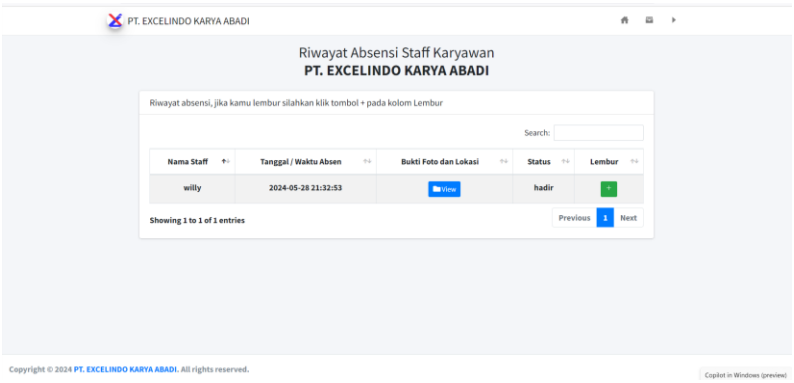

Figure 8. Attendance History Display

Figure 8. shows the interface where users can check whether their absence has been noted or not. If users work overtime, they can click the plus sign in the overtime column to record their overtime.

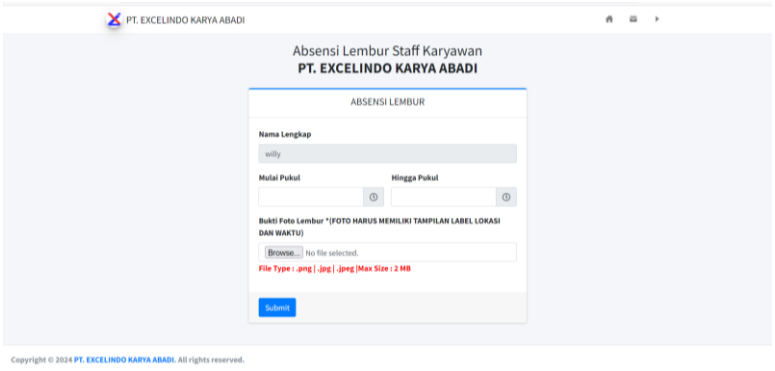

Figure 9. Overtime Attendance Display

Next, Figure 9 shows the overtime attendance display for users. Here users can fill in overtime, upload the required photo evidence, and then submit the form by clicking the submit button.

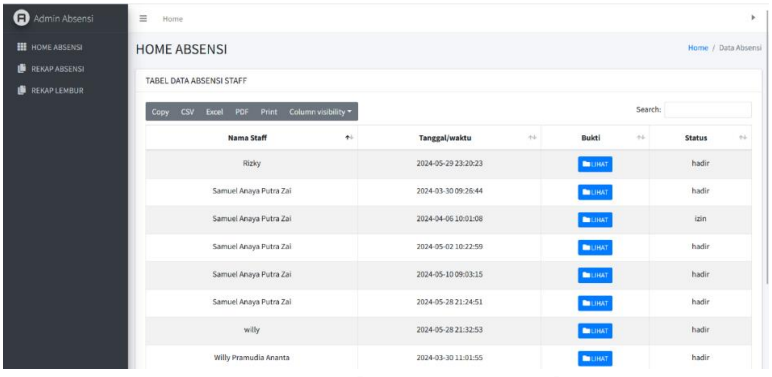

Figure 10. Admin Page Display

The "Home Attendance" page in Figure 6. is part of the employee attendance system intended for Admins. On the left, there is a navigation menu that allows users to access “Home Attendance Recap”, “Attendance Recap”, and “Overtime Recap”, making it easier to navigate between parts of the system. On the middle page, there is a table entitled "Employee Absence Data Table". This table displays a list of employee absences with several important columns. The first column, "Staff Name", lists the employee's name. The second column, "Date/Time", shows the time and date the absence was recorded. The third column, “Evidence”, provides a “View” button to view proof of absence. The final column, “Status,” indicates employee presence such as “present” or “allowed.” This system allows admins to manage and manage employee attendance easily. Buttons above the table such as "Copy", "CSV", "Excel", "PDF", and "Print" allow downloading or printing existing data in various formats, useful for documentation and reporting. There is also a search feature at the top right of the table to make it easier to find specific data. With an intuitive design, this system makes it easier for admins to manage employee whereabouts efficiently and accurately, with complete and structured information in tables for tracking whereabouts.

Testing

The system testing phase involves verifying and assessing the system to ensure it operates as intended and fulfills the established requirements. The table below presents the results of the system testing.

Table 3. Black-Box Testing

Test Table	Result
Admin Login	100%
User login	100%
Admin Manage Employe Informasi	100%
User Take Attendance	100%
View Attendance History	100%
View Employee Absenteeism Recaps (Admin)	100%
View Employee Overtime Attendance Recaps (Admin)	100%
User Logout	100%
Admin Logout	100%

Implementing a web-based system, recording becomes faster and more accurate because the data is directly stored in an integrated database. These findings are based on previous research by (Bartakke et al., 2024) which shows that web-based information systems can reduce human error and increase company operational efficiency. Therefore, the system developed not only increases precision but also efficiency in managing data availability.

Maintenance

Collecting feedback from users is an important aspect of the system improvement process. After initial implementation, feedback from employees and management is collected and analyzed to identify areas for improvement. Several improvements were made based on this feedback, including user interface improvements and system speed optimization. Research by (Dellmar, 2024) shows that user involvement in the system development and improvement process can increase system satisfaction and effectiveness. The main focus is to ensure continuous iteration and improvement so that the system remains relevant and effective. The use of iterative methods in development systems allows adjustments based on feedback and evolving needs. Other research also shows that this approach can improve the quality and adaptability of information systems in the long term.

CONCLUSION

This research aims to develop a web-based employee attendance information system at PT. Excelindo Karya Abadi overcomes the benefits of inefficiency in the manual attendance process. Using the Waterfall method, this research includes the stages of requirements analysis, system design, implementation, testing, and maintenance. Data collection is carried out through interviews and direct observation so that it becomes the basis of a system that includes the function of recording attendance via selfie photos, managing employee data, and creating reports. The system architecture is designed with front-end and back-end components, using technologies such as HTML, CSS, JavaScript, PHP, and MySQL. Testing involves black box techniques to ensure functionality and user feedback for system improvements.

The implemented system demonstrated significant improvements in whereabouts tracking accuracy and efficiency, reducing the potential for data manipulation and errors. The transition to a web-based system allows for greater accessibility and integration with the organization's existing systems, thereby contributing to increased operational efficiency. The findings show that digital attendance systems can solve administrative processes substantially, offer reliable solutions for employee attendance management, and are in line with technological advances to support company growth.

ACKNOWLEDGEMENT

We extend our heartfelt thanks to all those who supported this study. Special recognition goes to the management and staff of PT. Excelindo Karya Abadi for their collaboration and insightful feedback. We also acknowledge the support from our peers at Medan State University, especially for their technical and data analysis assistance.

REFERENCES

Adhiati, C. S. (2024). *The Effectiveness of Implementing an Electronic Attendance System in Increasing the Compliance of State Civil Apparatus (ASN) Employees in the Office Environment*. *1*(1), 11–29.

Akbar, F. A., Nugroho, B., & Indrawanti, A. S. (2024). *Design of a Location-Based Monitoring System for Agricultural Extension Officers at the Department of Food Security and Agriculture of Bojonegoro District Using the Waterfall Development Method and Hybrid Application*. 54–62. https://doi.org/10.31284/j.jtm.2024.v5i1.5294

Aldisa, R. T. (2024). *IMPROVING AND MANAGING HUMAN RESOURCES MANAGEMENT BY*. *2*(5), 1487–1494.

Amelia, A., & Solikhah, M. (2023). Web-Based Employee Attendance Information System On CV. Syntax Corporation Indonesia. *Jurnal Indonesia Sosial Teknologi*, *4*(12), 2436–2442. https://doi.org/10.59141/jist.v4i12.824

Arafat, M. (2022). Rancang Bangun Sistem Informasi Pemesanan Online Percetakan Sriwijaya Multi Grafika Berbasis Website. *Intech*, *3*(2), 6–11. https://doi.org/10.54895/intech.v3i2.1691

Arianti, T., Fa'izi, A., Adam, S., & Mira Wulandari. (2022). Perancangan Sistem Informasi Perpustakaan Menggunakan Diagram Uml (Unified Modelling Language). *Jurnal Ilmiah Komputer …*, *1*(1), 19–25. https://journal.polita.ac.id/index.php/politati/article/view/110/88

Arifai, M., Haris, A., Yasir, Y., Kurra, S. D., Hardiyanti, H., & Violin, V. (2022). Influence Leadership, Competence and Motivation To Performance Employee Service Health Regency Bay Bintuni West Papua Province. *Jurnal Ad'ministrare*, *9*(2), 305. https://doi.org/10.26858/ja.v9i2.36789

Aulia, A. N., Tsani, M., & Suharso, W. (2024). Design a Web-Based Library Information System Using the Waterfall Method (Case Study of Sma Muhammadiyah 2). *ASTONJADRO*, *13*(1), 169–181.

Bah, S. M., & Ming, F. (2020). An improved face recognition algorithm and its application in attendance management system. *Array*, *5*(February 2019), 100014. https://doi.org/10.1016/j.array.2019.100014

Bartakke, R., Wahutre, S., Bhalerao, R., Chavan, S., & Jaware, Y. (2024). Real Time Attendance System Using Image Processing. *International Research Journal of Modernization in Engineering*, *6*(1), 2703–2709. www.irjmets.com

Dellmar, J. (2024). *Designing a reactive feedback feature for end-users in web-based media software*.

Fauzan, R., Harsono, K., Meisandy, R. P., Barokah, M., & Muhaimin, M. I. (2024). Optimising Human Resource Management as an Effort to Improve Employee Performance through Digital Attendance. *Riwayat: Educational Journal of History and Humanities*, *7*(1), 16–25. https://doi.org/10.24815/jr.v7i1.36412

Haris Setyawan. (2024). Enhancing registration systems: Implementing database systems in digital boarding schools. *World Journal of Advanced Research and Reviews*, *22*(2), 856–863. https://doi.org/10.30574/wjarr.2024.22.2.1451

Huawei Technologies Co., L. (2023). *DATABASE PRINCIPLES AND TECHNOLOGIES – BASED ON HUAWEI GAUSSDB*. Posts & Telecom Press. https://doi.org/https://doi.org/10.1007/978-981-19-3032-4

Irfan, M., Rosid, M. A. G. N., & Lutfiyani, A. (2023). Perancangan Sistem Absensi Berbasis Website dengan Metode Waterfall di BAPPEDA Kebumen. *Jurnal Kridatama Sains Dan Teknologi*, *5*(01), 75–88. https://doi.org/10.53863/kst.v5i01.702

Kurniawan, t bayu, & Syarifuddin. (2020). Perancangan Sistem Aplikasi Pemesanan Makanan dan Minuman Pada Cafetaria NO Caffe di TAnjung Balai Karimun

Menggunakan Bahasa Pemrograman PHP dan MySQL. *Jurnal Tikar*, *1*(2), 192–206. https://ejurnal.universitaskarimun.ac.id/index.php/teknik_informatika/article/download/153/121

Mamatnabiyev, Z. (2021). Development of Attendance Monitoring System using IoT Technologies. *2021 16th International Conference on Electronics Computer and Computation (ICECCO)*, 1–6. https://doi.org/10.1109/ICECCO53203.2021.9663827

Pratama, Y. S., Gemasih, H., & Syahputra, H. (2024). Pelatihan Aplikasi Absensi Karyawan Berbasis Website Di Uptd Puskesmas Lampahan. *Jurnal Pengabdian Pada Masyarakat Indonesia*, *3*(1), 117–126. https://doi.org/10.55542/jppmi.v3i1.991

Ramadhani, S. P., Saputra, A. F., Dwiansyah, F., & Veritawati, I. (2024). Pengujian Sistem Informasi Akademik (NeoSiak) Berbasis Website Menggunakan Equivalence Partitioning dan Metode Black Box. *STORAGE –Jurnal Ilmiah Teknik Dan Ilmu Komputer*, *3*(1), 18.

Ropianto, M., Rukun, K., Krismadinata, & B. Herawan, H. (2022). *Utilization of Information System Dashboard of Internal Quality Guarantee At Stt-Ibnu Sina Batam*.

Setiabudi, W., & Wibowo, S. (2023). in-Fest 2023 Sistem Informasi Absensi Karyawan Berbasis Website Di in-Fest 2023. *IN-FEST 2023*, *2023*, 234–240.

Siswanto, B. F., & Rosyani, P. (2021). Perancangan Sistem Informasi Penggajian Karyawan Pada Tb Blitar Berbasis User Centered Design. *Journal of Information System Research (JOSH)*, *3*(1), 7–17. https://doi.org/10.47065/josh.v3i1.1096

Sitompul, E. A., Fiona Kharismatunnisaa, Yourdan Saputra, Riyo Putra Syam Satria, Nanda Octavia, Fiqri Nurfadilah, Muhammad Danang Mukti Darmawan, Firdayanti, Ivan De Nerol, Dhafa Kamil, Parmana, R. R., & Mohamad Alvin Renaldi. (2024). Implementing Fingerprint Attendance with Fuzzy Logic enhances employee attendance efficiency in a modern workplace. *Journal of Applied Science, Technology & Humanities*, *1*(1), 49–71. https://doi.org/10.62535/hse2me63

Sitompul, H., Matondang, Z., Daryanto, E., & Syahputra, F. (2024). *Use Case Diagram Design For Information System Services To Students At The Faculty Of Engineering Universitas Negeri Medan*. https://doi.org/10.4108/eai.24-10-2023.2342345

Tri Yulianti, D., & Tri Prastowo, A. (2021). Pengembangan Digitalisasi Perawatan Kesehatan Pada Klink Pratama Sumber Mitra Bandar Lampung. *Jurnal Teknologi Dan Sistem Informasi (JTSI)*, *2*(2), 32–39. http://jim.teknokrat.ac.id/index.php/JTSI

Venika, F., & Hadinata, N. (2023). Perancangan Sistem Informasi Manajemen Karyawan Berbasis Website pada PT Suryabumi Agrolanggeng. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *6*(11), 9416–9422. https://doi.org/10.54371/jiip.v6i11.3076

Viswanathan, J., E, K., S, N., & S, V. (2024). Smart Attendance System using Face Recognition. *ICST Transactions on Scalable Information Systems*, *11*(5), 1–6. https://doi.org/10.4108/eetsis.5203

Von Emster, M., Abdullah, M. H., & Sabtu, J. (2021). Sistem Informasi Pengaduan Kekerasan Perempuan dan Anak pada DP3A Kota Ternate Berbasis Website

dengan Menggunakan PHP dan Mysql. *JAMINFOKOM-Jurnal Manajemen Informatika Dan Komputer*, *2*(1), 46–54.

Wati, V., Kusrini, K., Al Fatta, H., & Kapoor, N. (2021). Security of facial biometric authentication for attendance system. *Multimedia Tools and Applications*, *80*(15), 23625–23646. https://doi.org/10.1007/s11042-020-10246-4

Yudha, B., Sutrisno, D., & Butar-Butar, F. T. S. (2023). Penggunaan Metode Waterfall pada Sistem Informasi Penggajian Karyawan Tetap. *Remik*, *7*(1), 134–141. https://doi.org/10.33395/remik.v7i1.11969