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Design of Student Attendance Information System at MTS Assalafiyah, Tegal City

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Abstract

The Attendance Information System is a modern solution for recording student attendance in schools, replacing conventional manual attendance lists. Student attendance tracking comprises two main aspects: attendance timekeeping and working timekeeping. With technological advancements, particularly in computing, educational institutions can leverage these tools to enhance operational efficiency. This study aims to design and develop a web-based Student Attendance Information System at MTs Assalafiyah Kota Tegal. The system is designed to streamline attendance management, making it faster, more structured, and resource-efficient.
The research employs the waterfall development method, consisting of several stages: requirements analysis, system design, coding, testing, and implementation for end-users. These stages are carried out sequentially to ensure that the system meets the needs of all stakeholders, including students, teachers, and school administrators. Using a web-based system supported by online networks, attendance processes can be conducted in real-time and with greater transparency.
The results of this study are expected to significantly contribute to administrative efficiency in schools, improve the accuracy of student attendance data, and simplify the management of attendance records in educational settings. Additionally, this system supports digitalization efforts in education, particularly in school administration.

Keywords: *Attendance, Information System, Web, Network, Online.*

1. Introduction

The rapid development of information technology has significantly impacted various sectors, including education. Not only does it influence educational institutions, but technology also provides substantial benefits for teachers and students in supporting the learning process. Technology enables tasks to be carried out more quickly, efficiently, and productively [1]. One example of its application is in recording student attendance, which has traditionally been done manually using attendance books or conventional attendance sheets. Attendance, in the educational context, serves as a form of monitoring students' presence during the learning process [2]. Attendance activities in education that still rely on manual methods have many drawbacks, such as the risk of losing physical documents or errors in data recapitulation. This manual system not only consumes time but also increases the likelihood of administrative mistakes. Therefore, an information system capable of managing attendance data centrally and integratively is needed to address these challenges [3].
At MTs Assalafiyah Kota Tegal, the need for a technology-based attendance information system has become increasingly critical. Student attendance data is an essential part of the learning process, especially for monitoring their presence in each lesson session. The web-based attendance information system designed in this study aims to provide solutions to issues arising from manual attendance systems, such as limited accessibility and inefficiency in data management [4]. This research focuses on the development of a web-based attendance information system using the waterfall method, which involves stages such as requirement analysis, system design, coding, testing, and implementation. The system is specifically designed to support daily attendance recording for students, particularly in informatics and multimedia subjects. By utilizing a centralized database, this system is expected to minimize the risk of data loss and improve the accuracy of recording processes. The primary objective of this research is to design and implement a modern and effective student attendance information system. It not only aims to produce a better system but also to provide policy recommendations to enhance student compliance with attendance requirements and support the digitization of school administration [5].
The benefits of this research are extensive for researchers, educational institutions, and general readers. For researchers, this study offers in-depth insights into the development of information systems in educational technology [6]. For MTs Assalafiyah Kota Tegal, this system will support the digitization of attendance recording, improve the quality of data reporting, and simplify the attendance process for students. Additionally, readers can utilize this research as a reference for developing similar systems in the future [7]. Thus, this research is expected to serve as an initial step toward improving the efficiency and effectiveness of attendance administration processes in educational settings. The implementation of a web-based attendance information system not only facilitates schools but also supports the digital transformation of the education sector as a whole [8].

2. Research Methodology

This study employs various data collection and system analysis methods to ensure that the results are relevant, accurate, and can be effectively implemented in the environment of MTs Assalafiyah Kota Tegal. The research methodology includes observation, interviews, literature review, and system analysis and design approaches using Unified Modeling Language (UML) [9]. The observation method was carried out through direct visits to MTs Assalafiyah to understand the current attendance recording process. The researcher observed the manual system used for recording student attendance, which was found to have many limitations such as the risk of data loss, delays in summarizing data, and inefficiencies in operation. These observations form the primary basis for designing a more modern and efficient web-based attendance information system.

In addition to observation, the interview method was employed to gather direct information from relevant stakeholders at MTs Assalafiyah, including administrative staff and educators. These interviews provided deeper insights into user needs, challenges faced, and their expectations for the proposed system. The findings from these interviews serve as essential inputs for defining the system requirements and ensuring that the designed system aligns with the institution's needs. A literature review was also an integral part of this research. The researcher reviewed various relevant sources, including research journals, e-books, and other academic documents. The purpose of the literature review is to strengthen the theoretical foundation of the research and to ensure that the proposed system design is based on current approaches and technologies. The references reviewed included studies on information systems, web-based attendance methods, and the application of technology in education [10]. The system analysis method was conducted through four main stages. The first stage was a survey of the manual system currently in use to identify processes that require improvement. The second stage involved analyzing the survey findings to uncover the weaknesses of the manual system. Subsequently, the researcher identified the information needs required by the new system, such as features for daily attendance recording and data accessibility online. The final stage was identifying system requirements to ensure the completeness and accuracy of the system design.

For system design, this study utilized the Unified Modeling Language (UML) approach. UML was chosen for its ability to describe system processes in a structured and comprehensible manner. The design stages included the creation of Use Cases to define interactions between users and the system, Sequence Diagrams to depict communication flows among system components, Activity Diagrams to explain operational processes, and Class Diagrams to describe the data structure and relationships among entities in the system. Through this methodological approach, the research aims to produce a student attendance information system that not only addresses the needs of MTs Assalafiyah but also provides solutions to various existing challenges. The system is expected to enhance administrative efficiency, minimize recording errors, and provide a better user experience.

The overall research methodology is designed to ensure that the resulting system is a targeted solution, practical for implementation, and provides long-term benefits to the educational institution. Therefore, this study not only contributes to the advancement of educational technology but also supports the broader digitalization of school administration.

3. Result and Discussion

In this section, this system analysis focuses on the processes involved in the running system, including the analysis of outputs and inputs within the system. One of the main outputs generated by the analyzed system is student attendance records. The primary function of this output is to record student attendance for each teaching and learning activity. In the current system, attendance is still recorded manually using paper, where students write down their attendance. This attendance document is distributed to students and processed once every semester. The frequency of data collection is done at the beginning of each semester, with the data being collected over a six-month period. The format used is an attendance report containing student attendance data for that period. While this system is operational, the analysis results show that it still requires improvement in terms of effectiveness, given the potential for errors or delays in data processing due to the manual recording process.

Furthermore, the input analysis is crucial in understanding how the attendance data is collected. The main source of input comes from the students who record their attendance before the teaching and learning activities begin. This input is still done manually on paper, which is then used as input to create the student attendance report. This data is collected every semester and is valid for six months. This manual data entry process means that students must record their attendance before the teaching and learning activities begin. This highlights the need for a more efficient system for real-time attendance data collection, which would speed up the data processing and minimize errors.

Considering both the output and input analysis, it is clear that the current system still relies on manual documentation, which requires improvement in terms of both speed and accuracy. Therefore, process analysis within this system needs to be conducted to illustrate the flow of data and information that takes place. In this process analysis, several steps involve various parties, such as students, the Vice Principal of Curriculum (Waka Kurikulum), and the duty teachers. The process begins with students recording their attendance in the attendance book in class before the teaching and learning activities begin. Afterward, the recorded attendance data is compiled by the class representative or class president. This compiled attendance data is then submitted to the relevant authorities for further processing.

In this context, the document flow in the running system can be more clearly illustrated through a Flow of Document (FOD) or document flow diagram. This diagram serves to depict the sequence of document processing in the student attendance system, from the initial recording by the students to the final report submission to the responsible parties. This document flow illustrates how each step in the data processing is still done manually, which has its drawbacks, such as the risk of input errors and delays in the reporting process. Thus, the need for a digital, automated system that can speed up the processing and storage of data becomes urgent.

Although the current manual system is still operational, it is evident that there is a need for improvements in the efficiency of attendance data management. With the introduction of an automated system, attendance can be recorded directly and in real-time, reducing the reliance on manual recording, which is prone to errors. This would undoubtedly improve the accuracy and speed of data processing and enable quicker and more accurate attendance reports. For instance, the use of a web-based system could make it easier for all parties involved in attendance processing, from students to teachers and administrative staff.

Moreover, implementing a digital attendance system will not only increase efficiency but also provide ease of monitoring student attendance data. With an automated system, the school administration can easily access and analyze student attendance data directly and generate reports more quickly. This would provide greater benefits for school administration management and support the overall improvement of education quality. Therefore, the adoption of a more modern and efficient system is highly necessary to improve and expedite the attendance data processing at MTs Assalafiyah.

Thus, it is evident that while the current system successfully records student attendance, significant improvements are necessary. The existing manual process has proven to be inefficient, and the implementation of a web-based system would greatly help in enhancing the current system. With a more efficient and automated system in place, it is expected that student attendance will be processed more accurately and quickly, providing convenience for all parties involved in managing student attendance data.

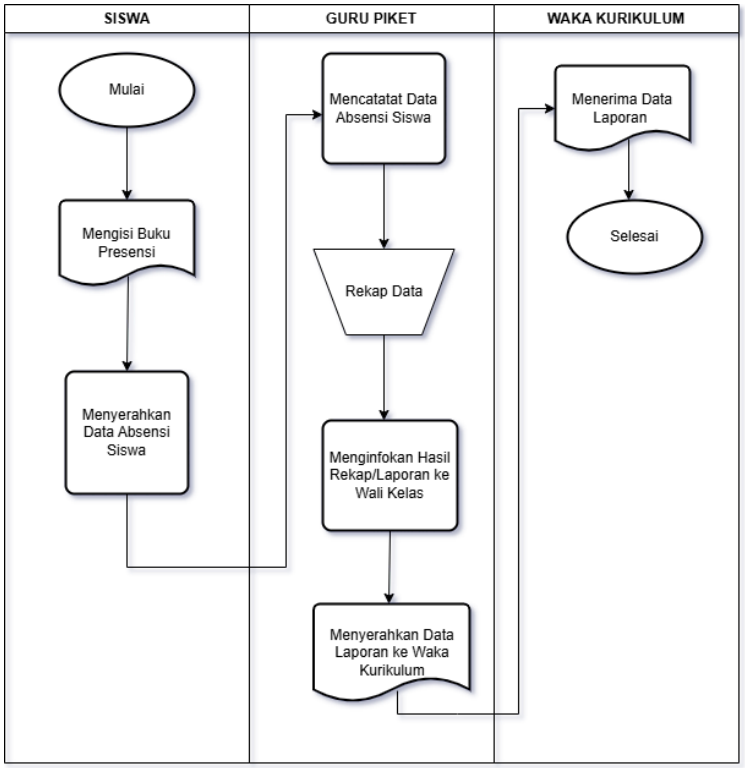

Fig. 1: Flow of Document Student Attendance

3.1. Usecase Diagram

In the development of a web-based attendance system to be implemented at MTs Assalafiyah, the use case diagram is a crucial tool for illustrating the interaction between system users and the system itself. This diagram provides a clear overview of the roles and functions of each actor in the system. The three main actors involved in this system are students, the duty teacher (guru piket), and the curriculum vice principal (waka kurikulum). Each actor has different roles and responsibilities, which are reflected in various system use scenarios. Students, as the first actor, have a relatively simple but essential role within the system. As users who directly interact with the system, students are responsible for logging in and logging out of the system. Once logged in, students can access and record their attendance data every time the teaching and learning activities begin. This activity is crucial because attendance is one of the key indicators in the academic process at the school. Students must ensure that they log in to mark their attendance, and once completed, they can log out of the system to protect their personal data.

The duty teacher (guru piket), as the second actor, plays a more complex role in the system. In addition to logging in and logging out of the system, the duty teacher is responsible for managing student attendance data. One of their primary tasks is editing attendance records, either to correct errors in the data or to update relevant information. Furthermore, the duty teacher has access to view attendance reports that have been compiled over a certain period. Therefore, the duty teacher plays a crucial role in ensuring that attendance data is properly managed and that the resulting reports are reliable. Additionally, the duty teacher can view the student data registered in the system, allowing them to monitor student attendance more efficiently. The curriculum vice principal (waka kurikulum) is the third actor involved in this system. The waka kurikulum has broader authority compared to the students and the duty teacher. Like the other two actors, the waka kurikulum also logs in and logs out of the system to ensure that the data they access remains secure and controlled. One of the main functions of the waka kurikulum is to view student data, which includes information related to academic performance, attendance, and other relevant data. The waka kurikulum also has the ability to manage student data, meaning they can update or edit information in the system when necessary. Additionally, the waka kurikulum can view attendance reports that have been compiled, helping them in evaluating or making decisions related to curriculum policies and teaching activities at the school.

Overall, this use case diagram illustrates how the three actors interact with the attendance system. Students interact with the system to record their attendance, while the duty teacher is responsible for managing attendance data and reports. The waka kurikulum, on the other hand, plays a vital role in managing overall student data and evaluating attendance reports for administrative and academic evaluation purposes. These three actors work together in the system to ensure that the attendance process runs smoothly and efficiently.

In this context, the use of a use case diagram is highly beneficial for visualizing the workflow of the system to be implemented. By depicting the relationships between actors and the system, this diagram allows developers to better understand the functional requirements of the system to be built. It also facilitates the design of user interfaces (UI) and the process flow that each actor must follow when using the system. This use case diagram not only shows the interactions between actors and the system but also identifies the main features that must be present in the attendance system. These features include the ability to log in and log out, manage attendance data, view reports, as well

as manage and view student data. All of these features are designed to make attendance management at MTs Assalafiyah more efficient and accurate, ultimately improving the administrative process at the school.

Additionally, this use case diagram provides a deeper understanding of the distribution of tasks and responsibilities among actors in the system. By clearly defining the roles of each actor, the system can be developed in a more structured manner, aligning with user needs. Each actor has access and control according to their responsibilities, which helps prevent overlapping roles and ensures that every part of the system operates optimally. Overall, the use of a use case diagram in this attendance system is crucial for designing an efficient, structured, and user-friendly system. By understanding the interactions between actors and the system workflow, developers can create a system that not only meets functional requirements but also provides ease of use and data management.

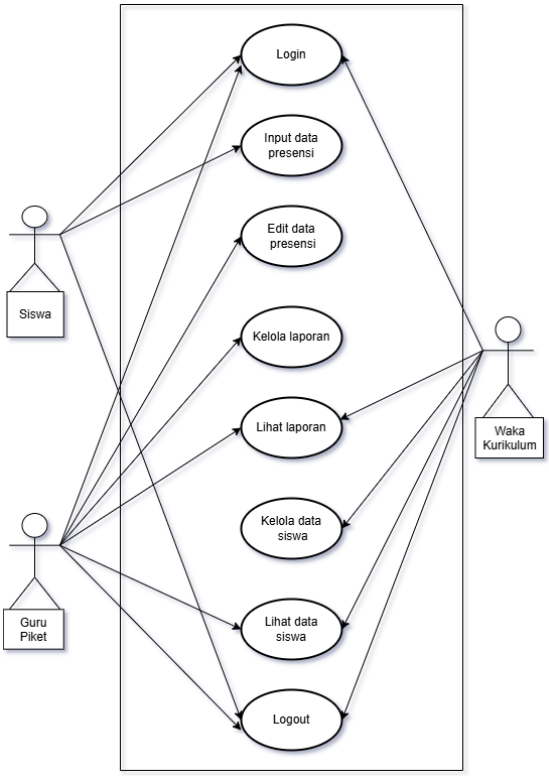

Fig. 2: Usecase Diagram in the Student Attendance.

3.2. Class Diagram

The Class Diagram is a crucial tool in object-oriented system development, representing the static structure of the system and the relationships between various elements within it. In the context of the attendance system at MTs Assalafiyah, this diagram serves to illustrate how key actors such as Students, Teacher on Duty, and Curriculum Vice Principal interact with the system, as well as how data and information flow within it. This Class Diagram includes several classes related to essential elements in the attendance process, such as student data, attendance records, and reports.

One of the primary actors in this system is the Student, who plays a pivotal role in recording daily attendance. The class representing Student includes attributes such as studentID, name, attendanceStatus, and loginTime. These attributes store basic information about the student, which is essential for the attendance process. The class also includes important methods such as login(), logout(), recordAttendance(), and viewAttendanceReport(). Each time a student marks their attendance, the data is linked to the AttendanceRecord class, where each student can have multiple attendance entries recorded. The Teacher on Duty, as the second actor, has an administrative role in the attendance system. As the main manager of attendance, the teacher on duty is responsible for editing and updating student attendance statuses and generating related reports. The Teacher on Duty class has attributes such as teacherID, name, and assignedClasses, which contain basic information about the teacher and the classes they supervise. Methods in this class include login(), logout(), editAttendance(), generateAttendanceReport(), and viewStudentData(). The teacher on duty can access student attendance data and update their attendance status, as well as generate reports regarding student attendance over a certain period.

The Curriculum Vice Principal's role in this system is more focused on managing student data and monitoring reports related to student attendance and performance. The class representing the Curriculum Vice Principal includes attributes such as principalID, name, and assignedStudents, which store information about the vice principal and the students under their responsibility. Methods in this class include login(), logout(), viewStudentData(), manageStudentData(), and viewAttendanceReports(). The Curriculum Vice Principal is responsible for viewing and managing student data, as well as monitoring attendance reports generated by the teacher on duty. The relationships between the Student, Teacher on Duty, and Curriculum Vice Principal classes in this Class Diagram illustrate how each actor interacts with the data within the system. The Student class has a one-to-many relationship with the AttendanceRecord class, meaning that each student can have multiple attendance records. Every time a student marks their attendance, the data is recorded in the AttendanceRecord class, which stores information about the attendance status and time of attendance. This allows the system to track the student's attendance history over a given period.

Additionally, the Teacher on Duty class interacts with the AttendanceRecord class to edit and update student attendance statuses. In this system, the teacher on duty can modify the attendance status of students if necessary, for example, in cases where a student cannot mark their attendance directly but has been granted permission. The Teacher on Duty class also serves to generate reports about student

attendance over a specific period, which helps in monitoring overall student attendance rates. The Curriculum Vice Principal class has broader relationships with both the Student and AttendanceRecord classes because the vice principal needs to view student data comprehensively and monitor the attendance reports generated by the teacher on duty. The Curriculum Vice Principal is also responsible for managing student data, both in terms of updating students' personal information and monitoring their academic performance. With this broader access, the vice principal can ensure that the data in the system remains accurate and up-to-date, enabling better decision-making regarding student management in the school. In this system, every relationship between the classes illustrates the necessary interactions for the system to function well. For example, the relationship between Student and AttendanceRecord shows that each student has multiple attendance records, allowing the teacher on duty and the Curriculum Vice Principal to monitor student attendance more effectively. The relationship between the Teacher on Duty and AttendanceRecord indicates how the teacher on duty can update and generate reports related to student attendance. Meanwhile, the relationship between the Curriculum Vice Principal and both the Student and AttendanceRecord classes highlights how the vice principal can manage student data and monitor attendance reports.

This Class Diagram is also crucial in system development as it provides a clear picture of the structure and interactions occurring within the student attendance system. By using the Class Diagram, developers can design and build the system in a more organized and efficient manner, as it offers a deep understanding of how data and information flow within the system. This enables developers to identify potential issues or shortcomings within the existing system and make the necessary improvements. Overall, this Class Diagram illustrates how various actors in the attendance system interact with the classes that manage student data and attendance records. Each actor has different functions and responsibilities within the system, but they all interact to ensure the smooth operation of the attendance process. With this diagram, the development and implementation of the attendance system at MTs Assalafiyah can be carried out in a more structured and effective manner, meeting the administrative and monitoring needs of student attendance more efficiently.

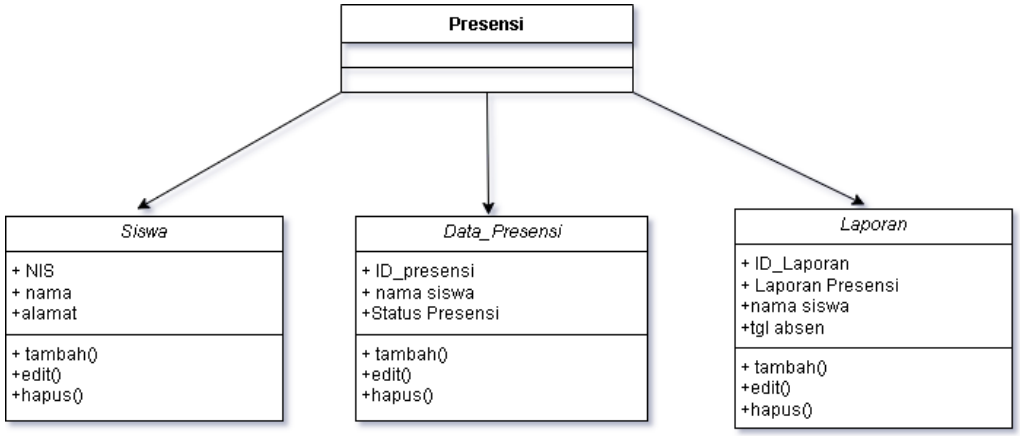

Fig. 3: Class Diagram in the Student Attendance.

4. Conclusion

Web-based attendance systems offer numerous benefits in enhancing the efficiency and accuracy of attendance tracking. By utilizing this technology, the previously manual attendance process, which was time-consuming and prone to errors, can now be conducted more quickly and precisely. This allows school staff, including teachers and administrators, to manage student attendance data more easily and accurately. Furthermore, the system enables structured data storage, making it easier to retrieve attendance information over the long term. However, despite offering many advantages, the implementation of web-based attendance systems also presents several challenges that must be addressed. One of the major challenges is the need for adequate technological infrastructure. To operate this system optimally, schools must have a stable internet connection and supporting hardware, such as computers or mobile devices, that can be used by both students and teachers. Without sufficient infrastructure, the system may not function effectively and could potentially disrupt the attendance process. In addition, web-based attendance systems require attention to data security. Attendance data stored in the system must be properly protected to prevent unauthorized access. Therefore, safeguarding the personal data of students should be a top priority when designing and developing this system. The system should be equipped with strong encryption mechanisms and secure login procedures to ensure that only authorized personnel can access the data.

On the other hand, while technology can help expedite and simplify the attendance process, there are challenges related to the adoption of technology by users, particularly those who are not familiar with the use of technological devices. Students, teachers, and administrative staff who are used to manual systems may need time to adjust to using the web-based attendance system. Therefore, adequate training and support are necessary to ensure they can operate the system smoothly. With proper planning, these challenges can be minimized. One way to address infrastructure issues is by conducting an initial evaluation of the school's existing infrastructure. If deficiencies are found, corrective actions such as improving internet connectivity or providing adequate devices can be implemented. It is also important to ensure that the system is user-friendly so that there are no barriers to adoption.

It is also crucial to note that the implementation of a web-based attendance system must be accompanied by continuous monitoring. Once the system is in place, regular evaluations should be conducted to ensure it is functioning properly and delivering optimal benefits. This monitoring should cover not only technical aspects but also operational ones, such as whether the system is truly simplifying administrative tasks and whether users are comfortable using it. Moreover, implementing a web-based attendance system also positively impacts transparency and accountability. The digital recording of attendance makes it easier for the school to conduct audits and monitor student attendance. Attendance reports can be accessed at any time, enabling the school to take immediate action if any issues arise with student attendance, such as frequent absences. This also allows parents to monitor their children’s attendance in real-time.

Overall, a web-based attendance system has great potential to improve the efficiency and accuracy of student attendance management. While there are challenges to overcome, with careful planning, appropriate technology adoption, and sufficient training, this system can provide significant benefits. It not only enhances administrative efficiency but also contributes to better data management in the school environment, making it easier for all stakeholders to monitor and manage student attendance effectively. Therefore, it is essential for schools to consider implementing this system as part of their efforts to modernize and improve the quality of educational management.

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