DESIGN AND DEVELOPMENT OF A WEB-BASED STUDENT ATTENDANCE AND VIOLATION MONITORING SYSTEM AT SMK MUHAMMADIYAH 1 PADANG

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***Abstract* - This study aims to design and develop a web-based system for monitoring student attendance and violations at SMK Muhammadiyah 1 Padang. The system was developed using the prototype methodology, which allows for iterative development tailored to user needs. Unified Modeling Language (UML) was employed as a modeling tool to ensure a systematic system design. The application was built using the PHP programming language with the Laravel framework, providing an efficient structure for application development. The findings of the study indicate that the application effectively simplifies and organizes the process of monitoring student attendance and violations. This system ensures a more structured and efficient management of attendance and violations, with real-time data access across two different campus locations. It is expected to serve as a valuable tool for enhancing student discipline at SMK Muhammadiyah 1 Padang.**

***Keywords*— Web-based system, student attendance, student violations, violation tracking system, prototype methodology, Unified Modeling Language (UML), PHP, Laravel framework, student discipline, system development.**

I. INTRODUCTION

Education is a deliberate effort aimed at passing down cultural heritage from one generation to the next. It shapes the current generation to become role models, drawing lessons from the teachings of previous generations [1]. The goal of education is to prepare individuals for both present and future life by adapting its structure to meet the demands of the times and the advancements in science and technology [2].

The success of an institution relies heavily on the discipline of all its stakeholders, including schools. Student discipline plays a crucial role in ensuring the effectiveness and success of the teaching and learning process. A student is considered disciplined in attending school if they are consistently punctual, never late, and do not skip school. In contrast, students who frequently arrive late, are absent, or violate school rules often demonstrate a lack of good attendance discipline [3].

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Disciplinary rules are regulations established by the school with the aim of familiarizing and disciplining students. Additionally, these rules help guide students toward positive behaviors. Through the implementation of these rules, students are expected to comply with and follow the established regulations [4]. Student violations are behaviors that deviate from the school rules, disrupting the teaching and learning process, and negatively impacting both the student involved and others [5].

The advancement of information technology has made communication and information exchange more efficient, as space, time, and distance are no longer obstacles. The rapid growth of information technology is closely linked to the progress of computer technology. Advancements in computer and information technology have also had a positive impact on the field of education [6]. The Industrial Revolution 4.0, which positions technology as the backbone, has shifted societal paradigms across various aspects of life, including in the field of education [7].

Many technologies have been implemented in the education sector to improve educational standards, one of which is technology developed to enhance student discipline. This includes automatic attendance systems and systems designed to assist teachers in monitoring student discipline, known as the student attendance and violation monitoring system.

Muhammadiyah 1 Padang Vocational High School (SMK) is one of the vocational schools in Padang city. SMK Muhammadiyah 1 Padang has two campus locations: the first campus is located at Jl. Sawahan No.103, Simpang Haru, East Padang District, Padang City, West Sumatra, and the second campus is located at JL. By Pass, Lubuk Begalung Nan XX, Lubuk Begalung District, Padang City, West Sumatra. There are 300 students at SMK Muhammadiyah 1 Padang, divided

into 20 classes, namely class X, class XI, and class XII. SMK Muhammadiyah 1 Padang offers 6 specialized programs that students can choose based on their talents and interests.

At Muhammadiyah 1 Padang Vocational High School (SMK), attendance management is still done manually using an attendance book, where students must sign the attendance sheet every morning before entering the classroom. Additionally, there is no system in place at SMK Muhammadiyah 1 Padang to monitor violations committed by students. Students who break the rules are only given sanctions without any record or point system.

With a total of 300 students, it is certainly not easy for the guidance counselors (BK) and class teachers to monitor student attendance and violations manually, especially since Muhammadiyah 1 Padang Vocational High School has two campus locations. Therefore, there is a need for an application to assist SMK Muhammadiyah 1 Padang in monitoring student attendance and violations, which will be developed as a web-based application using the Laravel framework. This system is expected to simplify the monitoring process while improving accountability and transparency in handling student violations. Guidance counselors and class teachers will be able to manage data more effectively, while students will benefit from clearer and fairer tracking of their attendance and discipline records.

Based on that, the author intends to design a Web-Based Student Attendance and Violation Monitoring System Application that can assist guidance counselors (BK) and class teachers in monitoring attendance and student violations at SMK Muhammadiyah 1 Padang.

II. LITERATUR REVIEW

A. Student Attendance System Application

System is a collection of interconnected and interdependent elements or components that work together to perform activities aimed at achieving a specific goal. For example, a computer system consists of software, hardware, and human resources (users) [8]. Student attendance at school is referred to as student presence. The term encompasses two aspects: a student's presence at school and their absence from school [9]. From the definitions above, it can be concluded that an Attendance System is a tool designed to record both the presence and absence of students at school.

B. Student Violation Monitoring System Application

A violation of school rules refers to behavior that contradicts the purpose of the school's regulations. It involves students failing to comply with established rules and policies. Such actions are considered negative behaviors that deviate from the norms and values upheld within the school environment [10]. Monitoring involves the process of observing or overseeing activities as they occur to ensure and control the implementation of a program, as well as its alignment with the predetermined plan [11]. From the definitions above, it can be concluded that a student violation monitoring system is a tool designed to observe and track student activities that deviate from school regulations during the teaching and learning process.

C. Laravel

A framework is a basic conceptual structure used to solve a complex problem. In simple terms, a framework is a blueprint for creating a website. By using this structure, the time needed to develop the website is reduced, and it becomes easier to make improvements [12]. Laravel is an open-source PHP framework that follows the model-view-controller (MVC) architecture. It is licensed under the MIT License and uses GitHub as a platform for code sharing. In December 2013, Laravel became one of the most popular frameworks [12].

D. MySQL

MySQL is a type of database server that uses SQL as the primary language for accessing its database. Additionally, it is open-source [13]. MySQL is a DBMS that is often bundled with web servers, making the installation process simpler [11].

III. METODHS

A. System Design Method

System development methodology refers to the series of steps undertaken by system analysts in developing an information system [14]. Prototyping is an iterative process in system development where requirements are transformed into a functioning system that is continuously refined through collaboration between users and analysts. Prototypes can also be created using various development tools to simplify the process [14]. The Prototype Model consists of several stages, including Communication, Quick Planning, Quick Design Modeling, Prototype Construction, Deployment, Delivery, and Feedback [14]. The following is an illustration of the prototype method:

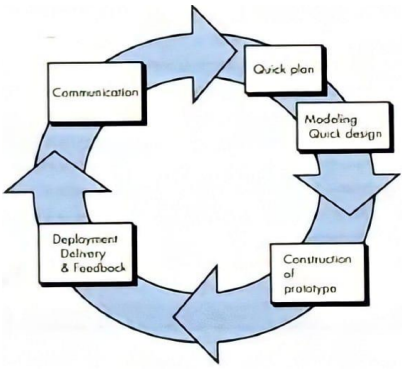

Fig. 1 Prototype method

1) *Communication:* In this stage, data collection is carried out. This data will serve as a reference to meet the requirements of the desired system and to understand the business process flow of the system, ensuring that it aligns with the expectations and objectives.

2) Quick Plan: This stage involves designing the application forms, which will provide an initial overview of the system design, focusing on the user experience.

3) *Modelling Quick Design:* This stage involves finalizing the design that was agreed upon in the previous phase, such as focusing on creating the use case diagram, activity diagram, sequence diagram, and class diagram.

4) *Construction of prototype:* In this stage, the design results are translated into programming code. The

programmer performs code generation using the framework. At the end of the process, the application is tested to minimize coding errors.

5) Deployment, delivery dan feedback: The program created in this phase is tested to evaluate the functionality of the developed system, such as ensuring that buttons work as expected. The completed monitoring software or application is then delivered to users to gather feedback on the evaluated application. This is crucial to make improvements or fix any bugs/errors that may be discovered after the application has been implemented.

B. UML (Unified Modeling Language)

UML (Unified Modeling Language) is a standardized language used to represent the design of an information system to be developed. It involves defining requirements, performing analysis and design, and visualizing the architecture in object-oriented programming [15].

1) *Use Case Diagram:* Use Case Diagram is a type of UML used to illustrate the interaction between actors and the system. This diagram helps identify user requirements and the functionalities the system needs to provide. The following is the design of the Use Case Diagram:

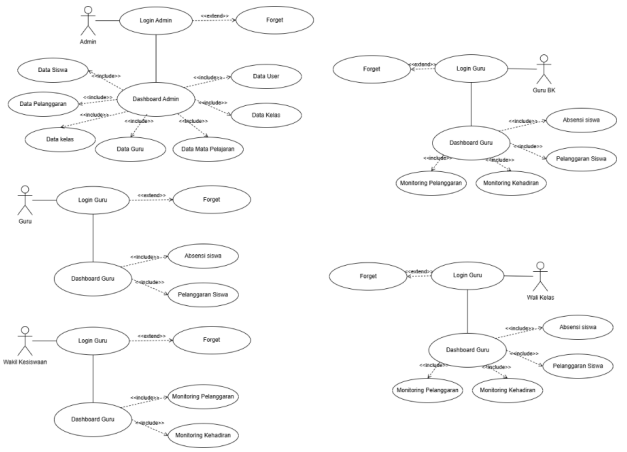

Fig. 2 Use Case Diagram

Figure 2 shows the design of the Use Case diagram, which includes 5 actors: admin/operator, vice principal of student affairs, teacher, guidance counselor (BK), and class teacher. The admin/operator is responsible for managing student data, violation data, and teacher data. This management involves adding, deleting, or editing data from each of the respective tables.

The teacher actor has the ability to log in using their registered account, and then can add student attendance and violations. The attendance and violations that have been added by the teacher can be edited or deleted. As for the vice principal of student affairs, guidance counselor, and class teacher actors, they are responsible for monitoring student attendance and violations.

2) *Activity Diagram:* An Activity Diagram is a type of diagram in UML (Unified Modeling Language) used to model the workflow of a system. This diagram illustrates the sequence of activities within a process and depicts how these activities are interconnected. Below is the Activity Diagram for the Student Attendance and Violation Monitoring System Application at SMK Muhammadiyah 1 Padang:

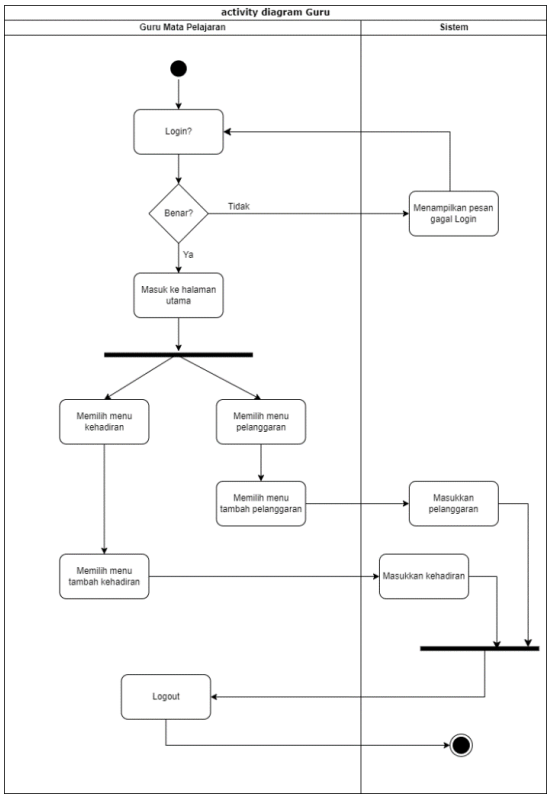

Fig. 3 Activity Diagram for Subject Teachers

In Figure 3, the activity diagram of the subject teacher is shown. The subject teacher can add attendance, as well as edit and delete attendance records. Additionally, the subject teacher is able to add violations committed by students.

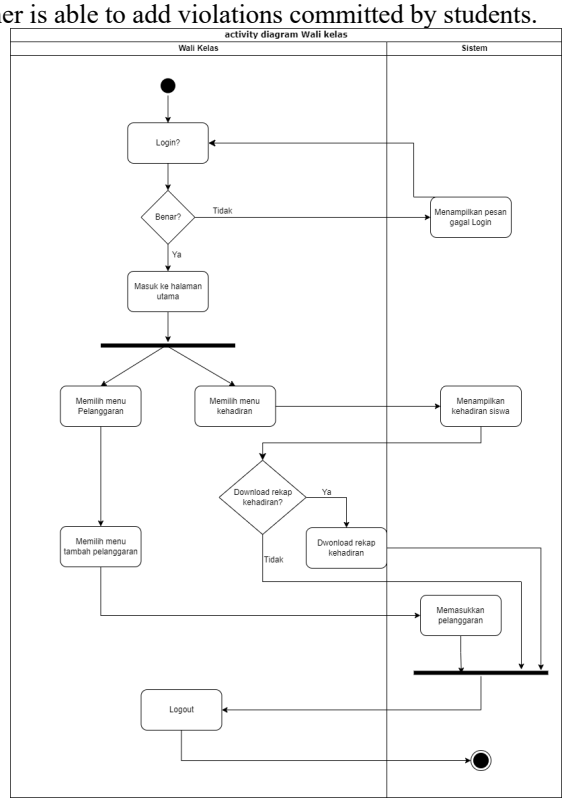

Fig. 4 Activity Diagram for Class Teachers

In Figure 4, the activity diagram of the class teacher is shown. The class teacher can add violations committed by

students, as well as monitor and download the student attendance recap.

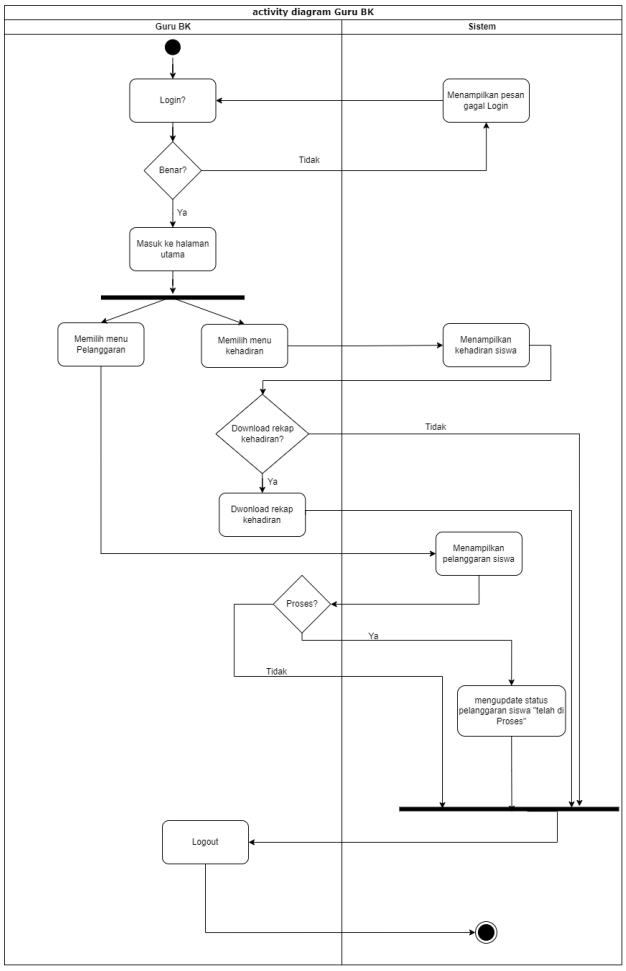

Fig. 5 Activity Diagram for Guidance Counselors (Guru BK)

Figure 5 is the activity diagram for the guidance counselor (Guru BK), where the guidance counselor processes violations that have been input by teachers or class teachers. The guidance counselor can also monitor student attendance.

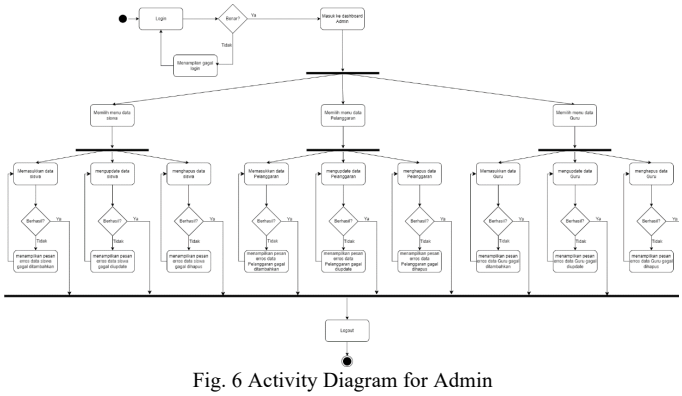

Fig. 6 Activity Diagram for Admin

Figure 6 is the activity diagram for the admin, where the admin logs in and then selects the menu to be accessed, such as adding, editing, deleting, or viewing data that has already been entered into the database.

3) *Class Diagram:* A Class Diagram illustrates the structure of a system by defining the classes that will be created to build the system. It shows how these classes are organized and how they relate to each other [7]. The following is the Class Diagram for the Student Attendance and Violation Monitoring System Application at SMK Muhammadiyah 1 Padang:

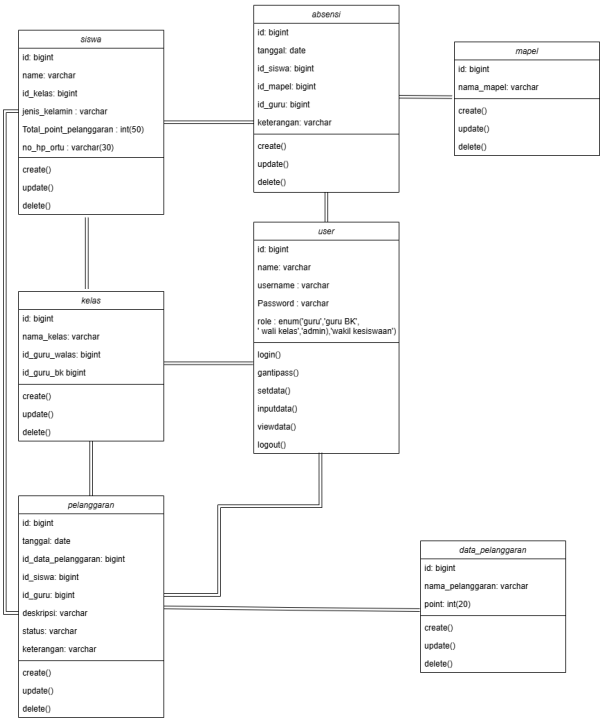

Fig. 7 Class Diagram

IV. Results and Discussions

A. Design Results

1) *Main Page of the Website*: The main page of the website is the first page that appears when accessing the student attendance and violation monitoring system application. This page contains the profile of SMK Muhammadiyah 1 Padang.

Fig. 8 Main Page of the Website

2) *Login Page:* The login page is the page that appears when the user accesses the application. It serves as an intermediary for users who have been granted access rights to enter the application. Below is the display of the login page for this application:

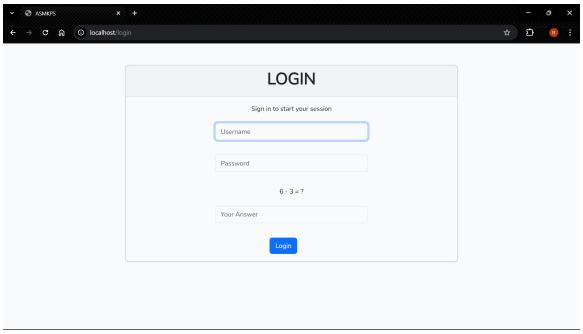

Fig. 8 Login Page

3) *Student Data Page:* On this page, the admin can view, add, edit, and delete student data.

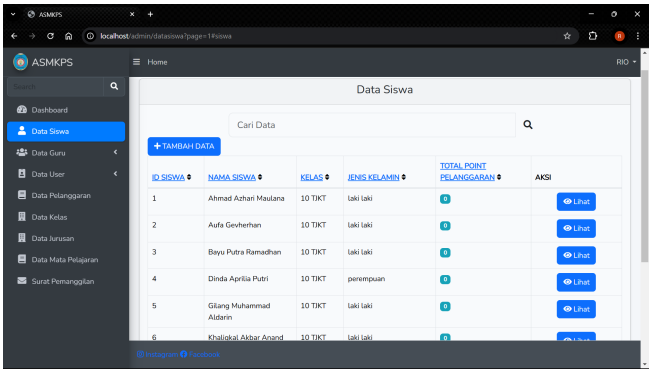

Fig. 9 Student Data Page

4) *Violation Data Page:* On this page, the admin can view, add, edit, and delete violation data.

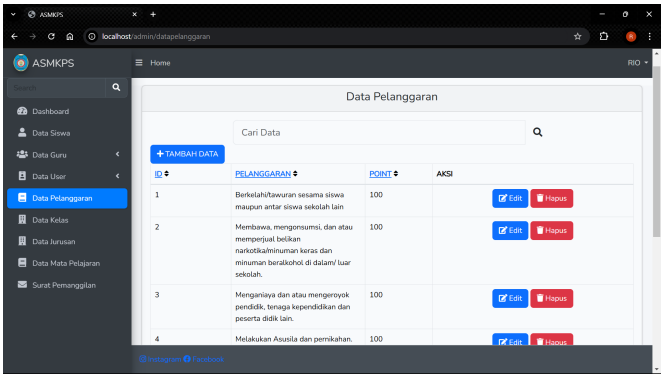

Fig. 10 Violation Data Page

5) *Student Attendance Page:* This page is dedicated to student attendance. Here, teachers can view, add, edit, and delete student attendance records.

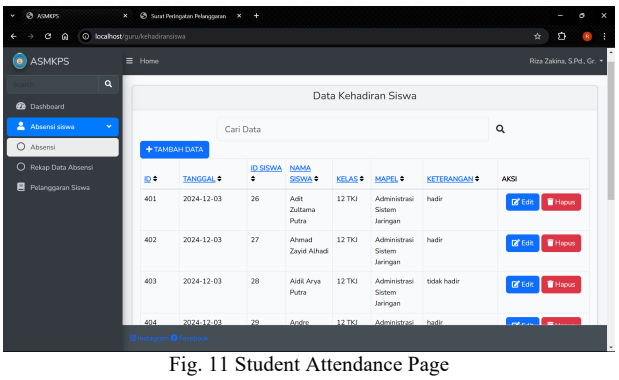

Fig. 11 Student Attendance Page

6) *Student Violation Page:* On this page, teachers can view, add, edit, and delete violations committed by students.

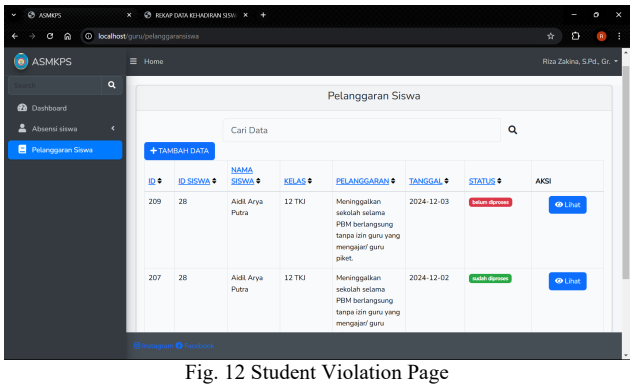

Fig. 12 Student Violation Page

7) *Student Violation Monitoring Page:* On this page, the guidance counselor, class teacher, department head, and student affairs representative can view the total violation points of students and also see the details of the violations committed by them.

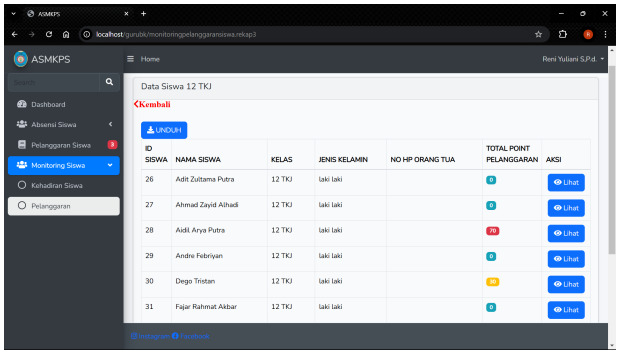

Fig. 13 Student Violation Monitoring Page

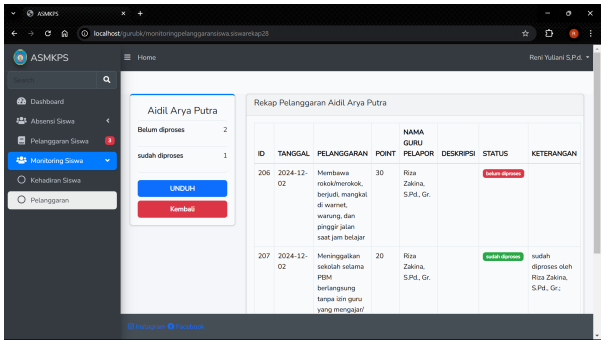

Fig. 14 Student Violation History Page

8) *Student Attendance Monitoring Page:* On this page, the guidance counselor, class teacher, department head, and student affairs representative can view student attendance and also see the details of each student's attendance.

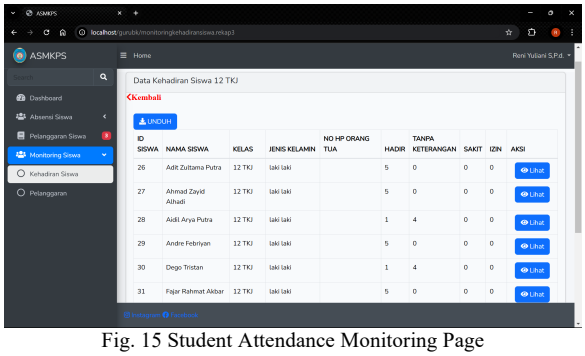

Fig. 15 Student Attendance Monitoring Page

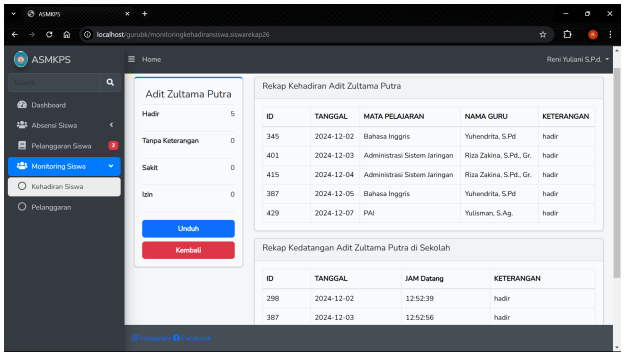

Fig. 16 Student Attendance History Page

9) *Violation Warning Letter Page:* If a student has reached a certain number of points, on this page, the class teacher, department head, and student affairs representative can issue a warning letter.

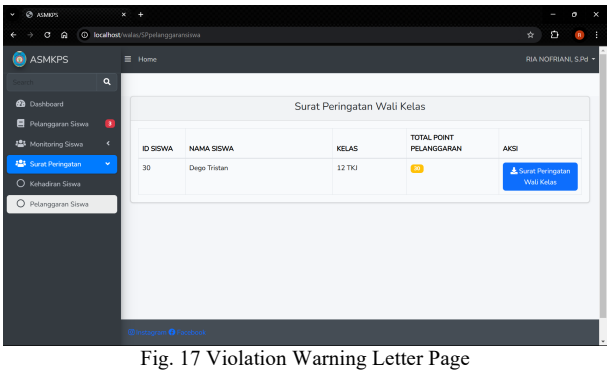

Fig. 17 Violation Warning Letter Page

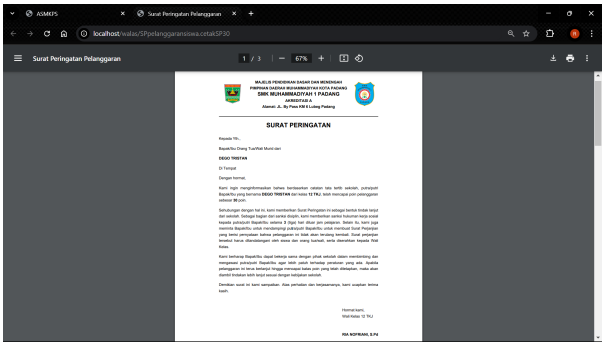

Fig. 18 Violation Warning Letter

10) *Change Password Page:* The change password page is displayed when the user accesses the change password menu. This page allows the user to change their password by entering the old password and the new password. Below is the display of the change password page for this application:

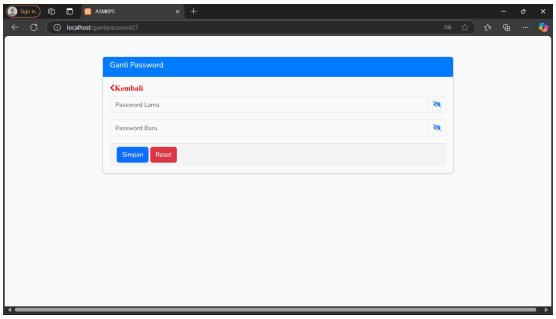

Fig. 19 Change Password Page

B. *Discussion*

The design of the Web-Based Student Attendance and Violation Monitoring System at SMK Muhammadiyah 1 Padang is driven by the absence of an existing system for monitoring student attendance and violations, which is still conducted manually. The school's guidance counselors (BK) and class supervisors face challenges in monitoring student attendance and violations manually, especially because SMK Muhammadiyah 1 Padang has two campuses.

With the introduction of this web-based application, it is expected that the monitoring process will become more efficient and accurate. The system allows guidance counselors, class supervisors, and other relevant parties to access data in real-time, regardless of physical location, which is a significant advantage for SMK Muhammadiyah 1 Padang with its two campuses. Additionally, this application simplifies the process of issuing warning letters. The system enables BK teachers, class supervisors, and student affairs representatives to create warning letters based on specific criteria (such as violation points or student absences), a task that may have previously taken longer when done manually.

This system addresses specific issues the school faced, such as managing attendance and violations across separate campuses and handling a large number of students. The manual processes were time-consuming, especially with the need for teachers and guidance counselors to coordinate data from different locations. The web-based system significantly improves efficiency and accuracy by allowing real-time updates and data access across both campuses, making it easier to monitor and track attendance and violations.

The design of this Web-Based Student Attendance and Violation Monitoring System is developed as a supporting tool for SMK Muhammadiyah 1 Padang to assist in improving student discipline. The system is built using the prototype method as the development approach, with Unified Modeling Language (UML) as the modeling tool. The programming language used is PHP (Hypertext Preprocessor) with the Laravel framework. The data for the Web-Based Student Attendance and Violation Monitoring System at SMK Muhammadiyah 1 Padang is stored and managed using a MySQL database.

V. CONCLUSIONS AND SUGGESTIONS

A. *Conclusions*

Based on the design of the Web-Based Student Attendance and Violation Monitoring System at SMK Muhammadiyah 1 Padang, the following conclusions can be drawn:

1) This research successfully developed a design for a Web-Based Student Attendance and Violation Monitoring System at SMK Muhammadiyah 1 Padang by applying the Prototype development approach and the Model View Controller (MVC) architecture, implemented using PHP programming language and the Laravel framework.

2) The application is systematically designed using Unified Modeling Language (UML) as a modeling tool to support student discipline. With this application, the process of monitoring student attendance and

violations becomes more effective, efficient, and structured, in line with the research objectives.

3) The implementation of this system is expected to have a direct impact on improving student discipline by providing a clearer and more transparent method for tracking attendance and violations. Additionally, the system enhances data management efficiency by enabling real-time access and updates across multiple campuses, making it a highly valuable tool for both school staff and students.

B. Suggestions

The following are the suggestions that the researcher can provide after designing the Web-Based Student Attendance and Violation Monitoring System at SMK Muhammadiyah 1 Padang:

1) It is hoped that this application can serve as a supporting tool to improve student discipline at SMK Muhammadiyah 1 Padang.

2) It is expected that by using this application, guidance counselors and class teachers will find it easier to monitor student attendance and violations as part of efforts to enhance student discipline at SMK Muhammadiyah 1 Padang.

3) It is anticipated that the presence of this application will foster a sense of discipline among students within the school environment.

4) To optimize the system's functionality, it is recommended to provide additional training to teachers and school staff on how to use the application effectively. This will help accelerate adoption and ensure that the system is fully utilized for its intended purpose.

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