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DESIGN AND CONSTRUCTION OF A WEB-BASED STUDENT DATA MANAGEMENT INFORMATION SYSTEM IN SCHOOLS

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Abstract: *Student data management is one of the important aspects in school administration that requires an efficient and accurate system. So far, data processing at SMK PAB 5 Kelambir Lima is still done manually, which often causes errors, delays, and difficulties in accessing accurate and up-to-date data. Therefore, a web-based information system is needed to support more effective and efficient student data management. This study aims to design and build a web-based student data management information system at SMK PAB 5 Kelambir Lima. This system was developed using the Waterfall software development method which includes the stages of needs analysis, system design, implementation, testing, and maintenance. The programming language used is PHP with a MySQL database to store student data. The results of this study are an information system that is able to manage student data, including new student registration, academic data management, and student reports. With this system, the data management process becomes more structured, efficient, and easily accessible to the school. The implementation of this system is expected to improve the quality of service and operational efficiency of school administration.*

Keywords: *Information System, Student Data Management, Vocational School, Web, Waterfall*

Abstrak: Pengelolaan data siswa merupakan salah satu aspek penting dalam administrasi sekolah yang memerlukan sistem yang efisien dan akurat. Selama ini pengolahan data di SMK PAB 5 Kelambir Lima masih dilakukan secara manual sehingga sering menimbulkan kesalahan, keterlambatan, dan kesulitan dalam mengakses data yang akurat dan terkini. Oleh karena itu diperlukan suatu sistem informasi berbasis web untuk mendukung pengelolaan data siswa yang lebih efektif dan efisien. Penelitian ini bertujuan untuk merancang dan membangun sistem informasi pengelolaan data siswa berbasis web di SMK PAB 5 Kelambir Lima. Sistem ini dikembangkan dengan menggunakan metode pengembangan perangkat lunak Waterfall yang meliputi tahapan analisis kebutuhan, perancangan sistem, implementasi, pengujian, dan pemeliharaan. Bahasa pemrograman yang digunakan adalah PHP dengan database MySQL untuk menyimpan data siswa. Hasil dari penelitian ini adalah sebuah sistem informasi yang mampu mengelola data mahasiswa antara lain pendaftaran mahasiswa baru, pengelolaan data akademik, dan laporan mahasiswa. Dengan sistem ini, proses pengelolaan data menjadi lebih terstruktur, efisien, dan mudah diakses oleh sekolah. Penerapan sistem ini diharapkan dapat meningkatkan kualitas layanan dan efisiensi operasional administrasi sekolah.

Kata kunci: Sistem Informasi, Pengelolaan Data Siswa, SMK, Web, Air terjun

INTRODUCTION

Student data management is a very important part of the school administration system, which includes the process of registering new students, managing academic data, attendance, and reporting learning outcomes. In the digital era like today, the need for fast, accurate, and organized data management is very

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urgent to support the effectiveness and efficiency of school operations. SMK PAB 5 Kelambir Lima, as one of the vocational education institutions, also feels the importance of innovation in managing its student data. (Izhari & Dhany, 2023)(Hendrawan, Perwitasari, & Ritonga, 2023)(Syahputra Novelan & Putra, 2020)

So far, data management at SMK PAB 5 Kelambir Lima is still done manually, either by recording in books or using simple spreadsheet applications. This manual method often causes various problems, such as delays in the data management process, input errors, difficulties in searching for data, and the risk of data loss due to the absence of a centralized and secure storage system. This has an impact on the effectiveness and efficiency of the performance of school administration staff, and reduces the quality of service to students and parents. (Rizal & Fachri, 2023) (Rizal et al., 2022) (Septian Hardinata et al., 2022) (Supiyandi et al., 2022) (Bangun Sistem et al., 2019) With the rapid development of information technology, web-based systems have proven to be an effective solution in managing data and administrative processes more quickly and in an organized manner. Web-based information systems allow real-time data access, making it easier for schools to manage and monitor student data anytime and anywhere. In addition, this system can also improve data security and integrity, as well as minimize human error in data processing.. (Hendrawan, Perwitasari, & Arifin, 2023)(Tasril, 2018)(Hasan Putra & Syahputra Novelan, n.d.)

Seeing the existing problems, this study aims to design and build a web-based student data management information system at SMK PAB 5 Kelambir Lima. This system is expected to be able to provide solutions to the data management problems that have been faced so far, while increasing efficiency and effectiveness in student data management. With this system, it is hoped that the school administration process can run faster, more accurately, and more structured, and be able to improve the quality of service to students and parents. (Fachri, 2018)(Informatika & Hasan, n.d.)(dan Pembuatan Aplikasi Manajemen Peminjaman Kendaraan Berbasis Web Dengan et al., n.d.)

METHOD

The research methodology for designing a web-based student data management information system in schools can involve several steps including planning, development, implementation, and evaluation. Here are some research methodologies that you can consider. (Rahmat et al., 2019)

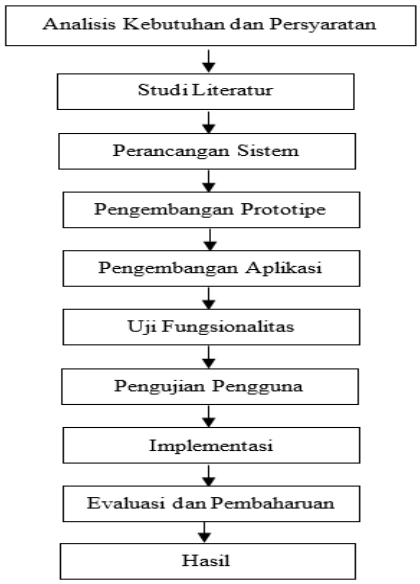

Figure 1. Research Stages

Based on Figure 3.1, the following is an explanation of each process of the research stages, including:

1. Needs and Requirements Analysis
   Identify application needs and requirements by communicating with principals and potential users. Determine key features, data security, and desired user scale.(Penjualan Online Berbasis Website et al., 2019)
2. Literature Study

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Conduct a literature study to understand the current trends in student data management applications in web-based schools and relevant technologies, such as websites. And the challenges they face in adopting digital technology. (Fauzi Siregar & Sari, 2018)

3. System Design
   Create an application system design, including application architecture, user interface, and integration with Firebase Realtime Database and Cloud Computer. Determine how data will be stored, managed, and accessed.
4. Prototype Development
   Build a prototype of your app to test your concept and get feedback from potential users. Make sure the prototype includes the key features you have identified.
5. Application Development
   Implement applications based on tested prototypes. Integrate database systems for data storage and Cloud Computer to improve scale and performance..
6. Functionality Test
   Perform functional testing to ensure that all application features are working properly. Identify and fix any bugs or technical issues that may arise.
7. User Testing
   Perform functional testing to ensure that all application features are working properly. Identify and fix any bugs or technical issues that may arise.
8. Implementation
   After passing the test and testing, implement and launch the application publicly. Ensure adequate technical support is available.
9. Evaluation and Update
   Conduct a post-launch evaluation to identify potential improvements or enhancements. Get feedback from users and make updates as needed.
10. Results
    In this application, an explanation will be given about the student data management application design system at school.

System Design

Use case is a modeling that displays the flow of the Student Data management application system at SMK PAB 5 Kelambir Lima. Figure 3.1 is a use case design for the information system research that was built.

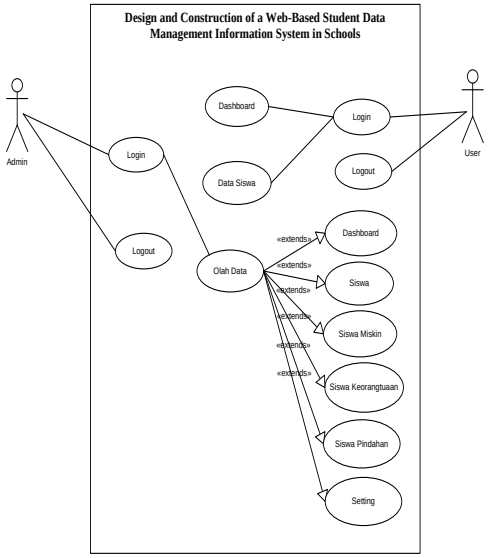
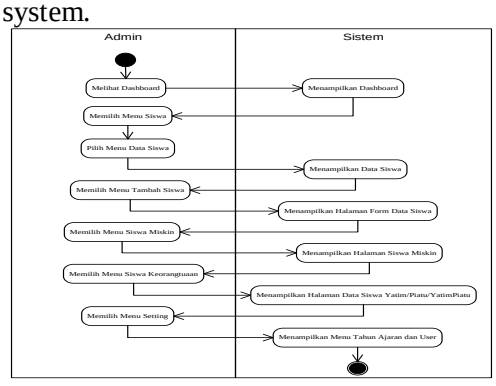


Figure 2 Use Case Diagram Research

1. *Activity Diagram*

Activity Diagram explains the activities carried out by the user on the system. For this Activity Diagram will explain how the Admin process interacts with the designed system. Figure 3 is the Admin Activity Diagram of the designed system.



Gambar 3. Activity Diagram Admin

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From the picture above explains about how the process of Admin activity in selecting a menu in the application system for managing Student Data at SMK PAB 5 Kelambir Lima school. The system will display if the admin selects several menus and submenus. Admin also functions to set the student user password if you forget the password and print the Student Data report. Next, it will be shown how the user activity process uses the application system for managing Student Data at SMK PAB 5 Kelambir Lima school. Figure 4 shows the user activity diagram process.

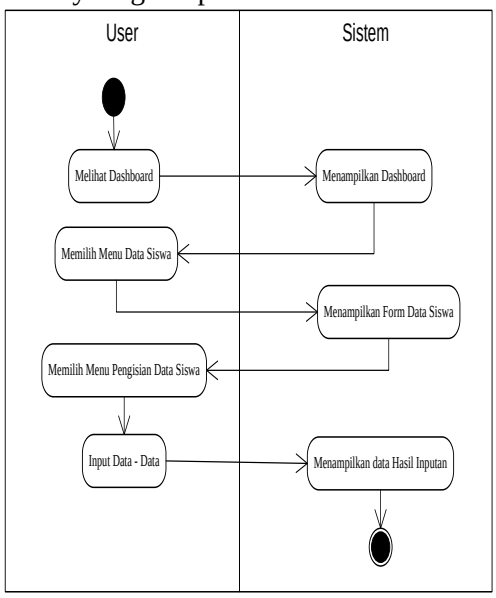

Figure 4. Activity Diagram User

2. Sequance Diagram

Sequence Diagram is a sequence of activities carried out by the admin in running the web-based Student Data management application of SMK PAB 5 Kelambir Lima. Figure 5 is the admin sequence diagram used in this study.

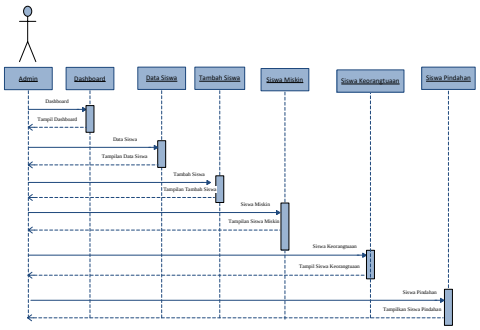

Figure 5. Sequance Diagram

RESULTS AND DISCUSSION

The results and discussion are the results of the implementation of the Student Data Management Application System for SMK PAB 5 Kelambir Lima. The author conducted a trial using data provided by the company. However, before conducting the test, there are several device requirements for the information system.

Admin Login Menu Display

On the admin login menu display, it is a display if the admin or user wants to enter the SMK PAB 5 Kelambir Lima student data management application system. The login menu display can be seen in the image below..

Figure 6. Page Views

Admin Dashboard Menu Display

On the admin dashboard page, it is the main page if the admin has logged in. The dashboard page can be seen in the image.

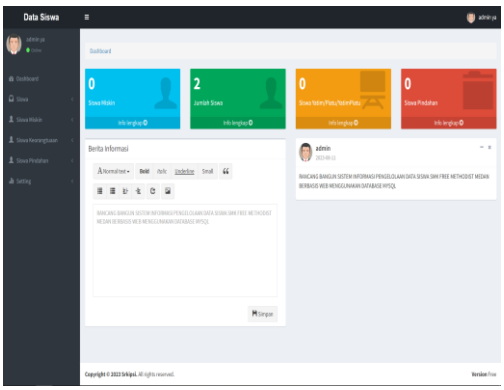

Figure 7. Dashboard Menu View

Add New Student Menu Display

On the display of the add new student menu is a display where the

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admin where the admin if he wants to add new student data then there are several forms that need to be filled in, for example the student's full name, national student registration number, student email address, latest student photo, student class, student's registered academic year and student gender. For the display of adding new students can be seen in the image below.

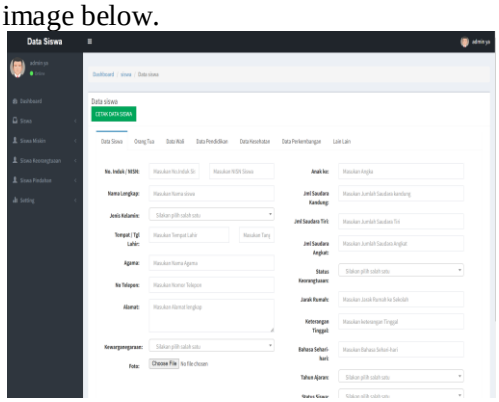

Figure 8. Add New Student View

Add Student Data View

On the student data page is a page where the admin can see student data, namely student names, national student registration numbers, father's data and mother's data. Then the data can also be deleted or edited. The display of the student list can be seen in the image below.

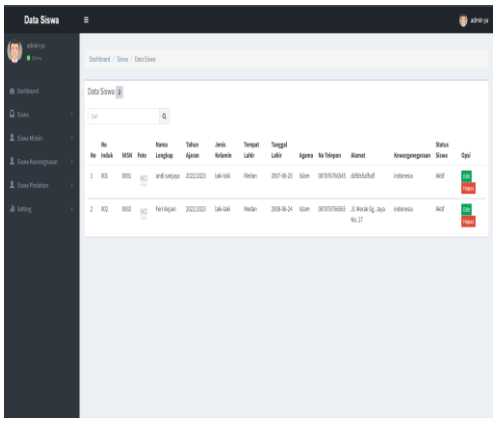

Figure 9. Student List View

Display of Poor Student Data

In the poor student data display, it is a display where if the admin selects the poor student data category, the data will be entered into the poor student data form. The poor student data display can be seen in the image below.

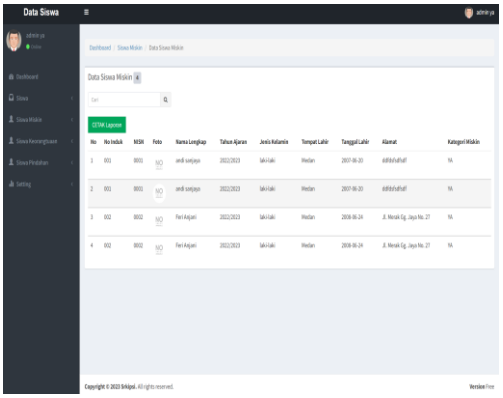

Figure 10. Poor Student Data Display

Transfer Student View

On the transfer student display is a display where the admin can manage student data if they want to move from school or enter from SMK PAB 5 Kelambir Lima school. For the student transfer display can be seen in the image below.

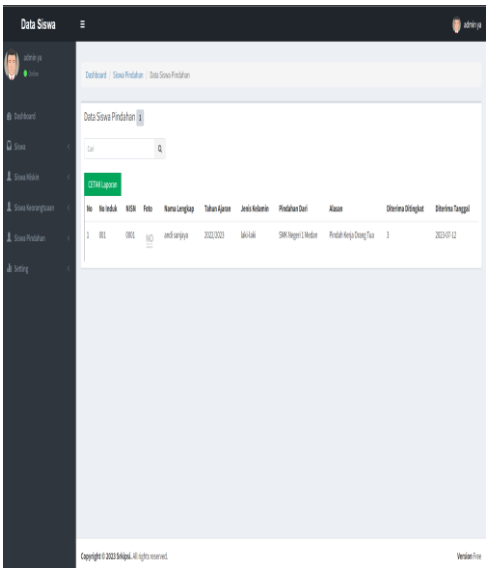

Figure 11. Transfer Student View

Student User Data Display

On the student data display is a display where users can fill in user data, namely data such as full name, national student registration number, address, place and date of birth, which child, number of siblings, and so on. The student list display can be seen in the image below.

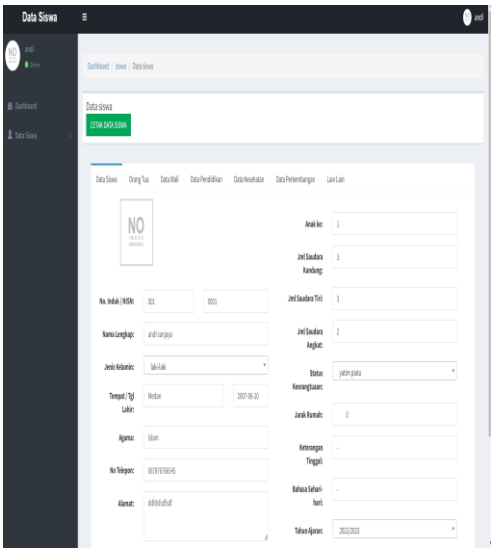

Figure 12. Student User Data View

CONCLUSION

The implementation of the design and construction of a web-based student data management information system in schools has several conclusions that can be presented, including:

1. The web-based information system that has been built has succeeded in increasing efficiency and accuracy in managing student data at SMK PAB 5 Kelambir Lima. The process that was previously done manually can now be done faster, more organized, and with minimal errors.
2. This system allows real-time and centralized data access, making it easier for schools to search, update, and report student data anytime and anywhere. It also supports transparency and order in school administration management.
3. With the implementation of this web-based information system, schools can provide better services to students, teachers, and parents. More effective and structured data management supports a more professional administration process, which ultimately improves the quality of education at SMK PAB 5 Kelambir Lima.

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