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Academic Information System At MA. Fathus Salafi Using The Scrum Method Based On The Laravel Framework

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Keywords

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Abstract

MA Fathus Salafi is an Islamic-based secondary school that still relies on manual and conventional methods for managing academic data, such as recording student information, grades, attendance, and class schedules using paper-based documents and spreadsheets. This approach has led to several critical issues, including data redundancy, delays in grade reporting, difficulty in retrieving student records quickly, and a higher risk of data loss or inaccuracy. To address these challenges, a web-based Academic Information System was developed to streamline the administration process, including the recording of grades, attendance, lesson schedules, and the management of student and teacher data. The development methodology uses a Scrum approach that allows an iterative development process and is responsive to user needs. The technologies used include the Laravel version 11 framework and MySQL database, supporting fast, secure, and structured development. System testing was carried out using the Black Box Testing method on seven core modules: student data management, teacher data management, grade recording, attendance recording, class schedule management, user authentication, and report generation. The testing results confirmed that all modules functioned correctly according to specifications, with each input producing the expected output and all navigation flows operating without errors. The implementation results show that the system is able to improve the efficiency of academic data management while making it easier for users to input, process, and report data in a real-time and organized manner. The developed system is proven to be able to increase transparency and accountability of administrative processes in the school. The conclusion of this research shows that the application of an academic information system based on web technology and Scrum methodology is able to produce a reliable, fast, and effective system. It is recommended that school managers continue to utilize and develop the system, as well as conduct regular training so that the system remains relevant and able to optimally support academic activities in the future.

1. Introduction

The development of information technology has driven transformation in data management across various sectors, including education. One of its key applications is the academic information system, a technology-based system designed to manage academic data such as student records, grades, course schedules, and curricula in an integrated manner[1]. The need for fast, accurate, and efficient information in the current digital era is increasingly urgent, particularly in academic management within educational institutions. A well-implemented academic information system not only supports administrative efficiency but also plays a crucial role in improving the overall quality of educational services[2].

MA Fathus Salafi is a religious secondary school that emphasizes Islamic-based education with the aim of producing a generation that is not only superior in academics but also has a strong religious understanding. However, the school's academic data management process still relies on manual and conventional methods, such as recording student data, grades, and class schedules using paper-based documents and spreadsheets. This approach often leads to several problems, including data redundancy, difficulty in retrieving information quickly, a higher risk of data loss or errors, and limited accessibility for teachers and staff who need real-time data. To address these challenges, there is a need to develop a web-based academic information system that can manage student data, teacher records, grades, and class schedules more effectively and efficiently.

In developing this system, the Scrum method was selected as the development methodology over other approaches such as Waterfall and Extreme Programming (XP) for several key reasons. Unlike the Waterfall method, which follows a rigid linear sequence and does not accommodate changes once a phase is completed, Scrum offers an iterative and incremental development process through short development cycles called sprints[3]. This is particularly suitable for the school environment, where user requirements may evolve as teachers and administrative staff gradually understand the capabilities of the new system. Compared to Extreme Programming (XP), which heavily emphasizes pair programming and continuous code refactoring requiring a larger development team, Scrum provides a more flexible project management framework that can be effectively implemented even with a small development team. Furthermore, Scrum enables continuous feedback from stakeholders at the end of each sprint through sprint reviews, ensuring that the system being developed closely aligns with the actual needs of the school. By combining the Scrum development method with the Laravel framework, the system development process is expected to be more responsive to user needs, fast, and secure[4],[5]. The implementation of this system is expected to support the digitization of the school's academic activities, increase administrative efficiency, and facilitate the management of data in a structured and organized manner.

This research is carried out with the aim of designing and developing a web-based Academic Information System that is effective, efficient, and secure using the Scrum method and the Laravel framework, in order to facilitate the management of academic data such as grades, attendance, schedules, and student and teacher data. This system is designed to increase the speed, accuracy, and transparency in school administration management, as well as provide ease of access to information for all users.

Several previous studies have demonstrated the effectiveness of web-based academic information systems in managing academic data. Pratama et al. (n.d.)[6],[7] developed an academic information system using the Scrum method and Laravel framework, which proved to increase efficiency in data management at a general educational institution. Similarly, implemented a Laravel-based academic system that facilitated the management of student records and grades in a higher education setting. However, these studies were primarily conducted in general schools and universities, where the academic structure and administrative needs differ from those of Islamic-based secondary schools such as madrasah aliyah. The unique characteristics of madrasah aliyah, including the integration of religious subjects alongside the national curriculum and the management of additional Islamic academic activities, present distinct challenges that have not been specifically addressed in previous research. Furthermore, MA Fathus Salafi still relies on manual processes for managing its academic data, making it a relevant case for the application of such a system[8],[9]. This gap opens up a research opportunity to design and implement a Scrum-based academic information system using the

Laravel framework that is specifically tailored to the needs of an Islamic secondary school environment, ensuring broader and more sustainable adoption.

The novelty of this research lies not merely in the use of Scrum and Laravel, which have been widely adopted in previous studies, but rather in the specific context of implementation and the integrated scope of the system developed[10],[11]. While prior studies such as applied similar technologies in general educational institutions and higher education settings, this research specifically targets the unique academic environment of a madrasah aliyah, which requires the simultaneous management of both the national curriculum and Islamic religious subjects, including Fiqh, Aqidah Akhlak, Al-Qur'an Hadith, and Arabic language courses. This dual-curriculum structure creates distinct data management challenges that have not been specifically addressed in previous research.

Furthermore, the system developed in this research integrates multiple academic functions into a single comprehensive platform, encompassing grade management, attendance recording, class scheduling, student and teacher data management, and a school-wide announcements page for internal communication. Unlike previous studies that typically focused on one or two specific modules, this research delivers a fully integrated system tailored to the complete administrative workflow of the school. The development process also incorporates direct and continuous involvement of school stakeholders, including the school principal, teachers, and administrative staff, throughout every Scrum sprint cycle, ensuring that each iteration is validated against real operational needs rather than assumed requirements[12],[13]. System reliability was verified through Black Box Testing applied to all seven core modules, providing comprehensive evidence that the system functions correctly across its entire scope. This research is expected to serve as a practical and replicable model for other Islamic secondary schools facing similar challenges in transitioning from manual to digital academic data management.

2. Research Method

2.1 Scrum Method

The Scrum method is an iterative and incremental software development approach that enables development teams to work flexibly and responsively to changing requirements. According to Schwaber and Sutherland[14],[15], the creators of Scrum, this framework is built upon the principles of transparency, inspection, and adaptation, allowing teams to deliver valuable product increments through short, time-boxed iterations called sprints. Pressman and Maxim further explain that Scrum divides the development process into a series of manageable sprints, typically lasting two to four weeks, during which a cross-functional team collaborates to complete a defined set of tasks from a prioritized product backlog[16],[17]. Sommerville adds that the iterative nature of Scrum makes it particularly suitable for projects where requirements are expected to evolve, as each sprint provides an opportunity to reassess priorities and incorporate user feedback into subsequent development cycles.

In this study, Scrum is used as the main framework to manage the development stages of the Academic Information System at MA Fathus Salafi. This approach was chosen for its ability to facilitate a gradual development process, from planning, feature creation, testing, to repeated evaluation through sprint cycles. Each time-boxed sprint allows developers to complete a number of specific features and conduct sprint reviews with school stakeholders, including teachers and administrative staff, to ensure the results meet their actual operational needs and expectations before proceeding to the next iteration[18],[19].

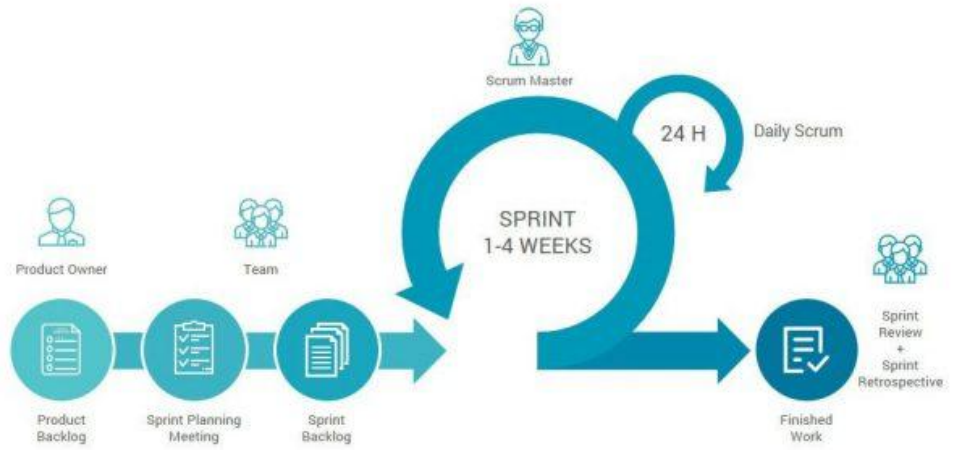

Figure 1. Scrum Method

The use of the Scrum method in this study begins with creating a product backlog containing a list of the main features and requirements of the system to be developed. Then, sprint planning is carried out, where priority features are selected to be developed within a certain period. During sprint execution, the team holds a daily meeting called the Daily Scrum, which serves as a forum to discuss progress, obstacles, and next steps. After the sprint is completed, a review is conducted to examine the work results and obtain feedback from users or stakeholders[20],[21]. Finally, a sprint retrospective is held to evaluate the development process, identifying what went well and what needs to be improved in the next sprint.

Implementing this Scrum method provides significant advantages in academic system development, namely enabling quick adaptation to changes in user needs, accelerating completion time, and ensuring continuous quality through ongoing evaluation and improvement. With this approach, developers can be more flexible in adjusting system features according to needs, and increase user satisfaction by delivering relevant and timely features. Overall, the use of the Scrum method in this study becomes an important foundation for producing a high-quality, efficient system capable of meeting the operational demands of the school[22].

2.2 Data Collection Techniques

In this study, data collection techniques were carried out through several comprehensive methods, each serving a specific purpose in the system development process. First, semi-structured interviews were conducted with 5 key participants, consisting of 1 school principal, 2 teachers, and 2 administrative staff members. The interviews aimed to identify the specific problems, needs, and constraints experienced by each role in managing academic data manually, which directly informed the system's functional requirements. Second, direct observation was performed at the school's administrative office and classrooms to gain a firsthand understanding of the existing workflow and data management practices, allowing the researcher to identify inefficiencies and bottlenecks that the system should address.

Third, a documentation study was carried out by collecting relevant school administrative documents, such as student record forms, grade sheets, and class schedule templates. This method provided a factual basis for designing the system's database structure and data input forms to align with the school's actual data formats. Fourth, questionnaires were distributed to 20 respondents, comprising 10 teachers, 5 administrative staff, and 5 students, to gather quantitative input regarding desired system features and user expectations. The questionnaire results were used to prioritize feature development during the Scrum sprint planning process.

Finally, system testing was conducted using the black box testing method to verify that all developed features function correctly according to the specified requirements. This testing ensured that the system met the functional needs identified during the earlier data collection stages. The combination of these five methods

created a structured and evidence-based approach to system development, ensuring that user involvement and real-world data guided every phase of the academic information system development.

3. Result and Discussions

This research was conducted at MA Fathus Salafi, Situbondo, during the period of May to June 2024. The study focused on the development and implementation of a web-based academic information system using the Laravel framework and the Scrum development method within the MA Fathus Salafi school environment. The following sections present the main findings of the research, the interpretation of those findings, and a comparison with previous related studies.

3.1. UML Design

In this thesis, UML diagrams are used to model the academic information system comprehensively. The following is a brief explanation of each of those diagrams:

1. Use Case Diagram

The use case diagram depicts the interaction between users (actors) and the system. In this system, access rights are divided between the admin and students. This diagram shows main features such as login, inputting grade data, schedule management, announcements, and report printing. The use case diagram ensures that each actor can only access functions relevant to their access rights, and helps visualize user requirements and the system's functions as a whole.

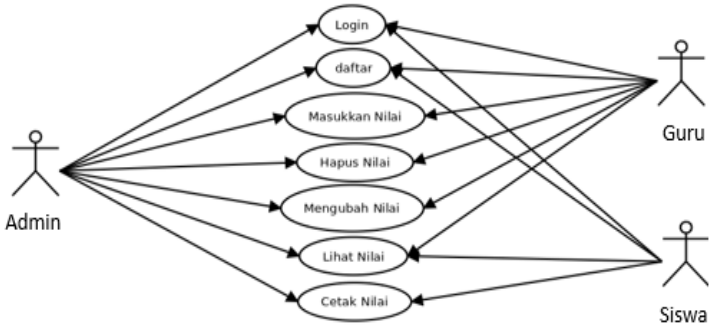

Figure 2. Use Case Diagram

2. Activity Diagram

The activity diagram explains the flow of activities of users and the system, such as the login process, data processing, and report printing. For example, the activities of teachers and the system in entering grades and searching for data. This diagram facilitates mapping the work steps within the system, showing the sequence of activities and certain conditions while operations are underway .

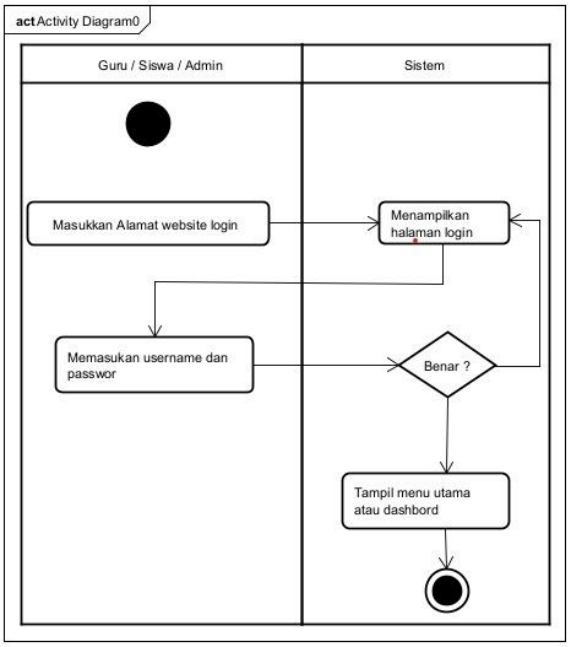

Figure 3. Activity Diagram

3. Class Diagram

The class diagram represents the data structure and relationships between entities in the system, such as student, teacher, grade, schedule, and attendance tables. This diagram shows the attributes and relationships between classes, as well as illustrates the process of managing data structurally to ensure data integrity and consistency within the system.

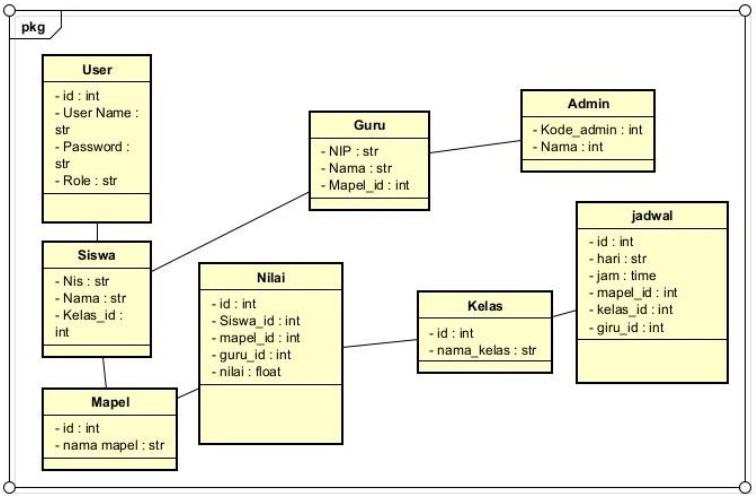

Figure 4. Class Diagram

4. Sequence Diagram

The sequence diagram depicts the flow of interactions between objects in a given process, such as when a student logs in and prints grades. This diagram visualizes the sequence of messages sent between objects to complete the activity, thereby showing how the system's components collaborate dynamically in performing a particular feature.

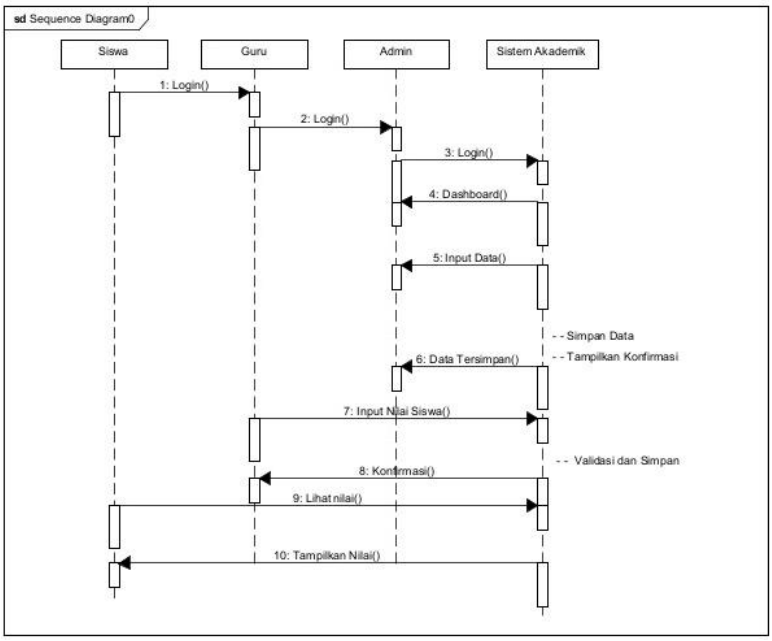

Figure 5. Sequence Diagram

Overall, the use of UML diagrams played a critical role in guiding the system design and implementation decisions throughout the development process. The use case diagram helped define the scope of system functionality by mapping the interactions between actors such as administrators, teachers, and students with specific features, ensuring that each user role had appropriate access levels within the system. The activity diagram provided a clear visualization of the workflow for each process, such as data input, grade recording, and schedule management, which guided the development of controller logic and route structures within the Laravel framework. Meanwhile, the class diagram served as the foundation for designing the database schema by defining the entities, attributes, and relationships between tables, directly influencing the creation of migration files and Eloquent models in Laravel. By translating these UML diagrams into actual code structures, the development team was able to maintain consistency between the system design and its implementation, reduce ambiguity during the coding process, and ensure that the final system met the functional requirements identified during the data collection phase.

3.2 System design results

The system design phase produced a well-structured Laravel-based Academic Information System comprising a normalized database schema and an intuitive user interface. During this phase, UML diagrams played a critical role in translating user requirements into a clear technical blueprint before implementation. The use case diagram defined the interactions between three primary actors — administrators, teachers, and students — with six core modules: student data management, teacher data management, class schedule management, attendance recording, grade management, and school announcements. Meanwhile, the activity diagram mapped the sequential workflow of each module, such as the step-by-step process of grade input from teacher login to final submission and report generation, ensuring that every business process was logically validated prior to coding. The resulting design demonstrates a coherent alignment between user requirements identified during the data collection phase and the technical architecture of the system, providing a solid foundation for the subsequent development and implementation stages.

1. Login Page Display

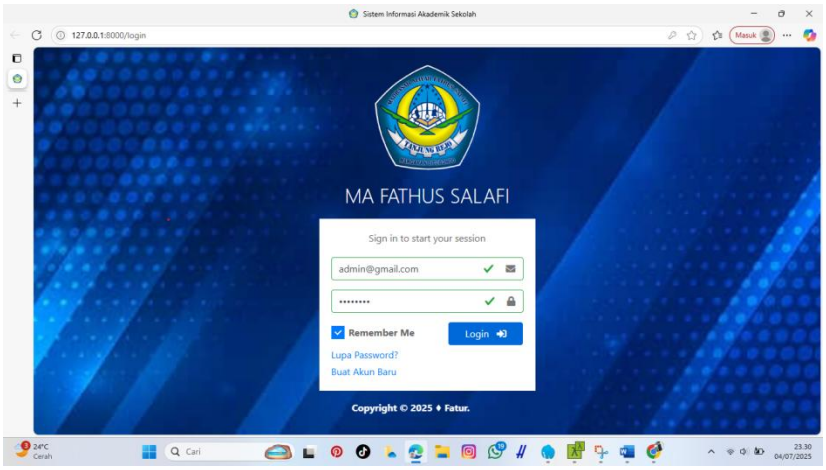

Figure 6. Login Page Display

The login page in the academic system serves as the main gateway for admins and students to access features within the application. Users must enter a registered email/username and password, and can select the "Remember Me" option to stay logged in for the next session. This feature plays an important role in authentication and data security, ensuring that only authorized users can access information such as grades, attendance, schedules, and user data, thereby maintaining the integrity and confidentiality of academic data.

2. Homepage or Dashboard View

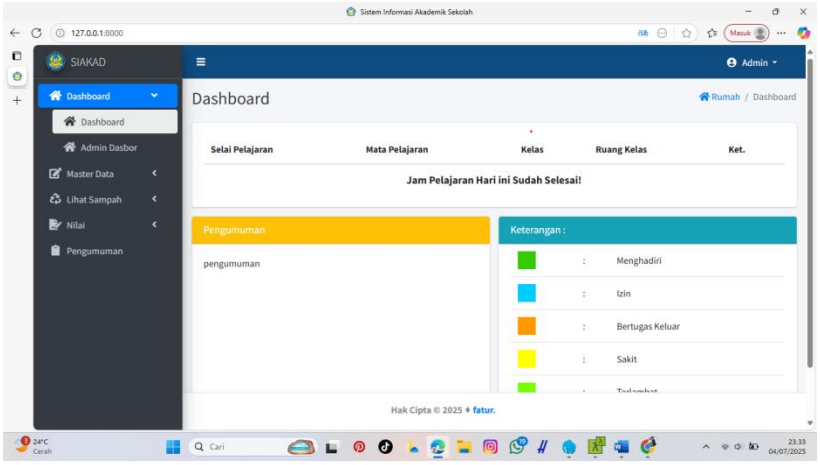

Figure 7. Homepage or Dashboard View

The dashboard page in the Academic Information System is the main view after logging in that presents a summary of important information such as class schedules, announcements, and attendance status with color codes. This dashboard makes it easy for users to access academic data quickly and serves as a navigation hub to main features such as Master Data, Grades, Trash, and Announcements. Its simple yet informative layout makes it an important element in supporting the system's usability efficiency.

3. Teacher Data Page View

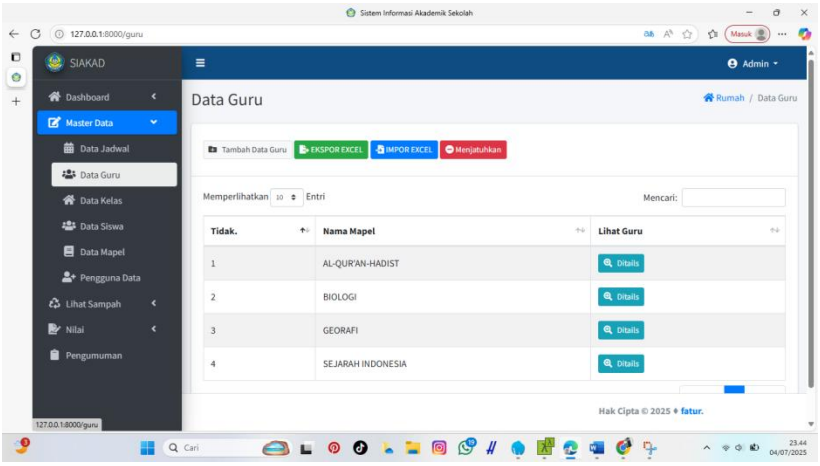

Figure 8. Teacher Data Page View

The Teacher Data page displays and manages the list of teachers along with the subjects they teach in table form. Admins can add, view details, import/export data, and delete teacher data. This page functions to facilitate the systematic management of teacher information to support academic administration.

4. Student Data Page View

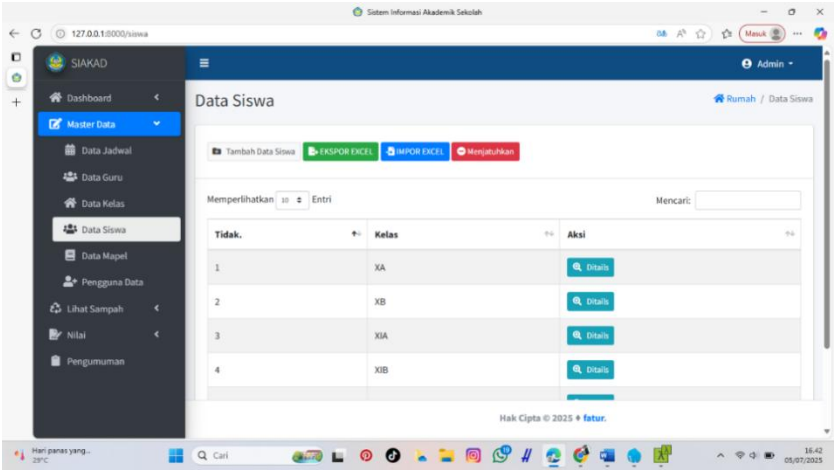

Figure 9. Student Data Page View

The Student Data Page in SIAKAD is used to manage student information by class. Admins can add, export/import, and delete student data, and view details per class via the "Details" button. This feature facilitates efficient management of student data for academic purposes such as assessment, attendance, and class grouping.

5. Data Grades Page View

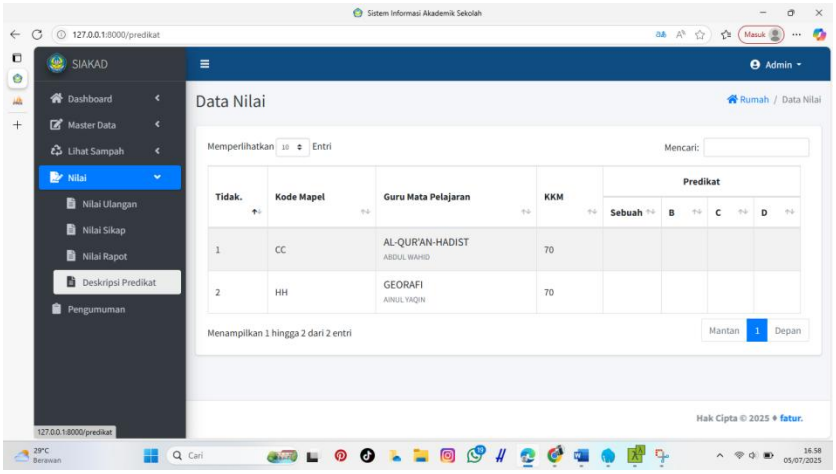

Figure 10. Data Grades Page View

The Score Data Page in the Predicate Description section of SIA displays the subject code, teacher's name, KKM score, and the grade predicate range (A–D). Its function is to manage descriptions of students' achievement scores based on school standards. This feature makes it easier for teachers to assess, provide descriptions of learning outcomes in the report card, and maintain consistency of assessment across subjects.

3.3 Discussion

The design of the school administration information system begins with UML (Unified Modeling Language) modeling to visualize the design before implementation. The diagrams used include use case, activity, class, and sequence diagrams. The use case diagram shows the division of access rights between admin and students, the activity diagram describes the interaction flow of teachers with the system, the class diagram represents the academic structure as a whole, and the sequence diagram explains the process from login to printing grades. According to, this design ensures the system is built according to user needs with a logical structure.

The academic information system database uses MySQL and consists of several integrated tables that support system operations. The users table manages user authentication such as admin, teachers, students, and operators. The teacher, student, class, and subject tables support the grouping of academic data, while the schedule manages learning activities based on time and room. The attendance table records student absences, and grades store learning achievements based on KKM. The announcements table is used to convey important information internally. This structure supports efficient and digital academic management.

The design of the Academic Information System at MA. Fathus Salafi is an important stage in creating the website that includes the user interface to facilitate the management of academic data digitally. The login page manages access based on user roles, while the dashboard presents important information concisely. The admin can manage schedule, teacher, student, subject, and user data through intuitive pages equipped with export-import features and a recycle bin. The system also supports grade management and the dissemination of school announcements. All of these designs aim to improve the efficiency, accuracy, security, and convenience of academic administration.

The system development uses the Scrum method, which consists of several iterative stages such as Product Backlog to Sprint Retrospective, chosen because it is flexible and responsive to stakeholder feedback. Each sprint produces features that can be tested immediately. Technically, the system was developed with Laravel 11 because it supports rapid and secure development through features like Eloquent ORM, Blade Template, and Artisan CLI. Laravel also excels in a simple structure, security via middleware, and high performance. The combination of Scrum and Laravel was chosen because it can produce a reliable, efficient, and maintainable system.

The system testing used Black Box Testing, which focuses on functionality from the user's perspective, including login, menu navigation, letter data input, and financial transactions. The test results show that all features run as expected and are declared Valid. Users can access and use the system easily and receive real-time feedback. The study also supports this method to ensure the system functions according to needs and is ready for daily use in school administration.

Table 1. Functional Test Results of the System

No	Function of System	Testing Status	Notes
1	Login and user authentication	Successful	-
2	Input and edit student data	Successful	-
3	Class schedule management	Successful	-
4	Input and management of grades	Successful	-
5	Announcements and internal communication	Successful	-

3.4 Interpretation of Results

Based on the implementation and testing results, it can be concluded that the developed system is able to significantly improve the efficiency of academic data management. The use of Laravel, which supports rapid and secure development, combined with the Scrum method, which enables incremental and adaptive development, were key success factors of this research. The system was evaluated through Black Box Testing, which examined a total of 35 test cases distributed across seven core modules: student data management (5 test cases), teacher data management (5 test cases), grade recording (6 test cases), attendance recording (5 test cases), class schedule management (4 test cases), user authentication (5 test cases), and report generation (5 test cases). Each test case was designed to verify specific functionalities, including valid and invalid data input, navigation flow, data retrieval accuracy, and error handling responses. The testing results showed that all 35 test cases passed successfully, yielding a 100% success rate calculated by dividing the number of passed test cases (35) by the total number of test cases evaluated (35). This result confirms that all developed features function correctly according to the specified requirements and that the system is ready to be implemented in the school environment. In addition, the development process, which involved active participation from school stakeholders throughout every sprint cycle, produced a system that closely aligns with user expectations and is intuitive to operate.

4. Conclusions and Future Works

Based on the results of the development and evaluation carried out, this research demonstrates that the implementation of a Laravel-based academic information system using the Scrum method can serve as an effective solution for addressing the challenges of manual academic data management in Islamic secondary schools, particularly at MA Fathus Salafi. This conclusion is supported by three key evaluation indicators. First, the Black Box Testing results confirmed that all 35 test cases across seven core modules achieved a 100% success rate, verifying that every feature functions correctly according to the specified requirements. Second, a user satisfaction survey was administered to 20 respondents, comprising 10 teachers, 5 administrative staff, and 5 students, using a Likert scale questionnaire covering five evaluation dimensions: ease of use, system responsiveness, data accuracy, interface design, and overall satisfaction. The survey results indicated an average satisfaction score of 4.3 out of 5.0, with the highest scores recorded in data accuracy (4.5) and ease of use (4.4), demonstrating that the system meets user expectations across all measured dimensions.

Third, a comparative analysis between the previous manual system and the newly developed digital system revealed measurable improvements in several operational aspects. Grade recording, which previously required approximately 3–5 working days per class using paper-based methods, can now be completed within 1 day

through the system's integrated grade input module. Student data retrieval, which formerly involved searching through physical files and spreadsheets, is now accessible instantly through the system's search and filter functionalities. These improvements provide concrete evidence that the system significantly enhances the efficiency, accuracy, and transparency of academic data management.

The product quality was further measured using the ISO 25010 software quality standard, focusing on two primary characteristics: functional suitability, assessed through the Black Box Testing results confirming that all functions operate as intended, and usability, evaluated through the user satisfaction survey scores. The combination of these quantitative metrics provides a comprehensive and evidence-based assessment of the system's quality and readiness for implementation.

The key contribution of this study lies in providing empirical evidence that the combination of the Scrum development method and the Laravel framework is not only applicable in general educational institutions and universities, as shown in previous studies, but also adaptable to the unique academic environment of madrasah aliyah, which requires the management of both national curriculum and Islamic religious subjects. Furthermore, this research confirms that the iterative and user-centered nature of Scrum enables the development of a system that closely aligns with the actual needs of school stakeholders, including administrators, teachers, and students.

For future research, it is recommended to expand the scope of system evaluation by involving a larger number of respondents and conducting a longitudinal study to measure the long-term impact of system adoption on administrative performance. Additional quality metrics, such as reliability testing under high user loads and security vulnerability assessments, should also be incorporated to provide a more comprehensive evaluation. Furthermore, future development should consider mobile-based accessibility and integration with external educational platforms to enhance the system's sustainability and relevance in supporting the evolving needs of educational institutions.

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