NEWTON: Networking and Information Technology
Vol. 6 No. 2 October 2026, Page. 103 - 111
E-ISSN: 2797-0728

Design of a Web-Based Student Data Management Information System for PP. Putra Al Wahabiyyah 1 Bahrul Ulum Using Laravel

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ABSTRACT
Pondok Pesantren Putra Al Wahabiyyah 1 Bahrul Ulum currently manages 70 active students (santri), yet its data recording process is still carried out manually through three unintegrated media, namely physical forms, ledgers, and Microsoft Excel. This condition leads to recurring problems such as recording errors, inconsistent data formats, and a reporting process to the Forum Komunikasi Diniyah Takmiliyah (FKDT) of the Ministry of Religious Affairs that takes up to one month to complete. In addition, approximately 80 percent of the students' guardians live outside Jombang Regency, making direct, in-person data collection inefficient. This study aims to design a web-based student data management information system using the Laravel 12 framework with PHP 8.2 and a MySQL database. The system was developed using the Waterfall method, consisting of requirement analysis, system design, implementation, testing, and maintenance. System testing was carried out using black-box testing and compatibility testing on the Google Chrome and Mozilla Firefox browsers. The developed system provides two separate user portals, namely an Admin portal and a Guardian (Wali Santri) portal. The main features include a seven-tab staged student registration form, full student data management by the admin, online data entry and updating by guardians, and a data export feature to Excel format with 98 columns to support reporting to the FKDT. The black-box testing results show that all system features passed, and the compatibility testing results confirm that the system can be accessed properly through both Google Chrome and Mozilla Firefox.

***Keywords**: Management Information System; Student Data; Laravel; Islamic Boarding School; FKDT.*

INTRODUCTION
Islamic boarding schools (pondok pesantren) are Islamic educational institutions that play a strategic role in shaping character, deepening religious knowledge, and instilling discipline among students. Beyond their educational function, pesantren also serve as centers of moral and social development within the surrounding community. As the variety of pesantren education models grows, ranging from salafiyah institutions that emphasize classical texts to khalafiyah institutions that integrate formal education, the way each pesantren manages its administration, including student data, varies considerably.

Student data management is a fundamental aspect of administration in a pesantren. The data managed covers not only basic student identity but also parents' data, guardians' data, educational records, activity records, and other administrative information required for both internal purposes and reporting to related institutions. As the number of students and the complexity of pesantren activities increase, the need for an effective, efficient, and structured data management system becomes increasingly important. Nevertheless, many pesantren still manage student data manually, which creates a high potential for recording errors, data duplication, difficulty in retrieving information, and the risk of data loss.

Pondok Pesantren Putra Al Wahabiyyah 1 Bahrul Ulum currently has 70 active students managed by a single administrator. Based on observation, the student data management process is still carried out manually through three unintegrated media: physical forms completed during initial registration, a ledger archive, and records kept in Microsoft Excel. Guardians who cannot attend in person submit data separately through Google Forms. This condition causes student data to be scattered across various

unconnected media, making comprehensive data management and updating difficult.

The problems arising from this manual system are not merely technical but directly affect the accuracy and integrity of student data. Observation identified several recurring recording errors, including misspelled names due to illegible handwriting, duplicated letters, and data being mixed up between students, such as birth dates and addresses. These findings are consistent with reports that manual recording processes tend to have low accuracy and are prone to human error, which hinders administrators from providing fast and accurate information.

The problem becomes more significant when associated with the obligation to report student data to the Forum Komunikasi Diniyah Takmiliyah (FKDT) under the Ministry of Religious Affairs. This reporting, conducted every semester, requires comprehensive data covering student identity, parents' data, guardians' data, and student activity status. Because the data is still managed separately across multiple media, the process of compiling this report takes up to three weeks and is carried out by a single administrator. This shows that the current manual system can no longer meet dynamic administrative needs, particularly in supporting timely and accurate reporting to external institutions.

Another challenge concerns guardian involvement in the data entry process. Approximately 80 percent of the guardians at PP. Putra Al Wahabiyyah 1 live outside Jombang Regency. Data has traditionally been collected by requiring guardians to attend in person during initial registration to complete physical forms and submit photocopied documents. This disconnected mechanism results in inconsistently formatted incoming data, adding to the administrator's workload during verification and recapitulation.

Amid the rapid development of information technology, educational institutions, including Islamic boarding schools, have begun transforming from conventional to digital systems. The use of information technology allows data to be managed in an integrated manner, stored securely, and easily accessed by authorized parties. Web-based information systems are among the most widely adopted implementations, offering centralized, real-time data management services. Such systems also enable broader stakeholder involvement, including guardians, in the data entry and monitoring process, thereby improving transparency and accountability.

A number of previous studies have demonstrated the effectiveness of web-based information systems in pesantren environments. One study successfully developed a monitoring system that allows guardians to track students' educational progress and billing online. Another developed a student data management information system covering curriculum monitoring and parental involvement, while a separate study built a web-based violation point management system within the Bahrul Ulum environment. However, these systems remain partial in scope and do not provide an integrated data export feature to support reporting to external institutions such as the FKDT.

In developing a web-based information system, selecting an appropriate framework is one of the key factors determining the quality of the resulting system. Laravel is a PHP-based framework that applies the Model-View-Controller (MVC) architecture, which facilitates code management while improving system security and scalability. The use of Laravel in various studies has proven effective for building well-structured and secure information systems, including in the context of inter-system data integration.

Based on the problems outlined above, this study aims to design a web-based student data management information system using the Laravel framework at Pondok Pesantren Putra Al Wahabiyyah 1 Bahrul Ulum. The designed system functions not only as an internal data management tool but also provides access for guardians to enter and update data online, and is equipped with a data export feature to Excel format to support reporting to the FKDT of the Ministry of Religious Affairs. With this system, the previously manual and fragmented data management process is expected to transform into a more modern, integrated system suited to the administrative needs of a digital-era pesantren.

METHOD

This study employed the Waterfall method, a linear and systematic system development model in which each phase must be completed in full before proceeding to the next. This model was chosen because the requirements for the student data management information system at Pondok Pesantren Putra Al Wahabiyyah 1 Bahrul Ulum had been clearly identified from the outset through direct observation and interviews.

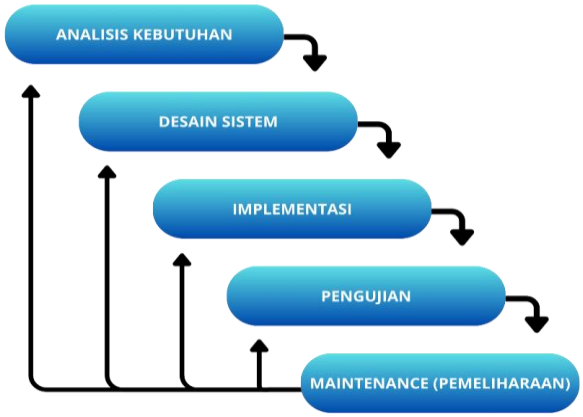


Figure 1. Waterfall Method Stages

Primary data were obtained directly through interviews with the pesantren's administrators and staff to understand the current data management workflow, the problems encountered, and the desired system requirements, complemented by direct observation of the manual recording process involving the ledger, Microsoft Excel, and Google Forms. Secondary data were obtained from official pesantren documents, such as student registration forms and the FKDT reporting format, as well as scientific literature relevant to the development of web-based management information systems.

In the requirement analysis stage, two types of system requirements were identified. Functional requirements include full student data management by the admin (add, view, update, delete), guardian account management, a seven-tab staged student registration form covering personal, father's, mother's, guardian's, address, and photo data, automatic guardian account creation upon registering a new student, data export to Excel for FKDT reporting, filtering of student data by name, status, year of entry, and gender, and a statistical dashboard showing the number of active, graduated, withdrawn, and inactive students. Non-functional requirements include accessibility through the Google Chrome and Mozilla Firefox browsers, data protection through Bcrypt encryption and CSRF protection, ease of use for both administrators and guardians, and stable, responsive performance across devices.

Based on the requirement analysis, the system design stage produced a use case diagram describing the interaction between the Admin and Guardian actors and the system, a class diagram comprising ten main classes (Student, Guardian, Student Data, Father's Data, Mother's Data, Guardian's Data, and the corresponding address classes), activity diagrams covering login, admin student data management, admin guardian account management, and guardian student data management, as well as interface designs for both the Admin and Guardian portals, including the login page, dashboard, staged registration form, student detail page, and data export page.

The system was implemented using Laravel 12 with PHP 8.2 as the main framework based on the MVC architecture, MySQL as the database management system with a database named db_santri, the Blade templating engine together with Tailwind CSS for a responsive user interface, the maatwebsite/excel library for the Excel export feature, and Axios to support a dynamic Indonesian regional dropdown based on an external API.

System testing was carried out using two methods. Black-box testing was used to ensure that all system features functioned according to user requirements, covering multi-role login, data entry by guardians, data management by the admin, and the Excel export feature. Compatibility testing was used to confirm that the system could be properly accessed through the Google Chrome and Mozilla Firefox browsers on various devices.

Following testing, the system was deployed and handed over to Pondok Pesantren Putra Al Wahabiyyah 1 Bahrul Ulum for real-world use in managing student data, a stage that included system installation, database configuration, and initial mentoring for the pesantren's administrator. A maintenance stage was subsequently carried out to fix bugs identified after implementation, accommodate changing user requirements, and maintain the system's performance and security over the long term.

The hardware used in developing this system was an Acer laptop with an Intel Core i5 11th Generation processor and 16 GB of RAM. The software used included Windows 11 as the operating system, Visual Studio Code as the primary code editor, Laragon as the local server package providing the

PHP and MySQL environment, PHP 8.2, Laravel 12, MySQL, Composer for dependency management, and Node.js together with NPM for managing JavaScript packages including Tailwind CSS and Vite. The research was conducted at Pondok Pesantren Putra Al Wahabiyyah 1 Bahrul Ulum, located in Jombang Regency, East Java, over a period of approximately 15 months from January 2025 to March 2026.

RESULT AND DISCUSSION

Result

The student data management information system was successfully implemented using the Laravel 12 framework with PHP 8.2, a MySQL database, and Tailwind CSS for the user interface. The system can be accessed through a web browser and provides two separate user portals: an Admin portal and a Guardian (Wali Santri) portal.

The implemented system consists of the following main features.

- **Login pages.** Separate login mechanisms are provided for administrators and guardians, each validated against its own authentication guard. Guardian accounts are created automatically when a new student is registered, with credentials derived from the guardian's phone number.
- **Admin dashboard.** Displays real-time statistics retrieved directly from the database, including the total number of students, the number of active, graduated, withdrawn, and inactive students, and the number of registered guardian accounts.
- **Student list page.** Presents all registered student data in a searchable, paginated table with filters for name, status, year of entry, and gender, along with shortcuts to register a new student or export data to Excel.
- **Staged student registration form.** A seven-tab form covering personal data, father's data, mother's data, guardian's data, address (with a dynamic, API-driven Indonesian regional dropdown down to the village level), and photo uploads. Each tab is saved temporarily to the session via AJAX so that users do not need to re-enter information when moving between tabs. After all tabs are completed, a preview page summarizes the data before it is permanently saved in a single database transaction, during which the guardian account is created automatically.
- **Student detail and edit pages.** Display a student's complete information in one page, including data on the father, mother, guardian, and address, together with the student's photo and family card photo. An automatic synchronization feature updates the guardian account's phone number whenever the father's or mother's number is changed and matches the guardian's recorded name.
- **Excel export feature.** Allows the admin to download the complete student dataset in a single click. The resulting Excel file contains 98 columns covering student identity, parents' data, guardian data, and full address details, and includes automatic styling such as a colored header, alternating row colors, a frozen header row, and column-level auto-filters. Filters applied on the student list page also apply to the exported file, allowing targeted exports for FKDT reporting.
- **Guardian account management page.** Enables the admin to add, edit, and delete guardian accounts, and displays each account's plain-text password so that login credentials can be relayed to guardians who have forgotten them.
- **Guardian portal.** After logging in, guardians see a dashboard listing the students under their guardianship. They may view each student's full details and update the data online, with the system restricting access so that guardians can only view and edit data for their own students.

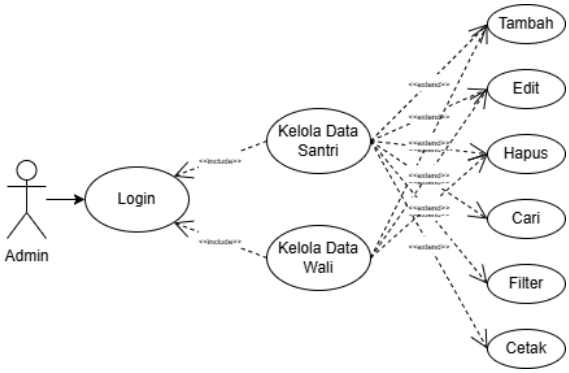


Figure 2. Use Case Diagram of the Admin Actor

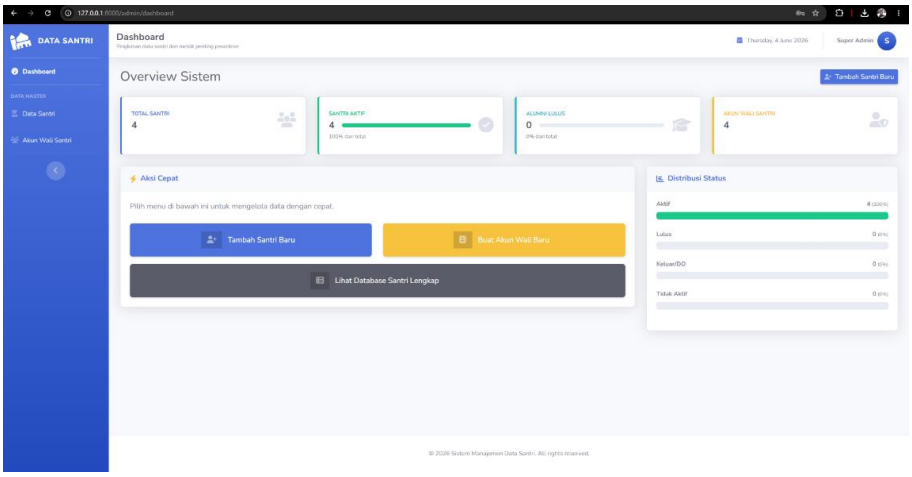


Figure 3. Admin Dashboard Page

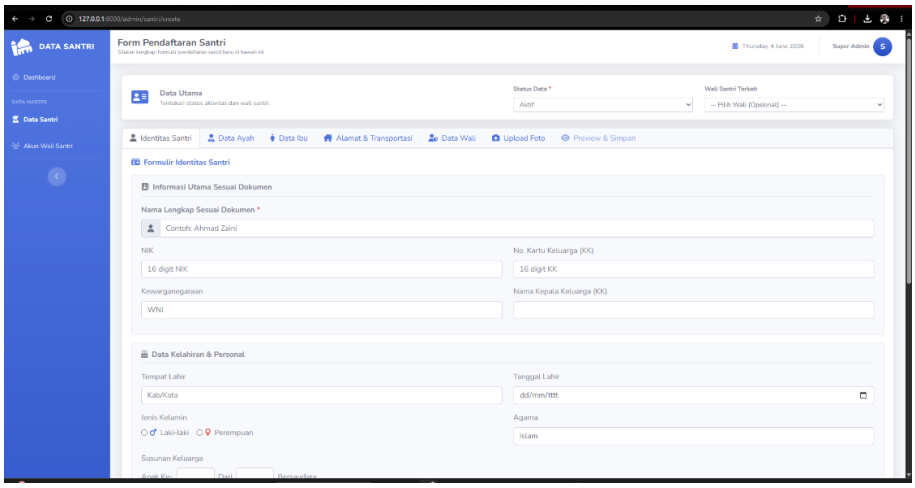


Figure 4. Staged Student Registration Form

System testing was conducted using black-box testing covering 37 test cases across all major functions. A condensed summary of the results is presented in Table 1.

Table 1. Summary of Black-Box Testing Results

Test Case ID	Tested Function	Status
TC-01–TC-07	Login and logout (Admin and Guardian)	Pass
TC-08	Admin dashboard statistics display	Pass
TC-09–TC-17	Student data management (list, filter, view, edit, delete, guardian phone sync)	Pass
TC-18–TC-25	Staged student registration (7-tab form and final save)	Pass

Test Case ID	Tested Function	Status
TC-26–TC-27	Excel data export (with and without filters)	Pass
TC-28–TC-30	Guardian account management (add, edit, delete)	Pass
TC-31–TC-34	Guardian data entry and update	Pass
TC-35–TC-37	Access security (unauthenticated and cross-role access)	Pass

All 37 test cases produced results matching their expected outcomes, confirming that the system's authentication, student data management, staged registration, Excel export, guardian account management, and access-security functions operate as intended.

Compatibility testing was performed on Google Chrome and Mozilla Firefox across all major pages of the system. The results are summarized in Table 2.

Table 2. Summary of Compatibility Testing Results

Tested Page	Google Chrome	Mozilla Firefox
Login (Admin / Guardian)	Passed	Passed
Dashboard (Admin / Guardian)	Passed	Passed
Student data, registration form, and preview	Passed	Passed
Student detail and edit pages	Passed	Passed
Excel export	Passed	Passed
Guardian account management	Passed	Passed

All tested pages were displayed and functioned correctly on both browsers, with no significant differences in appearance or functionality, confirming that the system can be accessed reliably regardless of the browser used.

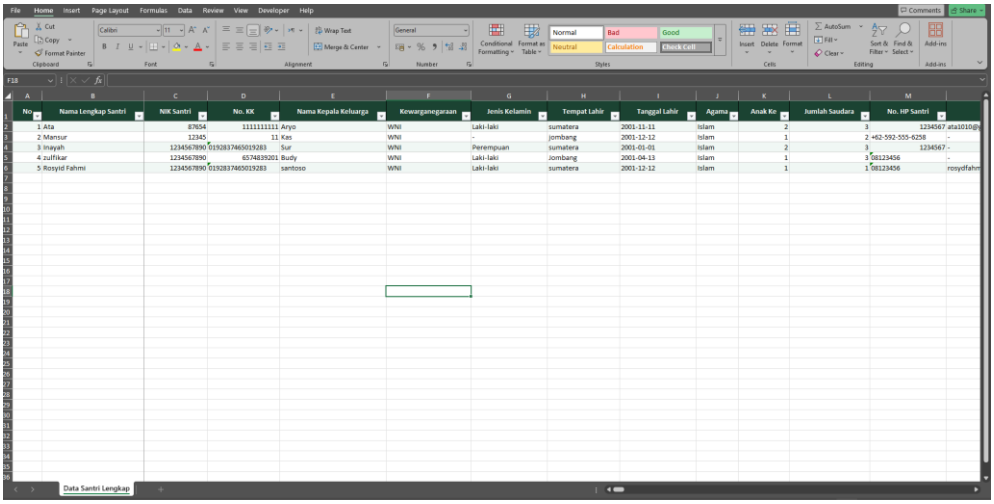


Figure 5. Result of the Student Data Export to Excel (98 Columns)

Discussion (font size 11pt)

The web-based student data management information system at Pondok Pesantren Putra Al Wahabiyyah 1 Bahrul Ulum has been successfully implemented in line with the study's objectives. Based on the implementation and testing results, the system addresses the core problem identified during observation, namely the manual management of student data across three unintegrated media.

The first objective, designing a system that centralizes and integrates student data management, has been achieved. The system replaces physical forms, ledgers, Microsoft Excel, and Google Forms with a single centralized platform. All student data is now stored in one MySQL database consisting of 11 interrelated tables, simplifying data management, retrieval, and updating.

The second objective, developing an online data entry feature for guardians, has also been achieved. The system provides a dedicated guardian portal that allows guardians to enter and update

student data online without needing to visit the pesantren in person, a feature that is particularly beneficial for the approximately 80 percent of guardians who live outside Jombang Regency.

The third objective, developing an Excel export feature to support FKDT reporting, has likewise been achieved. The system provides a 98-column export covering all data required by the FKDT, complete with automatic styling so that the resulting file is immediately ready for reporting purposes.

Compared with the previous manual system, the new system offers substantial improvements in efficiency, accuracy, security, and accessibility, as summarized in Table 3. Reporting time, in particular, is reduced from roughly three weeks of manual recapitulation to an automated export completed in seconds, while guardian accounts that previously had to be created manually by the admin are now generated automatically whenever a new student is registered.

The system offers several notable strengths: two separate user portals with distinct access rights for the Admin and Guardian roles; a seven-tab staged registration form with session-based temporary storage so that users do not have to repeat data entry when switching tabs or recovering from an error; a 98-column Excel export tailored to FKDT reporting needs with automatic styling; a dynamic, API-driven Indonesian regional address dropdown down to the village level for more standardized and accurate address data; and accessibility from multiple devices and browsers, which benefits guardians located outside the local area.

Several limitations remain for future development. The system does not yet provide automatic notifications to guardians when data is updated or important information is issued by the pesantren. It also does not cover student financial management, activity scheduling, or daily attendance, all of which are part of broader pesantren administration. Advanced security features such as two-factor authentication have not been implemented, and the system is only accessible through a browser rather than as a native mobile application, which would likely offer guardians a more optimal experience on smartphones. Finally, the system is not yet directly integrated with the FKDT's own system, so reporting still requires the additional step of downloading the exported Excel file and uploading it manually to the FKDT platform.

Table 3. Comparison Between the Previous Manual System and the New System

Aspect	Previous (Manual) System	New System
Data storage medium	Scattered across physical forms, a ledger, Excel, and Google Forms	Centralized in a single MySQL database with 11 related tables
Guardian data entry	Required an in-person visit or a separate Google Form	Available online anytime through a dedicated guardian portal
Data accuracy	Prone to errors such as duplicated letters, illegible handwriting, and mixed-up records	Reduced through automatic input validation
FKDT reporting process	Took up to three weeks of manual recapitulation	Automated Excel export with 98 columns completed in seconds
Data search	Manual search through the ledger or Excel files	Real-time filtering by name, status, year of entry, and gender
Data security	Vulnerable to loss or damage as physical, unbacked-up files	Protected with Bcrypt encryption and CSRF protection

CONCLUSIONS

Based on the design, implementation, and testing of the web-based student data management information system at Pondok Pesantren Putra Al Wahabiyyah 1 Bahrul Ulum, three conclusions can be drawn. First, the system was successfully designed and implemented using the Laravel 12 framework with PHP 8.2 and a MySQL database, providing two separate user portals, Admin and Guardian, with role-appropriate access rights. Through this system, student data management that was previously carried out manually across three unintegrated media (physical forms, a ledger, and Microsoft Excel) can now be performed centrally on a single, well-structured, and easily accessible platform.

Second, the system successfully facilitates guardian involvement in entering and updating student data online through the guardian portal, a feature that particularly benefits the approximately 80 percent

of guardians who live outside Jombang Regency, since they no longer need to visit the pesantren in person for administrative purposes. Black-box testing confirmed that all system features, including the guardian data entry feature, function correctly and meet the established functional requirements.

Third, the system successfully provides a 98-column Excel export feature covering all data required for reporting to the Forum Komunikasi Diniyah Takmiliyah (FKDT) of the Ministry of Religious Affairs. With this feature, a reporting process that previously took up to three weeks can now be completed automatically within a matter of days. Compatibility testing further confirmed that the system can be accessed properly through both the Google Chrome and Mozilla Firefox browsers without issues.

For future development, several directions are suggested: adding automatic notifications to guardians via email or WhatsApp; extending the system to cover student financial management, activity scheduling, and daily attendance for a more comprehensive pesantren management platform; implementing stronger security measures such as two-factor authentication; developing a native Android or iOS mobile application to better serve guardians who predominantly access the system via smartphone; and building direct API-based integration with the FKDT system so that reporting can be completed automatically from within the application. Researchers pursuing similar work may also consider more flexible development methodologies, such as Agile or Extreme Programming, to adapt more quickly to changing field requirements..

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