

## DIGITAL TRANSFORMATION OF MAIL ADMINISTRATION: DEVELOPMENT OF A WEBSITE-BASED INTERNAL MAIL INFORMATION SYSTEM

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**Abstract:** Digital transformation in the higher education sector is increasingly necessary to support the effectiveness and efficiency of administrative services. This research aims to develop a website-based Internal Correspondence Information System as a solution to the problems of manual or semi-digital letter creation processes currently used at the University of Muhammadiyah Tasikmalaya (UMTAS). The development method used is Agile with an Extreme Programming approach, which includes the stages of planning, design, coding, and testing. This system is built using the Laravel framework with a MySQL database and is designed to manage outgoing mail digitally, including creation, approval, tracking, and printing features. The development results show increased time efficiency, cost savings, and ease of real-time data access. System trials using the Black Box method show that all functions run well on various browser platforms. This system not only optimizes the outgoing mail creation process but also supports digital transformation and professionalism in campus administration.

**Keywords:** Information Systems, Correspondence, Laravel, Administrative Digitalization, Agile.

### 1. INTRODUCTION

Currently, information technology in various institutions, including universities like Muhammadiyah University of Tasikmalaya, has developed rapidly. However, the implementation of information technology in Muhammadiyah University of Tasikmalaya (UMTAS), particularly in the field of correspondence, is still suboptimal, with many shortcomings in terms of efficiency and effectiveness [1]. The letter-writing process is carried out manually, without the use of a dedicated website [2].

Administrative staff still rely on conventional methods for creating letters, namely manual typing without the aid of an integrated website-based system [3]. Furthermore, the letters created and recorded are not stored in the website-based system, making it difficult to access information quickly [4]. To address these issues, the development of a website information system for UMTAS letters is necessary. This system is designed to simplify the letter creation process at UMTAS. With this system, letters can be created directly through the website, letter data is stored in an organized manner, and document searches can be performed quickly and accurately [5].

Administrative digitization is the process of transforming a previously manual data and document management system into a digital one [6]. In the context of correspondence administration, digitization aims to increase the efficiency, speed, and accuracy of document management, while minimizing the risk of archive loss and facilitating real-time tracking of mail processes [7]-[10]. Laravel is a PHP framework widely used in web application development because it provides a neat coding structure, built-in security features, and ease of building systems from small to large scales [11]-[13]. With an MVC (Model-View-Controller)

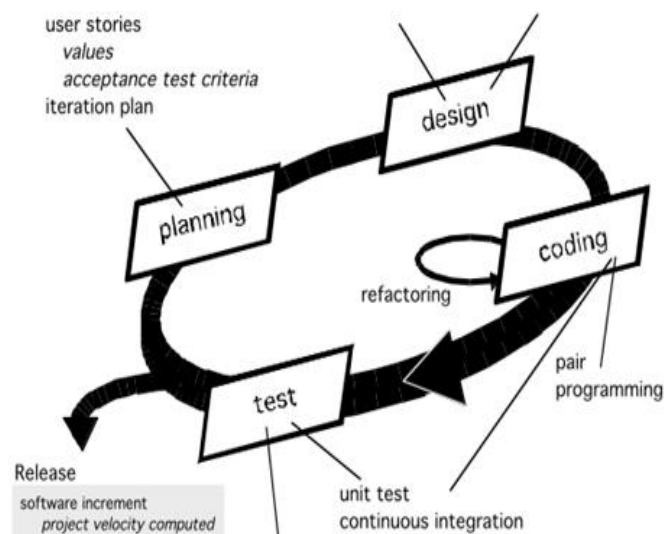
approach, Laravel facilitates the development and maintenance of information systems in an efficient and structured manner [14]-[16].

The purpose of this development project is to identify the information system for outgoing mail services and the challenges it faces. This web-based system is designed to improve the efficiency of the outgoing mail process at UMTAS, which is currently still done manually. This manual process tends to be time-consuming and cumbersome in managing outgoing mail. Therefore, a web-based information system was developed with the hope of accelerating and simplifying the letter-making service. The limitations of this project include the system's use being limited to the internal environment of UMTAS, and system access being limited to registered users. The system focuses on the university's official correspondence process and does not encompass informal communications or external correspondence. Furthermore, system development will be conducted within the constraints of time and available resources, with implementation phases tailored to the university's operational needs.

## 2. METHODOLOGY

Agile development is a software development method that emphasizes speed, flexibility, and team collaboration. The process is carried out iteratively to adapt to changing needs, with concise documentation and intensive communication within small teams [17]. This approach allows projects to be completed more quickly and according to user needs. The application of the Agile method in the development of an internal correspondence information system allows for a system that is more flexible, efficient, and easily adaptable to change. With this method, development is carried out in stages, so that the team can continuously improve and adjust the system as needed. Active communication between the development team, users, and system owners is very important so that any changes or updates can be implemented immediately. This way, the correspondence system becomes more dynamic, transparent, and always relevant to user needs [18]. The method applied in this study is the Agile Development Method. The agile method is a software development that prioritizes iterative and incremental processes, in which the development team actively collaborates with stakeholders. This development method can be applied in the development of a Correspondence Information System to increase flexibility, efficiency, and transparency in the creation of outgoing letters [19].

The Extreme Programming (XP) approach is an agile approach that differs from other approaches. XP does not use formal documentation during the development process. This method is based on four core values: communication, simplicity, feedback, and courage. These four values make XP more flexible to changes requested by clients [20]. Figure 1 illustrates the main phases in the Extreme Programming (XP) software development method, which is the Agile approach used in your project.



**Figure 1:** Stages Extreme Programing

The Agile Extreme Programming method also has several stages in the system development process, namely :

The system development phase begins with planning, which involves identifying the system's requirements and objectives. This is followed by design, which involves developing technical plans such as interfaces and databases. The coding phase translates the design into a program. Finally, testing ensures the system functions as intended and is error-free.

1. Planing  
At this stage, the developer identifies and analyzes needs, user needs and system needs..
2. Design  
The design stage is the stage where the workflow and database design of the system to be built is carried out.
3. Coding  
This stage is the implementation stage or creation of program code according to the system and database design created in the previous stage.
4. Testing  
This stage is the software/system testing stage. Testing is performed on the module being built to ensure the system being developed meets the client's requests and needs.

In this research, the instrument used to collect data was a Time and Motion Study. This method is used to systematically observe and record the time and workflow of outgoing mail distribution within an institutional environment. By using this approach, researchers can identify points in the process that cause delays and evaluate overall work efficiency. The results of this study will form the basis for designing more effective and efficient information system solutions [21].

A system feasibility analysis aims to assess whether a project can be developed, taking into account technological, economic, operational, and schedule aspects. This process ensures the project is effective, beneficial to users, and identifies potential obstacles so they can be anticipated early on [22].

In the context of developing the UMTAS Letter Information System, the feasibility analysis includes:

- a) Technological Feasibility  
The technical aspect evaluates whether the technology required to build the UMTAS Letter website is available, accessible, affordable, and easy to use. If all these technological requirements are met, the system is deemed technically feasible for development.
- b) Economic Feasibility  
From an economic perspective, feasibility is assessed based on cost efficiency and potential long-term benefits. Developing the UMTAS Letter website is deemed feasible if the investment is commensurate with the increased efficiency and benefits achieved, and the return on investment is acceptable.
- c) Legal Eligibility  
Legal evaluation ensures that the development and implementation of the UMTAS Letter website does not conflict with applicable laws and regulations. This includes the legality of the software used and the validity of the data or information generated by the system.
- d) Optional Eligibility  
This aspect assesses whether the UMTAS Letter website can operate optimally within the Muhammadiyah University of Tasikmalaya. This means the system must be easy to operate, acceptable to users, and compatible with the institution's workflow.
- e) Schedule Feasibility  
Time feasibility measures whether the development of the UMTAS Letter website can be completed within the specified timeframe. If the system development can be completed on time, the project is considered feasible in terms of schedule.

### 3. RESULTS AND DISCUSSION

The project results in the context of developing the UMTAS Letter Information System for Muhammadiyah University of Tasikmalaya refer to the concrete achievements that have been successfully realized during the system development process. This project aims to provide a digital system that facilitates the submission and management of internal letters in a structured and efficient manner. This project produces achievements that are divided into three categories: concrete results, ongoing results and recommendations.

**Table 1:** Project Results

No	Results	Description
1	Concrete results	<ul style="list-style-type: none"> <li>– Manual login system with two roles: User and Admin</li> <li>– Dashboard according to user role.</li> <li>– Letter Submission Form for user submissions.</li> <li>– Letter Request List for admins to verify submissions.</li> <li>– Letter status (processed, approved, rejected).</li> <li>– User-friendly and responsive interface design.</li> <li>– Letter storage database using MySQL.</li> </ul>
2	Running Results	Finished
3	Recommendation Results	Addition of letter type categories.

Table 1 summarizes the key outcomes of the UMTAS Letter Information System development, which are categorized into concrete results, ongoing results, and recommended enhancements. The concrete results highlight the core features that have been successfully implemented, including a two-role login system (User and Admin), role-based dashboards, online letter submission and verification, status tracking, a responsive interface, and secure MySQL-based data storage. The ongoing results indicate that the system has been fully completed and is functioning as intended. Meanwhile, the recommendation section suggests the addition of more detailed letter type categories to further improve system usability and classification.

The project results refer to the development approach stages, namely extreme programming, namely:

#### 1) Planing

The initial phase focused on analyzing user needs and the manual process for submitting letters to ensure the system was built to meet real-world needs. The process began by identifying two primary users: students as applicants and FKIP administrators as those who process and approve applications.

**Table 2:** Identification of User Needs

No	User	User Story
1	Student	As a user, I want to submit a letter online.
2	Student	As a user, I want to see a list of my mails and their status.
3	Admin	As a user, I want to see all the letters submitted by students.
4	Admin	As a user, I want to change the status of the mail, so that I can approve the mail.

Table 2 outlines the user needs by presenting four user stories that describe how students and admins interact with the UMTAS Letter Information System. For students, the system must allow them to submit letters online and view the list of submissions along with their status, ensuring transparency and ease of access. For administrators, the system must enable them to view all incoming letter submissions and update the status of each letter, such as approving or rejecting

them. Overall, the table captures essential functional expectations from both user groups, forming the foundation for system design and development.

The next stage is also accompanied by a data collection instrument using the Time and Motion Study method, to objectively measure the time and movement in the manual process of submitting letters.

**Table 3:** Instrument Time and Motion Study

No	Activity	Time	Information
1	Write a letter of application on the form provided	43 second	Write down personal data and requirements
2	Towards FKIP	1 minutes	Walk to Location
3	Waiting in line	11 minutes	Depends on the number of students
4	Admin verifies data and inputs into the computer	2 minutes	Admin retyped
	Total	14 minutes 43 seconds	Not including the long queues

Table 3 presents the results of a Time and Motion Study conducted to measure the duration and workflow of the manual letter submission process before the digital system was implemented. It shows that the process includes four main activities: filling out the letter form (43 seconds), walking to the faculty office (1 minute), waiting in line (11 minutes), and admin verification (2 minutes), resulting in a total time of **14 minutes and 43 seconds**, not including longer queues that may occur. This table illustrates how inefficient and time-consuming the manual process was, highlighting the need for a digital system to improve speed, reduce waiting time, and streamline administrative tasks.

After identifying users and formulating user stories, the next step is to classify system requirements into two main parts, namely functional requirements and non-functional requirements.

a) Functional Requirements

Table 4 describes the functional requirements of the system, which are the essential features needed to ensure the UMTAS Letter Information System operates properly. These requirements include user authentication so that students and admins can log in securely, an online letter submission feature for students, and the ability for students to view, edit, and delete their submissions as long as they have not been processed by the admin. Admins must also be able to update the status of letters—either approving or rejecting them. Additionally, there is an optional feature allowing students to print their letters in PDF format. Altogether, these functional requirements represent the core capabilities necessary for managing the digital submission, processing, and tracking of letters.

**Table 4:** Functional Requirements

No	Functional Requirements	Description
1	User Authentication	The system must provide login features for students and admins.
2	Submission of Letters	Students can submit letters via the online form.
3	View Mail List	Students can view all letters that have been submitted and their status
4	Edit Letter	Students can edit letters as long as the letter has not been processed by the admin
5	Delete Mail	Students can delete letters that have not been processed.
6	Change Mail Status	Admin can approve the submitted letter.
7	Print Letter (Optional)	Students can print the letter in PDF format (if needed).

## b) Non-Functional Needs

Table 5 outlines the non-functional requirements, which define the quality attributes, performance criteria, and supporting environment needed for the system to run effectively. These include 24/7 accessibility via the internet, a responsive interface, and strong security to ensure that only registered users can access the system. From a performance standpoint, the letter submission process must not exceed two minutes, and the system should maintain at least 99% uptime during campus operating hours. The table also specifies minimum hardware requirements (8GB RAM, dual-core processor), necessary software such as modern browsers, PHP, Laravel, and MySQL, and basic user competencies for operating a web-based application.

**Table 5:** Non-Functional Needs

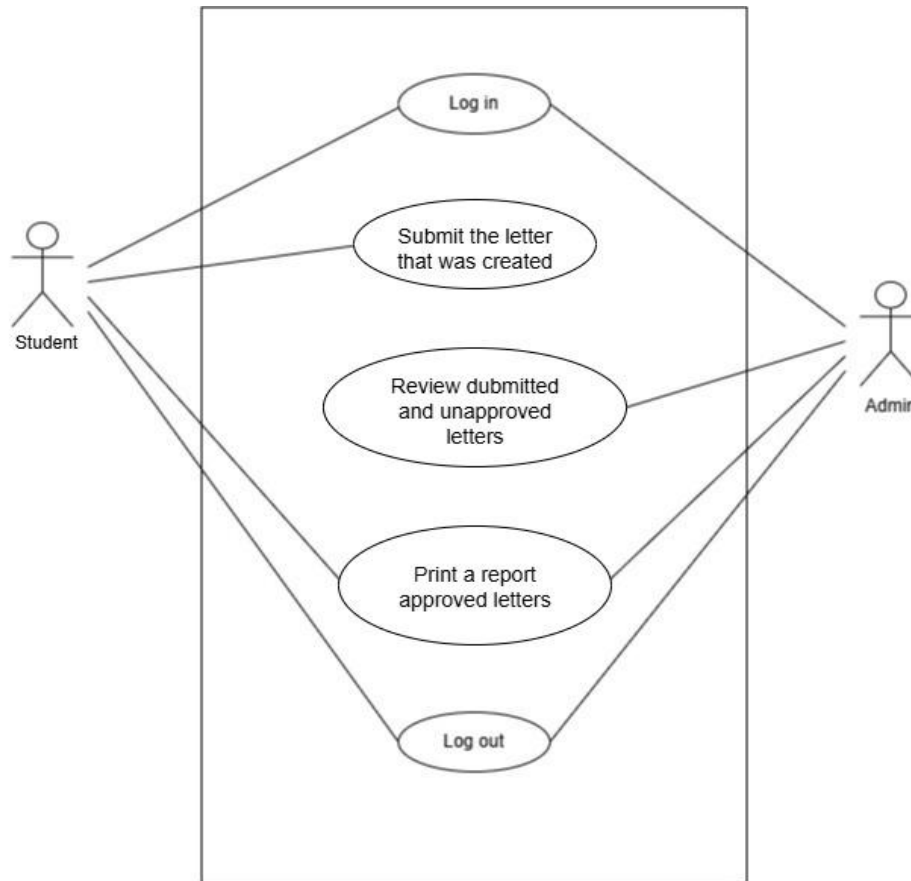
No	Non-Functional Needs	Description
1	Accessibility	The system must be accessible 24/7 via the internet.
2	Responsiveness	The system must be able to open properly
3	Security	Only users who have an account can log in to the system.
4	Performance	The letter submission process should not exceed 2 minutes
5	Availability	The system must have a minimum uptime of 99% during campus operating hours.
6	Hardware	At least use a computer/laptop with 8GB of RAM and a dual-core processor.
7	Software	Operating systems (Windows/Linux), modern browsers (Chrome, Edge), PHP, Laravel, and MySQL.
8	Brainware	Students and admins must have basic knowledge in using web applications.

## 2) Design

This stage involves the system design process, starting with creating an overview of the system flow using UML diagrams such as Use Case Diagram, Activity Diagram, and Sequence Diagram.

## a) Use Case Diagram

Figure 2 illustrates the overall interaction between users (students and admins) and the UMTAS Letter Information System. The diagram shows that students can log in, submit letters, view their submission list, edit or delete letters, and track the status. Meanwhile, admins can log in, view all incoming submissions, update the status of letters, manage categories, signers, and requirements. This diagram clearly maps the system's main functionalities and defines what each type of user is allowed to do.



**Figure 2:** Use Case Diagram

b) Activity Diagram

Figure 3 presents the login workflow. It shows the steps a user must take when accessing the system, starting from opening the login page, entering credentials, and the system verifying the username and password. If the credentials are valid, the user is directed to the appropriate dashboard (student or admin). If invalid, the system will show an error message. This diagram explains the decision-making process during login. Figure 4 explains the flow of creating a letter submission. It starts with the student opening the letter submission form, filling in the required data, and submitting the form. The system then stores the data in the database and updates the submission list. The process ends when the student can see the newly submitted letter in their dashboard. This diagram illustrates the sequence and logic behind the letter creation feature. Furthermore, Figure 5 shows the workflow for admins when managing letter submissions. The diagram includes steps such as accessing the admin dashboard, viewing all incoming submissions, selecting a specific letter, and updating its status (approved or rejected). It also covers additional actions like managing categories, signers, and requirements.

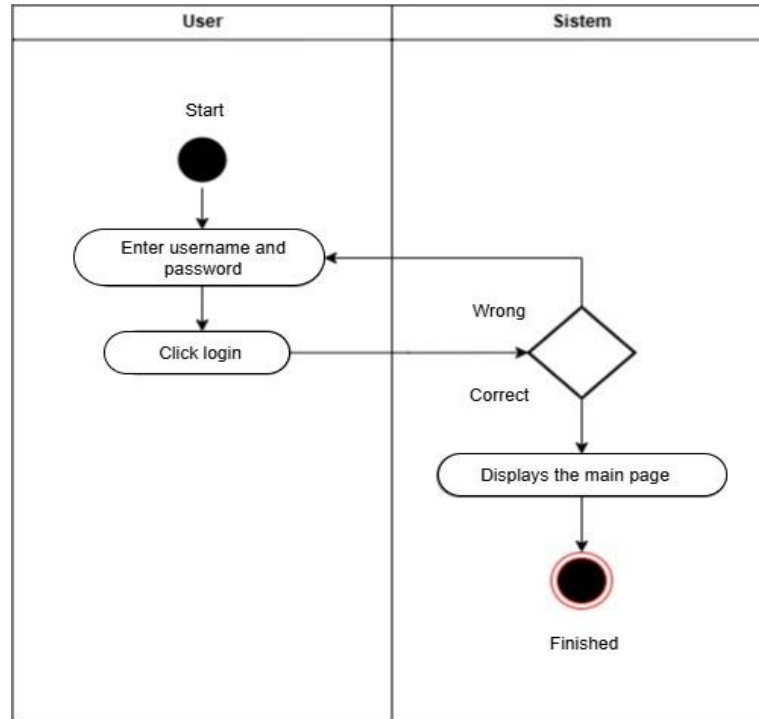


Figure 3:Activity Diagram Login

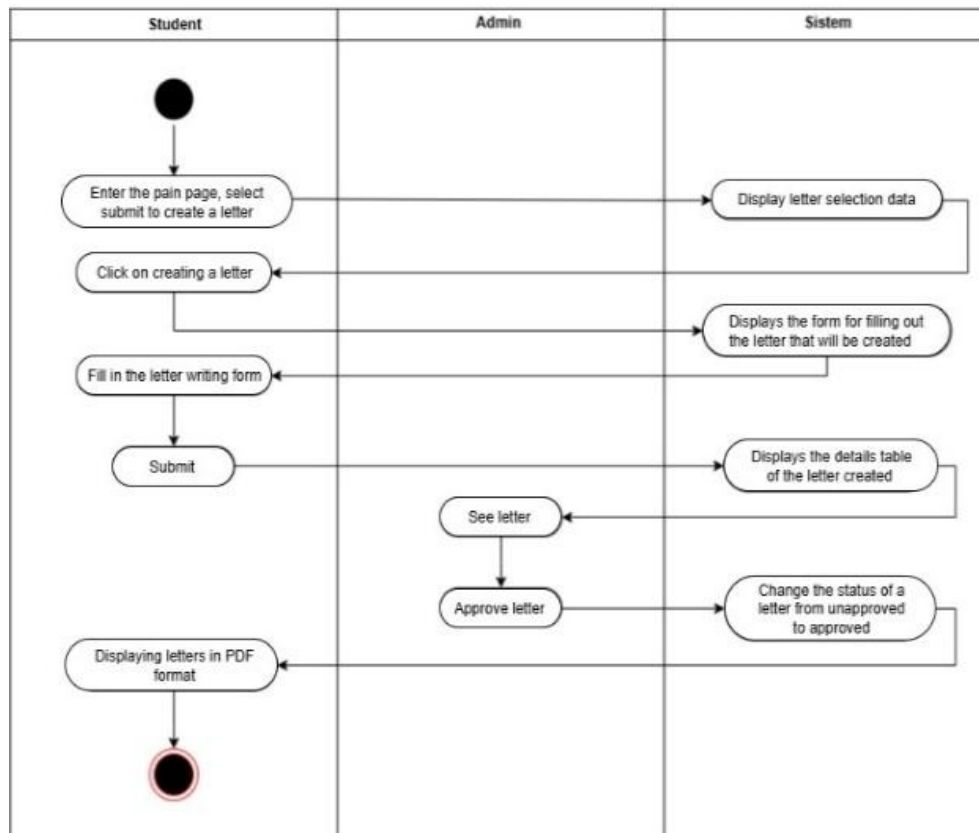
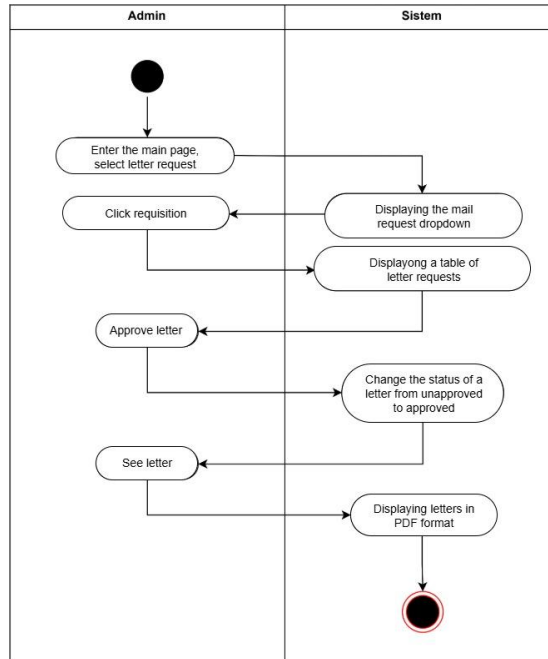


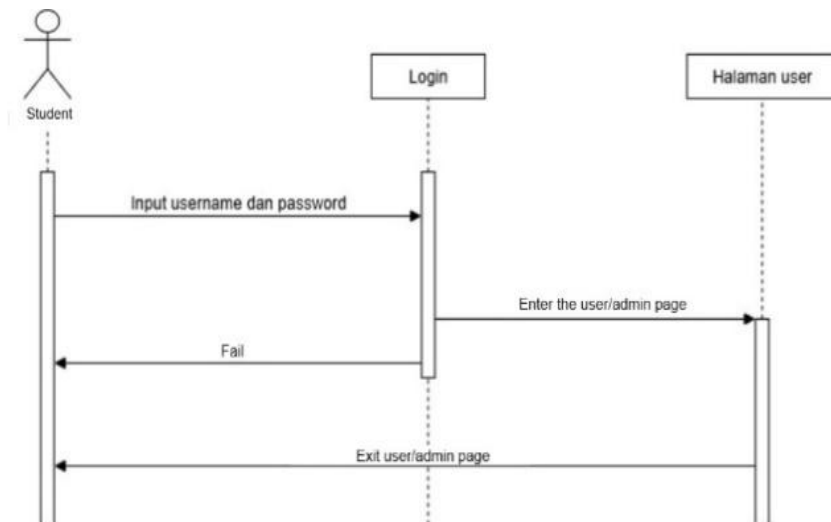
Figure 4: Activity Diagram for Letter Making



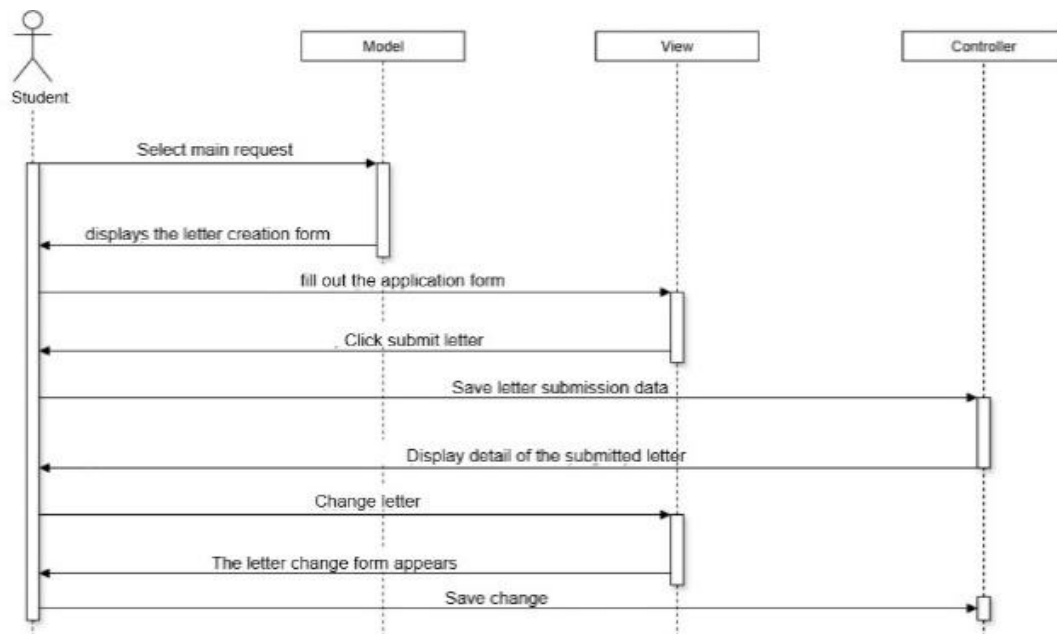
**Figure 5.** Activity Diagram Admin

c) Sequence Diagram

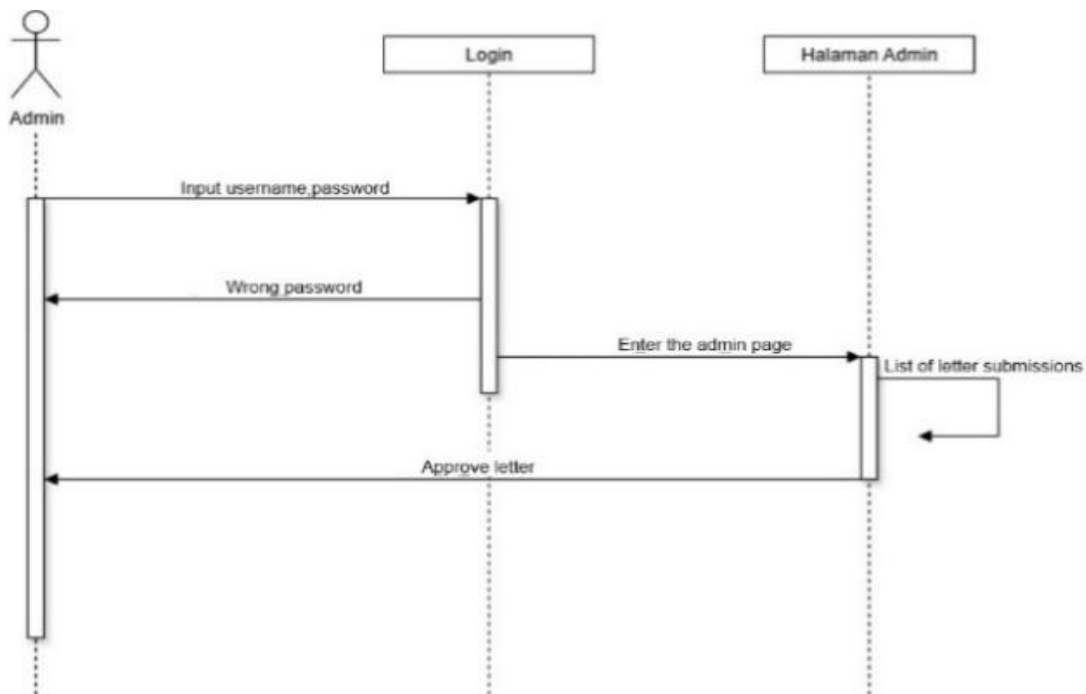
Figure 6 describes the login process in sequence form, showing interactions among the user, interface, system controller, and database. The user inputs credentials, the controller checks the database, and the system returns either a success response (redirecting to the dashboard) or a failure response (invalid login message). Figure 7 demonstrates the sequence of steps when a student submits a letter. It includes interactions such as opening the form, entering data, sending the request to the controller, and storing the data in the database. Finally, the system confirms that the submission was successful and displays it on the student's dashboard. Furthermore, Figure 8 describes the sequence of interactions when an admin processes letters. The admin views the incoming submissions list, selects a letter, updates its status, and the controller commits the update to the database.



**Figure 6:** Sequence Diagram Login



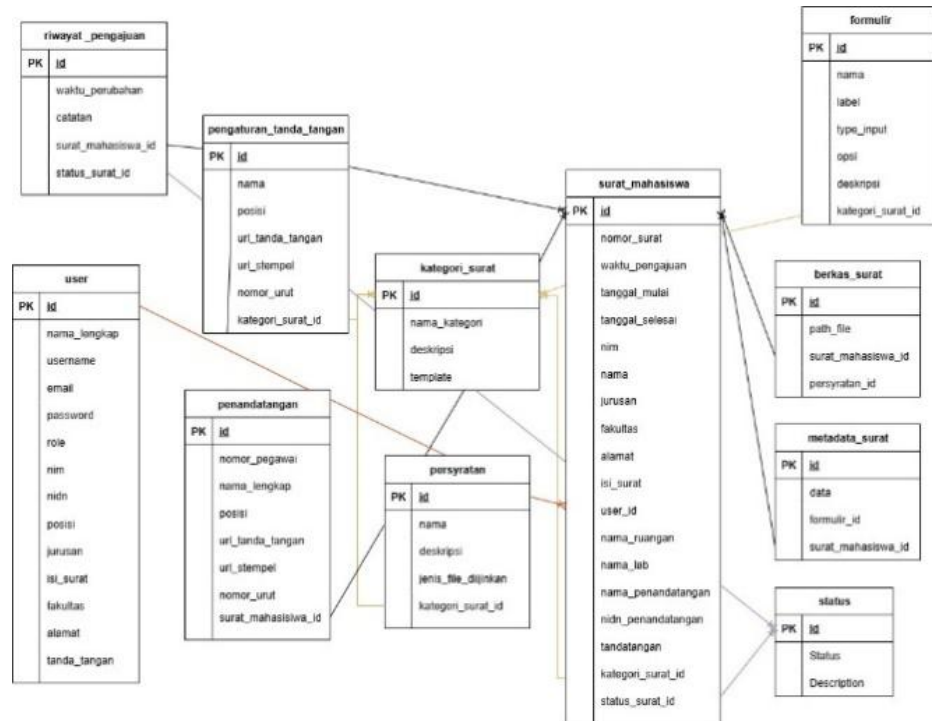
**Figure 7:** Sequence Diagram for Letter Making



**Figure 8:** Sequence Diagram Admin

d) Database

Figure 9 shows the database structure used in the system. It includes tables such as users, letters, categories, signers, and requirements, along with their relationships. The database stores all essential information needed for login, submission, tracking, and administrative actions.



**Figure 9:** Database UMTAS Letter

e) Coding

This stage is the stage of implementation or creation of program code according to the design of the system made. Figure 10 displays the system's login interface, designed with a simple and user-friendly layout. It includes fields for email and password, along with buttons for accessing the system. Next, Figure 11 shows the page where students submit their letters. The form contains input fields for personal details and letter-related information. It is designed for quick and efficient submission, supporting the goal of reducing the time required for administrative processes. Finally, Figure 12 presents the page where students or admins can view all submitted letters. For students, it lists their own submissions and statuses. For admins, it displays all incoming letters requiring verification. The table layout allows easy tracking and decision-making.

The screenshot shows the login page for the UMTAS Letter website. The page has a white background with a dark blue header. The main content area contains the following elements:

- Title:** Masuk Ke Akun Website Surat
- Email:** A text input field with a placeholder.
- Password:** A text input field with a placeholder.
- Remember Me:** A checkbox labeled "Ingat Saya".
- Forgot Password:** A link labeled "Lupa password anda?".
- Login Button:** A dark blue button labeled "MASUK".

**Figure 10:** Login Page

Figure 11: Application Form Page

No	Status	Nomor Surat	Waktu Pengajuan	NIM	Nama Lengkap	Jenis Surat	Aksi
1	Ditolak	002/SURAT/07/2025	25/07/2025 21:52	C2183207036	Fahmi Abi Jemaly	Ijin penelitian	[Detail] [Download] [Delete]
2	Menunggu	003/SURAT/07/2025	25/07/2025 14:44	C2183207026	Farid Taufik Nugraha	Ijin penelitian	[Detail] [Download] [Approve] [Reject] [Delete]
3	Disetujui	001/SURAT/07/2025	25/07/2025 11:23	C2183207036	Fahmi Abi Jemaly	Ijin penelitian	[Detail] [Download] [Delete]

Figure 12: Request List Page

## f) Testing

This stage is a testing process to ensure the system meets the needs of the user. The test is carried out using the black box testing method which focuses on the functionality and response of the system without looking at the internal code. Table 6 presents the results of the Black Box Testing conducted to evaluate whether each system feature functions correctly without examining the internal code. The table shows that all tested components—including login validation for both students and admins, letter submission, display of submitted letters, tracking features, and admin functions such as approving, rejecting, managing categories, signers, and requirements—performed as expected. Every test scenario is marked “Valid,” indicating that the system successfully meets all functional requirements and behaves correctly from the user’s perspective.

**Table 6:** Black Box Testing

No	Testing	Expected Results	Conclusion
1	Login Page	Users (students/admins) can log in according to their credentials.	Valid
2	User Page	Students can fill out and send the letter submission form	Valid
		The user dashboard displays the table submitted	Valid
		On the user's sidebar, select "Mail Request List" and click "Request Form", then fill out the form provided.	Valid
		On the user's sidebar, select "Mail Request List" to open a dropdown containing "Request Form" for mail submission and "Tracking" to track the status of the mail submitted.	Valid
3	Admin Page	Admins can change the status of the mail to "Approved" or "Rejected"	Valid
		The admin dashboard displays a table of mail submissions, total requests, and the number of students served.	Valid
		On the admin sidebar, select "Letter Requests" and then click "Request List" to see all student letter submissions	Valid
		On the admin sidebar, select "Mail Request" to open the "Tracking" dropdown to search for mail that has been submitted.	Valid
		On the admin sidebar, click "Settings" to open a dropdown containing "Mail Categories", "Requirements", and "Signers".	Valid
		On the "Mail Categories" menu, admins can add and remove mail categories.	Valid
		On the "Signers" menu, admins can change the signer's data.	Valid
		On the "Requirements" menu, all mail submissions do not require uploading files	Valid

Table 7 summarizes the outcomes of the system trial, which evaluates the real-world performance and usability of the UMTAS Letter Information System. The results show that all features worked properly during functional testing, the system maintained optimal appearance and performance across different browsers, and the system remained responsive under use. Additionally, user testing confirmed that users could easily understand and operate the system. These results demonstrate that the system is stable, user-friendly, and ready for practical implementation.

**Table 7:** Trial and Outcomes

No	Trial	Expected Results	Result
1	Functional Tests	All features can be used	Succeed
2	Brower Compatibility Test	Appearance and functionality remain optimal in all browsers.	Succeed
3	Performance Test	The system remains responsive.	Succeed
4	User test	Users can easily understand the system.	Succeed

The UMTAS Mail system user training aims to make users understand the workflow and key features. Training can be chosen, either face-to-face, online, or digital guide modules. The material includes a basic introduction. This training helps users operate the system optimally, minimize errors, and improve work efficiency. After the training activity with the topic "Introduction to the System and Main Features of the Surat Umtas Website" was completed, an evaluation and measurement of the effectiveness of the system was carried out through the Time and Motion Study method and direct interviews with users. The goal is to find out how much efficiency has improved after the implementation of the system, as well as to get feedback from users.

**Table 7:** Time and Motion Study - After Implementation

No	Activity	Time	Information
1	Log in to the system	17 Seconds	Access the system using email & password
2	Fill out the letter submission form	20 Seconds	Populate data
3	Submit a submission	5 Seconds	Click on the "Apply" button
4	View mail status	10 Seconds	Check the contents of the letter and approve it through the dashboard
5	Total	52 Seconds	The process is much faster than manual

Table 8 compares the improved efficiency of the letter submission process after implementing the digital system. The study shows that activities such as logging in, filling out the submission form, sending the request, and checking the letter status now take a total of only 52 seconds, a dramatic reduction compared to the previous manual process, which took approximately 14 minutes and 43 seconds.

#### 4. CONCLUSION

The development of the UMTAS Letter Information System has successfully transformed the manual correspondence process at Muhammadiyah University of Tasikmalaya into a more efficient, structured, and easily accessible digital system. By implementing the Agile Extreme Programming (XP) method, the system was developed iteratively with continuous improvements based on user feedback, ensuring that the system meets the actual needs of both administrative staff and students. The system simplifies the process of letter submission, verification, and tracking, reducing the time required from approximately 14 minutes in the manual process to only 52 seconds through the website-based system. The results of testing and user training show that the system operates effectively, is user-friendly, and functions optimally across different browsers. Overall, the UMTAS Letter Information System enhances the efficiency, accuracy, and transparency of correspondence management within the university. It provides a sustainable solution for digital administrative services and supports the university's efforts in administrative digitization. Future development may include the integration of additional features such as automated notifications, expanded letter categories, and interoperability with other campus information systems to further improve service quality.

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