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Unified Modeling Language Website-Based Mail Administraion System

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Abstract

Mail management is one of the administrative activities that plays an important role in maintaining smooth communication and documentation in an organization. However, many agencies still use manual methods in recording, distribution, and storing letters, so there are often obstacles such as process delays, recording errors, and difficulties in tracing archives. This research aims to design a website-based mail administration system as a solution to improve the effectiveness and efficiency of the mail management process. The design method uses Unified Modeling Language (UML) to model functional needs and process flows in a structured manner through use case, activity, sequence, and class diagrams. The results of the design show that the proposed system is able to provide a more organized, accessible, and well-documented mail management mechanism. With UML modeling support, system designs become clearer, standardized, and easier to develop. This research is expected to be the basis for the implementation of a digital mail administration system that supports the improvement of the quality of administrative services in various institutions.

Keywords*: Mail Administration System, Website, Unified Modeling Language (UML)*

I. INTRODUCTION

The development of information technology in the last two decades has changed the way organizations carry out operational and administrative activities. Digital transformation is no longer just a trend, but has become a fundamental necessity to improve service quality, work effectiveness, and data management accuracy. Organizations are required to respond to these changes by adopting technologies that are able to speed up business processes, especially in administrative activities that are directly related to document management and information flow.(Putra et al., 2023)(Purwanto et al., 2024)

One of the administrative activities that plays an important role is the management of correspondence. Letters, both in physical and digital form, are official communication media that support internal and external coordination within an institution. (Hafiz & Nababan, 2023) However, the reality on the ground shows that many organizations, especially government institutions, educational institutions, and medium-scale private organizations, are still carrying out the mail administration process manually. Starting from recording incoming and outgoing letters, numbering, dispositioning, to archiving is carried out in a conventional way using an agenda book or paper document. (Eka Purnama Rijaludin et al., 2019) The manual management is prone to cause various problems. Data duplication often occurs when recording is done by more than one officer without an integrated system. The risk of losing documents increases due to the absence of digital archives as a backup. Writing or recording errors are difficult to avoid and have an impact on data inaccuracies. In addition, the mail tracking process becomes slow because the clerk has to physically search for the files, which is time-consuming and labor-intensive. This condition hinders the smooth flow of formal communication between units, slows down decision-making, and reduces the effectiveness of overall administrative services(Darmansah et al., 2025)

To overcome these problems, a system is needed that is able to support the mail administration process in a computerized and integrated manner. A website-based mail administration system is the right solution because it has various advantages, such as high accessibility, real-time data processing capabilities, and easy integration with other work units. Users can manage mail from any device as long as they are connected to the network, while digital archives make it easier to search, monitor mail status, and track document history.(Pinaria et al., 2022)

However, the development of a system cannot be separated from a careful analysis and design process. A modeling approach is needed that is able to clearly describe the structure, functions, workflows, and interactions in the system. Unified Modeling Language (UML) is a modeling standard that is widely used in the world of software engineering because it provides a number of diagrams that can visually describe user needs and business processes. Use case, activity, sequence, and class diagrams are important tools for mapping the functional needs of the mail administration system,

inter-stakeholder relationships, and interaction mechanisms between processes.(Putra et al., 2024)(Muslihah et al., 2021)

The use of UML provides significant benefits in clarifying communication between developers, analysts, and stakeholders. With structured modeling, the potential for errors due to misunderstandings of needs can be minimized. In addition, the documentation generated through UML can be an important basis for future implementation and further development.(E. Sitorus et al., 2025)

Thus, the design of a website-based mail administration system using UML not only provides a solution to manual administration problems, but also contributes to increasing efficiency, transparency, and accountability of information governance in the organization. The development of this system is a strategic step in supporting the modernization and digitalization of administration, so it is relevant to be applied to various institutions that want to improve the quality of service and order of documentation.(Pinaria et al., 2022)

II. RESEARCH METHODOLOGY

This research uses a Research and Development (R&D) approach with a focus on the process of analysis and system design. The research method carried out to obtain data related to this research consists of :(J. H. P. Sitorus & Sakban, 2021)

Figure 1. Research Flow

The stages of the research are as follows:

1. Studi Literatur
   The initial stage of the research was carried out by collecting various references related to mail administration systems, software modeling, and the use of Unified Modeling Language (UML). Literature is obtained from books, scientific journals, proceedings, and trusted online sources. This activity aims to understand relevant concepts, theories, and technical approaches as a basis in the system design process.

2. Data collection is carried out to find outThe Need for a Real System. Techniques used
   a. Interview, with an admin or mail management officer to understand work procedures, constraints, and user needs
   b. Observation, by directly observing the process of managing letters in related agencies, starting from recording to archival storage.
   c. Documentation, which is collecting administrative documents such as the format of incoming letters, outgoing letters, agenda books, and disposition flows that are currently used.

3. System Requirements
   A needs analysis is done to identify the main functions that a website-based mail administration system should have. Needs are divided into:
   a. Functional needs include recording, archiving, status tracking, and report creation features.
   b. Non-functional needs, such as access security, ease of use, and system reliability.

4. System Planning Using UML
   The design stage is done by creating various UML diagrams to illustrate the structure and behavior of the system, which include:
   a. Use Case Diagrams, to map out the actors and functions that can be used by the user.
   b. Use Case Diagrams, to map out the actors and functions that can be used by the user.
   c. Sequence Diagram, to show the interaction between objects in performing system functions.
   d. Flowchat, to describe the data structure and relationships between objects in the system.Validasi Rancangan

5. Verification is carried out by verifying the design results to authorities, such as administrators or administrative staff. The goal is to ensure that the design fits the actual needs and that no important process is missed. Feedback from users is then used to refine the model that has been created.

III. RESULTS AND DISCUSSION

System design is built using UML (unified modeling language) which is a visual language for modeling and communicating about a system using diagrams and supporting text. There are several diagrams that researchers must build as a guide and create a system so as not to deviate from the design. (Endang Amalia1, 2023) The diagrams used in the UML system are as follows:

1. Use Case Diagram is an overview of the activities that will be built by the information system. Use Cases are used to find out who has the right to access or use the information system.

a. Use Case Diagram Admin

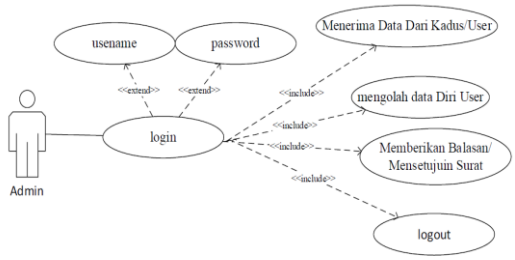

Figure 2. Use Case Diagram Admin

The image above shows a Use Case diagram for the website-based mail administration system used by the Admin. This use case describes the flow of activities that admins can perform when interacting with the system. An admin is a user who has full access rights to manage data and process mail. In the diagram, the admin is depicted as a human figure on the left side. Admins need to log in to the system as a first step, then After successfully logging in, admins can perform some system functions after logging in.

b. Use Case Diagram User

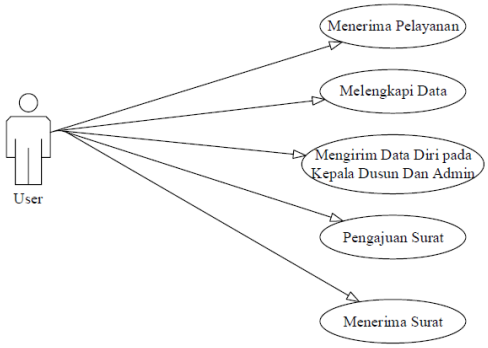

Figure 3. Use Case Diagram User

The image above shows a Use Case Diagram that illustrates the activities that can be carried out by the User in a website-based mail administration system. This diagram illustrates that users have five main functions in the mail administration system, starting from receiving initial services, filling in data, sending information to the authorities, submitting letters, to receiving process results in the form of letters. All of these activities run in a structured and interrelated manner to support the smooth web-based administration process.

2. Activity Diagram

An activity diagram is an overview of the workflow or work activities of a system process that can be performed by information system users.

a. Activity Diagram Admin

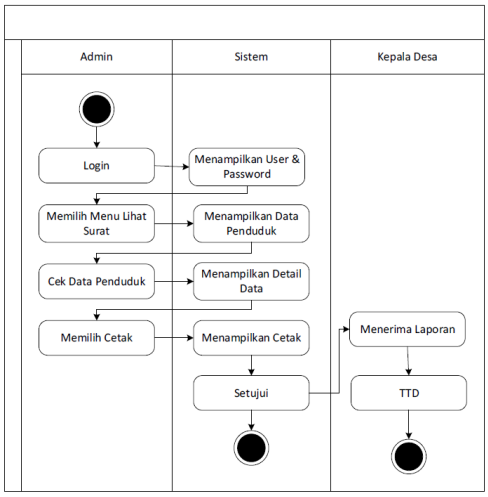

Figure 4. Activity Diagram Admin

The image above is an activity diagram showing the workflow of the mail and approval management process in the village system. This diagram uses a swimlane that divides roles into three parts, namely Admin, System, and Village Head. Each section shows the activities carried out by each role, as well as the interactions between them. roses start from the incoming Admin. After logging in, the admin is directed to the system to enter or select the user and password. When the login is successful, the admin proceeds by selecting the menu to view the email. The system then displays the required population data. The admin checks the data of the occupant and the system displays the details of the selected data. Once the data is deemed appropriate, the admin chooses the option to print the email. The system displays a print display of mail that is ready to be processed. At this stage, the flow continues to the Village Head. The Village Head receives a report or letter file that has been prepared by the Admin. After checking it, the Village Head gave a signature as a form of approval. This action is then re-recorded by the system as an Approved status. With the completion of the approval process.

b. Activity Diagram User

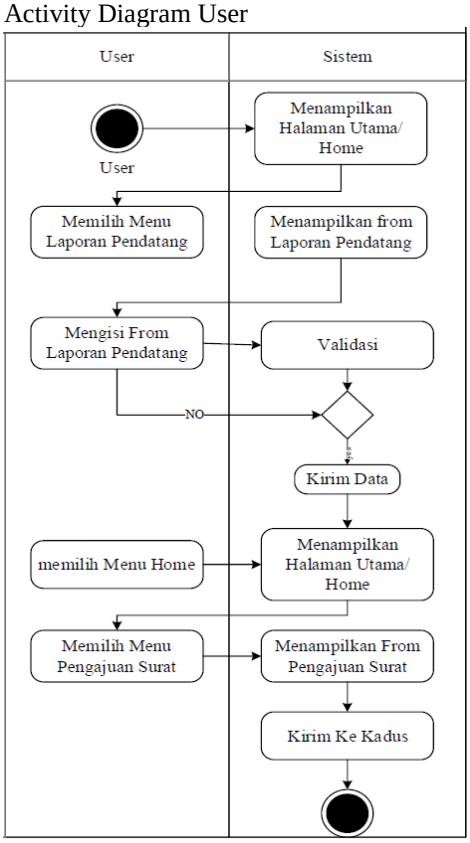

Figure 5. Activity Diagram User

The diagram above illustrates the flow of the interaction between users and systems in migrant reporting and mailing features. The flow starts when the user opens the app, which is marked with a start symbol on the user's side. Once the app is launched, the system immediately displays the main page or homepage as the initial view that users can use to select the available menus. When a user decides to create a visitor report, he selects the visitor report menu on the main view. This triggers the system to display a custom form that must be filled out. Once the form appears, the user starts filling in all the necessary data. The filled data is then sent to the system for validation processing. This validation serves to check whether the information provided is complete and in accordance with the provisions. If the validation results show that there is incorrect or incomplete data, the system will return the user to the previous form so that the user can correct or complete the missing data. However, if the data entered has been declared valid by the system, it will be further processed and sent to the database or authorities. Once the data is successfully submitted, the system returns to the main page to the user, which indicates that the visitor reporting process has been completed. Once back on the main page, users can proceed to another process, for example by selecting the email delivery menu. When this menu is selected, the system will display a mail submission form containing data that must be filled in by the user according to the type of mail needed. After the form is displayed and then filled out by the user, the system processes the data and sends it to the Hamlet Head (Kadus) as the party responsible for following up on the submission. This process becomes the last step in the pipeline, which is depicted with a final symbol in the system section, indicating that the entire set of activities has been completed.

3. Sequence Diagram

Sequence Diagram adalah salah satu jenis diagram dalam UML (Unified Modeling Language) yang digunakan untuk memvisualisasikan alur interaksi antar objek dalam suatu sistem berdasarkan urutan waktu. Diagram ini membantu menggambarkan bagaimana suatu proses berjalan dari awal sampai akhir dengan menampilkan pesan (message) yang dikirim antar objek atau aktor.

a. Sequence Diagram Admin

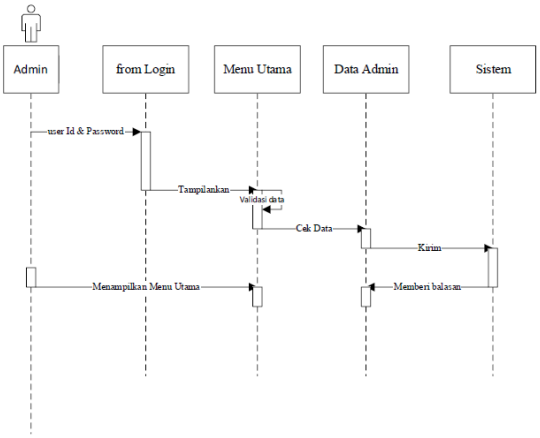

Figure 6. Sequence Digaram Admin

Sequence Diagram is a type of diagram in UML (Unified Modeling Language) that is used to visualize the flow of interaction between objects in a system based on time order. This diagram helps illustrate how a process goes from start to finish by showing the messages sent between objects or actors. After receiving the input, the login page then displays the results of the next process, which in this context is to send the credentials to the Main Menu section for further examination. Arriving at the Main Menu module, the system immediately carries out the data validation process. This validation step ensures that the data entered by the admin matches the data registered in the system. After checking Initially, the

Main Menu passes the data to the Admin Data module, which is the section that specifically stores and manages admin account information. The Data Admin module then performs a more specific check, confirming that the user ID and password match the stored data. After the check process is complete, the verified data is sent by the Data Admin to the System department for further processing. At this stage, the system receives the data and provides a response in the form of verification results. This response can be either a successful or failed status, depending on whether the credentials submitted match the existing data. After receiving a response, the Data Admin sends a reply back to the Main Menu as a marker that the check is complete and the results are ready to be sent to the user. Once the Main Menu receives a reply that the credentials are valid, the Main Menu then displays the next view to the admin, which is the app's Main Menu page. This page indicates that the sign-in process was successful and that the admin has been granted access to the available features. The process ends at this point, after the system has successfully provided the app menu display to the admin.

b. Sequence Diagram User

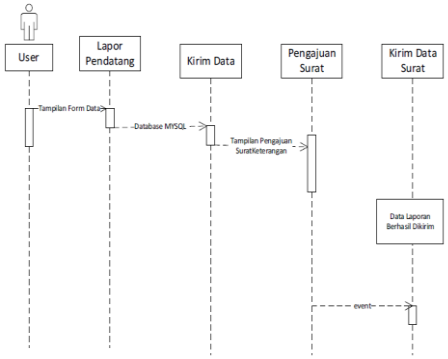

Figure 7. Sequence Diagram User

The image above is a sequence diagram that explains in detail how the process of reporting migrants and sending mail is done by users and how the system responds to each of those actions. This diagram shows the flow of messages running in sequence, illustrating the relationships between several objects or modules in the system, namely: User, Report Comer, Send Data, Mail Submission, and Send Mail Data. The process begins when the user interacts with the system to report an intruder. The user accesses the reporting feature, and the system displays a Data Form that the user will use to fill in information about the participant. Display This form is obtained from the Immigrant Reporting Module. Once the form appears, the user fills in the requested data, and then the Report Visitor module sends the data to the next module for further processing. Once the traffic data is collected, the traffic data is sent to the Submit Data section, which is the process of storing data to the database expressed by streaming to the database. This ensures that any visitor information reported by the user is permanently stored in the database, so you can access or check whenever needed. After the storage is complete, the Send Data module sends a response to the Email Delivery module. Letters of recommendation are then sent to Testimonial Testimonials. This is followed by the successful completion of the project. At this point, the user can proceed to fill out a mailing form that may be required for a particular control. The program responded to this action by providing a specific view for the release of these letters. After the mail delivery form is filled out and the delivery process is carried out, the data is sent back to the mail delivery module, which is the module responsible for maintaining the process of sending mail delivery data to a central system or server. This module collects complete data and processes it according to the appropriate process. At the end of the image, information or results appear in the form of Delivered Success Report Data, which indicates that the entire set of processes both arrival reporting and mail delivery has been completed and the data has been delivered correctly. After that, there is an event indicator that leads to the Email Send Data module, which indicates that the system generates a response or event as a sign that the process has been fully completed.

4. A flowchart is a flowchart that contains symbols to visually describe the sequence of processes, work steps, or logical flows of a system.

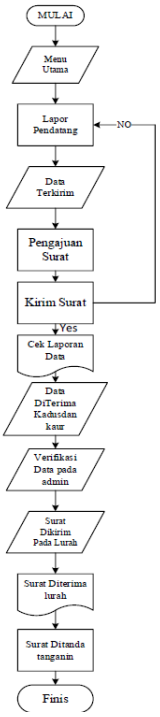

Figure 8. Flowchart

The image above shows a diagram you uploaded that illustrates the flow of the migrant reporting and letter issuance process in the administrative system in the village. Here is a detailed explanation of each stage of the process seen on the diagram. The process begins with the first step, which is to get started. At this stage, users or residents access the reporting system or services provided by the village. After that, the user will be redirected to the Main Menu. In this main menu, there are various service options that users can choose from. One of the available options is Report Arrival. After selecting this option, users are asked to fill out an immigrant reporting form, which includes information such as the visitor's identity, destination address, and reason for arrival.Once the visitor reporting form is completed, the data entered will be sent to the system. At this stage, the system will check whether the data sent was successful or not. If the data transmission is successful, the system will proceed to the next stage. However, if the data is not sent correctly, the process will return to the Report Participant stage for repair, according to the NO path in the diagram. If the data is successfully submitted, the user then proceeds to file Mail. The submission of this letter is required as an administrative document to process the immigrant report that has been submitted before. Once the letter is sent, the system will send the letter. The system will then check whether the letter has been successfully sent or not. If successful, the letters will be moved to the next stage, according to the YES path in the flowchart.

After the letter is successfully sent, the Data Report Checking is carried out by the authorities. Usually this is the officer who is responsible for verifying the reporting data. They will check whether the report received is complete and in accordance with applicable regulations. After that, the report and letter submitted will be received by the Kadus/Kaur (Hamlet Head or Head of Affairs) for further examination. At this stage, the kadus or kaur ensures that the report comes from the correct area and that the data provided is in accordance with reality. If the data is considered legitimate, then Data Verification on the Admin is performed. The village administrator will examine the reports more carefully, ensuring there are no errors in the data entered and all administrative documents are complete. Once this verification is complete, a letter will be sent to the Village Head for approval. At this stage, the village head will check all reports and ensure that all administrative requirements have been met. The Village Head will also review whether the letter is correct and in accordance with the applicable legal provisions. After that, the letter received by the village head will be signed. The village chief's signature on this letter shows that the letter is valid and official. The process is completed once the letter is signed, which indicates that the immigrant's report has been processed and the required letters are ready to be provided to the citizen or applicant.

As such, the process flow depicted in this diagram includes all the steps required to process incoming reports to the publication of valid emails. Starting from filling in the data, verification by officers, to the signature of the village head, each stage is carried out in a structured manner to ensure that the administrative process runs properly and in accordance with applicable regulations.

IV. CONCLUSION

This study confirms that the use of a web-based mail administration system can be an effective solution to overcome various drawbacks of manual mail management, such as slow processes, inaccurate recordings, and difficulties in searching archives. Through designing that utilizes UML, the flow of system needs and processes can be described in a structured manner resulting in a clear, standardized, and easy-to-develop design. The system is designed to offer more organized, accessible, and well-documented mail management. These findings can be the basis for the development of a digital mail administration system to improve the quality of administrative services in various agencies.

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