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Development of a Document Archiving Information System at the Social Affairs Office of North Central Timor Using Adaptive Software Development (ASD)

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ABSTRACT

Document archiving plays an important role in supporting administrative services within government institutions. At the Social Affairs Office of North Central Timor Regency, archiving activities are still carried out manually by recording incoming and outgoing correspondence in logbooks. This process often causes difficulties in document retrieval, report preparation, and archive management, especially when records increase or logbooks are lost or damaged. Therefore, this study aims to develop a web-based document archiving information system using the Adaptive Software Development (ASD) approach. The system was designed using Use Case Diagrams and Activity Diagrams and implemented using PHP and MariaDB. System testing was conducted using the Black-Box Testing method to evaluate system functionality. The results show that all system functions operated according to the specified requirements. The developed system improves the efficiency of archive management, facilitates document retrieval, and reduces the risk of data loss compared to the previous manual process. In addition, this study demonstrates the applicability of the ASD approach in developing document archiving systems for local government institutions.

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1. INTRODUCTION

Archives are records of activities or events in various forms of media, in accordance with advancements in information technology, created and received by state institutions, local governments, educational institutions, companies, political organizations, community organizations, and individuals in the course of social, national, and state life.

The Social Services Agency is a government institution that addresses and resolves social issues arising in the community in order to achieve social welfare for the people of North Central Timor Regency; it is located in the Benpasi neighborhood on Jl. Mayjend El Tari, Kefamenanu. The records managed by the Social Services Agency of North Central Timor Regency consist of letters. The management of these records comprises two categories: outgoing letters—which are sent from the Social Services Agency to other agencies, companies, or individuals—and incoming letters, which are received from internal agency sources or external parties.

Archiving at the North Central Timor Regency Social Services Office is still conducted manually, with archivists recording incoming and outgoing letters in logbooks. This manual process creates challenges when the number of records increases, especially if the logbooks are lost or damaged. In addition, retrieving documents from previous months or years is time-consuming because archivists must search records manually. Therefore, an information system is needed to support the collection, processing, storage, analysis, and dissemination of information effectively [19]. Previous studies have developed web-based archiving systems to improve document management efficiency [11], [6], [5]. However, most of these studies focused primarily on system functionality and did not emphasize adaptive development to accommodate changing user requirements. This study differs from previous research by implementing the Adaptive Software Development (ASD) approach, which is chosen due to its ability to support iterative and incremental development with continuous user involvement. The main advantages of ASD lie in its flexibility, rapid adaptation to changing requirements, and strong collaboration with users throughout the development process. In relation to previous studies and similar case studies, ASD has been widely applied in information system development and proven effective in improving system adaptability, usability, and alignment with user needs in dynamic environments.

2. METHOD

2.1 Research Design

Research is the systematic and objective collection, processing, analysis, and presentation of data to solve problems or test hypotheses. There are several types of research; in this study, the type of research used is applied research, in which researchers are guided to implement, create innovations, and advance scientific knowledge with the aim of finding solutions to problems encountered in everyday life.

2.2 Research Phases

2.2.1 Data Collection

Data collection for the development of this document archiving information system was conducted in several ways, namely:

a. Observation
   During this observation, the researcher conducted direct observations to identify existing problems or shortcomings in the current document archiving system at the Social Affairs Office of North Central Timor Regency.
b. Interviews
   At this stage, interviews were conducted with individuals directly involved in the archiving process at the Social Affairs Office of North Central Timor Regency.
c. Literature Review
   The purpose of this literature review was to collect and examine books and journals related to the research in order to gather the necessary information regarding the archiving information system.

2.2.2 Data Analysis

The results of observations and interviews are used to analyze the data required to build a system that meets user needs. System requirements analysis is divided into two categories: functional requirements—which involve providing forms for letter input and letter disposition—and non-functional requirements—which involve the tools used to access the system.

2.2.3 System Design

At this stage, a new system is developed and documented in writing. The activities carried out include logical system design, which consists of three diagrams: the use case diagram, the activity diagram, and the Entity-Relationship Diagram.

2.2.4 System Testing

System testing is conducted to verify that the system functions correctly and satisfies user requirements. This study employs Black Box Testing and User Acceptance Testing (UAT). Black Box Testing focuses on validating system functionality based on input–output behavior without examining internal code structure, while UAT involves end users to assess whether the system meets operational needs and expectations. The combination of both methods ensures functional correctness and user acceptance of the developed system.

2.2.5 Implementation

At this stage, the system is deployed after testing and in accordance with user requirements.

2.3 System Development Method

This study employs the Adaptive Software Development (ASD) approach, one of the Agile methodologies, due to its flexibility in accommodating changing user requirements and its emphasis on collaboration between developers and stakeholders. ASD is particularly suitable for developing information systems in government institutions, where system requirements may evolve during the development process. According to Highsmith, ASD is designed to support the development of complex software systems through iterative and collaborative processes [2].
The stages of the Adaptive Software Development System are as follows:

1. Speculation Stage: Adaptive Planning
   In this stage, the researcher conducted initial observations at the research site, met directly with personnel involved in archiving at the Social Affairs Office of North Central Timor Regency, as well as the head of the office, to gather information regarding the system to be developed. After obtaining the relevant information regarding archiving, the researcher designs the archival information system. Once the system is designed, the researcher consults with the head of the department and the archivists, during which the local head of the department requests several changes, which are then revised and approved.
2. Collaboration Phase
   In this phase, the researcher collaborated with the archivists, such as adjusting the document classification codes and document numbers in the archives to meet the needs of the archiving system at the Social Affairs Office of North Central Timor Regency.
3. Learning Phase:
   This phase involved a learning process where the researcher demonstrated the system to the clients—specifically the archivists, the head of the department, and other personnel involved with archives at the Social Affairs Department of North Central Timor Regency—to study the system together. During this phase, system testing was also conducted through the completion of a questionnaire provided by the researcher and filled out by the clients.

3. RESULT AND DISCUSSION

The developed document archiving information system provides several advantages over the previous manual archiving process. Previously, archivists recorded documents in logbooks, which increased the risk of data loss and made document retrieval time-consuming. With the implementation of the system, document storage and retrieval become faster as verified through response time testing. System accuracy is ensured by validating the consistency and correctness of processed data during Black Box Testing and User Acceptance Testing (UAT), while security is determined based on authentication mechanisms, access control, and data protection features that restrict system access to authorized users only. The system also enables efficient management of incoming and outgoing letters through digital records and search features.

The implementation of the system has positively impacted the organization by improving archival efficiency, reducing the risk of document loss, and supporting better administrative services at the North Central Timor Regency Social Services Office. In addition, the use of the ASD approach facilitated collaboration with users and accommodated changes in system requirements during development.

3.1. System Analysis

The following figure shows a flowchart of the current outgoing mail filing system. The management of incoming mail at the Social Affairs Office of North Central Timor Regency is currently still carried out manually, following the process depicted in the flowchart above. The incoming mail filing process involves the secretariat receiving incoming mail, recording it in the incoming mail logbook, filling out and attaching a disposition sheet, then submitting it to the head of the office for review and assignment of responsibility or disposition of the letter to the relevant department or division. The department responsible for the disposition then responds to and follows up on the letter, while the letter file is stored as an archive for the office.

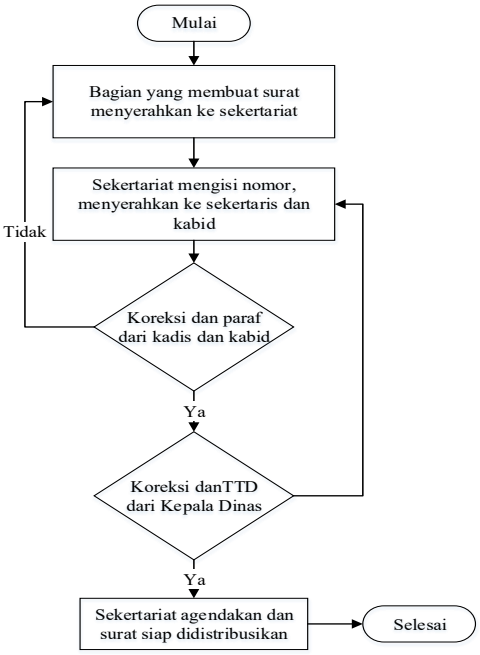

Figure 1. Flowchart of the Old Outgoing Mail System

The following figure shows a flowchart of the current incoming mail filing system. The management of outgoing mail at the Social Services Office of North Central Timor Regency, which is currently handled manually, can be illustrated as shown in the flowchart in Figure 2 below. The department responsible for drafting outgoing letters delivers the letters to the Secretariat or the filing section; the archivist then assigns a letter number to each document and forwards them to the division heads and the agency secretary for review and initialing. Once approved, the letters are submitted to the agency head for final review and approval. If approved, the letter is signed and duplicated into two copies, one of which serves as an archive for the office, and the other is ready for distribution.

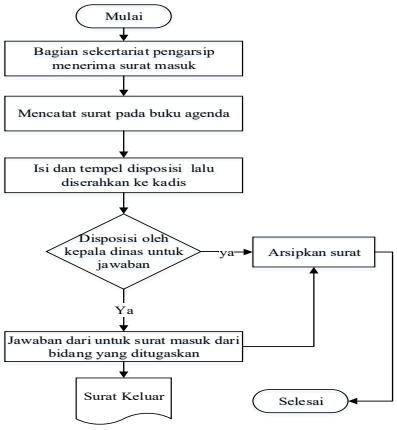

Figure 2. Flowchart of the Old Incoming Mail System

Analysis of the proposed system at the North Central Timor Regency Social Services Office to describe the proposed document management system. An overview of the new incoming document archiving system proposed for the North Central Timor Regency Social Services Office. The Archives Section Secretariat, acting as the archiving user, receives incoming mail, which is then scanned for archiving. The incoming mail is entered by inputting the relevant data and clicking the save button, after which the entered data is automatically saved.

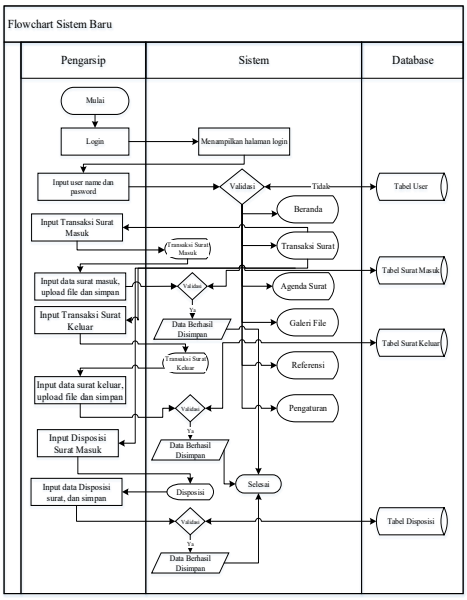

Figure 3. Flowchart of the proposed system

3.2 System Design

3.2.1 Use Case Diagram

A use case diagram is a diagram that illustrates the interactions between the people involved in the system—the actors—and the system itself, as well as the activities that these actors can perform within the system. The previous figure shows the use case diagram for the information system for archiving outgoing and incoming correspondence at the Social Affairs Office of TTU Regency.

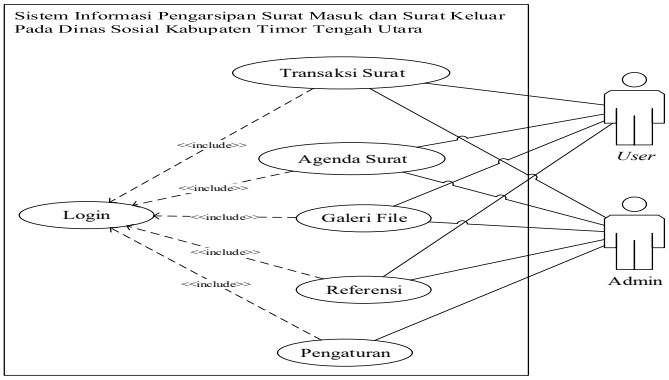

Figure 4. System use case diagram

3.2.2 Activity Diagram

An activity diagram, or system activity diagram, is a diagram that illustrates the system's workflow while remaining consistent with the system that has been in operation so far; this diagram represents the actions the system will perform. The following is an illustration of the login activity diagram for this system:

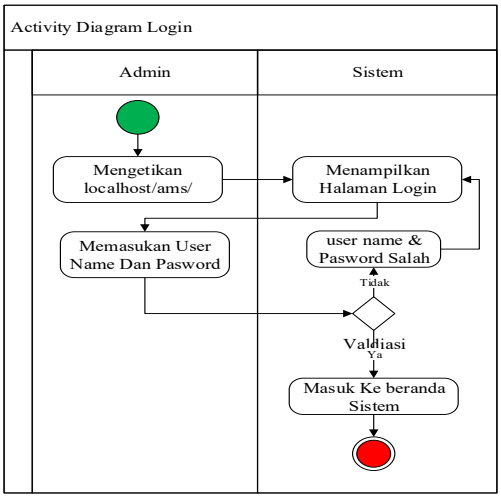

Figure 5. System Login Activity Diagram

3.2.3 Basis Data Sistem

a. Entity Relationship Diagram

The system database design is intended to represent the data processed in this document archiving information system and to illustrate the database flow of this document archiving information system. The relationships between tables in this document archiving information system are depicted in the form of an Entity-Relationship Diagram (ERD) and relational tables. The Entity-Relationship Diagram of the document archiving information system at the Social Services Office of North Central Timor Regency comprises six entities: incoming documents, outgoing documents, users, agencies, dispositions, and document classifications.

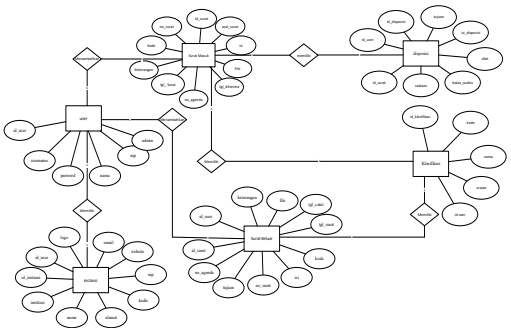

Figure 6. System ERD

b. Database Tables

A database design that displays information about the tables used in the document archiving information system at the Social Affairs Office of North Central Timor Regency, in accordance with the ERD described earlier. Each table contains attributes, data types, and data constraints. The following database tables consist of six tables, as shown in the figure below:

Figure 7. Database Table

3.3 System Testing

3.3.1 Functional Testing (Black-Box Testing)

System testing was conducted using the Black-Box Testing method to evaluate whether each system function operated according to its specifications [3]. The tested functionalities included login, incoming mail management, outgoing mail management, disposition management, file gallery, and database backup features.

Table 1. Black-Box Testing Results

No	Tested Feature	Test Scenario	Expected Result	Result
1	Login	User enters valid username and password	System displays dashboard	✓
2	Incoming Mail	User adds incoming mail data	Data saved successfully	✓
3	Outgoing Mail	User adds outgoing mail data	Data saved successfully	✓
4	Disposition	User creates disposition	Disposition stored successfully	✓
5	File Gallery	User searches archive	Archive displayed correctly	✓
6	Database Backup	Administrator performs backup	Backup file generated	✓

The test results indicate that all system functions operated correctly and met the specified requirements.

3.3.2 User Acceptance Testing (UAT)

User Acceptance Testing (UAT) was conducted by distributing questionnaires to three users directly involved in document archiving at the Social Affairs Office of North Central Timor Regency. The evaluation used a five-point Likert scale, where 1 = strongly disagree and 5 = strongly agree.

Table 2. User Satisfaction Results

No	Evaluation Aspect	Average Score	Category
1	Ease of Use	4.67	✓
2	Interface Design	4.33	✓
3	Document Retrieval Efficiency	4.67	✓
4	System Functionality	4.67	✓
5	User Satisfaction	4.33	✓

Average score: 4.53/5.00 (Very Good)

The UAT results indicate that users were satisfied with the developed system and considered it effective in improving document management and retrieval efficiency.

3.4 System Interface Design

The following are mockups of each menu in the system prior to its implementation on the website

1. Login Page

The following image shows the interface design of the login page for this document archiving information system; this page was designed prior to its implementation on the website.

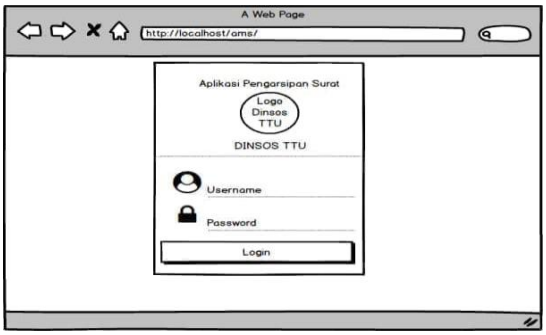

Figure 8. System login page

2. Home Page

The Home Page is the page that appears when a user logs in to the system by entering their username and password.

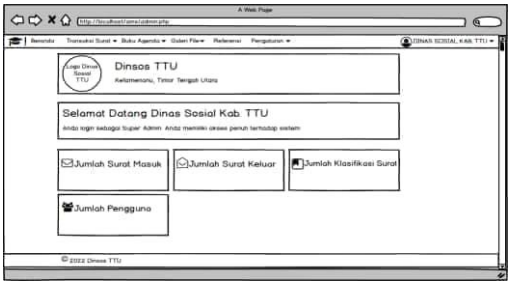

Figure 9. Home Page

3. Add Incoming Mail Page

This is the screen that appears when a user wants to add a new incoming mail item to the system

Figure 10. Add Incoming Mail Page

4. Outgoing Mail Transaction Page

For outgoing mail transactions, as shown in the following image, users simply need to enter the required data and save it.

Figure 11. Outgoing mail transactions

3.5 System Implementation

During the system implementation phase, everything previously discussed in the interface analysis and design was implemented into the Web-Based Document Archiving Information System at the Social Affairs Office of North Central Timor Regency using the programming language

1. Login Page

The following is the implementation of the login page. After accessing the system and the login page appears, users must enter their username and password to log in. The login page display is the same for both regular users and the main administrator, as shown below:

Figure 12. Login Page

2. Home Page

The following image shows the home page or dashboard of the system, which is the initial screen that appears when a user logs in by entering their username and password. The home page displays the number of incoming emails, the number of actions taken, and the number of system users.

Figure 13. Home Page

3. Incoming Mail Transactions Page

This page is located in the Mail Transactions menu and the Incoming Mail submenu. It is used to enter data for new incoming mail. Access to this page is available to archivists or regular users assigned to this task.

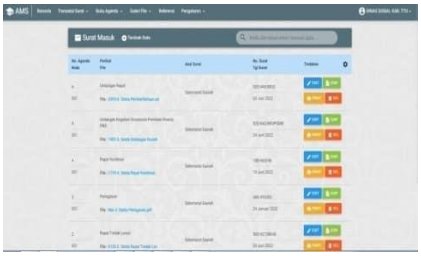

Figure 14. Incoming Mail Transactions

4. Add Disposition

This page is located in the Incoming Mail section, where only users with disposition privileges can access it to add a new disposition by filling in the disposition details and saving them. Regular users can view dispositions that have been made and carry out the instructions accordingly.

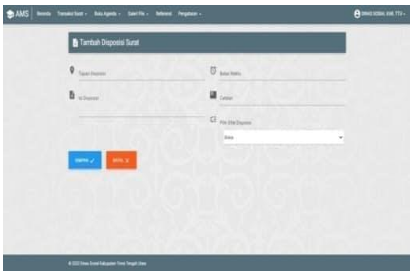

Figure 15. Letter Layout

5. Outgoing Letters

This page is located in the "Letters" submenu. Here, users can create a new letter by filling out the required fields for the outgoing letter.

Figure 16. Outgoing Mail Transactions

6. Mail Calendar

When a user selects the Mail Calendar menu, they will be directed to the incoming and outgoing mail calendars. The user can select one of them, enter the date range to be displayed in the system, and then click

"Display"; the incoming mail calendar for the selected dates will then appear on the page. The display of the incoming mail calendar can be seen in the figure.

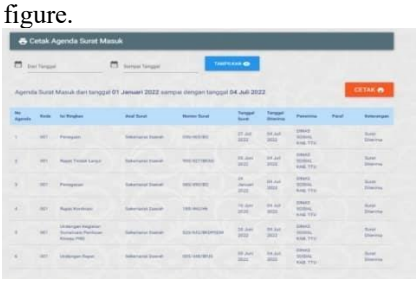

Figure 17. Mail Log

7. File Gallery

The File Gallery displays an overview of all letters that have been entered, including both incoming and outgoing letters.

Figure 18. File Gallery

8. References

In this menu, there is a distinction between users logged in as archivists and those logged in as main administrators: only the main administrator can add classifications to this menu, while regular users can only view the document classifications.

Figure 19. Email Classification

9. Settings Page

The Settings page is only available to users logged in as administrators. Administrators can perform three actions in the settings: view users, back up the database, and restore the database.

On the "Add User" page, there is also an "Add User" button used to add new users; this action can only be performed by system administrators. The "Add New User" screen is shown in the following image:

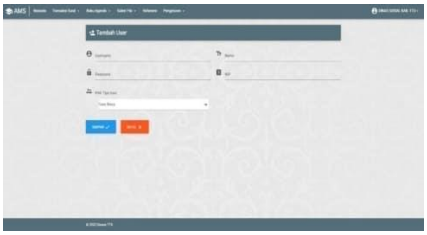

Figure 20. Add User Page

In the settings menu, there is also a database backup submenu, which is used to back up the system database, making it easier to restore it later. The database backup interface is shown in the following figure:

Figure 21. Database Backup

4. CONCLUSION

Based on the research conducted, the document archiving information system was successfully developed using the Adaptive Software Development (ASD) approach and implemented at the Social Affairs Office of North Central Timor Regency. The system effectively addresses problems associated with manual archiving, such as difficulties in document retrieval, inefficient archive management, and the risk of data loss. The results of system testing demonstrated that all functionalities operated properly and met user requirements.

The implementation of the system has improved the efficiency of managing incoming and outgoing documents, facilitated faster document retrieval, and supported better administrative services within the organization. Scientifically, this study contributes to the application of the Adaptive Software Development (ASD) approach in developing document archiving systems for local government institutions.

However, this study has several limitations. The system evaluation involved only a limited number of users within a single government institution, and the system has not yet been integrated with cloud services or mobile platforms. Future research may expand system evaluation with a larger number of users and enhance the system by integrating cloud storage, mobile access, and advanced search features to improve scalability and accessibility.

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