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ANALYSIS OF THE DOCUMENT MANAGEMENT INFORMATION SYSTEM USING THE RAPID APPLICATION DEVELOPMENT METHOD

M. Nurul Ihsan[1]*, Khairul Umam [1], Mala Rosa Aprillya [2], Darmawan[3]

[1] Computer Engineering; Faculty of Science Technology and Education;Universitas Muhammadiyah Lamongan; Lamongan 62218, Indonesia
[2]Informatics Engineering; Faculty of Engineering; Universitas Trunojoyo Madura; Bangkalan 69612, Indonesia
[3]Information Technology; Faculty of Business Management and Information Technology; Universitas Muhammadiyah Malaysia; Perlis 02100, Malaysia

*Corresponding Author Email: ihsan@umla.ac.id

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ABSTRACT

The rapid advancement of information technology has pushed higher education institutions to improve document management efficiency, yet many study programs still rely on manual processes or non-integrated storage, causing data duplication, retrieval difficulties, weak security, and inefficient archiving. This study aims to develop a web-based Study Program Document Management Information System using the Rapid Application Development (RAD) method to enable centralized, integrated, and secure document management. The RAD approach comprised four stages: requirements planning, user design, system construction, and testing and implementation. Data were collected through field observations, stakeholder interviews, and analyses of hardware and software requirements. The system was built using PHP and MariaDB as the RDBMS, providing key features such as login authentication with CAPTCHA security, document upload and download, categorization, search, and user management. Based on Black Box Testing, all 35 test cases were executed successfully without failures, yielding a system validity of 100%. Therefore, the developed system is considered valid, feasible, and effective in improving digital document management, administrative efficiency, and accreditation support for study programs.

Keywords: *Document Management System; Rapid Application Development; Information System; Black Box Testing; Study Program.*

I. INTRODUCTION

The advancement of information technology transformation has had a significant impact on various sectors, including higher education. Digitalization can support universities in improving operational efficiency, enhancing the quality of education, and preparing students to face the current digital era and Industry 4.0 (Andi Kambau, 2024). Information technology plays an important role in improving management efficiency within higher education institutions. The implementation of information management systems, electronic archiving, and digital communication has accelerated data processing, facilitated access to information, and improved collaboration among staff members (Deha, 2024). One important aspect in this context is the management of study program documents, particularly those related to accreditation, academic administration, and institutional reporting (Prastyo et al., 2025).

Currently, study programs manage documents manually or through non-integrated media such as local storage, flash drives, or poorly structured cloud services. This situation often results in problems such as data duplication, document version inconsistencies, difficulties in document retrieval, and low levels of information security. To address these issues, a technological solution in the form of a document management information system is required to integrate document storage, management, retrieval, and distribution processes efficiently and effectively (Julianto et al., 2025; Lende et al., 2026). Electronic document management systems play a strategic role that goes beyond functioning merely as digital document repositories. These systems support the effectiveness of knowledge management by enhancing organizational capabilities in storing, organizing, distributing, and systematically utilizing knowledge (Zaini, 2025).

Document management issues are considered important and require a centralized study program document management system protected by a reliable security mechanism. The development of such a management system requires an appropriate system development method, such as Rapid Application Development (RAD), which is well suited to user requirements (Dalis et al., 2024; Rhomadhona et al., 2025). System development using the RAD method is capable of producing a functional system within only 90 days (Ihsan et al., 2022).

However, previous studies on document management information systems primarily focused on system functionality, efficiency, and usability, while largely overlooking system security aspects. Most previously developed systems did not implement adequate security mechanisms to protect against cyber threats, particularly brute force attacks and SQL injection attacks. This research gap highlights the need for a document management system that not only supports centralized document management but also strengthens system security.

Therefore, this study develops a centralized study program document management system integrated with CAPTCHA security to enhance protection against brute force attacks and SQL injection attacks. The implementation of CAPTCHA aims to prevent unauthorized automated login attempts and improve the overall security of the system. This research is intended to explain the development process of the study program document management system, starting from the preparation stage through to implementation.

II. METHOD

A research method is a series of steps and plans that can be applied in research to collect information in order to obtain answers and solve problems accurately (Charismana, D. S.,

Retnawati, H., & Dhewantoro, 2022). This study employs the Rapid Application Development (RAD) approach because the system being developed is relatively small-scale and the method accelerates the system development process. The research process flow is illustrated in Figure 1.

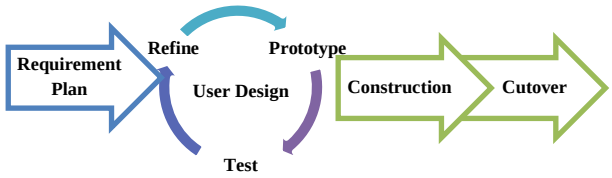

Figure 1. RAD Software engineering

2.1. Planning and Requirements Analysis

The first stage in the RAD method is system planning and requirements analysis. At this stage, user requirements and problems related to the management of study program documents are identified. Requirements analysis is conducted to formulate a description of the software to be developed during the software development project. High-quality software that meets user needs is highly dependent on the successful execution of the requirements analysis process (Sari & Pudjiarti, 2021).

2.1.1. Field Observation

Observation is a method of collecting data directly from the research location by observing and examining field conditions or research objects in order to obtain information about phenomena occurring in real situations. The purpose of observing these phenomena is to obtain contextual information related to time, processes, and ongoing conditions (Putri & Murhayati, 2025). Field observations were conducted by directly examining the document management process within the study program environment. This activity aimed to identify document storage workflows, data retrieval processes, archiving procedures, and frequently encountered problems.

2.1.2. Interviews with the Study Program

Interviews are a method of information collection involving direct communication between the researcher and research participants (Ardiansyah et al., 2023). The interview stage involved relevant parties such as the head of the study program, administrative staff, quality assurance teams, and accreditation operators. The interviews aimed to gather information regarding system requirements, required features, types of managed documents, user access rights, and problems encountered during the document management process.

2.1.3. List of Required Tools and Materials

At this stage, the hardware and software requirements used in system development were identified. Hardware requirements included computers or servers, internet networks, and data storage media. Meanwhile, software requirements included operating systems, databases, programming frameworks, web servers, and browsers used to operate the system.

2.2. User Design

The user design stage aims to design the system interface and workflow according to user requirements through a prototyping process (Rhomadhona et al., 2025).

2.2.1. Prototype Development

At this stage, a prototype of the study program document system was developed. The prototype was designed in the form of a user interface, including login pages, dashboards, document upload menus, document search features, document categories, and user management.

2.2.2. Evaluation with Relevant Stakeholders

The developed prototype was then evaluated together with the study program representatives. The evaluation was conducted to determine whether the system interface, features, and workflows met user requirements.

2.2.3. Error Correction

Based on the evaluation results, improvements were made to design errors and feature deficiencies identified in the prototype. This stage was carried out repeatedly until the prototype was approved by the users.

2.3. System Construction

The construction stage is the process of fully developing the system based on the approved prototype.

2.3.1. Coding

During the coding stage, the system design was translated into a programming language. Developers began building the main features, including user authentication, document management, file upload and download functions, document search functionality, document category classification, and user access rights management.

2.3.2. Debugging

After the coding process was completed, debugging was carried out to identify and fix program errors. This process included checking for code errors, validating system functions, testing database connections, and conducting basic system security testing.

2.3.3. Testing and Implementation

The final stage consisted of system testing and implementation. Testing was conducted to ensure that all system functions operated according to user requirements. After the system was confirmed to function properly, implementation was carried out within the study program environment through server installation, database configuration, user account creation, and system usage training for administrators and users.

III. RESULTS AND DISCUSSION

This study produced a web-based Study Program Document Management Information System developed using the Rapid Application Development method. The system was developed to support document management processes so that they become more structured, easily accessible, and capable of supporting both administrative and accreditation requirements.

The system development process was conducted through the four main stages of the RAD method, namely requirements planning, user design, system construction, and testing and implementation.

3.1. Requirements Planning Stage

At this stage, field observations and interviews with study program representatives were conducted to identify problems related to document management. Based on the observations, it was found that document storage processes were still carried out manually using computer folders and separate storage media. This condition resulted in several issues, including:

1. Documents were difficult to locate when needed.
2. The risk of data loss was relatively high.
3. Documents were frequently duplicated.
4. Accreditation document management was not well structured.
5. There was no regulation of user access rights.

The interview results with study program operators indicated that the required system should be capable of:

1. Uploading and downloading documents.
2. Categorizing documents based on classifications.
3. Performing fast document searches.
4. Managing user access rights.
5. Providing centralized data storage.

Based on the results of the requirements analysis, a web-based system accessible to administrators and study program users was designed.

3.2. User Design Stage

The design stage was carried out by developing a prototype interface tailored to user requirements. The prototype included:

1. Login page.
2. Main dashboard.
3. RPS document management menu.
4. Teaching document management menu.
5. Research document management menu.
6. Community service document management menu.
7. User management menu.
8. User profile menu.

The prototype was then evaluated together with study program representatives to obtain feedback regarding the system interface and functionality. The evaluation results indicated that users preferred a simple and user-friendly interface.

Several improvements were made to the system, including:

1. Adding a document category filtering feature.
2. Simplifying the navigation menu.
3. Adding document upload date information.
4. Improving the layout of action buttons.

The evaluation and revision stages were carried out repeatedly until the prototype fully met user requirements. The business process use case diagram of the system is illustrated in Figure 2.

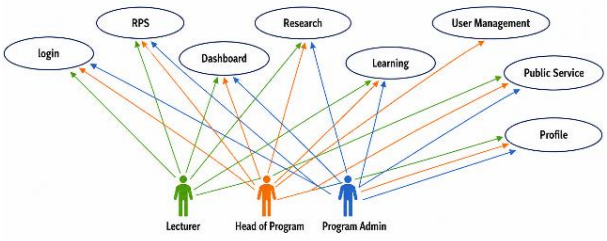

Figure 2. Usecase diagram information management system of the computer departement document.

3.3. Prototype Development Stage

During the prototype development stage, the user interface design process was carried out using the HTML web programming language. The interface was designed in such a way as to facilitate user activities, enabling the system to effectively support user tasks.

3.4. System Construction Stage

During the system construction stage, the coding process was carried out using web programming languages and a database for document data storage. The system was developed using the PHP programming language with MariaDB as the Relational Database Management System (RDBMS). The system was successfully developed with several main features and database components as follows:

3.4.1. Login System

The login feature is used to restrict user access based on the access rights assigned to each user. To enhance security against SQL injection attacks, additional security mechanisms were implemented to prevent the use of symbolic and arithmetic code manipulation. Furthermore, to prevent brute-force attacks, users are required to complete a CAPTCHA verification process, as shown in Figure 3.

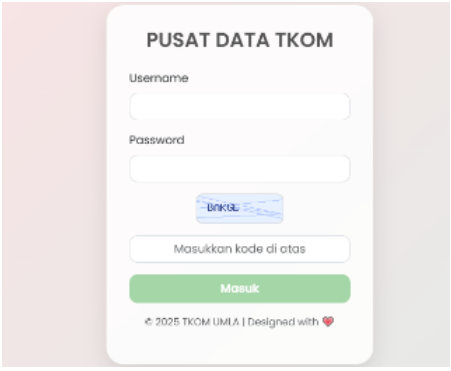

Figure 3. Login page with capcha security

3.4.2. System Dashboard

The dashboard feature is provided to users with administrator (Head of Study Program) and lecturer roles, while admin users are only granted permission to view and search documents. Figure 4 shows the dashboard page containing a welcome page and information related to the documents available in each feature of the system.

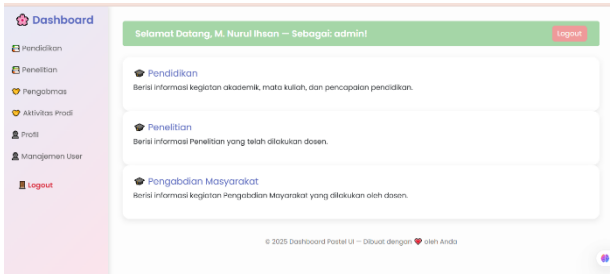

Figure 4. Dashboard page

3.4.3. RPS Document Management

This feature is used to manage Semester Learning Plan (RPS) documents, including adding, editing, deleting, and downloading documents. This feature is available to users with administrator (Head of Study Program) and lecturer roles, while admin users are only permitted to view and search documents. Figure 5 shows the list of RPS document data and the documents uploaded on the page. Meanwhile, Figure 6 displays the appearance of the RPS document. To view the document, users simply need to click the lihat button, and the document will appear in a pop-up window.

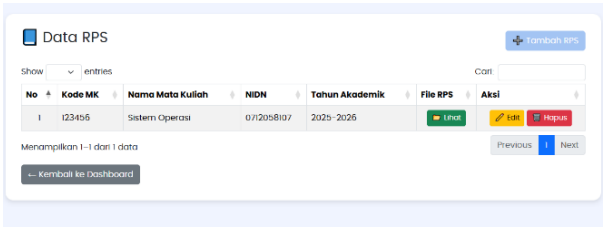

Figure 5. RPS data management page

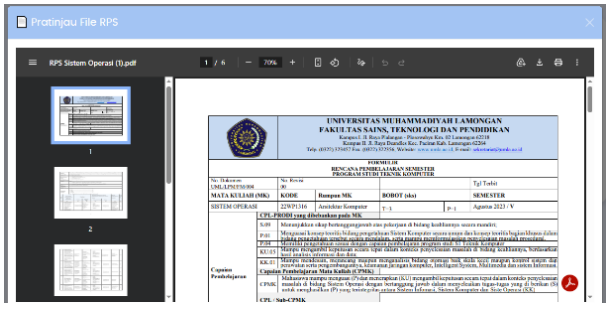

Figure 6. RPS document viewing page

3.4.4. Teaching Document Management

This feature is used to manage teaching documents, including adding, editing, deleting, and downloading documents. This feature is provided to users with administrator (Head of Study Program) and lecturer roles, while admin users are only allowed to view and search documents. Figure 7 shows the list of teaching document data and the documents uploaded on the page. Meanwhile, Figure 8 displays the appearance of the teaching document. To display the document, users simply need to click the Preview button, and the document will appear in a pop-up window.

Figure 7. Teaching management page

Figure 8. Teaching document management page

3.4.5. Research Document Management

This feature is used to manage research documents, including adding, editing, deleting, and downloading documents. This feature is available to users with administrator (Head of Study Program) and lecturer roles, while admin users are only permitted to view and search documents. Figure 9 shows the list of research document data and the documents uploaded on the page. Meanwhile, Figure 10 displays the appearance of the research document. To display the document, users simply need to click the Preview button, and the document will appear in a pop-up window.

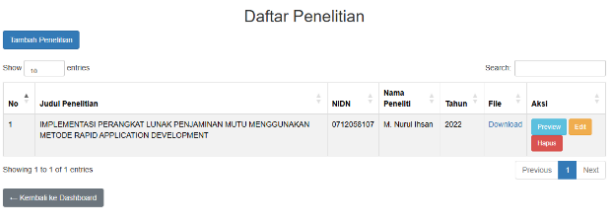

Figure 9. Research document management page

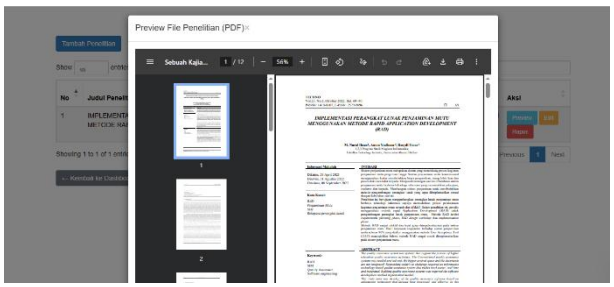

Figure 10. Research document management page

3.4.6. Community Service Document Management

This feature is used to manage Community Service documents, including adding, editing, deleting, and downloading documents. This feature is available to users with administrator (Head of Study Program) and lecturer roles, while administrative staff are only allowed to view and search for documents. Figure 11 shows the list page of Community Service documents that have been stored in the system, while Figure 12 shows the display of documents stored in the system.

Figure 11. shows the list page of Community Service documents

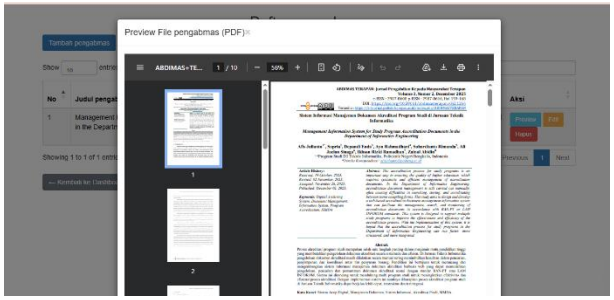

Figure 12. Community service document viewing page

3.4.7. User Management

Administrators are able to manage user accounts and determine the access rights assigned to each user. Furthermore, a debugging process was carried out to ensure that all system features functioned properly and that no system errors occurred. Figure 13 shows the list of system users. The Head of the Study Program has full authority over user management, including creating, modifying, viewing, and deleting user accounts.

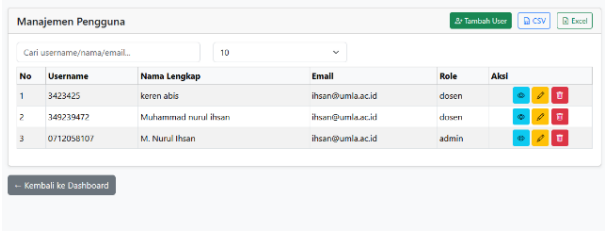

Figure 13. User management page

3.4.8. RDBMS Management

A Relational Database Management System (RDBMS) is a system used as the central data storage engine. In this study, MariaDB was used as the RDBMS engine, while PhpMyAdmin was utilized as the database management dashboard.

3.5. The system testing

The Black Box Testing method was used to test system functionality based on inputs and outputs without examining the program code structure. The testing process was conducted to ensure that all system features operated in accordance with user requirements. Table 1 describes the testing results of the login page feature used to validate the user authentication process. Testing was conducted under various input conditions, including correct usernames and passwords, incorrect passwords, unregistered usernames, and empty fields. In addition, security testing using SQL Injection techniques was performed to ensure that the system could reject unauthorized access attempts. Based on the testing results, all scenarios were executed successfully, and the system provided responses as expected.

Table 2 presents the testing results of the main dashboard page. The testing process was conducted to ensure that the dashboard could be displayed properly after a successful login process. Furthermore, testing was performed on the document count display feature, navigation menus based on user access rights, and

dashboard access restrictions without login authentication. The testing results indicate that all dashboard functions operated according to system requirements.

Table 3 describes the testing results of the RPS document management feature. Testing was conducted on document addition, PDF file upload, file format validation, document editing, document list display, and document deletion functions. The testing results show that the system was able to store, display, update, and delete documents properly according to the designed process.

Table 4 presents the testing results of the teaching document management feature. The testing process was conducted to ensure that the system could perform document addition, editing, display, and deletion processes properly. All testing scenarios produced valid results, indicating that the feature can be effectively used by users.

Table 5 describes the testing results of the research document management feature. Testing was conducted on research document addition, data modification, research data display, and document deletion processes. Based on the testing results, all system functions operated according to user requirements without any significant functional errors.

Table 6 presents the testing results of the community service document management feature. Testing was performed on data addition, editing, display, and deletion processes related to community service documents. The results indicate that the system was able to manage community service documents effectively and that all functions operated as expected.

Table 7 describes the testing results of the user management feature used to manage system user accounts. Testing was conducted on new user creation, user data modification, user list display, and user deletion processes. The testing results indicate that all user management functions operated properly according to the assigned access rights.

Table 8 presents the testing results of the user profile feature. Testing was conducted to ensure that user profile information could be displayed correctly and that unauthorized access to the profile page without login authentication would redirect users to the login page. The testing results indicate that the user profile feature functioned properly and that the system successfully maintained user access security.

Table 1. Login page testing

NO	TEST SCENARIO	INPUT DATA	EXPECTED RESULT	STATUS
1	Login with correct username and password	Valid username, valid password	System successfully enters the dashboard	Valid
2	Login with incorrect password	Valid username, incorrect password	System displays an incorrect password message	Valid
3	Login with unregistered username	Invalid username	System displays a user not found message	Valid
4	Empty username	Password entered	System displays username required validation	Valid
5	Empty password	Username entered	System displays password required validation	Valid
6	All fields are empty	Empty	System rejects login	Valid
7	SQL Injection on login form	' OR '1'='1	System rejects access and secures the query	Valid

Table 2. Dashboard page testing

NO	TEST SCENARIO	INPUT DATA	EXPECTED RESULT	STATUS
1	Display dashboard after login	User successfully logged in	Dashboard displayed properly	Valid
2	Display document count	Document data available	Total documents displayed according to database	Valid
3	Display navigation menu	Click menu	System displays menu according to access rights	Valid
4	Access dashboard without login	Dashboard URL	System redirects to login page	Valid

Table 3. Management RPS document testing

NO	TEST SCENARIO	INPUT DATA	EXPECTED RESULT	STATUS
1	Add complete document	Document data	Document successfully saved	Valid
2	Upload PDF file format	PDF file	System accepts the file	Valid
3	Upload non-PDF file	DOC file	System rejects the file	Valid
4	Edit document data	Document data	Data successfully updated	Valid
5	Display document list	Click menu	All data displayed	Valid
6	Delete document	Click delete icon	Data deleted from database	Valid

Table 4. Management learning document testing

NO	TEST SCENARIO	INPUT DATA	EXPECTED RESULT	STATUS
1	Add teaching document	Document data	Data successfully saved	Valid
2	Edit teaching document	Document data	Data successfully updated	Valid
3	Display teaching document	Click preview icon	Data displayed in table	Valid
4	Delete teaching document	Click delete icon	Data successfully deleted	Valid

Table 5. Management research document testing

NO	TEST SCENARIO	INPUT DATA	EXPECTED RESULT	STATUS
1	Add research document	Document data	Data successfully saved	Valid
2	Edit research document	Document data	Data successfully updated	Valid
3	Display research data	Click preview	Data displayed in table	Valid
4	Delete research document	Klik hapus	Data successfully deleted	Valid

Table 6. Management community service document testing

NO	TEST SCENARIO	INPUT DATA	EXPECTED RESULT	STATUS
1	Add community service document	Document data	Data successfully saved	Valid
2	Edit community service document	Document data	Data successfully updated	Valid

3	Display community service data	Click preview	Data displayed in table	Valid
4	Delete community service data	Klik hapus	Data successfully deleted	Valid

Table 7. User management testing

NO	TEST SCENARIO	INPUT DATA	EXPECTED RESULT	STATUS
1	Add new user	User data	User successfully added	Valid
2	Edit user data	User data	Data successfully updated	Valid
3	Display user list	Click menu	All data displayed	Valid
4	Delete user	Klik hapus	User data deleted	Valid

Table 8. User profile testing

NO	TEST SCENARIO	INPUT DATA	EXPECTED RESULT	STATUS
1	Display user profile	Click menu	Profile information displayed	Valid
2	Access profile without login	URL	Sistem mengarahkan ke login	Valid

Table 9. Testing Data

DESCRIPTION	TOTAL
Total Test Cases	35
Successful Test Cases	35
Failed Test Cases	0

$$SVP = \frac{Successful\ Test\ Cases}{Total\ Test\ Cases}\ x\ 100\%$$

$$SVP = \frac{35}{35}\ x\ 100\% = 100\%$$

IV. CONCLUSION

Based on the results of the analysis and development of the Study Program Document Management Information System using the Rapid Application Development (RAD) method, the developed system is capable of supporting the document management process in a more effective, structured, and integrated manner. The system provides main features including RPS document management, teaching document management, research document management, community service document management, user management, and user profile management, all of which can be accessed through a web-based interface.

The implementation of this system provides convenience for study programs in storing, searching, managing, and maintaining documents digitally, thereby reducing the risk of document loss, data redundancy, and errors in manual archive management. In addition, the use of the MariaDB database supports organized data storage and improves the efficiency of information access.

Based on the Black Box Testing results, all 35 test cases were successfully executed without any failures. Therefore, the system achieved a validity percentage of 100%, indicating that the system functions properly and is considered valid and feasible for implementation.

Therefore, the developed Study Program Document Management Information System can be considered suitable for use as a digital

document management platform within the study program environment to support administrative effectiveness, improve the quality of document archiving, and better support study program accreditation requirements.

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