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Website Development of Information System Study Program UNSRAT as an Information Medium

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Abstract: Although the Information Systems Study Program at UNSRAT had an existing website, it failed to effectively deliver up-to-date and comprehensive academic information. Using the Rapid Application Development (RAD) methodology**,** this study aimed to address these limitations by designing and implementing a more interactive and informative website. Both students and the broader community often experienced difficulties in accessing essential program-related content, while the site's visual design was deemed unattractive. The objective of this research is to enhance the efficiency of academic information dissemination through requirement analysis, system design (UML diagrams and wireframes), implementation (CodeIgniter framework), and black-box testing. The findings revealed that all implemented website features operated as intended, with feedback from 70 respondents yielding an average rating of 4.1 out of 5.0. These results demonstrate that the website successfully met user expectations regarding accessibility, visual design, content relevance, and overall technical performance.

Keywords: Website; Information System Study Program; Rapid Application Development; Black box Testing

1. INTRODUCING

In the contemporary digital age, the demand for information has escalated substantially across diverse disciplines, encompassing the academic realm. Information functions as a conduit for the expansion of knowledge among its recipients. The dissemination of information can be facilitated through a multitude of methodologies, including the utilization of web-based platforms[1]. In the context of government agencies, private entities, and educational institutions, the presence of a website is of paramount importance. Websites are instrumental in the dissemination of information to a diverse audience. For students, a university website serves as the primary resource for obtaining information regarding their academic pursuits. Concurrently, the general public is expected to benefit from expedited access to information, which should facilitate a more profound comprehension of the available study programs. Prospective new students are advised to consult the website, which contains crucial information regarding registration, scholarship opportunities, and the particulars of the study program. This information can be taken into consideration prior to the decision of enrolment [2] .

Information Systems study program is the youngest study program at FMIPA UNSRAT based on SK Menristekdikti No.509/KPT/I/2016 and do not yet have specializations such as mathematics study programs[3]. Presently, the Information Systems Study Program maintains a website; however, it has not yet been fully optimized. A significant number of the website's elements are not updated with

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regularity, and the website's design is considered less appealing by users. Consequently, students, prospective students, and the general public encounter challenges in accessing information about the study program. Consequently, the development of a responsive website that incorporates academic requirements is imperative to optimize user experience.

Several previous studies have examined the development of web-based information systems for educational institutions, each focusing on different aspects such as promotion, academic resource delivery, or administrative integration [4][5][6][7][8][9][10]. However, most of these studies adopted traditional development models like the Waterfall method [9][10], lacked comprehensive user experience analysis, and did not consider accessibility issues. Furthermore, they generally targeted institutions at the faculty or university level, rather than focusing on specific study programs with unique needs.

Compared to those approaches, this research introduces three key contributions: (1) a focus on a specific academic program (Information Systems at UNSRAT), which allows for deeper customization and relevance; (2) an application of user-centered design and interactive features to enhance user engagement; and (3) the use of the RAD methodology for faster iteration and testing. This combination addresses existing gaps in the literature by integrating both content relevance and user accessibility in a focused, program-specific context.

2. RESEARCH METHODOLOGY

2.1. Research Stage

The research process commenced with the identification of the core problem, followed by a comprehensive literature review to gather insights from scholarly sources such as journals and relevant books, aiming to understand existing solutions or previous approaches to similar issues. Subsequently, data necessary for system development were collected through interviews, surveys, observations, and other appropriate methods to accurately determine system requirements and identify effective solutions. The system was then developed using the Rapid Application Development (RAD) methodology, which emphasizes accelerated development and frequent iterations. Upon completion, the researcher compiled a detailed report encompassing the entire process—from problem identification and literature review to data collection, system development, and testing.

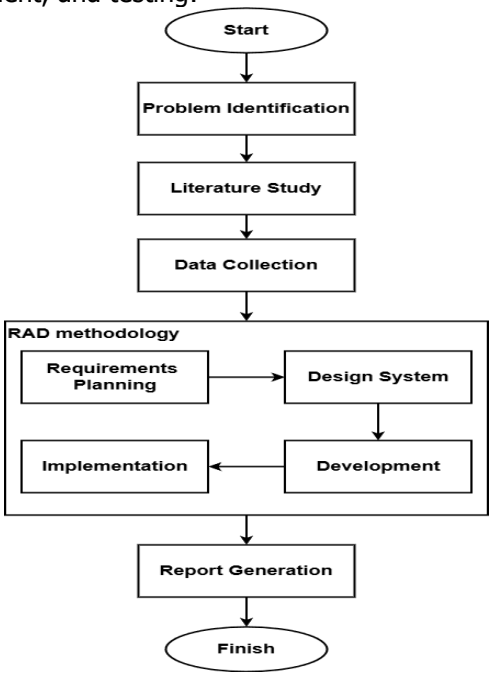

Figure 1. Research Flow Diagram

2.2. Data Collection Techniques

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This study uses three complementary data collection techniques: Observation, which involves direct monitoring of activities and situations at the study site to collect relevant data; Interviews, which consist of direct interactions between researchers and respondents through structured or semi-structured questions to obtain the necessary information; and documentation, which refers to the data collection process by taking pictures or collecting existing notes and documents as supporting evidence.

2.3. System Development Methodology

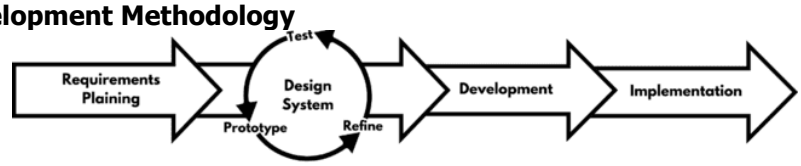

Figure 2. Stages of RAD Development Method

This study adopts the Rapid Application Development (RAD) methodology, comprising four key phases. The Requirement Planning phase involves conducting comprehensive needs analysis in collaboration with the Information Systems Study Program to identify system requirements and essential website features.

The System Design phase encompasses prototype development and database architecture design. Website prototypes are visualized through wireframe models that serve as blueprints for client review and feedback. System modeling employs UML diagrams to define user interactions, system processes, and database relationships.

During the Development phase, design specifications are converted into a functional application. The database is implemented using MySQL, while the user interface and system functionality are developed using PHP with the CodeIgniter framework. System validation is conducted through Black Box Testing to ensure all features [11].

The Implementation phase integrates all components into a fully operational website, accompanied by staff training for the Information Systems Study Program personnel to ensure effective system utilization and maintenance. This phase contributes new insights toward addressing the identified information accessibility problems, supported by comprehensive documentation including system diagrams and operational flowcharts[12][13][14].

2.4. Likert Scale

The Likert Scale is a commonly utilized psychometric tool intended to assess respondents' attitudes, perceptions, or behaviors regarding a particular research subject. Responses are assigned numerical values, enabling the transformation of subjective opinions into quantifiable data[15].

Table 1. Likert Scale

Scale	Interval	Category
1	1 – 1,8	Strongly Disagree
2	1,9 – 2,6	Disagree
3	2,7 – 3,4	Quite
4	3,5 – 4,2	Agree
5	4,3 – 5,0	Strongly Agree

3. RESULT AND DISCUSSIONS

4.1. Requirement Planning

Based on discussions with coordinator of Information Systems Study Program and user observations, the following needs analysis has been identified for website development:

Table 2. Needs analysis

Functional Needs	Non – Functional Needs
Admin login system	A responsive design that works on different devices

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Study program profile management	Easy-to-use navigation
Lecturer and staff data management	Simple content updates
Academic information updates	Compatible with various web browsers
Information and event management	
Activity gallery management	
Achievement records management	
Website slider/banner management	
Visitors should be able to access profiles, academic information, news, galleries, achievements, and alumni	
The website must always provide the latest study program information	

4.2. System Modelling

This study employs UML system modeling, comprising a Use Case Diagram, Admin and User Activity Diagrams, as well as a Class Diagram to depict the relationships among database tables.

4.2.1. Use Case Diagram

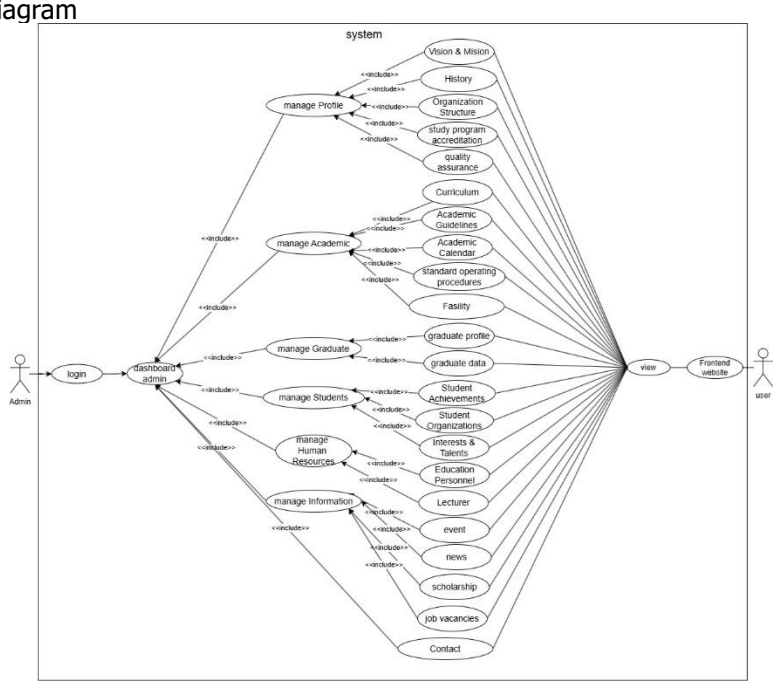

Figure 3. Use Case Diagram

A Use Case Diagram illustrates the expected functionalities of the system being developed and represents interactions between actors and the system[16]. The Use Case Diagram illustrates the core functionalities of the system, highlighting interactions between two main actors: the administrator and the general user. The administrator manages dynamic content through the backend interface, while users access published information via the public-facing frontend.

4.2.2. Activity Diagram

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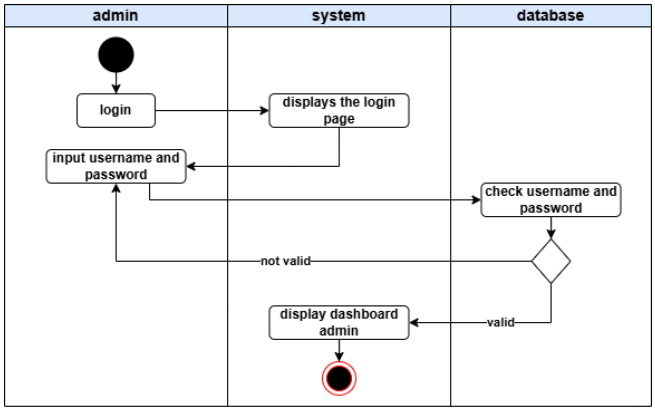

Figure 4. Activity diagram admin login

The activity starts with filling in the email and password. Next, the system will check what is entered with the data in the database. If the email and password entered are correct, the system will move the page to the main page.

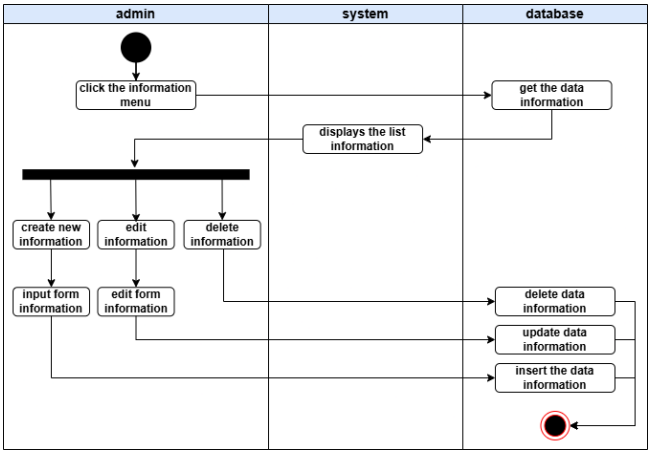

Figure 5. Activity diagram management information

On Figure 5 illustrates the workflow of the administrator when managing information on the system. The process begins when the administrator clicks on the information menu. Then, the system displays a list of information retrieved from the database. The administrator can then choose to add, edit, or delete information. When adding or editing information, the administrator fills out the appropriate form, and the system saves the changes to the database. If the admin selects delete, the data is immediately removed from the database. The process ends once the data has been successfully processed

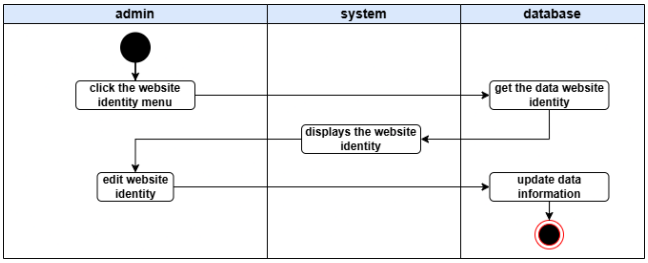

Figure 6. Activity diagram update website identity

On Figure 6 This activity diagram explains the admin process in managing website identity. The process starts when the admin clicks on the website identity menu, then the system retrieves and

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displays identity data from the database. After that, the admin can edit the website identity as needed. Changes made will be updated by the system into the database. The process ends after the identity data is successfully updated.

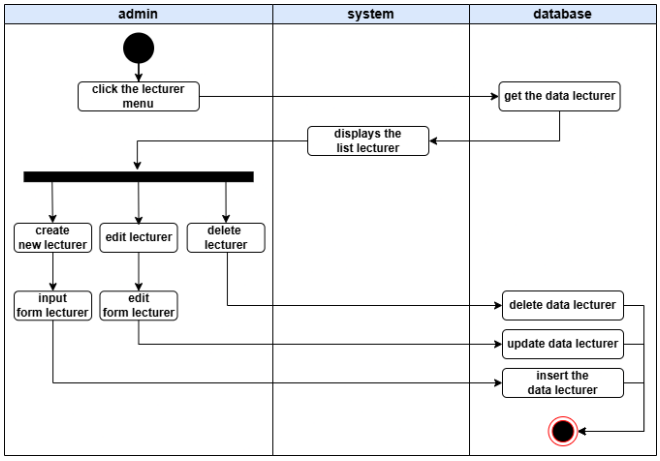

Figure 7 Activity diagram management lecturer

On Figure 7, illustrates the admin process in managing lecturer data. The process starts when the admin clicks on the lecturer menu, then the system retrieves and displays a list of lecturer data from the database. After that, the admin can choose to add, edit, or delete lecturer data. If adding or editing, the admin will fill in the appropriate form, and the system will save or update the data into the database. If deleting, the system will immediately delete the data from the database. The process ends after the lecturer data has been successfully processed.

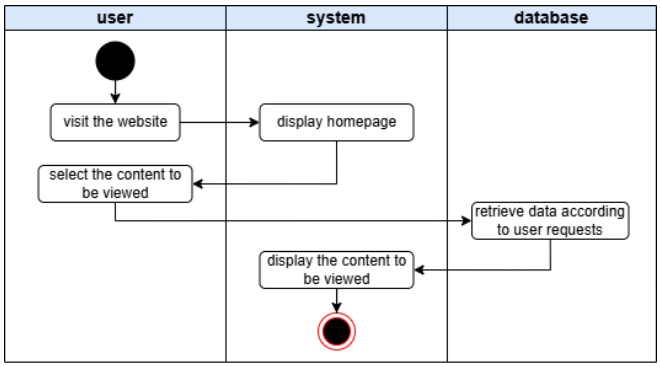

Figure 8. User Activity Diagram

Figure 8 illustrates user activity when accessing the website. The process starts when the user visits the website, then the system displays the main page (homepage). Next, the user selects the content they want to see, then the system retrieves data from the database as requested and displays it to the user. In this system, users can only view the available information without the need to log in, because there is no special feature for user authentication.

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4.2.3. Sequence Diagram

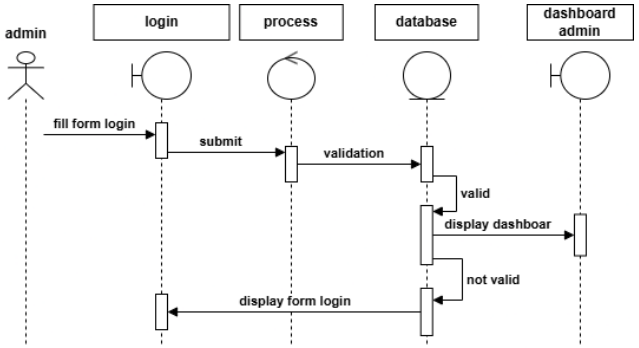

Figure 9. sequence diagram login admin

Figure 9 explains the login process performed by the admin. The process starts when the admin fills in the login form and sends it to the system. The system then processes and validates the login data by matching it to the database. If the data entered is valid, the system will display the admin dashboard page. But if the data is invalid, the system will display the login form again to be filled in by the admin.

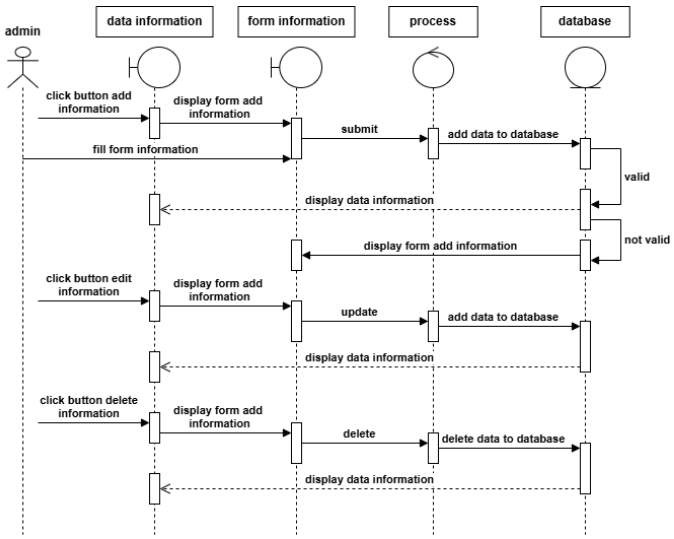

Figure 10. sequence diagram management information

Figure 10 explains the flow of information data management by the admin. The process starts when the admin clicks the button to add information, then the system displays the form. After the form is filled in and submitted, the data will be processed and saved to the database. If the data is valid, the system displays the information data again; if it is invalid, the form will be displayed again. Admins can also edit or delete information via the edit or delete buttons. Each of these actions will call the form and update or delete the data in the database, then the system will display the updated information data.

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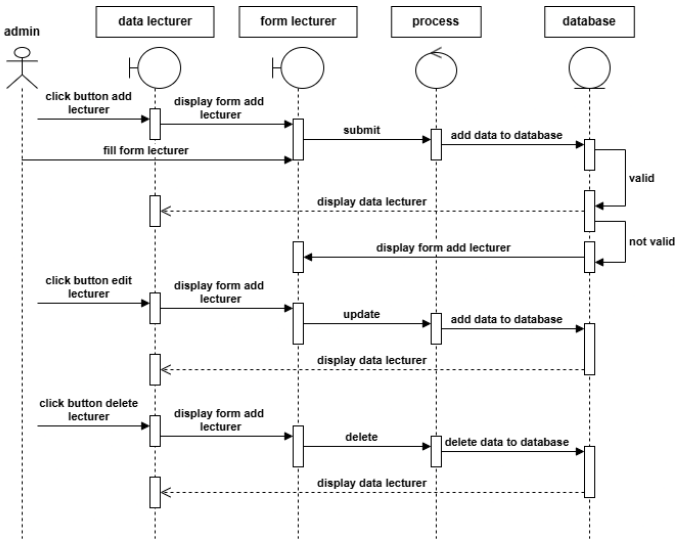

Figure 11. sequence diagram management lecturer

Figure 11 explains the process of managing lecturer data by the admin. Admin can add, edit, or delete lecturer data through the available buttons. When the admin adds a lecturer, the input form will be displayed and after being filled in and then submitted, the data will be validated and saved to the database. If valid, the system displays the lecturer data, if invalid, the form is displayed again. The edit and delete process is done in a similar way, where lecturer data is updated or deleted from the database, then the system displays the updated lecturer data.

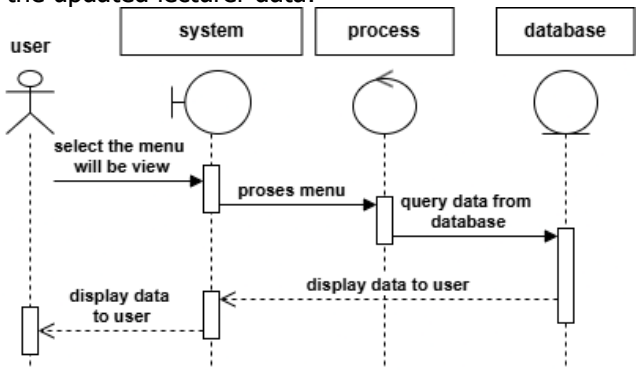

Figure 12. sequence diagram user

Figure 12 explains the process when the user selects the menu they want to see, such as history, vision and mission, SOP, curriculum and others. The system then processes the request and requests data from the database. After the data is successfully retrieved, the system displays the data to the user.

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4.2.4. Class Diagram

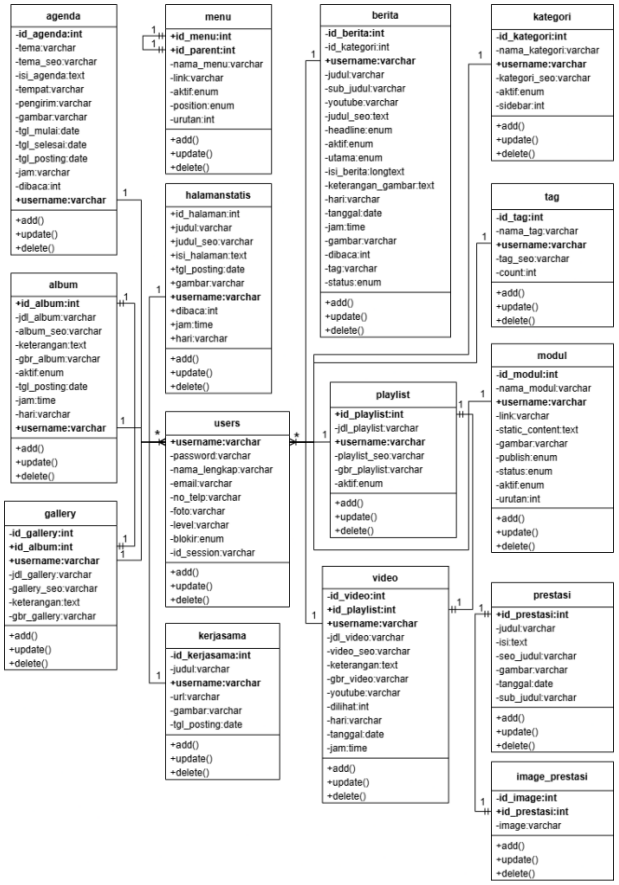

Figure 13. Class Diagram

A Class Diagram represents the database structure by depicting the system's classes along with their attributes and relationships [17]. Figure 13 illustrates the database structure and the relationships between the entities of the Information Systems Study Program website. The Users entity serves as the central authentication system, managing user accounts and access levels. Content management is handled through several interconnected entities: Berita (News) manages articles, Agenda manages events, Gallery and Album manage photos, and Video with Playlist manages multimedia content. The Kategori (Category) and Tag entities provide flexible content classification systems, and the Menu entity manages the website's navigation structure. Additional entities include Halamanstatis (Static Pages) for institutional information, Modul for managing system components, Kerjasama (Partnerships) for collaboration records, and Prestasi (Achievements) with Image_prestasi for documenting institutional accomplishments. Each entity contains relevant attributes and standard CRUD operations (add(), update(), and delete() to support comprehensive content management functionality. The relationships between these entities ensure data integrity and enable efficient organization of content across the website.

4.3. Development

The system development phase begins with coding activities guided by the previously constructed wireframe designs. This stage employs the CodeIgniter 3 framework, utilizing PHP as the programming language and MySQL for database management. Backend development adheres to the Model-View-Controller (MVC) architectural pattern, wherein the Model facilitates interactions with the database, the Controller manages business logic and user requests, and the View is responsible for presenting data to users. Data entered through the View is processed by the Controller and either stored in or retrieved from the database via the Model. Upon completion of the website, Black Box Testing was implemented

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to verify that all functionalities and system components performed according to expectations. This testing method focuses on examining input-output behavior and process workflows without reviewing the underlying source code. Each system element was tested based on predetermined use case scenarios, which included data handling within the admin interface, frontend presentation, and user-system interactions. The testing outcomes were analyzed to detect and correct any bugs or malfunctions prior to the system's official deployment.

4.3.1. Admin Page Testing

The Admin Panel is a page used by admin users to manage various data in a website. Through this page, admin can add, edit, and delete data on several main menus, such as Home, Profile, Academics, Human Resources, Information, and others.

Table 3. Blackbox Testing User Page

No.	Case Test	Expected Result	Test Result
1	Admin enters the appropriate username and password	Successfully log in to the admin dashboard	Pass
2	Click the add data button on page slider menu	The website displays a form to add data	Pass
3	Click the edit data button on page slider menu	The website displays a data edit form	Pass
4	Click the delete data button on page slider menu	System successfully deletes data	Pass
5	Click the edit data button on Statistics study program	The website displays a data edit form	Pass
6	Click the edit data button on page Koor. Prodi Welcome	The website displays a data edit form	Pass
7	Click the add data button on page SOP	The website displays a form to add data	Pass
8	Click the edit data button on page SOP	The website displays a data edit form	Pass
9	Click the delete data button on page SOP	System successfully deletes data	Pass
10	Click the add data button on lecturer page	The website displays a form to add data	Pass
11	Click the edit data button on lecturer page	The website displays a data edit form	Pass
12	Click the delete data button on lecturer page	System successfully deletes data	Pass
13	Click the add data button on page Event	The website displays a form to add data	Pass
14	Click the edit data button on page Event	The website displays a data edit form	Pass
15	Click the delete data button on page Event	System successfully deletes data	Pass
16	Click the add data button on page Information	The website displays a form to add data	Pass
17	Click the publish/no data button on Information page	Website displays a status Published/ Unpublished	Pass
18	Click the edit data button on page Information	The website displays a data edit form	Pass
19	Click the delete data button on page Information	System successfully deletes data	Pass
20	Click the logout button	Admin exits successfully exit the admin dashboard	Pass

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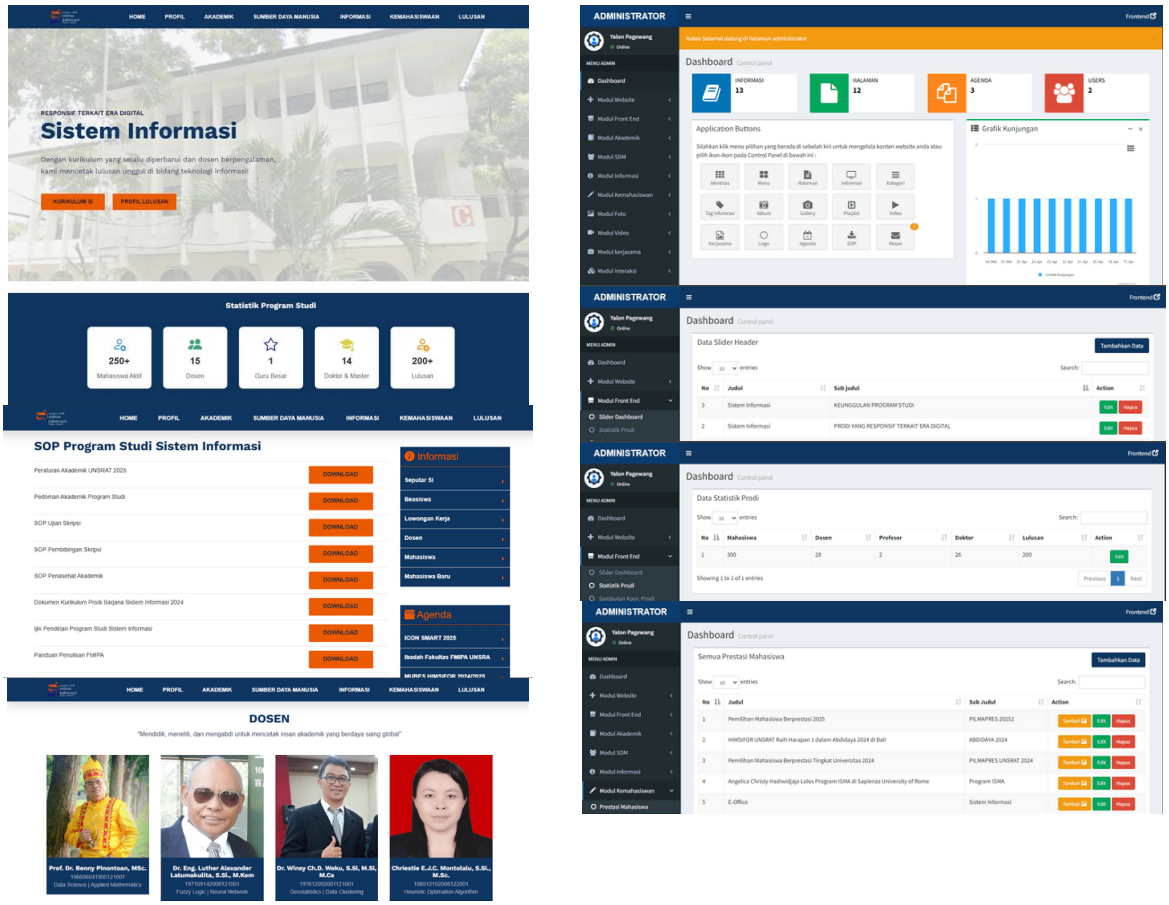
4.4. Implementation

The implementation stage outlines the outcomes achieved following the completion of the research. In this phase, the researcher details the application of the developed system and assesses its effectiveness based on the results of the testing process.



(a) **(b)**

Figure 14. Implementation user page and admin panel

The implementation phase of this research showcases the realization of a functional website for the Information Systems Study Program at UNSRAT. As illustrated in Figure 14, the system interface has been developed to accommodate both user-facing and administrative functionalities within a unified platform. On the user side (part a), the homepage features a clean and responsive design with a top navigation bar that includes menus for accessing program information, statistics, news, facilities, and contact details-each equipped with sub-menus for improved navigation. The interface also includes a dynamic image slider, program statistics display, a welcome note from the coordinator, and sections highlighting the latest information, facilities, achievements, and partner collaborations. These elements aim to ensure intuitive access to academic content for students and the general public.

Meanwhile, the administrator interface (part b) provides comprehensive content management capabilities. The admin dashboard features a sidebar with modules for managing various aspects of the website, including homepage sliders, study program statistics, standard operating procedures (SOP), lecturer data, event schedules, and student achievements. Each module enables administrators to add, edit, or delete entries, ensuring that the website remains up-to-date without requiring code-level modifications. Additionally, a control panel displays key metrics, while analytics graphs offer insights

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into visitor engagement. This dual-interface system ensures that both content accessibility for users and efficient backend management for administrators are effectively addressed.

4.5. User Feedback Analysis

Following the website implementation, the researchers carried out an analysis of user feedback utilizing a Likert scale to evaluate the quality and effectiveness of the developed website. The questionnaire instrument used for gathering this feedback is presented in Table 4.

Table 4. Questionnaire

No	Questionnaire
1	I find it easy to find the academic information that I need on this website
2	This website helps me in getting information about the curriculum, lecturers, related news study programs, and scholarships
3	This website contains information about lecturers, academic staff, and activity documentation
4	This website navigation is clear and easy to understand
5	Visual design of this website is attractive and comfortable to use
6	This website has a layout that makes it easy for me to find the information needed
7	This website provides information that is relevant to my needs as a student or general user
8	I find it easy to access academic documents (such as study program accreditation, academic guidelines and study programs) through this website
9	I feel the photo and video gallery feature on this website is useful for finding out the activities of the study program
10	This website is responsive and can be accessed well through various devices (computers, tablets, cellphones)
11	This website loading time is fast and does not experience interference when used
12	I did not experience technical obstacles when using this website (error, pages were not found, etc.)

Total Score is calculated by the formula:

$$\text{Total score} = (\text{Amount STS} \times 1) + (\text{Amount TS} \times 2) + (\text{Amount N} \times 3) + (\text{Amount S} \times 4) + (\text{Amount SS} \times 5) \quad (1)$$

Table 5. Detailed calculations User Feedback

Questionnaire	Total Score calculated	Average
Q1	$(0\times1)+(1\times2)+(10\times3)+(35\times4)+(24\times5)$ $=0+2+30+140+120=292$	$\frac{292}{70} = 4.17 = 4.1$
Q2	$(0\times1)+(0\times2)+(8\times3)+(31\times4)+(30\times5)$ $=0+0+24+134+150=298$	$\frac{298}{70} = 4.25 = 4.2$
Q3	$(0\times1)+(0\times2)+(8\times3)+(32\times4)+(30\times5)$ $=0+0+24+128+150=302$	$\frac{302}{70} = 4.31 = 4.3$
Q4	$(1\times1)+(3\times2)+(7\times3)+(34\times4)+(25\times5)$ $=1+6+21+136+125=289$	$\frac{289}{70} = 4.12 = 4.1$
Q5	$(0\times1)+(3\times2)+(8\times3)+(28\times4)+(31\times5)$ $=0+6+24+112+155=297$	$\frac{297}{70} = 4.24 = 4.2$
Q6	$(0\times1)+(0\times2)+(10\times3)+(36\times4)+(24\times5)$ $=0+0+30+144+120=294$	$\frac{294}{70} = 4.2 = 4.2$
Q7	$(0\times1)+(2\times2)+(7\times3)+(35\times4)+(26\times5)$ $=0+4+21+140+130=295$	$\frac{295}{70} = 4.21 = 4.2$
Q8	$(0\times1)+(3\times2)+(11\times3)+(28\times4)+(28\times5)$ $=0+6+33+112+140=291$	$\frac{291}{70} = 4.15 = 4.1$
Q9	$(0\times1)+(2\times2)+(7\times3)+(35\times4)+(26\times5)$ $=0+4+21+140+130=295$	$\frac{295}{70} = 4.21 = 4.2$

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Q10	(0×1)+(2×2)+(6×3)+(28 ×4)+(34×5) =0+4+18+112+170=304	$\frac{304}{70}$ = 4.34=4.3
Q11	(0×1)+(6×2)+(13×3)+(37×4)+(14×5) =0+12+39+148+70=269	$\frac{269}{70}$ = 3.84=3.8
Q12	(2×1)+(5×2)+(17×3)+(23×4)+(23×5) =2+10+51+92+115=270	$\frac{270}{70}$ = 3.85=3.8

The Table 6 groups the results of the Likert score calculation from 12 questions, along with the interpretation of the categories based on the 1-5 assessment scale in the Table 1

Table 6. Summary of Scores and Average User Ratings

No.	Value Questionnaire	1 STS	2 TS	3 N	4 S	5 SS	Score	Average	Category
1	Q1	0	1	10	35	24	292	4.1	Agree
2	Q2	0	0	8	32	30	298	4.2	Agree
3	Q3	0	0	8	32	30	302	4.3	Strongly Agree
4	Q4	1	3	7	34	25	289	4.1	Agree
5	Q5	0	3	8	28	31	297	4.2	Agree
6	Q6	0	0	10	36	24	294	4.2	Agree
7	Q7	0	2	7	35	26	295	4.2	Agree
8	Q8	0	3	11	28	28	291	4.1	Agree
9	Q9	0	2	11	29	28	295	4.2	Agree
10	Q10	0	2	6	28	34	304	4.3	Strongly Agree
11	Q11	0	6	13	37	14	269	3.8	Agree
12	Q12	2	5	17	23	23	270	3.8	Agree

Total Score of All Questions= 286+307+288+298+310+301+291+288+297+279+267+263=3.465

$$\text{overall Average percentage} = \frac{\text{Total Score}}{\text{total respondent x total questionnaire}} \quad (2)$$

$$= \frac{3.465}{70x12} = \frac{3.465}{840} = 4.125 = \mathbf{4.1}$$

Based on responses from 70 participants, the Information Systems Study Program website at Sam Ratulangi University received a generally very positive assessment with an average score of 4.13 on a scale of 5. Users highly appreciated the ease of accessing academic information (score of 4.1), the completeness of curriculum and lecturer profile content (score of 4.2), and the documentation of study program activities, which received the highest score of 4.3. Design and navigation aspects also received good ratings, ranging from 4.1 to 4.2, reflecting a user-friendly interface.

However, two aspects require special attention: page loading speed and technical stability, which scored lower than the other aspects at 3.8. The low page load speed score is likely due to several technical factors, such as large media file sizes, poor cache management, or limited server capacity. Meanwhile, technical stability issues, such as errors or broken links, may be due to a lack of regular system maintenance or dependence on unstable external features.

4. CONCLUSION

This study successfully developed an interactive and informative website for the Information Systems Study Program at UNSRAT, aimed at enhancing the distribution of academic information. Utilizing the Rapid Application Development (RAD) approach alongside Black Box Testing, the system demonstrated reliable performance and met user expectations. The website features a responsive layout and intuitive navigation, enabling students and the general public to access information more efficiently.

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Furthermore, user feedback from 70 respondents yielded an average rating of 4.1 out of 5.0, reflecting a high level of satisfaction regarding usability, content quality, and system performance. The implementation of this website significantly improves access to academic information and strengthens the communication of program-related updates.

Although the developed website has fulfilled its main objective of improving access to academic information for the Information Systems Study Program, some limitations have been identified. First, the system does not currently support personalized access for different user roles, such as student login or an alumni dashboard. This limits interactivity and personalization. Second, the system has experienced minor performance issues, such as slow page loading and occasional technical errors, as reflected in user feedback. These issues may stem from unoptimized media content and limited hosting capacity.

Future work should focus on implementing user authentication features to enable personalized access and content targeting. Additionally, a more scalable server infrastructure and a scheduled maintenance plan are recommended. Further usability testing across different devices and accessibility audits can improve inclusivity and the user experience for a wider audience.

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