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Designing a Web-Based Complaint System at The Medan Religious Training and Training Center Office

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ABSTRACT

This study aims to design and implement a web-based complaint system at the Medan Religious Training and Education Center as a solution to improve the effectiveness and efficiency of the complaint handling process. The problems encountered so far are that complaint management is still carried out manually, resulting in delays in response, lack of transparency, and potential data loss. The system development method used is the Unified Modeling Language (UML), with a focus on Use Case Diagrams and Activity Diagrams to model the complaint process flow in a structured manner. The system implementation was carried out using web-based technology, with black box testing as the testing method to ensure the system's functionality aligns with user needs. Testing results showed that all core system features, such as complaint registration, status tracking, and feedback provision, functioned according to specifications and produced valid outputs. With this system, the complaint process became faster, well-documented, and monitorable in real-time, thereby supporting improvements in public service quality within the relevant agency. This research provides practical contributions to the development of complaint management information systems and can serve as a reference for similar implementations in other government agencies.

Keywords: Complaint System, Web-Based Application, UML, Black Box Testing, Public Services

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1. INTRODUCTION

The development of information and communication technology (ICT) has brought significant changes to various aspects of life, including the government and public service sectors (Syahputri & Dewi, 2024). The use of web-based technology is one effective strategy for improving efficiency, transparency, and accountability in administrative management and public services. One form of public service innovation that is gaining attention is the development of a web-based complaint system, which enables the submission, recording, and handling of complaints or feedback to be carried out quickly, in a structured manner, and with proper documentation.

The Central Office for Religious Training and Training in Medan, as one of the institutions with a strategic role in the implementation of education, training, and human resource development in the religious field, has the responsibility to provide responsive, transparent, and accountable public

services (Faruqi & Ramadhan, 2024). In carrying out its duties and functions, this office frequently receives various inputs, suggestions, and complaints from trainees, staff, and the public. However, the current manual or conventional complaint handling mechanism poses several issues, such as delays in addressing complaints, lack of systematic documentation, and difficulties in monitoring the status of complaint resolution.

A web-based complaint system is a solution that can address these challenges. This system is designed to facilitate the process of submitting complaints by users online, including complaint registration, processing by the authorities, and real-time reporting of the status of handling. Thus, communication between the reporter and the managing party can be more effective, and the complaint handling process can be documented automatically. Additionally, this system can serve as a medium to increase public participation, build public trust in institutions, and support the principle of information transparency.

From a technical standpoint, designing a web-based complaint system requires careful planning, including needs analysis, system architecture design, implementation of a user-friendly interface, and functional testing to ensure optimal performance. A structured software development methodology is necessary to ensure that the resulting system meets user needs, has high reliability, and is easy to develop in the future. In addition, data security is a top priority, given that the information managed includes the personal data of complainants and sensitive complaint details.

Based on research conducted by (Wilda & Hanum, 2022) related to network complaint services at the Tebing Tinggi Communication and Information Office, previously, complaints were handled manually via telephone or direct visits, with records kept using Microsoft Word, which was ineffective and prone to errors. This study designed a web-based network complaint application using CodeIgniter, Bootstrap, MySQL, and PHP, with the Waterfall development method. This system is expected to speed up the handling of services and the processing of network complaint data.

Meanwhile, research conducted by (Rawat et al., 2022) related to Decision Support Systems (DSS) is an interactive computer-based information system that facilitates two-way communication between users and software. Many organizations, including the Ethiopian TVET Polytechnic College, face limitations in complaint management because they do not yet have an effective framework. This study developed an Intelligent Decision Support System for Managing Complaints (IDSSMC) based on a web and mobile application with SMS notifications, enabling users to register, submit, and monitor complaints anytime and anywhere. A descriptive approach was used to test the effectiveness of the system, and the results showed great potential for the application of model-based DSS to improve service quality and organizational decision-making.

Research conducted by (Hingorani et al., 2020) shows that criminal activity in India continues to increase, but much of it goes unreported. Although there is an online portal for filing Police Reports (FIR) and Incident Reports (NCR), most reports are still made manually and require the reporter to be physically present at the police station. The CCTNS system, launched in 2009, is centralized at the state level, making it vulnerable to central failures. To address this, a blockchain-based complaint system is proposed that decentralizes data storage, encrypts FIRs, stores them on IPFS, and records the hash on the blockchain. This approach ensures the security, integrity, and authenticity of complaints while preventing data manipulation.

The research conducted by (Heriyanto et al., 2022) was motivated by the low number of complaints and slow response times through SP4N-Lapor in Pontianak City. Using a qualitative approach and referring to Policy Implementation Theory, the results of the study show that program

implementation is generally in line with its objectives, supported by adequate facilities and infrastructure, and that implementers have good attitudes and communication skills. However, the limited human resources are the main factor hindering the effectiveness of SP4N-Lapor.

However, research carried out by (Rahmawati et al., 2023) related to UPT TIK complaint services that still rely on manual methods, such as physical letters and WhatsApp, faces obstacles in terms of priority and technical resource limitations. This study proposes the application of Multi-Attribute Utility Theory (MAUT) to assist decision-making in complaint handling, through the development of an information system based on the prototyping method. The process includes needs analysis, design, prototyping, testing, and implementation, aimed at simplifying complaint prioritization, optimizing resources, and improving the quality of ICT services within the university environment.

Therefore, this study focuses on designing a web-based complaint system at the Medan Religious Training and Education Center, using the UML development method. The web-based complaint system design aims to accelerate the complaint handling process at the Medan Religious Training and Education Center, but it can also serve as a model that can be adopted by similar institutions. This research will focus on needs analysis, system design, and functionality evaluation to ensure that the developed system can provide optimal benefits for users and the institution.

2. LITERATURE REVIEW

2.1. Complaint Service Information System

Complaint management in educational and training institutions is a structured mechanism designed to receive, process, and follow up on complaints or feedback from stakeholders, such as students, educators, employees, and the community. This system acts as a two-way communication tool that enables effective information exchange between the institution's management and service users. The primary objective of complaint management is to ensure prompt, appropriate, and transparent responses to every issue raised, thereby preventing problem escalation and enhancing public trust in the institution. In the context of education and training, complaints may encompass various aspects, including the quality of learning materials, the competence of educators, facilities and infrastructure, as well as administrative procedures.

The existence of an effective complaint system has strategic value in improving the quality of educational services. By utilizing data and information obtained from complaints, institutions can conduct continuous internal evaluations to identify weaknesses, formulate improvement strategies, and implement policies that are more responsive to user needs. Additionally, good complaint management supports the principles of accountability and transparency, which are important pillars of modern public institution governance. The implementation of an information technology-based complaint system, particularly one integrated into a web platform, enables the recording, monitoring, and reporting of complaints to be carried out more efficiently and well-documented. This aligns with the trend of digital transformation in the education sector, where public services are expected to be accessible quickly, easily, and without barriers, thereby strengthening the competitiveness and credibility of institutions at both the national and international levels.

A complaint management information system is a platform designed to manage, process, and follow up on reports or complaints from users in a structured manner. According to (Faujiah & Muín, 2024), information systems serve to collect, process, store, and distribute information to support decision-making and organizational coordination. In the context of complaint services, this system facilitates the recording of complaints, monitoring of resolution status, and communication between users and service providers. A digital-based information system can improve the efficiency and

effectiveness of complaint handling compared to manual methods such as the use of physical letters or unstructured instant messages (Harefa et al., 2024).

A complaint service is a mechanism provided by institutions, agencies, or companies to receive, process, and follow up on reports, complaints, or feedback from the public or customers. The main function of a complaint service is to serve as a two-way communication channel that bridges the gap between service providers and users, thereby improving service quality and building public trust. An effective complaint system is capable of identifying issues, measuring user satisfaction levels, and providing swift and targeted solutions.

However, many complaint services are still carried out manually, for example through suggestion boxes or recording in report books, and often encounter obstacles such as delays in handling, loss of data, and a lack of transparency in the problem-solving process. The lack of a report status tracking system means that complainants are unaware of the progress of their complaints, which ultimately reduces public trust and participation. Additionally, manual processes also risk introducing bias in handling priorities due to the absence of objective evaluation methods.

The use of information technology in complaint management enables the reporting, verification, and handling of complaints to be carried out more quickly, in a structured manner, and transparently. Information systems can provide real-time tracking of report status, send automatic notifications to relevant parties, and facilitate data analysis for service improvement.

2.2. Web-based Information System

According to (Rifai & Akbar, 2025), a web-based information system is a platform that utilizes network technology to provide real-time, interactive, and flexible access to information. These systems are typically developed using technologies such as HTML, CSS, JavaScript, PHP, and databases such as MySQL to store and manage data.

Previous studies have developed web-based and mobile application complaint systems. These systems generally include features such as report creation, status tracking, data management, and notifications to reporters. The results show that digitizing complaint services can improve the speed of handling and transparency of the process. The success of implementing a complaint service system is influenced by factors such as ease of use, response speed, clarity of information, data security, and the openness of the administrators to feedback. An effective system must be designed to be accessible to various segments of society with different levels of digital literacy.

2.3. Unified Modeling Language (UML) in Information System Design

Unified Modeling Language (UML) is a standard modeling language widely used in software engineering to visualize, design, and document the components and workflows of an information system. UML provides a set of graphical notations that enable developers, system analysts, and other stakeholders to share a common understanding of the system specifications to be built. In the information system design process, UML not only serves as a visual communication medium that bridges business needs and technical solutions, but also as a systematic guide for identifying the structure, behavior, and interactions between system components.

Two types of UML diagrams that are often used in the system design stage are Use Case Diagrams and Activity Diagrams. Use Case Diagrams serve to illustrate the relationship between actors (users or external systems) and the main functions provided by the system, thereby helping to clearly identify functional requirements. Meanwhile, Activity Diagrams are used to model workflows or

business processes that occur within the system in a structured manner, illustrating the sequence of activities, decision branches, and interactions between processes. The integrated use of these two diagrams allows developers to understand the system from both a functional and operational process perspective, thereby minimizing the risk of misinterpretation. In the context of modern information system development, UML also supports model-driven development practices, where well-documented designs can be directly integrated into the implementation phase, ensuring consistency between the design and the realized system.

3. METHODS

3.1. Research Design

This research was designed using a research and development (R&D) approach with a focus on developing a web-based information system that functions as a complaint mechanism at the Medan Religious Training and Education Center. The R&D method was chosen based on the need to produce an information technology product that is not only conceptually designed but also implemented and tested for feasibility in a real operational context. This approach allows researchers to go through systematic stages, starting from identifying user needs, designing system models, implementing software, to evaluating the performance of the resulting system. The research framework adopts a structured system development model, which includes the following stages (Khairani et al., 2024) : (1) needs analysis to identify the main functions required in the complaint system, (2) system design using Unified Modeling Language (UML) to visualize workflows and relationships between components, (3) web-based system development with the selection of appropriate technologies to support performance and security, (4) system implementation in a test environment, and (5) system testing using the Black Box Testing method to ensure that all functions run according to specifications (Ananda & Ihsan, 2024). This research design emphasizes the integration between user needs validation and system functionality evaluation, so that the development results can make a real contribution to improving service quality in the relevant institutions.

3.2. System Requirements Analysis

System requirements analysis was conducted to comprehensively identify the features and functionality that must be possessed by the web-based complaint system at the Medan Religious Training and Education Center. This process was carried out through a combination of interviews, direct observation, and document studies related to the complaint management procedures that have been used so far (Syamia et al., 2024). Interviews were conducted with employees who serve as complaint managers, training instructors, and management to obtain a comprehensive picture of the complaint handling process, the obstacles encountered, and expectations for the new system. Observations were made by directly monitoring the complaint reception and processing process in the office environment, thereby obtaining factual data on work patterns, handling duration, and frequently occurring problems. In addition, a document study was conducted on complaint forms, complaint handling reports, and internal communication archives to understand the data format, the type of information required, and the applicable administrative procedures. Based on the analysis results, system requirements were categorized into two main categories: functional requirements and non-functional requirements. Functional requirements include user registration, online complaint form submission, complaint status tracking, notifications to relevant parties, and the generation of complaint summary reports. Meanwhile, non-functional requirements include data security, usability, access speed, and system compatibility across various devices. The results of this needs analysis form the basis

for the system design phase, ensuring that the developed product addresses existing issues and meets stakeholder expectations.

3.3. System Design with Unified Modeling Language (UML)

The system design method used in this study employs the Unified Modeling Language (UML) approach as a standard visual modeling language in software development. UML was chosen for its ability to describe system designs clearly, in a structured manner, and in a way that can be understood by various parties, both technical and non-technical. The UML diagram is illustrated in Figure 1. (Nugroho & Rahmadani, 2024) (Rifki & Syamia, 2024)

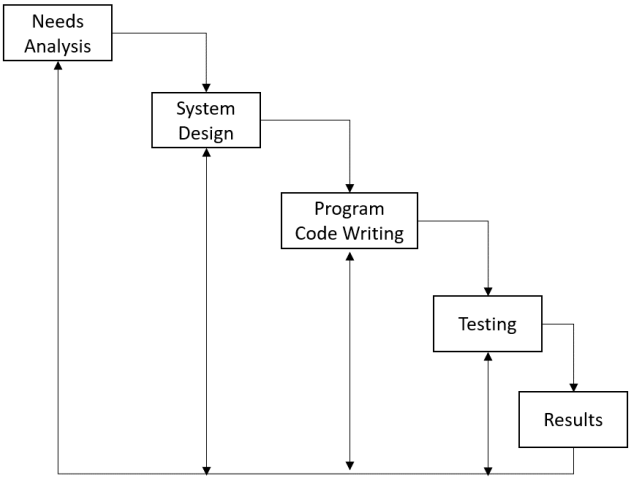

Figure 1. UML Diagram

In designing the Web-Based Complaint System at the Religious Training and Training Center in Medan, the UML modeling used focused on two types of diagrams, namely Use Case Diagrams and Activity Diagrams, to describe the functional requirements and business process flows of the system in detail. Use Case Diagrams are used to model interactions between external and internal actors and the system. In this context, the actors involved include general users (complaint submitters), administrators, and complaint handling officers. This diagram illustrates each service or function accessible to each actor, such as complaint report creation, report verification, follow-up assignment, and the creation of resolution outcome reports. Through this modeling, the system's functional requirements can be identified comprehensively, thereby minimizing the risk of errors or functional deficiencies during the implementation phase.

Activity Diagrams are used to illustrate the flow of activities for each main process in the system. These diagrams explain the sequence of steps performed by users and the system, starting from the complaint submission process, reception and verification by the admin, assignment to officers, to the complaint resolution process. With Activity Diagrams, every business process in the system can be visualized in detail, including workflow branches and decisions made at each stage. This aims to ensure that the processes designed are in accordance with the work procedures at the Central Office for Religious Training and Training in Medan. The usage of a combination of Use Case Diagrams and Activity Diagrams in the UML development method in this study provides two main benefits, namely: (1) assisting developers in visualizing system requirements and workflows comprehensively prior to

implementation, and (2) facilitating communication between the development team and stakeholders, so that the system built can address organizational needs accurately and effectively.

3.4. Development of a Web-Based Complaint System

The development of a web-based complaint system in this study was carried out using open source technology that supports flexibility, scalability, and ease of management. The development environment was built using XAMPP as a local server package that integrates Apache as a web server, MySQL as a database, and PHP as the main programming language. Database management was carried out using phpMyAdmin, which facilitates the creation, modification, and maintenance of tables and data relationships in a graphical manner. For user interface design, a CSS Framework (such as Bootstrap) was used to ensure a responsive, consistent, and accessible appearance across various devices. The code editor used is Notepad++, which supports PHP, HTML, CSS, and JavaScript syntax, thereby simplifying the process of writing and testing program code.

The coding process began with building a database structure in MySQL, including creating tables to store user data, complaints, handling status, and activity logs. The next stage was creating PHP scripts to implement system logic, including user authentication, complaint form input and validation, data management by administrators, and sending complaint status notifications. The interface design is created using HTML combined with a CSS Framework to produce a user-friendly and professional layout. Integration between the interface and the database is achieved through PHP scripts that execute SQL commands to retrieve, process, and display data according to user requests. After all modules were developed, internal testing was conducted in the XAMPP environment to ensure all functions operate as required before the system was deployed on the production server. This approach enables structured, efficient system development that is easy to expand in the future.

3.5. *System Implementation*

The system implementation stage is the process of translating the design that has been created into an application that can be run in real life. In this study, the implementation was carried out using a local development environment based on XAMPP, which provides Apache web server services and MySQL databases. All system components, from the frontend to the backend, were integrated gradually to ensure that each module functioned according to the design.

The implementation began with building the database in phpMyAdmin, including creating tables, relationships, and constraints that had been determined in the design phase. Next, the program code was written using PHP to handle process logic, HTML and CSS Framework for the user interface, and JavaScript for dynamic interactions on web pages. Notepad++ Editor was used as an efficient code writing medium that supports syntax highlighting.

Integration between modules is carried out iteratively, starting from the user authentication module, complaint form, complaint data management by admin, to the reporting and data printing module. Each feature is tested directly on the local XAMPP server before being uploaded to the production server. With this approach, the implementation not only ensures that the system can be run, but also maintains consistency between design, functionality, and user experience.

3.6. *System Testing*

System testing is conducted to ensure that every function in the web-based complaint application runs according to the specifications set during the design stage. The method used is Black Box Testing, which focuses on testing the functionality of the system without looking directly at the program code.

This approach checks whether the output generated matches the input provided, thereby identifying logical errors or process inconsistencies.

The testing stages are carried out by compiling test scenarios based on a list of functional requirements, such as testing the login process, submitting complaint forms, verifying data stored in the database, tracking complaint status by users, and generating reports by administrators. Each scenario is equipped with varying input parameters to test the system's resilience under normal and extreme conditions.

Test results are recorded in a test table, which includes columns for the scenario, input, expected output, actual output, and test status (pass or fail). Based on the test results, all main system features functioned according to specifications, with minor improvements addressed promptly. This testing ensures the system has sufficient functionality and reliability for operational use at the Medan Religious Training and Education Center.

3.7. Research Environment and Equipment

The development and testing of the web-based complaint system was carried out in an environment that had been adapted to support the programming, testing, and implementation processes. The hardware used consists of a laptop with the following specifications: Intel Core i5 processor, 2.5 GHz speed, 8 GB RAM, 512 GB SSD storage capacity, and a 14-inch screen. These specifications were chosen to ensure that code compilation, local server execution, and application testing can run smoothly without performance issues.

The software used includes XAMPP as a local server that provides Apache and MySQL modules, PHP as the main programming language, PHPMyAdmin as a database management interface, CSS Framework to support responsive interface design, and Notepad++ as a text editor for coding (Alda & Rifki, 2022). The operating system used is Windows 10 Pro 64-bit, which is compatible with all development software. This environment was chosen to provide flexibility, stability, and ease in the debugging and system testing processes.

4. RESULTS AND DISCUSSION

The Medan Religious Education Training Center Participant Complaint Service is one solution for handling cases that have been identified previously, as it will become a place to record complaints from participants who come to the Medan Religious Education Training Center. This application will be able to determine how many visitors came today and what activities they engaged in. Additionally, the application can also identify which civil servants have visited the Medan Religious Education Training Center based on the stored data.

The system design implementation phase is the process of translating conceptual and technical designs into a web-based complaint application that can be directly used by users. This implementation is based on the results of the needs analysis and design formulated in the previous phase, ensuring alignment between the design and the final system output In terms of user interface, the system was developed based on user-centered design principles to ensure ease of navigation, consistency of appearance, and readability of information. The interface design utilizes a combination of responsive layouts so that it can be accessed easily via desktop and mobile devices. Each page, such as the dashboard page, complaint form, complaint list page, and admin module, is designed with a clear visual hierarchy, consistent use of colors, and representative icons to enhance the user experience.

From a system architecture perspective, the application is built using a three-tier architecture model that separates the presentation layer, application layer, and data layer. This approach provides flexibility in development, simplifies maintenance processes, and enables system scalability in the future. The presentation layer is implemented using HTML, CSS, and JavaScript to display information and interactions to users. The business logic layer is developed using the PHP programming language, which manages the complaint process flow from data entry to verification by the admin. Meanwhile, the data management layer utilizes MySQL as a relational database that stores complaint information in a structured manner and ensures its integrity.

4.1. System Implementation

The design of the main page interface of a web-based complaint system designed for the Medan Religious Training and Education Center. This interface contains key elements such as a navigation menu, complaint form, and general information area that make it easy for users to understand how to use the system. The navigation menu is strategically placed to facilitate access to important pages such as the home page, complaint form, report status, and service contacts. The complaint form is equipped with clear input fields for filling in the reporter's data, problem description, and options for uploading supporting evidence such as images or documents. Additionally, this interface is designed to be responsive, ensuring optimal access via both computers and mobile devices, thereby guaranteeing user comfort and efficiency. The design prioritizes simplicity and readability, with color choices, icons, and typography that support accessibility and convey a professional appearance in line with government agency requirements. The main page interface can be viewed in Figure 2.

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	id	int(11)			No	*None*		AUTO_INCREMENT	Change Drop More
☐	2	nama	varchar(50)	utf8mb4_general_ci		No	*None*			Change Drop More
☐	3	username	varchar(30)	utf8mb4_general_ci		No	*None*			Change Drop More
☐	4	password	varchar(250)	utf8mb4_general_ci		No	*None*			Change Drop More
☐	5	komplain terhadap BDK Medan	varchar(250)	utf8mb4_general_ci		No	*None*			Change Drop More

Figure 2. phpMyAdmin Structure

A Use Case Diagram representation that illustrates the interaction between actors (users) and the system. The actors, represented by human silhouette icons, are located on the left and act as the parties using the system. From these actors, there are associations to six use cases represented by yellow ellipses, namely Menu, Login, Save Data, Delete Data, Update Data, and Search Data. Each use case represents a function or service that users can access within the system. Menu provides the main access point for selecting available features. Login is used for user authentication before accessing system features. Save Data allows for the storage of new data, while Delete Data is used to remove unnecessary data. Update Data is used to update existing data, and Search Data is used to search for specific data within the system. This diagram provides an overview of the system's limitations and the interactions between users and the functionality provided.

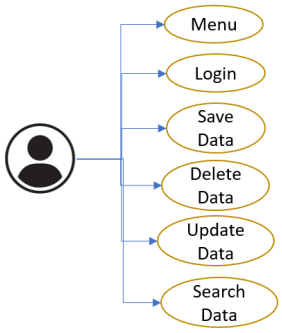

Figure 3. Use Case Diagram

Meanwhile, the activity diagram for the menu mechanism in the application can be seen in Figure 4.

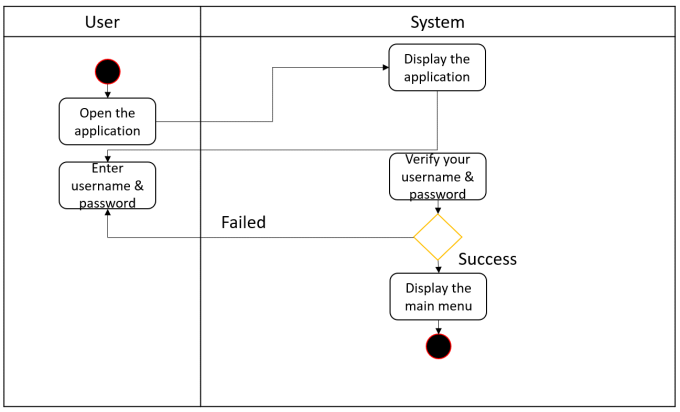

Figure 4. Activity Diagram Form Menu

Based on Figure 4, the Activity Diagram illustrates the user authentication process in an application. The process begins with the User actor opening the application. Once the application is open, the system displays the application interface to the user. Next, the user is prompted to enter their username and password. The system then verifies these credentials. If the verification process is successful (Success), the system displays the main menu to the user, indicating that the login process has been completed successfully. However, if the verification fails (Failed), the user is redirected back to the process of entering the username and password to attempt login again. This diagram uses swimlanes to distinguish between activities performed by the User and the System, making the interaction flow clear. Additionally, the Activity Diagram can be viewed in Figure 5.

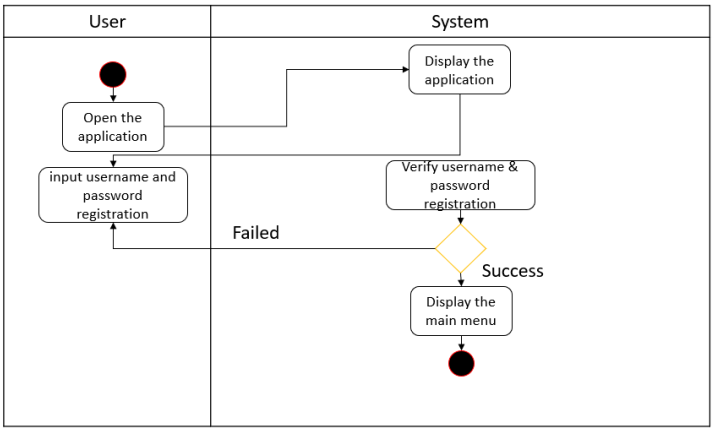

Figure 5. Activity Diagram Login Form

Figure 5 shows an activity diagram that models the user authentication process in an application. The flow begins when the user opens the application, then the system displays the initial interface. Next, the user enters their registered username and password. The system then verifies the entered data. If the verification fails (Failed), the process prompts the user to re-enter the correct username and password. However, if the verification succeeds (Success), the system displays the main menu (Display the main menu). This diagram separates the roles of the user and the system into two swimlanes, making the interaction between the two parties clear. This model helps systematically understand the login and account validation process stages before the user can access the application's main features.

4.2. Application Display

4.2.1. Login Page Display

This main form displays the initial screen for the program. This form is the first step that must be completed. From this menu, participants select the login option and are then directed to the login form. The login screen is shown in Figure 6.

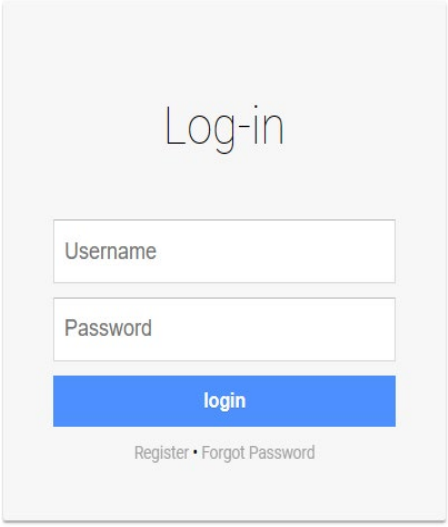

Figure 6. Form Login

Figure 6 shows the login page interface of a web-based application or system. There are two input fields, namely Username and Password, which users use to enter their account credentials. Below the input fields is a blue button labeled “Login” that sends the authentication data to the server.

Additionally, there are two extra links: 'Register' for creating a new account and "Forgot Password" to assist users who have forgotten their password. This design is simple and focused on authentication functionality, making it easy for users to access available features immediately after successfully logging into the system.

4.2.2. Dashboard Page

The main interface display (home) of the AdminBDKmedan system. In the main section of the screen, there are three large icons, each representing the main functions of the system, namely Complaint Entry (yellow document icon), Print Complaint (gray printer icon), and Users (blue three-person icon) which indicates user data management. On the right side, there is a vertical navigation panel with a dark brown background containing admin profile information, navigation menus such as Home, Dashboard, and Reports.

Additionally, at the bottom of the navigation panel, there is a Logout button with a power icon, as well as application version information (V. 3.05). This interface design uses a combination of neutral colors and illustrative icons to facilitate function identification, and places the main navigation on the right side to provide a concise and structured user experience. The main page interface display can be seen in Figure 7.

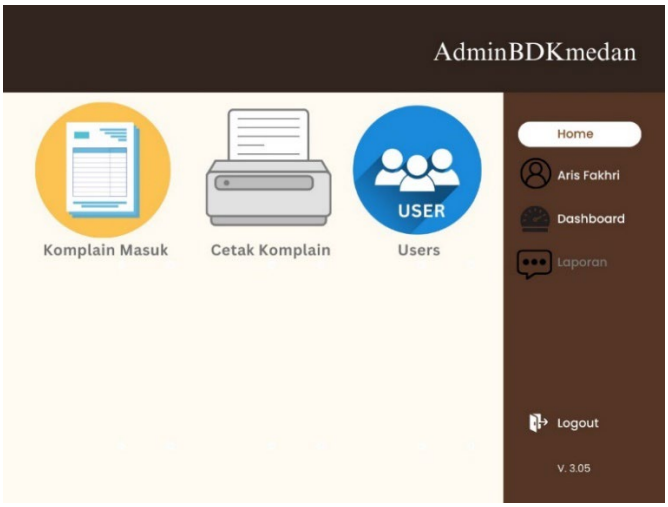

Figure 7. Dashboard Page

4.2.3. Complaint Entry Input Page

The interface display of the complaint data change form page on the BDK Medan admin system. The design uses a dominant brown and cream color scheme that gives a professional and consistent impression. On the left side of the page, there are four input columns labeled Name, Email, Address, and Complaint. These columns allow the admin to update detailed information related to the received report or complaint. Below the input columns, there is a dark brown "Update" button, which is used to save the changes made to the data. On the right side of the page, there is a vertical navigation panel. The user interface of the complaint form page can be seen in Figure 8.

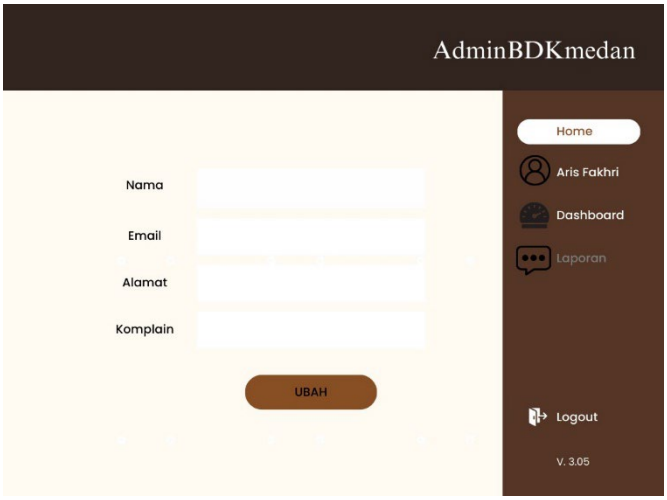

Figure 8. Complaint Input Form

4.2.4. Complaint Data Page

The Home page interface of the AdminBDKmedan system, designed to manage report or complaint data. The interface is divided into two main sections: a navigation panel on the right and a data table on the left. In the main section, there is a table listing complaints with columns for No., Date, Name, Complaint, and Action. The displayed data shows three entries with varying complaint contents, ranging from complaints about lunch breaks being too long, appreciation for the cleanliness of the training facility, to praise for the organizing committee. Each entry has an Edit option in the Action column, indicating that the data can be updated by the admin. The design uses a warm color palette with brown and cream tones, giving a formal yet friendly feel for the internal report management system. The complaint summary page interface can be seen in Figure 9.

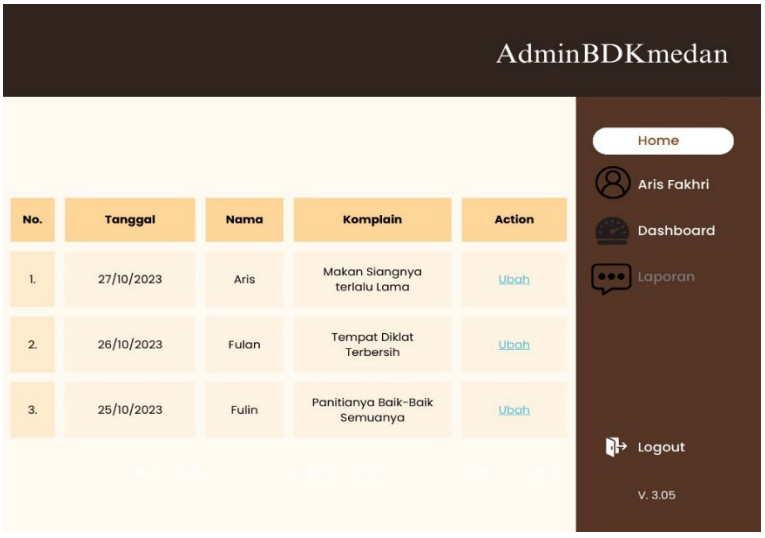

Figure 9. Complaint Summary Page Display

4.3. Application testing

Application testing using the Black Box method focuses on evaluating system functions based on inputs and outputs without directly examining the source code. In the context of a web-based complaint system, testing is conducted by simulating user scenarios, such as the complaint submission process, the display of complaint data on the admin page, and data management (edit or delete). Each

scenario is tested by inputting both valid and invalid data to ensure the system responds appropriately (Rifki et al., 2023). The results of the Black Box testing can be viewed in Table 1.

Tabel 1. Results of Testing using Blackbox

No	Test Scenario	Test Data	Expected Result	Description
1	Login test with correct credentials	Registered username and password	System accepts login and displays the main page	Valid
2	Login test with incorrect username	Incorrect username, correct password	System displays message "Invalid username or password"	Valid
3	Login test with incorrect password	Correct username, incorrect password	System displays message "Invalid username or password"	Valid
4	Input report form data	All fields filled in correctly according to the format	System saves the data and displays a success message	Valid
5	Input report form data with required field empty	One required field is left blank	System rejects the save and displays an error message	Valid
6	Search report data	Keyword matches existing data	System displays relevant search results	Valid
7	Search report data with unmatched keyword	Keyword does not match any data	System displays message "Data not found"	Valid
8	Logout test	Click the logout button	System ends the session and returns to the login page	Valid

5. CONCLUSION

This study has successfully designed, developed, and tested a web-based complaint system implemented at the Medan Religious Training and Education Center. The main objective of this study is to provide a digital solution capable of overcoming the problems of complaint management that were previously done manually, which tended to be time-consuming, poorly documented, and prone to data loss. Using a system development approach based on the Unified Modeling Language (UML), specifically Use Case Diagrams and Activity Diagrams, the system design was systematically structured so that each process flow could be clearly mapped. System testing was conducted using the Black Box Testing method, which focuses on examining the application's core functions based on inputs and outputs without directly evaluating the program code. Testing results indicate that all designed test scenarios functioned properly, with all outputs falling within the valid category as specified during the design phase. This success indicates that the developed system meets the requirements for functionality, reliability, and usability for both internal and external users.

In practical terms, the implementation of this system has had a positive impact on time efficiency, response speed, and transparency in complaint management. Users can submit reports online anytime and anywhere, while administrators can monitor, verify, and follow up centrally through an easy-to-use interface. This increases community participation and strengthens the accountability of agencies in providing responsive and measurable public services. This research also opens up opportunities for further development. Integration of the system with Application Programming Interface (API)

technology enables data exchange with relevant external systems. The application of data analytics can help identify patterns and trends in complaints that occur periodically, which can be used as material for evaluation and strategic policy formulation. Thus, this study not only succeeded in producing a functional web-based complaint system, but also contributed to options and recommendations for steps aimed at improving the quality of information technology-based public service governance, as well as providing a foundation for the development of similar innovations in other government agencies and public institutions.

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