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Monitoring Application Complaints of Internet Service Provider Interference Using Waterfall Method (Case Study: Indihome Pasar Baru Tangerang)

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Abstract

The impact of information systems and technology on various industries, including internet services like Indihome, is substantial. However, providing seamless access to Indihome internet services remains a challenge for PT Telkom Akses, particularly at their Pasar Baru Tangerang branch. One of the issues faced by staff members when handling complaints from internet service users is the lack of integration between the manual data management system and Telegram, which could automate operations and streamline the process of distributing trouble tickets. The current process for distributing trouble tickets is also inefficient, relying on manual copying and pasting. To address these issues, the application was developed using the PHP programming language, Codeigniter Framework, and MySQL, and the Waterfall method was employed in the design process. The application includes features such as Add Data Datin, Add Data Non Datin, Close Data Datin, Close Data Non Datin, and Telegram bots to facilitate complaint monitoring and ticket distribution.

Keywords: Web Monitoring Complaint, Internet Service Provider, Interference Ticket, Telegram Bot

1. INTRODUCTION

PT. Telkom Akses is a prominent internet service provider (ISP) that offers internet and cable TV services, with its premier product being Indihome. Indihome uses fiber optic technology to provide three services: internet, cable TV, and telephone services. However, in the Pasar Baru Tangerang branch, convenience in using Indihome internet services has become a challenge due to frequent complaints from users regarding call and data failures, decreased bandwidth, and other usage constraints. Despite the 147 call center media being a platform for customers to file complaints, the manual processing and distribution of customer complaint data through telegram media results in delayed obstacle-solving processes. The absence of a unified platform for communication between technicians, helpdesk, and customer service further exacerbates the problem [1].

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To streamline its service management system, PT Telkom Akses can implement an information system that allows users to add, search, update, and delete data, and can be used for future needs [2]. The helpdesk department can serve as an active response team to user needs, with the ability to collect data from various sources. CodeIgniter, a PHP application development framework, can be utilized to create programs and implement commands more efficiently [3].

A fishbone diagram can also be utilized to identify potential performance problems and determine their causes. Moreover, Telegram, a cloud-based instant messenger service application with secure features, can be utilized to create a Bot that can reply to users with commands, thus streamlining the customer complaint process [4], [5].

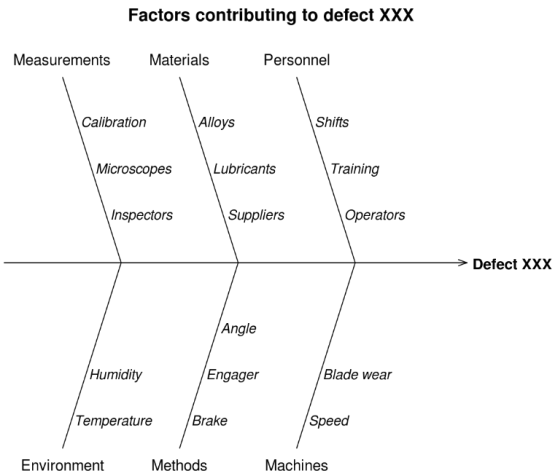

Figure 1. Fishbone Diagrams

Several studies have been conducted on the design and development of various information systems. One such system is the Helpdesk application described in [6], which is built to provide damage reporting services. The application includes knowledge management features that allow technicians to search a recorded knowledge base to find solutions to problems and share knowledge with others. In [7], a web-based partner performance data monitoring information system is redesigned with the addition of data visualization features that simplify and improve the accuracy of data monitoring. The system is tested and proven to help managers make informed decisions. Similarly, [8] presents a web-based system that enables users to report and manage disruptions, as well as manage warehouse storage. This system uses progressive web application technology and incorporates APIs from OneSignal and APIWHA for notifications and push notifications.

In [9], the management of information disruption and restitution is discussed, highlighting the importance of data validity and easy accessibility for all parties. The solution presented involves using a database accessible via a local network or company intranet. [10] describes the design and development of a web-based Helpdesk application that can detect disturbances in the department portal. The application is built using PHP, HTML5, and JavaScript, with a MySQL database, and tested using the Black box application. In [11], the challenge of IT technicians managing a high volume of reports is addressed, with the Helpdesk application offering features that simplify the process of managing and reporting on services. [12] presents the IT Helpdesk recorded reporting system, which enables employees and users to report issues easily with features that simplify the reporting process. Furthermore, [13] analyzes two applications, Ibooster and Embassy, for their ability to monitor disturbances in Indihome, with results showing that both applications can support Indihome staff when a disruption occurs. Finally, [14] presents the design of a web-based customer disruption service complaint system for Speedy Rantauprapat customers, accessible via a web interface without requiring a mobile phone connection.

In light of previous research, in this study, we explore the use of the Waterfall Method to design a Monitoring Application for Complaints of Internet Service Provider Interference. While there have been previous studies on this topic, our approach differs in terms of the design and functionality of the application. Moreover, we have incorporated a telegram bot feature that automates the distribution of nuisance tickets. The main objective of this study is to provide a comprehensive solution to the problem of monitoring and addressing internet service provider interference complaints in a more efficient and effective way.

2. METHODS

The system development life cycle (SDLC) is the primary methodology utilized by system analysts and programmers in constructing information systems. In this research, the SDLC approach is adopted for system design. The waterfall model, a classic dynamic and sequential software development model, is specifically employed. This model allows for departmentalization and control in the software development process, resulting in a minimized occurrence of errors [15].

Moreover, the implementation of the waterfall method ensures that the model's phases are developed one after the other, ensuring that each phase is completed before moving on to the next. This helps to eliminate the occurrence of errors that may arise from overlapping phases, ultimately leading to the successful construction of an efficient and effective Monitoring Application for Complaints of Internet Service Provider Interference [16].

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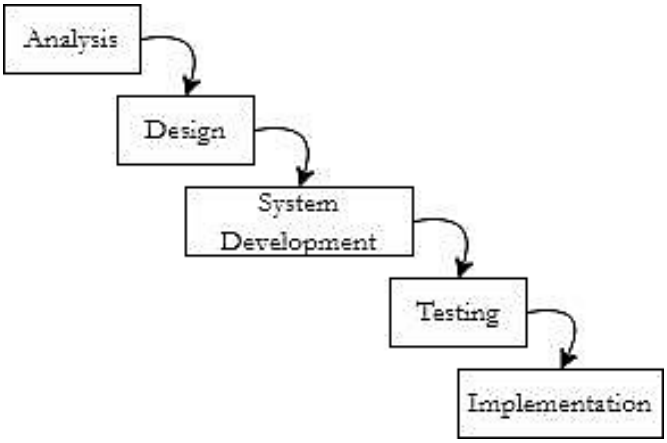

Figure 2. Waterfall Method

1. Analysis: The first stage of the SDLC method involves analyzing the system's needs, starting with the functional and non-functional requirements of the system. The analysis provides a list of system advantages and disadvantages, system functions, and applicable updates. To perform the analysis, a Fishbone diagram is used.
2. Design: The design stage follows the analysis stage, where the application's design is presented. This stage includes designing the application's interface and database. UML modeling is used for application design.
3. System Development: The application is developed using the PHP programming language with a display base using Codeigniter. The Bootstrap Framework supports website interface elements, making them work optimally on all screen sizes. MySQL is used as the database to store a large amount of data. Additionally, telegram bots are used as an auxiliary medium to distribute ticket trouble messages that need to be resolved. The add datin and add non-datin buttons' functions are to be automatically shared with the telegram group when the admin presses the submit button.
4. Testing: The testing stage is the final stage of the waterfall method. In this stage, testing is performed to observe the results and check the application's functionality. The following testing methods are used:
    a) Equivalence Partitioning: This test is performed on existing forms in the inventory application system.
    b) Boundary Value Analysis: This test ensures that the data entered cannot be stored correctly in the database if it exceeds a predetermined limit.
    c) Comparison Testing: The interface's appearance is compared on different web browsers.
    d) Sample Testing: This test ensures that the selected results produce good data and are consistent with the input.

e) Robustness Testing: The examiner enters random data to prove that there is no error if the input is invalid.
f) Behavior Testing: This test is performed by creating new data repeatedly to avoid stack data.
g) Performance Testing: This test evaluates the system's ability to operate correctly.
h) Requirements Testing: The requirements are tested to ensure that they are in accordance with the system manufacturer's specifications.
i) Endurance Testing: This test determines whether the algorithm's results on this system are correct or incorrect.
j) Cause-Effect Relationship Testing: This test involves input conditions starting from Input, View, Update, Delete, and Search.

5. Implementation: Implementation is the final stage of the Waterfall method. At this stage, the system is created, tested, and confirmed to work correctly. The application is ready for deployment and use.

3. RESULTS AND DISCUSSION

Data collection for this study was conducted through a combination of observation, interviews, and literature review. The results obtained provide a clear understanding of the current business process flows, which are presented in Figure 3.

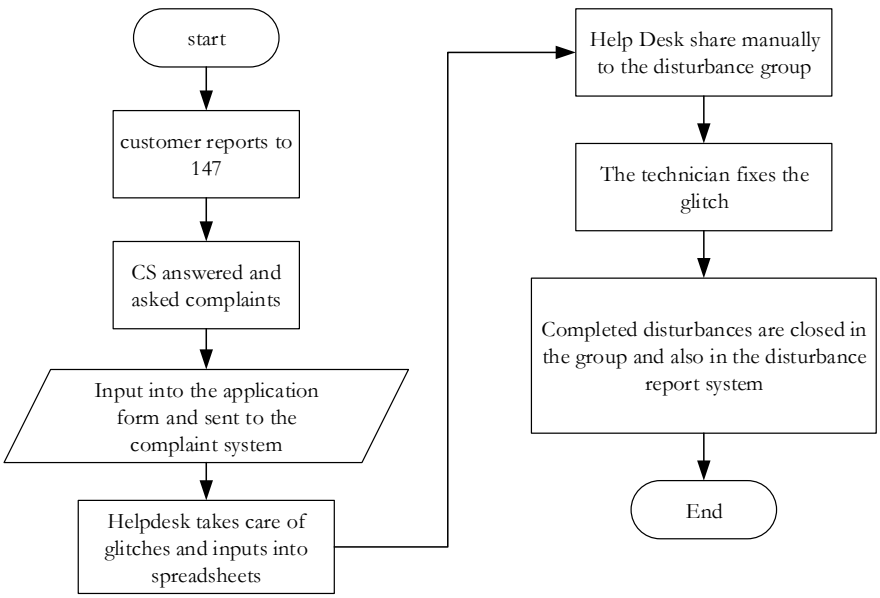

Figure 3. Business process flows

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The business process flow starts with customers contacting customer service at number 147. The customer service representative receives the complaint and records it in the submission form in the system. The complaint is then processed and forwarded to the interference system. The helpdesk takes the disturbance report and enters it into a spreadsheet and the interruption group in Telegram. The technician works on the disturbance and closes the report when the work is done in the Telegram group.

In the requirements analysis stage, the problem data obtained in the previous stage is analyzed to generate alternative solutions for the application needs. This stage involves using a fishbone diagram, which is shown in Figure 4.

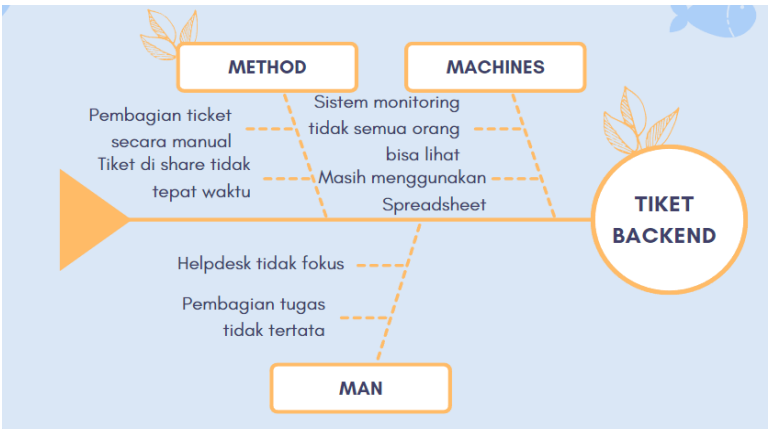

Figure 4. Fishbone Analysis

After conducting a thorough analysis of the problem, it has been determined that Telkom Akses Pasar Baru requires an application to aid in the operational process of handling customer complaints. The application will serve as a complaint service information system for customers, providing support for activities related to complaint management. The following are the key features and functions that the application will provide:

1. Man
a) Unfocused Helpdesk
   Errors often occur if the helpdesk is not focused on distributing tickets.
b) Disorganized Division of Duties
   In the division of helpdesk tasks, there is still a lack of coordination.
2. Method
a) Manual Ticket Distribution
   In ticket distribution still use the manual method with copy and paste.
b) Tickets are shared Not on Time.

Because they still use Spreadsheets, the data shared is still manual resulting in tickets not being on time when shared if the helpdesk is not focused.

3. Machines
a) Previous Systems Not Everyone Can See
Previous systems had limited access by technicians and customers.
b) Still Using Spreadsheets
The inputted data still uses Spreadsheet as a database.

The application will made with the following features:
a) A website-based information system that can be accessed by helpdesk admins and field technicians
b) There are master data features such as datin data, non-datin data, close datin data, close non-datin data, user data, and system user management
c) There are two system roles with their respective ethics, the role is the admin role, namely from the helpdesk side, and the user role from the field technician side
d) The admin role can manage incoming complaint data from customers, manage user data, make changes to ticket status, download report data on each available master data and manage user settings
e) Users can monitor data to see tickets whose status is still open and have been completed properly, download available data, and make user settings to change the user password used.
f) There is a page to view a list of users who have access to the system with information on the role of each user
g) There is a proof upload feature that serves as proof that the customer's ticket problem has been resolved
h) There is a page that is used to view the details of each data record contained in the datin master data and non-datin master data
i) There is an upload evidence feature that must be filled in every time you close a disturbance
j) There is a feature to see the ticket queue where customers can monitor the progress of any repairs carried out
k) There is a feature to see SLA disturbances that are used for priority services
l) Admin can change the repair status on the page provided

The application design process utilizes UML (Unified Modeling Language) modeling, and a UML Use Case Diagram is created to illustrate the interaction of all actors with the system. The diagram depicts two actors, admins, and technicians, who are interconnected with the system but have different levels of access. Use Case Diagram is shown in Figure 5.

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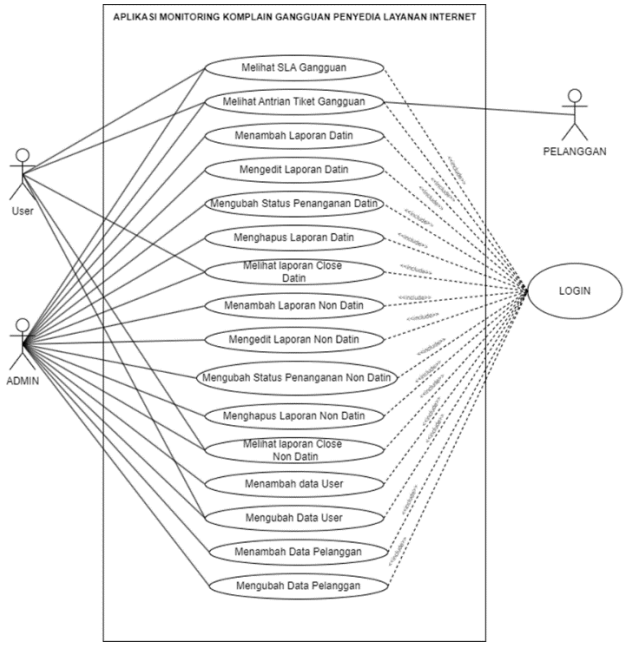

Figure 5. Use Case Diagrams

Furthermore, the relationship between classes is described through the Class Diagram. Class Diagram can be seen in Figure 6.

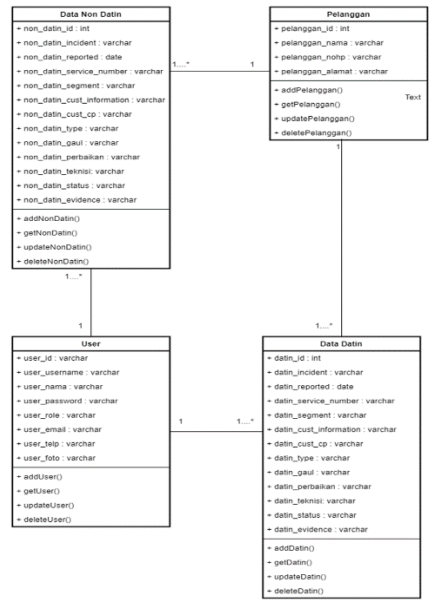

Figure 6. Class Diagrams

a. User. This class is required when logging in to the application.
b. Datin's data. This class contains outage report data. This class requires close datin data.
c. Non Datin. This class contains non-datin or regular fault report data. This class requires close non datin data.
d. Customers. This class contains the identity of the stored customer.

The development of the application has commenced based on the previously created design. The application is being developed utilizing the PHP programming language, the Bootstrap CSS framework, and the MySQL database management system. The result of this development will be a system with an aesthetically pleasing user interface.

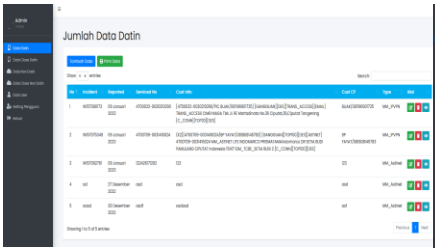

Figure 7. Dashboard Data Datin

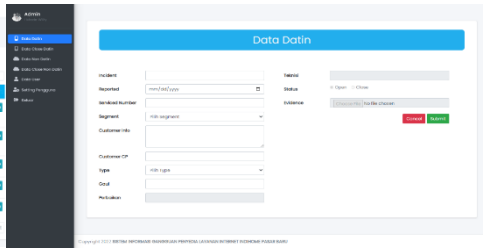

Figure 8. Add Data Datin

Figure 7 displays the incoming datin report data that has been processed by the report system, inputted by customer service and helpdesk. Figure 8 shows the page for adding datin data, accessible by hovering the cursor over the datin data menu and pressing the add data button. Once the admin fills in the datin data form, they can save it by pressing the submit button, which will also share it in the telegram group. Refer to Figure 9 for a visual representation.

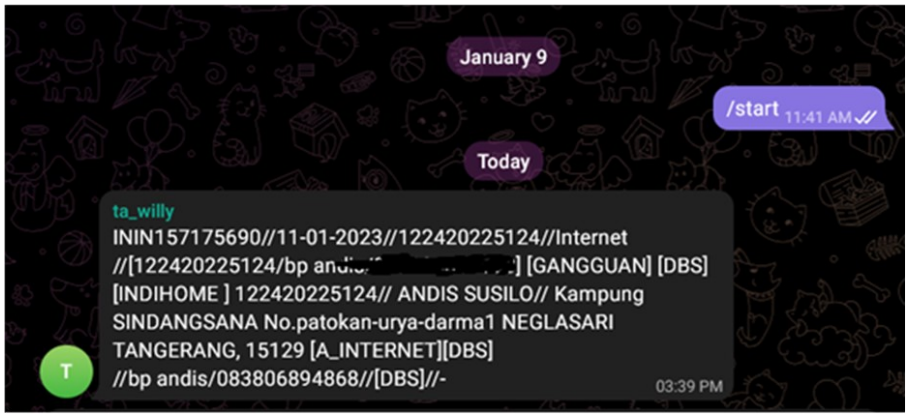

Figure 9. Implementation of Automatic Share into Telegram Groups

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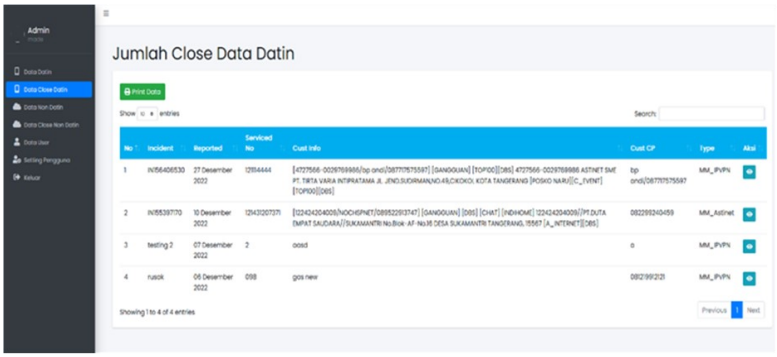

Figure 10. Telegram Bot Implementation Add Datin Data

Figure 10 shows the first step of the 'add_datin' function, which populates the report data. Upon submission, the 'sendMessage($tele_id, $message)' function sends the data to the group using the tele_id and predefined templates in the $data variable. The templates include datin_id for data identity, datin_incident for disturbance number, datin_reported for the report date, datin_serviced_number for customer service number, datin_segment for service segment, datin_cust_information for customer information such as address, datin_cust_cp for customer contact information, datin_type for datin type, datin_gaul for services that have been completed but have experienced re-interruption or not, and datin_status for the interference status, whether it is still active or closed.

Figure 11. Dashboard Close Datin

Figure 11 illustrates the close datin data, which refers to datin data that has been marked as completed or deleted and is no longer displayed in the datin data menu. To view the details of the close datin data, the user can click on the "view data" button on the available record, and the system will display the relevant information.

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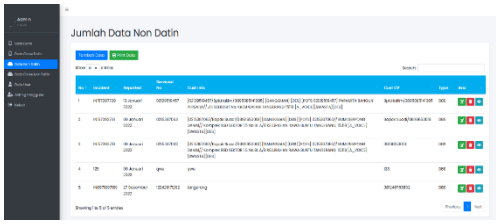

Figure 12. Dashboard Data Non Datin

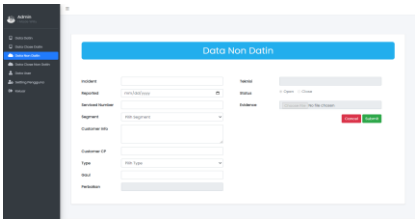

Figure 13. Add Data Non Datin

Figure 12 shows the incoming datin report data that has been processed by the customer service and helpdesk system. Figure 13 displays the page for adding non-datin data, where the admin can hover the cursor to the non-datin data menu and press the add data button. Then, the admin will be directed to a form for filling in the non-datin information. Once the form is complete, the admin can submit the data and share it into the telegram group. This process is illustrated in Figure 14.

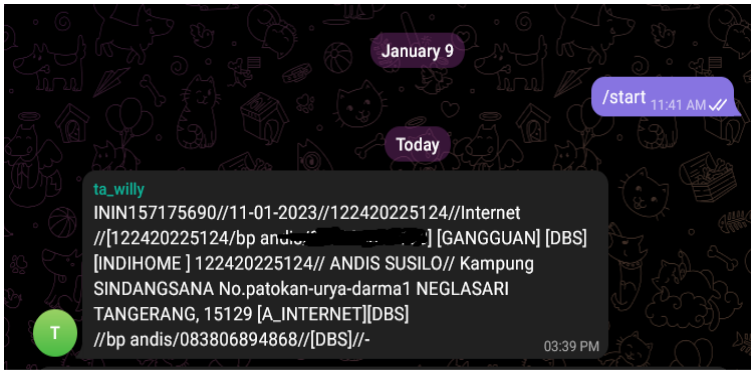

Figure 14. Implementation of Automatic Share into Telegram Groups

```
//Function API
function sendMessage($tele_id, $message)
{
    $token = "5936499614:AAFv4oRLy4EQQn2zaMy50x4u95WUNxCQgvM";
    $url = "https://api.telegram.org/bot" . $token . "/sendMessage?chat_id=" . $tele_id . "&text=" . urlencode($message);
    $ch = curl_init();
    $optArr = array(
        CURLOPT_URL => $url,
        CURLOPT_RETURNTRANSFER => true
    );

    curl_setopt_array($ch, $optArr);
    curl_exec($ch);
    curl_error($ch);
    curl_close($ch);
}

//Function untuk share otomatis ke telegram

 public function add_non_datin()
    {
        $data['non_datin_id'] = null;
        $data['non_datin_incident'] = $this->input->post('incident');
        $data['non_datin_reported'] = $this->input->post('reported');
        $data['non_datin_serviced_number'] = $this->input->post('serviced_number');
        $data['non_datin_segment'] = $this->input->post('segment');
        $data['non_datin_cust_information'] = $this->input->post('customer_info');
        $data['non_datin_cust_cp'] = $this->input->post('customer_cp');
        $data['non_datin_type'] = $this->input->post('type');
        $data['non_datin_gaul'] = $this->input->post('gaul');
        $data['non_datin_status'] = "Open";

        if ($this->NDM->add_non_datin($data)) {

            $message = "IN" . $data['non_datin_incident'] . '//' . date('d-m-Y', strtotime($data['non_datin_reported'])) . '//' . $data['non_datin_serviced_number'] .
            '//' . $data['non_datin_segment'] . '//' . $data['non_datin_cust_information'] . '//' . $data['non_datin_cust_cp'] . '//[' . $data['non_datin_type'] . ']//' .
            $data['non_datin_gaul'];

            sendMessage('-734706294', $message);

            $result['status'] = '1';
        } else {
            $result['status'] = '0';
        }

        echo json_encode($result);
        exit;
    }
```

Figure 15. Telegram Bot Implementation Add Datin Data

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Figure 15 illustrates the initial step of the add_non_datin function, which involves populating the form with report data. Once the admin submits the non-datin data, the bot's sendMessage($tele_id, $message) function sends the data to the group. The data is transmitted according to the tele_id and templates that have been set in the $data variable. The data includes non_datin_id for data identity, non_datin_incident for the interference number, non_datin_reported for the date of report, non_datin_serviced_number for customer service number, non_datin_segments for service segments, non_datin_cust_information for customer information such as address and others, non_datin_cust_cp for customer contact information, non_datin_type for non-datin, non_datin_gaul for services that have finished working but are experiencing disruption again or not, and non_datin_status for the interruption status which is either still active or closed. Figure 16 displays data on disturbances that have been resolved by technicians. This feature is not editable or deletable. The resolved data will go through the editing feature for closing disturbance data, which will be later forwarded to the closed non-datin dashboard.

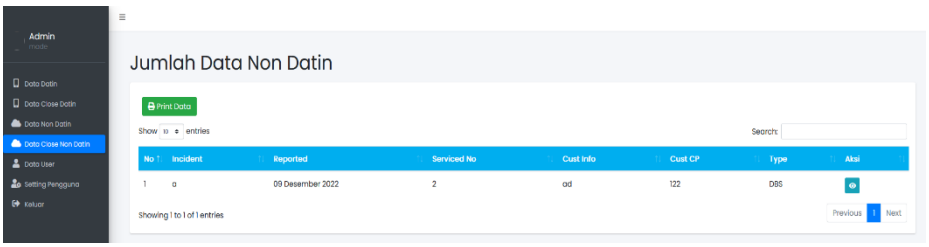

Figure 16. Close Data Non Datin

Testing is conducted using the black box testing technique. Black box testing is a software testing technique that focuses on testing the functionality of a software application without knowing the internal structure, logic, or implementation details of the application. In other words, the tester treats the application as a black box, where inputs are given and expected outputs are checked, without any knowledge of how the application processes the inputs or produces the outputs.

The main objective of black box testing is to identify whether the software application meets the functional requirements, specifications, and business logic. Testers use various techniques, such as equivalence partitioning, boundary value analysis, and decision table testing, to design test cases and scenarios. These test cases are then executed on the software application to identify defects or errors.

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Tabel 1. Black Box Testing

No	Interface	Scenario	Expected	Results
1	Datin Page	User add data datin	Data add successfully	Success
2	Edit Data Datin Page	User upload evidence	Data change successfully	Success
3	Delete Data Datin Page	User remove data datin	Data remove successfully	Success
4	Data Close Datin Page	User see data datin closed	Data view successfully	Success
5	Non Datin Page	User add non datain	Data add successfully	Success
6	Edit Non Datin Page	User edit data non datin	Data change successfully	Success
7	Delete Non Datin Page	User remove data non datin	Data remove successfully	Success
8	Close Non Datin Page	User see data non dating has been closed	Data view successfully	Success

4. CONCLUSION

The Waterfall Method was utilized to develop the Application Complaints of Internet Service Provider Interference. This system can improve the efficiency of distributing nuisance tickets compared to previous processes. The system is equipped with various functions, including Add Data Datin, Add Data Non Datin, Close Data Datin, Close Data Non Datin, and telegram bots, which assist system users in monitoring complaints and distributing trouble tickets.

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