Development and Implementation of Web Based Fault Monitoring System, case study: PT. PLN (Persero) Tondano Customer Service Unit

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ABSTRACT

PT. PLN ULP Tondano has several divisions in which there is the Engineering Division or Distribution Section. Within this division, there are several jobs that are carried out on a daily basis, one of which is monitoring and managing current disturbances that occur around the dependent area. However, technical monitoring even to collect data in order to view daily data is very difficult because office employees have to input what has been reported by field workers and then the data will be returned again for execution. This is what really slows down the performance because the techniques used are still manual and old. Due to this, the monitoring and archiving process takes a very long time. This also results in the possibility of existing data being lost because the data is still inputted manually and there is no back up file that can be used if the data disappears at any time. In addition, field officers are also overwhelmed to find out data that is only input manually and firstly which could hamper existing performance.

Keywords: *Information System, Current Disturbance, PT PLN ULP Tondano*

INTRODUCTION

PT. PLN (PERSERO) Tondano Customer Service Unit has several divisions in which there are also human resources who work according to their portion and job desk, one of which is in the Engineering division or the Distribution section. Staff or office employees and field officers or

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freelancers in this division must have synergy and unity to work together to realize PLN as a trusted Customer Service Unit and function as this agency should be formed.

One of the things that must always be monitored by the Engineering division or the Distribution section is the Disturbance Flow, where field workers will conduct a survey of customers or consumers who complain about the current disturbances they experience, then the data obtained by field workers will be returned to the staff. office which will then make a data recap manually and the same data will be reused by the field workers if the obstacles or disturbances are not resolved.Monitoring system is a system that is used to monitor a job, where in this monitoring system the progress or development of a problem and work that is currently being carried out is monitored. This Monitoring System can be used to monitor fault currents that occur so that the progress of recovery or fault current reporting can be easily known.

So far, monitoring of fault currents is done manually, where office staff will enter data received from field workers manually. With manual data entry, this causes several errors and problems that can occur, such as inputting so much data because there is so much data with little human resources at a very fast time, causing input errors to be unavoidable. Data entry and monitoring are not well controlled, so Technology, Information and Communication can be a means or forum for solving this problem to assist and facilitate the monitoring of this current disturbance. By doing this manual input, it makes it more likely that the Current Disruption data at PLN ULP Tondano will be lost because there is no back-up data other than the data inputted manually by office workers which will then be brought by field employees. and then returned to the report employee to be recapitulated and checked.

Based on the various problems above that became the basis for researchers in writing a study entitled Development and Implementation of a Web-Based Current Disturbance Monitoring System at PT PLN Tondano Customer Service Unit.

LITERATURE REVIEW

Website

Website is a collection of pages in a domain that contains various information so that it can be read and viewed by internet users through a search engine. Information that can be contained on a website generally contains image, illustration, video, and text content for various purposes. Usually for the initial appearance of a website can be accessed through the main page (homepage) using a browser by writing the right URL. In a homepage, it also contains several derivative web pages that are linked to one another.

Website is an internet facility that connects documents locally and remotely. Documents on the website are called web pages and links on the website allow users to move from one page to another (hyper text), both between pages stored on the same server or servers around the world. Pages are accessed and read through browsers such as Netscape Navigator, Internet Explorer, Mozilla Firefox, Google Chrome and other browser applications. (Judge Lukmanul, 2004) "Website or abbreviated as web, can be interpreted as a collection of pages consisting of several pages that contain information in the form of digital data in the form of text, images, video, audio, and other animations provided via the internet. More specifically, websites are pages that contain information displayed by browsers such as Mozilla Firefox, Google Chrome or others." (Rohi Adulloh, 2016). Meanwhile, according to Ippho Santoso in Rahmadi (2013: 1) "dividing the website into the right and left groups. In the website known as dynamic websites and static websites.

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Static Web

A static website is a website that has content pages that do not change.

1) Dynamic Website

Dynamic websites are websites that are structurally intended to be updated as often as possible.

Required Software

In the process of making a website, there are several software needed and these software include:

1) Text Editor

This text editor will later be used to write scripts such as HTML, CSS, PHP, JS scripts and other programming language scripts. There are many types of text editors that can be used to write scripts and including Notepad, Notepad++, Visual Studio Code, SubLime Code, Adobe Dreamweaver, and also many other text editors that are free to choose and use according to their individual wishes and needs.

2) Apache and Phpmyadmin packages

Apache functions as a web server, which is a place to store files – php files and other files that will later be needed and used in making the website. While Phpmyadmin is a web-based application that will later be used to create a MySQL database as a place to store website data. Apache and PHPMyAdmin are usually already provided in one application package such as Appserv or Xampp which means they don't need to be downloaded differently.

3) Web Browsers

The web browser is used to display the results of the website that has been created. The most frequently used web browsers include Mozilla Firefox, Google Chrome, Microsoft Edge, and so on. There are so many web browsers that can be used according to their individual needs but in making this system Google Chrome is used as the default web browser or the main web browser.

2. Website Elements

To provide a website, there must be supporting elements in it so that the website can run and work in accordance with the wishes of the website maker, and the elements of the website are as follows:

1) Domain Name (domain name)

Domain name is a unique address that is commonly used in the internet world which is used to identify a website, or in other words the address used to find a website on the internet world. This domain name is traded freely on the internet with annual rental status.

2) The house where the website is (web hosting)

Web Hosting can be interpreted as a room that contains various data, files, images, videos, email data, statistics, databases, and so on that will be displayed on the website. Web Hosting can also be obtained freely by renting. Users will get a control panel that is protected with a username and password for website administration.

3) Program Language (Program Scripts)

The language used to translate every command on the website when it is accessed.
The type of programming language greatly determines the static, dynamic, or interactive nature of a website. The more programming languages used, the more dynamic and interactive the website

will look. The types of programming languages that are widely used include: HTML, ASP, PHP, JSP, Java Scripts, Java Applets, XML, Ajax and so on.

4) Website Design

After renting a domain name and web hosting as well as mastering the language of the program, the most important and main element of the website is design. Web design determines the quality and beauty of a website. The design will affect the visitor's assessment of whether a website is good or not.

5) Data transfer program to data center

FTP (File Transfer Protocol) is the access given when we order web hosting, FTP is useful for moving website files on our computers to the web hosting center so that they can be accessed all over the world.

c. Databases

Database is a collection of data files that are interconnected with each other that are organized in such a way as to make it easier to obtain and process the data. The database system environment emphasizes data that is independent of the application that will use the data. (Mukhamad Masrur, 2015).

Database is a collection of structured data. The data can be in the form of schemas, tables, queries, reports and other objects. The way to access this data is usually called a Database Management System in the form of a computer software where the user can interact and access all the data in the database.

The following is a database definition according to experts:

1) According to Gordon C. Everest Database is a collection or collection of data that is mechanical, shared, formally defined and also controlled centrally in an organization.
2) According to C.J. Date Database is a collection of "operational data" stored and also used by the application systems of an organization.
3) According to Toni Fabbri Database is an integrated file system that has at least a primary key for data repetition.
4) According to S. Attre Database is a collection of interacting data about an organization or enterprise with various uses.
5) According to Chou database is a collection of useful information organized into a special procedure.
6) According to Fabbri and Schwab database is an integrated file system designed primarily to minimize data redundancy or repetition.
7) According to Jogiyanto database is a collection of data that are interconnected with each other, stored in storage outside the computer and used certain software to manipulate it.
8) According to Connolly and Begg (2010: 65) database is a collection of data that is logically related and designed to meet the information needs of an organization.
9) According to Indrajani (2015: 70) a database is a collection of logically interconnected data and is designed to obtain the data needed by an organization.

The benefits of this database are avoiding duplicate or double data, can be arranged in a standard format from a data, can secure data, can determine the quality of an information, can also solve data problems that are difficult to access.

Databases also have the benefit of grouping data and information so that they are easier to understand. With the database can simplify the process of storing, accessing, updating and also to make it easier to delete data. Another benefit is that it can maintain existing and accessed data and information so that the data accessed is the same data according to the data that has been inputted.

d. Agile Development

Agile Development is a method of developing software quickly with changing requirements that occur in a relatively short time.

The main concept of Agile Development is application development and teamwork. Focus on application work by minimizing documentation. Teamwork in the form of programmer-client intensive communication. Agile Development is in the form of iteration or iteration, the goal is to respond and deal with any changes flexibly, thereby reducing project time and achieving client satisfaction. Agile development practices are suitable for small-scale projects.

All methodologies incorporated in agile development are based on the principles of the agile manifesto. Agile Manifesto is the values of software development or software development initiated by a group of software developers or software development. The Agile

Manifesto emerged due to frustration with the traditional method, namely the Waterfall method or the waterfall method. This is because the Waterfall method has a fairly long process lag between requirements and product delivery, thereby increasing the possibility of canceling product orders, so the Agile Manifesto was created.

The Agile Manifesto has four underlying values, they are:
- Individual interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

Extreme Programming (XP) and SCRUM are examples of methodologies in agile development. SCRUM practice focuses on team management on iterations (called sprints) of SCRUM projects. Another factor that distinguishes it from XP is that in SCRUM projects, changes to requirements can only be made at the end of the iteration. XP is referred to as a methodology with a short development cycle where iterations span 1 to 2 weeks. XP Practice is designed in a simple way with a focus on working on application programs in a relatively short time.Extreme Programming XP was implemented on a project that had vague requirements and underwent many changes.

XP prioritizes communication and feedback, so it is not suitable for use on large-scale projects and difficult to get feedback. The basic concept of XP is writing code and testing. There are 4 main values that underlie XP according to
· Communication
  XP practice uses communication as a critical value to project success. Pair programming, unit testing, and estimating are examples of XP practices that allow programmers, clients, and managers to communicate during a project to get results as needed.
· Simplicity
  Each stage of XP is kept simple. Make every part of the application function according to current needs, so that the application is completed in a fast time.
· Feedback

XP divides the work of each function of the application and performs a short-term release schedule to get feedback from clients more quickly. The short-term release schedule allows clients to test the program more quickly and provide feedback on the results.

· Courage

Courage is an important value for XP where team members are brave in repairing program code errors and defects. This includes removing most of the code and working overtime to fix the defect.PHP NATIVE

e.PHP Native

PHP Native or commonly called PHP Pure is a type of system development without using a framework or without using a framework in it. Software work using PHP Native starts from 0 or implements coding and data from various places so that it becomes a single framework on its own without the need for help from existing frameworks. Examples of commonly used frameworks are CodeIgniter, Laravel, Symphony and many other frameworks that can also be used.The striking difference between PHP Native and framework is that PHP Native does not require an existing framework or coding as well as a user guide, while the framework already has a framework with much more coding and data readiness than using PHP Native starting from scratch. Frameworks can make it easier to work on a system that will be created and also speed up processing time, but using PHP Native will make the programmer or coder better understand the contents of the system and the code that has been created.

Developers must create their own framework for building dynamic websites. Applications built with PHP Native are usually not standard because these PHP Native Applications are designed by the developers themselves and can automatically be customized according to the wishes of the developer. Now PHP Native can also be developed into a Mobile platform combined with HTML5 and Jquery. PHP Native can also be used as its own framework by means of which developers can create their own framework which will automatically be easier for developers to use because it is done by themselves from the start. In making libraries, security, plugins made by yourself without using other people's libraries. Some of the advantages of PHP Native are Easier to Learn, the end result of the web tends to be smaller and Developers / Programmers are free to create functions, system hierarchies and libraries.

f. HTML (Hypertext Markup Language)

HTML stands for Hypertext Markup Language called hypertext because in HTML a text can function differently. We can make it a link that can move from one page to another just by clicking on the text. This text capability is called hypertext although in its implementation later it is not only text that can be used as a link. Markup language is an HTML language that uses marks to mark parts of text. For example, text that is between certain marks will be bold and if it is between other marks it will appear large. These marks are known as HTML tags. HTML is the basic language of web creation. It is called basic because in making a web, if you only use HTML, the web appearance feels bland. There are many web programming languages that are intended to manipulate HTML code such as JavaScript and PHP.

g. PHP

According to Arief (2011: 43) PHP is a server side scripting language that integrates with HTML to create dynamic web pages. Because PHP is server-side-scripting, the PHP syntax and commands will be executed on the server and the results will be sent to the browser in HTML

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format. Thus the program code written in PHP will not be seen by the user so that the security of the web page is guaranteed. PHP is designed to create dynamic web pages. Meanwhile, according to Nugroho (2006:61) "PHP or the abbreviation of Personal Home Page is a scripting language embedded in HTML to be executed on a server side". PHP is included in the open source product, so the PHP source code can be changed and distributed freely. PHP can also run on various web servers such as IIS (Internet Information Server), PWS (Personal Web Server), Apache, Xitami. PHP is also able to run on many operating systems currently available, including: Microsoft Windows Operating System (all versions), Linux, Mac Os, Solaris. PHP can be built as an Apache web server module and as a binary that can run as a CGI (Common Gateway Interface). PHP can send HTTP headers, can set cookies, set authentication and redirect users.

METHOD

a.System Development Method

From the XP development stages above, here is an explanation of each stage. In the research conducted, namely in the development of existing software using the approach of the Extreme Programming system development methodology or commonly called XP.

So in this XP approach, it is very focused on cosing or system development which is the system development cycle and is the most important stage or activity in this research. XP is used because in its development it takes a relatively very fast time and can also be repeated in different parts according to the focus of developing the existing system, unlike the Waterfall method or the traditional method which requires to wait for a very long process transfer.

And besides that, with the development of a system that can simplify each process at each different stage, this XP method is very adaptive. In addition, the XP method is also very flexible in changes that will later be in the manufacture and in system development.

The following are the steps used in developing the existing system using the Extreme Programming System Development Method, as follows, See figure 1
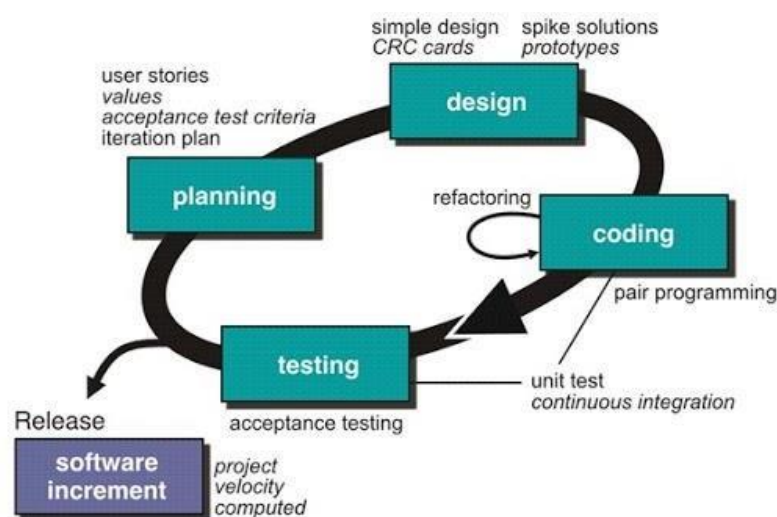
Figure 1. Extreme Programming System Development Method

a.   System Development Method

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The following are the steps used in developing the existing system using the Extreme Programming System Development Method, as follows:

1) Planning

The very first stage is the initial step that must be taken in system development using the XP method, which is the planning stage or often referred to as the Planning stage. In this stage, an identification of the existing flow of the software to be made will be carried out, then also to define the output of the software, the existing facilities in the software to be made, the important functions of this software or application and also the flow of the software development. Not only that, at this stage, developers have demands to do or create user stories which describe the output, functions and features that will be made to the user. This stage also contains the stages where the developer will determine the function of the entire software to be developed.

2) Design

The second stage is design or system design. In this research, UML or Unified Modeling Language is used. UML or Unified Modeling Language is a visual language used to model and describe the communication of a system using diagrams. The diagram used in this study is a Use Case Diagram, precisely used at the design stage. Use Case Diagram is a diagram that has the ability to visualize the interactions that exist between actors and software which will then be developed by developers.

3) Coding

The next stage is coding or coding which in this stage, the developer already has a plan about the software or application that will be made and has also made a design for the software. This stage is the stage where the design or design that has been previously made by the developer will be made or will be implemented in the form of a programming language which will then be recognized by the computer so that it can be accessed later.

4) Testing

And the last stage of XP is the testing stage or testing rather than software. This stage is to confirm if the software can function properly and in accordance with the wishes then the testing stage must be carried out so that the developer can find errors in the software that has been made before being given to the client. This testing stage uses an approach called black box testing. Black Box Testing is a software testing that will test the functional specifications of the software to test and find out whether the features, inputs and outputs of the software are in accordance with predetermined specifications or not. In testing this software will be tested without paying attention to and showing the internal logical structure of the existing software.

b. Modeling Tools

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The modeling tools used in this research report are the Unified Modeling Language, so:

1. Entity Relationship Diagram (ERD)

In general, ERD can be interpreted as a model that regulates relationships between entities or tables in a database. Where entities with one another have a relationship or relationship that can not be separated. The entity referred to in this case is a table, the database itself is a collection of tables, especially for SQL.

ERD function
· Provides convenience in analyzing a database (database) in a fast and inexpensive way.
· Execute relationships between related data based on objects associated with a relation.
· Documenting existing data in a database by analyzing and identifying each object or entity and their relationships.
· Test the model that has been made

2. Data Flow Diagram (DFD)

Data Flow Diagram (DAD) or Data Flow Diagram (DFD) is a diagram that uses notations to describe the flow of system data, whose use is very helpful for understanding the system logically, structured and clear. DFD is a tool in describing or explaining this DFD is often referred to as Bubble chart, Bubble diagram, process model, workflow diagram, or function model.

The objectives of DFD are as follows:
· Provides an indication of how data is transformed as it moves through the system.
· Describe the functions (and sub-functions) that transform data streams
· The functions and benefits of DFD are
· Data Flow Diagram (DFD) is a modeling tool that enables systems professionals to describe the system as a network of functional processes linked to each other by data flows, either manually or computerized.
· This DFD is one of the most frequently used modeling tools, especially when system functions are a more important and complex part of the data being manipulated by the system. In other words, DFD is a modeling tool that places emphasis only on system functionality.
· This DFD is a system design tool that is oriented to the flow of data with the concept of decomposition, which can be used to describe the analysis and design of systems that are easily communicated by system professionals to users and program makers.

RESULTS AND DISCUSSION

Fault Flow is one of the things that most often happens at PLN ULP TONDANO, and automatically all forms of existing fault currents must be controlled and monitored by workers at PLN ULP TONDANO, especially employees or staff in the Engineering division.

The process of recapitulation of fault currents that occur is done manually so that there are often mistakes so that sometimes they cannot be controlled and monitored properly. In addition to being used by employees or office staff in the Engineering division, field workers must always report the progress of the existing current disturbance to office employees and office staff must recap on the development of the existing fault current. This slows down the performance of workers due to the reporting and monitoring procedures of the flow disturbance. In addition, the ULP Manager and other office staff who are not part of the Engineering division are very difficult

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to access or participate in monitoring current disturbances because there is no storage area or monitoring area that can be easily accessed and accessed by everyone. Due to the reporting process as well as data collection and monitoring that is carried out only manually, it is very likely that a lot of the data that has been inputted could be lost because there are also no back-up files or existing data.

This Flow Disruption data is updated daily or at the latest with a period of only a few days which causes employees to have to input quickly, coupled with the relatively large number of existing data and insufficient human resources, which will cause difficulties during monitoring and monitoring. look at the current Disturbance. From these existing problems, PT. PLN ULP TONDANO gives a task to create a Flow Disruption monitoring system that can be accessed by Employees or Technical Staff as ADMIN and also so that it can be accessed by Field Workers and other staff or employees including Managers to help see the existing Fault Flow. Making this system also has the aim of being able to simplify and speed up the existing work of the Engineering division employees in doing their work and not having to work twice in inputting and also in terms of monitoring the existing Fault Flow. This system is also designed to minimize data loss and piles of work.

a. Identification of User Needs

After conducting interviews with the staff of the Engineering division and also field supervisors together with the Manager, and holding joint discussions regarding the fulfillment of data and what needs are needed in the development of the system to be made, namely the current disturbance monitoring system.

From interviews that have been carried out together with the Technical staff and also the Manager, it was found that some of the results of the discussion were needs rather than users.

The results of the discussions that have been carried out are as follows:

· Has 3 users, namely, Technical division office employees as admins, field workers or Yantek as officers and also Managers and other employees as Users.
· Provide data from officers, admins and also existing users
· Can display data regarding existing current disturbances
· Provide dashboard
· Has some interesting features
· Provides a search feature to find data easily
· Provide user management features

b. Coding

After the planning stage has been carried out, the next stage will be implemented in the form of code or you could say if the next stage is Cosing. Coding is done using the PHP programming language with the text editor used is Visual Studio Code and also uses MySQL. In accordance with the display that has been set, the first display that will be displayed is the front page display first. See figure 2.
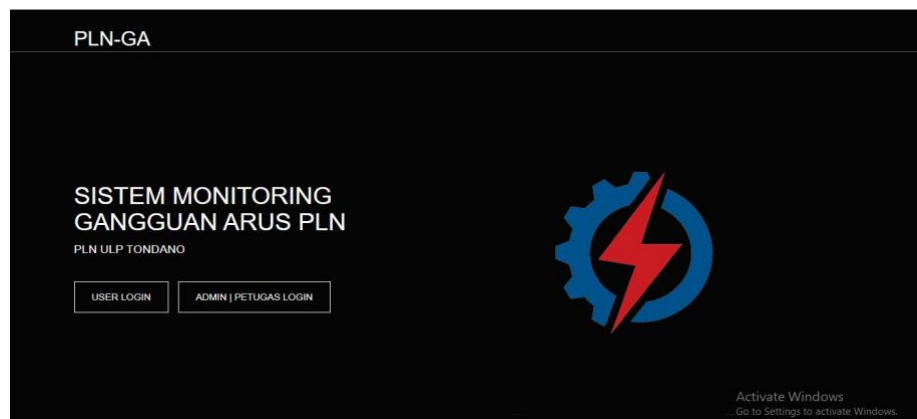
Figure 2. System Start Page

The figure 2 is the initial page of the current disturbance monitoring system, and if you pay attention to this page there are two types of buttons that can be used, this button is the classification button for the user that will be used later as a login. These two types of buttons are buttons for users and the second button is buttons for admins and officers. See figure 3.
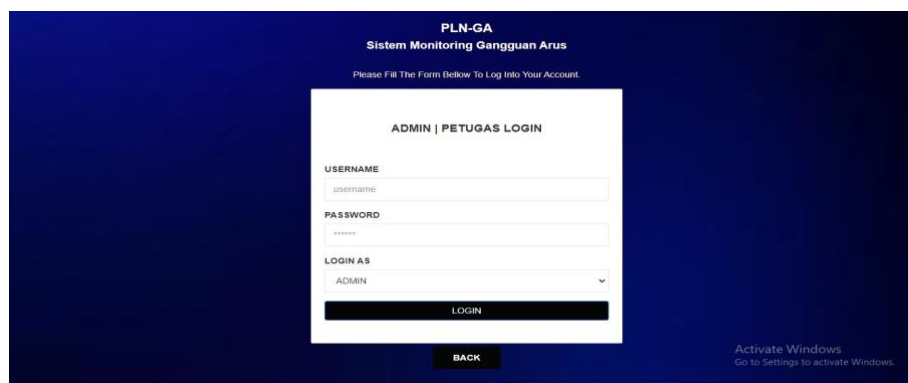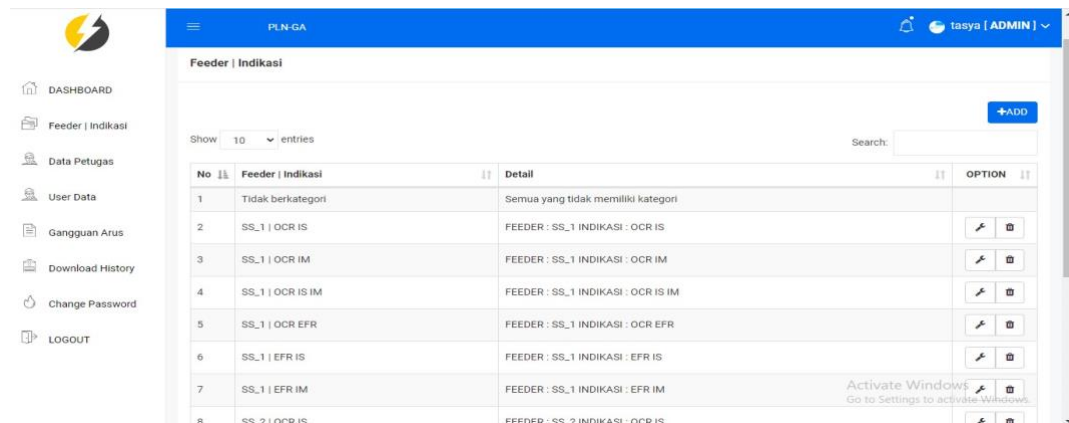
Figure 3. Login page of Admin and Officer

The figure 3 is is the display of the login page that will be used by officers and admins. So on this page there is the first classification, namely Username, then the second is the Password of the user who will log in and then there is the "Login As" feature where later the one who will Login will choose if he will Login as Admin or will Login as Officer. And then after all the fields are filled in correctly, the Admin/Officer can press a button called LOGIN which will take the user to the next stage and under the LOGIN button is a button called BACK which if pressed will take the user back to the System Start Page.

The figure 4 is a view of the Page that contains data from the Feeder and Indications, where the admin can add data from the feeder and this indication.

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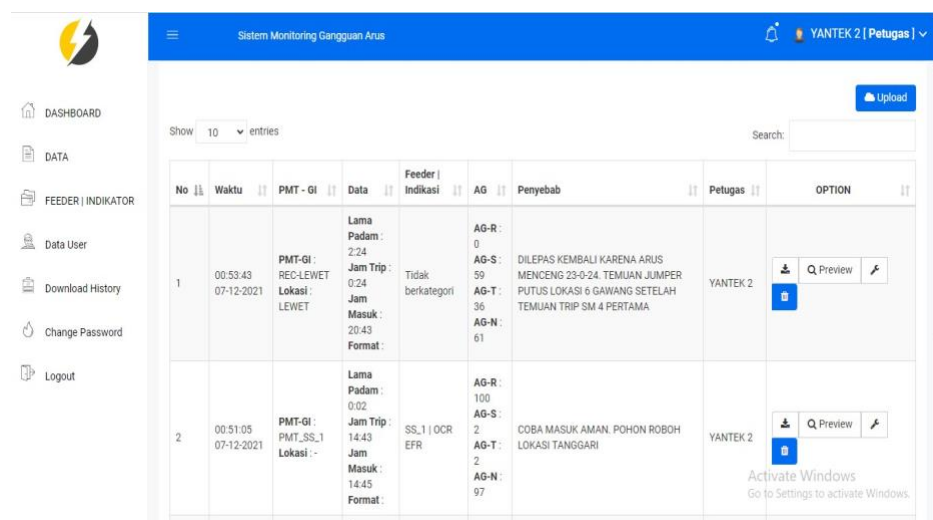
Figure 4. Data Feeder and Admin Indication Page

The dashboard page is shown if logged in as an officer. See fugure 5. On the sidebar there is a menu to view Flow Disturbance Data, then next there is to view Feeder and Indicator data, and then you can view data from users, then there is download history or view download history from admins, officers or users. The next sidebar menu is a menu for changing passwords, and the bottom sidebar is for logging out or exiting the officer page. On this dashboard there is also a graph that shows how many officers there are, how many users are there, how much total data is there and also how many feeders or indications are there. Below that there is a graph that shows the details of the data that has been downloaded or downloaded.

In Figure 5, there are data from current disturbances that have been uploaded by the officer. Here there is the date or time the data was uploaded, PMT-GI, Location, Long Outages, Trip Hours, Entry Hours, Feeders and Indicators, AG-R, AG-S, AG-T, AG-N, Causes of Current Disturbances and officers who uploaded the data. Here, officers can see a preview of the uploaded data, then they can edit the uploaded data and even delete the uploaded data.


Figure 5. Current Fault Data Page

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c. Testing

In this research, testing is carried out using a testing method called black boc where this black box test is a test that is carried out only by observing the results of the executive through the data being tested and checking the functional capabilities of the software that has been made.

CONCLUSION

The conclusion that can be drawn with the completion of this research at PT. PLN ULP TONDANO was previously the work of inputting and monitoring current disturbances at PLN ULP TONDANO was still done manually and now it can be done using an information system and is done digitally, all data that is usually still input and monitored digitally manual with the possibility that the data could be lost now can be accessed easily by using this system. This system also makes it easier for employees or staff, both office and field workers to work much easier with this system. This system will continue to be monitored for its development progress in order to monitor existing current disturbances, and hopefully it can be used properly.

In the future, it is hoped that this website-based current disturbance monitoring system can continue to be developed so that all deficiencies in the features and interfaces can be overcome. And you can add many new features that can be implemented to facilitate work at PLN ULP TONDANO.

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