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Analysis and Design of an Web-Based Ticketing Service Helpdesk at Food and Packaging Machinery Company

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***Abstract*— PT Putra Chandra Sentosa is a company engaged in food and packaging machinery. In the business process that runs in the customer service division, the process of recording service submissions by customer service is carried out using word processing software which has the potential for data accumulation and the search for information on service submissions to be slower. This company is large and has 87 employees; in the customer service division, four people manage customers, and two technicians are in charge of repairing. There are quite a lot of repair requests coming in every day, with an average of 10-15 requests per day. Customer service has difficulty dividing technicians' duties due to service status updates that are not real-time, and they have to wait for technicians to submit a letter of assignment after the visit. In addition to using conventional data processing, customers who complain about service results or technician attitudes make management feel they need feedback reports regarding customer satisfaction. This study aims to design a website that is useful to facilitate the search for service information, perform a balanced division of technician tasks and assist management in seeing customer satisfaction in the form of reports. The Helpdesk Ticketing website in this study has been developed using *Website Development Life Cycle (WDLC)* model with the *Hypertext Preprocessor (PHP)* programming language, Unified Modeling Language (UML) notation and MySQL database. The *PHP* programming language is used in this research because various operating systems can run it via a browser. This research produces a Helpdesk Ticketing website that can answer the needs of the company PT Putra Chandra Sentosa. This research also proves that the website can optimize business processes in recording service submissions compared to using word processing software.**

Index Terms—*Customers; Helpdesk; Service; Ticketing; Website.*

I. BACKGROUND

Information technology (IT) has become an important requirement for every company to support increasing the effectiveness and efficiency of its activities [1]. The essence of the function of information technology is to create efficiencies to reduce waste generated by the company [2]. One of the benefits of implementing IT in the company is that it can provide convenience for consumers and prospective customers in accessing the product information of a company. In the industrial era 4.0, information technology has been applied in almost all industrial sectors, including the banking sector.

PT Putra Chandra Sentosa is a company engaged in food and packaging machinery. This company has four business units located in Jakarta, Surabaya, and Semarang. In addition to selling machines, PT Putra Chandra Sentosa also attaches great importance to service to post-purchase customers by providing service centres in its business units. Customers can make complaints by coming directly to the service centre or telephone. Internally, the company records the service using a working paper containing customer complaints and data called a service call and then inputs it into the Microsoft Word software. The technician who will perform the service is selected by Customer Service by looking at the status of the unfinished assignment letter from each technician.

Meanwhile, there is a delay in updating the service status because they have to wait for the technician to submit their assignment letter after the visit. It will only be updated by Customer Service, causing frequent unfair/even distribution of tasks. When servicing, the technician will record every process carried out on the technician's assignment letter. This condition causes the risk of loss and damage to the assignment letter to be unavoidable, and customer service often has difficulty finding service information because the records only use paper. The service that the technician has completed is not a guarantee that the customer is satisfied. Sometimes some customers complain about the attitude of the technician because the positive or dissatisfied feedback from the customer is not recorded correctly, making management feel the need to look at the feedback report from the customer.

This research was conducted based on previous research that focused on the Analysis and Design of a web-based information system using the WDLC model, which has been successfully deployed and implemented in the website content management system (CMS) for

managing the website [3]. The following research focuses on the analysis and design of a website-based helpdesk ticketing with the prototyping method that was successfully created, making it easier for users to report problems, and making it easier for IT technicians to manage reports [4]. The following research aims to develop a website-based help desk ticketing application to help IT technicians and employees, especially IT technicians, provide information and management reports to devise problems quickly and accurately [5].

Based on the results of the previous research that is still related to this research, to give a solution to the company's needs in customer service problems, a system is needed to facilitate and simplify the business process. This study aims to produce a website-based helpdesk ticketing system that will be developed using the Website Development Life Cycle model and test the functionality aspect using black-box testing before being implemented in the company.

II. METHODS

In the present turn of events, there is no a standard procedure or rule which we can be continued in creating static site. Despite the fact that the course of the web improvement has likenesses with the interaction in ordinary programming advancement life cycle (SDLC) model, still there is a need to have a very much custom fitted or committed methodology for web improvement dependent on explicit prerequisite [6].

The term of web improvement life cycle (WDLC) that is utilized by many web engineer can be misconstrued in term of its degree. Some of them comprehend WDLC as another model of SDLC. Some of them comprehend it as new strategies in WDLC. Additionally, some of them even comprehend it all in all new investigation of SDLC as a result of its overall term of WDLC itself. Notwithstanding of the issues, the thought behind WDLC is to plan a particular methodology for web improvement particularly for static web advancement. The methodology may not be an entirely different model of SDLC yet it could be an inference of SDLC model that infers with the run of the mill interaction of web improvement life cycle.

The methodology depends on the current innovation and might be shifts later on. Concerning today, the generally utilized of web content administration framework (CMS), progressed web composing instruments that can facilitate the most common way of prototyping to execution stage are major contributing variables of why this methodology is present at the primary spot.Consequently, it is important to comprehend SDLC which incorporates the philosophies and the models inside every one of them. Additionally it is likewise essential to comprehend the site trademark and its sort like static site and dynamic site. Besides, understanding the most recent and ordinary advancement process patterns is likewise significant as it will recognizes the advances includes in it. Thus, the data will assist with deciding the suitable model of SDLC and consequently can be inferred by web improvement life cycle patterns. The design method using the WDLC (Web Development Life Cycle) model is a step in developing the website cycle model. Although the Waterfall model introduced in the SDLC (System Development Life Cycle) model provides a sequential structure for Software Development, but WDLC provides a basic structure that also includes various guidelines for meeting the requirements with the final product. It can be adopted by all types of web application development processes such as waterfall, prototyping, and spiral. This model can also be modified to include a Prototyping structure to improve the quality of the website [6].

Structured analysis and design is an approach to solving problems in a business activity into small parts that can be compiled and linked and then can be put back together into a single unit that can be used to solve problems. Structured techniques focus on data and processes [6]. Structured analysis and design are used because it is a method that is commonly known in various industries, is relatively simple and easy to understand, and has been applied for a long time so that this method is feasible to use, relatively simple, and easy to understand [7]. The system design includes the Create, Read, Update and Delete (CRUD) functions on the Content Management System (CMS) of the web-based Ticketing Helpdesk Service [8].

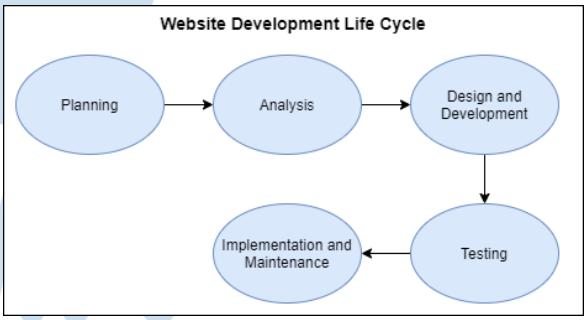

Figure 1. WDLC Model

A. *Planning*

The planning stage is the initial stage of designing a website using the WDLC method. Identifying the goals and objectives of the website to be built is the first step in the planning process. After the purpose is known, it must understand the criteria for system users. Then determine the website technology that will be used and identify who will later be involved in the website. After that, determine where the information will be distributed later.

B. *Analysis*

At this stage, user needs are identified by collecting information from users, systematically analyzing the function of the system to be created, what data is needed and where the data is

collected, and what results from you want to get from the system. After this is done, then the Analysis of the function of the system can be carried out by considering the processes needed to support the features on the website.

C. Website Design and Development

At this stage, prepare a blueprint for the website to be created. Then also various diagrammatic representations of logical and physical objects. The main objects include the data model, process model, and presentation model. Next, document the system design. The website composition stage includes planning site format and acquires the imaginative UI-UX creators to the cutting edge. The format includes planning an unpleasant sketch, which might be graphical, to get a vibe of the plan of the site. The reason for the design is to introduce a data structure, empowering a visual visit through the substance and base highlights for your customers. The wireframe planned in the last stage is changed into buttons, tabs, menus, dashboards, shading topics, typography, and illustrations to make a base design of the site. In order to give the user interface more easy to use and user friendly, in this stage has been implemented the Bootstrap and CSS Framework. Bootstrap is a CSS framework that was developed by Twitter developers in mid-2010. Before it officially became open source, Bootstrap was known as Twitter Blueprint. Until now, bootstrap version 3.3.7 has been released and has become one of the most popular front-end frameworks and an open-source project in the world. Bootstrap is described as simple CSS but built with a preprocessor which provides more power and flexibility than standard CSS. Bootstrap already provides CSS classes and integrates with JQuery. Responsive layout in CSS bootstrap with 12 column grid system produces a website layout that automatically adjusts to the width of the user's browser. This is what causes Bootstrap to support all types of devices such as smartphones, tablets, laptops, or desktop PCs. In addition, bootstrap also supports HTML 5 and CSS 3 [11]. In addition, to optimize the user interface, this stage is also developed using Responsive web design, which is about creating web pages that look good on all devices. A responsive web design will automatically adjust for different screen sizes and viewports. Responsive web design uses HTML and CSS to automatically resize, hide, shrink, or enlarge a website to make it look good on all devices (desktops, tablets, and smartphones).

D. Testing using Black-box Testing

The testing stage shows how the work of the website builder is, whether the results of the website that have been created are the same as the expectations of the users, from the information needed to the performance obtained. The components tested in this stage include content, functionality, usability, and system accuracy. The outcome of this research will be tested using Black-Box testing, a software testing method in which the functionalities of software applications are tested without having knowledge of internal code structure, implementation details and internal paths. Black Box Testing mainly focuses on input and output of software applications and it is entirely based on software requirements and specifications. There are three types of Black Box Testing such as: Functional testing, Non-Functional testing and Regression testing. The test focuses on the functions of the system to ensure that the user can use the existing functions on the system [9][10].

E. Website Implementation and Maintenance

In the implementation phase, the website is placed in the user's computer to interact directly with the system, and the user gets the opportunity to work on it for the first time [12][13].

III. RESULTS AND DISCUSSION

In the description of the current procedure, it can be described as follows:

1. Customers Make Service Requests.

   Complaints/service submissions made by customers can be made by telephone or directly coming to the service centre. Usually, customers who have difficulty carrying a large machine can make a complaint by telephone for a service visit. Customers who have small machines can come directly to the service centre with a machine. Customers notify the problems experienced by Customer Service.

2. Customer Service Make a Service Submission Form.

   Customer Service records customer complaints, customer data, and machine types in a service application called a service call. A copy of the service call is given to customers who come directly to the service centre as evidence that the machine is being serviced and the conditions that must be brought when picking up the machine. For customers who make complaints by telephone, Customer Service will send a softcopy service call to customers via email or social media.

3. Customer Service Selects a Technician and Creates a Technician Assignment Letter.

   Furthermore, customers who come directly to the service centre hand over the machine to Customer Service to determine the technician who will perform service on each service call.

Then customer service will make a technician's assignment letter sent via social media groups and hand over the machine to the technician. Customers who cannot come directly to the service centre waiting for a visiting technician.

4. Technicians Do Assign Tasks.

   Technicians carry out machine work under the letter of assignment. Some technicians conduct service visits, and some perform services at the service centre. The technician will notify customer service when the service has been completed.

5. Customer Service Completion.

   a) For customers who request a service visit, Customer Service will call the customer to inform them that the service has been completed. If the customer disagrees, the customer will notify the customer of the lack of service to Customer Service. Then Customer Service will record and inform the technician of additional service. The technician will perform additional services and immediately notify Customer Service when the service is finished. Customer Service will notify the customer when the service has been completed. Customers who have agreed to the service, the customer, will show a softcopy of the service call and sign the service agreement completed on the technician's assignment letter to the technician. The technician will check the softcopy of the service call according to the technician's assignment letter. After receiving the signed technician assignment letter, the technician will hand over the machine to the customer.

   b) For customers who do service at the service centre, Customer Service will call to notify the machine that it has been serviced and ask the customer to come to pick up the machine with a copy of the service call. Customers come to the service centre and check the machines that have been serviced. If the customer disagrees, the customer will notify Customer Service of the lack of service. Then Customer Service will record and inform the technician of additional service. The technician will perform additional services and immediately notify Customer Service when the service is finished. Customer Service will notify customer service has been completed. Customers who have agreed to the service will submit a copy of the service call and sign the service agreement completed on the technician's assignment letter to Customer Service. Customer Service, who has received a copy of the service call and a signed assignment letter, will inform the technician to hand over the machine to the customer. Technicians hand over machines to customers after receiving instructions from Customer Service.

In the description of the proposed procedure, it can be described as follows:

A. Proposed Use Case Diagram

Designing the Use Case Diagram serves to make it easier to understand the system. Where this picture consists of actors as actors who interact with the system, and there are various series of activities that occur. The following is an figure of the Use Case Diagram, namely:

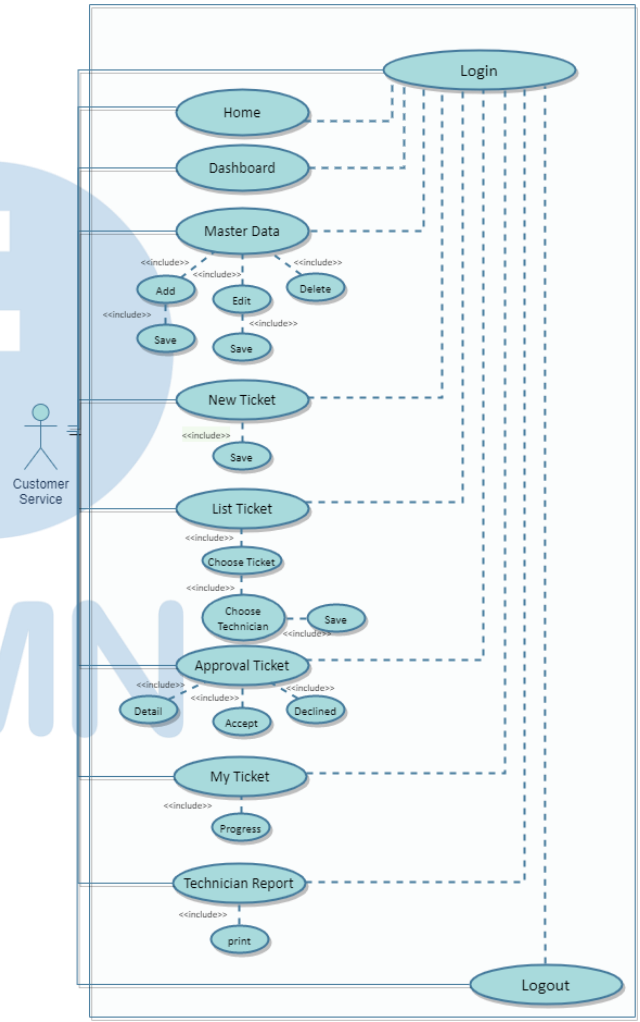

Figure 2. Proposed Use Case Diagram of Customer service

Customer service actors have several prominent features such as: home, dashboard, master data, new tickets, ticket list, approval ticket, my ticket and technician report that can be accessed after logging in. In addition, there is a log-out function to exit the website if the business process is complete.

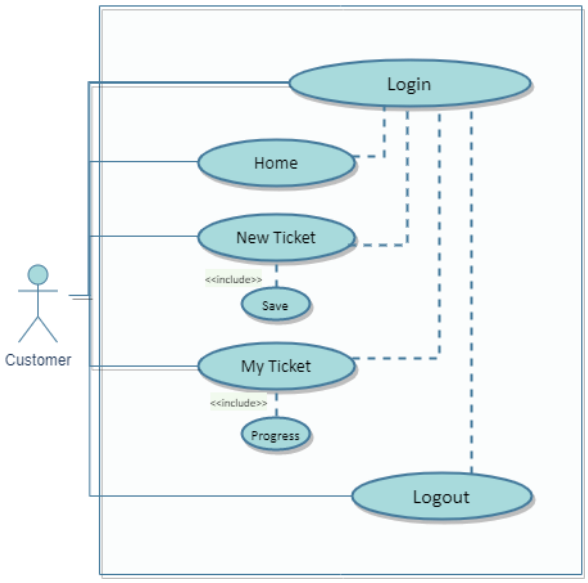

Figure 3. Proposed Use Case Diagram of Customer's

Customer actors have several prominent features such as: home, new ticket, and my ticket, which can be accessed after logging in. In addition, there is a log-out function to exit the website if the business process is complete.

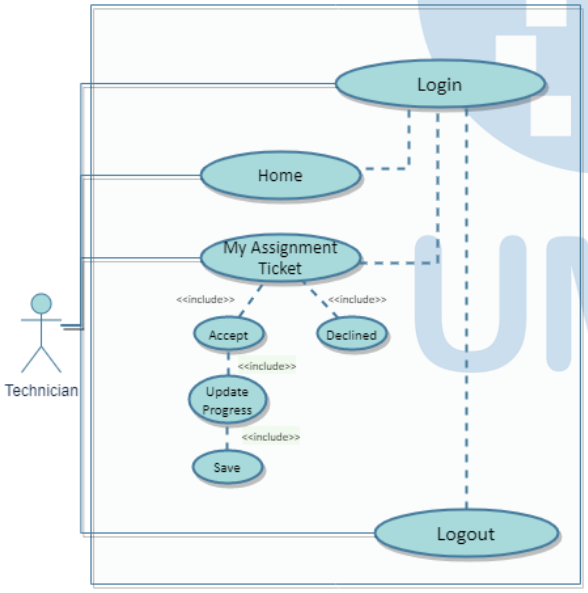

Figure 3. Proposed Use Case Diagram of Technicians

And for the last, the technician actor has two main features: home and my assignment, which can be accessed after logging in. In addition, there is a log-out function to exit the website if the business process is complete.

B. Proposed Activity Diagram

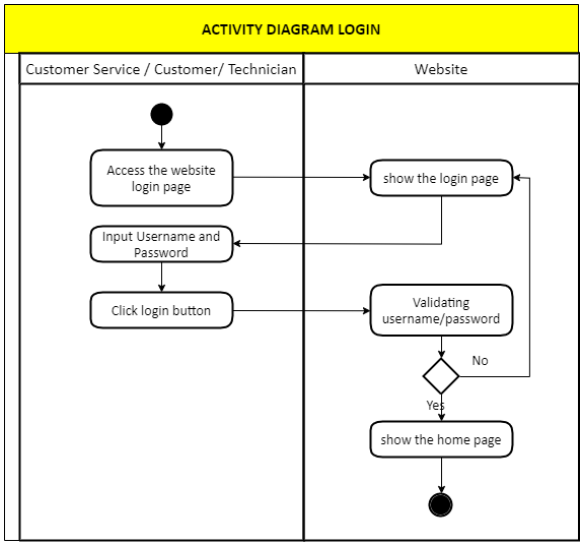

Figure 4. Login Activity Diagram

The login activity begins with the customer/customer service/technician entering the login page. The customer/customer service/technician login page displays fill in the login data in the form of a username and password. The system will display the main page when the login is successful and return to the login page when the login fails.

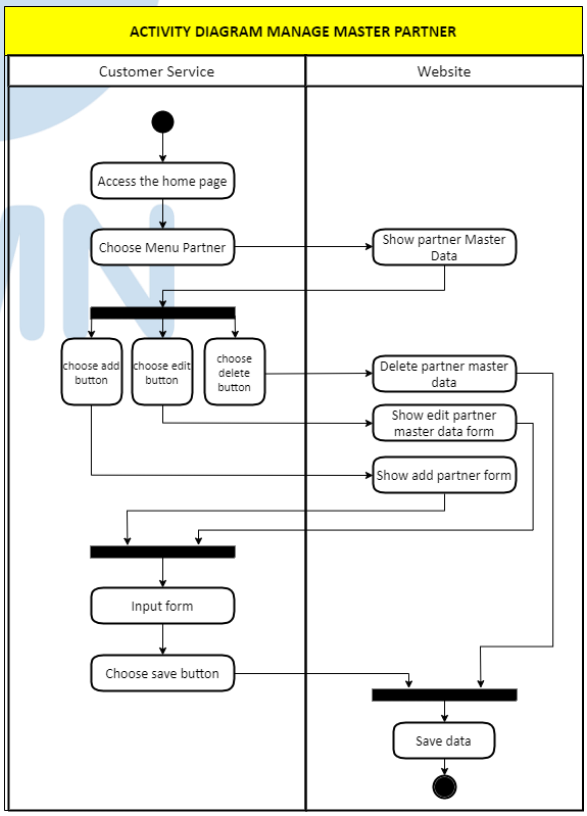

Figure 5. Master Partner's Management Activity Diagram

The master partner management activity starts after customer service enters the main page; customer service clicks on the partner menu then the system will display partner data. In partner data, customer service can add new partner data by filling in the data, then save, change partner data, and delete customer service data that is no longer needed.

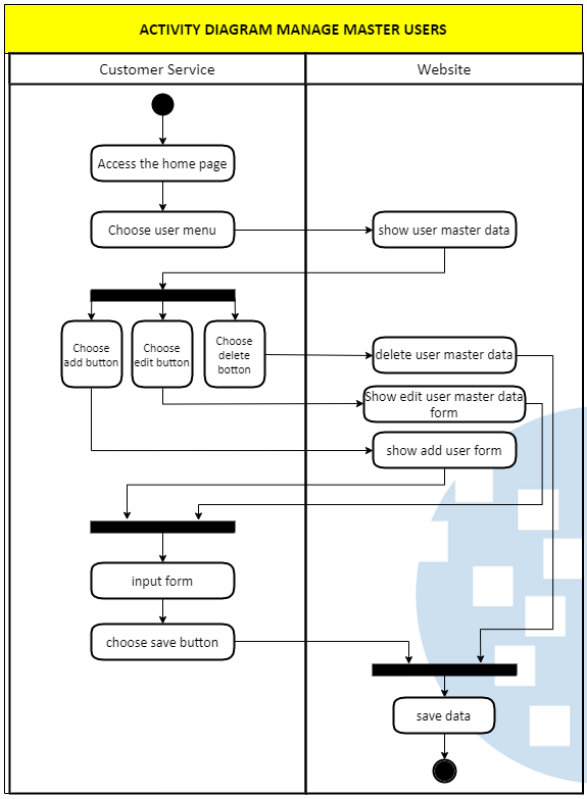

Figure 6. Master User's Management Activity Diagram

The master user management activity starts after customer service enters the main page; customer service clicks on the user menu then the system will display user data. In user data, customer service can add new user data by filling in the data, then save, change user data, and delete customer service data that is no longer needed.

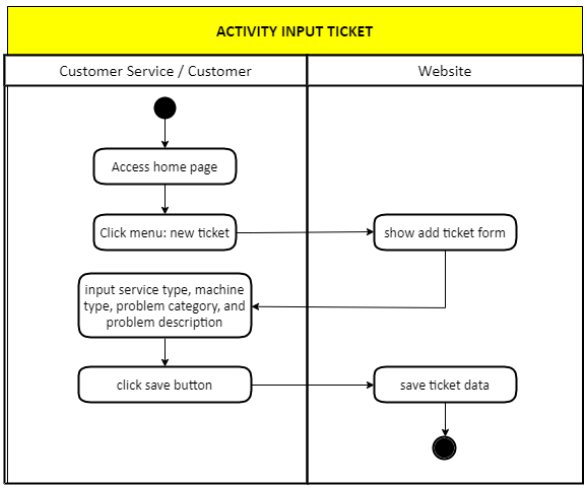

Figure 7. Input Ticket Activity Diagram

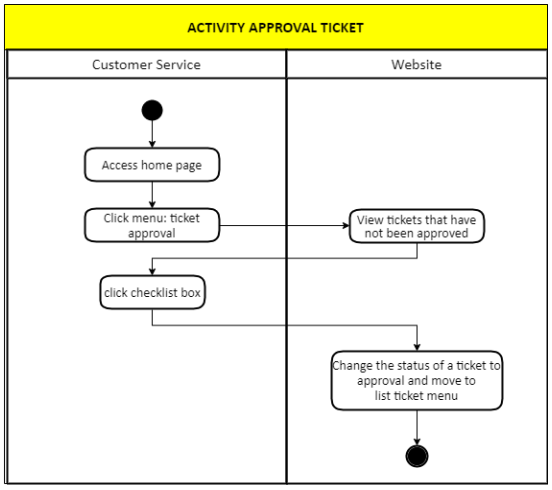

Figure 8. Approval Ticket Activity Diagram

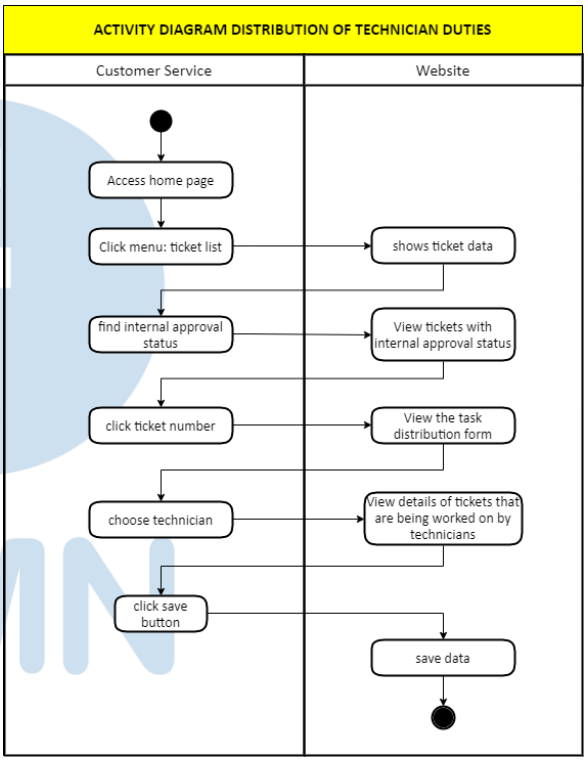

Figure 9. Technician task management Activity Diagram

The technician's task-sharing activity starts after the customer service enters the main page; customer service clicks the ticket list menu then the system will display ticket data. In the ticket data, customer service looks for tickets with internal approval status and selects the ticket number you want to divide technician duties; after clicking the ticket number, the system will display a task distribution form. On the task distribution form, customer service selects a technician who will be assigned to resolve complaints on the ticket. When choosing a technician, customer service can see all the tickets that the technician is working on. Then customer service saves the technician who has been selected by clicking the save button.

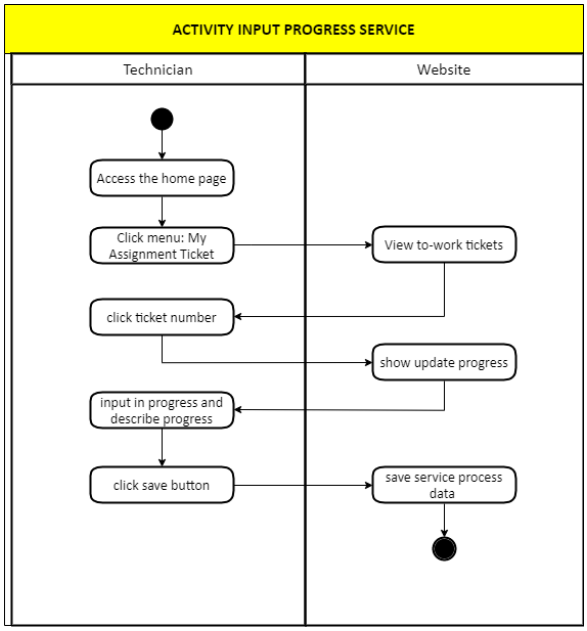

Figure 10. Input Progress service Activity Diagram

The service progress input activity starts after the technician enters the main page and clicks on my assignment ticket menu; then, the system will display the technician's task data. In the technician's task data, the technician selects a ticket number; after clicking on the ticket number, the system will display an update progress form. Then the technician fills in the progress and progress description and clicks the save button to save the data.

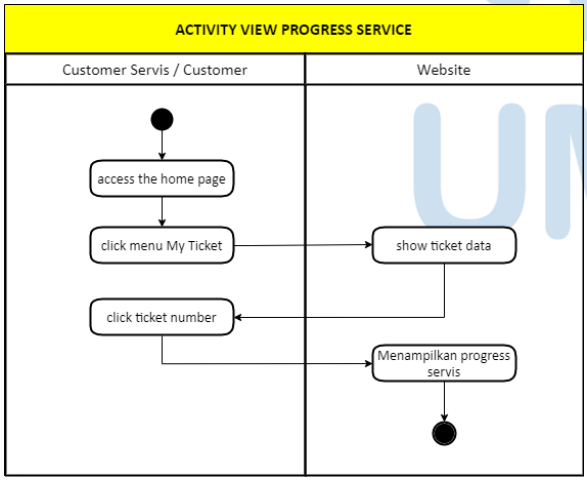

Figure 11. View Progress service Activity Diagram

The activity of viewing service progress starts after customer service/customer enters the main page, then customer service/customer clicks on my ticket menu, and then the system will display ticket data. In the ticket data, the customer service/customer selects the ticket number; after clicking the ticket number, the system will progress the service in detail.

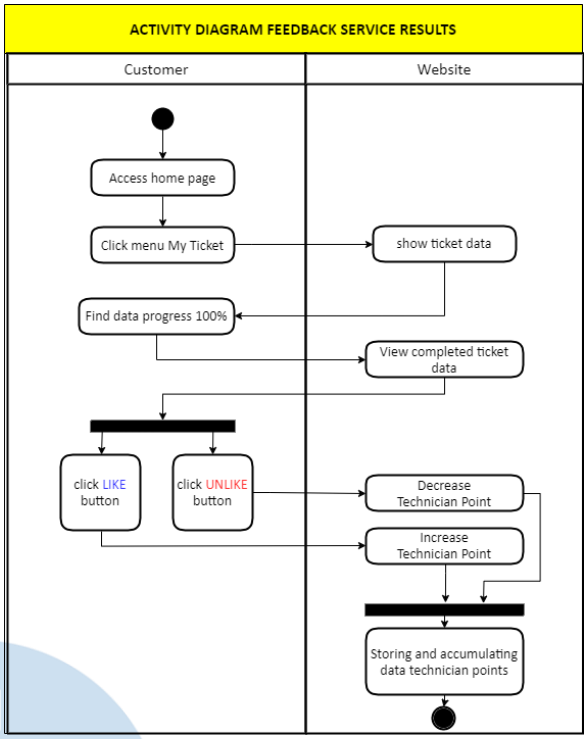

Figure 12. Feedback service results Activity Diagram

The service feedback activity starts after the customer enters the main page, then the customer clicks on my ticket menu then the system will display ticket data. In ticket data, customers look for ticket numbers with 100% progress; after that, customers can give positive feedback by clicking the like button or negative feedback by clicking the, unlike button. The system will save the points according to the feedback given.

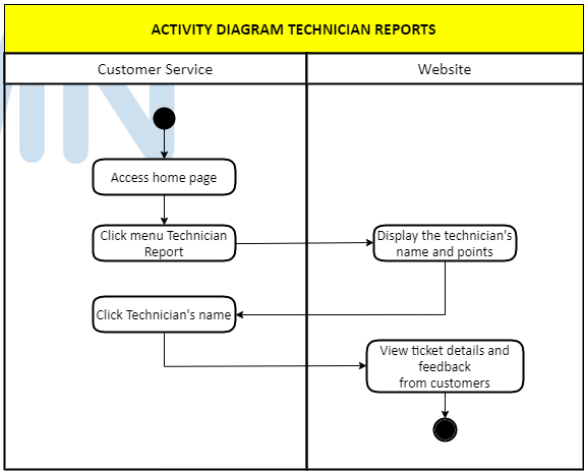

Figure 13. Technician reports Activity Diagram

The technician report activity starts after customer service enters the main page, then customer service clicks the technician report menu, and then the system will display the name and point of the technician. After that, customer service clicks on the technician's name to display ticket details and customer feedback for each ticket.

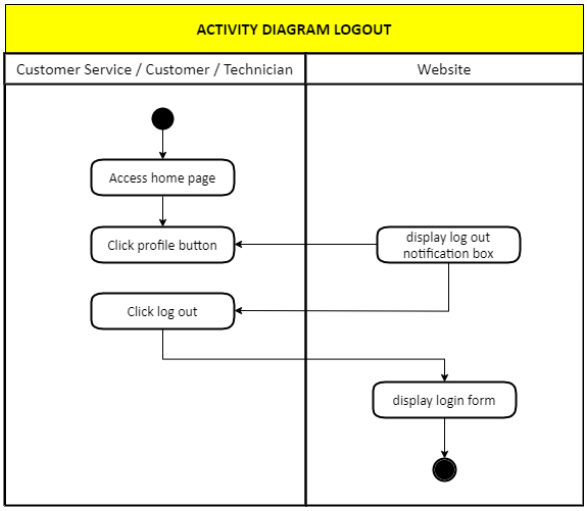

Figure 14. Log out Activity Diagram

This activity is carried out when the actor has finished carrying out activities in the system, and the actor can select a profile and click logout. Then the system will finish and return to the login page.

C. Proposed Class Diagram

The proposed Class diagram of web-based helpdesk ticketing describes eleven entities, including the attributes, operations and the relationship between these entities. That class diagram also shows us the primary key and the foreign key.

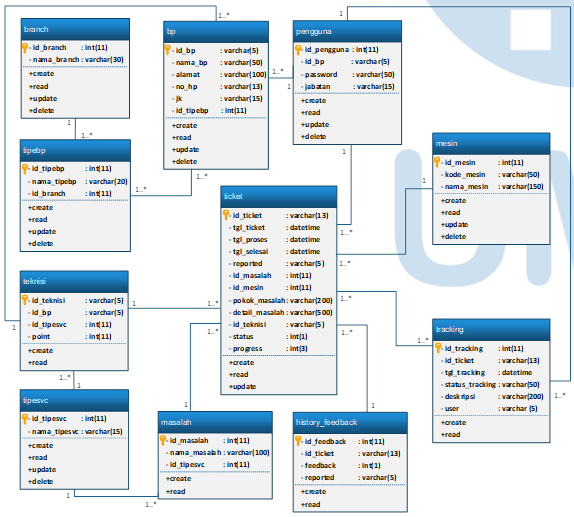

Figure 15. Class Diagram

D. User Interface

The interface to an interactive system or service, also called the user interface (UI), is all those parts of the system with which people come into contact, physically, perceptually and conceptually:

- Physically we might interact with a device by pressing buttons or moving a finger over a touch-sensitive screen. The interactive device might respond by providing feedback through the pressure of the button or changing a display in response to a swipe.
- Perceptually the device displays things on a screen which we can see, makes noises which we can hear or behaves in a way we can feel.
- Conceptually we interact with a device by trying to work out what it does and what we should be doing. The device provides messages and other content designed to help us do this.

The interface needs to provide some mechanisms so that people can give instructions and enter data into the system: 'input'. It also needs to provide some mechanisms for the system to tell people what is happening by offering feedback and mechanisms for displaying the content: 'output'. This content might be in the form of information, pictures, movies, animations and so on. The interface may enable connectivity between devices and services provided by an environment such as the internet [14].

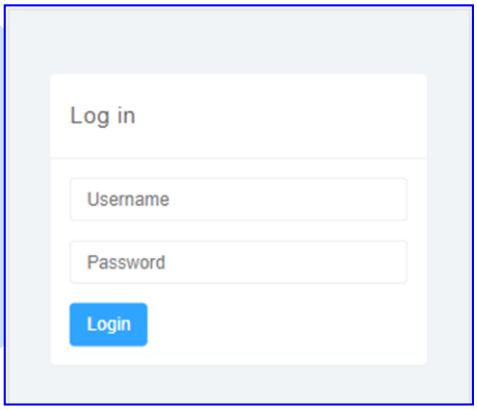

Figure 16. Log in form

On the login form, there are username and password fields. The field can be inputted according to the username and password of each user. If the input result does not match the user database, the system will validate and provide invalid/error notifications.

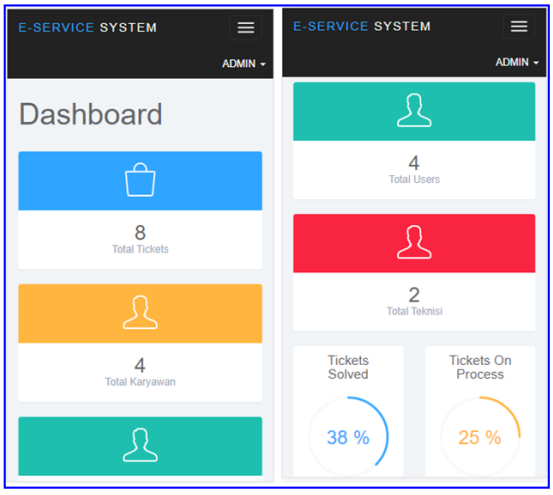

Figure 17. Dashboard

On the dashboard menu, there is a display of total tickets, total employees (customer service), total users, total technicians and the percentage of tickets that have been completed and tickets that are still being worked on.

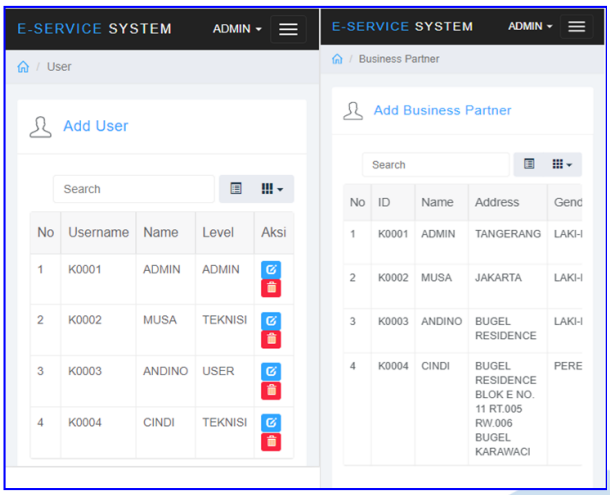

Figure 18. CMS User's and business partner form

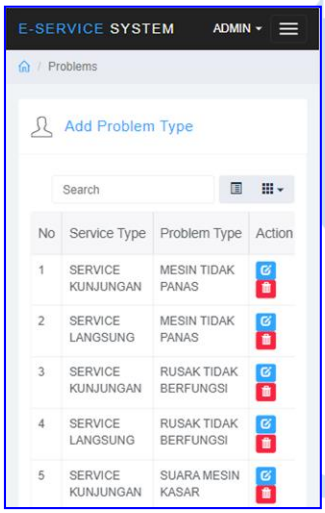

Figure 19. Ticketing input problem form

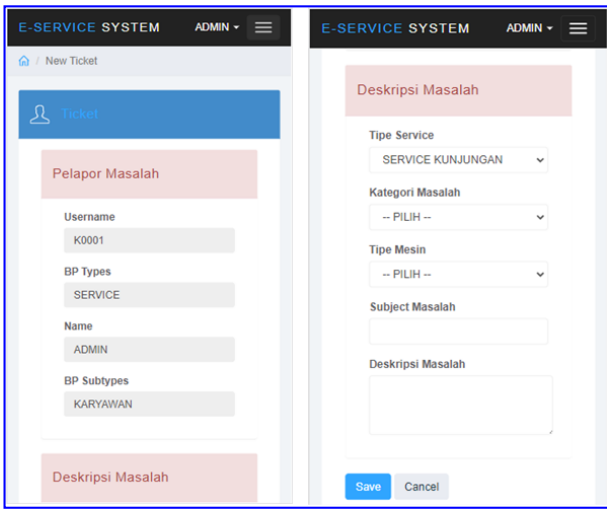

Figure 20. Report and problem description form

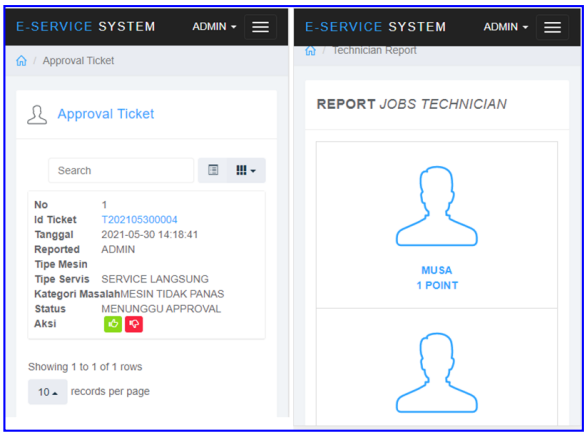

Figure 21. Report and problem description form 2

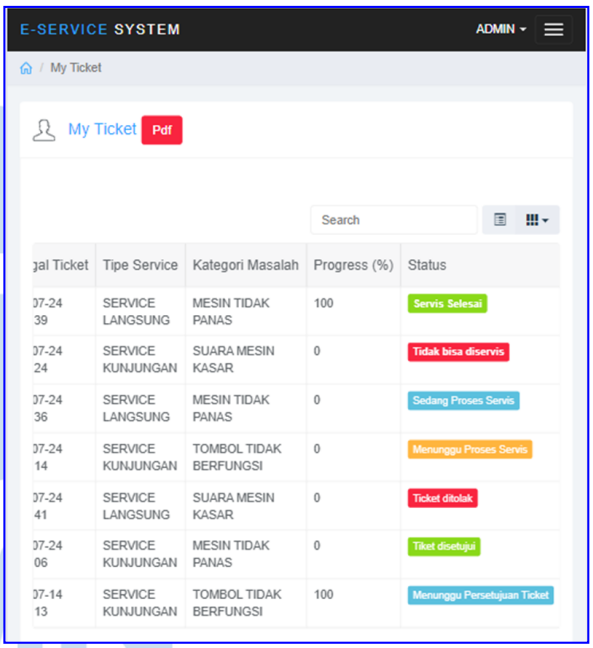

Figure 22. My Ticket menu's and status form

As for the status bar that shows with some colours, here is the explanation:

1) Waiting for Ticket Approval, namely Tickets that have just been created by customers that have not been approved by Customer Service on the New Ticket Menu
2) Approved ticket means a ticket that has been approved by Customer Service on the Approval Ticket Menu
3) ticket rejected means that the ticket is rejected by Customer Service on the Approval Ticket Menu
4) Waiting for Service Process means Tickets that the technician has not approved on the My Assignment Ticket Menu
5) In-Service Process means a ticket that the technician has approved on the My Assignment Ticket Menu

6) Cannot be serviced means a ticket that has been approved by the technician but cancelled by the technician on the My Assignment Ticket Menu because during the service process, the technician cannot repair the machine because the condition of the machine is already severe.

7) Service Completed means Tickets technicians have completed up to 100% on the technician progress page.

E. Black-box testing

TABLE 1. Black-box testing results.

The system testing phase is critical in determining a system's quality. These tests include design, specification, and coding. The testing process is done to determine the level of error that occurs in the system. The test used a black box testing shown the table below: [15]

Description	Case	Status
Log in	User's input username and password.	PASS
Add ticket	Customers / Customer Service fill in the complaint ticket and save the data.	PASS
Dashboard	The main menu to access all the feature of the web-based information systems.	PASS
Approval ticket	Customer service add the new approval of ticket.	PASS
Technician task management	Customer service choose the technician to do the service	PASS
Master data	Customer service input the data to the database..	PASS
Input progress service	Technician input the progress service.	PASS
View progress service	Customer service or customer's view the progress of the service.	PASS
Service feedback	Customers give the testimonial for the feedback on the satisfied or dissatisfied service quality.	PASS
Technician reports	Customer service view the feedback from the customer's.	PASS
Log out	User's can log out after finish the task or an activity.	PASS

At the testing stage, after testing the system using black-box testing, it can be seen that the results of testing the main functionality of the website have been in accordance with the design objectives.

IV. CONCLUSION

After all the stages are completed, it can be concluded that with the helpdesk ticketing service application, service submissions from customers will all be input into the system and stored in a database to perform the process of searching for service information. Then with technicians who can immediately update the service status without having to provide customer service after the visit, help customer service to see the status of unresolved services in real-time so that the division of technician tasks by customer service can be done relatively / evenly. As well as from the management, it is also easier to see in the form of customer satisfaction reports with the feature of providing feedback in the form of liking or disliking the service results from customers.

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