Unilever's Customer Data Management Information System in Medan City and Approaches to Android Smartphone and IoT Flexibility

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Abstract: A web application is a type of application that uses browser technology to run an application accessed via a mobile network. In this case, the web application can also assist in collecting customer data, especially those carried out by Unilever companies, where the system is quite efficient and accurate in collecting customer data. This system also makes it easier for companies engaged in data collection. In this case, the employees can easily record every customer and see the number of products used and selling well in the market. This is where the Unilever company will know how many products will continue to be produced and marketed. Furthermore. This paper discusses the development plan for this W.E.B. application towards Smartphone mode and development towards the Internet of Things for flexibility when accessing and getting data in real-time.

Keywords: Web, Customer Registration, Unilever, Smartphone, IoT

1. Introduction

Unilever customers are loyal customers who have used many of Unilever's superior products. These exceptional products have been widely recognized and received positive responses from Unilever customers in the city of Medan. These excellent products include *Pepsodent, Rinso, Lifebuoy soap,* and *Sariwangi tea*, which customers always use in Indonesia, especially Medan.

Unilever employees have the right to record each Unilever product. However, the data collection process for Unilever products is still carried out utilizing data collection using paper. Different employees do this. It has weaknesses, including a lot of data or reports that aren't well organized. Data searches are time-consuming because they have to look for customers one by one; even the marketing side of the company itself is challenging to find out—employees in the city of Medan in marketing Unilever products. One way to solve the problem is by using a web application system to make it easier for the company to collect data, especially surveyors, to record each customer and know the number of Unilever products that Unilever customers have used. Based on this description, the author raised the title "Unilever's Customer Data Management Information System in Medan City and Approaches to Android Smartphone and IoT Flexibility."

2. Literature Review

A management Information System is an information system used by organizations to manage all transactions that support management functions and can be helpful for decision making. Or management information systems, namely those that produce output with input and various other processes whose results are needed for specific management activities.

Management information systems are often abbreviated as M.I.S.; the results of M.I.S. are generally always a consideration for deciding on an organization. Using a Management Information System, various kinds of work related to management analysis can always be completed quickly. Management Information Systems can run well if supported by sophisticated technology, quality human resources, and organizational commitment. Management Information System is beneficial to support management functions, operations, and decision making.

Moreover, SIM functions, in general, are explained in the following points: The management information system functions are as follows: [1] To facilitate management in planning, monitoring, and decision making. [2] To increase efficiency in accessing data or information faster and more accurately. [3] To improve the quality of human resources and other resources that can support the organization or company. And Benefits of SIM for Companies, [1] The availability of quality and skills in utilizing information systems. [2] Improve the accessibility of information in a timely and accurate manner for its users, without the need for intermediaries. [3] It can help manage various transactions, reduce costs, and generate new information to create profits. [4] Can develop the planning process that has been made to be more effective. [5] Can identify various kinds of skill needs that support information systems. [6] Anticipating and understanding different economic consequences of a new information system and technology. [7] Improve productivity in the application of maintenance and development of information systems. [8] Support for making a management decision.
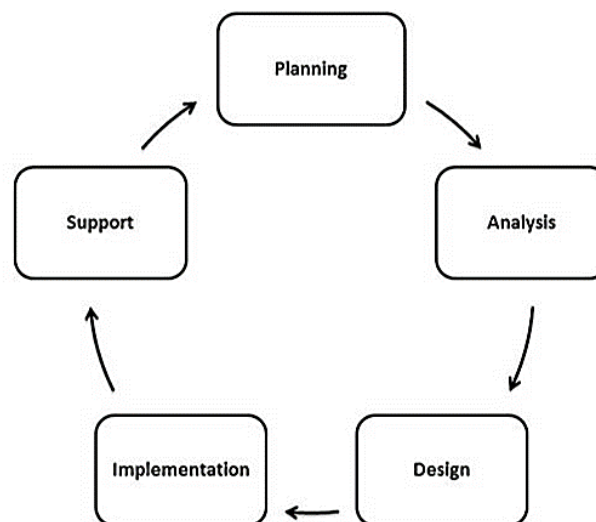

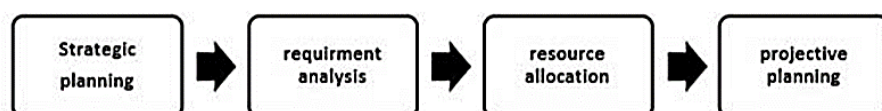**Figure 1.** System Development Life Cycle

Figure 2. Information System Requirements

Specifically, the management information system must go through a Lifecycle, as shown in Figure 1, starting from Planning, Analysis, Design, Implementation, and Support. Moreover, Figure 2 is the Information System Requirements needed to build a reliable management information system [12,13, 15, 16, 18, 19] and the items include Strategic Planning, requirements analysis, resource allocation, and projective planning.

3. Methods

The design analysis is seen in the following description; Design is the first step in building the system's development phase. Design is applying various techniques and principles to define a device, a process, or a system in detail that allows for physical realization. This phase is the technical core of the software engineering process. In this phase, the elements of the analysis model are converted using one of several design methods; the design phase will result in the design of Use Cases, Activity Diagrams, and Sequence Diagrams. Furthermore, a use case diagram is a form of a chart that describes the flow of the system to be planned and can later be used as a basis for development. The following is a use case diagram of the system design. Figure 3 is a use case diagram for the proposed system.
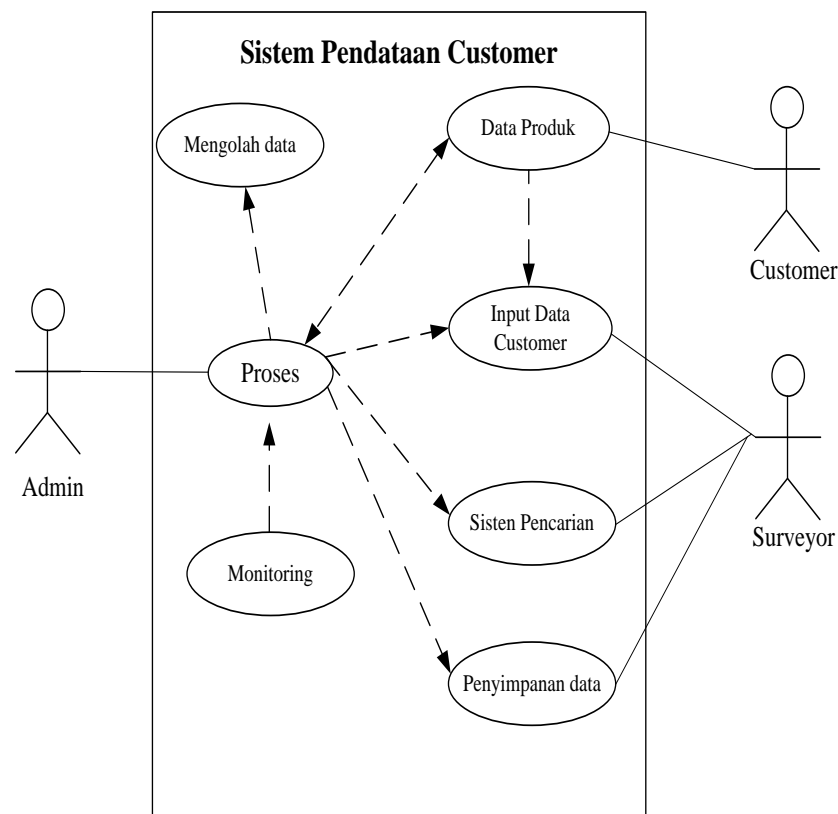

Figure 3. Use Case Diagram

Furthermore, the Activity diagram in Figure 4 will describe the system that will be planned and can later be used as a basis for further system development. Activity diagram is also a technique to define business processes and work paths. The following is an activity diagram of the planned system.
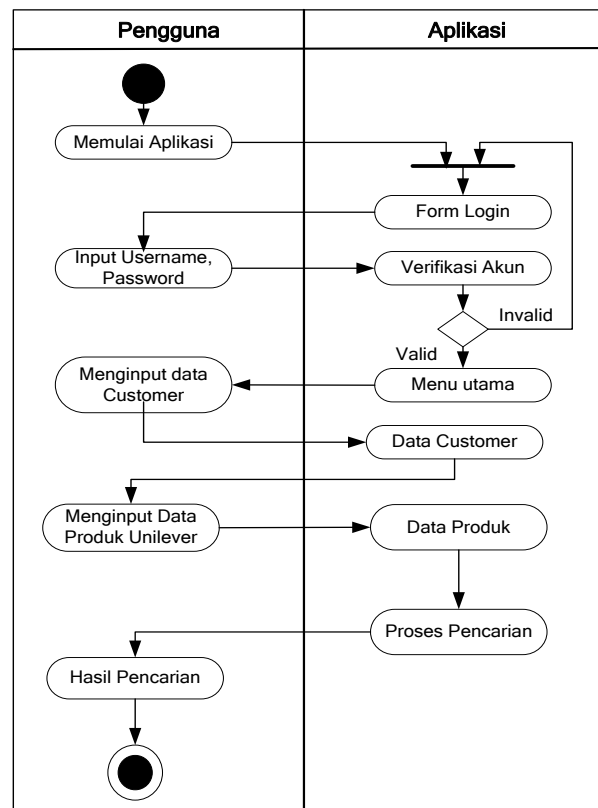
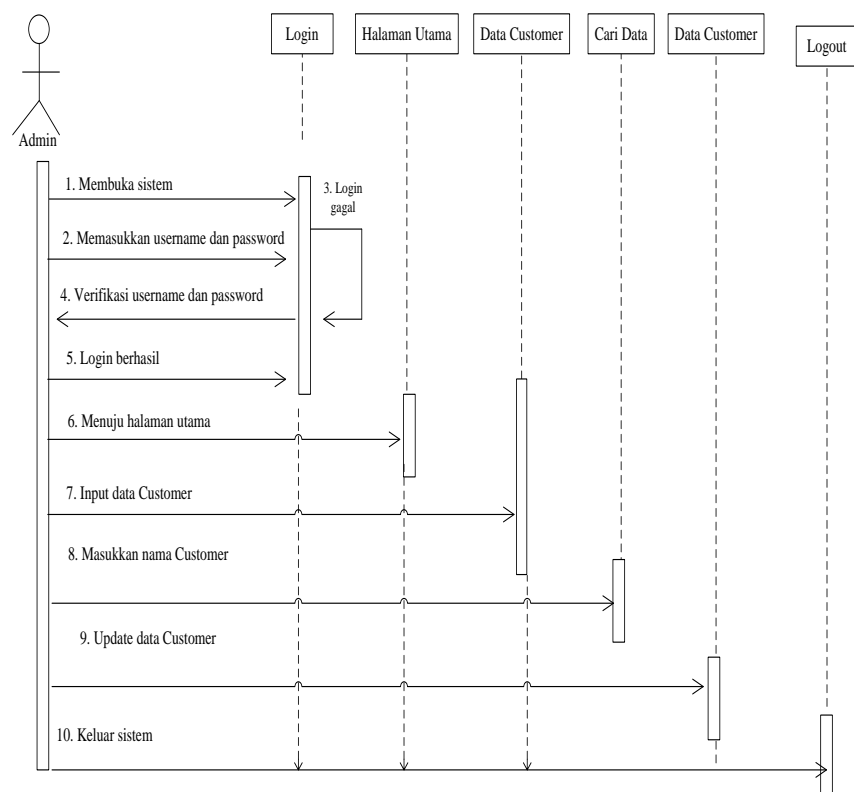**Figure 4.** Activity Diagram

Figure 5. Sequence Diagram

Sequence Diagram is one of the diagrams in UML; this sequence diagram is a diagram that describes dynamic collaboration between several objects. Its use is to show a series of messages sent between objects and interactions between objects and something that happens at a certain point in system execution. A Sequence Diagram is an Interaction Diagram used to explain the performance of a semantic scenario. Sequence Diagrams are also used to describe the interactions between objects in a time sequence, so the Sequence Diagram is shown in Figure 5. If you use an IoT [3, 4, 17, 22] and Internet server approach, it can be seen in Figure 6. This IoT [23, 24,25,26] or Internet Server is used to display data from the Management Information System [5, 7, 8, 9, 10, 11] on smartphones.

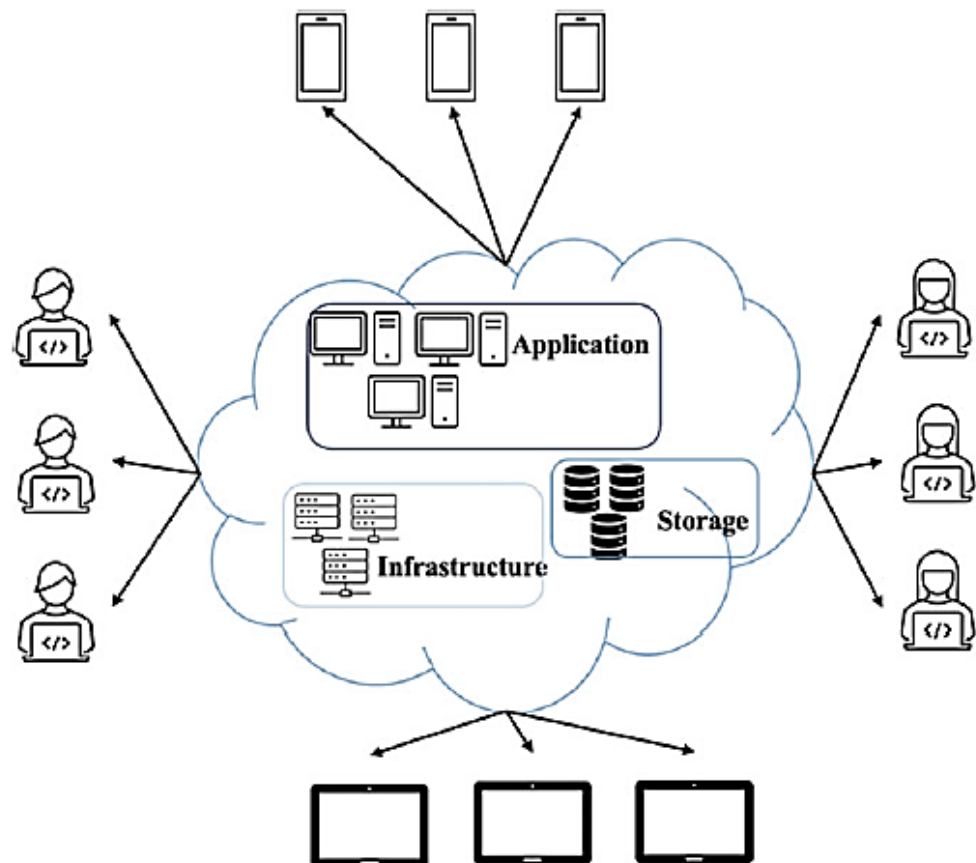**Figure 6.** Building Blocks for IoT System

Figure 7. The Architecture of cloud services in a network

In Figure 6, there are main components in forming an IoT-based system, including Embedded Processing or Embedded Systems or Microcontrollers. Hardware or embedded systems that are often used for IoT needs are Arduino with WiFi extension, ESP32, ESP8266, Bluetooth Low Energy (BLE), Raspberry Pi, and others, The wireless

transceiver (WiFi, Zigbee, LoRa, GSM, etc.). Next is sensors, sensors here are input devices that provide information in the form of digital data, next is Connectivity, here we talk about API (Application Programming Interface), Internet Server, Application Server, Internet devices, etc. and this security is the code used to secure the system, such as system logins, databases, etc. Figure 7 is an architecture in the cloud or network, i.e., end devices, application servers, storage or databases, and infrastructure. In detail, it is called Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS). Management information systems use this architecture with an Internet of Things (IoT) approach.
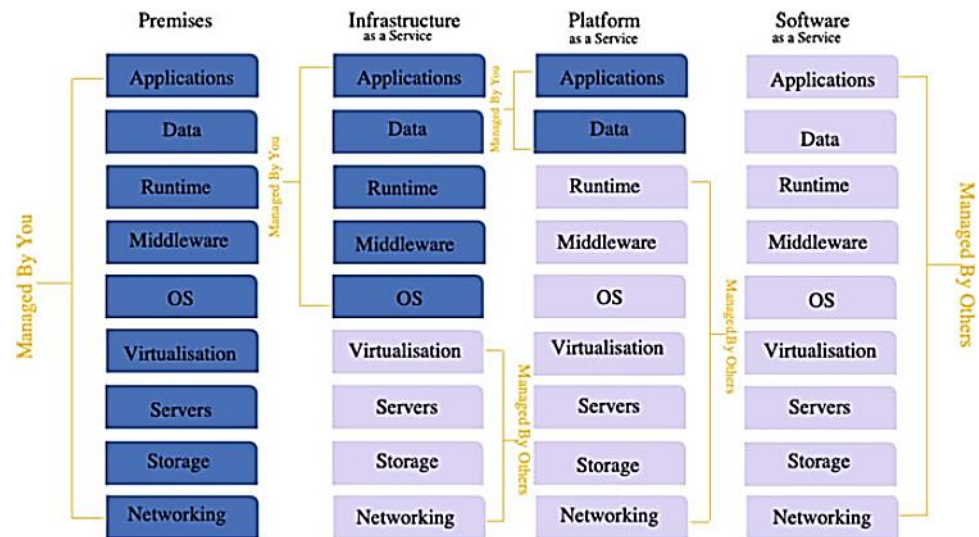

Figure 8. An IoT embedded device's general architecture
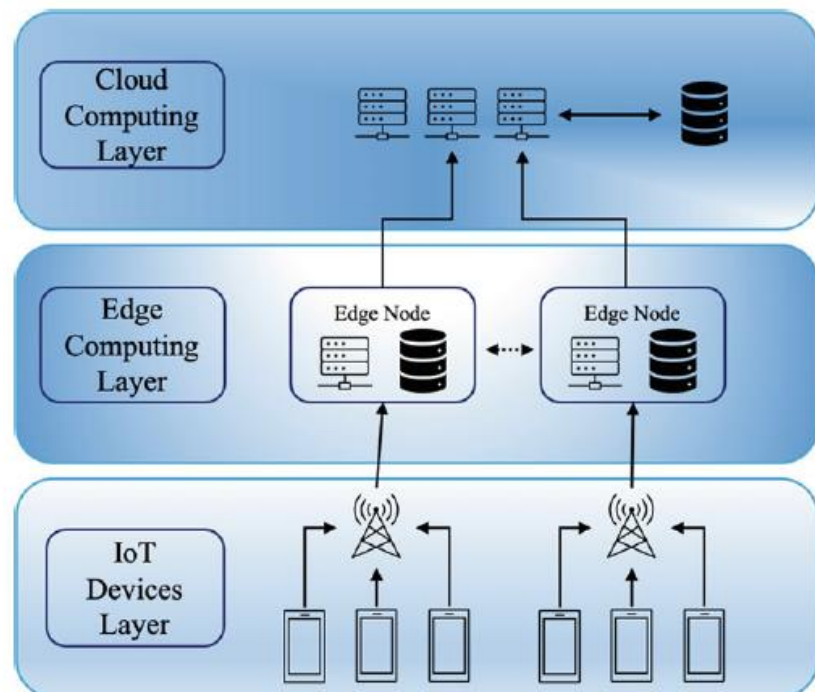

Figure 9. The Architecture of Edge Computing

Figure 8 explains in a complex way the parts of hardware and Software that are important components in embedded systems or embedded hardware, including Applications, Data, Runtime, Middleware, O.S., Virtualisation, Servers, Storage, and Networking. The management system described in Figure 8 is management formed by individuals or with management from other interconnected people.

Figure 9 is The Architecture of Edge Computing, which shows the relationship between end devices containing management information systems. One of the multi-end-node connections on the IoT Devices Layer is connected to the Edge Computing Layer or Edge Node; there are databases for storage. Data then sends the data to the Cloud Computing Layer, also known as the Application Server.

4. Result and Analyzes

When implementing a Management information system on Software [21, 27, 28, 32, 33], software specifications are needed to support the system's running to be implemented. Requirement devices used include Keyboard, Mouse, RAM at least 4 G.B. Moreover, Software Requirements (Software) include Windows 7 Operating System, X.A.M.P.P. Server, Sublime Text and PHP as programming languages and Adobe Photoshop CS5. And the development towards flexibility on smartphones and android [1,2, 6, 14, 20] phones is the use of CSS, HTML, XML, Javascript, and JSON. In contrast, the product of IoT is to use Internet Server devices that are connected to the WiFi module on each smartphone or Android O.S. Phone [29, 30, 31] Furthermore, the implementation of this system consists of initial management, i.e., design on the admin display, including admin design; in the admin design, there is data that must be processed by the admin, such as product data, added product data, product categories, and product brands. Admin login: To enter the admin login, the admin must first enter the username and password where the username is filled with a minimum of five different characters (@%*abcdeABCDE) like in Figure 10.
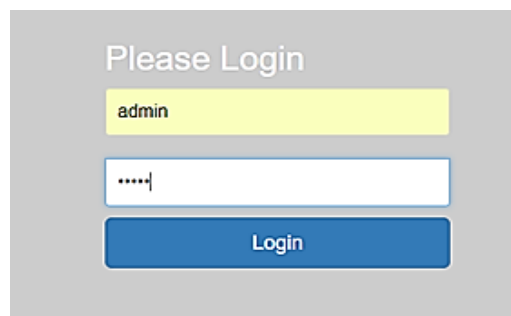

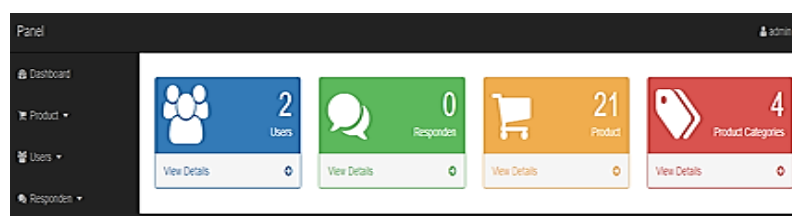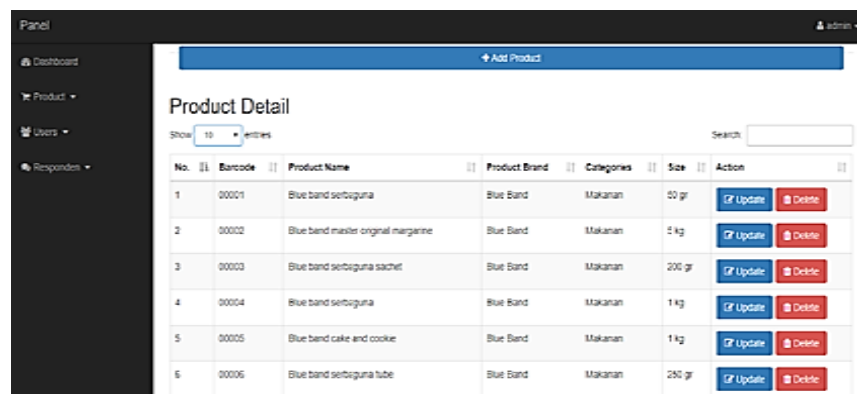**Figure 10.** Login Display

Figure 11. Dashboard view

Figure 11 is a Dashboard view; this contains a User detail, Respondent detail, Product detail, and Product Categories; furthermore, Product Data is shown in Figure 12. This

page contains Unilever product data that can be updated, deleted, searched, and added products later on the page.

Figure 12. Unilever Product Data

Figure 12 is Unilever Product Data that has been input into the management information system. Furthermore, management of this information system is carried out by adding, editing, deleting, and other direction such as editing profiles and others. The addition of a product, for example, is a Barcode input, Product Name, Product Brands, etc., as a Figure 13.
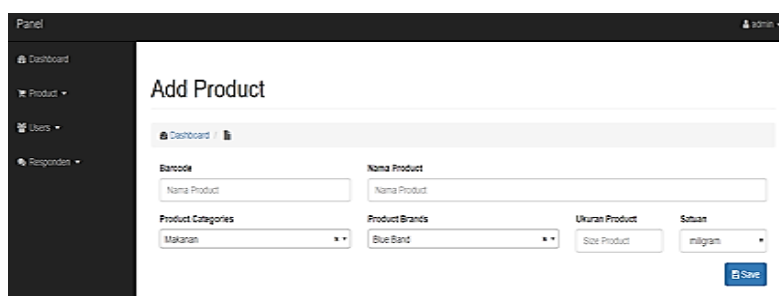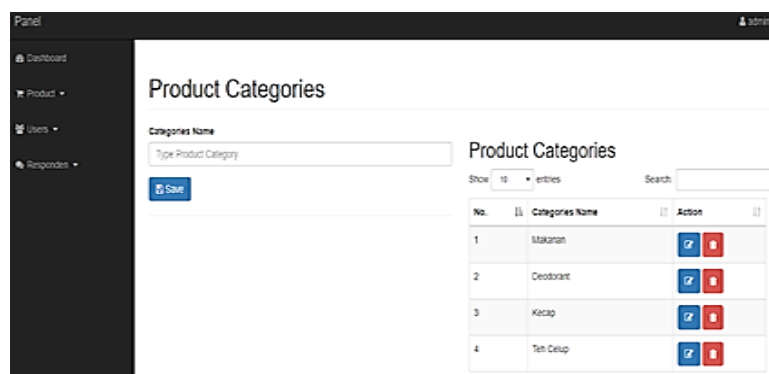

Figure 13. Add Product Data

This page contains product categories in Figure 14, which later on the page can be updated, deleted, searched, and saved. Furthermore, the Product Brand in Figure 15 is a page that contains product brands which later on the page can be updated, deleted, searched, and saved.
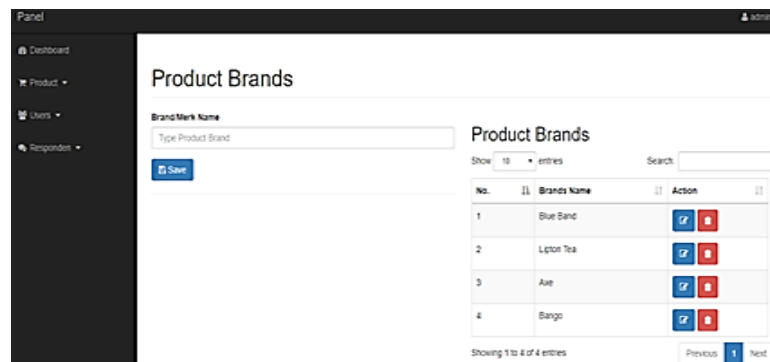

Figure 14. Product Categories

Figure 15. Product Brand

In the User or Surveyor Design, User View Page in Figure 16 is a home page containing the names of users or surveyors, which can be edited and deleted later.

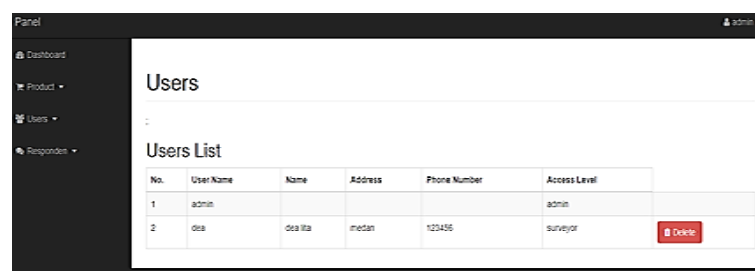**Figure 16.** User Display

In the User Registration Display in Figure 17, this page displays the addition of Surveyor, which later the name can be saved.

Figure 17. User Registration Display

In the Respondent Design in Figure 18, a Display adds Respondent page is a data display in the addition of Respondent data which later the name can be saved.

Figure 18. Display add Respondents

In the Respondent View in Figure 19, this page displays the respondent's name, which later the name can be added, edited, and deleted data.

Figure 19. View Respondents

Respondent data in real-time can be converted to graph form and displayed in real-time as a form of IoT function. An example is a graph of output sensors from end-nodes or embedded systems or hardware shown in a real-time graph like figure 20. As for the application server, can use The Things Network (T.T.N.) [Figure 21] and Thingspeak Mathworks App.
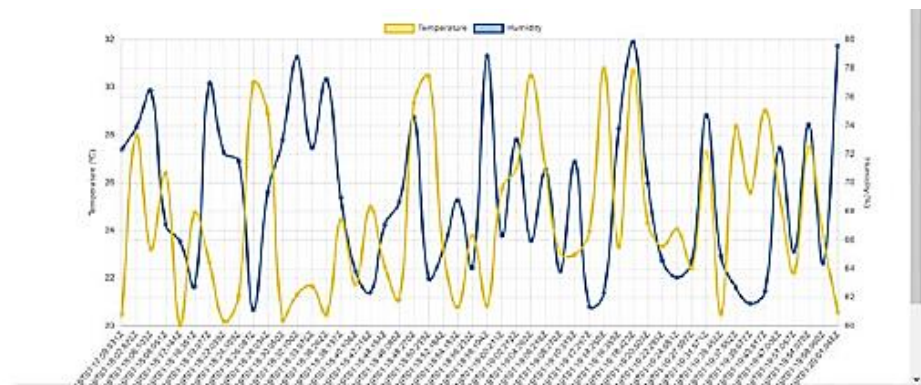

Figure 20. The Screenshot of Web App for Visualisation of IoT Hub Data as the respondent's data example
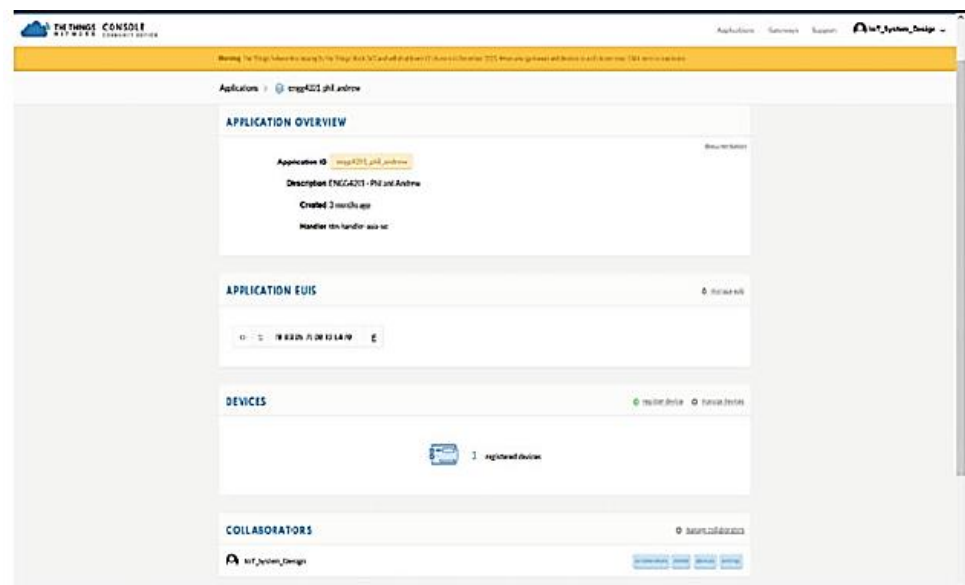

Figure 21. The Things Network as IoT Application Server

5. Conclusions and Suggestion

With this application, employees can record every customer and product easily and manually. And The Unilever Customer data collection is done using a web-based method. And with these two applications, the results obtained in recording every Unilever Customer are quite efficient and genuine. The designed system still has some limitations; therefore, the authors suggest continuous system development. The Suggestion is that customer data collection can be expanded to various cities in North Sumatra. And The application can be developed again in the form of an android based to make it easier for surveyors to record every customer and Unilever products.

Conflicts of Interest: The authors declare no conflict of interest.

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