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# Web-Based Telegram Chatbot Management System: Create Chatbot Without Programming Language Requirements

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**Abstract.** The growth of communication technology that keeps developing, the way we obtain and provide information are developing. One of the applications that get lots of interest is Telegram. This application makes out communication easier. The development of communication model through Telegram is developing as well, one of the models is the chatbot. Chatbot can be made answers a lot faster. Until recently, chatbots are mostly created with a particular programming language. This makes creating a chatbot only limited to those who understand the programming language. Although many applications offer to create a chatbot without programming by big vendors, but there hasn't been any academic literature for this topic yet. Therefore, in this research, I will design and implement the Telegram chatbot management system. This application provides to create a chatbot without programming language requirements. The user just needs to set the keyword and choose what action will chatbot give. This application also provides a direct message, broadcast message, and display usage statistics. This application tested by creating actions set, buttons set, command, direct message, broadcast message, and display usage statistics. The user can do all of those without any programming language requirements.

## 1. Introduction

The growth of information technology has become more advance. It started with the rise of cellular technology generation 0 or 0G in 1970 after world war 2. The growth keep growing to 0.5 G in 1971 by The Autoradiopuhelin (ARP). They both can't be called yet as cellular technology [1].

In 1980 the analog cellphone was introduce making it the first generation of cellular technology, 1G. Continued with 2G in the early 1990s which introduced in Finland [1]. After that, 3G was born it is then well known as Universal Mobile Telecommunications System (UMTS) in 2001. 4G discovered and introduced in 2010. Today 5G is the newest cellular technology keep on developing [2].

Of course, the growth of cellular technology is followed by the growth of its features and ability from every generation to generation. On 0G, although it cannot be called as cellular technology yet, which only provide half-duplex transmission and still analogous. 0.5G as the development from 0G has enhancement by introduced ARP (Autor adipophilin). For the first time, the 1G provides to make a very basic voice call through the radio waves. Unfortunately, it was not given too much attention to security. Enhancement was given for 2G, it provides features to send text messages, pictures, and multimedia



messages. In this generation, security has already better. Furthermore, at the same time, GSM (Group Mobile Special Mobile) is introduced as the data transfer technology[1].

On 3G or well known as universal mobile telecommunications standard (UMTS) which three times better from GSM with data rate 8Mbps. 3G started to provide video call features. On 4G the data rate also increased up to 1Gbps for user-server and 1-100 Mbps for mobile user [2][3].

As the growth of cellular technology, it triggered the industrial revolution, it's called industrial revolution 4.0. Besides that, Internet of Things and Artificial Intelligence on 2010s which become the backbone of connectivity and movement between human and machine [4].

One of the many important buffers for Industrial Revolution 4.0 is information. Almost all of life aspects need information. Activities we do are expected to generate useful information [5].

Besides the cellular technology, information technology was growing too. In the early development of cellular technology, information exchange only provide phone call, short message, and multimedia message[1]. With this, data exchange is still limited.

With the growth of cellular technology, information technology was growing too. The instant chat application presences. With the instant chat application, it increases the user performance. The impact is the user can do their tasks more effectively[6].

One of the many things which provide information faster is the chatbot. The chatbot is an account in a chat platform which can receive and send message to serve more effective conversation. It doesn't need additional installation by the user on the platform, so it is practical. Although it can receive and send messages, chatbot account different from human's account because it doesn't have online status, last seen log, and make calls with other accounts [7].

Chatbot has been used in many needs line. Such in the educational sector to serve campus information service[8]. In the IT sector, it used as server monitoring[9]. In the business sector, it used to make order, logging, and business transactions[10]. In the health sector, it supports to make consultations[11]. Moreover, it can be used for home automation[12].

One of many platforms which usually used to develop chatbot is Telegram. Telegram is a cloud-based chat application that provides features to share many file types. Telegram client can run the application on a smartphone or desktop. Telegram client's code is open-source, but the source has a proprietary license. Using Telegram is free and doesn't have a limit size for media transfer[13].

Telegram chatbot is a Telegram account that can provide messages automatically. User interaction provide by sending predetermined command to this account. Chatbot account doesn't need a phone number to register. This account's role is to become the interface of the program in the server [9].

In various researches, until recently the chatbot creation requires coding by certain programming languages such as PHP [14] and Python[15][8]. It makes only those who mastered the programming languages who can make a chatbot. Because of that, many software developers develop software that can help to make a chatbot without any programming language requirements such as Chatfuel (for Facebook)[16], Manychat (for Facebook and SMS), Motion.ai (for Web). Moreover, some big players who have the platform join this game too. Google with Api.ai, Facebook with Wit.ai, Microsoft with LUIS, Amazon with Lex, and IBM with Watson[7]. But, for now, there has not existed yet the such application specifically made for Telegram chatbot. Because of that, I propose to make a Telegram Chatbot Management System.

## 2. Material and Methods

### 2.1. Related Works

#### 2.1.1. Integration Telegram Bot on E-Complaint Applications in College(M A Rosid, A Rachmadany, M T Multazam, A B D Nandiyanto, A G Abdullah and I Widiaty)[14]

This research explains how Telegram-based chatbots are used as a means to submit complaints to the campus. From complaints that have been collected, administrators can view complaints that are given and validate or delete them. Also, it can show statistical data from complaints given. For the method used in making this chatbot is the Long-Polling method. Administrator pages are created using web applications.

### 2.1.2. *Design of Telegram Bots for Campus Information Sharing (Hari Setiaji, Irving V Paputungan ) [8]*

In this research still chatbot for campus purposes. In this research, the programming language used is python. As for the method used is the Webhook method.

### 2.1.3. *Rancang Bangun Chatbot Untuk Meningkatkan Performa Bisnis (Eka Larasati Amalia, Dimas Wahyu Wibowo)[10]*

In this research, the bot used is the Facebook Page chatbot. For manufacturing using the Chatfuel platform. With this Chatfuel, making a chatbot for Facebook Page does not require coding.

## 2.2. Chatbot

Chatbot is an account on the chat platform that can receive and send messages to serve the conversation to users efficiently. Chatbot doesn't need additional installation by the user on the platform. It provides features to receive and send messages. But chatbot different from human's account because it doesn't have online status, last seen log, and can't make calls to other accounts.[15]

Chatbot simulating conversation with the user. Conversations are made by replying to the user's request[17]. Chatbot receive message through API. Chatbot is processing by an incoming message. After processing, the chatbot will send the reply through API to the user.



**Figure 1.** how chatbot works

## 2.3. Telegram API

Telegram does not just have a chat platform. Telegram also has API service which can be accessed by the developer to use Telegram in various needs. API usually used to make a chatbot. If we want to use Telegram API, we must create a chatbot account from Telegram. This account can be created through the @botfather account(<https://telegram.me/BotFather>). We will get token which can be used to access Telegram API.[18]

To run Telegram chatbot, Telegram API provides two methods, they are long-polling and webhook. With long-polling, the server should check the application periodically. When messages are coming, the server will process it. Long-polling methods are suitable for those who don't have https server or web hosting, so it can run on their computer. Whereas the webhook method doesn't need routine checking because Telegram API will send it to the server when the message is coming. Therefore, to run the webhook method we should have an active https server or web hosting because Telegram API will send incoming messages to its server.[15]

## 2.4. Web Application

Web application is an application which developed to be accessed through a web browser. To be accessed through the web, it has to use language which the web browser understands, such as HTML and Javascript.[19]

#### 2.4.1. Front-end

Front-end handle the user interface. Front-end has three main components, they are HTML, CSS, and Javascript. Those three have close relation and their own role. HTML which has an ideal structure and pattern become front-end's base. CSS handles the style of the web interface. Javascript has a role to make interface effect more dynamic and optimal.[20]

#### 2.4.2. Back-end

Back-end handle system processing on web application. For a system that I developed, I use PHP (PHP: Hypertext Processor). PHP is a scripting language which inserted in HTML. PHP is largely used in dynamic webs. At first, PHP is an abbreviation from Personal Home Page. At first, it developed by Rasmus Lerdorf in 1995. At that time named Form Interpreted(FI). It still a bunch of scripts that process data form from the web.[16]

#### 2.5. Database

Database is a collection of data that has a logical connection and designed to provide some needs of the organization's information. Database Management System(DBMS) is a software system that grants access to users to define, create, maintain, and control database.[21]

#### 2.6. Feature Requirements

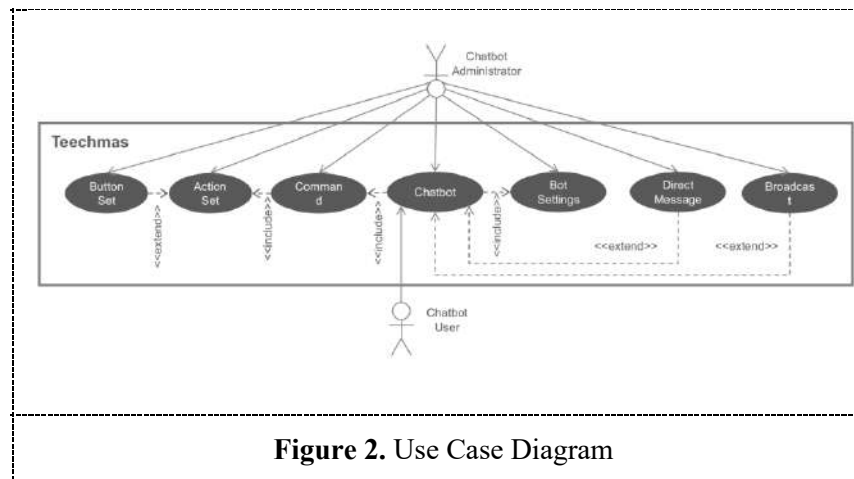
For the Telegram chatbot management system that I developed in this research has several features that I have planned, they are:

**Table 1.** feature requirements and it's functions.

Feature	Function(s)
Button Set	Used to create and edit button arrays that can be used in Action Sets. This feature can create a button layout, give a caption and it's value to the button.
Action Set	Used to create and edit Action Sets which can later be called by Command in reply to chatbot users. Actions supported here are photos, videos, audio, documents, locations, contacts, buttons, and messages. These buttons are called from the button set that was created before.
Command	Used to set the reply that will be given to users based on keywords that have been determined. The replies given are from action sets that were created before.
Direct Message	Provides the administrator for answers directly to users whose messages do not contain predetermined keywords.
Broadcast	Used to create broadcast messages to all chatbot users who have used this chatbot.
Settings	Used to change settings on the chatbot.
Analytics	This feature is used to display chatbot usage statistics.

#### 2.7. Use Case Diagram

The system created in this research has two types of users, they are Chatbot Administrator who can manage the chatbot and Chatbot Users who can make conversations and get replies from the chatbot. The interactions of the two users are illustrated in Figure 2 which contains a use case diagram.

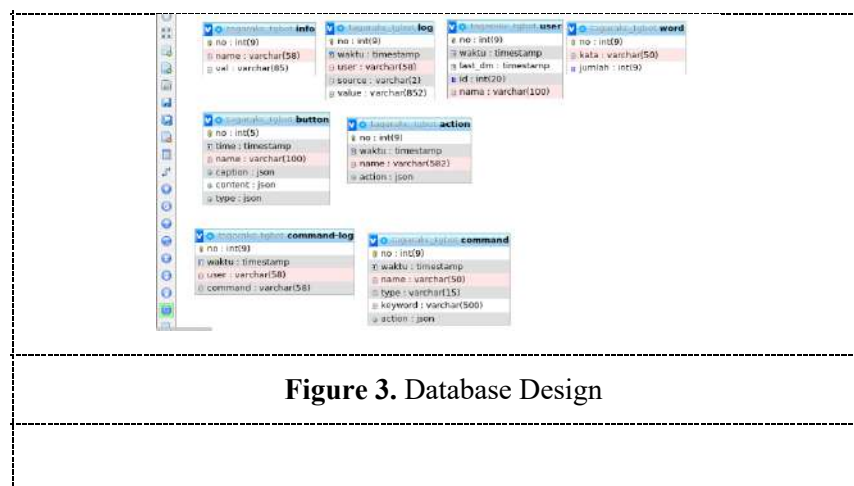


## 2.8. Database Design

In the system that I develop for this research, I use the database as the data storage. Here the data that's stored in the table:

**Table 2.** table name and it's function(s)

Table	Function(s)
Action	store action set data
Button	store button set data
Command	store command data
Command-log	store records of commands data that have been sent
Info	store chatbot settings informations data
Log	store incoming and outgoing conversation data.
User	store account data that has used chatbot.
Word	store data of words that have been entered and the amount



## 2.9. System Design

As explained in the use case diagram, the system created in this research has two types of user interaction, the first is a chatbot administrator and the second is a chatbot user. So here I present the system that handles interactions with administrators and with users.

To interact with the administrator, there are at least four main operations. Those are set a token, create buttons set, create actions set, create command. For further explanation figure out in figure 4.

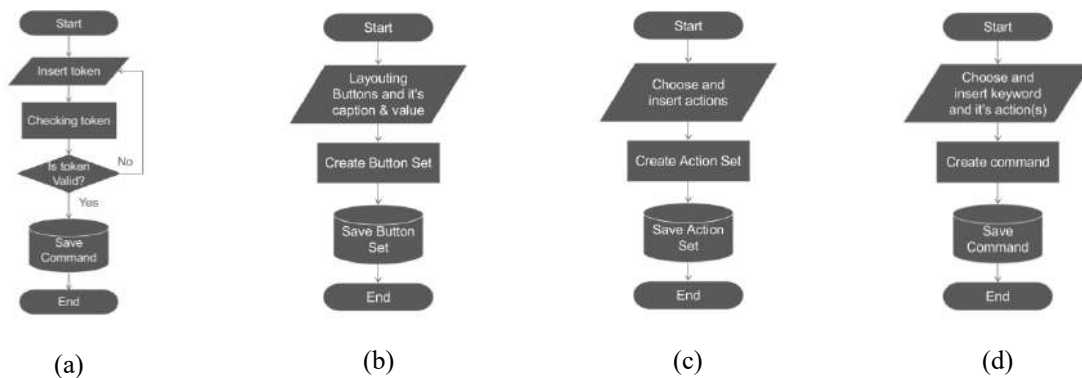


Figure 4. (a) Flowchart set token, (b) Flowchart create button set, (c) Flowchart create action set, (d) Flowchart create command

Chatbot user interactions are done by giving out answers based on the chat that previously sent by the users. The replies are in the form of actions created in the action set.

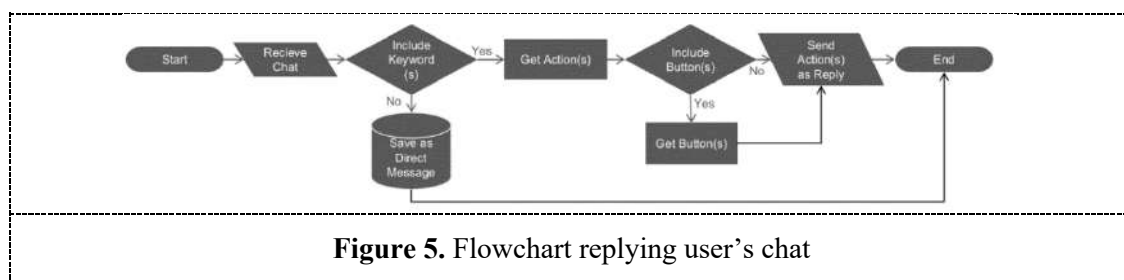


Figure 5. Flowchart replying user's chat

## 3. Results and Discussion

### 3.1. Change Chatbot Settings

The administrator can change the following settings: token settings, welcome messages, and messages if there are no matching keywords.

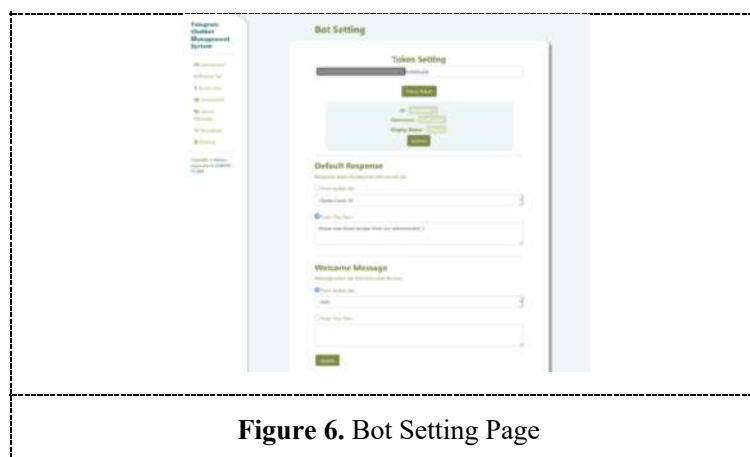


Figure 6. Bot Setting Page

### 3.2. Create and Display Button Set

When you first time enter the Button Set menu page, all button sets will be displayed. Then if you want to create a new button set, you can select the "Create New Button Set" button, whereas if you want to edit an existing button set you can select the "Edit" button. And if you want to delete the button set you can select the "Delete" button.

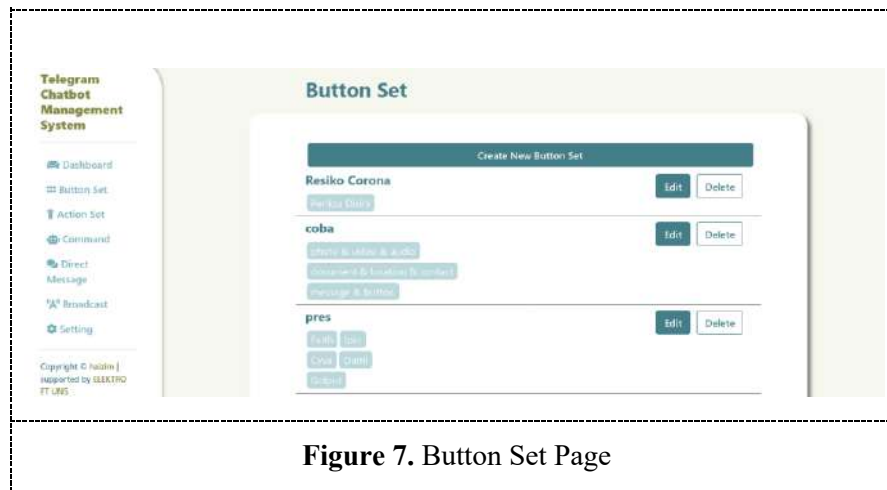


Figure 7. Button Set Page



Figure 8. (a) Create Button Set (b) Edit Button Set (c) Button Set Deleted (d) New Button Set Created

### 3.3. Create and Display Action Set



Just like in the button set, when you first enter the Action Set menu page, all action sets that have been created will be displayed. If you want to create a new one, then you can choose the "Create New Action Set" button. If you want to edit an existing one, you can do this by selecting the "Edit" button. Meanwhile, if you want to delete you can choose the "Delete" button.

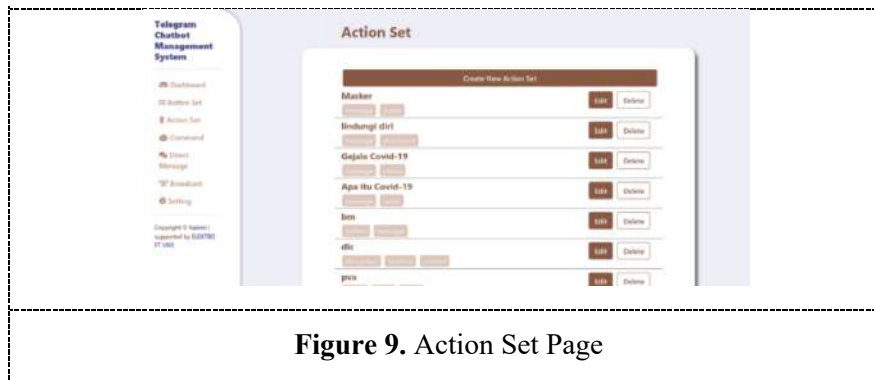


Figure 9. Action Set Page

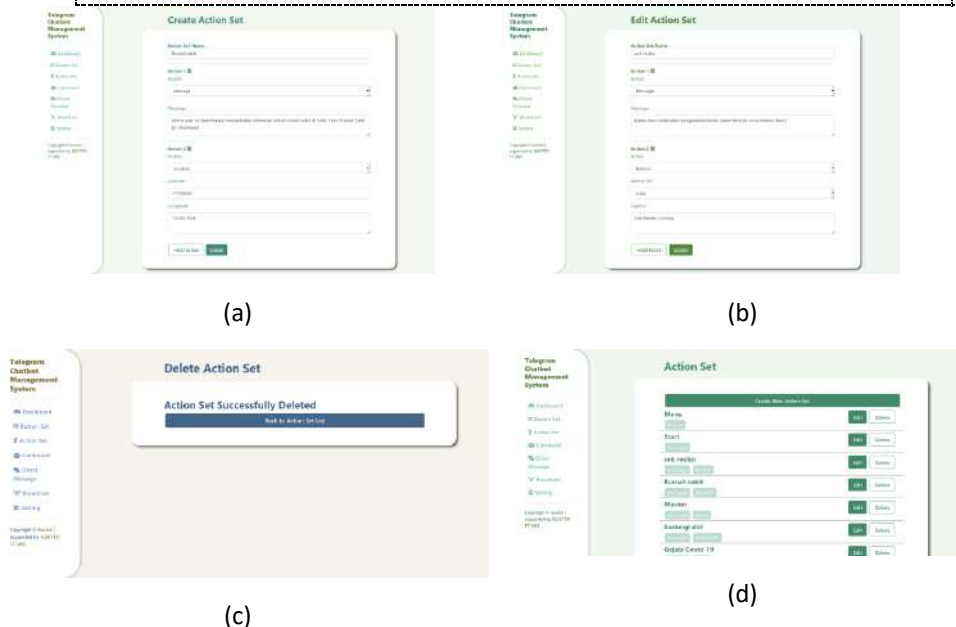


Figure 10. (a) Create Action Set (b) Edit Action Set (c) Action Set Deleted (d) New Action Set Created

### 3.4. Create and Display Command

This menu is the same as the previous one before, when you first enter it will be presented with all commands that have been made. If you want to create a new one, you can select the "Create New Command of Reply Set" button. Then if you want to edit, you can choose the "Edit" button. Meanwhile, if you want to delete you can choose the "Delete" button. Keyword recognition is a word. So each space will be considered as a different keyword.

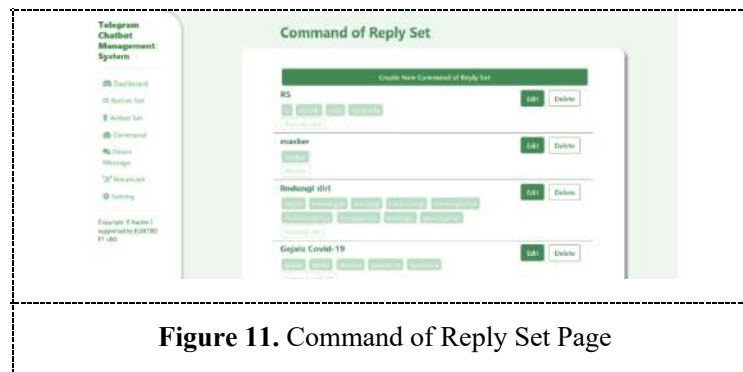


Figure 11. Command of Reply Set Page

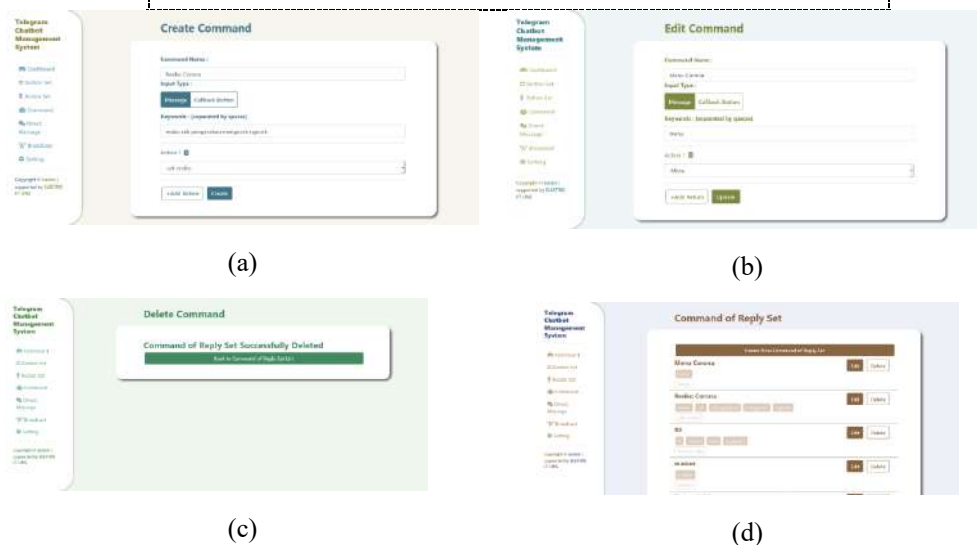


Figure 12. (a) Create Command (b) Edit Command (c) Command Deleted (d) New Command Created

### 3.5. Give Answers To Chatbot Users Based On Keywords In The Command

This is a bot test on the Telegram. The test is done with the command that was just created, namely "menu" and "resiko". It also checks for welcoming messages with the "/start" command and if a keyword is not found.

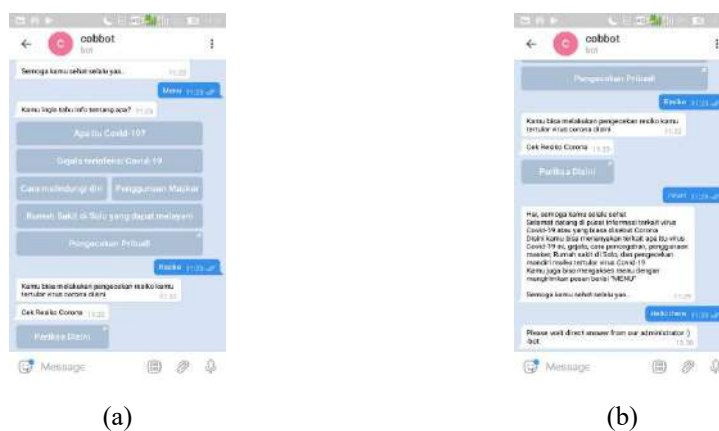


Figure 13. (a) Test command "menu" and "resiko" (b) Test welcome message and if keyword are not found

### 3.6. Answer Direct Message

When you first enter the Direct Messages page, it will display all accounts that have used this chatbot. They are sorted according to the messages that were last sent or received. From there, you can choose which accounts to send messages. On the account page that has been selected, it lists all direct messages that have been sent and received. When first entering the Direct Message page it will be shown that all registered accounts are sorted according to the last sent or received message. From there you can choose which account to send the message from. On the account page that has been selected, it shows all direct messages that have been sent and received. Direct messages will be marked with the word “mimin” end of the message as a sign that this is a direct message from the administrator.



**Figure 14.** (a) Direct Message Page (b) Direct Message to selected user (c) user received message from administrator

### 3.7. Send broadcast messages

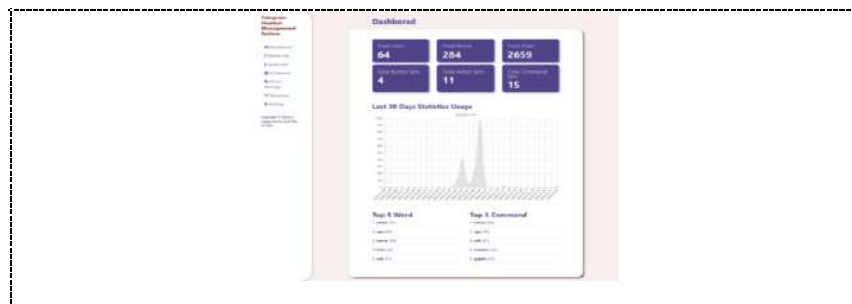
Broadcast is sent to all accounts that have used this chatbot. The broadcasts will be marked with words “-bc” at the end of the message as a sign that this is a broadcast message.



**Figure 15.** (a) Sending broadcast message (b) User received broadcast message

### 3.8. Display analytics

The Analytics that I show here is a statistic report on chatbot usage. The analytics displayed are total users, total words, total chats, total button sets, total action sets, total commands, last 30 days statistic usage, top 5 words, dan top 5 commands. Analytics shown on the dashboard page.



**Figure 16.** Analytics on Dashboard Page

### 3.9. Comparison Between Chatbot Management System & Conventional Chatbot Programming

**Table 3.** Comparison between chatbot management system & conventional chatbot programming

Aspect	Chatbot Management System	Conventional Chatbot Programming
Chatbot Building Interface	No coding skills required	Coding skills required
Modify Response	Graphical user interface	Text-based
Usage Analytics	By changing button-set/action-set/command	By changing the code
Send Direct Message and Broadcast	Shown on the dashboard page	Need to create manually
	Provide send direct message and broadcast	Usually only auto-respond

## 4. Conclusion

The telegram chatbot management system can be created by using a web-based application. With this chatbot management system, the chatbot can be created without coding. Therefore, creating a chatbot is no longer limited to those who understand programming language.

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