

IMPLEMENTATION OF CLOUD COMPUTING AND LINE BOT TECHNOLOGY AS A PROMOTION AND TRANSACTION MEDIA OF MSME PRODUCTS IN BANDUNG

Rangga Djatikusuma Lukman¹, Irawan Afrianto²

^{1,2} Universitas Komputer Indonesia

Jl. Dipatiukur No.112-116, Lebakgede, Coblong, Kota Bandung, Jawa Barat 40132

E-mail : djatikusumadata@gmail.com¹, irawan.afrianto@email.unikom.ac.id²

ABSTRACT

Data in 2018, MSME in the Bandung City amount to 6.038 in 6 industrial fields. However, the current obstacle experienced by MSME is that there are difficulties in managing and creating websites for online product promotion media. The purpose of this study is to apply cloud computing technology and LINE Bot as a promotional media for MSME products. The system built consists of two systems namely a website in the form of a Content Management System (CMS) application by implementing cloud computing technology, the Software as a Service (SaaS) service model that can be used by MSME. And the LINE Bot system to help communicate with customers, where the algorithm used in the construction of LINE Bot includes the forward chaining algorithm and the Jaro-Winkler distance algorithm that is applied to the word processing process in the LINE Bot. Alpha and beta testing are used as a testing system built. Alpha testing on the CMS application that was built gives the conclusion that 100% of system functionality can run as expected. Whereas in LINE Bot, accuracy testing was carried out with 86% of the results obtained. On the results of beta testing calculations obtained 85.38% strongly agree HelloUMKM application helps in product promotion, 74.62% agree HelloUMKM application is easy to use, 82.31% strongly agree LINE Bot supports product promotion activities, and 77.69% agree LINE Bots can help in serving customers.

Keywords : Cloud Computing, LINE Bot, Product Promotion, MSME, Customers

1. INTRODUCTION

Technology cloud computing is a technology that uses the Internet as central service servers that are virtual management goals, and maintenance of data and applications [1]. Cloud computing is one technology that can help in solving problems related to limited computing resources [2]. Cloud computing has 3 service models that can be utilized by software developers, one of which is Software as a Service (SaaS) service. SaaS is an application that is intended

to be accessed and used by many users who are stored on a cloud infrastructure and accessed through the internet using a browser.

LINE is an instant messaging application that has quite a several users in Indonesia. Based on data from LINE, there are 90 million users in Indonesia [3]. One LINE product that is currently in demand by several companies in marketing their products to customers is LINE Bot. Some companies say that using LINE Bot is an effective way to introduce their products to the public.

MSME is a productive business group owned by individuals and business entities. The role of the MSME in increasing regional income can be considered very large [4]. Based on data from the Office of Cooperatives for Micro, Small and Medium Enterprises in the City of Bandung, in 2018 the MSME in the City of Bandung totaled 6,038 business units which were divided into 6 industrial sectors. In promoting its products online, MSME in Bandung still has several obstacles. Of the 30 respondents found some problems became an obstacle namely the MSME had difficulty in managing and creating websites for the media to promote their products. Based on the results of an interview with Mrs. Rikrik Sukmanurrakhmi, SH as the Head of the MSME Financing Section at the Office of Cooperatives for Micro, Small and Medium Enterprises in Bandung, stated that currently there are no applications that can support MSME product promotion activities in Bandung. Another problem experienced by MSME is the limitations when serving customers which results in customer service being less responsive and less effective.

In a previous study carried out the application of cloud computing technology for the construction of e-catalog of MSME participants at BALATKOP West Java, the research found that cloud computing services provide an effective solution to overcome product promotion problems experienced by MSME participants [5]. The research was also conducted on the application of the LINE Bot which is integrated with the web cms for customer service at Minsu UKM. The research found that the application of LINE Bot as customer service can help and provide convenience for Minsu UKM. However, in this study LINE Bot was only applied to one UKM [6].

Based on the problems that exist as a solution in this research, an application is proposed that applies Cloud Computing technology with the Software as a Service (SaaS) service model. SaaS will be used by MSME as a product management and order management application. In communication with customers, data stored in the cloud is integrated with LINE Bot as a medium in promoting MSME products to customers. Expectations are expected by the implementation of cloud computing technology and LINE Bot is to provide an alternative solution that can be utilized by MSME as a media to promote its products to customers.

2. RESEARCH CONTENTS

2.1. Cloud Computing

Cloud computing is the next evolution of the internet "cloud" in cloud computing is a provider of matters relating to computing power to the computing infrastructure, applications, business processes to collaboration that appears as a service that can be accessed when needed whenever and wherever [7].

It can be concluded that cloud computing refers to on-demand computing services available on a computer/internet network. Cloud computing services can be accessed by several users simultaneously where all information is stored centrally on a server. Cloud computing has good benefits for users including scalability, reach, and management.

2.2. Software as a Service (SaaS)

Software as a Service (SaaS) is a type of service provided by Cloud Computing technology to its users in the form of shared use of software (applications) that are generally provided in the form of a face-to-face web. SaaS is the type of Cloud Computing service that is most widely used by computer users, especially end-users who do not need technical knowledge in installation and configuration. Enough with a computer / mobile device, operating system, web browser application, and internet connection or intranet a computer user can easily use Cloud Computing services with this SaaS model [8].

It can be concluded that SaaS is a cloud computing technology service that is the closest to the end-user. This service is a software (application) that can be run jointly by the user. So that users are no longer required to install applications and create applications, users can only use or rent software from SaaS service providers. SaaS is a service that aims to facilitate the user's computing activities,

2.3. Chatbot

Chatbot or "chat robot" is a communication mechanism with advanced technology through the chat interface. This program helps in conducting conversations with users [9].

The chatbot is also a QA system or question-answering system, which gives the ability of a

machine (computer) to interpret natural language for dialogue with users almost like a dialogue between two people in everyday language [10].

2.4. LINE Messaging API

LINE@ provides facilities to create a business account that can be used to send messages to customers and also communicate directly with customers. This communication can take the form of live chat or by using auto-reply messages and keyword replies. This messaging API allows LINE @ to be able to create responses that can be tailored to special needs that are not handled by the standard auto reply and keyword reply features. Through the use of the Messaging API, LINE@ can send information between our server and the user's LINE application through the LINE platform [11].

2.5. Research Methodology

In this research, the methodology to be carried out uses descriptive methods with a qualitative approach. The descriptive method aims to solve problems by describing the state of the subject or object in research today based on the facts that are seen [12]. The stages in this study refer to the prototype model. Then adjusted to the research needs so as to produce steps such as a) Problem Identification, b) Communication, c) Quick Plan & Modelling Quick Design, d) Construction of Prototype & Development Delivery. The research step is seen in Figure 1.

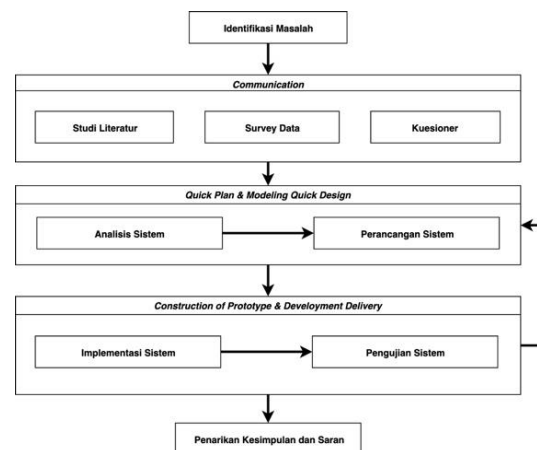


Figure 1. Research Steps

2.6. Analysis of System Architecture Built

HelloUMKM is a system based on the application of cloud computing technology using the Software as a Service (SaaS) service model and LINE Bot technology. This system makes it easy for MSME to promoting its products to customers and can help in serving customers.

HelloUMKM architecture consists of sub-architecture cloud computing and sub arsitektur LINE Bot. Arsitektur cloud computing system is built on the two sides of the front-end and back-end. Front-end is the side that is seen by MSME and

Admin as users of SaaS services. Front-end includes the user interface, and computer network needed to access the SaaS services in the form of a Content Management System (CMS) application. While the Back-end side is on the cloud server which includes Virtual Private Server (VPS), Data Storage, and Programs that make up cloud computing.

The LINE Bot architecture explains how LINE Bot can communicate with customers. In the process of integration between LINE Bot and cloud computing, the system requires the data - the data that will be built LINE Bot generated from sites LINE Developers. An overview of the HelloUMKM architecture can be seen in Figure 2.

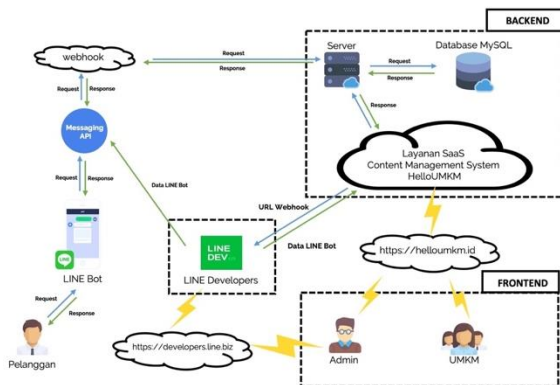


Figure 2. HelloUMKM System Architecture

2.7. Analysis Software as a Service

In this research, the cloud computing service model that is applied is Software as a Service where the service can be used by MSME in Bandung in other words the nature of cloud computing is Public Cloud.

Software as a Service is built with the type of shared application and shared database model. In other words, the application accessed by the user is the same application where the user cannot customize the application, even with the database used as storage, the data stored in the same storage is not separate for each user. An overview of the Software as a Service sub-system can be seen in Figure 3.

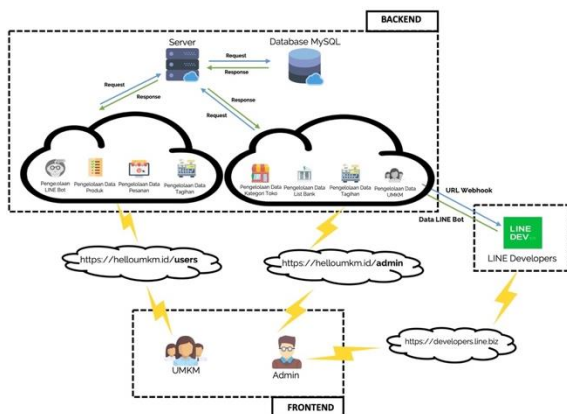


Figure 3. Sub System Software as a Service

2.8. Data Visibility Analysis

The HelloUMKM application will store data entered by the user either MSME or the Customer. Data to be stored on the server is product image data and order payment proof data. This analysis aims to obtain a minimum recommendation for server storage specifications.

- Product Image Data
 - Number of MSME = 190 MSME
 - MSME Product = 10 Products
 - Maximum Image Size = 1024 KB
- So the minimum storage is :

$$\text{minStorage} = \frac{\text{MSME Product} \times \text{Number of MSME} \times \text{Max Image Size}}{1024} = \frac{10 \times 190 \times 1024}{1024} = 1900 \text{ MB}$$

- Proof of Payment Data
 - Number of MSME = 190 MSME
 - Number of Transactions = 100 transactions
 - Maximum Image Size = 1024 KB
- So the minimum storage is:

$$\text{minStorage} = \frac{\text{Maks. Image Size} \times \text{Transactions} \times \text{Number of MSME}}{1024} = \frac{1024 \times 100 \times 190}{1024} = 19000 \text{ MB}$$

2.9. LINE Bot Analysis

The HelloUMKM application can be integrated with LINE Bot as a promotional media for MSME products to customers. LINE Bot will replace the role of MSME to communicate directly with customers, to accelerate service to customers. An overview of LINE Bot system can be seen in Figure 4.

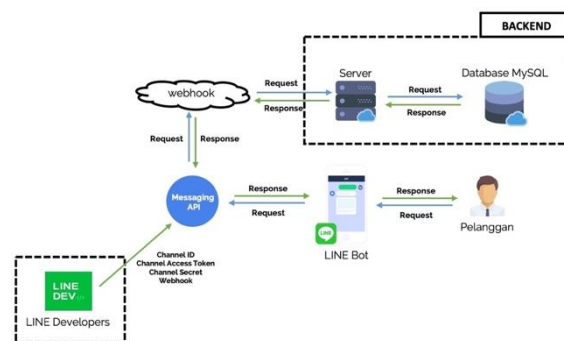


Figure 4. LINE Bot Sub System

2.10. LINE Bot Keyword Analysis

The response given by LINE Bot is based on keywords given by the customer. These keywords can help LINE Bot to find the right response by requests from customers. The keywords that are built on LINE Bot are obtained from questions that are often asked by buyers to MSME, but many keywords are based on the activities that will be built on LINE Bot. The

keyword builder questions on this LINE Bot can be seen in Table 1.

Table 1. LINE Bot Keywords

Keywords	The Response
Produk, Katalog, Barang, Ready	To get information on the product list in the store
Profil, Alamat, Lokasi, Kontak	To get MSME store information in the form of contacts and MSME locations
Bayar, Pembayar, Bank, Transfer, Metode	To get information on how you can pay
Riwayat, Histori, Pesanan, Pemesanan	To get order history information of what has happened
Bantuan, Help, Tutorial, Penggunaan, Pakai	To get keyword help information on LINE Bot
Menu, Home, Cancel, Reset	To return to the LINE Bot main menu
Tentang, About	To display the menu view the profile or see how to pay

2.11. LINE Bot Server Analysis

In the development of LINE Bot, the Jaro-Winkler Distance algorithm is used to overcome typographical errors when communicating with bots and the Forward Chaining algorithm to map the flow of interactions in the bot.

A. Jaro-Winkler Distance algorithm

Jaro-Winkler Distance algorithm is used in the server to detect the level of similarity of text sent by users with keywords that have been set for the response LINE Bot.

Examples of applications in this study are as follows:

$S_1 = \text{KATALOG}$

$S_2 = \text{KATLOG}$

Then it is known:

$m = 6$

$|S_1| = 7$

$|S_2| = 6$

The character that does not exist is the letter A after the letter T, in this string, there is no transposition so $t = 0$. So that the calculation of Jaro Distance is:

$$d_j = \frac{1}{3} \times \left(\frac{6}{7} + \frac{6}{6} + \frac{6-0}{6} \right) = 0,952$$

Then, if considered between and can know the value. $l = 3$. Then the value of Jaro-Winkler Distance is:

$$d_w = 0,952 + (3 \times 0,1 (1 - 0,952)) = \mathbf{0,966}$$

Based on the calculation using the Jaro-Winkler Distance algorithm, the string similarity level is 0.966.

B. Forward Chaining Algorithm

The Forward Chaining algorithm is used to provide flow rules for LINE Bot communication. The

development of rules in the LINE Bot is based on the customer's request activity on the LINE Bot and the response activities provided by the LINE Bot to the customer so that the forward chaining algorithm rules table in this study can be seen in Table 2.

Table 2. Forward-Chaining Algorithm Rules

Rule 1	IF the customer requests the main menu event, THEN LINE Bot will send the main menu event response
Rule 2	IF a customer selects the THEN LINE Bot product catalog will display a product event response carousel
Rule 3	IF a customer places an order THEN LINE Bot will send an inquiry to the order amount
Rule 4	IF a customer sends the order amount THEN LINE Bot will send the customer name inquiry
Rule 5	IF a customer sends the subscriber's name, THEN LINE Bot will send contact questions that can be contacted
Rule 6	IF a customer sends a contact, THEN LINE Bot will send an order address inquiry
Rule 7	IF a customer sends the order address THEN LINE Bot will ask for the shipping method
Rule 8	IF a customer has chosen a shipping method THEN LINE Bot will ask for confirmation of data completeness
Rule 9	IF a customer confirms the data, THEN LINE Bot will send a payment notice
Rule 10	IF a customer wants to change the data THEN LINE Bot will repeat Rule 4
Rule 11	IF a customer has made a payment THEN LINE Bot asks to upload proof of payment
Rule 12	IF a customer has uploaded proof of payment THEN LINE Bot will send
Rule 13	IF a customer selects the order history, THEN LINE Bot will display the response event carousel order history
Rule 14	IF a customer chooses about THEN LINE Bot will display a response event menu about
Rule 15	IF a customer selects a store profile, THEN LINE Bot will display shop profile details
Rule 16	IF a customer chooses the method of payment THEN LINE Bot will display the payment method
Rule 17	IF a customer chooses help THEN LINE Bot will display help using LINE Bot

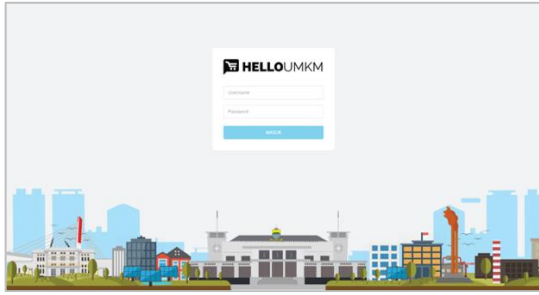


Figure 8. HelloUMKM Login

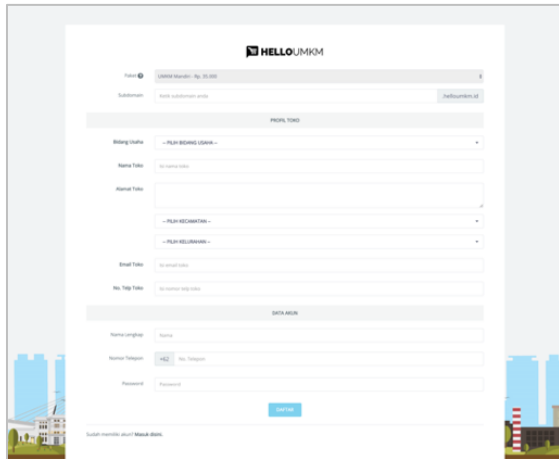


Figure 9. MSME Account Registration

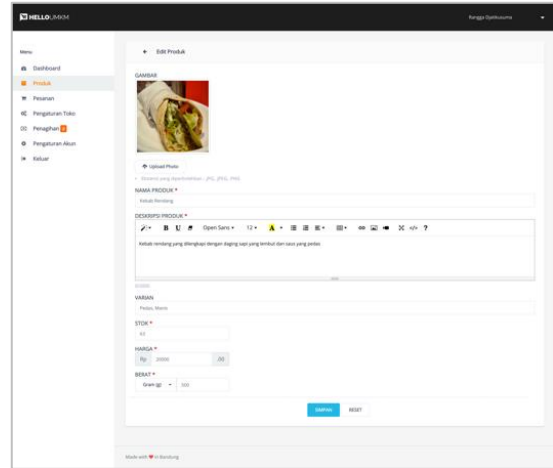


Figure 12. Add Product

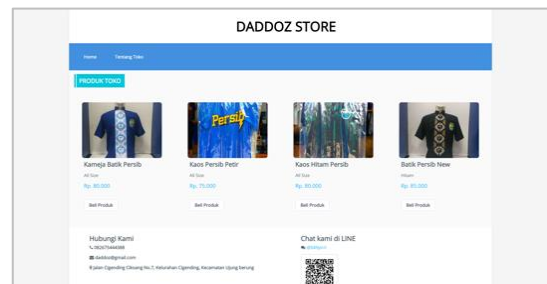


Figure 13. MSME Website

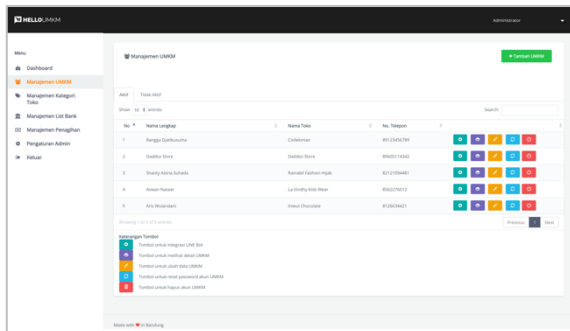


Figure 10. MSME Management

B. MSME LINE Bot Sub System

The implementation of the LINE Bot HelloUMKM system can be seen in Figure 14 through Figure 16.

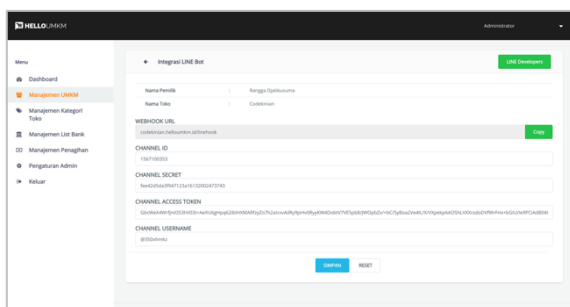


Figure 11. LINE Bot Integration



Figure 14. LINE Bot Menu

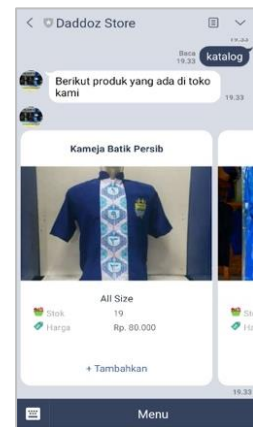


Figure 15. Product Catalogue



Figure 16. Transaction Receipt



Figure 17. History Orders

2.15. Alpha Testing

Alpha testing is done to find out the functional applications that are built to obtain compatibility between design and implementation.

A. HelloUMKM SaaS Sub System

In alpha testing using the black box method, the results showed that 100% of the functional HelloUMKM website that was tested produced the output as expected.

B. MSME LINE Bot Sub Sistem

Alpha testing on the LINE Bot sub-system was carried out with the black box method and accuracy testing. Where in the test using the black box method, the result is that 100% functional LINE Bot produces output as expected. Whereas the accuracy test is tested by giving 50 questions on the features and the following results are obtained:

- Number of test questions = 50
- Number of answers accordingly = 43
- Accuracy =
$$\left(\frac{\text{Number of Answers Corresponding}}{\text{Number of Questions}} \right) \times 100\%$$

$$= \left(\frac{43}{50} \right) \times 100\% = 86\%$$

2.16. Beta Testing

Beta testing is done by giving questionnaires to 26 MSME that are targeted by application users. The statements given to respondents are shown in Table 4 and the results of the questionnaire calculations can be seen in Figure 18.

Table 4. Beta Testing Statement

No	Statement
1	The HelloUMKM application helps in promoting products online
2	I feel the HelloUMKM application is easy to use
3	LINE Bot supports product promotion activities to customers
4	I feel that LINE Bot can help responsive and effective customer service

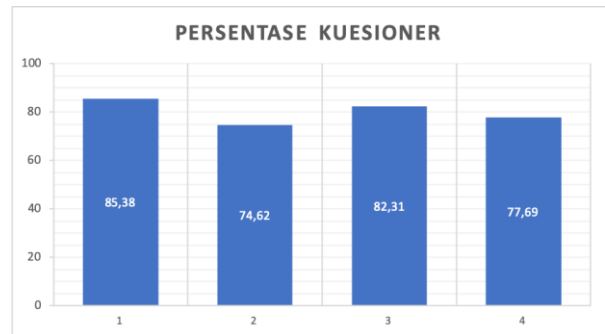


Figure 18. Percentage of Beta Testing

The conclusions of beta testing are as follows :

1. The calculation results of 85.38% and concluded strongly agree that the HelloUMKM application can help MSME in promoting its products online.
2. The calculation result is 74.62% and concluded that the HelloUMKM application is easy to use by MSME.
3. The calculation result is 82.31% and concludes that I strongly agree that LINE Bot can support MSME product promotion activities to customers.
4. The results of the calculation of 77.69% and conclusions agree that with the LINE Bot, service to customers can be helped so that the service becomes responsive and effective.

3. CLOSING

3.1. Conclusion

Based on the results of the implementation and testing that has been done on the HelloUMKM system by implementing cloud computing technology and LINE Bot as a medium for promoting MSME. Obtained that the functional application runs well and the application of Software as a Service has been successfully implemented so that the application built can be utilized and provides convenience for MSME in promoting their products online. Based on testing the accuracy of LINE Bot, the accuracy of 86% is obtained where LINE Bot can respond according to customer demand well so that with this LINE Bot system can help MSME in serving customers responsively, interactively, communicatively and effectively. Software as a Service and LINE Bot services are built well integrated to form a system that can provide benefits for MSME in promoting their products to customers.

3.2. Suggestion

The system built certainly still has many shortcomings. For this reason, there is a need for system development to be able to provide better solutions to existing problems. Suggestions given for further development of this software are as follows:

- a) The Software as a Service system built is expected to require the development of features such as displaying analytics from existing data, printing data and being able to manage MSME financial

management to support MSME business activities from the current application.

b) Development is carried out on the application interface so that it can make it easier for users to use the application.

c) Increase the word dictionary to increase knowledge in LINE Bot interactions, so that LINE Bot can provide more appropriate answers.

d) The LINE Bot system that is built is expected to be developed using machine learning algorithms in the process of naturalizing the language so that it can receive requests with natural language.

REFERENCES

- [1] Y. Fauziah, "Arsitektur Cloud Computing Pada Sistem Informasi Desa Sebagai Layanan Akses Informasi Desa," Seminar Nasional Informatika, pp. 224-230, 2014.
- [2] A. P. Utomo, "Penerapan Konsep SaaS (Software as a Service) Pada Aplikasi Penggajian," Jurnal SIMETRIS, vol. 6, no. 1, pp. 137-142, 2015.
- [3] kumparanTECH, *Pengguna LINE di Indonesia Capai 90 Juta, Didominasi Anak Muda*, Kumparan, https://kumparan.com/@kumparan_tech/pengguna-line-di-indonesia-capai-90-juta-didominasi-anak-muda, 17 Januari 2019 20:41
- [4] D. C. Lantu, M. S. Triady, A. F. Utami dan A. Ghazali, "Pengembangan Model Peningkatan Daya Saing UMKM di Indonesia: Validasi Kuantitatif Model," Jurnal Manajemen Teknologi, vol. 15, no. 1, pp. 77-93, 2016.
- [5] H. P. Ginanjar dan A. Setiyadi, "Pembangunan Teknologi Cloud Computing Pada Katalog Produk Sebagai Layanan Pendukung Umkm Di Balatkop Jawa Barat," Jurnal Komputa, 2018.
- [6] A. Dwi, F. Imamah, Y. M. Andre S dan A. Dores, "Aplikasi Chatbot (Milki Bot) yang Terintegrasi dengan Web CMS Untuk Customer Service Pada UKM Minsu," Jurnal Cendekia, vol. XVI, 2018.
- [7] I. Afrianto, "Pengenalan Cloud Computing," dalam Prosiding dari. Seminar IT 2010 Cloud Computing : Today and Tomorrow, Bandung, 2010.
- [8] I. P. A. Eka, *Smart City berserta Cloud Computing dan Teknologi - Teknologi pendukung lainnya*, Bandung: Informatika, 2014.
- [9] Newgenapps, *The Chatbot Handbook*, <https://cdn2.hubspot.net/hubfs/202339/Chatbot%20Ebook.pdf?t=1502436031576>, 17 Maret 2019 17:11
- [10] E. Nila, dan I. Afrianto, "Rancang Bangun Aplikasi Chatbot Informasi Objek Wisata Kota Bandung Dengan Pendekatan Natural Language Processing," Jurnal Komputer & Informatika, vol. 4, no. 1, pp. 49-54, 2015.
- [11] F. H. Sudaryanto, Belajar Membangun LINE Chatbot, <https://www.dicoding.com/academies/32>, 3 Maret 2019 19:32
- [12] M. Nazir, *Metodologi Penelitian*, Bogor: Ghalia Indonesia, 2005.