

# Design and Implementation of Cloud Computing Model in the Increase of Productivity in Electronic Commerce

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## To Cite this Article

Ali Yar Ahmadi, "Design and Implementation of Cloud Computing Model in the Increase of Productivity in Electronic Commerce", *International Journal for Modern Trends in Science and Technology*, Vol. 05, Issue 09, September 2019, pp.-40-47.

## Article Info

Received on 16-August-2019, Revised on 11-September-2019, Accepted on 16-September-2019, Published on 22-September-2019.

## ABSTRACT

*With the development of business in the Internet domain, it is possible for manufacturers to introduce their commodities globally and earn significant profits. Also, with the use of new technologies, can promote electronic commerce that one of these technologies is cloud computing. The purpose of this article is to provide method for calculating cloud efficiency on electronic commerce sites and increasing its productivity. The biggest motivation for the electronic commerce is the accompaniment with cloud computing that have good financial efficiency on outputs, manufacturing and products. When web pages rank higher in the search results, more users will refer that site and ask for more purchases from that site. On the other hand, with the increasing growth of clouds among the users of electronic commerce sites, the need for indicator, benchmark and computing method of fuzzy logic, in order to help consumers decide on the cloud in terms of infrastructure and application functionality is evaluated*

**Keywords:** Cloud Computing, Electronic Commerce, Resources Management, Fuzzy Logic

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## I. INTRODUCTION

Cloud service providers provide their processing and memory resources available for users. Users by paying expense of using these resources, at any time and place can use them for their calculations and processes. In this environment, a data center contains large number of host machines that can be more efficiently available for users by virtual machine techniques. The quality of the service that user can take is diverse and is commensurate with the cost that he pays. Using these resources not only results in quick runs of applications but also

has great reliability. In this environment, users can run their applications in high quality, use cloud memory resources considerably and protect their information.

Ultimate users in the cloud environment do not need specialized information and pay for the installation cost of such services. Since, that lot of information, exchanging in cloud service and lot of data saving in there, is keeping information secret means keeping it confidential. Cloud services allow users and developers to use these services without the need for technical knowledge or requiring control of the technology infrastructure and day by day saves more information from individuals and

companies in the clouds, which this case creates security challenge for the users.

Increasing the profitability in variety of businesses is the most important factor that can develop this factor by its intelligence. With regard to electronic commerce provision, increases of customers trust expressed that can be apply its identity authentication with information security. Because the customer is dissatisfied with distrust in the security of this technology, in this case the customer dissatisfaction can be reduced by providing appropriate methods. At the time of using electronic commerce technology, we need to focus on its components so that we can use this technology completely specialized to have intelligent professional efficient commerce.

Electronic Commerce is one of the largest and most important activities in the age of communication and technology. According to the IBM definition, the electronic commerce is the transformation of key commerce processes by using Internet technology (Kumar et al., 2017).

With the development of electronic commerce technology, it is necessary to have secure platform for the commerce activities and impact of SEO on them, but sometimes with the different platforms cannot easily trust an internet seller, because trust in electronic commerce has high importance and considered as basic principle for any commerce.

Electronic commerce faces with three problem of information contradiction, the complexity of applications and additional information in organization's information systems. Cloud computing technology can be developed as comprehensive information system in electronic commerce. With this technology, the problem of contradictory information, complex processes, duplicate information and other problems related to traditional electronic commerce can be solved and increased the quality and benefits related to service providers (Nilsson et al., 2018).

The level of inclination to electronic commerce is not the same in different communities, but its use is enormous and successful companies and groups with this approach are seeking investment in different dimensions, pattern recognition and its successful implementation. In the electronic commerce, information flows in the most of commerce areas conducting unilaterally and acquisition of information is very limited in these fields.

Electronic commerce as one of the new achievements of the information age, performing all stages of commerce through computer and

Internet networks without the need for physical presence in the transaction. The process of electronic commerce utilization, contains the cases such as create and flowing innovations in online money transfer, supply chain management, online transaction processing, online data interchanging, inventory management and mechanized data collection systems. These factors providing information search, purchasing goods and services through direct links to online stores. In the electronic commerce, by creating proper and intelligent infrastructure, all the commodities in the future must wait for diverse applications of electronic commerce. In the figure below, the implementation of cloud computing technology is placed in all of the major areas of electronic commerce (Yodaya et al., 2017).

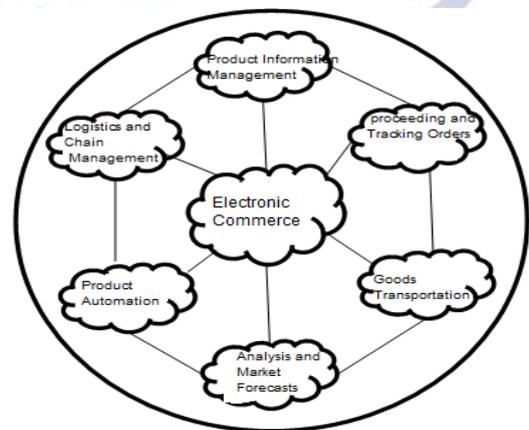


Figure 1- Classification of Internet of Things Application in the Electronic Commerce

Considering the study of mentioned concerns in regard with Internet and electronic commerce, it is a great opportunity for organizations diverse commerce, service providers, applications and ranking electronic commerce web sites in the integration way, telecom operators and Software vendors.

In the startup of new businesses, cloud computing can help its users and consumers with value and new diverse high benefits. In addition, increasing the efficiency of existing businesses conducted by value added on products, services and innovations in this organizations commerce models. Networking in commerce allows individuals and companies to share their ideas and feelings about products and services. It also requires companies to have a new perspective and thought on creating value for customers (Almarabeh et al., 2019).

Companies and organizations use the electronic commerce to advance and compete with other

organizations and can understand and manage the behavior of their customers. By increasing the importance of customer satisfaction in the business environment, many organizations focus on the topics related to customer recognition, customer loyalty and profitability to increase their market share and obtain customer's more satisfaction. With regard to electronic commerce provision, increases of customers trust expressed that can be apply its identity authentication with information security. Because the customer is dissatisfied with distrust in the security of this technology, in this case the customer dissatisfaction can be reduced by providing appropriate methods and introduced it to users by evaluating the quality and performance of the site to boost and expand the electronic commerce and user trust about that site.

Most of the companies are creating websites for their purchase and sale that provide them capability of doing business transactions on Internet in order to give customers better access, because the shopping process is prevalent on the web. Electronic commerce applications are between the parties of business transaction through the network and management of data involved in the backup process. The prosperity of electronic commerce expands it and increase the importance and demand of information technology professionals in various companies (Sabou et al., 2017).

Electronic commerce has become more appropriate than ever for expanding use of Internet along with increased activity on web search engines and Internet users have access to variety of information of companies and online customers. It is often difficult for companies to know which types of electronic commerce strategies are used to sales pitches. High traffic of company's website is the important and major concern in the use of electronic commerce (Sagot et al., 2017).

Since the economy and electronic commerce in different organizations is very important, it also has vulnerability to economic downturn. Organizations act reliably and cautiously during the economic down turn that also reduces the cost of Internet services. Because cloud computing services does not have much initial setup cost for organizations, organizations are interested in using software as cloud service and data storage in this environment, as percentage of electronic commerce globally belong to cloud processing systems.

Improving the level of user trust in the field of electronic commerce of the cloud environment is

secure in receiving service, where the operation system and applications run directly on the cloud network virtual environment to be reliably active in providing service. Designing security architecture based on an information management system allows many cloud-computing services to be securely evaluated before presenting and presents after identifying their hazards and accepting risk threshold of service (Atan et al., 2018).

Cloud computing is also used for easy access based on user demand over the network to the set of variable computational resources and configurations such as networks, servers, storage space, applications and services. This access quickly provided or released with the least need for resource management and direct involvement of the service provider.

Service providing in cloud computing is based on demand and user requests from computing resources in accordance with their demand and without communicating with the supplier. Access to the widespread network, delivery of all services and cloud computing capabilities is through the network. In this network, the combination of resources from collecting stored resources, their processing, memory, bandwidth, etc. used to provide services to the different customers (Qian et al., 2018).

Data optimization in the electronic commerce environment refers to parameters that allow a site to have traffic and more visitors from search engines, which when searching for a specific keyword, search engine shows most relevant site in the first page of the search results. Therefore, one of the most important parameters in the design of the site is the association of the site with the search engines and getting the high rank in them. If the site does not have high rank in the search engines, users cannot find the site and use site services.

Applying cloud computing to improve electronic commerce including:

**Easy Communication Between Sales Data** - In the business, one of the most important products is sales, which with the access to each product's information locally, enables vendors to make business for specific customers.

**Intelligent Customer's Relationship Management System** - Cloud computing, in addition to collecting and organizing data, analyzes it accurately. Choose to decision making chain is long and time-consuming process for purchasing a customer, but through the electronic commerce, can conduct the excellent schedule for the performance to do it faster.

**Social Media** - Cloud computing can focus on user's opinion to have up to date community. The combination of Web, cloud computing and electronic commerce will identify new trends and its use for marketers (Qiu et al., 2018).

**Advertising**-Marketers avoid from traditional advertising that was frustrating for the customers and brought new technologies to provide their services globally.

**Creating New Opportunities** - Using applications and providing services conducts in cloud computing. Applications such as spatially sensitive have the ability of large-scale process for users and develop various computing applications.

**The Ability to Quick Scale Flexibility**-Resources automatically reduces or increases based on user demand. Finally, the services offered by cloud systems in electronic commerce, uses resources through the ability to measure their use in the network, automated control and data optimization.

**Innovation Structure** - By using cloud computing, information barriers can be reduced and focuses on online applications in Facebook and YouTube to online applications.

**Uninterrupted Services** - Cloud computing is always available and instant access to hardware resources is provided to users without investment, which provides faster data processing time.

**Centralized Management** - Cloud services leading to profitability in computing service of backup system and increase the trust and security of the system as it uses centralized management to improve the program compatibility and fast updates (Babu and Kumar, 2018).

and in the form of network. That firstly robots detect abnormal behavior in a user session and in the designed method detect network robots, identifying networks of robots that search for keywords in a given context repeatedly and select the desired result to increase the rank of desired page. Networks that use repetitive keywords to disrupt the search engine suggestion system are also of attention.

## II. THE WORK DONE

Qiu et al. (2018) in a research entitled "Intelligent Data Storage Privacy Protection for the Financial Industry in Cloud Computing" that the purpose of this study is to provide a method for protecting the privacy of intelligent storage memory, which addresses to solve problems of lack of privacy in existing threatening models. As a result, the proposed approach uses a new distributed data storage method to refrain from information attacks on financial firms.

Beloglazov (2015) conducted a research with the topic of artificial intelligence for allocating energy resources to efficiently management of data centers for cloud computing. Cloud processing on computer provides information technology services to customers around the world. Based on the pay model as pervasive applications, you can host variety of consumer, scientific and business domains. The results show that the cloud-computing model has very high potential because it offers significant cost savings and shows high potential for improving energy productivity in dynamic work scenarios.

Zhang et al. (2017) in a research entitled "Cloud Computing Electronic Commerce Model: Using Block chain Technology for Cloud Computing" traditional electronic commerce models have been very completed that even people use it to guide variety of electronic commerce activities. This research was conducted with the aim of transferring intelligent features and paying for data in cloud computing with the help of peer-to-peer business based on Block chain and intelligent contract to improve electronic commerce.

## III. THE MATERIALS AND METHODS

The proposed method of this study is using fuzzy logic for critical and determinant frameworks of cloud efficiency. Initially, the related factors and topics are defined, and then the main idea of making Gaussian membership function for the compute of efficiency is considered. By using defined Gaussian membership function, the data is

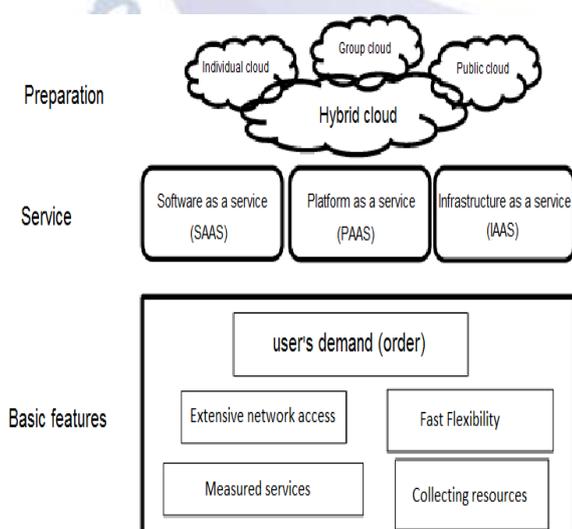


Figure 2. The main structure of cloud environment

To rank the site's pages in electronic commerce uses classification to identify robots, individually

examined and the primary law is defined for decision-making. Since more than one result can be obtained, must combine primary laws to reach the common conclusion. In the end, we convert the output to non-fuzzy values. Generally, fuzzy system is a nonlinear method for directing input data into the system and converting them to output data. As users pay for the clouds of their electronic commerce sites according to their usage level, performance of the infrastructure is important in this environment and must conduct essential investigation accurately in term of statistic.

**Rules for Cloud Infrastructure Performances and Application Functionality**

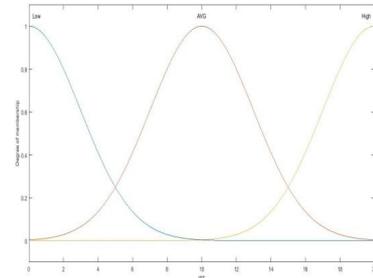
By using logical fuzzy rule of "AND" and fuzzy rules of the "OR" logic, the cloud performance analysis is calculated. This model explains how the different values of the specified parameters can increase or decrease performance of the cloud. Fuzzy logic works with basic rules, so the basis of the rule must be defined. Firstly, focusing on the data fuzzification or input by using defined membership function. The basic rules are used to get ideas. As there is more than one idea, the results of each law are combined to obtain the collective idea. Finally, the output data is converted to non-fuzzy values. Map the non-fuzzy inputs to the fuzzy values, which are then obtained according to the basic law.

Fuzzy rule editing is used to define the rules of the parameters used in the test phase. Here, for infrastructure performance, can mention the IRT, number of users, and resource utilization rates that interconnected through AND logical operation. This fuzzy set uses logical operations to evaluate the rules and combine the results of individual rules. Therefore, can creates arbitrary rules because it must test the system. Here we define six rules for assessing the performance of the infrastructure and three rules for evaluating performance of the application. In evaluating the performance of the infrastructure, the output becomes non-fuzzy after the base rules are obtained and the final results are obtained by combining separate rules. According to the fuzzy logic model, the rules defined will be used to define the performance.

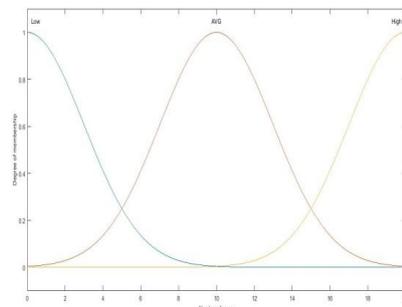
**Cloud Infrastructure Performance**

Since cloud infrastructure includes components such as virtual machines, storage space, network and so on calculating its efficiency to cloud makers is of great importance. If even one of these components does not conduct its operation

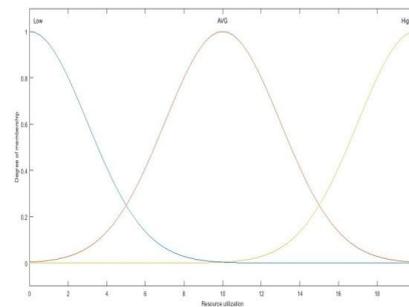
properly, the level of general cloud efficiency is lowered. In order to obtain precise understanding of cloud space, we consider the response time structure of (IRT), which is actually the amount of time that is spent on requesting data from virtual machines and getting the answer from them.



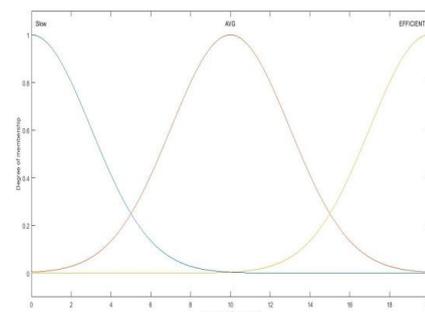
1. Input Gaussian membership function (membership rate 0-20)



2. Input Gaussian membership function (membership rate 0-20)



3. Input Gaussian membership function (membership rate 0-20)



4. Output Gaussian of membership function

To calculate the performance of cloud computing, all resources must be sufficiently powerful, functional and compatible with the cloud space. Among the influential factors for the infrastructure performance, can mention the IRT, number of users and resource utilization rates. Based on the IRT variable, if the response time is short, the infrastructure has very high storage space, low data traffic, high accidental memory and desirable bandwidth. The frame of IRT inputs data values, number of users and the resource utilization rates is from 0 to 10. Output data rate of cloud efficiency is from 0 to 20. If the obtained number is within the frame of 12 to 20, can be said that efficiency is appropriate. If it is from 0 to 8 efficiency is slow and if the efficiency rate is from 8 to 12, efficiency of the cloud is normal.

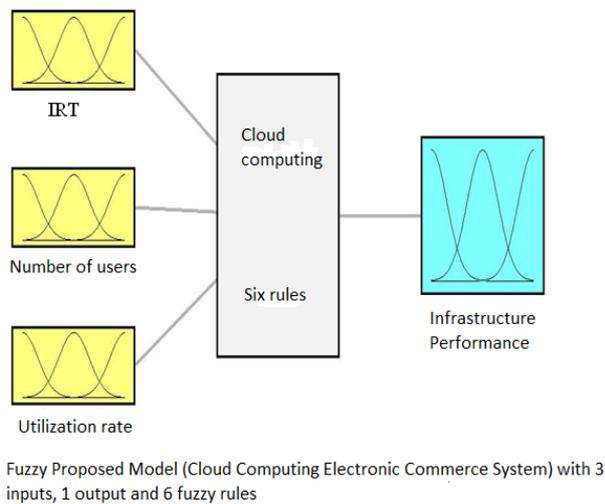


Figure 3. Fuzzy proposed model of infrastructure performance with 3 inputs and 1 output.

**Rules defined in This Model:**

If (the IRT value is low) and (the number of users is low) and (the amount of resource utilization is high) then (its performance is efficient)
If (the IRT value is average) and (the number of users is average) and (the amount of resource utilization is average) then (its performance is average)
If (the IRT value is high) and (the number of users is high) and (the amount of resource utilization is low) then (its performance is slow)
If (the IRT value is high) and (the number of users is high) and (the amount of resource utilization is high) then (its performance is slow)
If (the IRT value is low) and (the number of users is high) and (the amount of resource utilization is

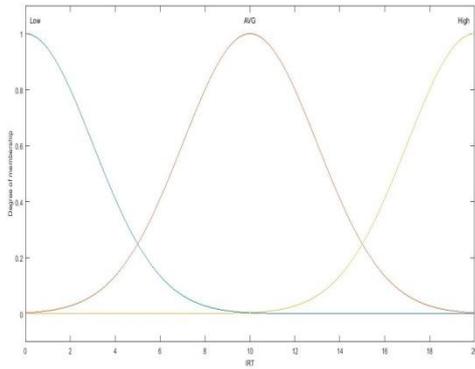
high) then (its performance is efficient)
If (the IRT value is low) and (the number of users is average) and (the amount of resource utilization is average) then (its performance is average)

After the definition, variables forms respectively based on membership functions range. Membership functions are used to fuzzification and non-fuzzification of data. Non-fuzzy input data is converted to fuzzy values based on the primary law, which designed to indicate the output value and the Gaussian membership function. The three Gaussian membership functions designed in this base forinput data. When we gave the three variables, different amounts of inputs, low, average and high, each presenting final result as a fuzzy amount. Output result is also obtained by using the main rule of fuzzy mode and the Gaussian membership function, which is defined previously, obtains the non-fuzzy output value on this basis.

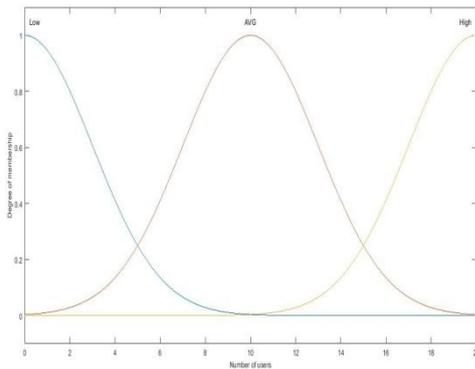
**Application Performance**

This rate of efficiency is very important in the users view. An application running on the cloud cannot be directly provides information based on the type of resource utilization associates with cloud efficiency level. Applications on the cloud are continually circulating among virtual machines (VMs) and require a method to find them. Frame time of application also defined as the time that takes from the user's request to obtain the requested information, which can be designed to determine the efficiency level of application on the cloud as supervisory system.

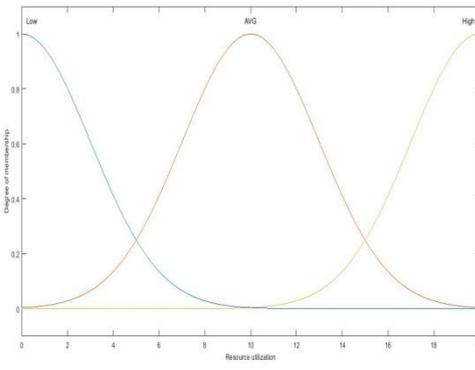
Optional variables for calculating application efficiency include ART, attached data and the amount of displacement among virtual machines (VMs). The ART variable, if has high value means it responded to user's requests over a long period of time. If ART has low value, means application on the cloud has responded quickly to the user's requests. The reason of using attached data indicates the amount of data that must be shared to complete the application. If amount of data that must be shared with virtual machines is high, speed of cloud efficiency, will be slow and vice versa. In the variable displacement rate between virtual machines (VMs), if the user fails to complete the desired action on one of the virtual machines must be displace the order on the other virtual machine and can affect the speed of the cloud efficiency, which is very important. Although it increases workloads but its conduction consumes less power.



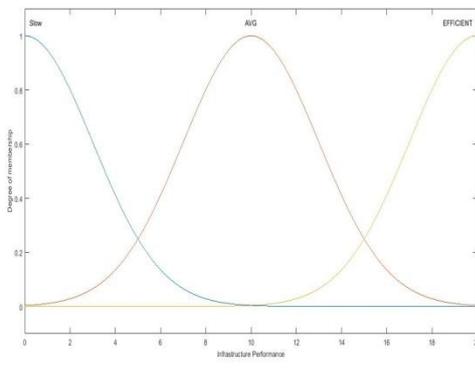
1. Input Gaussian membership function (membership rate 0-20)



2. Input Gaussian membership function (membership rate 0-20)

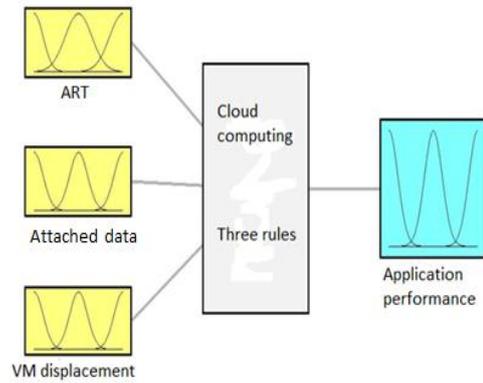


3. Input Gaussian membership function (membership rate 0-20)



4. Output Gaussian of membership function

Users are geographically dispersed on the cloud servers, which this action taking place to increase the speed of responding to user requests. For the proposed fuzzy model, application response time (ART) is from 0 to 20 Mbps and its efficiency based on the related data to the requested application defines on the cloud servers.



Fuzzy Proposed Model of Application Performance (Cloud Computing of Electronic Commerce System) with 3 input, 1 output and 3 fuzzy rules

Figure 4. Fuzzy proposed model of application performance with 3 inputs and 1 output.

**Rules Defined in This Model:**

(If the ART value is low) and ( value of connected data is low) and ( value of virtual memory performance is low) then (its performance is efficient)
(If the ART value is average) and ( value of connected data is average) and ( value of virtual memory performance is average) then (its performance is average)
(If the ART value is high) and ( value of connected data is high) and ( value of virtual memory performance is high) then (its performance is slow)

The displacement of virtual machines has very important role in computing efficiency of cloud. The ranges in which applications are facing with displacement of virtual machines are very determinative in specifying efficiency value. In the server, if the use of applications increases, 10% displacement occurs among the virtual machines, 90% of the other applications occurred without any displacement, and accordingly efficiency shows good result. The purpose of calculating the application efficiency examined for the three above-mentioned variables in this model and the fuzzy logic model and its defined rules are used to

determine the application efficiency in the proposed cloud-computing environment.

#### IV. CONCLUSION

In cloud computing, each object connected to the network becomes a business network. By understanding demographic features and customer behavior, communication organizations are able to organize their business strategies and by using these services can increase customers loyalty and improve the business profitability. By using cloud computing in each country, the role of the government in protecting personal data in the relevant systems is very sensitive and if the information exposed or manipulated, appropriate processes must be planned to respond promptly. Due to the various benefits of cloud-computing for different individuals in electronic commerce, can eliminate barriers existing in this technology. Cloud computing has an important role in improving people's lives and high quality of public services but it must be fully prepared for this technology. It can be concluded that cloud computing in electronic commerce is very efficient and makes it profitable in various business areas because it can respond to user's requests online. According to the proposed method, testing efficiency is very important help for finding and reducing dangers possibility. Compared with the methods that have been proposed so far, the evaluation of the cloud efficiency by fuzzy logic method shows the role of different infrastructure components. This research for providing better and proper services proportional with the users need in the electronic commerce field should be performed in accordance to related rules of service level, which the first and most important factor of efficiency in cloud environment is data. Therefore, the cloud environment provider must ensure that the level of efficiency and performance of infrastructure and application is acceptable and increasing number of users will make profits for the service provider in electronic commerce but the quality of work is always important.

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