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A New Method to Localize Utilize Organizational Architecture FEAF 2.0 in Cloud Computing

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Abstract: FEAF2.0 framework is a complete architecture which by integrating with leading cloud computing technology leads to improvement of components and essential processes. Also an analytical review will be done on choosing of improvement field for locating the federal enterprise architecture in management layer of cloud computing technology and ways to improve it, how to measure the quantitative and qualitative improvement by comparing the proposed method with other approaches and ultimately the success or failure of data recovery method. in this paper, a new architecture is provided based on the needs of organizations. This architecture brings together processes of standard frameworks related to information technology, organizational architecture components of FEAF 2.0 and the benefits of a cloud environment. for achieve this goal, the presented study considers appropriate processes in cloud environment from proposed frameworks as well as components of an organizational architecture of FEAF 2.0 for selected cloud environment and management layer of cloud computing.

Keywords: Architecture FEAF2.0, layer of cloud management, cloud computing, Localize Utilize Organizational.

I. INTRODUCTION

In today's world, if a system is not a legal organization so it will encounter to problems and cannot be grown. This is particularly true for large and governmental organizations so, it needs to use tried and tested Organizational architectures. Of course, making changes in these architectures for localization of them for certain applications are unavoidable. Enterprise Architecture Framework of FEAF especially for large systems and computing Cloud [1] [2] are consistent with the challenges of integration and complex interoperability and are clearly unique among the various frameworks in its application from “Operational views "and" data ". This view does presenting an overview and details to specific stakeholders with the aim of helping them in their respective fields and interacts with other areas of the system [3].

Cloud computing technology [1] [2] with its many advantages has created a new development in the world of computing and makes IT industry a step forward. Modern large organizations transfer their part of the process and data into clouds. On the other hand, the extent of organizations will increase the complexity of component-based architecture. one of the ways for reduction of this complexity is classification of information by using reference architecture & model [3] which among reference models, framework of FEAF 2.0 is one of the most complete reference models [4]. Thus, large and complex organizations for long survival and development, reduction of complexity and related costs had to make changes and improvements. FEAF 2.0 is a complete architectural framework which together with cloud computing technology leads to improvement of the efficiency of organizations &essential components and processes [4]. Also an analytical reviewing will be done on selecting of improvement field for localization of the federal enterprise architecture in layer of management of cloud computing, how to measure the quantitative and qualitative improvement compared with the proposed methods with other methods and finally, on the success or failure of other approaches. Generally, management layer of cloud computing provides services related to infrastructure, software/ platform layer in cloud architecture. In this layer, set of tools is devised for support of IT services and operations layer, as well as implementation of operational processes. Management layer is located in reference model of private cloud and in fact it provides a set of capabilities to infrastructure layer, platform and software layer. IT management layer is known as a IT layer.

This layer is provided due to doing operations related IT and connections and providing necessary services to other layers. So the present goal was offering a new architecture for cloud computing environments based on organizational needs and what was discussed. This architecture brings together processes of standard frameworks related to information technology, architecture components of FEAF 2.0 and the benefits of enterprise cloud environment. In order to achieve this goal, in this research suitable processes of cloud environment from proposed framework as well as components of enterprise architecture frameworks of FEAF 2.0 were selected and placed on cloud computing environment. The aim of the new architecture for cloud computing environments, was localization of FEAF 2.0 architecture components in a cloud environment, improvement of the structure of the environment, reduction of organizational costs and providing a better way for enterprise customers. In this architecture, in addition to processes of

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IT frameworks & communications, a new service for enterprise customers will be proposed in which services related to the business, IT etc. are offered to institutional clients.

The remain of this article is divided as follows: In Section 2 we examined the work done in the past, in Section 3 we describe the proposed model with the proposed architecture. In Sections 4 and 5 results and in section 6 conclusion and future suggestion are presented.

II. RELATED WORKS

Introducing of concepts of cloud computing dates back to the 1960s, when John McCarthy suggested that "computation may someday be organized were investigated [6] [5]. It is clear that word of "cloud" was taken from the phone industry where telecommunications organizations were the only airlines offering point-to-point lines until 1990s, began offering virtual private network with the same quality [8][7]. FEAF2.0 enterprise architecture has described set of tools to help government planners with different approaches toward previous version at end of 2012. FEAF2.0 enterprise architecture had a reference architecture model at its core that is equipped with federal agencies with a common language and framework to describe the analysis of investment [4]. On the other hand, cloud computing has the potential to be a major part of inefficiency and improving service delivery for government. Cloud computing model can provide substantially reliable and innovative services to organizations despite resources constraints [9]. On the other hand, the range and scope of this study was included introduction of a new architecture of cloud computing at a high level of conceptual and macro concept. The study included using of processes in high-level and architecture level and technical levels, implementation and coding were excluded. Elements of the existing institutional framework were in macro level and non-technical level and implementation, installation and related information were excluded. Considering the importance of enterprise architecture of FEAF 2.0, cloud computing, few the works done in recent years are as follow:

Kim and colleagues in 2005 introduced an enterprise architecture framework based on common information technology or EAFIT to improve cooperation between heterogeneous information of organizations. In this paper, they examined variety of organizational architectures to meet Information Systems Challenge [10]. Also Mahdavifar and et al in 2010 placed their main focus on business model of enterprise architecture framework of FEAF. They used an international software testing quality control to solve the problem of non-attention to test process [11]. Abbasi and his colleagues in 2008 examined one of the main challenges for enterprise architecture, planning process. In this paper, a methodology for benchmarking of software during planning process based on Enterprise Architecture Framework of FEAF Offered [12]. Since 2009, the federal government pushes the storage of data toward the cloud computing that is away from Data centers belonging to the Agency. Therefore, these changes were done in order to reduce maintenance costs, investments by federal government in total information and communication technologies (data centers) and also benefit from the advantages of efficiency, access, collaboration, innovation speed, reliability and security [13].

In December 2010, senior sources of information in the USA provided 25 projects of implementation related to reform of the management of information technology to increase efficiency of technology. One of the projects was in relation to using Cloud computing in agency that was starting to implement strategy of the federal cloud computing. This policy means that federal agencies must implement cloud-based solutions that provide secure, reliable and cost-effective conditions [14]. In 2015, some senior managers of information agency have announced that in addition to the security benefits of cloud computing, they in fact concern about outsourcing data centers on the cloud, management and control. Despite this and other related concerns, there should be a culture of trust in the cloud. Congress also has many tools to monitor the status of project of the federal cloud computing [15]. Adriana and Salvaru in 2015; given that there were many tools and methodologies for implementation and management of organizational frameworks, Adriana and his colleagues examined past methods of managing for organizational frameworks and evaluated together. In this study, only four methods were selected: 1-process of organizational integration 2- modelling methodology 3-developed way of architecture 4- framework of enterprise architecture of Federal. Finally, each of these architectures was examined and compared [16]. Joseph and Colleagues in 2016, proposed a new model-based on enterprise architecture that using this method they produced a tools and by this tool they managed architectures in the form of integrated networks [17].

III.SYSTEM ANALYSIS

In section, proposed method will be fully described according to flow chart. Next, steps of flowchart will be described by details. In section, the overall architecture that can be defined to combine Federal Enterprise Architecture with cloud computing will be examined. As seen in Figure (1), there are users or organizations that are engaged in private environments. These user or organizations transform their information and records from paper to digital files and outsource them into cloud computing.

Cloud computing environment encodes data and places data on central servers. Each central server also includes a host that provides the possibility of storing and managing data. Users or organizations that use information of other relevant

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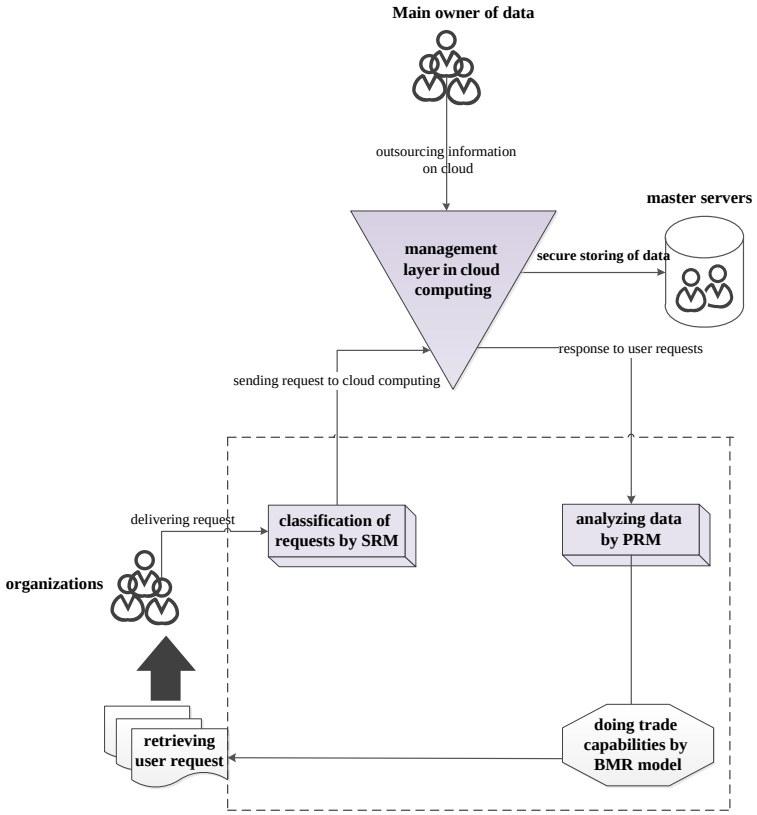

Fig. 1 Initial models offered for utilizing of FEAF2.0 layers in Cloud computing management.

organizations send them applies in term of queries from cloud computing management layer. Cloud computing management layer that combined with some reference models sends received queries securely to the cloud. After retrieving data from data sources or servers, retrieved data will be resending to management layers in cloud computing and classified by PRF and will be delivered to end user or provider organizations. In the next section, different parts of the proposed method will be described and evaluated with the relevant details.

Given the importance of management layers in cloud computing, this section will examine these layers and localization of architecture of FEAF 2.0. Cloud computing has a reference model in which there are different layers. One of the most important and widely used for localization of federal organizational architecture is management layer in Cloud computing. In figure (2), layers in cloud computing reference model architecture are shown.

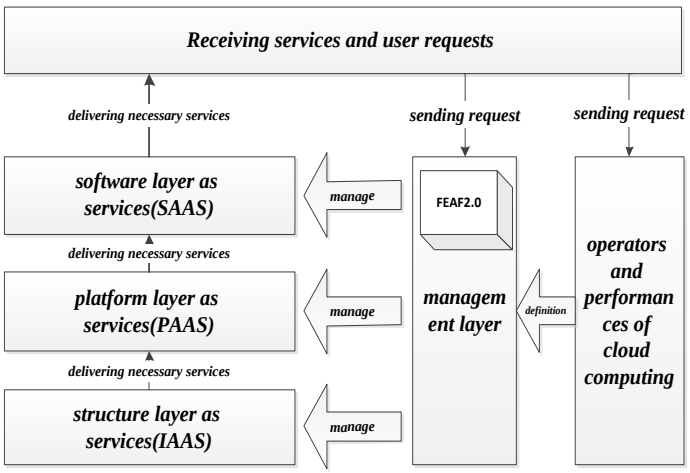

Fig. 2 proposed model in cloud computing.

As can be seen from the above figure, organization and customer request has been sent to cloud computing and then reference model sends a request to management layer and operator. If necessary, specific action will be done on the

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request. In management layer that enterprise architecture of FEAF is allocated, according to request, management will be done based on federal laws and select model to do operations and finally client's request will be delivered. In figure(3), subsets of the necessary processes that will be located in management layer by federal enterprise architecture are shown.

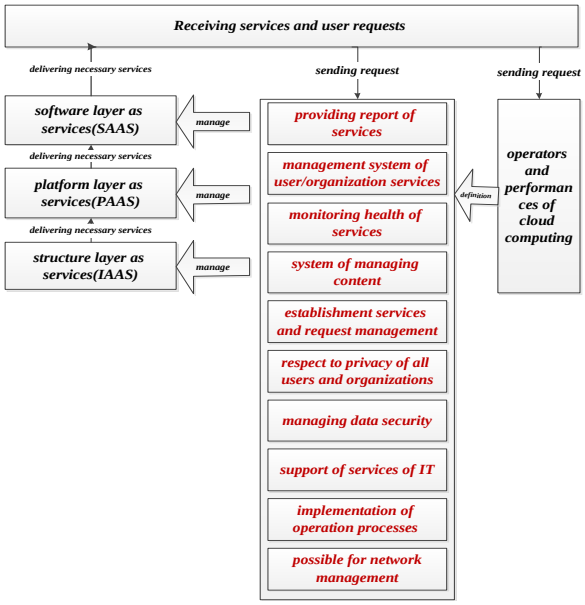

Fig. 3 necessary operations of federal enterprise architecture located in management layer of cloud computing.

Considering that there are facilities in management layer to implement or localize infrastructure and architecture; so it is possible to localize FEAF enterprise architecture in layers and use related facilities. Management layer provides needed capabilities to implement the operations and processes of the Federal Enterprise Architecture through support of IaaS, PaaS, and SaaS. These capabilities have potential for daily growth and development.

IV. EXPERIMENTAL RESULTS

In this section, the proposed method is evaluated through a case study features including qualitative interoperability, Security qualitative characteristics, quality customization capabilities, features of quality of management, quality features of analysis and is compared with other methods. Finally, elements and criteria used in this chapter are examined by famous architectures Such as the IBM, NIST, and Oracle.

A. Evaluation of the proposed method based on interoperability

Interoperability features, is defined as capability and various internal or external structures to work with each other. Below figure shows architectural superiority of the proposed method compared to other architectures in terms of interoperability.

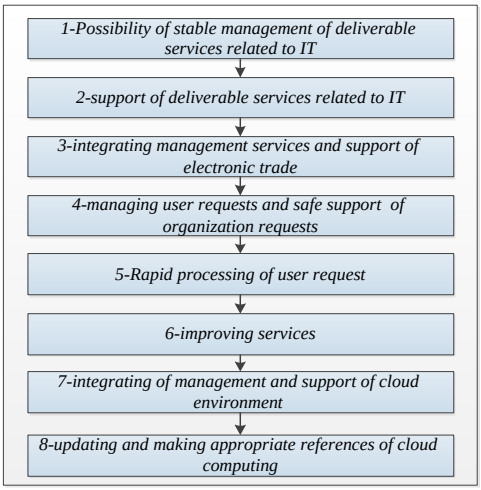

Fig. 4 comparison of features of proposed method against other popular architectures in terms of interoperability.

As can be seen in the figure above, the various components of the proposed architecture have qualitative interoperability but other architectures have such ability to meet this feature. On the other hand, the proposed

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architecture is based and from famous and known architecture. Therefore, given that interoperability feature, there is possible to manage, support and provide secure services to customers and organizations that is better than other architecture in this term.

B. Evaluation of the proposed method based on secure property

In Internet-based environments, maintaining the security and privacy of our users are very important. This is more important when users give organization's information to cloud. In the proposed architecture, for testing and evaluation of security of data transmission and providing services to customers or organizations, simulation was performed using the software called Rapid miner that results will be discussed below. In order to assess the security and modelling of proposed framework, it requires set of data to test security in this present research. So, there were no sets of data to determine the presence or absence of abnormal behaviour of systems in cloud computing that by basic literatures reviewing, it was observed that most of the articles used set data of MCFP. These sets were collected in CTU university of Republic Check; files are usually very large so that they are stored on a server at university [42]. There are different versions of the data set that was used to evaluate the newest version of the data set. This collection is the most widely used data collection to detect anomalous behaviour and assess the security of a cloud computing architecture. Data set MCFP Includes 1,048,576 records with 15 features.

Among 15 features, 14 features are defined as system input and1 feature is defined as system output that by providing log reports, 14 features had prominently been selected by the University. The first 14features- in the following table- express the characteristics of abnormal behaviour in sample and characteristics of abnormal behaviour in the system in the form of an attack; feature 15 as final feature is done as a type of attack. In fact, by using first 14features last feature can be identified. Due to the high volume of feature sets and easy estimate, 10% of records are randomly selected which selected set includes 10,500 records with the same feature. The data set includes all types of attacks including bot note, DDos, CVUT, etc. that are taken place by the attackers in any system, organization, or requests of a person. For proper evaluation, all attacks were considered equal in which 1,654 records include records without attack; 8,855 records include attack and attack and abnormal behaviour of system. All 15 features listed in dataset used as the training model and the final feature that is relevant tag is used to identify the type of attacks and anomalous behaviour. Procedures are such ways in that data includes 15features are entered to stimulator as training samples. After operation and implantation of method, training samples entered to model that were without log. At this stage, according to the 14 features, identification of attacks and anomalous behaviour will be done and log will be assigned to it that represents type of attacks. In the following flowchart, security of requests and transfers related to customers and organizations in proposed architecture is shown by localization of federal enterprise architecture.

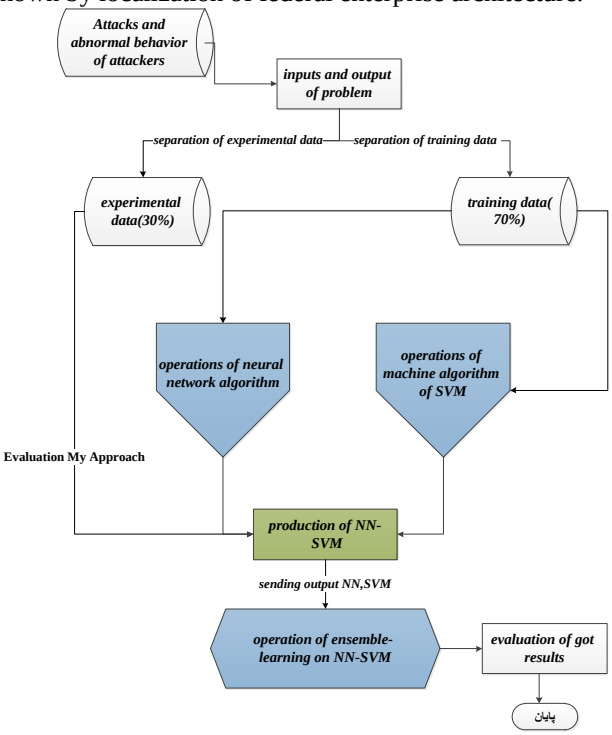

Fig. 5 flowchart of security of users requests of cloud computing by NN-SVM

As is clear from the flowchart, detection procedures for attacks in cloud computing is done according to method in combination of algorithm of support vector and neural network and collective strategy. In the present research,

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proposed method is named NN-SVM. According to the flowchart, firstly, dataset entered as abnormal behaviour of users or data set of attacks for evaluating NN-SVM method. Then the inputs are determined as variables or characteristics of the dataset and also type of attack or normal feature of the application are determined. Then Data is separated into two parts: training and testing. Training data produces models of neural network and SVM (support vector machine algorithm) that are the most applicable algorithms to detect penetration. Test data is also used to assess the accuracy and error. For this purpose, 70% of data as training data and 30% of data as test data entered into the SVM and NN and interested model will be produced. Finally, last detection will be done. Results of evaluation of security of proposed architecture by NN-SVM are as follow:

TABLE I

RESULTS AND ACCURACY OF ATTACK DETECTION BY ALGORITHM SVM-NN

NN Error	SVM Error	ATTACK DETECTION BY NN	ATTACK DETECTION BY SVM	TYPE OF MAIN ATTACK
0.04	0.65	1.0463	1.659	1
0.01	0.604	1.0136	1.604	1
0.005	0.586	1.0058	1.586	1
0.003	0.576	1.00368	1.576	1
0.002	0.570	1.00238	1.570	1
0.701	0.683	1.2989	2.683	2
0.006	0.67	1.9933	2.676	2
0.701	0.68	1.2982	2.602	2
0.222	1.61	3.2227	4.618	3
0.179	0.002	2.8209	2.997	3
0.085	0.16	2.9140	3.166	3
0.257	1.00	4.74289	6.006	5
0.173	0.99	4.82619	5.995	5

As it is clear from the above table, the type of attack has been detected using a variety of methods. For example, in row 13, type of attack is 5, which is stored in the database system. By applying SVM algorithm on sample, response 5.9 has been shown that by rounding it toward up or down a main response will be offered. With rounding of 5.9, the final answer is 6 that attack is no correctly detected and this is a negative score. If the neural network 4.8 identifies 4/8 and be detected correctly, this is a positive rating. By combining these two algorithms due to the neural network model has more accuracy than SVM, so because the responses were not the same ultimately, response of model will be selected that is better identified. In following figure, the difference of identification of SVM algorithm on 13 samples of attacks has been shown.

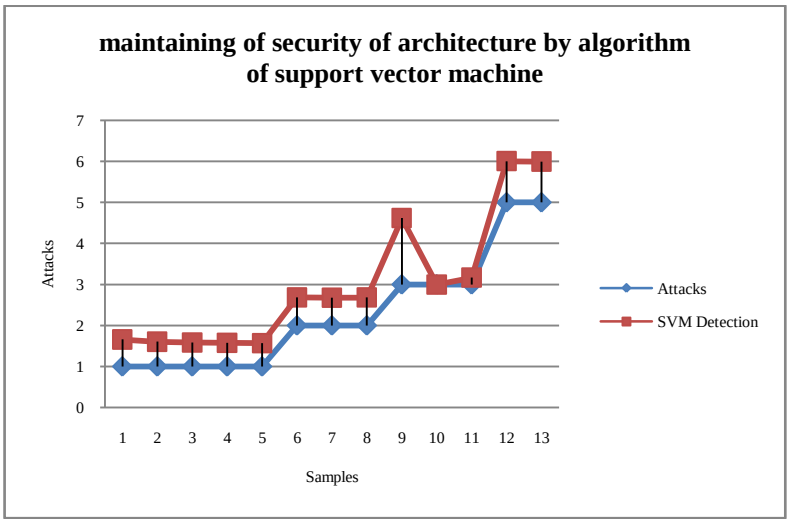

Fig. 6 maintaining of security of architecture by algorithm of support vector machine

As it is clear from the above figure, detection of attacks using the proposed algorithm in the proposed architecture was with a subtle difference and it provides possibility of detection of penetration. It is worthy to mention that neural network algorithm detects attack lower than the support vector machine algorithm. In the figure (7), amount of attacks detection using SVM and NN approach against type of the main attacks on architecture are shown.

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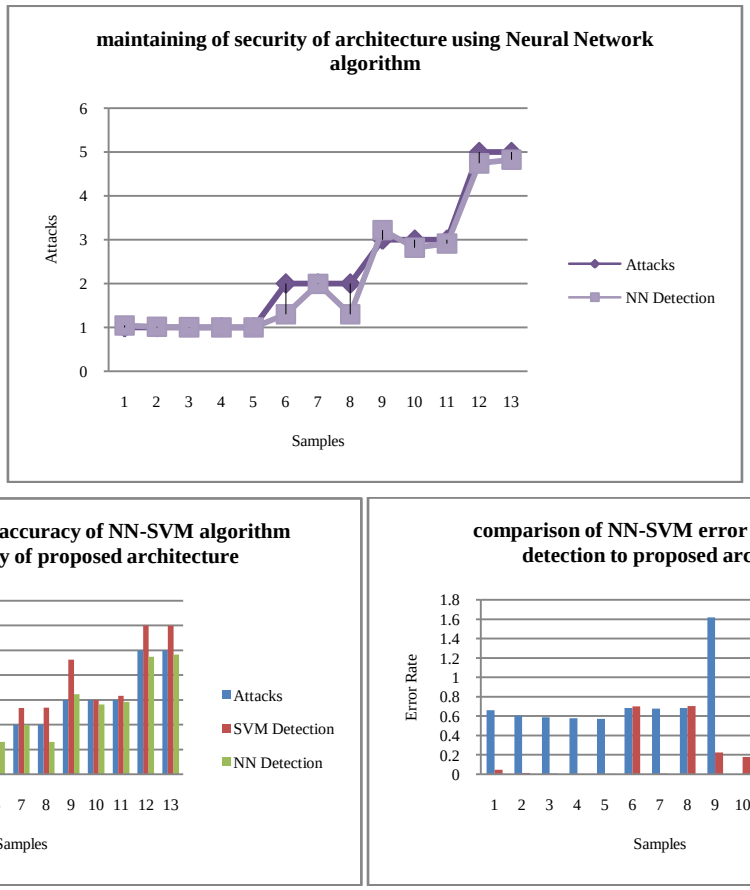

Fig. 7 comparison of the rates of accuracy and error rate of NN-SVM method in the security of proposed architecture

In the following figure, detection error rate of attacks using SVM and NN approach against the main attacks are shown. According to accuracy of the proposed method, using the tool called Rapid Miner, at worst state, this model has 99.24% accuracy as well as 99.35% at best state. So with regard to the proposed method NN-SVM in architecture presented in this study, one can maintain data security in the event of any attack on the proposed framework to thwart the attack.

C. Evaluation of proposed method based on customized features

Customization features associated with possible customization services and architecture. Since cloud services are designed and provided for public use and all industries, customization of services is very limited. In below Figure, the architectural superiority of proposed method over other architectures methods is in terms of interoperation feature. As can be seen in the figure above, the various components of the proposed architecture meet customized features needs. But other architectures have the ability to meet these features. This architecture is derived from well-known architecture.

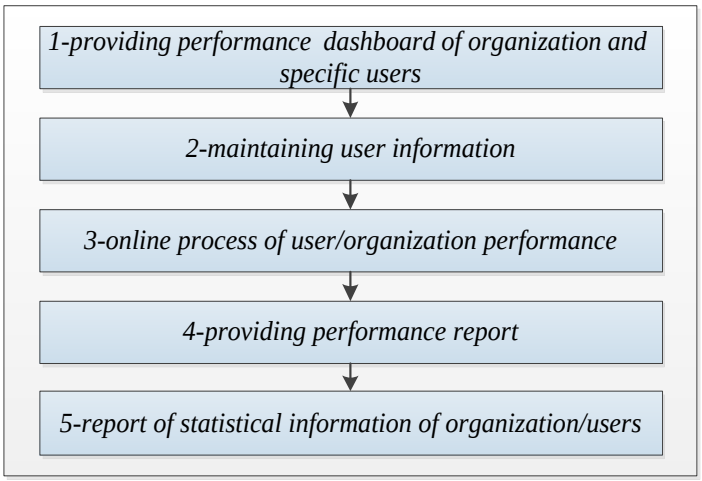

Fig. 10 comparison of proposed architecture based on customization features with other architectures.

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V. CONCLUSION

Service-oriented architecture is an attractive architectural concept for providing a unified structure and movement toward this architecture is main goal of the most modern organizations. Today, organizations are looking forward standard structures and in order to achieve these standard frameworks in different areas - Frameworks of field of information technology and communication in this present research-to synchronize organization with modern interior and exterior changes. On the other hand, cloud computing is now the subject of modern organizations and communities. Large organizations are moving towards cloud computing environments and sometimes operations departments come to Cloud by funding high costs and in fact in some ways they are outsourced. Therefore, architecture of cloud environment should be standardized in accordance with the rules and laws. Therefore, in this study to provide a reliable new architecture in order to offer cloud computing services to customers and organizations, firstly, layers architecture in cloud computing are discussed. Then, architecture of federal agency was analyzed and the conditions of localization of architecture in cloud computing management layer were analyzed. Finally, by providing the necessary fields to display the federal enterprise architecture management layer we be able to guarantee cloud security of customer privacy and public and private organizations. This architecture is analyzed based on characteristics of interactivity, customization, security and analysis as well as is compared to other architectures, including IBM, Oracle and NIST were compared. Finally, it was observed that the proposed architecture in comparison to other architecture provides more facilities. we offer a design and new ideas for improvement of the performance of the proposed method. Suggestions are as follows: the present research is a high-level research and technical aspects are not addressed which can be addressed them in relation to concepts of architecture and improve architecture.

REFERENCES

[1] Abah Joshua, Francisca N. Ogwueleka, "Cloud Computing with Related Enabling Technologies", International Journal of Cloud Computing and Services Science, 2013.
[2] V. D. Kale, S R.Gupta, "Recent Research Trends in Cloud computing", International Journal Of Computer Science And Applications, 2013.
[3] M. Land, E. Proper, M. Waage and J.Cloo, Enterprise Architecture, Springer, 2009.
[4] U.S, "Federal Enterprise Architecture Framework Version 2," in SRM Taxonomy with Definitions, January 29, 2013.
[5] A. Joshua, F.N. Ogwueleka, "Cloud Computing with Related Enabling Technologies," International Journal of Cloud Computing and Services Science, 2013.
[6] N. Venkateswara Rao, SK. MeeraSaheb, "A Survey of Cloud Computing: Cloud Computing Concerns and Issues", International Journal of Engineering Research & Technology, 2013.
[7] N. Antonopoulos, L. Gillam, "Cloud Computing Principles, Systems and Applications", Springer, 2010.
[8] M. Malathi, "Cloud Computing Concepts," Department of Computer Science - IEEE, 2011.
[9] V. Kundra, "FEDERAL CLOUD COMPUTING STRATEGY," in U.S. Chief Information Officer, FEBRUARY 8, 2011.
[10] J.W. Kim, Y.G. Kim, J.H.Kwon, S.H. Hong, C.Y. Song and D.K. Baik, "An enter-p rise architecture framework based on a common information technology domain (EAFIT) for improving interoperability among heterogeneous information systems ," Third ACIS Int'l Conference on Software Engineering Research, Management and Applications (SERA'05), 2005.
[11] H. Mahdavifar, R. Nassiri, A. Bagheri, "A Method to Improve Test Process in Federal Enterprise Architecture Framework using ISTQB Framework," World Academy of Science, Engineering and Technology, Vol:6, 2012.
[12] A. Akkasi, M. A. Seyyedi, F. Shams, "Presenting A Method for Benchmarking Application in the Enterprise Architecture Planning Process Based on Federal Enterprise Architecture Framework," Information and Communication Technologies, pp. 7-11, April 2008.
[13] G. Reese, "Cloud Application Architectures," in O Reilly from books.google.com2009 ,.
[14] E. A. Marks, B. Lozano," Executive's Guide to Cloud Computing," Wiley, 2010.
[15] Eric A. Fischer, "Overview and Issues for Implementation of the Federal Cloud Computing Initiative: Implications for Federal Information Technology Reform Management", Specialist in Internet and Telecommunications Policy, January 20, 2015.
[16] A. Ferrugento, Á. Rocha, "Evolution of Methodological Proposals for the Development of Enterprise Architecture," Department of Informatics Engineering, University of Coimbra, Coimbra, Portugal, 2015.
[17] J. Horalek, , V. Sobeslav, O. Hornig , L. Balik, "A Methodology for the Enterprise Networks Architecture and Modeling, " Advanced Computer and Communication Engineering Technology Volume 362 of the series Lecture Notes in Electrical Engineering, pp. 831-841 , 2016.