TECHNIUM

Technium Vol. 3, Issue 11 pp.19-31 (2021)
ISSN: 2668-778X
www.techniumscience.com

E-Governance System Challenges and Cloud Computing Benefits in E- Governance

Alaa Ibrahim Mahmood Ali

Directorate of Education in Nineveh, Mosul , Iraq
Corrosponding Author : alaaibmah2@gmail.com

Abstract. The global rise in the communications is affecting the life of societies particularly our modes of work, learning and interacting . Presently, nearly all organizations as well as the official government are presenting their facilities via internet. E-Governance is an approach to implement ideal system through ICT to help find a better citizen involvement. The various customers of the E- governance like government, citizens, as well as businessmen. A successful e- governance regime has to be cost effective, easy and dependable to be maintained. Unluckily, recent technologies are insufficient to cover the entire need of E-governance. The cloud computing is a modern approach to computing that targets improve the ways of communication and storing of data in a protected environment through the internet find a policy. cloud computing is an active application advancement that help find a resolution for all E-Governance infrastructure development with low price as well as short time. This research introduces e-governance challenges and benefits supplied by cloud computing that complement and sustain e-Governance.

Keywords. Cloud Computing, E-Governance, Challenges, Benefits

1. Introduction

The vast growth and huge success in IT and communication strategies. Our daily life is under the influence of manner in which we act, interact and learn. Recently, huge number of organizations, and governments are offering their facilities with the help of internet, [1].

The traditional way of reaching services of government is not quite easy, due to the fact that we are supposed to pass through number of processes and regulations. Thus, governments around the globe tends to present their facilities with the help of internet website by what is known as e- governance. Use of the E- governance is more by governments, citizens and business owners, [2]. By applying E-governance, governments deal with their citizens more smoothly and speedily. An essential E-governance program has to be cost effective, easy and reliable to be maintained, [3]. Unluckily, though there is a variety of affordable technologies and resources, lot of challenges are faced when making and execute e-governance schemes, [4-5].

The constant developments in technologies concerning the implementation and deliverance of E-governance facilities could create chances of getting rid of some of challenges sustain as well as help the accomplished systems to be highly functional. Cloud computing is modern technology that can dramatically enhance a government work, the facilities that it supply to its citizens as well as it organizations, and its collaboration with different governments, [6].

Conventional methods for developing, planning, and examining IT capacities in contradiction with the merging need to interact swiftly when experiencing modern thoughts. Cloud computing is a way that can afford abilities rapidly[6]. The cloud computing is an active process development that prepares solution for all E-Governance infrastructure advancement with a low price and short time, [7]. It means using over the internet of computing software and hardware facilities and processes which are stored in far mode, [2].

Cloud based E-governance refers to a rising scheme to allotted computing of E-governance processes which uses resources as foundational factors to construct agile webs of cooperation processes spread across and within government limits. In unlocked spread computing conditions, security is of very importance concern, [8].

2. E-Governance

E-Governance refers to technologies of Information and Communication in different plains of the government, the general sector and other than that, to improve governance. Electronic governance (E-Governance) refers to applying technologies of communication and information to convey regulation, transparency, efficacy as well as responsibility of transactional and informational interchanges inside government, Govt. to Govt. different levels like the Local, Municipal, State, National, citizen & businesses, and to help individuals through reaching& usage of data, [9].

Information Revolution changing the available conventional systems into Systems of Knowledge. Operation of Re-Engineering Business practically executing with government and internationally organizations. Management of knowledge is a emerging to e-governance, [9]. E-Governance is able to facilitate the work of government duties by furnishing lucidity, powerful workings, immediate reaction plus availableness of information of government processes to customers, time to time. E-Governance is employed to govern procedures of administrations, taxes of income, pension works etc. to ease use by the service of IT facility. E-Governance empower the effectiveness of government working by eliminating routine in many stages, [4].

3. E-Governance Requirements

The successful e-governance calls for e-governance commitments and assets of the e-governance. E-Governance bestows an approach to enhance government working and facilitate spreading of information among citizens. For empirical application of E-Governance it is significant to determine particular elements that will perform significant part throughout distribution of E-Governance.

The e-governance requirements that fall under four sections for suitable inquiry that is illustrated in figure 1, [2] :-

1- Government to Government: The requirement of govt. to govt. functionality is totally associated with administration, inter control of government and monitor on the government. It emphasizes on the internal communication between two governments and other features of the government to government communication.

2- Government to Business: Business companies are significant for any government as well as participating significantly to the development, it basically demanded to automaize government for business interaction such as tax payments and contract and tender administration, and so on.

3- Government to Citizen: essentially, the main duty of any government is the service of citizens. Government is in charge of providing citizens with the necessary and basic emanates, suitable education, health services and quality life. A single window government solution may contribute for achieving satisfaction of citizens is required in E-Governance.

4- Government to Enterprise (G2E): Enterprises in form of Electricity and Water Board, are monitored by government and must response immediately to policies of government. Policy enforcements, insurance and scrutinizing (for liability) are the greatest challenges.

Technium Vol. 3, Issue 11 pp.19-31 (2021)
ISSN: 2668-778X
www.techniumscience.com

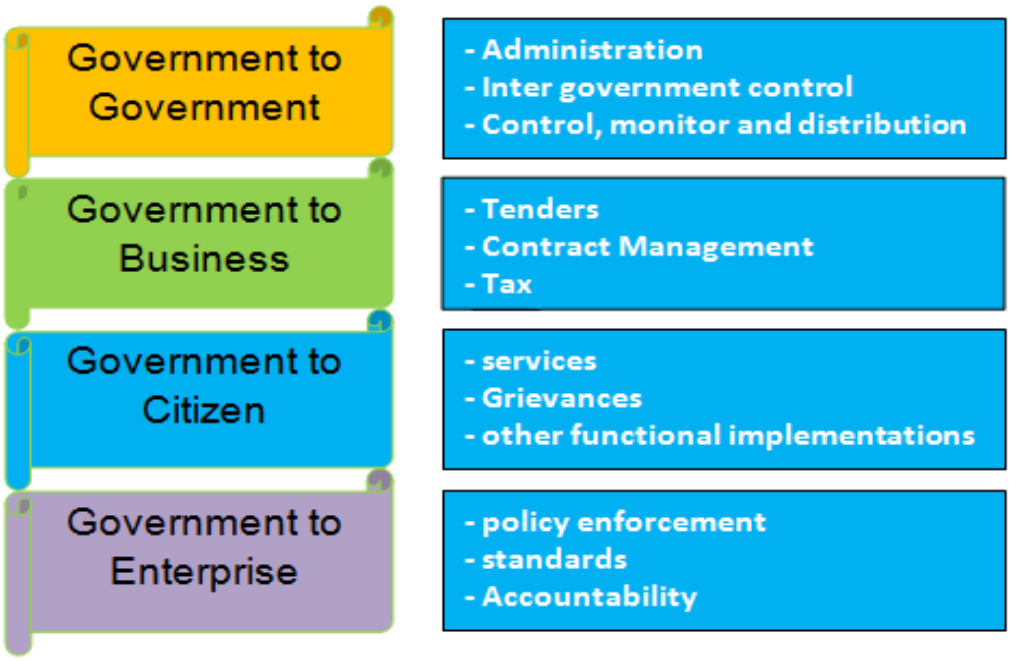

Figure 1. Typical Demands of E-Governance

4. Constituents of a typical E-Governance Employment

Triple tier architecture for E-Governance is illustrated in figure 2. The architecture has three tiers of the system. In the data storage tier, appropriate chart for storage of data has been designated for e-governance. It adds infrastructure for storage for data that is obtained from several operations and deliver the demand of the any operation that requires the data.

Application layer operates between user tier and data tier. It promotes the correlation between user operation and data tier. The upward or user tiers has a Graphical User Interface(GUI) for the costumer communication with the schema(system). In E-Governance scheme, the citizen(user) is allowed to keep interact with the assistance of upper layer(GUI) as well as can obtain info from the scheme. The officials of government as well as legislators have the ability to upgrade the information of the schema(system) with the assistance of upper layer. This structure has these advantages in framework of E-Governance, [10]:

1- Heterogeneous Systems: Applications could employ powers of several gateways besides several software units in various layers.

2- Modifiability: When authorities are disjointed, it sounds be simple to change the code in every layer while other layers stay intact as Modifiability is important structural driver of the matter.

3- Scalability to handle different consumers: Every consumer is easy to carry to reach the service is helped of the middle layer. The middle layer may allot the data of connection among users, yet in case of blocked middle tier, one may spread different servers finishing the middle tier code; users are capable of join any of these servers.

4- Integrated Data Access: at different practices, data has to be obtained through different sources, and be managed evidently in middle layer, whereas one is basically able handle the connections of all database system used.

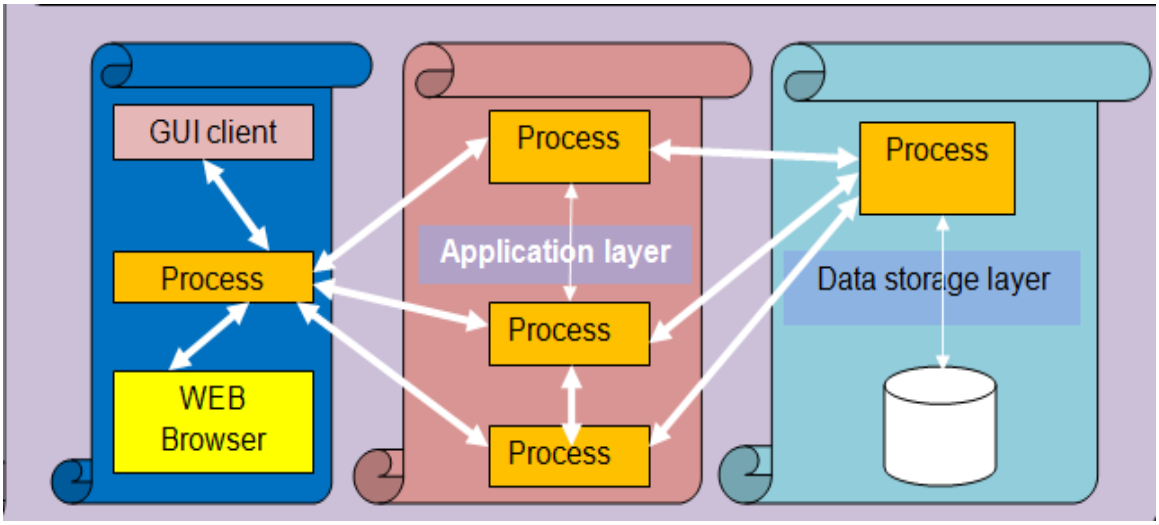

Figure 2. Typical Structure of an E-Governance Application

5.Cloud Computing

It worth thinking of a cloud as a group of software and hardware which operates in the center of data and let on the cloud computing model.

The cloud computing is one of the great challenging of nowadays skill that permits people or projects to have their necessary or required organization, data storage and others computing amenities in a smooth way. This mechanization employees the infrastructure of the already set up internet as well as provides total computing works through allowance of infrastructure, APIs, platform, software in addition to extra applications. It support use and pay item namely the cloud operators merely pay whatever is used.

Many definitions to cloud computing exist, for example, the National Institute of Standards and Technology (NIST) defined cloud computing as "model for allowing convenient, on-demand network access to a shared pool of configurable computing resources (storage, network, services and applications) that can be rapidly provisioned and released with minimal management effort or service provider interaction", [11].

The cloud computing may be understood like a huge group of computers. Such as those personal computers or servers of the internet in the public and private projects. Hence, a comprehensive various end operators demand approval to the data and services supported with cloud. Entry is by the internet and it passes over various platforms as well as companies. For the end promoter the infrastructure and skill behind the cloud is imperceptible and is unable to decide if cloud advantages depends on HTML , XML, JavaScript, HTTP, or other protocols.

The service models Cloud computing refers to the method cloud services are to be accessed by users. Nearly all basic models of service comprise of a collection of IaaS (infrastructure as a service), PaaS (platform as a service), and SaaS (software as a service), [12].

1- Infrastructure as a Service (IaaS): provides regular capacities of computing and storage like including services on internet. Routers , controls, storage systems, applications and others are accessible and pooled for covering loads of tasks which varies from application parts for operations of high-performance computing. For E-governance applications demands vast quantity of data. Cloud computing offers infinite provide of cpu, bandwidth and storage for E-governance operations, thus, the designers have merely emphasized the usability and features of it.

2- Platform as a Service (PaaS): cloud computing offers an implicit improving environment to the developers. Cloud provides regular platform for E-governance developers. Among the platform it offered are OS provisioning, database support services, middleware support programs, workflow

administration and Queuing workings. In e-governance with cloud benefits departments may obtain resources whenever they need them when compared with conventional ways.

3- Software as a Service (SaaS): Architectures an entire program offered in form of service when required. A single matter of the software operates on the services and client projects or cloud different end users. Government departments may not will to purchase the E-governance services, however they may use it as it is available for anyone on the cloud .A lot of services to be offered in form of model services. Several of these are Compliant decision system, systems of employee management and attendance resolutions, water Boards, Billing, Payment systems, E-police, E-court, Maintenance by Municipality. Thus, cloud lowers expenses of E-Governance. The types of services provided in cloud computing areas shown in figure3.

Figure 3. Cloud Computing Service Models

The several deployment models of cloud computing are the following, [13]:-

1- Public Cloud: Consists of services and facilities which are at the fingers of people. Such servers in public clouds can be delivered through third party on the networks, systems of storage and cloud's servers.

2- Community Cloud: The architecture of cloud is provided for upper layer usage through a certain group of users in institutions that have general worries(e.g., security, task demands ,policy and approval accounts). It can be owned, controlled, and run by individual or multiple institutions in the community, a third party, or both, and it can be available in or off the establishment.

3- Private Cloud: the cloud structure is administrated and hosted outside or inside of a third-party of a single institution. Special clouds are designed for high-class use of single client,in a belief of assuring full arrangement of data, betterment of privacy ,as well guaranteeing excellency of the service.

4- Hybrid cloud: This integrates different clouds (private , public and community) are clouds recall their specific identities, however are assembled in a specific figure. A hybrid cloud can offer rational and dominion access to data and services, in addition to application flexibility.

The main types of cloud computing deployment models as illustrated in figure 4:

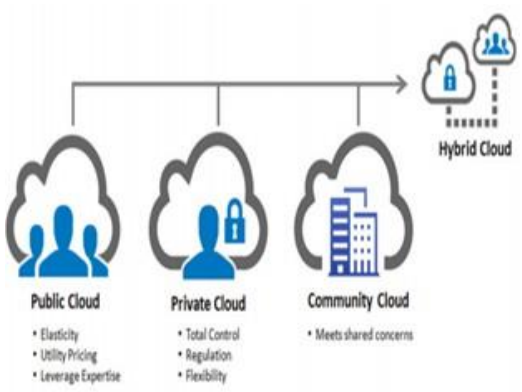

Figure 4. Deployment Models of Cloud Computing

The following features, that are commonly built-in cloud computing, [11]:

- On-demand self-service: it refers to the automatic provision of resource of computing to users (e.g. storage of network and server time) if requested without interaction by operator.
- Broad access to the network**:** Computing applicattons are presented through website that is available and stored through thin or thick clients like PC., laptop computers, tablets and smart phones).
- Resource pooling: Place independent pooling of computing applications to serving different users (multi-tenancy), advantages like that are allotted to users force fully as reply to the requirements.
- Flexible provision of services: the services is adjustably furnished and free, frequently, to scale and adapt to the heights on requirement. Users can enjoy the available facilities easily, it appears not limited and is retrievable in any period of time and any amount.
- Measurement of services: Cloud systems use a measuring capacity to spontaneously manage and enhance the resource allotment in accordance to the type of service for instance processing of data and storage.

6. Cloud computing technology based E-governance system

Cloud based E-governance system refers to modern pattern for allocated computing of applications of E-governance which use applications as fundamental components in establishing agile networks of cooperating services allotted across and inside the limits of governments, [8] .

6.1 Cloud Vision for E-Governance

This part functions an option of factors(elements) to the cloud that is useful for achieving the cloud based E-Governance, [4].

- Internet over Cloud: The majority of the services in internet are based on cloud 70% of the users of internet are also make use of cloud in many applications.
- Distributed Data Centers: systems of the individual information are exposed to dangers like offenses from outside, intruders, environmental dangers etc. Centers of allotted data offer shielding from such kind of risks, it also facilitates the usage E-Governance application as well as management through offering support for communication and real time stage. Data is disseminated among various spots so single possession of data is abolished and it offers more privacy and safety to information of the citizens.
- Data Center Operation: major purpose behind the operations of Data center is to ease availableness and the flow of service. Cloud computing employs cost effective hardware to set data centers as well as these centers is possible to be shared in different E-Governance applications. Using the same hardware system is utilized in many e-governance applications. It escalates the utilization of resource and offers scalability to the system of E-Governance .

6.2 The Challenges E - Governance

E-governance is a great chance for bringing services to the hands of citizens, yet certain significant challenges are there to consider. Such challenges fall under the three categories major in form of technical, social and economic. Interoperability between the available and present hardware and software are main technical issue. Certain lawful phases like security and privacy and security matters are significant. The societal challenge like technical illiteracy is a big burden too. First hand expenses of installing, the price of executing and repairing are economic difficulties that encounter system of E-governance, [5].

6.3. Cloud Benefits over the E-governance

As in mentioned in the last part of this study the researcher explained the major issues of e-governance. The cloud computing is able to resolve issues like that, [3]:-

1- Data Scaling :The databases must have scalability feature in order to handle the huge data throughout the time of the applications of E-Governance. As related databases assure integrity of data at the low-cost measurement, cloud databases is can be scale and employed in this kind of processes. Cloud databases accessible in distribution display modern and unfamiliar level of measurement without risking the performance. The databases of Cloud has to be counted when the main concern is on-demand high-end scalability – which is, great scale, distributed scalability, the type which is not possible to be simply achieved by increasing .

2- Auditing and Logging :Traceability of every change that contains information that is necessary in e-governance programs. It helps in controlling Corruption of government agencies throughout using the services of information technology and by account abilities of the providers of service. Auditing process, and security audits has to be performed from time to time in order to assure the security of system. Through Cloud it is possible to analyze large volumes of data and identifying fraud attempts. Such way may lead to find mechanisms of defense to improve the security, thus applications are found easily with reliability, [3].

3- Rolling out new Instances, Replication and Migration: Ordinarily, applications in E-Governance operates to departments and municipalities of states ,thus consumes lot of time, resources, hard work, and budget. This occurs to all the examples of the concerned applications. Capacities have to be existed to replicate these in order to add another e-court or municipality being a constituent of E-Governance. Cloud structures provide outstanding characteristics to prepare an example of application to roll out a modern municipality. Cloud may lessen time of distributing fresh samples of application.

4- Recovering From Disaster: disaster of nature such as earthquake, flooding, war and internal unrest not only contribute to loss of data from the E-Governance applications, but making the service un obtainable. Various setups in geographically different spots with full recovery solutions and backup have to be available. They could create complicate disuses. The practices to control and recover from disaster should be in place and practiced from on a regular basis. Data and applications have to be dispensable and available on a brief notification to shift from one data center to another.

5- Performance and Scalability: The structure and technology assumed to the initiatives of E-Governance has to be scalable as well as familiar across the passages of deliverance. To satisfy the increased numbers as well as requirements of citizens is a necessity. On condition of implementation, the E-Governance gateways may become the greatest beneficiaries and users of (IT). scalability is inbuilt, with cloud architectures. Generally, E-Governance applications can be scaled vertically through moving to a more potential appliance which is able to provide big memory, storage, and CPU. An easier choice is to collect the applications and scale in parallel motion through addition of resources. The technologies of Cloud virtualization permit restoring and backups, and provides application transfer absolutely in comparison with regular data centers.

6- Reporting and intelligently: Center of Data(network, CPU, storage, etc.),the degree of top load, consuming, usage of energy in addition to time, are certain elements that monitor and reporting are essential for finer employment of resource. This decreases expenses and arrangements. Data of

profiling help finding many services visible through the government. Cloud offers the optimal smart Infrastructure business if compared to former ways due to its own functionality and extent. Applications can draw out huge amounts of actual time and valid data to choose the proper decision to provide finer services, [3].

7- Policies Management : E-governance applications must apply policies taken up by the government dealing with citizens Such policies have to be made possible in addition to data centers and infrastructures to enhance the performance on daily basis. Cloud architecture helps to achieve policy like that in a data center, [3]. Security-related policies spread applications, and so on and can be prepared as well as executed in the data center.

8- Integration Systems and Software Legacy: In addition to shifting the provided services and applications to the cloud, it merges with the services of cloud-based, [3]. Powers of technology are data correlation across applications and messages transmit in various systems to supply high-speed services for customers. Cloud is depended on the foundations of SOA and has the ability to offer ideal solutions to combine different applications. In addition, applications are to be absolutely moved into cloud, [3].

9- Old Technologies and Shifting to Modern Technologies: to shift to a newer is usually not easy. Utilizing various types of programs, software and security packages, is one of the degrees in the security maintain of the data center in e-governance. Due to security and adaptability E-governance services, is able to manage the suggested policies with the help of cloud. Various kinds of applications of e-governance are plainly combined. Cloud structure offers capacity to simultaneously operate various kinds of software. After testing such applications they are able to enter the production phase.

10- Going green : Nowadays huge attention is made regarding quantity of pollution caused by the centers of data. The use of power, electronic waste and air-conditioning could cause threat. That is possibly among the motives for shifting to cloud structure for governance. Rather than replicating these services, with cloud, government may provide focused structure that can be competently employed to reduce pollution.

7. Related Work

According to, Mukherjee and Sahoo, [14], cloud computing: future framework for e-Governance is suggested. Such structure for e-governance is put forward due to Hadoop to ease a variation of projects. Idle and active commodity hardware is also suggested in correlation to Hadoop. The intended e-Governance architecture has three layers, they are knowledge Base, inference engine as well as user interface. The knowledge base consists of a sequence of regulation and facts regarding the specific difficulties zone from which the system extract its skill. To exploit the expertise that is incorporated in the knowledge base, the system must also have an element, known as' Inference Engine', that is able to check rules and facts, as well as gives responses to the inquiries raised through the user .User interface is the method through that the user communicates with the system when to use understandable human language. Cloud computing is to compute over a cloud, where a cloud consists of networks of commodity machines and software layers which is in charge of spreading data of application to the devices, administrating as well as parallelizing application implementing across devices as well as ascertaining and recover from failure of machine. Hence, the software layer that is in charge of distributing application is known as Hadoop, so, it would perform a main part to grant a fresh shape of smart e-Governance service of websites. The suggested frame is illustrated in figure 5:-

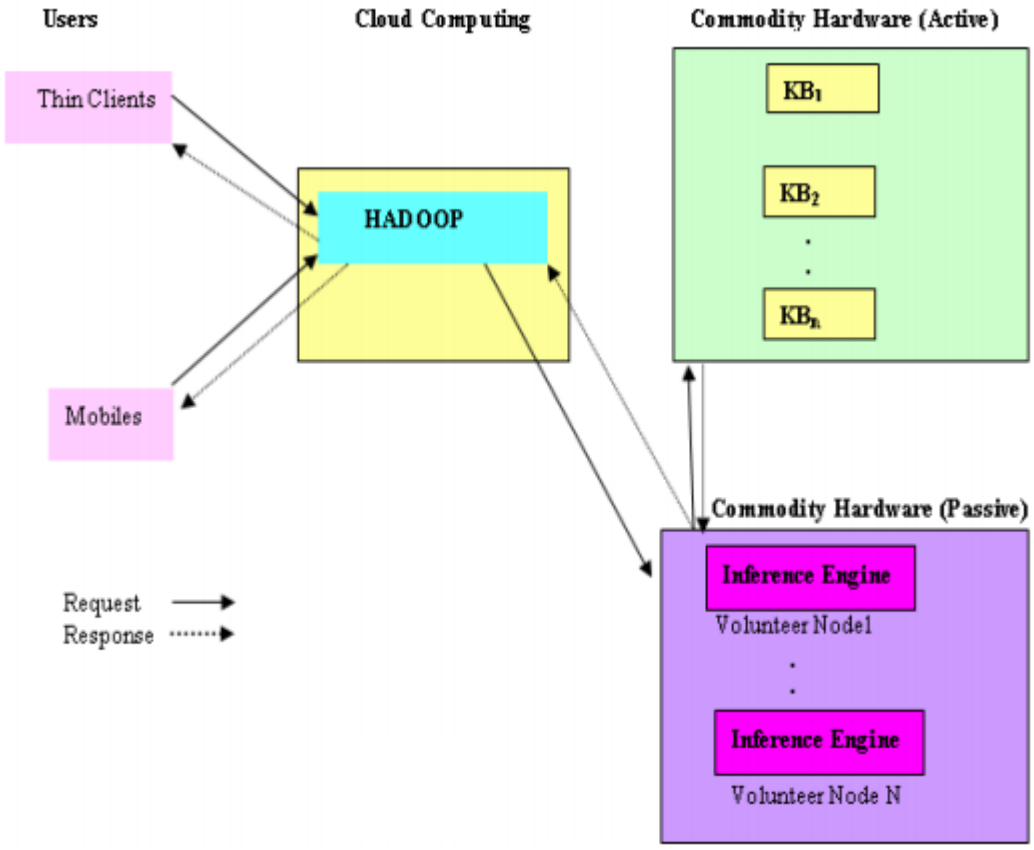

Figure 5. Framework for Cloud Based E-governance

A study by Abdulelah A. Al-Rashedi , [15],debate the E-governance based on Cloud Computing and Service- Oriented Architecture. Cloud Computing permits E-governance solutions to cover the entire country, independently of divergence of local managerial positions. Service-Oriented Architecture eases distributing combined services covering all operations of end user. Service-Oriented Architecture (SOA) is a modern approach to design and develop IT solutions with the service as the elementary building block. Web service, Software components, and REST technology are technologies employed to execute a service. The existence of eight major outlines fundamentals in SOA they are standardized service contract, service compos ability, service reusability, service Autonomy, service discoverability, service abstraction, service loose coupling, and service statelessness. Figure 6 illustrates an instance of a blended services combined of services offered by both business and Govt.institutions.

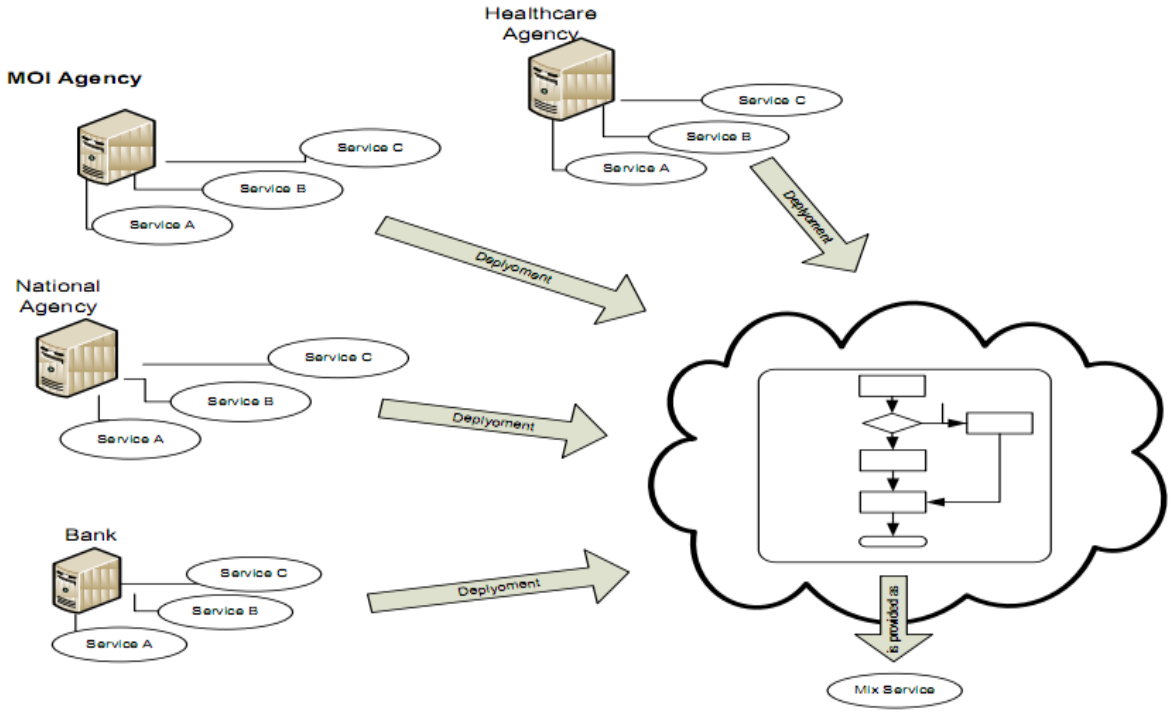

Figure 6. SOA in General Sector: A blended Services Combined of Services Supplied by Both Business and Governmental Departments.

Another research-paper by Alshomrani and Qamar, [16], cloud based e-government: benefits and Challenges are introduced. The method cares for the decreased expenses of ICT usage as consequences of cloud computing, such way may help to reduce the expense of e-governance by exploiting the resources existed on the cloud.

Other concerned research studies by Dash and Pani, [17], e-governance paradigm using cloud infrastructure: benefits and Challenges is suggested. This research argues about the best e-governance services in addition to the possibility to be available to the consumers if the applications are available by cloud infrastructure. It offers a gateway for using the application as services that is more reliable , scalable, high performance as well as relatively less expensive if compared with other allotted computing infrastructures. As e-Governance is the service of ICT to empower as well as interchange info between the G2G,G2C,G2B,G2E modality of society. Hence, it is possible to simply see as shifting citizen services online, however in its largest meaning it represents the technology-enabled government transformation. It lowers expenses, at the same time encouraging the development of economy, escalating transparency in government, enhancing service transport and collective administration, and smoothing the progress of an information society. So for e-governance cloud application, resources for e-governance procedure can be charted for the services and the models of distribution. Giving the E-Gov cloud distribution is a largest challenge of ICT, yet the major challenge is the protection and security of the citizens as well as government. The major target of this paper is to give a lucid idea regarding about the e-Gov employing models of cloud computing and outlines the challenges and demands for perception of the e-Gov paradigm in India.

Another study by Kishori L. Bansal, et al. , [18], Impact of Cloud Computing in Implementing Cost Effective e-Governance Operations , the study stresses using cloud computing for sake of e-governance in India, it further explains the difficulties as well as advantages in using cloud in e-governance.

Other paper by Stoicaa, Pitic and Mih , [19], a novel model for e-business and e-government processes on social media is suggested, it notices that main technologies as cloud computing directs many activities. It sets up models of business in e-government.

The research by Vats, Sharma and Rathee, [20], a Review of Cloud Computing and e-Governance is viewed. That research considers e-governance at selected places of the world that also employ cloud computing. The challenges of e-governance and cloud computing are studied too.

According to, Ahmed, [21], Exploring Cloud Computing Services and Applications is reviewed. Different cloud applications as well as services are studied. Pattern of applications introduced by e-governance cloud is illustrated too.

Among other related research studies by Sharma and Sadhana, [22], G-cloud (e-Governance in cloud) is suggested for review. The researcher in this study concentrates on the way of using cloud computing in e-governance. Advantages of cloud computing in e-governance are studied too. Another paper, Implementing e-governance in Bangladesh Using Cloud Computing Technology is suggested. It tested e-governance as well as the different methods it utilize for achieving it on the cloud. A pattern which has been executed on the Google Cloud gateway.

In study Smitha, Thomas and Chitharanjan , [23], Cloud Based e-Governance System: a Survey is viewed. A major purpose is the investigation of e-governance according to its advantages that are existed in using the cloud.

Due to Singh and Singh , [24], e-Governance: Information Security Issues is introduced. It aims is to check the safety of data created in addition to placing it online in e-governance. Different privacy procedures are mentioned which could improves security in e-governance.

The paper by Vijaykumar, [25], Role of ICT in e-governance; impact of cloud computing in driving new initiatives is introduced. The major purpose is the applying ICT in governance. Government owns many initiatives that can be spread with the usage of ICT. This could be additionally improved through using cloud computing under the condition of Software as a Service.

8. Conclusions and Scope of Further Study

E-Governance system demands entities in form of software, hardware, service, security network, administration, policy, business, etc. to persist in addition to working appropriately. Sadly the present methods and technology are deficient to operate on all the above mentioned entities. Cloud mostly gives a powerful solution to all the problems encountering the implementation of the E-Governance. Cloud computing offers modern service of consuming as well as model of delivery rouse by Consumer Internet Services.

Cloud computing reduces expenses besides increasing benefit of reducing of cost. E-Governance with cloud computing provides combined administration with mechanized trouble solving, administer safety end to end, and control accounts according to exact use of data. Internationally speaking, Cloud structures satisfy Govt.'s needs, in eliminating identical as well as repeated attempts and enhance the effectiveness of resources utilization. The current paper studies the e-governance challenges and benefits offered with the use of cloud computing to E-governance. Besides, presentation of related studies in E-governance challenges and cloud benefits.

There is a scope for further study on how can we implement E-governance services with the use of cloud computing with much details throughout providing several supposition and proposals in matter of how to choose the much effective services in the cloud to obtain the optimal execution of E-governance with the use of cloud computing and particular attention is to be given to Republic of Iraq.

References

[1] N.GOEL: e-Governance Towards Cloud. Computing Trendz - *The Journal of Emerging Trends in Information Technology,* 5(1),7-9 (2020).

[2] N. KTOMSON: Cloud Computing for E-Governance. *International Journal of Engineering Research & Technology (IJERT)*, 4(27) ,(2016).

[3] A.TRIPATHI AND B.PARIHAR: E-Governance challenges and cloud benefits. 2011 IEEE International Conference on Computer Science and Automation Engineering , 2011, 351-354,doi:10.1109/CSA E.2011.5953237.

[4] H.BELWAL AND A.SHARMA: Cloud Computing for e-Governance: Indian Perspective. *International Journal on Emerging Technologies (Special Issue NCETST-2017)*, 8(1) ,619-622 (2017).

[5] T.H.THABIT,Y.A.JASIM: The Challenges of Adopting E-Governance in Iraq. *Current Research Journal of Social Sciences*, 2(1), 31-38 (2019).

[6] T.ALMARABEH, Y.K.MAJDALAWI, H.MOHAMMAD: Cloud Computing of E-Government. *Communications and Network,* 8(8), 1–8(2016), https://doi.org/10.42 36/cn.2016.81001.

[7] M.KUMAR,M. SHUKLA,S.AGARWAL , C.N.PANDEY: An E Governance model using cloud computing technology for Developing Countries, (2010) .

[8] M.S.DARAK,V.P.PAWAR: Empowering E-Governance through Cloud & Biometrics. *International Journal of Scientific & Engineering Research*, 5(5),43-48 (2014).

[9] R.S.R. PRASAD, V.R. ATUKURI: Cloud Computing Technology for Effective e-Governance. *International Journal of Computer Science and Information Technologies*, 3(1), 3241-3244(2012).

[10] P.NATARAJA , G.T.RAJU: A novel approach towards proliferation of E-Learning in India through the analysis of existing ICT scenario. 2011 International Conference on Recent Trends in Information Technology (ICRTIT),(2011), 1298-1302, doi: 10.1109 /ICRTIT .20 11.5972277.

[11] P.MELL , T.GRANCE: The NIST Definition of Cloud Computing (Draf) Recommendations of theNational Institute of Standards and Technology. NIST Special Publication 800 (145),1-7(2011).

[12] E.M.CORRADO , H.L.MOULAISON: Getting started with cloud computing : a LITA guide. New York: Neal-Schuman Pub,(2011).

[13] S.R.LIHITKAR: Virtual Learning Enviornmnet for DLISc, RTMNU, Nagpur: a Prototype design.(2010).

[14] K.MUKHERJEE , G.SAHOO: Cloud Computing: Future Framework for e-Governance. *International Journal of Computer Applications* ,ISSN 0975 – 8887, 7(7), 31-34 (2010).

[15] A.A.AL-RASHEDI: E-Government Based on Cloud Computing and Service-Oriented Architecture. *International Journal of Computer and Electrical Engineering*, 6(3), 201-2016(2014).

[16] S.ALSHOMRANI , S.QAMAR: Cloud Based E-Government: Benefits and Challenges. *International Journal of Multidisciplinary Sciences and Engineering*, 4(6), 15-19(2013).

[17] S.DASH , S.K.PANI: E-Governance Paradigm Using Cloud Infrastructure: Benefits and Challenges. International Conference on Computational Modeling and Security (CMS 2016. Procedia Computer Science 85),(2016), 843 – 855.

[18] K.L.BANSAL, S.K.SHARMA, S.SOOD: Impact of Cloud Computing in Implementing Cost Effective E-governance Operations. *GIAN JYOTI E-JOURNAL*, 1(2), (2012).

[19] E.A.STOICAA, A.G. PITIC , L.MIH: A Novel Model for E-Business and E-Government Processes on Social Media. International Economic Conference of Sibiu 2013 Post Crisis Economy: Challenges and Opportunities, IECS 2013. Procedia Economics and Finance 6 (2013),(2013), 760 – 769.

[20] K.VATS, S. SHARMA ,A.RATHEE: A Review of Cloud Computing and E-governance, *International Journal of Advanced Research in Computer Science and Software Engineering*, 2(2),(2012).

[21] E.Y. AHMED: Exploring Cloud Computing Services and Applications. *Journal of Emerging Trends in Computing and Information Sciences*, 3(6),(2012).

[22] M.K.SHARMA , R.SADHANA: G-cloud (e-Governance in cloud)". Proceedings of the 5th National Conference; INDIACom-2011 Computing For Nation Development, March 10 – 11,(2011).
[23] K.K.SMITHA,T.THOMAS , K.CHITHARANJAN: Cloud Based E-Governance System: A survey. International Conference on Modelling, Optimization and Computing (ICMOC2012), Procedia Engineering, vol.38, (2012), 3816-3823.
[24] S.SINGH , K.D.SINGH: E-Governance: Information Security Issues. International Conference on Computer Science and Information Technology (ICCSIT'2011) Pattaya December, (2011).
[25] N.VIJAYKUMAR: Role of ICT In e-Governance; Impact of Cloud Computing in Driving New Initiatives. SETLabs Briefings, 9(2), Infosys Technologies Limited, (2011).