



A REVIEW OF CLOUD COMPUTING AND E-GOVERNANCE

Kuldeep Vats

CSE Department, SBSCET(FZR)
Punjab -152004, India

Shravan Sharma

CSE Department, Manav Bharti University,
Himachal Pradesh, India

Amit Rathee

CSE Department, CBS Group of Inst.
Jhajjer, Haryana, India

Abstract— This is an age of vibrant and rapidly evolving communication technologies, internet have shaped and changed society dramatically and technically, a ‘network society’ has been developed as in which work and do business. It’s the era of facebook and twitter, YouTube and smart phones. The way we share communications and engage interaction with other, has a radical altered. Cloud computing is fast creating a revolution in the way information technology is used and procured by organizations and by individuals. In this paper, we examine how cloud computing is rapidly grows in government across the globe, from Europe to Asia to America. The concept of Cloud computing has spread rapidly through the e-governance. Cloud computing helping nations make great gains through addressing major healthcare, education, and other societal issues.

Keywords- Cloud computing; E-Governance; Innovative Technology; Layers; Classification; Cloudy Government

1. INTRODUCTION

E-governance is no longer an option but it is a reality and a necessary of governance. E-Government can transform citizen service, provide access to information to empower citizens, enable their participation in government and enhance citizen economic and social opportunities, so that they can make better lives, for themselves and for the next generation. E-governance should be value-driven not technology-driven. According to the World Bank Website (2005), e-government can be defined as : “information technologies...that have the ability to transform relations with citizens, business, and other arms of government...[and] can serve a variety of different ends: better delivery of government services to citizens, improved interactions with and industry, citizen empowerment through access to information, or more efficient government management...benefits can be less corruption, increase transparency, greater convenience, revenue growth, and/or cost reduction ” [1]. This definition observable that e-government is not only the computerization of a government system, but contains the ability of high technology to achieve the high levels of improvement in various areas of government sectors, that provide convenient and effective services to citizens for improving high standards. The Waseda University Institute of e-Government has released 2011 Waseda University World e-Government Ranking, it shows that governments provide more advanced e-service delivery, better access to information, more efficient management and

improved interactions with peoples, primarily as a result of increasing use by the public sector of information and

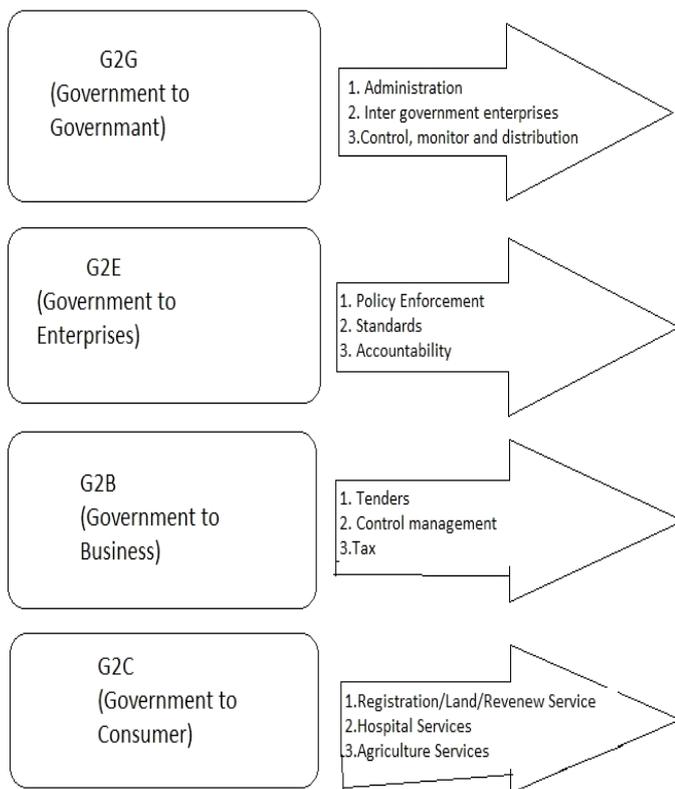
communications technology. High-income countries enjoy the top rankings in the e-government development index among the top five countries, Singapore received the highest score (92.14), followed by the United States (92.14), Sweden (88.32), Korea (87.50) and the Finland (86.90) [2]. Most top 20 countries are European, then American, Asian. There were few up and down compare to 2010 e-government development index (see appendix).

2011 top 20 e-Governments

No	Final Ranking	Score
1	Singapore	92.14
2	USA	92.13
3	Sweden	88.32
4	Korea	87.50
5	Finland	86.90
6	Japan	86.85
7	Canada	85.13
8	Estonia	84.10
9	Belgium	83.55
10	UK	82.40
11	Denmark	82.40

12	Italy	81.20
13	Taiwan	79.31
14	Australia	78.50
15	Norway	77.61
16	Spain	75.30
17	Germany	73.15
18	France	72.05
19	Switzerland	71.88
20	Netherland	70.75

2. APPLICATION IN THE E-GOVERNANCE



Types of E-Governance

2.1 Government-to-Government

It is the online non-commercial interaction between Government organizations, departments, and authorities and other Government organizations, departments, and authorities.

2.2 Government-to-Enterprises

Enterprises like Water Board, Electricity and controlled by the government and should react quickly to government policies. Policy enforcement, security and auditing (for accountability) are the biggest challenges.

2.3 Government-to-Business

G2B is the online non-commercial interaction between local and central government and the commercial business sector, rather than private individuals (G2C), with the purpose of providing businesses information and advice on e-business 'best-practices'. Tenders (e-tenders), tax collection and control management are the challenges.

2.4 Government-to-Customer

In G2C, customer (citizen) relationship management, the business (government) can provide the needed products and services fulfil the needs from customer (citizen).

3. NEED OF INNOVATIVE TECHNOLOGY

Today both developed and developing countries facing significant economic crisis. To secure their future, all countries will have to think on their capacity of technical innovation especially African and Asian countries. Electronic government policies need to contribute to making the benefits of ICT reach the people, by providing more feasible and efficient solutions that improve citizen, intergovernmental and business access to information, and services by supporting interoperability and collaboration. A systemic approach is required, which will ensure interoperability by implementing standards which enable cooperation, while supporting these attempts by incorporating into the country's legal system suitable measures relating to ICT.

Recently, the U.S. federal cloud computing initiative was published, which is a service oriented approach, whereby common infrastructure information and solutions can be shared across the U.S. government (National Institute of Standards and Technology (NIST), 2009) [3]. A high-reliable Cloud Computing services has been launched by India-headquartered global IT solutions organization, NIIT Technologies, and Hitachi Asia (Thailand) jointly, rendering their respective expertise in Data Center management. The Cloud Computing hub will be hosted in NIIT Technologies' Data Center in Bangkok and would initially serve local Japanese corporations. The overall objective is to create a more agile e-government using cloud computing architecture by which services can be reused and provisioned on demand to meet business needs. This endeavor can be viewed as an opening step into computing clouds, which is primarily focused on applications dealing with less sensitive data. These initiatives hold the capacity to expand into the building blocks of a universal e-Government solution supported by cloud infrastructure, whereby computing resources and tools can be uniformly shared between agencies and citizens while increasing participation. Cloud computing offers a

deployment architecture, which has the ability to address a number of vulnerabilities recognized in traditional IS. Distributed system of cloud computing provide real time services over network, software and hardware play important role to make cloud computing possible [4], [5]. Cost effectiveness, scalability, reliability, elasticity, and security are keys to the success of any information system, particularly e-Government. By reaping these benefits, e-Government can target a broader audience with a more inclusive, effective, and efficient platform.

This paper focuses the advantages of adopting a cloud solution for electronic government deployed information systems.

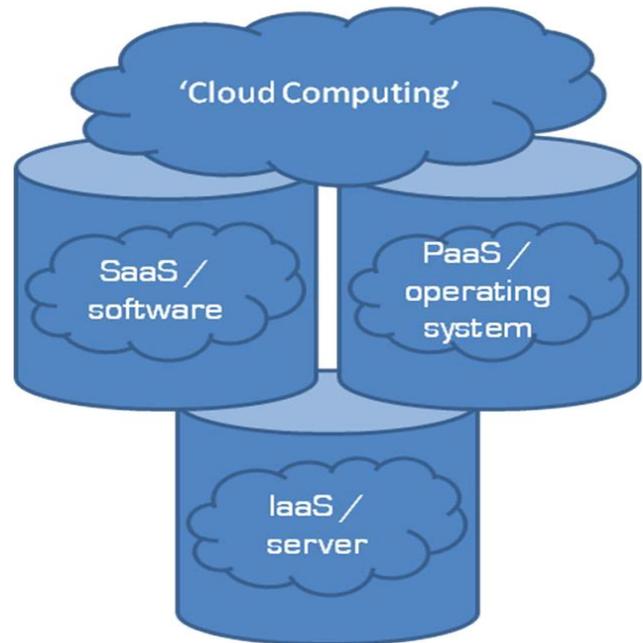
4. CLOUD COMPUTING

Cloud computing is the delivery of computing as a service rather than a product, where by shared resources, software and information are produced to computers and other devices as a metered over a network. It does not require end-user knowledge of the physical location and configuration of the system that delivers the services. It is similar to the concept of Electric grid, wherein end-user consumes power without needing to understand the components devices or infrastructure requires providing the services. The idea of cloud computing focuses around keeping all applications and data storage online in massive warehouses and making the computer merely a tool in which to access this information cloud via the broadband Internet. The cloud computer is essentially just a processor along with a screen, keyboard and mouse that is connected to a high speed Internet connection [6]. Applications that you want to utilize are downloaded from a central database and data that you want to save is stored online in your personal storage space. "Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction." [5].

5. LAYERS OF CLOUD COMPUTING

5.1 IaaS-(Infrastructure as a Service)

Infrastructure-as-a-Service like Amazon Web Services provides virtual server instance API to start, stop, access and configure their virtual servers and storage. In the enterprise, cloud computing allows a company to pay for only as much capacity as is needed, and bring more online as soon as required. Because this pay-for-what-you-use model resembles the way electricity, fuel and water are consumed; it's sometimes referred to as utility computing.



Layers of Clouds.

5.2 SaaS-(Software as a Service)

In the software-as-a-service cloud model, the vendor supplies the hardware infrastructure, the software product and interacts with the user through a front-end portal. Services can be anything from Web-based email to inventory control and database processing. Because the service provider hosts both the application and the data, the end user is free to use the service from anywhere.

5.3 PaaS-(Platform as a Service)

Platform-as-a-service in the cloud is defined as a set of software and product development tools hosted on the provider's infrastructure. Developers create applications on the provider's platform over the Internet. PaaS providers may use APIs, website portals or gateway software installed on the customer's computer. Force.com, (an outgrowth of Salesforce.com) and GoogleApps are examples of PaaS. Developers need to know that currently, there are not standards for interoperability or data portability in the cloud. Some providers will not allow software created by their customers to be moved off the provider's platform.

6. CLASSIFICATION ON THE BASIS OF LOCATION

6.1 Public Cloud

Computing infrastructure is hosted at the vendor's premises. The customer has no visibility over the location of the cloud computing infrastructure. The computing infrastructure is shared between organizations.

6.2 Private Cloud

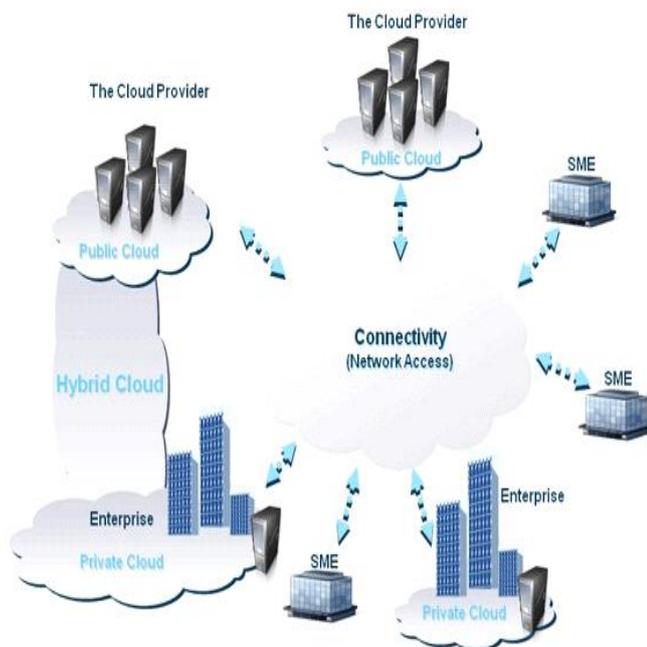
Computing architecture is dedicated to the customer and is not shared with other organizations. They are expensive and are considered more secure than Public Clouds. Private clouds may be externally hosted ones as well as in premise hosted clouds.

6.3 Hybrid Cloud

Organizations host some critical, secure applications in private clouds. The not so critical applications are hosted in the public cloud. The combination is known as Hybrid Cloud. Cloud bursting is the term used to define a system where the organization uses its own infrastructure for normal usage, but cloud is used for peak loads.

6.4 Community Cloud

The cloud infrastructure is shared between the organizations of the same community. For example, all the government agencies in a city can share the same cloud but not the non government agencies.



Types of Clouds.

7. CLOUD COMPUTING AND E-GOVERNANCE

An effective e-government system should be reliable, cost effective, ease to maintenance, satisfying other nonfunctional. Presently two main trends in the area of information technology influence e-government. The first trend is constant development of computer infrastructure which becomes more powerful with the less expense. The second trend is constant increase of users' skills and knowledge of operating computers and the Internet. These two trends enhance

possibilities of providing electronic services both in the public and the private sector. The private sector already noticed that chance – development of e-economy and e-business, both B2B and B2C, accelerated. Governments can leverage the Cloud to bridge the communication divide, especially with those citizens that reside in remote parts of the country. The Cloud could also be used to increase interoperability between various government agencies, reduce redundancy, track /monitor the effectiveness of government schemes. Computing resources shared between Central and State governments would result in reducing costs by leveraging existing infrastructure. Transparency in Government can be achieved at a faster pace through the adoption of Cloud. The Cloud has the potential of transforming this sector, to benefit not only the Government itself, but also millions of people [7]. E-Governance with cloud computing offers integration management with automated problem resolution, manages security end to end, and helps budget based on actual usage of data. At a global level, Cloud architectures can benefit government to reduce duplicate efforts and increase effective utilization of resources. This in turn helps the government going green, reducing pollution and effective waste management. Enterprises and Small and Medium businesses are already reaping the benefits of cloud by using the pay-as-you-use service model, its massive scalability and ready availability. Since government requires a massive infrastructure it is important for government to use cloud computing on long term basis.

8. HALLENGES OF E-GOVERNANCE AND CLOUD COMPUTING

A number of challenges have limited the reach and impact of e-governance. Several social, economic and political barriers constrain the scope of transformation and restrict the ability of policy makers to make efficient use of new technology.

Several technical challenges like Data scaling, auditing and logging, rolling out new Instances, replication and migration, disaster recovery, policy management, system integration and legacy software, obsolete technologies and migration to new technologies [8]. Cloud computing scales these challenges. Cloud database provides on-demand and high scalabilities which maintain large number of records which is primary need in government. Cloud provides ability to audit event, log and report information on per-tenant and application basis which detect frauds and corruption in government organizations. It can help in building and placing defense mechanisms to enhance the security, thereby making the applications reliable and available [8]. Effortless replication and migration of applications, virtualization technologies can be possible with cloud which is beneficial in disaster recovery and reduce deployment time for new application instances. The cloud offers tools and technologies that make disaster recovery simple and easy. Cloud offers distributed, virtualized system which is key to implements data center policies with respect to security and application deployment.

9. CLOUDY GOVERNMENT EXAMPLES

9.2 Singapore

Singapore Government currently has a whole-of-government infrastructure (SHINE) to provide shared computing resources to government agencies on an "as-a -service" subscription model. Central G-Cloud is the next-generation infrastructure which will replace SHINE [10].

9.2 Japan

A nation-wide "Kasumigaseki Cloud" is being developed to enable various ministries to collaborate. At the local level, the "Jichitai Cloud" is being built to provide interoperability among local governments [11].

9.3 India

The Jammu & Kashmir state government is the first to adopt Cloud computing for its e-governance services. The government, using the State Data Centers based out of Madhya Pradesh, is provisioning e-governance services such as issuing death or birth certificates and trade licenses through the Cloud. It is using Microsoft's solution to implement Cloud computing. The governments of Himachal Pradesh and Uttaranchal are also in discussions with Microsoft to roll out e-Government services based on the Cloud platform.

10. CONCLUSION

In this paper authors tried to point the game changing phase of e-government that is not only impacting the way providing services are and will be delivered but also the way in which users will use IT. The Cloud promises several benefits in commercial and technical terms. We can get better services than traditional computing with reduced costs with the help of cloud computing. Cloud model will ultimately provide services in a big way not only in IT Cooperates, but in government Information Technology. It is the best option to implement or enhance the government services in education, healthcare and social upliftment of the citizens of the developing countries.

11. APPENDIX

In 2010 rankings in the e-government development index, Europe receives the highest score, followed by the Americas. These are the only two regions above the world average. Africa continues to lag far below the world average, given that most of the world's least developed countries are in this region and they generally lack the financial and human resources to fully implement e-government [12]. The Asian region is slightly above the world average, but the Republic of Korea is the exception, as it stands at the top.

2010 top 20 e-government

Rank	Country	E-government development index value
1	Republic of Korea	0.8785
2	United States	0.8510
3	Canada	0.8448
4	United Kingdom	0.8147
5	Netherlands	0.8097
6	Norway	0.8020
7	Denmark	0.7872
8	Australia	0.7863
9	Spain	0.7516
10	France	0.7510
11	Singapore	0.7476
12	Sweden	0.7474
13	Bahrain	0.7363
14	New Zealand	0.7311
15	Germany	0.7309
16	Belgium	0.7225
17	Japan	0.7152
18	Switzerland	0.7136
19	Finland	0.6967
20	Estonia	0.6965

ACKNOWLEDGEMENT

Authors are thankful to **Dr. Krishan Saluja** for the discussion on some important points and his precious time.

REFERENCES

- [1] World Bank Website (2005) Definition of E-Government, <http://www1.worldbank.org/publicsector/egov/definition.htm>.
- [2] 2011 Waseda University World e-Government Ranking, http://www.waseda.jp/eng/news10/110114_egov.html
- [3] National Institute of Standards and Technology (NIST), US Federal Cloud Computing Initiative RFQ (GSA). U.S. government (2009).
- [4] N. Leavitt, "Is Cloud Computing Really Ready for Prime Time," J. of ACM, vol.42, issue 1, pp. 15-20,2009.
- [5] L.Youseff, M.Botrico, and D. D Silva, "Towards a unified Ontology of Cloud Computing," Proc. Of Grid Computing Enviornments Workshop 2008.
- [6] www.wikipedia.com.
- [7] International Journal of Web & Semantic Technology (IJWesT), Vol 1, Num 1, January 2010.
- [8] "The Cloud Changing the Business Ecosystem", kpmg.com/in.
- [9] <http://www.egov.gov.sg/egov-programmes/programmes-by-government/cloud-computing-for-government>.
- [10] A. tripathi, B. Parihar, "E-governance challenges and cloud benefit", VSRD International Journal of CS & IT Vol. 1 (1), 2011 Page 34 of 35.
- [11] "Cloud Computing for E-Governance" A white paper, IIIT Hyderabad, India.
- [12] United Nations of E-government Survey2010, chapter 4.