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An Analysis upon the Use of Cloud Computing Environment for Designing of Governance Model

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Abstract – Over the past years, many businesses, government and individuals have been started to adopt the internet and web-based technologies in their works to take benefits of costs reduction and better utilization of existing resources. The cloud computing is a new way of computing which aims to provide better communication style and storage resources in a safe environment via the internet platform. The E-governments around the world are facing the continued budget challenges and increasing in the size of their computational data so that they need to find ways to deliver their services to citizens as economically as possible without compromising the achievement of desired outcomes. Considering E-government is one of the sectors that is trying to provide services via the internet so the cloud computing can be a suitable model for implementing E-government architecture to improve E-government efficiency and user satisfaction.

Information and communication technology (ICT) is an emerging era of present decade and playing a vital role for the advancement of our global society. As the popularity of ICT enabled application is increasing E-Governance has been established as a revolution not only in developed country but also in developing nations. E-Governance is a way to achieve good governance through ICT in order to have better citizen participation. The sole aim of E-Governance is to establish strong and transparent relationship between citizens, government organization and business organization so that a faith could be developed among all. This could also ensure improved services, optimized Government process and an ideal democratic environment for government operations. The cloud computing is a vibrant application development which provide solution for all E-Governance infrastructure development at lower cost and less time requirements.

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INTRODUCTION

Information and communication technology (ICT) is an emerging era of present decade and playing a vital role for the advancement of our global society for getting timely information and making communication faster. As the popularity of ICT enabled application is increasing, E-Governance has been established as a revolution not only in developed countries but also in developing nations. So E-Governance is the necessity of time for not only in developed countries but also developing nations. As internet reachability increases, demand of E-Governance is also increases. So, E-Governance is an essential requirement to any nation for providing better citizens participation and intergovernmental relationship. The sole aim of E-Governance is to establish strong and transparent relationship between citizens, government organization and business organization so that a faith could be developed among all. Selection of technology for E-Governance is a critical task because of ever increasing demand of cost, security; reliability and confidentiality are associated with E-Governance. The cloud computing is a vibrant application development which provides solution for all E-Governance infrastructure development at lower cost and less time requirements.

E-Governance has the ability to achieve the required efficiency and transparency. E-Governance supported by ICT's like internet, local area networks, PDA, mobiles, tablets promise high delivery speed, efficiency, and improved public services. We can say this all leads to good governance.

E-Governance is rapidly finding favor with government across the world. Keeping up with the external pace of e-Governance adoption, India has not been late to roll out National e-Governance Plan (NeGP) (Tripathi, 2011). In the past few decades, e-government has been considered "a powerful enabling tool" (Bhatnagar, 2004). that has aided governments in utilizing information and communication technologies (ICTs) in achieving

administrative reform goals to save operational costs for themselves and the transaction cost for citizens and businesses.

We also know that India is a vast country in terms of area and population, government can hope to reach the higher number of population with internet enabled services. E-Governance has been proven itself as an important tool for transformation of information. Large number of projects has been undertaken in India in last decade. E-government service development is contributing positively to the fight against corruption, administration reform and improving business environment competitiveness.

Enabling e-Governance is also necessary because it enable the government and the people of the country to become more usable towards the new technology. This implementation bridge the gap between developed and developing countries. Therefore, e-government is no longer just an option but a necessity for countries aiming for better governance (C. R. Kothari (2004).

We are hereby proposed the model of e-Governance based on cloud computing. Cloud computing has the capabilities to offer solution for e-Governance. Cloud computing provides service oriented architecture without and security compromises. It provides excellent environment to host e-Governance services. Currently (when this study begins) there are quite a few approaches (that do have very limited scope) or initiative that provide the details for implementing cloud in e-Governance in country like India.

In this research we analyze various aspects of cloud computing and its use in e-Governance. We also identify the advantages and disadvantages of cloud based architecture.

Cloud computing offers three delivery models SaaS, PaaS & IaaS and four deployment models i.e. public cloud, private cloud, hybrid cloud and community cloud (Cloud Computing for E-Governance, 2010).

In this research work we proposed the model for all these delivery models with e-governance integration. We also study the pros and cons of all these delivery and deployment models and then propose the models for all channels.

Various e-Governance service delivery channels like G2C, G2B, and G2G are also studied and their implementation through cloud computing is suggested in the research. Limitation of e-Governance and their cloud solutions has been studied and discussed in the study.

Indian Government is come up with NeGP (National e-Governance plan) for successful implementation of e-Governance. This NeGP plan comprises of various entities like SDC (State Data Centres), CSC (Common Service Centre), SWAN (State Wide area Network), NSDG (National e-Governance Service Delivery Gateway) etc. We also study in detail the above mentioned framework and also integrate it with our cloud based framework. This framework provides the necessary infrastructure needed for the cloud computing framework.

Security is the main concern of any government services. Huge number of users, their trusts etc are also some of the concern seen in e-Governance service delivery models. Cloud came up with the advantage over this difficulties/concern. Our main focus in this research is to analyze the issues in e-Governance and their cloud counterpart's advantages.

E-GOVERNANCE

E-Governance provides an automation of all government functionalities and enhances organizational efficiency and citizen participation. (Bhatnagar, 2004). The effective e-governance involves e-governance requirements and components of the e-governance. These terms are explored below.

E-Governance Requirements -

E-Governance provides a way to improve government work and make easy sharing of information with the citizens. For practical implementation of E-Governance it is important to identify certain factors which are going to play key role during deployment of E-Governance.

The e-governance requirements are divided into three parts for proper investigation which is shown in fig 1:

1. **Government to Government:** The need of government to government functionality is fully related to administration, inter government control and monitor on the government. It focuses on the inter communication between two governments and other aspects of the government to government communication.

2. **Government to Business:** Business organizations are important for any country and contributing substantially for the development. Government also keep an eye on these organization for enforcing the policies ,standards and accountability .here it essentially required to automate government to business interaction such as tender management, contract management ,tax payments etc.

3. **Government to Citizen:** Basically, the prime responsibility of any government is citizen

service. Government to citizens interface is required to facilitate them basic emanates, proper education, health care and a quality life. A single window government solution could help to achieve citizens satisfaction required in E-Governance. Fig 1 is representing the typical requirement of E-Governance.

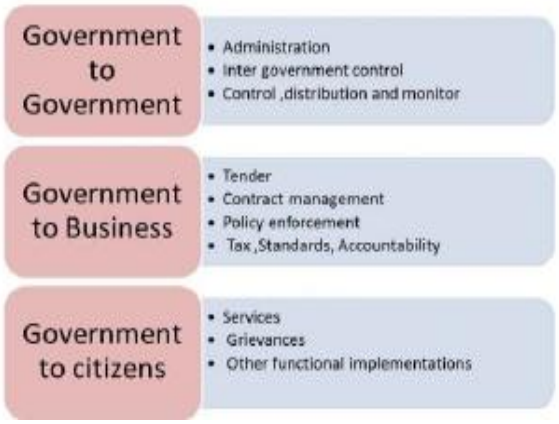

Figure 1: Typical requirements of e-governance.

Cloud Based Architecture of E-governance-

Cloud computing model can offer an easy means of achieving the unified application model across all local government entities with multi-tenancy. To achieve an optimal or suboptimal allocation for immediate cloud services, the cloud environment with security is the best option. Cloud computing is cheaper than other computing models; zero maintenance cost is involved since the service provider is responsible for the availability of services and clients are free from maintenance and management problems of the resource machines, so organizations do not need to pay for and look after their internal IT solutions. Moreover, it is characterized by:

1. A distributed system where applications are stored in a cloud of decentralized servers that can be reached through an Internet connection and a Web browser.

2. A strong extensibility at the applications, platforms and infrastructures levels.

3. The resources offered by the cloud can be dynamically assigned according to the need.

4. A strong tolerance when one or several resources breakdown.

5. A business models where customers pay according to the resources used.

RELATIONSHIP BETWEEN E-GOVERNMENT AND CLOUD COMPUTING

Cloud computing is used to help the E-governments in providing best possible services to its stockholders i.e. citizens and businesses, and to reduce the costs by reducing repetitive operations and increase the effective use of resources, in the global arena.

Some agencies in Australia seek for innovative ways to deliver government services and want to rationalize their ICT asset so they commenced small pilots to evaluate the potential of application, platforms and infrastructure cloud computing.

In 2011 the UK government published its ICT strategy which covered the cloud computing and involved reducing ICT costs for governments, optimizing the use of data center infrastructure, and increasing public sector agility [36] using G-Cloud(Government Cloud).

While Kuwait cloud computing was established in 2006 and has achieved several projects involving data infrastructure which are needed to develop E-government that incorporates relevant official bodies. It established a data network that links over 56 governmental bodies, sharing electronic documents and data at a very high speed where the aim of using cloud computing is for easy data recalling and storage.

Cloud computing technologies have many benefits in different parts of E-government. These benefits discussed in the following points.

1) Scalability: Cloud computing resources such as CPU, servers, hard drives can be purchased automatically in any quantity at any time to fit growing number of users.

2) Availability and Accessibility: cloud computing applications and information are hosted online therefore it has high availability and citizens can use them at any time and from anywhere.

3) Cost Saving: cloud computing systems do not need to purchase and install the ICT equipments and software on their own building.

4) Backup and Recovery: Since all the data is stored in the cloud, backing it up and restoring is much simpler than traditional way.

5) Unlimited Storage. Storing information in the cloud gives you almost unlimited storage capacity.

6) Green technology: Cloud computing is relatively good in energy consumption and provides eco-systems through virtual services.

Due to cloud computing benefits as mentioned above, many countries have launched E-governance services using cloud computing.

Although cloud computing offers a lot of advantages to E-government , several issues and challenges need to be targeted or to be met when applying cloud computing.

The main issues and challenges for adopting cloud computing for the E-government are:

1) Security and privacy: Security requirements must be fulfilled on several layers where the Implementation of cloud computing includes advanced security technologies.

2) Data protection and compliance: some data protection regulations do not allow the storage of sensitive data in other countries, which is basically not accomplished by most cloud service providers.

3) Interoperability and data portability: There is a lack of standards when using and implementing cloud computing services. Users should be able to change between cloud service providers with a minimum of risk and cost, so governments may need to adopt open standards policies for the cloud [54]. Many governments decided to use ICT systems that consistent to open standards in order to save the cost or that can take place when using nonstandard systems.

4) Identity and access management: As cloud computing services relies completely on the availability and speed of the Internet as a carrier between consumer and service provider, speed and availability will be an issue [53].

5) Auditing: Cloud providers currently do not offer detailed auditing possibilities where the auditing becomes essential in situations where compliance to specific regulations or policies must be verified.

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 (Gordon & Petre, 2006). Some Arab governments have developed modern suite of laws which strongly facilitate and support cloud computing. For example, Saudi Arabia put comprehensive privacy legislation besides intellectual property laws that are relevant to cloud computing.

LITERATURE REVIEW

"The term "cloud computing" has at its core a single element: computing services are delivered over the Internet, on demand, from a remote location, rather than residing on one's own desktop, laptop, mobile device, or even on an organization's servers. For an organization, this would mean that, for a set or variable, usage-based fee—or even possibly for free—it would contract with a provider to deliver applications, computing power, and storage via the web." (David C. Wyld 2009)

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." (L. Youseff, M.Botrico, and D. D Silva 2008) (Bhatnagar, 2004).

Cloud computing is a model for enabling ubiquitous, 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 (C. R. Kothari (2004).

Cloud is used as an umbrella term to describe a category of sophisticated on-demand computing services offered by some commercial providers. It denotes a model on which a computing infrastructure is viewed as a "cloud," from which businesses and individuals access applications from anywhere in the world on demand (David, 2009).

Cloud computing refers both hardware and applications, which are being delivered through services. These services are distributed through three delivery model as Software as a Service (SaaS), Platform as a Service (Paas) & Infrastructure as a Service (Iaas).

Cloud is a combination of hardware and software. When we made these clouds as pay-as-you-go manner then it is called public cloud. If we have internal data-centers then it called private cloud and it is not available for public.

E-Governance is a new word used to refer to the use of information and communication technology to provide and improve government services,

transactions and interactions with citizens, businesses, and other arms of government.

E-Governance (short for electronic governance, also known as e-government, digital government, online government or transformational government) is a diffused neologism used to refer to the use of information and communication technology to provide and improve government services, transactions and interactions with citizens, businesses, and other arms of government.

Governance refers to the exercise of political, economic and administrative authority in the management of a country's affairs, including citizens' articulation of their interests and exercise of their legal rights and obligations. E-Governance may be understood as the performance of this Governance via the electronic medium in order to facilitate an efficient, speedy and transparent process of disseminating information to the public, and other agencies, and for performing government administration activities." (UNESCO definition of e-Governance).

The use by the Government of web-based Internet applications and other information technologies, combined with processes that implement these technologies, to- (A) Enhance the access to and delivery of Government information and services to the public, other agencies, and other Government entities; or (B) Bring about improvements in Government operations that may include effectiveness, efficiency, service quality, or transformation". (The US E-Government Act of 2002 defines electronic Government).

In the past few years e-governance has aided government in utilizing ICT (information and communication technologies) in achieving administrative reform goals to save operational costs for themselves and the transaction cost for citizens and businesses.

In general one can think e-governance as the application of electronic media in-between government and the citizen for better interaction. But e-governance is not just about improving communication between government and citizens, it is also about blending ICT with administrative reforms to make government more effective, cut-down cost and increase transparency on how govt. department works.

E- Governance is facing some challenges and cloud provides the way to cope up with these challenges. So here we provide the challenges and their removal process as described by cloud.

- **Data Scaling:** As we know the e-Governance projects deals with the huge amount of data (of citizens), so, the option of scaling of databases according to the data should be there. Cloud databases support high-end scalability and also distributed scalability. These databases can be used for on-demand scalability of e-Governance applications.

- **Auditing and logging:** In e-Governance services tracing is required at periodic interval. Information Technology Services can be used for controlling corruption in Government Departments. Regular Audits (process as well as security audits) must be done to ensure high security of the system.

Cloud can make audit process easier by analyzing huge amount of data and detecting any fraud. With the help of cloud a defense mechanism can be developed to enhance the security.

- **Rolling out new Instances, Replication and Migration:** Government works at different levels to provide services to its citizens. Therefore e-Governance applications should be present at different levels of Government (departments, states, cities, districts and municipalities etc.). A project in a district can be applied for other district also by creating its replication. So, all e-Governance application should have this option available. Cloud offers excellent architecture to support the feature of Replication, new Instances and Migration.

- **Disaster Recovery:** Natural disasters like floods, earthquakes, wars and internal disturbances could cause the E-Governance applications not only loose data, but also make services unavailable. Cloud virtualization technologies give the facilities of backups and restoring. It also gives such application and facilities by which migration and disaster recovery becomes possible.

- **Performance and Scalability:** Commonly e-Governance technologies are required to meet the growing numbers and demand of citizens. If implemented, the E-Governance portals could become the biggest users and beneficiaries of Information Technology. Scalability is inbuilt in Cloud Architecture. E-Governance applications can be scaled to larger extent with the help of Cloud.

- **Reporting and Intelligence (Better governance):** Various factors like data center usage; peak load hours, consumption level, power usage etc. are to be monitored for the better utilization of resources.

Different services provided by the Government can become better and citizen friendly if they can be visualized properly. Different frameworks like MapReduce (Apache Hadoop) can process large dataset available on clusters of computers. Cloud computing offers easy integration with these types of frameworks.

- **Policy management:** Government has certain policies in terms of dealing with citizens. E-Governance also adheres to these policies. Along with the infrastructure and data center, policies have to be enforced for day to day operations. Cloud helps in implementing these policies in data centers. Policies like securities, application deployment etc. are too applied on data centers seamlessly.

- **Systems Integration and Legacy Software:** The main advantage of e-Governance can be the data sharing between different applications. This shared data can be used for different purposes in the Government. The information technology empowers e-Governance in co-relating data across application and share messages across different systems for the betterment of the end user (citizen). Service Oriented Architecture (SOA) of Cloud provides awesome solution for integration of various applications. Also, the applications which are already built can be easily moved onto cloud.

- **Obsolete Technologies and Migration to New Technologies:** Software and platforms becomes obsolete on the arrival of their newer versions. Moving to newer version of software is never an easy task, lots of security patches exist in between the shifting, which must be dealt with great care. Cloud deal with this requirement very effectively. The different versions of software exist in parallel at the same time. Firstly, the versions are tested and then the application can be migrated into the newer one.

- **Going Green:** E-Governance provides facilities to the citizen to the root level. Therefore, large data centers and massive hardware support are to be provided by the Government to fulfill the need of large number of citizens. The power usage, air-conditioning and electronic waste could create bio-hazard. An AT&T-sponsored report from research firm Verdantix announced that cloud computing could allow companies to save an estimated $12.3 billion off their energy bills, annually. This energy savings would directly translate into carbon emission savings of 85.7 million metric tons per year by 2020 (NIST).

METHODOLOGY

Research Problem is systematically solved by Research Methodology. It may be understood as a science of studying how research is done scientifically. Researcher adopts various steps in studying his research problem and these steps are studied in the Research Methodology. It is necessary for the researcher to know not only the research methods/techniques but also the methodology (Cloud Computing for E-Governance, 2010).

Quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity (Cloud Computing for E-Governance, 2010).

Qualitative research, on the other hand, is concerned with qualitative phenomenon, i.e., phenomena relating to or involving quality or kind (Cloud Computing for E-Governance, 2010).

Online surveys and qualitative interviews are conducted by us in order to find the current state and concern of Cloud computing in e-Governance. This is necessary to determine for the study rather than using predetermined information from the literature or rely on results from other research studies.

METHODS OF DATA COLLECTION-

There are usually two kinds of research data one is primary and other is secondary.

a) **Primary data:** Primary data is the data that is usually collected by the researcher for the first time. This data is the fresh one which collected for the first time, and thus happen to be original. In this research primary data is collected by conducting online surveys. It also shows the originality and new findings.

b) **Secondary Data:** Secondary data is the data that is already been collected by someone else. Research books, reports, journal articles and websites of reliable authors and organizations are the sources of secondary data.

Author has collected secondary data from various sources and presented a detailed study in chapter 2 (Literature review).

INTERVIEWS -

Interviewing is a technique used to understand the experiences of others, and is a method for conducting qualitative research (Dwivedi, Bharti, 2010). The main task is to understand interviewees. The interviewing is most effective when the goal of said research is to

gain insight into the subjective understanding (Dwivedi, Bharti, 2010). of those around us.

Interviews can be further classified as:

- Structured Interviews
- Unstructured Interviews
- Semi-Structured Interviews

The Structured Interview is useful when looking for very specific information. The benefits are that it keeps the data concise and reduces researcher bias.

The Unstructured Interview is best used when researchers want to find as much information as possible about their topic. The benefit is that unstructured interviews often uncover information that would not have been exposed using structured or semi-structured interviews.

The Semi-Structured Interview is most useful while researchers using this type are expected to cover every question in the protocol. The benefits include the ability to gain rapport and participants' trust, as well as a deeper understanding of responses. Data sets obtained using this style will larger than those with structured interviews.

Semi-structured interview can also be defined as a technique where there are some predetermined topics and questions along with some space for the interesting topics from their side (Soleimanian, Hashemi, 2012).

CONCLUSION

Cloud provides a better way to offer services to clients related to different regions. Cloud follow service oriented architecture and provide low cost hardware/software resources. E-governance could use both service oriented architecture and cloud architecture and can provide services to citizens and governments at low operating cost. In this paper, a novel cloud computing based E-Governance model has been presented .A SWOT analysis is also performed to highlight the strength and challenges of the proposed model.

We found that the in India cloud is in its infancy stage. Present scenario in India is forcing the Cloud to be adopted in e-Governance despite some of its drawbacks. Lots of public/private organizations are moving to cloud because of its benefits like cost reduction, data storage, scalability, speed, sharing of resources etc.

There are some issues also in adopting cloud and security is the main concern. We have proposed the cloud architecture of e-Governance with hybrid deployment model, which secure the sensitive data and other government information at private end (government own infrastructure) and provide a safer side of using cloud.

REFERENCES

Bhatnagar, S.C. (2004). E-government: from vision to implementation; a practical guide with case studies. New Delhi : London : Sage Publications.

C. R. Kothari (2004). ”Research Methodology, Methods and Techniques”, Copyright © 2004, 1990, 1985, New Age International (P) Ltd., Published by New Age International (P) Ltd., Publishers, ISBN (13) : 978-81-224-268-1

Cloud Computing for E-Governance (2010). A White Paper, IIIT Hyderabad, January 2010 , http://search.iiit.ac.in/uploads/CloudComputingForEGovernance.pdf

David C. Wyld (2009). Robert Maurin Professor of Management and Director of the Strategic e-Commerce/e-Government Initiative, Southeastern Louisiana University, “Moving to the Cloud: An Introduction to Cloud Computing in Government”, Copyright © 2009 by IBM

Dr. Sanjay Kumar Dwivedi, Ajay Kumar Bharti (2010). “E-governance in india – problems and acceptability”, Journal of Theoretical and Applied Information Technology, © 2005 - 2010 JATIT & LLS. All rights reserved.

F. Soleimanian, S. Hashemi (2012). "Security Challenges in Cloud Computing with More Emphasis onTrust and Privacy", international journal of scientific & technology research, 1(6), pp. 49-54.

Gordon, R., & Petre. M. (2006). A Gentle Guide to Research Methods in Open University press. England, Edition-1, Berkshire: McGraw-Hill Companies, Retrieved from http://www.mcgraw hill.co.uk/html/0335219276.html

Gupta, M.P., Jana, D., (2003). E-Government evaluation: a framework and case study. Government Information Quarterly 20, 365–387.

Hashemi, S., Monfaredi, K., Masdari, M. (2013). Using Cloud Computing for E-Government: Challenges and Benefits, World Academy of Science, Engineering and Technology, International Science Index 81, International Journal of Information Science and Engineering, 7(9), pp. 987 – 995.

L. Youseff, M. Botrico, and D. D Silva (2008). Towards a unified Ontology of Cloud Computing, Proc. Of Grid Computing Enviornments Workshop.

National Institute of Standards and Technology (NIST) Definition of Cloud Computing, http://csrc.nist.gov/groups/SNS/cloud computing/

Naveen Tewari and M. K. Sharma (2011). "Towards e-Governance Framework in INDIA using Cloud Computing", Proceedings of the 5th National Conference; INDIACom-2011

Nilotpal et al. (2013). International Journal of Advanced Research in Computer Science and Software Engineering 3(2), February - 2013, pp. 73-77

NIST, Mell, P. & Grance, T. (2011). The NIST Definition of Cloud Computing, 2011. p.2 at http://csrc.nist.gov/publications/nistpubs/800-45/SP800-145.pdf.

Rajkumar Buyya, James Broberg, Andrzej Goscinski (2011). "Cloud computing : principles and paradigms", Copyright © 2011 by John Wiley & Sons, Inc, ISBN 978-0-470-88799-8

Reed, L.E. (1998). "Performing a literature review", Frontiers in Education Conference, 1998. FIE '98. 28th Annual, vol.1, no., pp. 380 383.

S. Prem Kumar (2010). "E-Governance Applications for citizens- Issues and Framework", (IJCSE) International Journal on Computer Science and Engineering Vol. 02, No. 07, pp. 2362-2365.

Seidman I. (1998). "Interviewing as qualitative research: A guide for researchers in education and the social sciences". New York, NY: Teachers College Press.

Tripathi, B. Parihar (2011). "E-governance challenges and cloud benefit, VSRD International Journal of CS & IT Vol. 1 (1), pp. 29-35.

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