Towards e-Governance Framework in India using Cloud Computing

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ABSTRACT

Cloud computing is the future of next generation of computing. It is an innovative and emerging concept in the field of computing. The collective, shared and integrated nature of Software, Hardware and Network is known as the Cloud. The subject of cloud computing is currently in the very early stages of development and there is a lot of scope to do research in this area. In this paper, we analyze cloud computing and examine its application in the context of e-Governance. As existing e-Governance projects in India are facing many challenges, right from the development phase to implementation. We propose use of cloud computing in e-governance model, as a new and ideal solution to face these challenges in the future projects.

In India most of the states are willing to adopt the e-Governance model to offer government services online up to last level, some major barriers are unavailability of required infrastructure, unavailability of e-Governance application, unavailability of trained workforce in IT and unavailability of required funds. They can use the power of cloud computing to offer some urgently required e-Governance services within short time span as described in this paper.

KEYWORDS

Cloud ICT Cloud computing e-Governance IaaS SaaS PaaS Data centers g-Cloud

1. INTRODUCTION

E-Governance is a term 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.\footnote{10} E-Governance signifies innovation in management quality to deliver customer oriented services at low costs in the most effective and efficient way by using:

E=MC\textsuperscript{3}

E= e-Governance,
M = Mass (people),
1st C = Computer,
2nd C = Connectivity,
3rd C = Content/Information \textsuperscript{\footnote{11}}.

E-Governance short for electronic governance, also known as e-government, digital government, online government or transformational government.

1.1 The drawbacks of manual Government are:

- Costs of accessing services, including the number and cost of trips required to complete a service, the amount of bribes paid to complete the service satisfactorily, and the waiting time at the service centre.
- Overall quality of service, rated by a five-point scale, also including questions regarding likely attributes to the quality of service, for example, responsiveness of staff, convenience of office location, office hours and facilities at the service centre.
- Long Queues: At any government service centre there are so many long queues, and the citizens availing the services must go through that. This results in waste of productive time.
- Quality of overall governance, for example, transparency, corruption, fairness of treatment, quality of feedback, and levels of accountability.

2. CLOUD COMPUTING:

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 \cite{14}.

2.1 THREE DELIVERY MODELS OF CLOUD

2.1.1 Software as a Service (SaaS): The consumer uses an application, but does not control the operating system, hardware or network infrastructure on which it’s running.

2.1.2 Platform as a Service (PaaS): The consumer uses a hosting environment for their applications. The consumer controls the applications that run in the environment (and possibly has some degree of control over the hosting environment), but does not control the operating system, hardware or network infrastructure on which they are running. The platform is typically an application framework.

2.1.3 Infrastructure as a Service (IaaS): The consumer uses "fundamental computing resources" such as processing power, storage, networking components or middleware. The consumer can control the operating system, storage, deployed applications and possibly networking components such as firewalls and load balancers, but not the cloud infrastructure beneath them.
2.2 FOUR DEPLOYMENT MODELS

2.2.1. **Public Cloud:** In simple terms, public cloud services are characterized as being available to clients from a third party service provider via the Internet. The term “public” does not always mean free, even though it can be free or fairly inexpensive to use. A public cloud does not mean that a user’s data is publically visible; public cloud vendors typically provide an access control mechanism for their users. Public clouds provide an elastic, cost effective means to deploy solutions.

2.2.2 **Private Cloud:** A private cloud offers many of the benefits of a public cloud computing environment, such as being elastic and service based. The difference between a private cloud and a public cloud is that in a private cloud-based service, data and processes are managed within the organization without the restrictions of network bandwidth, security exposures and legal requirements that using public cloud services might entail. In addition, private cloud services offer the provider and the user greater control of the cloud infrastructure, improving security and resiliency because user access and the networks used are restricted and designated.

2.2.3 **Community Cloud:** A community cloud is controlled and used by a group of organizations that have shared interests, such as specific security requirements or a common mission. The members of the community share access to the data and applications in the cloud.

2.2.4 **Hybrid Cloud:** A hybrid cloud is a combination of a public and private cloud that interoperates. In this model users typically outsource non-business critical information and processing to the public cloud, while keeping business-critical services and data in their control.

3. WHY E-GOVERNANCE THROUGH CLOUD COMPUTING?

**Significant Cost Reduction:** Available at a fraction of the cost of traditional ICT services; upfront capital expenditures eliminated, dramatically reduced ICT administrative burden as you can hire the infrastructure from clouds.

**Increased Flexibility:** On-demand computing across technologies will help us to run specific applications on demand as per our need. For example, users can interact with any ERP application with their own procedures. Business solutions for e-commerce based application that are required in e-procurement type of services can be shared easily, and large group of service providers will be available which will result in reduction of implementation time of the new solution.

**Access anywhere:** Unlike to current scenario of offering government services from a single computer or network, we may use different computers in shared network environment or use portable devices like laptops, notepads, mobile phones, to run applications and documents anywhere.

**Elastic scalability and pay-as-you-go:** We can add and subtract the services and infrastructure support as we need. Pay per use and pay for only services used concepts can be applied.

**Easy to implement:** No need to purchase hardware, software licenses or implementation services. You can start any new service within less time.

**Service quality:** Reliable services, large storage and computing capacity and the users will get 24*7 services and up-time.

**Delegate non-critical applications:** We can outsource non-critical applications to service providers and we may focus on to more business-critical applications.

**Always the latest software:** As updates are automatic we will get the latest software without paying new purchase cost to vendor.

**Sharing documents and group collaboration:** Applications and documents accessible from anywhere in the world, will help in facilitating group collaboration on documents and projects.

**Data Recovery:** Natural disasters like floods, earthquakes, wars and internal disturbances could cause the regular e-Governance applications not only loose data, but also make services unavailable. Multiple installations in geographically separated locations with complete backup and recovery solutions is required as without this we may fall in huge problems. Applications and data must be redundant and should be available on a short notice to switch from one data center to another. Cloud virtualization technologies allow backups and restoring. It offers application migration seamlessly compared to traditional data center.

**Distributed Data Centers:** ICT based e-Governance model have many risks, like attack of viruses, hackers, fire and terrorist some time. Some disasters posses mass destructibility and even intentioned activities after disasters. Distributed data centers provide fault tolerance against such disasters. These centers facilitate robust communication support, self-supervision capability and real visible platform, which will help in e-Governance applications to use and manage.

4. **g-CLOUD**

Almost every country in the world has tried to use or develop the e-government system. Some of them have already implemented and achieved maximum benefits from it. Some of them have just started but many of them have not able to implement it irrespective of good design and master plan. Why is it so? The prime reason is something else. The challenges are as follows:

**Cost:** Cost is one of the prime challenges in e-government system. In many countries service comes after the cost. Especially when the entire world is facing economic crisis, the cost is the big factor. We have to try to get maximum services in minimum cost. Cloud computing can do this [13].

**Expertise:** Various experts are required in e-government system. The role of experts are not only limited during
development phase. It is required throughout the life cycle of e-government system. It is not possible for developing countries to provide these experts all the time and even for developed countries it is not easy [13].

**Maintenance:** In e-government system there are huge involvements of software, hardware, networking, security etc. As per the cyclic nature of e-government life cycle, the replacement and updating of all these software and hardware are very much required and moreover maintaining data centre in every city is very big challenges. In order to meet these challenges, cloud computing can help [13].

**Green ICT:** The use of ICT devices is increasing very rapidly. In e-government system, we can find thousands of PCs, a huge number of sophisticated servers, printers, scanners, digitizers etc in a single organization. Green ICT is environment friendly ICT which has the main goal of reducing the rate of emission of carbon dioxide from ICT tools and preserve the energy. Even though cloud is also collection of computing devices, but number of such devices are very less as compared to the traditional ICT infrastructure. The features of cloud do support in making green ICT [13].

5. **CONCLUSION**

In this paper we discussed how a Cloud could be utilized to provide useful e-Governance. Government services can become more reliable and transparent. The issues pertaining to the realization of Cloud based e-Governance were discussed emphasizing the points like implementation, usability and infrastructure. Current governments should take due steps to build a favorable infrastructure for Clouds. E-Government system requires entities like, software, hardware, service, management, network, business, policy, security etc to survive and function properly. Unfortunately current approaches or technology is insufficient to manage all these entities. Cloud computing which treats all these entities as a service can be used in e-government system.

6. **FUTURE SCOPE**

In future Government can use all the models of cloud computing to offer more complex service like e-commerce, e-procurement etc. The future of cloud computing has to be visible more in coming years and people will learn lessons about the drawbacks of cloud computing like security of data after some time.

**REFERENCES**


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