

## **Prime and Prospective status of cloud computing in E-governance: A Literature Review Approach**

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### **Abstract**

Internet has brought revolution in the manner in which we work, interact and learn. These changes reflects the way government works as an organization, the way one department interact with other department and the citizens and the way government communicates with the institutions, businesses and other governments. It aims to deliver more interactive and transparent services to citizens and other businesses. For this cloud computing is the best fit solution capable of providing services anywhere, anytime to billion people and at lower cost. In this paper we present application types in e-governance, brief introduction to cloud computing, the relationship between cloud computing and e-governance, challenges of e-governance cloud solution to those challenges and introduction of Service Management Systems for cloudy governance.

**Keywords:** E-governance, cloud computing, cloudy governance, government

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### **Introduction**

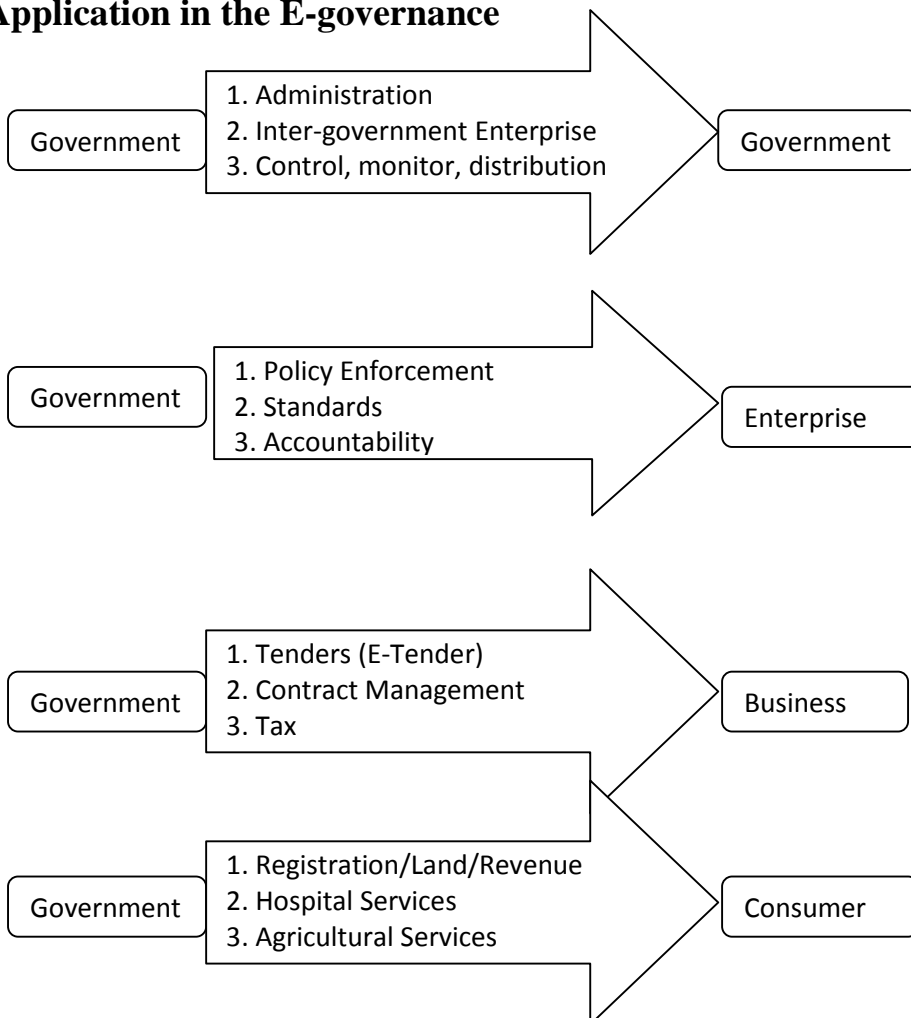
The aim of e-governance is to provide citizen-centric services focussed on the citizen and ensuring increased accountability and transparency in service interactions with the government authorities and departments. Governments at global level are focussing on reduction of manual mode of communications so as to provide reliability, service efficiency and reduction in processing time of workflow scenario (Tripathi & Parihar, 2011). Accessibility to remote areas, user-friendliness and volumes are some of vibrant success factors for any e-governance initiative and government departments at the global level are leveraging the advancement in IT to reduce digital divide and to drive these initiatives. A technology that has the potential to offer solutions for e-governance is cloud computing (Tripathi & Parihar, 2011). Cloud provides access to users based on service orientation without compromising the security. This feature makes cloud an excellent platform to host e-governance services.

Cloud computing has the ability to process large volumes of data using clusters of computers. High volume computation problem can be solved easily and in an appropriate manner with the expansion of cloud computing (Tripathi & Parihar, 2011).

The other benefits of cloud computing are cost reduction, integration and reusability of services (Chanwick & Mary, 2003).

Cloud computing should be employed for e-governance initiatives because of several advantages it offers over traditional model and service levels should be used to measure performance of system (Chanwick & Mary, 2003). If the consideration is number of business processes and services that are there in any governance model, cloud is one of important technology vehicle that could make e-governance projects a reality, take it to remotest areas and sustain them for long term

**Application in the E-governance**



**Figure1: Type of E-governance applications**

The categories of E-governance applications are:

**1. Government to Government (G2G):** It includes all types of interactions which occur between one government and other government e.g. in a democratic country like India between Central government and state government or UT administration. It

includes transaction taking place between the departments and authorities of one government and authorities and departments of other government. In this case frequent message passing also occurs between the departments.

**2. Government to Enterprise (G2E):** It includes all sorts of interactions between government departments, authorities and the public sector enterprises like State Electricity corporation, State water Board and Municipalities. These enterprises are actually controlled and regulated by the governments. The prime challenges in these interactions are policy enforcements, security and accountability.

**3. Government to Business (G2B):** It includes all types of interactions between the government and the business organisations e.g. in terms of collection of taxes, contract management which takes place in the workflow of government policy implementation and other works.

**4. Government to Consumer (G2C):** These are those interactions which occur when the government is providing its services to consumer or citizen. The services vary from a simple request resolution to starting a workflow related scenarios.

## Cloud Computing

Cloud computing have various definitions which some have been looked upon here. The definition of the national institute of standard and technology of America is as follows: "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." (Vats & Sharma, 2012). On other common & acceptable definition is "A very exact scalable instrument, capable of technology-enabled service, which is available easily on the internet when needed." (Vats & Sharma, 2012).

A cloud has three important characteristics which are Firstly, resource usage is on demand and billed at actual consumption. Secondly, scalability that can tackle traffic bursts. Thirdly, accessed over the internet. Cloud presents a dramatic variation from traditional infrastructure hosting which is done within the customer premises.

Cloud Computing has various types like Public, private and hybrid cloud whose categorization is based on the manner and the location in which the IT infrastructure is setup and the manner in which the IT resources are accessed. Based on the services provided variant of cloud computing model is IaaS (Infrastructure as a service), PaaS (Platform as a service) and SaaS (Software as a service). For e-governance a suitable combination model can be selected based on actual requirements.

## Cloud Computing & E-governance

An e-governance system can only be successful if it is reliable, cost-effective and easy to maintain. The two main trends constantly evolving in sphere of IT and influencing e-governance are: Firstly, Advancement of technology of IT resources, platforms and simultaneously becoming cheaper. Secondly, Enhancement of expertise of knack of citizens. These two trends open the opportunity of implementation of cloud in public and private sector. The private sector has already seen the emergence e-commerce, e-business in last decade and its tremendous success which has changed the life of citizens. Governments can build upon this opportunity and provide efficient and prompt services to citizens who live in remotest of areas.

Government can use e-governance as a tool for planning, operationalization and evaluation of development tasks in country. This can be possible by realistic evaluation of ground situation of country, BI assisted decision making, policy formulation and implementation and by accurately noting of the actual results of government policies and projects. These activities require the use of IT resources and implementation of IT infrastructure. Here cloud pitches in and provides interoperability between different government departments, reduces duplication of tasks, tracks the policy and project results. Cloud can also help in providing transparency in e-governance and bridge the communication divide between government and the billion people of our country. E-governance powered by cloud can have integration management with automated problem resolution, end to end security management and budget optimization on actual usage of data.

If we talk about the cloud utilization for governance at the global level then cloud can bring revolution in sharing of information, decision making, reduction in pollution and in power consumption. Cloud will provide mobility to the citizens who can make use of e-governance services anytime, anywhere around the globe. The government should plan and implement the projects of e-governance so that the entire population of the country gets benefitted by advantages of cloud. At the global level BRICS, G-20, G-8, developed and developing countries should collaborate to tackle global environmental issues using cloud.

### **Challenges of E-governance & Cloud Benefits**

<b><u>E-governance challenges</u></b>	<b><u>Cloud Solutions</u></b>
1.Data Scaling	Cloud databases available for deployment offer unprecedented level of scaling without compromising on the performance. It helps in achieving distributed scalability.
2.Auditing & Logging	Cloud helps in fraud detection and analysis of large volume of data. It helps in making application reliable and available by assisting in building robust security defence



	mechanisms.
3.Rolling out new instances, Replication and Migration	Cloud compresses time to deploy new instances of applications.
4.Disaster Recovery	Cloud virtualization technologies allow backup and restoring and offer seamless migration which is incomparable.
5.Performance & Scalability	Cloud allows scaling of e-governance applications both horizontally and vertically.
6.Reporting & Intelligence	Cloud offers better BI infrastructure because of its size and additional capabilities. Applications can mine huge collection of Real-time and historic data to offer excellent services.
7.Policy Management	With Cloud architectures security policy and deployment policy can be enforced effectively.
8.System Integration & Legacy Software	Cloud being built on SOA offers excellent solutions and services for system integration and makes moving of application to cloud very easy.
9.Obsolete technologies and migration to new technologies	In cloud different versions and releases of software at the same time can co-exist and also co-located. After testing these can be migrated to production environment with great ease.
10.Going Green	Cloud solution optimizes power usage, air conditioning and electronic waste and pollution due to data centres by offering centralized infrastructure.

### **Cloudy Future: SMS initiative in E-governance**

SMS here stands for Service Management System. The future of e-governance will be secured by implementation of Service Management Systems using Cloud. A service management system provides the visibility, control and automation needed for efficient cloud delivery in implementations. SMS using cloud offers following benefits over traditional infrastructure:

1. Reduced Costs.
2. Improved Service delivery to citizens.
3. Automated virtual infrastructure for peak performance.

4. Increased productivity of system administrator.
5. Provisioning which enables policies to lower cost.

Also a performance metrics that is key to the success of e-governance is service levels. In manual form of government transaction service levels are not measured often but in electronic form using service management system with cloud service levels, are to be published upfront for tracing and tracking. An example can be service catalog in SMS using cloud. This also drives standardization of hardware, software, platform and storage which in turn avoids unexpected problems. Hence Service levels in automated and cloud environment will be better than manual or traditional mode. Thus the future e-governance projects should utilize a service management system using cloud and serve the government needs and citizen requirements in a better and efficient manner. This solution is environment friendly as well as promising social impact on the society by providing accurate and transparent informational services to the remotest of the citizens.

## **Conclusion**

This research presents the basic application types of e-governance. It provides insight into challenges and issues faced by e-governance by usage of traditional model of IT solutions. It suggests the possible solutions which are provided by the cloud computing which solve the challenges and issues faced by e-governance. It also highlights the role of cloud computing in implementation of e-governance. It also mentions in brief about the cloudy future and the proposed Service Management System using cloud initiative in e-governance. The service management system using cloud will play a game changing role in future. Service orientation covers entire consumer process and enables applications to be used in more integrated and compounded fashion. Since speed and transparency are main objectives of e-governance, they have to be monitored and measured. This is possible only with implementation of service management system using cloud. Thus the future e-governance projects should utilize a service management system using cloud and serve the government needs and citizen requirements in a better and efficient manner.

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