

A Common Entrance for E-Governance using Cloud

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Abstract — At a glance E-Governance is gateway to avail all government services. India is a country which is well known leader in Information Technology area but government itself has put forth a very limited approach where every government department has separate IT projects for citizens. Such limited view cannot optimum the benefits from E-governance initiatives taken so far. This paper shows a conceptual framework to implement the E-governance using cloud technology. This paper also highlights various types of cloud services and its exact implementation required for E-governance. Almost all its Benefits and challenging issues which may arise in cloud bases E-governance are studied and presented.

Keywords—E-Governance, Cloud Computing, SAAS, private cloud, public cloud, hybrid cloud, E-Governance Development Index.

I. INTRODUCTION

The word governance came from a Greek word, kebernon, which means to steer. At present, to govern means to steer or to control something. The governance is a process of power for controlling social systems. It is also an exercise through which organizations are controlled, directed. E-governance is the application of information & communication technologies to reform the way of Government work, share information, engage people and provide services to clients. In other words E-governance is implementation and delivery of required government services through information communication technology to provide transparent and effective governance to a common man. E-Governance has very efficient role in development of nation. A per Economist Intelligence Unit (EIU), e-readiness index of India is low. E-Governance improves delivery of existing services to country citizens. It helps the government more efficient and effective.

II. E-GOVERNANCE : THE PAST AND PRESENT

The origin of E-Governance in India started during the seventies with the focus on development of applications in the area of defense, economic monitoring, tax administration etc with the establishment of Department of Electronics. The first major step towards E-Governance was National Informatics Centre (NIC). NIC set a good path for information and communication. At last but not least in 1987, NiCNET provided a better runway for e-Governance through national satellite-based computer network. NiCNET was a program to computerize all district offices of the country. To bring the computerization, free hardware and

software was offered to the State Governments. NiCNET was extended to all district head quarters in 1990. [3]

E-governance is not only popular in India but also worldwide. Countries like UK, USA, New Zealand, and Brazil are also in the race of E-governance implementation. From last decade, there have been e-governance initiatives in the country at national, state and district level. Some of these are truly successful and are implemented across country. Some of those are not successful. E-governance is almost implemented in every field. Its existence is from urban to rural and from politics to education field. From a common man to a businessman is totally dependent on E-governance.

III. FOUR PILLARS OF E-GOVERNANCE

Mainly, there are four pillars of E-Governance-

1. **CONNECTIVITY:** All are dependent on internet. Connectivity is required to connect the people to the services provided by the government. There must be strong connectivity to make effective E-governance.
2. **DATA CONTENT:** The database plays very important role while E-governance implementation over the internet. This database should have security constraints provided by the admin due to fear of loss of important data.
3. **KNOWLEDGE:** Knowledge refers to the term IT knowledge. Government should have skilled employees to handle E-governance in an efficient way. These employees should have capable to handle fault if any which may arise in implementation stage.
4. **CAPITAL:** Capital refers to the term money. It can be public, private or partnership.

IV. E-GOVERNANCE MODELS

E-Governance services are utilized and distributed to citizens, businessmen and government employees by the use of following models-

1. **Government to government (G2G):** It includes various functions between one government to another state government. Many times, finance and budget work is executed through this one.
2. **Government to employee (G2E):** This model increases the transparency between government employee and government. Here, employee keep track on government functioning and vice-versa. Employee can also file all types of complaints through this model.
3. **Government to business (G2B):** This model increases and make bond strong between government and

businessmen. Collection of taxes, approval or rejection of any patent is shared through this model.

- Government to Citizens (G2C): This model makes a strong bond between government and country citizen. It provides various services and goods to fulfill the need of a citizen. Services such as payment of water, telephone and water bills are provided by this model. Detail of land record can be searched by such model.

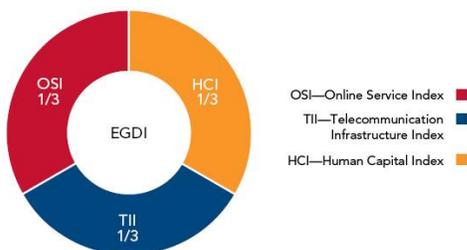
Table 1: E-Governance Projects in India

State	Projects Implemented through E-Governance
Andhra Pradesh	CARD, e-Seva, FAST, e-Cops, Saukaryam, VOICE, Prajvani
Bihar	Sales Tax Administration System, Chetana (Disaster Management System)
Chhattisgarh	Treasury Office, E-linking Project
Delhi	RCS Website, Vehicle tracking system
Goa	Project Dharani
Gujarat	G R book online, Mahiti Shakti, Census online, Tendor Notice, E-Dhara, E- Jan Sampark
Haryana	Nai Disha
Himachal Pradesh	Lok Mitra
Karnataka	Kaveri, Khajane, Bhoomi, CASCET
Kerala	RDNet, FRIENDS, e-Srinkhala, Fast
Madhya Pradesh	Smart Card in Transport Department, Mandi Board, Gyandoot, Gram Sampark
Maharashtra	SETU, Online Complaint Management System.
Punjab	Land Record Management System
Rajasthan	Jan Mitra, RajSWIFT, Lokmitra, RajNIDHI
Tamil Nadu	Kanchipuram
Uttar Pradesh	Bhu-Lekh
Uttarakhand	Devbhoomi

(Source: Quest Article, 2014)

V. E-GOVERNANCE RANKING

The conceptual framework of the E-Governance Development Index (EGDI) is almost same though its inception in 2001. The EGDI is a calculated measure of three important factors of e-governance, as: provision of online services, telecommunication connectivity and human capacity.



Twenty-five countries have a “very high EGDI” with index values in the range of 0.75 to 1.00. The Republic of Korea has retained the top spot in 2014 with its continued leadership and

focus on e-government innovation where India has at the position 118 having EGDI 0.3834 in E-Governance development rank. [4]

Table 2: World E-Government Leaders (EGDI) in 2014

Rank	Country	EGDI	Online Service Component	Telecomm, Infrastructure Component	Human Capital Component
1	Republic of Korea	0.9462	0.9764	0.9350	0.9273
2	Australia	0.9103	0.9291	0.8041	0.9978
3	Singapore	0.9076	0.9921	0.8793	0.8515
4	France	0.8938	1.0000	0.8003	0.8812
5	Netherlands	0.8897	0.9291	0.8175	0.9224
6	Japan	0.8874	0.9449	0.8553	0.8621
7	United States of America	0.8748	0.9449	0.7406	0.9390
8	United Kingdom	0.8695	0.8976	0.8534	0.8574
79	Jordan	0.5167	0.5197	0.3104	0.7202
118	India	0.3834	0.5433	0.1372	0.4698
158	Pakistan	0.2580	0.3228	0.1174	0.3337

(Source: E- Government Complete Survey 2014)

VI. SUCCESSFUL E-GOVERNANCE EXAMPLES IN INDIA

- Project Akshaya: This project was launched on 18th November 2002 in Kerala district named Malappuram. The main objective of this project was to make at least one person literate in each of 65 Lac families. Total 5000 centers were stood up in Kerala for this project achievement. More than 5 Lac people were trained under this project.
- MCA 21: This project has a naming convention as Ministry of Corporate Affairs which is responsible for administration of companies act in accordance with law. This project was made under highest priority rating under national E-governance plan.

VII. CHANGES TO BE MADE IN E-GOVERNANCE

If we see keenly at all government departments, all applications are not having interface with each other. As a result, a big question of interoperability may arise in future when implementation will become the norm of the time. India’s poor position in the world clearly indicates to initiate and take some serious measures to improve the e-governance in India. Common strategies should be defined and designed for central and state government functions. To achieve this task, key personnel must be appointed for entire E-governance initiate along with standing committee in government. For example, national citizen database with a unique ID card will prove the key stone of E-governance in India.

VIII. CLOUD COMPUTING

The term Cloud refers to a Network or Internet. In other words, we can say that Cloud is something, which is present at remote location. It offers online data storage, infrastructure

and application. Cloud can provide services over network, i.e., on public networks or on private networks, i.e., WAN, LAN or VPN. Cloud services allow individuals and businesses to use software and hardware that are managed by third parties at remote locations. Cloud computing is a set of services that provide infrastructure resources using internet media and data storage on a third party server. Cloud computing is the delivery of computing services over the Internet. Examples of cloud services include online file storage, social networking sites, webmail, and online business applications. The cloud computing model allows access to information and computer resources from anywhere that a network connection is available. Cloud computing provides a shared pool of resources, including data storage space, networks, computer processing power, and specialized corporate and user applications. cloud computing refers to the many different types of services and applications being delivered in the internet cloud, and the fact that, in many cases, the devices used to access these services and applications do not require any special applications.

The characteristics of cloud computing include on-demand self service, broad network access, resource pooling, rapid elasticity and measured service. On-demand self service means that customers (usually organizations) can request and manage their own computing resources. Broad network access allows services to be offered over the Internet or private networks. Pooled resources means that customers draw from a pool of computing resources, usually in remote data centres. Services can be scaled larger or smaller; and use of a service is measured and customers are billed accordingly.

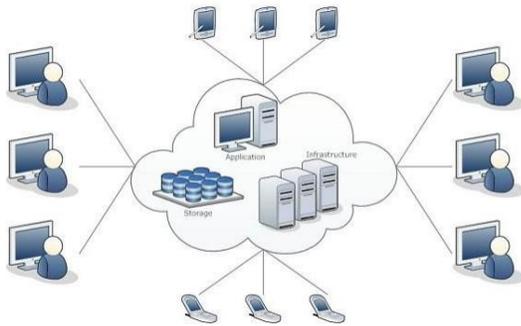


Fig. 01 - Cloud Computing Structure

IX. CLOUD DEPLOYMENT MODELS

Deployment models define the type of access to the cloud, i.e., how the cloud is located? Cloud can have any of the four types of access: Public, Private, Hybrid and Community.

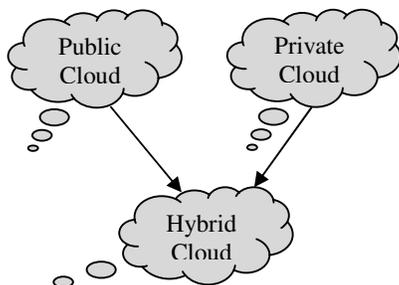


Fig. 02 - Cloud Computing Deployment Models

A. Public Cloud

The Public Cloud allows systems and services to be easily accessible to the general public. Public cloud may be less secure because of its openness. (e.g. e-mail)

B. Private Cloud

The Private Cloud allows systems and services to be accessible within an organization. It offers increased security because of its private nature. The cloud infrastructure is operated solely for a specific organization, and is managed by the organization or a third party.

C. Hybrid Cloud

The Hybrid Cloud is mixture of public and private cloud. However, the critical activities are performed using private cloud while the non-critical activities are performed using public cloud.

X. CLOUD SERVICES

The term services in cloud computing is the concept of being able to use reusable components across a vendor’s network. This is widely known as “as a service”.

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A. Software as a Service (SaaS)

Software as a Service (SaaS) is the model in which an application is hosted as a service to customer who accesses it via internet. When software is hosted off-site, the customer does not have to maintain it. The idea is that you use this software as it is and no need to make changes to the system. Patching and Upgradation work is done by the provider all time. This is also known as Software on Demand. SaaS is becoming more popular only because of its significant benefits for both vendors and customers. For customers, it is not needed to purchase full copy of software and deploy servers at their premises. As a result capital expenditure gets reduced.

B. Platform as a Service (PaaS)

Platform as a service providers deliver a computing platform which include operating system, programming language execution environment, database, and web server. Application developers can develop and run their software solutions on a cloud platform without the cost and complexity of buying and managing the underlying hardware and software layers. PaaS supplies all the resources required to build application and services completely from internet. PaaS services include application design, development, testing, deployment and hosting. PaaS may fail if you create one application with one cloud provider and decide to move to another cloud provider. You may not be able to do so or you have to pay high price. Also if provider goes out of business

C. Infrastructure as a Service (IaaS)

IaaS is the next form of service available in cloud computing. Infrastructure as a Service (IaaS) delivers a computer infrastructure that is a fundamental resource like processing power, storage capacity and network to customers; instead of building data centers, purchasing servers, software or

network equipments, a customer buys the resources as a fully outsourced service; a customer does not manage the underlying infrastructure but has full control over the operating systems and the applications running on it. IaaS models often provide automatic support for on demand scalability of computing and storage resources.

XI. E-GOVERNANCE IN THE CLOUD

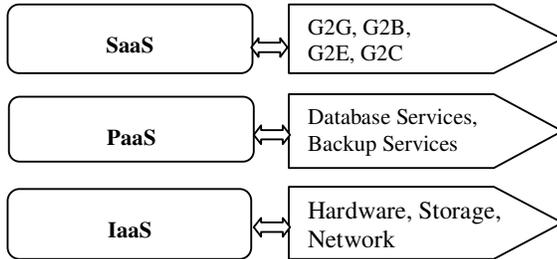


Fig. 03: Cloud Architecture with provided services
E-Governance system is the hardware and software systems that support various processes. Cloud service providers offer solutions for running e-governance applications on their own servers not on yours. These providers offer cloud services with advantages such as lower upfront cost, greater flexibility and negligible burden on customer to keep system up-to-date technically.

A. SaaS for E-Governance:

In Software as a Service model, E-governance application instance will be provided by the cloud service provider. Number of applications can be provided as standard services. By adopting such services, various departments can make request for a particular module which they require. Some of the applications may be –

- E-Police
- Complaint Resolution System
- Municipal Maintenance
- Water Billing and Payment System

Cloud computing fits into required standards for excellent services for the nation. This will give uniformity and single window stop for all government employees and citizens. Solution of SaaS may accelerate the e-governance functions.

B. PaaS for E-Governance:

PaaS is essentially platforms provided by a third-party service provider. PaaS may get fail if cloud provider gets altered. Main advantage of PaaS is that no need to develop a new platform for designing new application. Integrating PaaS and conventional E-governance system could indulge multiple development platforms. Integration between E-governance development environment and PaaS may affect technical management including programming, testing, deploying and maintaining. Number of services such as Database, operating system, middleware etc is provided through PaaS.

C. IaaS for E-Governance:

Infrastructure as a Service represents the data centre. E-governance requires 24x7 infrastructure facility. All applications require unlimited provision of CPU, bandwidth and storage when operating from cloud. These data centers are installed at different places to avoid loss of data from

unexpected natural calamities. In short, services like data backup, clustering solutions are provided.

XII. MAJOR REASONS BEHIND IMPLEMENTING CLOUD SERVICES IN E-GOVERNANCE

Mostly, all states of India have their own portals for providing E-Government services. So, all these portals are not considered anywhere as ‘one-stop-shop’, which would provide services to endpoint citizen in country at a time uniquely. Individual departments and ministry have their separate websites. Again, these are not linked with each other in a meaningful way. Logically and ideally, all official government websites should have a single window to provide government information and its services.

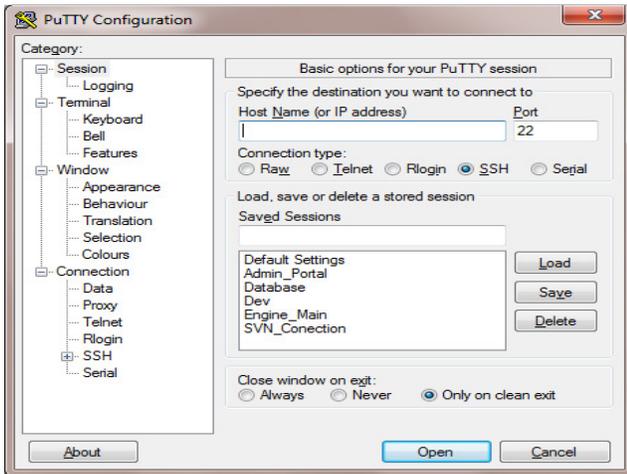
XIII. CLOUD FRAMEWORK FOR E-GOVERNANCE

Table 3: Framework for Integrating E-Governance and Cloud

Service Type>	SaaS	PaaS	IaaS
Characters	Point to point integration based on service contract	Not for business process integration but for development environment	Not connected to the system itself but to the H/W necessary to operate the system.
Opportunities	Enhance business productivity	Facilitate and make integration more efficient	Upgrade performance and simplify server maintenance
Challenges	Not enough ability to develop customization	Small defects on PaaS may result in significant issues	Vendor lock-in and compatibility issues.

XIV. CLOUD IMPLEMENTATION USING LINODE

This interface shows the PuTTY configuration where cloud can be acquired using hostname or IP address of cloud which may be public, private or hybrid one. The second parameter represents the port number of cloud server where we have to implement an application or save database/s. Here, LINODE is a cloud service provider.



XV. DISCUSSION

Cloud service providers may face challenge of data storage location. Government always expects that sensitive information must be stored with country's geographical boundaries. It might be difficult to make the data storage within same country. Lot of initiatives must be taken by the cloud service providers to ensure data storage locations.

XVI. CONCLUSION

There are some traditional E-Governance systems are in use while new technology of cloud computing is a good supplementary solution. Government may explore cloud computing and green ICT for implementation of E-governance. A successful implementation must be carried out with effective management skills and different marketing of channels. Cloud computing may deploy unified knowledge base and get service standards to set a "unique single view" so that everyone individual in country will get easy access to

the information with consistent standards. Without changing laws and rules of every state of India, a common entrance can be implemented for E-Governance for every citizen.

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