MeghRaj – A Cloud Environment for e-governance in India

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Abstract— E-governance uses Information and communication technology for delivery of services to the citizens. Today the Government of India has adopted e-governance and many projects and services are available online for the easy delivery of the facilities to the general citizens. The e-governance has helped in increasing transparency, reducing corruption, better administration and effective interaction with the Government. Cloud computing is a new technology in which the user pays only for the service which they are using. It is economical, scalable and more secure than the current technology. Realizing this Government is making an effort to incorporate cloud computing in e-governance. This paper explains the importance of cloud computing in e-governance and briefly describes the various projects available online which are using the cloud services. Some of such projects are digilocker, online registration services, etc. Although many of these services are not fully functional but efforts are being made to implement them properly. The Government needs to take proper care while implementing cloud services keeping in mind the proper guidelines and policies so that the confidential, personal and sensitive data is safe and secure.

Keywords—e-governance, Cloud computing, GI-cloud, IAAS, Digilocker, NPIP

I. INTRODUCTION

E-governance has gained a lot of importance in last few years. In fact, much effort is being made in developing countries to gain momentum towards e-governance. India has moved way ahead and e-governance is now implemented in India almost everywhere. E-readiness is essential for any country to successfully implement e-governance. By e-readiness is meant Infrastructural preparedness, data preparedness, human preparedness and technological preparedness. E-governance has many benefits like increased transparency, reduced corruption and more convenience for the citizens. In a country which has implemented e-governance the interaction between government and different stakeholders i.e. citizen, business, employee and government, becomes smooth and easy. India has successfully implemented e-governance and is now moving towards adoption of new technologies to be used in e-governance like cloud computing for a still better delivery of services to the citizens [1, 2, 3]. This paper defines e-governance, covers the initial launch of the NeGP program towards e-governance till the implementation of new technology and launching of GI cloud. The paper clearly highlights the point that Government has adopted the new technology of cloud computing and is using it in the e-governance and has launched many projects on cloud for easy access of the citizens. The break-up of this paper is as follows. Section I contains the Introduction to e-governance, Section II lists the various definition of e-governance, Section III describes the NeGP program launched by the Government. Section IV describes and gives definition of cloud computing. Section V defines GI cloud and its objectives, Section VI describes the architecture of the GI cloud and the services in GI cloud, and Section VII briefly explains the various projects launched by the Government on cloud. Finally, Section VIII gives the conclusion and the future work of the paper.

II. E-GOVERNANCE

For better and timely delivery of services to the citizens e-governance has been adopted by almost all countries. For successful implementation of e-governance, ICT is essential. According to the World Bank:
"E-Government refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions."
Ravi Kant (Special Secretary, IT, Govt. of West Bengal):
"E-governance, however, is not really the use of IT in governance but as a tool to ensure good governance. E-governance does not mean proliferation of computers and

accessories; it is basically a political decision which calls for discipline, attitudinal change in officers and employees, and massive government process re-engineering."

III. NEGP

For supporting e-governance, India launched a program called NeGP in May 2006 which specifically worked in introducing ICT in governance at all levels be it state or central. NeGP was formed with a vision to "Make all Government services accessible to the common man in his locality, through common service delivery outlets and ensure efficiency, transparency & reliability of such services at affordable costs to realise the basic needs of the common man." The NeGP e-infrastructure comprises of SWAN (State wide area network), SDC (State Data Centre) and CSC (Common Service Centre). Initially the NeGP with 27 Mission mode projects (MMPs) was launched. 9 central, 11 state and 7 integrated MMPs were primarily introduced. Some of them are MCA 21, land records, e-courts, etc. Later on the number of MMPs was increased to 31. Many of the MMPs have been conceptualized but some are still in implementation phase. NeGP majorly achieved the purpose for which it was created but new technologies like cloud computing, mobile platform; e-authentication can always be incorporated in the program to make it still better. In fact cloud computing has been implemented in e-governance and GI cloud has been introduced. [4, 5, 6]

IV. CLOUD COMPUTING

Cloud computing is a model which is scalable, ubiquitous and can access the shared resources like networks, storage, servers, etc. It is easy to use with minimum management requirement [7,8,9]. Cloud computing has been defined in different ways. Some of the definitions are as follows:

 According to NIST, National Institute of Standards and Technology:

"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."

According to Vikram Kumar Mallavarapu, Vice President – Sales, Public Sector, Cisco India & SAARC:

"Cloud computing can contribute in a variety of ways to deliver citizen services efficiently and enable IT resources to be provided on demand, at scale in a multi-tenant, yet secured environment."

V. GI CLOUD AND OBJECTIVE

Keeping in pace with the latest technology, the Government of India launched its GI cloud initiative, commonly known as MeghRaj, which incorporated cloud computing in e-governance in India. This cloud initiative was developed with the objective of accelerating the growth of the delivery of services to the general citizen and also keeping in mind the expenditure done on ICT and optimizing it. Centre and the state department of Government make use of this GI cloud computing environment for delivery of services to the citizens. There are many advantages of implementing GI Cloud in e-governance applications like reusability of the software developed, scalability and best use of the infrastructure, security, cost reduction, faster and cheaper services, etc.[10].

The objective of GI cloud is as follows:

1.   Effective utilization of prevailing infrastructure: Since the inception of NeGP, Government has invested a lot in the infrastructure build-up of ICT. These include SWAN, SDC, CDC, etc. So, initially same infrastructure can be used thus saving money, time and effort. If required the infrastructure services can be always expanded.

2.   Rapid deployment and reusability: e-Gov app store has been developed for the convenience of adoption of the existing application. Any application developed by any department at centre and state level will be available in e-gov App store. With minor modifications and customization any other department of state or centre can reuse these applications according to their need.

3.   Scalability: The most important advantage of deploying any cloud services is scalability and so this is also an advantage of GI cloud. As and when required, the demand for ICT resources can be increased or decreased.

4.   Security: The security framework provided in GI cloud is very secure and will reduce complexity.

5.   Reduction in Cost: Cloud computing are based on the pay-as-per–usage policy which reduces the cost substantially. The same is the case in GI Cloud.

6.   Agility: ICT resources can be accessed very quickly and easily and so immediate and agile delivery of services is possible.

7.   Easy management of technology: For better support, cloud computing is based on prebuilt standardized foundation. Since computing applications are not installed in each user's computer but on cloud its maintenance is easy and can also be accessed from any place [11].

VI. ARCHITECTURE OF GI CLOUD
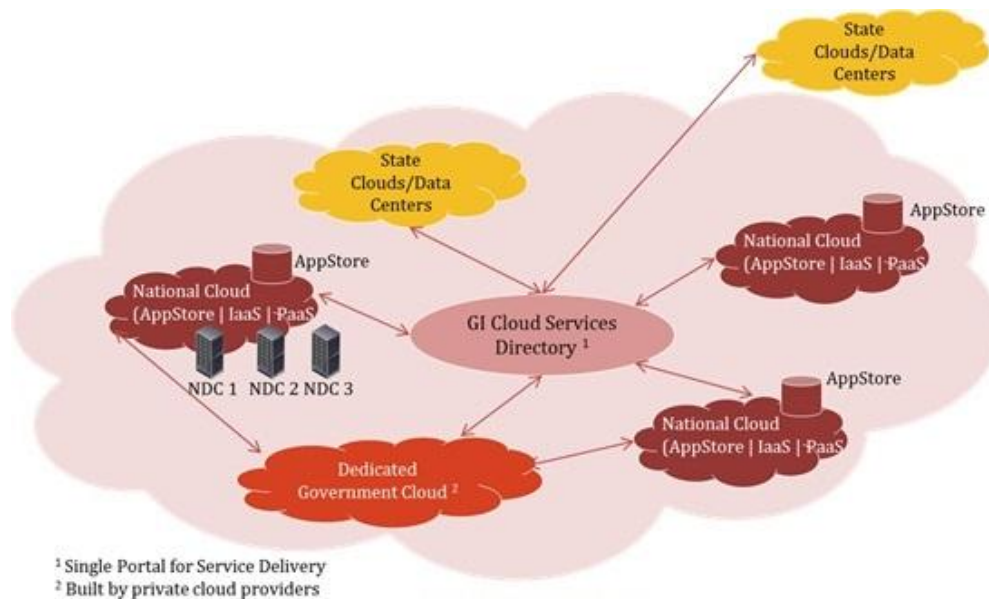
The architectural vision of GI cloud is given below:

Figure 1. GI Cloud Environment

In the above architecture (Figure 1) as can be seen there are many National and state clouds which are built on multiple locations. National clouds are at national level and state clouds are at state level. These together are visualized as national cloud. For national cloud same infrastructure can be used as in national data centres. If required, new centres can be built by expanding the state level data centres.

Services in GI Cloud

The cloud service of Government, MeghRaj offers many services like IaaS, PaaS, SaaS, STaaS. The details are as follows:

1.   IAAS - In this infrastructure is provided as a service. Users have the flexibility to access hardware services and networks and storage requirement services, database servers, etc. There is no need for organizations to purchase costly infrastructure, they can hire the required infrastructure from IAAS providers. In GI cloud infrastructure resources like CPU, disk storage, memory, etc. are provided. The user then can use their licenses for operating system and application software.

2.   PAAS: In this the servers- web or database, are provided by the Government and so the user can run the web applications easily. If any user wants to run their application quickly, they can make use of PAAS since servers are preconfigured and easily customizable. To encourage users to take benefit of this service they provide the OS and application software licenses.

3.   SAAS: In this the software service is provided as and when required by the user. This means the infrastructure, software, server, OS everything is managed by the cloud provider. The user only needs to load their web application and distribute it to the users.

4.   STAAS: Storage as a service provides storage solution. It is better than the traditional system of storage and also the complexities involved in storing data at multiple places is very much reduced in this system.

The NIC cloud hosting also provides certain service support like server backup, server antivirus, network firewall, server vulnerability assessment. [10,12].

VII.   GOVERNMENT PROJECTS ON CLOUD

The Government of India has hosted many of its projects on cloud. These projects have been launched on cloud services by NIC. Some of these projects are as follows:

1.   Digilocker: It is a service offered to the citizens of India wherein keeping documents digitally is encouraged. This reduces the hassles one faces in carrying the documents physically which are prone to wear and tear, damage and can be stolen or destroyed. This is implemented on cloud and a personal storage space is provided to each user to store their e-documents. The important advantage of this portal is that it has registered depositories and the documents can be electronically shared through these repositories only, thus confirming the authenticity of the documents. A mobile app for accessing digilocker also occurs. The user can store the scanned copies of all there documents electronically in png, pdf, jpeg form using digilocker and can e-sign them also. One can also receive documents in these digilockers directly from authorized organizations. Some of the registered

organizations in digital locker are Income tax department, school boards, UIDAI, etc. This facility is linked through both Aadhar card and mobile numbers. Digilocker is a very successful e-governance project implemented on cloud. Major advantages of this e-governance project being on cloud are reduction in usage of physical documents, secure-access to government-issued documents, minimization of administrative expenses and ease for citizens. Almost 1.35 crore users are availing this service [13, 14, 15].

2. National Prisons Information Portal (NPIP): NPIP is a project developed by NIC to computerize prison related activities. This is an application suite which uses cloud computing features and helps in the management of the prisoners. The three main products in this suite are ePrisons MIS, NPIP and Kara Bazaar. ePrisons management information system covers prisoner information management, visitors management system, hospital management system, prison management system, court monitoring and kiosk information. National Prisons portal helps the general citizen by providing them information they need about the prisons or prisoners. Anyone who wishes to meet the prison inmates can book the request through this portal. Further, any grievance regarding condition of inmates in prison can be reported through the site. Also, investigating agencies are helped by providing inmate tracking facilities to them. The products manufactured by prisoners are shown in the Kara bazaar portal for selling them online. This project covers 36 states and there are 893 prisons on-board and stores data of about 5621788 prisoners. This portal is on SaaS and has many security features embedded in it. [16,17]

3. Online Registration Services: An online registration system has been hosted on cloud through which patients can register themselves and book appointments across different government hospitals. The patients can book appointments using eKYC data of aadhar numbers. But this is possible only if the mobile number is registered with UIDAI. If not, then patient's name is used for registration and the new patient is allotted a Unique Health Identification (UHID) number. Many government hospitals have joined this system. This project was initially launched in AIIMS Delhi as a pilot project in 2015 and almost 1.5 lakh patients have taken the benefit of this system. Currently 179 hospitals from different states of the country are registered in this system for which the citizens can enroll and take appointment. Some of the hospitals registered in this online system are AIIMS Delhi, RML Hospital, PGI Chandigarh, etc.[18,19]

4. Forest Survey of India: Forest Survey of India was established in 1981. FSI works under the Union Ministry of Environment and Forests. The main function of FSI is to make an assessment of the forest cover and various resources available in the forest in the country and also monitor the changes in it. For this it conducts various surveys. This monitoring is essential to formulate a policy for forestry sector. FSI also conducts training on new technologies for application in remote sensing and GIS, etc. for forest personnel so that they can easily work on these software. Till now about 80% of the forest resources have been inventoried. All these information are stored on cloud services by NIC.[20]

5. MyGOV: MyGov portal was launched by the Government of India in 2014 where all information relating to the government is available for access by the citizens. It is an initiative wherein the common man of the country can interact and share their ideas and views with the government so as to bring major reform in the working of the government both social and economic. To make this platform interactive and beneficial, poll, discussions, talks and blogs are introduced in the system. It is a movement towards 'Surajya' or self-governance wherein citizen's voice is taken into consideration for formulation of policies and their implementation.

Prime Minister Shri Narendra Modi said "Let us join this mass movement towards Surajya. Realize the hopes and aspirations of the people and take India to greater heights." [21]

VIII. CONCLUSION

Cloud computing is being used nowadays in almost every application. India is now moving to be Digital India and so adoption of new technology for smooth, efficient and effective working is very essential. Government of India has made a move with the launch of GI cloud. In this paper the architectural vision of the GI cloud is discussed. The cloud architecture is to make use of the existing infrastructure available under NeGP and subsequently new infrastructure will be deployed for expansion of the services [10]. Many applications have been developed on cloud and the citizens are using them as per their convenience. Although cloud computing has many advantages but security is a main concern in this. GI Cloud will contain confidential data of the citizens so security plays an important issue. To avoid risk of loss of personal information, leakage of confidential information and compromise of intellectual property the cloud providers will have to abide to proper security policies and guidelines. Appropriate measures need to be taken for successful implementation of confidential data on cloud and its security. Cloud computing is very much needed in e-governance as the management of the IT services on demand will be possible.

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