

Meghraj(Gi Cloud)

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Abstract:- The GI Cloud is envisaged to consist of multiple National and State Clouds. The agencies responsible for operating and managing the National and State Clouds may engage Managed Service Providers (MSPs) for managing the respective cloud computing environments. These cloud computing environments will utilise the existing network infrastructure such as the SWANs, NKN, NOFN integration hubs as well as the internet.

Introduction:-

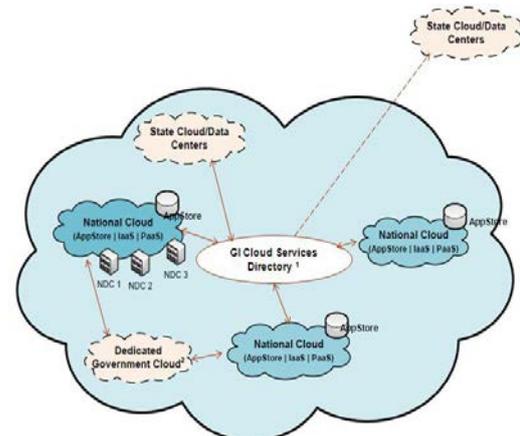
With an objective of utilising the benefits of Cloud Computing, Government of India has initiated a very ambitious and important Project – “GI Cloud” which has been coined as „MeghRaj”. The main objective of this initiative is to evolve a Strategy and implement various components including governance mechanism to ensure proliferation of Cloud in government. Formulation of the Cloud Policy is one of the primary steps that will facilitate large scale adoption of cloud by government. In order to drive this initiative a Task Force was constituted by Department of Electronics and Information Technology (DeiTY) under the Chairmanship of Additional Secretary (eGov) with a focus to bring out the strategic direction and implementation roadmap of GI Cloud leveraging the existing or new infrastructure.

Objectives:

The objectives of GI Cloud are as follows:

- Optimum utilisation of infrastructure
- Speeding up the development and deployment of eGov applications
- Easy replication of successful applications across States to avoid duplication of effort and cost in development of similar applications
- Availability of certified applications following common standards at one place

Architecture:



The figure above depicts an overview of the GI Cloud consisting of cloud computing environments at the national and state levels termed as ‘National Clouds’ and ‘State Clouds’ respectively. While one of the National Clouds will be built utilising the infrastructure available under the National Data Centre(s), other National Clouds may also be established. These may be new or established by augmentation of the existing data centres available at state level. Based on demand assessment and taking into account security related considerations, government may also engage the services of private cloud providers. The willing state clouds built on state data centres can also associate themselves with the GI Cloud and publish their services in the GI Cloud Services Directory.

Services provided by National Clouds would include infrastructure (compute, storage and network), platform, backup and recovery, infrastructure scaling of the State Clouds, application development, migration and hosting etc. Over a period of time, other clouds at the national level could also provide remote infrastructure management for the State Clouds.

Project implementation:

The various projects to be implemented in a phased manner as a part of this initiative are as follows:

- **Setting up of National & State Clouds** - Cloud computing platforms at National and State levels
- **AppStore (e-RAAS, Reusable Application Availability Store)**- Common platform to host and run applications. The overall objective of the National eGov AppStore is to create a market place of customizable and configurable applications that can be re-used by various government agencies /departments at Centre and States without investing time and effort in development of such applications. There would be minimum 20 applications to be hosted annually on the AppStore. NIC has been identified as the implementing agency for eGov AppStore.
- **GI Cloud Services Directory** - Single window or portal for GI Cloud service delivery
- **Common set of protocols, guidelines and standards** for GI Cloud
- **Institutional mechanism** - To operate and manage the GI Cloud environment.
- **Centre of Excellence** - For awareness building, best practices creation, providing advisory services to the departments on cloud adoption, showcasing the cloud technologies, international collaboration and research and development.
- **Architecture Management Unit** To bring out Common set of protocols, guidelines and standards for GI Cloud

A separate Working Group at DeitY headed by Shri. Kris Gopalakrishnan is also working on enabling cloud services in India covering aspects like jurisdiction, cross-border data flow, data security, data location etc.

Ecosystem:

The eco-system of the GI Cloud identifies the major actors, their activities and roles in the

envisaged cloud computing environment. The Conceptual Reference Model of NIST has been referenced for depicting the high-level eco-system of GI Cloud, as shown below.

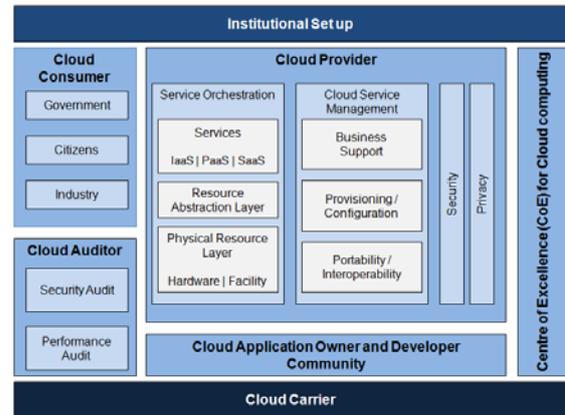


Figure 2: GI Cloud Eco-System

Eco-system actors

The GI Cloud eco-system defines eight key actors in the envisaged GI Cloud Environment (as defined under the section ‘GI Cloud Architecture’). These actors include: the Institutional Set up, Cloud Consumer, Cloud Provider, Cloud Auditor, Cloud Carrier, Centre of Excellence (CoE) for Cloud Computing and Cloud Application Owner and Developer Community. Each of these actors is an entity (a person or an organisation) or a community that participates in the eco-system, and has specific roles and performs specific tasks.

Cloud consumer:

The Cloud Consumer is the principal stakeholder that uses or consumes the GI Cloud services. The Cloud Consumer browses the GI Cloud Services Directory, requests the appropriate service, sets up service contract with the respective cloud provider and uses or consumes the service. Based on the services consumed from the GI Cloud, the cloud consumer may need to arrange for payments. Consumers of the envisaged GI Cloud include citizens, government departments, line departments and agencies at the central and state levels.

Cloud provider:

The Cloud Provider is an entity that is responsible for operating the respective cloud environment and makes available GI Cloud services to interested parties.

Responsibilities of the cloud provider include the following:

- Acquiring and maintaining infrastructure required for providing services
- Implementing measures for adherence to cloud standards
- Operating the respective cloud computing environment
- Protecting the security and privacy at required levels
- Providing cloud computing services and service elastic workloads based on the requirement of cloud consumers
- Adhering to service level agreement (SLA)
- Issuing bills and collect payments

It is envisaged that one of the National Clouds will be established and managed by a national government agency and the other clouds at the national level will be established and managed by separate Cloud Utilities. These Cloud Utilities will be a class of institutions set up to handle all aspects of operations and service delivery of the other clouds at the national level. These institutions would work in the spirit of partnership with government, which help them overcome operational challenges, providing necessary agility and flexibility required in managing the dynamic environment of GI Cloud.

Cloud utilities:-

Role of Cloud Utilities

The Cloud Utilities will act as the service providers of the GI Cloud through the respective cloud computing environments at the national level. Initial seed funding may be provided by DeitY depending upon the choice of Cloud Utility for setting up of the respective cloud environments at the national level. However, it is envisaged that Cloud Utilities will be independent entities and will sustain themselves by earning profits.

Major role of the Cloud Utilities for other clouds at national level includes the following:

- Acquiring or using existing infrastructure for set up (including the respective eGov AppStores)

- Running, operating and managing entire operations
- Provisioning of services (IaaS, PaaS and SaaS)
- Identification and selection of application for hosting on the respective eGov AppStores
- Developing new applications and provide them as service
- Providing support services for application development and productisation
- Training of staff and handholding after cloud migration

Cloud carrier:-

The Cloud Carrier acts as an intermediat and provides the backbone for transport of cloud services between cloud consumers and cloud providers of GI Cloud.

The infrastructure backbone for the GI Cloud will be provided by existing networks like SWAN, NKN, NOFN and NICNET. It is envisaged that a National Information Infrastructure (NII 2.0) for the country will be established through seamless operations of the core government ICT infrastructure (network, data centre and security) The NII 2.0 would provide a unified and secure network to the cloud entities within the GI Cloud.

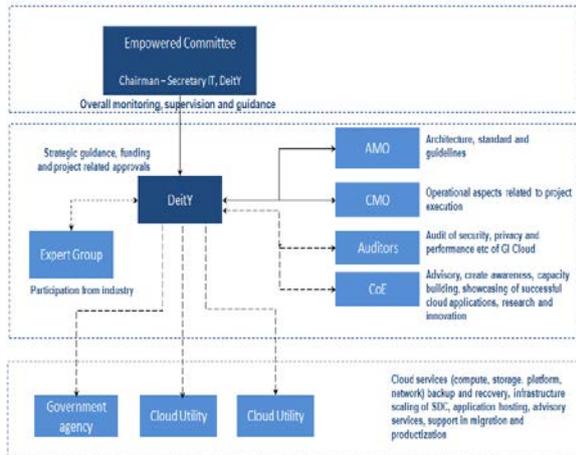
Cloud auditor:-

Responsibilities of the Cloud Auditor are as follows:

- Conducting independent audit of security, privacy and performance of GI Cloud
- Risk and compliance assessment to determine alignment to regulatory mandates
- Publishing independent audit report
- Certifying the cloud environments as per Government of India defined norms and guidelines

The audit reports will be presented to DeitY, which will process the same and take remedial actions and steps based on the audit reports.

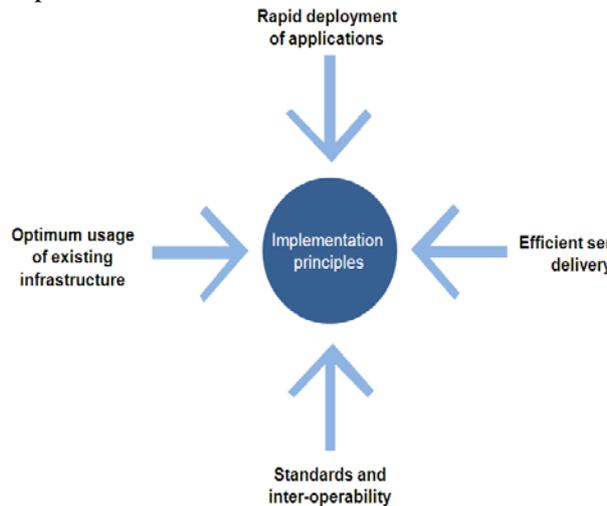
Institutional setup:-



The institutional set up for GI Cloud is represented in the figure above. It consists of the following:

- Empowered Committee
- Architecture Management Office (AMO)
- DeitY will be the administrative department responsible for implementation and monitoring of the entire GI Cloud initiative. DeitY will be assisted by Expert Group, CoE, Auditors, Cloud Management Office etc.

Implementation:-



The Implementation Strategy revolves around four principles shown below:

Figure 6: GI Cloud implementation principles

a) Optimum usage of existing infrastructure: As identified in the section under government of india is already making

huge investments for e-government projects under the various national and state projects. The efficient utilisation of this invested infrastructure is the foremost priority while creating a GI Cloud.

b) Rapid deployment of applications:

There's a long procedure for procurement of infrastructure, application development, testing and deployment for most e-government projects. The GI Cloud environment on the other hand, will provide the requisite platform for faster deployment of applications as infrastructure and platform can be procured as service. The GI Cloud has Appstore facility which will provide us some Apps that are ready to be customized and deployed as per user requirement. Which will result to the decrement of the time for development and deployment of Apps,

c) Efficient service delivery:

GI Cloud will ensure optimal utilisation of resources, infrastructure and speedy deployment of applications. However, the expected end result is efficient delivery of services through its faster availability.

d) Standards and inter-operability:

The envisaged GI Cloud environment consists of NDCs and SDCs interconnected by a network backbone creating a secured, on-demand space of technology, platform, infrastructure and services for the government. For effective implementation, the same standards will need to be defined for security, network, storage, technology, governance, compliance, inter-operability and data portability.

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