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CLOUD COMPUTING BASED RURAL E-GOVERNANCE MODEL

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Abstract- In the current scenario in India we are keen to implement the e-Governance model . The urban areas are in good position in form to avail the services of e-Governance as they have all the required infrastructure but in rural areas the biggest problem is the non availability of proper infrastructure as well lack of computer aware citizen , Cloud Computing can be a future solution to fulfill that needs. The critical problem discussed for the rural areas is non availability of the necessary infrastructure to implement the e-Governance services. In this paper we also discussed how to overcome that problems using the applications of cloud computing .
The e-Governance services can be designed in a manner that can be offered through fully customized Service-oriented (SaaS) Clouds. In this paper we are presenting the similarities between generic government process and services and the use of service oriented cloud computing model . Also, we will discuss the major issues in establishing services oriented grids for governmental organization. In this paper we propose a model based framework to implement cloud computing for rural area e-Governance model .
Keywords- e-Governance, cloud computing, SaaS, Iaas, PaaS

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Introduction

Our Indian government is putting in a lot of effort towards using applications of e-Governance using ICT and making the government services more useful and simple for citizens equally in urban and rural areas. However, there are many key issues in making the citizen-centric services accessible in rural areas. For service providers which is government is most of the cases , it is difficult to reach them and scale up the functionality. For the rural area population community in India accessibility and affordability of ICT infrastructure are major issues [1]. There is a clear opportunity divide that exists. To bridge this, we need to leverage on common elements. We need to build the backend for the last mile connector and facilitate building a community of independent rural citizens . Also, there is a need to build the front-end for the service provider. We need to provide more ICT application with good infrastructure to the service providers to use the platform and to provide last mile access in rural areas.
There is a clear need to build a cloud based e-Governance system and bring the entire rural community under one roof. This is possible through cloud computing. To start with cloud-based services, one needs to define a cloud model that you would like to go with such as public or private cloud, community cloud or hybrid cloud. [2]
Public sector should take advantage of those improved conditions for development and deployment of e-government solutions. This can be achieved through the adoption of new architectures such as cloud computing and service-oriented architecture, in the public sector. Cloud computing permits to uniformly cover the whole country with e-government solutions, independently of divergence of local administrative units that may be better or worse prepared to provide e-services. Service-oriented architecture facilitates provision of compound services covering whole customer processes, where a customer may be a citizen or an enterprise. One should understand the security risks involved. One can take Infrastructure-as-a-service (IaaS) as the foundation. Platform-as-a-service (PaaS) builds on IaaS, Software-as-a-service (SaaS) builds on

PaaS, and SaaS is the most integrated functionality. PaaS helps developers build their services on top of a platform. IaaS has limited application-like features but enormous extensibility.[3]

Why e-Governance with cloud Computing

Cloud computing might be one technique for the implementation of the national e-governance plan (NeGP), Cloud computing will play a important role in the national e-governance plan. There are certainly some advantages that cloud computing could accrue like start of using e-Governance services by SaaS such software as service with data centers and all other means, which are all bundled together using cloud computing can be a fairly attractive model for Indian rural areas . First, many people may want to use 'pay as you go' model and that generally appeals to the Indian economy , Second, on the context of e-governance, there are other aspects of possibility through cloud computing like different kinds of software platform that are available for making e-services available in one state or one part of the country or a department can be used in other area also when it will be web based using clouds . Once they are put onto a cloud (may be a government cloud), it could help in the usage of the same by other departments and organizations to speed up the rolling out of different projects.

Early work study

Chandwick and May [3] in the year 2003 proposed an e- Governance framework regarding the interaction between
Government and its citizens. They had focused on the managerial, consultative and participative models of e-Governance. In the year 2005, Grant and Chau's [7] review report proposed the strong integration between IT and managerial aspect of e-Governance in a sophisticated manner in reflecting the citizen-centric perspective of e-Governance. Coursey and Norris [4]in the year 2008, published in their review report that e-Governance should have web-technology in order to integrate the different Government information and services viz. eparticipation, e-democracy etc. Again the existing work in web service performance focuses on the latest trend of technologies and standards. S.Adreozzi, P. Ciancarini, D. Montesi, R. Moretti [1] present a model for rigorous representation of service
characteristics. D. Gouscos, M. Kalikakis, and P. Georgiadis [6] present a simple approach to model certain web service management attributes. J.P Thomas, M.Thomas and G.Ghinea [11] represent distributed web service by modeling the flow of messages and methods in a web service transaction. Tu et al. [10] discuss design strategies to improve the performance of web service. Levy et al. [8] present architecture and prototype implementation of performance management system for cluster based web service. V. Cardellini, E. Casalicchio, and M. Colajanni [5] consider different categories of web applications, and evaluate how static, dynamic and secure web service request
affects the performance and quality of service of distributed web sites. But the entire above discussed web services are either very much server centric or device centric in nature. A properly distributed cloud computing based web services that may fit effectively in e-Governance model are available in some areas and we can use this new model in India also to offer e-Governance service in rural areas .

Proposed Cloud based e-Governance Model

The three main features of our Cloud computing based model are instance availability of services, pay per use model and massive scalability. A simple Cloud architecture is build and hence is highly flexible and modular and can integrate with other systems. It offers the following layers of abstraction as shown in figure 1.

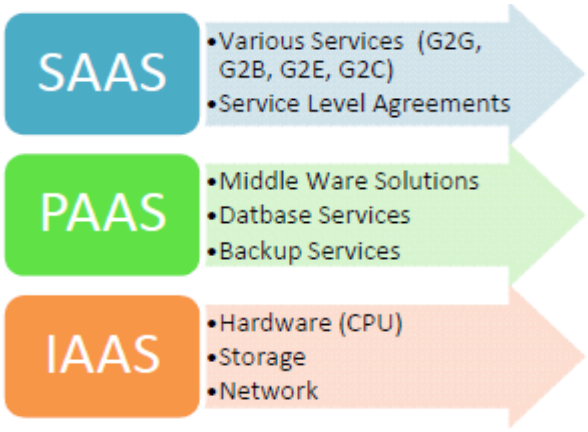

Fig. 1- e-Governance cloud model

The figure shows that we can offer e-Governance services using cloud computing layers that are IaaS , PaaS and Saas. Now in next section we will try to explore the services that can be offered through that 3 layers .

Layer 1 IAAS

Infrastructure as a service virtualizes the hardware/network and storage aspects of the datacenter. A Storage Area Network must also be in place in order to offer the e-Governance services to remote areas .e-Governance requires a 24x7 infrastructure availability minimizing downtime. e-Governance applications can assume unlimited supply of CPU, storage and bandwidth when operating from cloud. Application designers can focus on features and usability instead of worrying about scalability etc. Still, applications perform better on cloud compared to traditional architecture as the Infrastructure will be in some urban area and the rural area will use that without having actual availability they will access then using nodes like a simple PDA introduced by Indian government recently named Aakash .

Layer 2 PAAS

Platform as a service of Cloud model offers standard platforms in terms of providing different kinds of operating systems, software applications , middleware and integration systems. Some of the standard platforms they provide are:

- Web Based Operating system
- Web based Query systems
- Web based data base systems
- Middle ware services
- Work flow management services

Government departments or local area citizen requiring resources can request and get resources instantly using their PDA having WiFi or other network connections as compared to traditional methods where they have to wait till they purchase, deploy etc. Applications requiring middleware services can be provided instantly

Layer 3 SAAS

Software as a service model of Cloud offers software applications as a service. Imagine a case of new village of rural area deciding to move to e-Governance solution for some application for their citizens. The village need not purchase applications, hardware and software. They can make a request for a particular service from the cloud provider. Applications instances can then be created for their use. Numerous applications can be provided as standard services, where departments can request and manage. Some of the applications can be:

- Complaint Resolution System
- Employee Management Systems
- Tax Filing Systems
- E-police, E-court
- Municipal Maintenance
- Water Boards, Billing, Payment Systems
- District Management Solutions
- Government office service Desk

Cloud fits in right into the requirements and can offer excellent service in this regard. Instead of each department hosting hardware, software and applications, they can get all the applications for a district instantly to be provisioned and operational. Hence cloud accelerates the implementation of e-Governance services. This one feature can reduce the cost of E-Governance to a great extent specially in case of rural areas .

Benefits of this proposed model

If you compare with a traditional ICT based e-Governance architecture with this model , the services offered are bound to a physical machine. One has to maintain the redundancy in terms of the physical services. This model increases the cost of deployment and becomes expensive to maintain as number of services increase. Cloud computing offers:

- On-demand self sufficient service
- Ubiquitous network access
- Location independent resource
- Rapid elasticity

Cloud is making rapid inroads because of the following advantages:

- Can reduce IT labor cost by 50% in configuration, operations, management and monitoring
- Can improve capital utilization by 75%, significantly reducing license costs
- Reduce provisioning cycle times from weeks to minutes
- Can reduce end user IT support costs by upto 40%

In a traditional infrastructure there will be one instance of application per physical server and has an average utilization of 10%.

Conclusion and future work

Thus we have proposed a framework of e-Governance based on cloud computing for rural areas . Here, we have put forward the different components of cloud computing and then specifying the role of each component. We have introduced a new framework of e-Governance based on cloud computing, where SaaS as a main service and IaaS as to provide low cost infrastructure . But here, neither we have discussed the way of accessing the e-Governance web services nor the practical implementation of the model .

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