A Model based Approach to Implement Cloud Computing in E-Governance

Dr Ashish Rastogi
Department of Computer Science, GGU

ABSTRACT
In the current scenario every enterprise want to implement Cloud Computing to fulfill their computing needs. These changes naturally should reflect the way government functions in terms of the organization of the government, its relationship with its citizens, institutions and businesses and cooperation with other governments. The critical problem (Rastogi 2010) discussed for the developing countries is the necessary infrastructure to implement the E-services. In another paper he (Rastogi 2010) also discusses how to overcome the E-governance problems faced by the developing countries. Application of Cloud computing for the better E-governance in Developing countries In this paper we propose a model based framework to implement cloud computing.

Keyword : Information Technology, Cloud Computing, E-governance

1. INTRODUCTION
(Rastogi 2010) Discusses the various problems that has been identified in implementing the various phases of the E-governance in developing countries. The Main problems that he had discussed are Infrastructure Development, Accessibility, Security, Trust & Privacy, Transparency, Permanent Availability and Preservation, Cost Structures. The following section discusses the Traditional architecture of the E-governance and the various problems in this Architecture.

2. PROBLEMS WITH PRESENT ARCHITECTURE

- *Application Life Cycle Management*: cost-effective management of structured data throughout and testing to archiving and retirement replication facility needs to be provided and it's cumbersome. It may cause duplication of resource and departments. As the complexity and sophistication of the software development task has grown it needs to use increasing numbers of tools.
- *Software licensing and Support* application the licensing is required application is sufficient enough. Scalability: Traditional infrastructure to frequently upgrade to meet these challenges, software redundant.
- *Accountability* The applications in traditional infrastructure don't have accountability.
- *Modifiability* Traditional infrastructure example as they are not inherently scalable the provisioning cost and time for moving from 100 users to 10000 users could eat up lots of resources.
- *Physical security* It involves the provision of safe activities with a focus on preventing unauthorized physical access to computing equipment. includes:

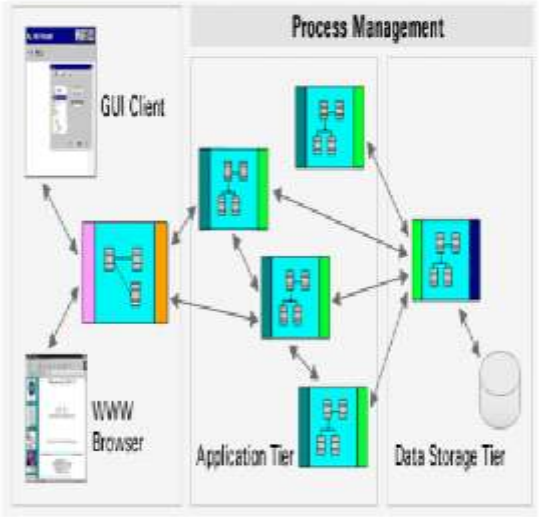

Fig 1 Present Architecture of the E-government

(1) Threats and facility requirements,
(2) Personnel physical access control, and
(3) Microcomputer physical security

3. TRADITIONAL INFRASTRUCTURE
With traditional infrastructure, we need to ensure secure, application life, from development retirement. For making the application highly available, the part of development activity which could be resources across various government organizations support: It is another major concern as for each but for distributed data centers only one license for the application cannot scale, scalability demands change over time. thereby making some of the hardware and central authority and traditional infrastructure incurs more costs when modification is required.

4. INTRODUCTION TO CLOUD COMPUTING
According to National Institute of Standards and Technology, USA (NIST) Definition of Cloud Computing is :

Definition: Cloud computing is a model for enabling ubiquitous, 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.

Cloud computing encompasses a whole range of services can be hosted in a variety of manners, depending on the nature of the service involved and the data/security needs of the contracting organization.

However, the basic idea behind the cloud model is that anything that could be done in computing — whether on an individual PC or in a corporate data center — from storing data to collaborating on documents or crunching numbers on large data sets can be shifted to the cloud. Certainly, cloud computing enables a new platform and location-independent perspective on how we communicate, collaborate and work. So long as you can access the Web, you are able to work when and where you wish. With fast, reliable Internet connectivity and computer power, it does not matter where the document, the e-mail or the data the user sees on the screen comes from. Cloud computing enables providers to use distant data centers for cloud computing. Still, while some have predicted the end of the PC era with the rise of the cloud computing model, many believe that most organizations and even individuals will continue to make use of traditional PCs and laptops, even if more and more of their use will be to access the cloud [3].

For individuals, cloud computing means accessing web-based email, photo sharing and productivity software, much of it for free [4]. For organizations, shifting to the cloud means having the ability to contract for computing services on-demand, rather than having to invest to host all the necessary hardware, software and support personnel necessary to provide a given level of services [5]. And for governments, the value proposition of the cloud is especially appealing, given both changing demands for IT and challenging economic conditions [6]. See below the Fig 2, Architecture of Cloud Computing for E-governance (Ref IIIT, Hyderabad Cloud Computing for E-Governance A white paper)

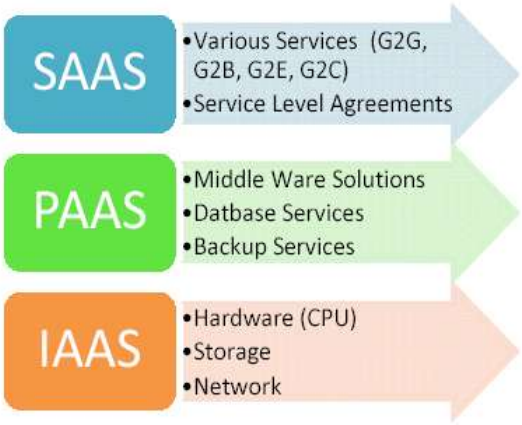

Fig 2 Architecture of Cloud Computing

In cloud computing generally we have to define three delivery models

4.1 Software as a Service (SaaS)

The consumer uses an application, but does not control the operating system, hardware or network infrastructure on which it's running. The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a web browser (e.g., web-based email). The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user specific application configuration settings.

4.2 Platform as a Service (PaaS)

The consumer uses a hosting environment for their applications. The consumer controls the applications that run in the environment (and possibly has some control over the hosting environment), but does not control the operating system, hardware or network

Fig 3 Data Centre Operations in Cloud Computing (Ref IIIT, Hyderabad Cloud Computing for E-GovernanceA white paper)

infrastructure on which they are running. The platform is typically an application framework. The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly application hosting environment configurations.

4.3 Infrastructure as a Service (IaaS)

The consumer uses "fundamental computing resources" such as processing power, storage, networking components or middleware. The consumer can control the operating system, storage, deployed applications and possibly networking components such as firewalls and load balancers, but not the cloud infrastructure beneath them. The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems; storage, deployed applications, and possibly limited control of select networking components (e.g., host firewalls).

5. PROPOSED MODEL

This section discusses the New approach to migrate from Traditional Computing to Cloud Computing. This approach is basically based on the Prototyping model of the Software Engineering. From Traditional Computing to Cloud

Computing is the continuous improvement process till we attain our goals. (See Fig 4)

5.1. Step One: Learning
The Cloud Migration Strategy begins with learning about the basics of cloud computing. Cloud computing is the thrust area in computing technology, it will be important for technology transfer to occur—the "techies" in and outside of government will need to go the extra mile to educate and inform the "non-techie" policymakers (agency executives, staffers, and lawmakers) as to the merits and value of cloud computing. It will be especially important to devote sufficient funding for research to establish how cloud computing is working - or not – in various areas and at all levels of government, so as to ground policy and practices in regard to governmental use of cloud computing.

5.2. Step Two: Organizational Assessment
In the second step the IT officers or Government officials should conduct an assessment of their present IT needs, structure, and capacity utilization. In a cloud computing environment, and study the requirement of addition or reduction of the resources can be added—or subtracted—based on needs and demand.

5.3. Step Three: Cloud Prototype
In the Third step the IT professionals will develop the prototype for cloud computing based on the requirement for the particular project.

Figure 4. The Six-Step Cloud Migration Strategy

5.4. Step Four: Cloud Assessment
After the internal assessment and external assessment of the prototype outreach stemming from the pilot effort, IT Professions should then conduct an overall IT cloud assessment to determine if their organization has data and applications that could readily move to a cloud environment, and which type of cloud public/private/hybrid cloud would be suitable or usable for these projects. As this assessment progresses, IT decision makers must focus on establishing decision rules as to which data and applications can - and cannot - be housed in any form of cloud environment. In doing so, they will discover a definite field of "cloud-eligible" and "cloud-ineligible" data and applications.

5.5. Step Five: Cloud Rollout Strategy
At this stage, it is time to begin rolling-out your cloud computing strategy - gaining buy-in from both organizational leadership and IT staffers, and communicating with both internal and external stakeholders as to the goals, progress, and costs/benefits of each cloud project. This is where the cloud goes from being a test effort to become more mainstream in the way the agency manages its data, its operations, and its people. It becomes part of "normal" organizational operations, just as other prior tech innovations (from telephony to fax to the Internet to e-mail and to social media) have become IT tools, used in support of the agency's IT strategy, and more importantly, its overall strategy.

5.6. Step Six: Continuous Improvement
This is the last step and we call it "continuous improvement" tills we get the fully functional cloud computing based system with live data.

6. ADVANTAGES OF CLOUD COMPUTING

Significant Cost Reduction
As discussed in section 1 the cost of implementing the E-governance is very high but in cloud computing available at a fraction of the cost of traditional IT services; upfront capital expenditures eliminated; dramatically reduced IT administrative burden

Increased Flexibility
On-demand computing across technologies, business solutions and large ecosystems of providers; reduced new solution implementation times.

Access anywhere:
The services will accessed from a single computer or network. Use different computer or move to portable devices, and applications and documents follow.

Elastic scalability and pay-as-you-go
Add and subtract capacity as your needs change. Pay for only what you use.

Easy to implement
No need to purchase hardware, software licenses or implementation services.

Service quality
Reliable services, large storage and computing capacity, and 24X7 service and up-time.

Delegate non-critical applications Outsource non-critical applications to service providers and focus agency IT resources on business-critical applications.

Always the latest software
Updates are automatic in cloud computing.

Private Public Partnership
Applications and documents accessible from anywhere in the world, facilitating group collaboration on documents and projects.

7. CONCLUSION
The conclusion drawn from the above research is that we can get the better services than traditional computing with reduced cost with the help of cloud computing. The cloud model will ultimately serve to transform - in a big way - not just government information technology, but IT in the corporate world as well. The transition, however, will take time But cloud computing is one of the best option to implement or enhance the Government services in education, healthcare and social upliftment of the citizens of the developing countries.

REFERENCES

[1] Gartner, *Press Release: Gartner says cloud computing will be as influential as e-businessSpecial report examines the realities and risks of cloud computing*, June 26, 2008.

[2] C. Johnson, "CIO technology survey results," *CIO*, October 1, 2009.

[3] D.C. Wyld, *Moving to the cloud: An introduction to cloud computing in government*. Washington, DC: IBM Center for the Business of Government, November 2009.

[4] M. O'Gara, "Washington itching to take the lead on cloud computing," *SOA Journal*, July 31, 2009. [Online].

[5] IDC, *Press Release: IDC Finds Cloud Computing Entering Period of Accelerating Adoption andPoised to Capture IT Spending Growth Over the Next Five Years*, October 20, 2008.

[6] S. Hamm, "How cloud computing will change business," *Business Week*, June 4, 2009.

[7] G. Nagesh, "Agencies predicted to move to cloud computing cautiously," *NextGov*, April 22, 2009.

[8] G. Nagesh, "USA.gov's successful shift to cloud computing could become the model," *NextGov*, September 29, 2009.

[9] S. Towns, "Federal web portal moves to cloud computing platform," *Government Technology*,May 1, 2009.

[10] D. Stegon, "Vivek: One stop cloud shop," *Washington TechBisNow*, July 16, 2009.

[11] National Aeronautics and Space Administration (NASA), "About the NEBULA cloud,"

[12] N. Atkinson, "NASA creates a new NEBULA: Cloud computing project," *Universe Today*, June 4, 2009.

[13] National Aeronautics and Space Administration (NASA), "NEBULA services,"

[14] S. Lohr, "I.B.M. to help clients fight cost and complexity," *New York Times*, June 15, 2009.

[15] G. Gross, "Gov't agencies embrace cloud computing: Government agencies say they're moving toward an embrace of cloud computing and software-as-a-service," *PC World*, February 25, 2009.

[16]Government of the United Kingdom, Department for Business Innovation & Skills and Department for Culture, Media and Sport, *Press Release: Building Britain's Digital Future*, June 16, 2009.

[17] Government of Denmark, IT and Telecom Agency, *Press Release: Launching a dialogue on cloud computing in government*, July 17, 2009.

[18] A. DiMaio, "Is there a European government cloud?" *Gartner*, May 19, 2009.

[19] R. Hicks, "The future of government in the cloud," *FutureGov*, 6(3), pp. 58-62, May 2009.

[20] D. Rosenberg, "Supercloud looms for Japanese government," *CNet News*, May 14, 2009.

[21] R. Hicks, "Chinese city builds public cloud to aid innovation," *FutureGov*, September 29, 2009.

[21] IBM, *White Paper - Seeding the Clouds: Key Infrastructure Elements for Cloud Computing*,February 2009.

[22] C. Babcock, "IBM talks up cloud computing: 'Cloud computing is a new way of consuming IT,'" *InformationWeek*, June 27, 2009.

[23] T.P. Strecker, "Govt IT procurement in for shake-up," *The Dominion Post*, June 22, 2009.

[24] J.F. Rayport and A. Heyward, *White paper: Envisioning the cloud: The next computing paradigm, a Marketspace point of view*, March 20, 2009.

[25] J. Erlichman, "Special report: Cloud computing," *1105 Media*, May 2009.

[58] J. Jackson, "New metrics needed for cloud computing," *Government Computer News*, July 30, 2009.

[26] B. Gardiner, "The future of cloud computing: A long-term forecast," *Portfolio*, March 9, 2009.

[27] B. Robinson, "3 steps to lift the cloud," *Federal Computer Week*, January 12, 2009.

[28] B. Golden, "The case against cloud computing, part one," *CIO*, January 22, 2009.

[29] L. Cureton, "Cloud computing in the federal government: On a cloudy day how it will astound you," *Goddard CIO Blog*, March 14, 2009. [Online]. Available:http://blogs.nasa.gov/cm/blog/Goddard-CIO-Blog.blog/posts/post_1237089048316.html

[30] J. King, "5 key questions about cloud storage," *Computerworld*, July 13, 2009.

[31] D. Beizer, "Cloud computing comes into focus," *Government Computer News*, June 11, 2008.

[32] K. Melymuka, "The end of corporate IT: Nicholas Carr is at it again. This time, he envisions a future where IT has gone the way of the electric generator," *Computerworld*, May 9, 2005.

[33] Rastogi A, "E-Governance in India : Challenges and Opportunities", unpublished 2010.

[34] Rastogi A. "Application of Cloud computing for the better E-governance in Developing countries", unpublished 2010.

[35] National Institute of Standards and Technology (NIST) Definition of Cloud Computing, http://csrc.nist.gov/groups/SNS/cloud-computing/ http://sites.google.com/a/bah.com/government-cloud-computing/files