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Cloud Computing Technology for Effective e-Governance

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***Abstract* -- Main objective of this paper is to discuss how to utilize the Cloud Computing (CC) applications for effective functioning of E-Governance activities in India. So, far technocrats as been utilizing various conventional based logical software applications for functioning of E-Governance. Unfortunately appropriate governments failed to get desired results through the existing available applications. Due to this cause of the deficiency, the author proposing sophisticated and suitable Cloud Computing applications just like Accounting, Business Intelligence, Backup, Budgeting, Forecasting, Customer Relationship Management (CRM), E-Mail Collaboration or Groupware, Software as a Service (SaaS),Business Process Management (BPM), Document Management System, Email Marketing, Enterprise Resource Planning (ERP),Human Resource Management (HRM), Investment Tracking and Management (ITM), Operating System, Project Management, School Management, Time Tracking, Translation Management etc., to overcome the existing real time operations of E-Governance problems and issues includes Inaccessibility, Cost, False sense of transparency and accountability etc., Cloud Computing can be used as an Service Oriented Programming (SOP) that uses "services" as the unit of computer work, to design and implement integrated business applications and mission critical software programs. Finally, Author will discuss further sophisticated Cloud Computing applications elaborately in full fledged paper to make the E-Governance user-friendly.**

***Keywords* -- E-Governance, CC, CRM, BPM, ERP, HRM, ITM, SOP**

INTRODUCTION

E-Governance (electronic governance) is using Information and Communication Technologies (ICTs) at various levels of the government and the public sector and beyond, for the purpose of enhancing governance. E-governance is the application of information & communication technologies to transform the efficiency, effectiveness, transparency and accountability of informational & transactional exchanges within government, between govt. & govt. agencies of National, State, Municipal & Local levels, citizen & businesses, and to empower citizens through access & use of information. Information Revolution converting the existing traditional systems in to Knowledge Systems. Business Re-Engineering process effectively implementing at the government as well as the organizations across the globe. Knowledge management is a emerging to the e-governance. E-Governance can smoothen the working procedure of government machinery by providing transparency, effective working, instant response and availability of information of government machinery to end users, time to time. The existing e-governance is very much server centric, cost effective in nature and finds itself unable to address all categories of users starting from rural urban to metropolitan citizens. The success of e-governance lies on wiping out of this discrimination by providing accessibility of different web services of e-governance irrespective of geographical and language barriers. Governance is all about flow of information between the Government and Citizens, Government and Businesses and Government and Government. E-Governance also covers all these relationships as follows:

- Government to Citizen (G2C)
- Citizen to Government (C2G)
- Government to Government (G2G)
- Government to Business (G2B)
-

The object of E-Governance is to provide a SMARRT Government. The Acronym SMARRT refers to Simple, Moral, Accountable, Responsive, Responsible and Transparent Government.

S - The use of ICT brings simplicity in governance through electronic documentation, online submission, online service delivery, etc.

M - It brings Morality to governance as immoralities like bribing; red-tapism, etc. are eliminated.

A - It makes the Government accountable as all the data and information of Government is available online for consideration of every citizen, the NGOs and the media.

R - Due to reduced paperwork and increased communication speeds and decreased communication time, the Government agencies become responsive.

R - Technology can help convert an irresponsible Government Responsible. Increased access to information makes more informed citizens. And these empowered citizens make a responsible Government.

T - With increased morality, online availability of information and reduced red-tapism the process of governance becomes transparent leaving no room for the Government to conceal any information from the citizens

OBJECTIVE OF E-GOVERNANCE

The main objectives of E-Governance are:

1. To build an informed society –

An informed society is an empowered society. Only informed people can make a Government responsible. So providing access to all to every piece of information of the Government and of public importance is one of the basic objective of E-Governance.

2. To increase Government and Citizen interaction –

In the physical world, the Government and Citizens hardly interact. The amount of feedback from and to the citizens is very negligible. E-Governance aims at build a feedback framework, to get feedback from the people and to make the Government aware of people's problems.

3. To encourage citizen participation –

True democracy requires participation of each individual citizen. Increased population has led to representative democracy, which is not democracy in the true sense. E-governance aims to restore democracy to its true meaning by improving citizen participation in the Governing process, by improving the feedback, access to information and overall participation of the citizens in the decision making.

4. To make the Government accountable –

Government is responsible and answerable for every act decision taken by it. E-Governance aims and will help make the Government more accountable than now by bringing transparency's and making the citizens more informed.

5. To reduce the cost of Governance –

E-Governance also aims to reduce cost of governance by cutting down on expenditure on physical delivery of information and services. It aims to do this by cutting down on stationary, which amounts to the most of the government's expenditure. It also does away with the physical communication thereby reducing the time required for communication while reducing cost.

6. To reduce the reaction time of the Government –

Normally due to red-tapism and other reasons, the Government takes long to reply to people's queries and problems. E-Governance aims to reduce the reaction time of the Government to the people's queries and problems, because's problems are basically Government's problems as Government is for the people.

TRADITIONAL ARCHITECTURE

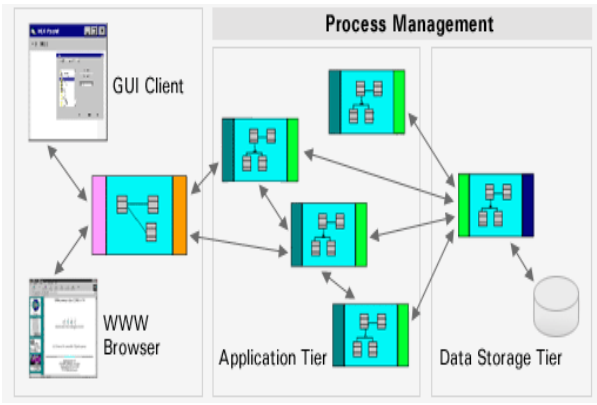

Fig: 1 Architecture of E-Governance

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.

ISSUES OF E-GOVERNANCE

Funding:

Funding is the foremost issue in e-Governance initiatives. The projects that are part of the e-governance initiatives need to be funded either through the Government sector or through the private sector. For the private sector to step into the funding activity their commercial interests needs to be ensured. The projects can be built either on BOO (Built Own Operate) or BOOT (Built Own Operate Transfer) basis. Also the Government interest of Value Addition in services also needs to be taken care of while transferring the services to private sector. Advertising, sharing of Government information etc could be a few revenue generators for the Government.

Privacy:

The privacy of the citizen also needs to be ensured while addressing the issues. Whenever a citizen gets into any transaction with a Government agency, he shells out lot of personal information, which can be misused by the private sector. Thus, the citizen should be ensured that the information flow would pass through reliable channels and seamless network.

Authentication:

Secured ways of transactions for the Government services are another issue of concern. The identity of citizens requesting services needs to be verified before they access or use the services . Here digital signature will play an important role in delivery of such services. But the infrastructure needed to support them is very expensive and requires constant maintenance. Hence a pertinent need still survives, compelling the authorities to ensure the authenticity in their transactions thereby gaining absolute trust and confidence of the citizen.

Interoperability:

A major design issue for integrated service delivery sites is how to capture data in a Web-based form and transfer it to an agency's systems for processing and sharing that information in a common format. In fact the interoperation of various state Governments, the various ministries within a state Government is a critical issue. Further how the various islands of automation will be brought together and built into one is another key issue of e-Governance.

Delivery of services:

The ability of citizens to access these services is another major issue. Since the penetration of PCs and Internet is very low in the country, some framework needs to be worked out for delivery of the e-Services that would be White Paper on E-Governance Strategy in India 12 accessible to the poorest of the poor. What will be the Government's network to deliver those services? Could we have something like a single stop shop of the Government? A proposed mechanism is delivery of the same through the Government Post Offices, for they already have the brick and mortar support and the most extensive network in the nation.

Standardization:

Defining the standards for the various Government services is another issue that needs to be addressed. The

standards need to be worked out not only for the technologies involved but also for issues like naming of websites to creating E-Mail addresses.

CLOUD COMPUTING TECHNOLOGY

Cloud computing encompasses a whole range of services and 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 .Cloud computing is fast creating a revolution in the way information technology is used and procured by organizations and by individuals. According to the IEEE Computer Society Cloud Computing is:"*A paradigm in which information is permanently stored in servers on the Internet and cached temporarily on clients that include desktops, entertainment centers, table computers, notebooks, wall computers, handhelds, etc.*"Cloud computing is the collection of scalable, virtualized resources, which is capable of hosting application and providing required services to the users and can charge as per the uses like utility. The basic model of cloud computing is shown in fig 2.

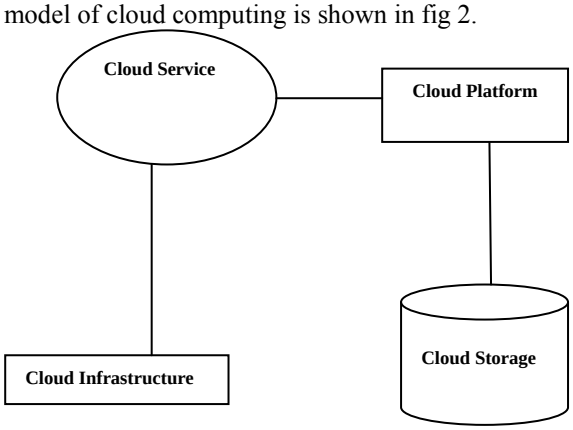

Fig: 2 Basic Model of Cloud Computing

The main goal of cloud computing is to provide ICT services with shared infrastructure and the collection of many systems. In cloud computing every facility is provided in terms of service. It provides infrastructure as a service, software as a service, platform as a service, network as a service, and data storage as a service. The main philosophy of cloud computing is to provide every required things as a service. In order to be clearer, the services in the cloud can be thought in layer architecture where various resources are available in different layers. For individuals, cloud computing means accessing web-based email, photo sharing and productivity software, much of it for free. 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. And for governments, the value proposition of the cloud is especially appealing, given both changing demands for IT and challenging economic conditions. According to the concept of cloud computing, instead of purchasing hardware or software, a user purchases remote access to them via the Internet. There are three levels of cloud computing as shown in fig 3:

- Infrastructure as a Service – IaaS
- Platform as a Service – PaaS
- Software as a Service – SaaS

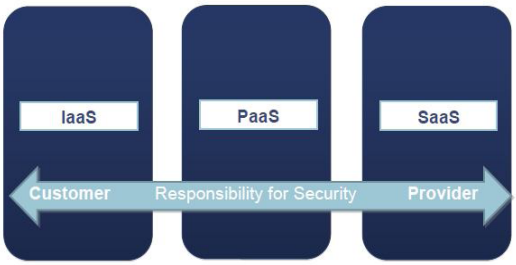

Fig 3

INFRASTRUCTURE AS A SERVICE (IaaS)

It consists in delivering computer infrastructure as a service. The infrastructure can include servers, storage space, network equipment and system software like operating systems and database systems. The infrastructure is provided in the form of virtual environment. The applications are accessible from various client devices through a thin client interface such as a web browser from the client's point of view it looks and operates exactly like standard infrastructure, while in fact it is one of many virtual environments hosted simultaneously on the same physical infrastructure resources.

PLATFORM AS A SERVICE (PaaS)

It consists in delivering application development environment. It supports the full life cycle of designing, implementing, testing, and deploying web applications and services. Developers, project managers, and testers are not required to download or install any development software on their local computers. 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.

SOFTWARE AS A SERVICE (SaaS)

It consists in delivering complete applications such as customer relationship management or enterprise resource planning over the Internet. A client purchases an access to these applications instead of purchasing licenses and exploiting them locally. 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.

PROPOSED MODEL FOR EFFECTIVE E-GOVERNANCE USING CLOUD COMPUTING TECHNOLOGY

❖ **PERUSE**

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 nontechie 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.

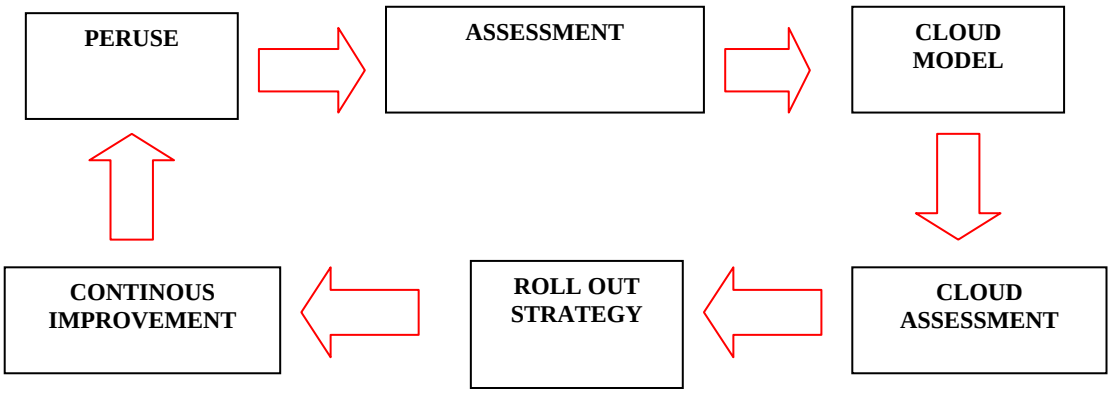

Fig: 4 Six Step Cloud Strategy

❖ **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

❖ **CLOUD MODEL**

In the Third step the IT professionals will develop the prototype for cloud computing based on the requirement for the particular project.

❖ **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.

❖ **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.

❖ **CONTINOUS 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

CLOUD BENEFITS OVER THE E-GOVERNANCE

❖ **Data Scaling**
❖ **Auditing and Logging**
❖ **Performance and Scalability**
❖ **Reporting and Intelligence**
❖ **Policy Management**

CONCLUSION

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.

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