Application Of Cloud Computing Technology For Rural Development

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Abstract

The majority of the population in Chhattisgarh lives in villages. Rural areas has been ignored since several decades and the Cloud will bring the change that is required to bridge the divide between rural and urban areas; and will improve the rural economy. This new information technology model is called "cloud computing," a network based computing 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. In this paper we analyze the study and application of Cloud Computing on education, agriculture, healthcare and business in rural areas of Chhattisgarh. The Cloud enables non English speaking literate individuals to join the information revolution and the future of the country by transacting on the web in the Indian language of their choice. It also enables people of rural areas to access the web based application of cloud computing with the help of tablets and mobile phones. The paper not only discusses vertical integration of the cloud concept and internet but also to expansion into other fields.

Keywords: *Cloud Computing, SaaS, PaaS, IaaS, e-learning, agriculture, healthcare, rural areas.*

Introduction

Chhattisgarh has a majority in rural population which has the potential of making the state economically strong and developed, but in the present scenario due to lack of awareness to the power and capability of Information technology people in the rural areas are deprived of business opportunities, healthcare facilities, quality education, good farming practices and employment opportunities because of the huge costs incurred on infrastructure, software etc. In today's world of competition – "information" is the key to success. Today relevant information outweighs the price of gold. The graphical user interface has simplified one of the most complex issues in the world. The time has come to exploit this medium to the best-suited interests in the other fields of life such as agriculture, education, healthcare etc.

Computing is constantly changing, creating new hardware technologies, improving software, and optimizing business processes. Sometimes the changes in hardware, software, and business processes converge in ways that create significant new opportunities for delivering business services. The advent of cloud computing is one of those events.

Cloud computing is an emerging new computing paradigm for delivering computing services. It represents a shift away from computing as a product that is purchased, to computing as a service that is delivered to consumers from the cloud. The definition of cloud computing provided by The National Institute of Standards and Technology (NIST)[1], as it covers, in our opinion, all the essential aspects of cloud computing: 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. The concept of cloud computing was jointly proposed by Google and IBM in 2007.

1. Cloud Computing: A different way of delivering services

Cloud computing in its simplest form is a model for allocating compute and storage resources on demand as shown in fig 1. It offers new ways to provide services while significantly altering the cost structure underlying those services.

Fig. 1 Cloud computing model

The cloud model is composed of four deployment models and three service models:

Deployment models: Cloud delivery models represent four different ways to obtain resources from the cloud. These four commonly recognized types of cloud environments are:
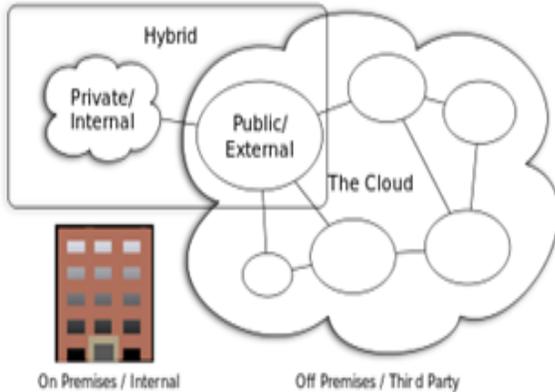

Fig.2 Cloud computing types

Public cloud: The cloud infrastructure applications, storage, and other resources are made available to the general public for free or on pay-per-use model. It is owned by an organization selling cloud services.

Community cloud: The cloud shares infrastructure for specific community with common concerns (security, compliance, jurisdiction etc), whether managed internally or by a third-party and hosted internally or externally.

Hybrid cloud: The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability.

Private cloud: The cloud infrastructure is operated solely for a single organization. It may be owned, managed and operated by the organization or a third party, and may exist on-premises or off-premises.

2. Service Models

Cloud computing is a form of virtualization that shares server hardware and data storage infrastructure remotely located at the service provider data center. Today cloud computing is comprised of three major services:
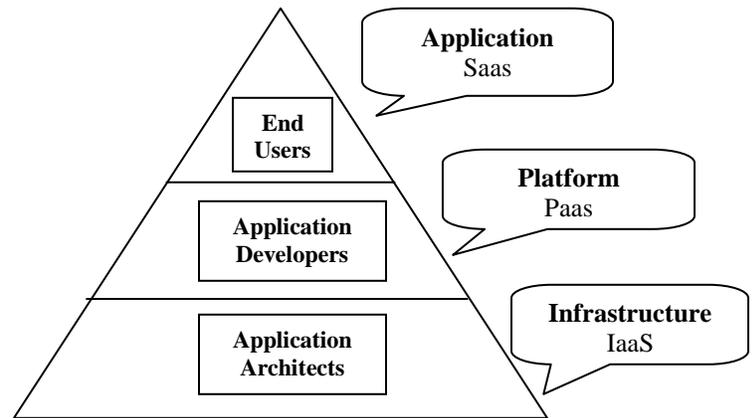

Fig.3 Cloud computing types

1. **Infrastructure as a Service (IaaS)**: It delivers computer infrastructure as a service.So instead of purchasing servers, processors, data center space, memory, network equipments etc clients buy them as a fully outsourced service.

2. **Platform as a Service (PaaS)** : It delivers a computing platform as a service where the developers can develop their own applications using web based tools and run them on systems software and hardware provided by another company.

3. **Software as a Service (SaaS)** : It is a model of software deployment where an application is hosted as a service provided to customers across the Internet.

3.Applications of Cloud Computing for Rural development:

The concept of cloud computing with internet must be infused into the rural areas through PCs, laptops, notebooks, tablets or mobile phones etc. connected to cloud so that the information is available to the poorest of the poor giving them a better life.

1. Education: Rural education in CG is facing problems like lack of qualified teachers, lack of IT institutes with proper infrastructure and teaching facilities, lack of involvement in

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and control of educational matters and difficulties of students in higher education [4]. Lack of IT study institutes in rural areas because of the huge amount of money spent on buying software licenses, setting up proper infrastructure is required for computation, storage etc.
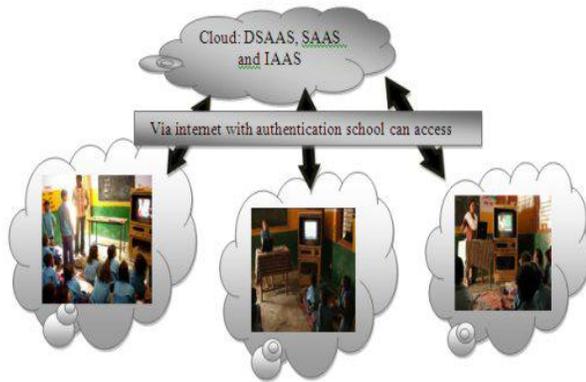

Fig.4 Cloud computing model for e learning

The three fundamental services offered by cloud computing i.e. IaaS, PaaS and SaaS will reduce the total expenses on setting up an IT institute by huge amount because:

- There is no need to buy expensive software licenses when they can pay for it on a pay-per cycle basis whether it is software.

- There is no need to setup huge and expensive infrastructure (such as high speed processing computers or huge data storage devices) when they can use these resources from the cloud providers.

- There is no cost involved in procuring and maintenance of infrastructure- mainly software and hardware.

To get benefitted by cloud computing model a *Web based education system* can be developed and deployed on the Cloud. The application should be an interesting and challenging representation of free education material (video lectures, powerpoint slides, eBooks, 3D diagrams and animations), so that it holds the attention of the student. The application must contain video lectures with communication in learner's language, periodic updating of information of the same must be monitored. Students would be able to access

the web based education system without purchasing any licensed software, can share knowledge by communicating between schools handling the same curriculum. As the application is run in the Cloud the rural schools can use PCs with lower price, with smaller hard disks and less memory. There is no requirement of a CD or DVD drive, because no software programs have to be loaded and no document files need to be saved at the user side.

2. Aadhaar (Unique Identification of People): UID the Common People Jan Lokpal Bill, one and only single used instead of Voter ID Card, Address Proof like Electricity Bill, Rashan Card etc. Aadhaar is the single source of identity verification to access services such as obtaining a bank account, passport, driving license and so on.

Cloud-computing infrastructure for Aadhaar: A *Cloud Based Management Information System (CBMIS)* can be developed for authenticating the identity of an individual. The use of Aadhaar-based authentication linked to a cloud-based management information system (MIS) would enable the public distribution system (PDS) to address broader procurement, mass storage and monitoring challenges online in real-time[2].

- Aadhaar-based authentication across PDS would enable the government to guarantee food delivery to the poor. Government can keep an eye on the storage and timely distribution of food grain.

- Using Aadhaar (UID number) to identify beneficiaries in PDS databases will eliminate duplicate and fake beneficiaries from the list.

- Detection of frauds, improper or duplicate claims can be monitored.

- Using large number of high speed servers in the cloud the analysis of issue status of card will be done in less time.

- An SMS alert containing information such as time the truck left, quantity of grain it is carrying, and grain prices can be sent to the resident's Aadhaar-linked mobile number, when the truck leaves from the warehouse for the FPS depot.

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3. Health care: The National Rural Health Mission (NRHM) is a government scheme that aims at providing valuable healthcare services to rural households all over the country. An web based application informing the facilities offered by NRHM can be deployed on cloud infrastructure which will enable people in rural areas:

- To access Hospitals' Database to check the location of hospitals nearby.

- To get advised by the specialists in metro cities advice through Audio/video/web conferencing, without going there personally.

- To get cost effective consultation, prescription online.

- With shortage of medical resources in the country, it may be useful to have medical expertise of good doctors wherever needed through internet.

- To talk to service help desk number obtained from the web based application for advice in case of small injuries and health related problems.

4. Agriculture: People from rural areas are unable to sell their own production (especially in the agriculture and the handicraft industry) in the market directly. Many brokers/agents pop up in between the retail and the production which ultimately leads exploitation of the farmers [3]. If the farmers involve themselves in e-commerce and sell their produced items directly to the end users/retailers which is very much possible with Agriculture management information system with the use of cloud computing.

A Web based Agriculture management information system can be useful in agriculture field as it brings latest bulletins regarding weather reports, prices, fertilizer, sowing of crops and its pricing etc., to farmers at rural areas [5].

- Scientists working at Agriculture research stations can add their discoveries, suggestions regarding modern techniques for cultivation, usage of fertilizers in the cloud, can obtain cultivation history of the region etc.

- Sales to customers and planting (producing) for cultivated land can be performed together.

- Progress management and operational checks can be performed on the basis of automatic collection of results.

- Management of all data related to land, including location, area; soil and land characteristics can be integrated.

- Reports can be easily issued by sharing on-site photographs to administrators and workers.

- Cloud based agriculture system can benefit Government officials/private organizations by obtaining/ inserting information regarding pricing of crops, supply of seeds, farming of lands at various places.

- Query for information and access in no time at free of cost from free services or by paying less amount for pay services are also available.

Advantages of cloud computing

- **Lower computer costs:** As the cloud computing are web based, and are run in the cloud desktop PC, laptops, tablets does not need the processing power or hard disk space .

- **Improved performance**: Computers in a cloud computing system boot and run faster because they have fewer programs and processes loaded into memory.

- **Reduced software costs**: Instead of purchasing licensed software applications, it can be accessed for free.

- **Unlimited data storage capacity and increased data reliability:** A computer in the cloud can store hundreds of Petabytes of data in the cloud and crashing in the cloud does not affect the storage of data.

- **Universal document access**: Document stay in the cloud, and can be accessed through an Internet connection

- **Device independence**: Changes to computers, applications and documents follow you through the cloud.

Limitations of Cloud Computing

- Requires a high speed internet connection.

- If the cloud servers happen to be backed up at that moment, or if the Internet is having a slow day, we would not get the instantaneous access we might expect from desktop applications.

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- With cloud computing, all data is stored on the cloud so it runs the risk of security

Conclusion

Cloud will continue to evolve as the foundation for the future internet where we will be interconnected in a web of content and services. The paper briefly explains the deployment of web based application on the cloud and knowledge of internet to improve education, agriculture and healthcare in rural areas of Chhattisgarh. The introduction of information technology in rural areas will not only benefit the people there but also the software providers by changing the role of IT people from technical support to project manager, business analyst, quality analyst, software developer. The widespread use of pirated software can be controlled using cloud as the software's are available at lower costs in the cloud and hence benefitting the software providers. By using cloud computing as an opening into the fields where IT is yet to be applied it is possible to establish new models for the application of IT.

Cloud computing is a simple idea with a big impact on society which can improve the lifestyle of people.

References

1. Peter Mell and Tim Grance, — The NIST Definition of Cloud Computing, NIST Report, July 2009 Recommendations of National Institute of Standards and Technology.http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf
2. Shaily Malik *et al.,* "Cloud Computing - A Hope For The Rural India", International Journal of Computer Applications (0975 - 8887) Volume 1 – No. 20,2010
3. Micheal Miller, Cloud Computing, 2008, Edition
4. Cloud Analyst http://www.cloudbus.org/cloudsim
5. Piracy rates in India http://www.bsa.org/ country.aspx
6. Gmail,http://www.technopulse.com/2011/06/cloud-service-models-saas-paas-iaas.html
7. G. Gruman, "What cloud computing really means", InfoWorld, Jan. 2009
8. www.joyant.com, Performance and scale in cloud computing, A Joyant white paper, 2010
9. http://en.wikipedia.org/cloud_computing
10. The Application of Cloud Computing in Education Informatization, BoWang, HongYu Xin*g*
11. M. Armbrust, A. Fox, R. Griffith, A. Joseph, R. Katz, A. Konwinski, G. Lee, D. Patterson, A. Rabkin, I. Stoica, and M. Zaharia. —A view of cloud computing. *Communications of the ACM*, 53(4), pp.50–58, April 2010.
12. Buyya R, "Market-Oriented Cloud Computing: Vision, Hype, and Reality of Delivering Computing as the 5th Utility," 9th IEEE/ACM International Symposium on Cluster Computing and the Grid, pp. 1, 2009

Biography

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