A Study of Cloud Computing Towards Rural Education

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Abstract

Advances in expertise tender fresh opportunities in attractive training and education. Educational establishments continue to look for opportunities to diminish the way they supervise their resources. The economic crisis that befell the world following the near cave in of the global financial system and due to these educational establishments affected. In this context cloud computing is likely to be one of those opportunities required by the cash-strapped educational establishments in these difficult times and could prove to be of massive assistance to them due to its flexibility . Cloud computing is a rising new computing paradigm for delivering computing services. This computing come near relies on a number of existing technologies, e.g., the Internet, virtualization, Web services, etc. The stipulation of this service in a pay-as-you-go way through the well-liked medium of the Internet gives this service a new uniqueness. In this, some aspects of this uniqueness will be highlighted and we endeavor to frame the full space of cloud-computing (IT Support) for rural education.

I. Introduction

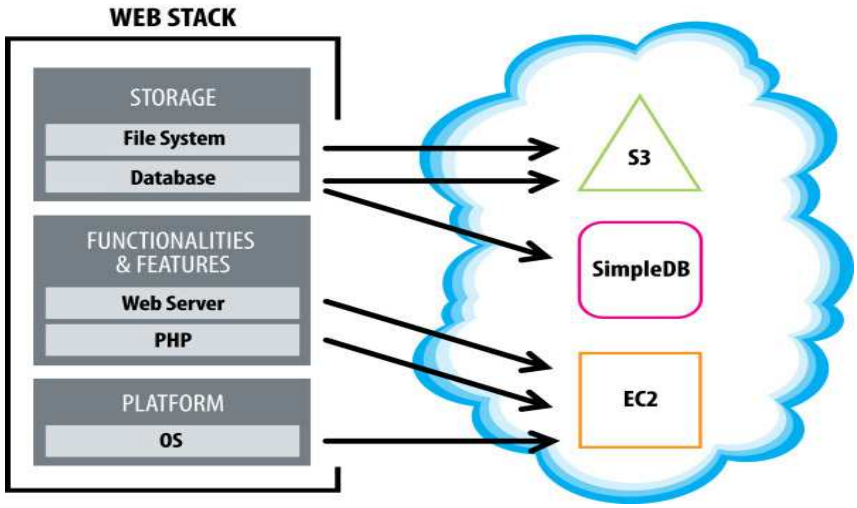
India's 72.2 % of population resides in the rural areas and villages [1]. India's huge population has a great potential to make it an economic as well as an IT superpower but the major obstacle is the lack of infrastructure for the development of the Educational schools and colleges in rural areas. With the introduction of the new cloud computing paradigm these problems can be easily eliminated because it doesn't require the end users to have any type of infrastructure, as all of them are delivered as services (whether it be infrastructure as a service (IaaS), Platform as a service (PaaS), Software as a service (SaaS)) on a pay per-use basis (utility computing) virtually which makes it easier and cheaper for the people living in rural areas to actively involve themselves in the this sector [2].

Cloud computing refers to the utilization of shared, elastic resources and processing power accessed via the Internet. In some ways, it hails the reversion to the golden age of time-sharing but with significant improvements to the distribution philosophies underlying the delivery infrastructure. So, analogously, we now have the shared wonders of

Hyde Park, where everyone and anyone can chill on the bench, throw some Frisbee, instead of having to financially pool money to buy a private park to shoot rabbits.

What is a cloud?

Developers today can avoid scalability and availability worries in case their site turns into the next big thing by developing upon the cloud. Traditionally, a typical web application stack will look like that on the left below:



Cloud-based development involves in some sense, the outsourcing, of various parts of the application out of the server and into the cloud. So instead of storing images, videos and other objects in the file system, they are stored on the cloud. Instead of using a local database, a cloud-based database is used instead. Batch-processing and other functionalities are also performed on the cloud. In other words, developers using the cloud will move most or all of the components of a web application into the cloud. The most significant benefit of course is that the cloud´s capacity is theoretically limitless as compared to that of some local servers, saving the need to frantically add hardware or worry at all if traffic explodes.

II. Characteristics of cloud computing

Cloud computing may exhibits following characteristics [4]:

1. **On demand self-service**- A consumer may have provision for computing capabilities.
2. **Broad network access**- Capabilities are available over the network and access through standard mechanism.
3. **Resource pooling**- Provider's computing resources are pooled to serve consumers.
4. **Rapid elasticity**- Capabilities can be rapidly and elastically provisioned to quickly scale out and rapidly released to quickly scale in.
5. **Measured service**- Cloud systems automatically control and optimize resource use by leveraging a metering capability.

Fig. 1. Cloud computing

III. Types of clouds

Based on purpose and characteristics cloud computing uses several delivery models [6]:

1. Public Cloud

Cloud computing services from vendors that can be accessed across the internet or a private network using one or more data centers, shared among multiple customers with varying degrees of data privacy control. Public clouds are run by third parties, and applications from different customers are likely to be mixed together on the cloud's servers, storage systems, and networks. Public clouds are most often hosted away from customer premises, and they provide a way to reduce customer risk and cost by providing a flexible, even temporary extension to enterprise infrastructure.

2. Private Cloud

Private clouds are built for the exclusive use of one client, providing the utmost control over data, security, and quality of service. The company owns the infrastructure and has control over how applications are deployed on it. Private clouds may be deployed in an enterprise datacenter, and they may also be deployed at a co-location facility. Private clouds can be built and managed by a company's own IT organization or by a cloud provider. In this "hosted private" model, a company such as Sun can install, configure, and operate the infrastructure to support a private cloud within a company's enterprise datacenter. This model gives companies a high level of control over the use of cloud resources while bringing in the expertise needed to establish and operate the environment.

Fig. 2. Public Cloud

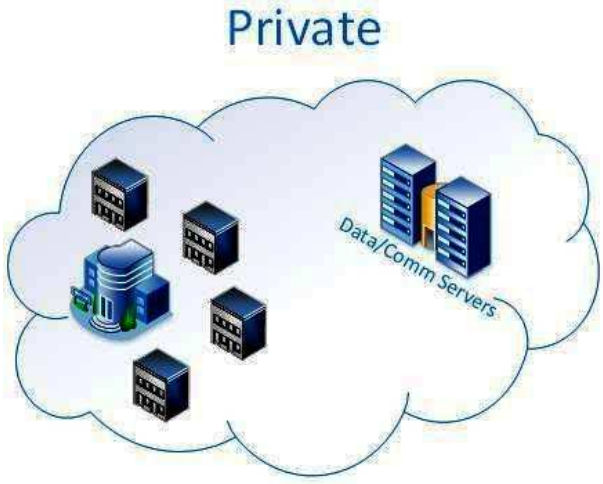


Fig. 3. Private Cloud

3. Hybrid Cloud

Hybrid clouds combine both public and private cloud models. They can help to provide on-demand, externally provisioned scale. The ability to augment a private cloud with the resources of a public cloud can be used to maintain service levels in the face of rapid workload fluctuations. This is most often seen with

the use of storage clouds to support Web 2.0 applications. A hybrid cloud also can be used to handle planned workload spikes. Sometimes called "surge computing," a public cloud can be used to perform periodic tasks that can be deployed easily on a public cloud. Hybrid clouds introduce the complexity of determining how to distribute applications across both a public and private cloud. Among the issues that need to be considered is the relationship between data and processing resources. If the data is small, or the application is stateless, a hybrid cloud can be much more successful than if large amounts of data must be transferred into a public cloud for a small amount of processing.

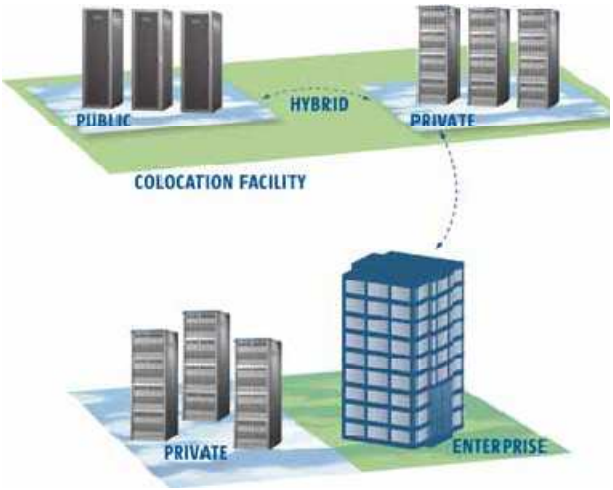


Fig. 4. Hybrid Cloud

IV. Impact of cloud computing in education

The impact of cloud in education has attracted researchers and countries attention all over the world especially due to technological implications of and open access to knowledge. The general infrastructure for providing conceptual and operational integration of ICT (Information and communications technology) in all activity fields and daily life areas translates, in the case of higher education, into management, education and research.

One report by McKinsey & Co. uncovered 22 distinct definitions of cloud computing. For this exercise, we will use the Gartner definition of cloud computing as "a style of computing where massively scaleable IT-enabled capabilities are delivered 'as a service' to external customers using Internet technologies."1 McKinsey presents a typology of software-as-a-service that elaborates the Gartner definition and is characterized by:

- Delivery Platforms
  - Managed hosting—contracting with hosting provider to host or manage an infrastructure (IBM, Open Source)
  - Cloud computing—using an on-demand cloud-based infrastructure to deploy an infrastructure or applications (Amazon Elastic Compute Cloud)
- Development Platforms
  - Cloud computing—using an on-demand cloud-based development environment to provide a general-purpose programming language (Bungee Labs, Coghead)
- Application-led Platforms
  - SaaS applications—using platforms of popular SaaS applications to develop and deploy application (Salesforce.com, NetSuite, Cisco Webex).

There have been a number of reviews on security and privacy in the Cloud. Xiao and Xiao identifies the five concerns of Cloud computing; confidentiality,

integrity, availability, accountability, and privacy and thoroughly reviews the threats to each of the concerns as well as defense strategies.

V. Impact of cloud computing in rural education

According to Dr. Bruce White, There was a time when every household, town, farm or village had its own water well. Today, shared public utilities give us access to clean water by simply turning on the tap; cloud computing works in a similar fashion. Just like the water from the tap in your kitchen, cloud computing services can be turned on or off quickly as needed. Like at the water company, there is a team of dedicated professionals making sure the service provided is safe and available on a 24/7 basis. Best of all, when the tap isn't on, not only are you saving water, but you aren't paying for resources you don't currently need. Some other benefits are –

- **Economical:** Cloud computing is a pay-as-you-go approach to Rural Educational Centers, in which a low initial investment is required to get going. Additional investment is incurred as system use increases and costs can decrease if usage decreases. In this way, cash flows better match total system cost.
- **Flexible:** The Educational Sectors that be hopeful of fluctuations in infrastructure load do not have to scramble to secure additional hardware and software. With cloud computing, they can add and subtract capacity as its network load dictates, and pay only for what they use.
- **Consistent Service:** Cloud computing can offer a higher level of service and reliability, and an immediate response to emergency situations.
- **Increased Effectiveness:** Cloud computing frees the user from the finer details of IT system configuration and maintenance, enabling them to spend more time on mission-critical tasks and less time on procedure and maintenance.
- **Energy Efficient:** Because resources are pooled, each educational community does not need to have its own dedicated infrastructure. Several groups can share computing resources, leading to higher utilization rates, fewer servers, and less energy consumption.

VI. Conclusion

The cloud computing appears to be truly obliging in rural educational division. There is a marvelous potential for cloud computing groundwork in the Rural Educational School and Colleges. Cloud computing would assistance Rural Education centers to accomplish effective use of their hardware and software stashes and to increase expertise in rural sector by cultivating the exploitation of resources to the thoroughgoing. Not only will it lead to improved education in these rural areas but also in gigantic business opportunities and better educational facilities. However, there are some challenges that are present when it comes to the use of cloud computing in the Rural Educational Sector. All these experiments should not be painstaking as path chunk in the pursuit of cloud computing. It is rather important to give thoughtful attention to these issues and the conceivable ways out before embracing the technology.

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