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A Study on Cloud Computing & Its Implementation in the Field of Education

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ABSTRACT

With the advancements in Information, Technology and Communication, the term Cloud is becoming more and more popular. Basically we can say that Cloud is space available on the Internet that provides users with specific services for their use. It is a subscription based service where we can obtain network storage space and computer resources.

KEYWORDS: OpenNebula, Rapid Elasticity, Deployment Models.

INTRODUCTION

Cloud Computing is not a new concept it was used long back in 1950s where large terminal computer i.e. mainframe where used to perform user specific operations.

In 1960 John McCarthy predicated that computation one day would be organized as a public utility. The development of Internet has led to development of Dynamic Web which provides more services. It all started in 2008; when Eucalyptus became the first open source, Amazon Web Service API-compatible platform for deploying private clouds. In the same year OpenNebula, enhanced in the RESERVOIR European Commission-funded project, became the first open-source software for deploying private and hybrid clouds, and for the federation of clouds. At the end of 2008 efforts were focused on providing quality of service guarantees to cloud-based infrastructures resulting to a real-time cloud environment.

What is Cloud Computing?

The most popular definition of Cloud Computing is provided by National Institute of Standards and Technology (NIST) in 2009 which was later updated in 2011.

The definition can be quoted as:

"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.

This CLOUD model is composed of five essential characteristics, three service models (Software / Platform / Infrastructure as a Service), and four deployment models, whereas the five characteristics are: on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured service. The deployment models include private, community, public and hybrid CLOUD."

The four service models can be given as follows:

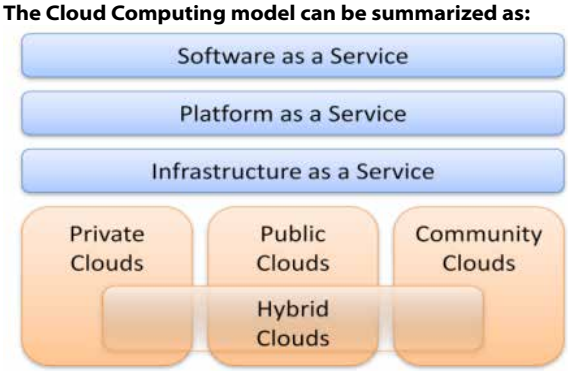
1. Software as a Service (SaaS): A SaaS provider gives the user with access to both resources and applications. By using SaaS, we do not need have the physical copy of the software to be installed on the user computer.
2. Platform as a Service (PaaS): A PaaS provides gives the user with the platform that the user require to develop and operate applications over internet.
3. Infrastructure as a Service (IaaS): An IaaS the subscriber completely outsources the storage and resources such as Software and Hardware.

Types of clouds

There are different types of clouds that we can use depending on the needs of the users. Different categories of clouds can be given as:

1. Public Cloud - A cloud which can be accessed by any subscriber with an internet connection. The user can also use the cloud space through it.
2. Private Cloud - A cloud which is established for a specific people or group or organization and which has a limited access is a private cloud.
3. Community Cloud - A cloud is shared among community of people is a community cloud.
4. Hybrid Cloud - A cloud which is a combination of at least two clouds. This cloud may include are a mixture of public, private, or community.

The Cloud Computing model can be summarized as:



In the above diagram, Network as a Service is not implemented as it is still not been part of Cloud Computing Model as it is still in the implementation phase.

Characteristics of Cloud Computing:

1. On-demand self-service: A consumer can use required parameters such as network space and disk storage without human intervention.
2. Broad network access: The services can be accessed through means of computer, laptops, or even through mobiles.
3. Resource pooling: There is facility of Resource Pooling which allows multiples resources to use as per the convenience of the user. Users can assign as well as de assign resource as per his or her requirement.
4. Rapid elasticity: According to demand of user, the resources are made available to the user's process. In this environment number of resources would be directly assigned to a task. If resources are not available then a replica of resource process is created.
5. Measured service: Clouds allows the resource to be controlled and used based on the measuring criteria such as storage, processing, bandwidth etc. Various resources can be controlled, monitored and reporting can be done various resources used by consumer which provides a transparency between provider and consumer.

Cloud Computing in Educational System

For those people in the educational sector, the Cloud seems like a nebulous and unattainable technology goal, used only by large enterprises and corporations. But in real sense the Cloud has the power to drastically change the goals of educational system. It could make easier for institutions to empower their students to succeed while at the same cutting costs and expanding accessibility.

Today's educational system is suffering from a lack of resources such as small classrooms, staff cutting, shortage of qualified teachers and constantly changing standards. The Cloud would be a valuable asset to improve accessibility in the quality of education and to boost achieve-

ment. The Cloud can help address all the above challenges in a number of ways by capitalizing on the economics of scale. The problem of outdated, too small, overcrowded classrooms can be addressed by the concept of virtualizing the classroom environment.

Students can just log onto a space given online and attend classes outside the classic classroom environment. Also the lecturers do not have to deal with the overflowing classes problems, instead they can give their main focus on the creating content that students can understand, develop their student skills and help students for better preparation for exams. The Cloud can be used to improve collaboration not only between students and teachers, but also between administrations and staff of the various colleges. The Cloud is a great way to address the needs of those students who have problem of face to face interaction, public speaking and/or small discussion group work.

Not only students can solve their problems, but they can also share their ideas, which would indirectly increase the student's academic performance along with the quality of the education. With advent of online videos, the teachers can provide universal access to teaching and could give a demonstration on any topic.

Cloud is not only useful just for teaching; it can be used by administrative departments also. So there is no need of paper based record keeping which in turn would help in bringing the administrator efficiency. With the advance of Cloud Computing quality learning materials like books and software can equalize access to these scarce resources.

Some of the use of Cloud in Colleges and Universities can be stated as below:

a. Store expansive amounts of sensitive data and information that's easily accessible.
b. Stay current (e.g. provides students with digital campus storage for class notes, papers and projects).
c. Acquire and implement the latest software and application updates.
d. Streamline enrollment and admissions processes that are costly and time-consuming.
e. Turn to subscriptions that are scalable and provide options.

Advantages/Disadvantages of Cloud Computing
Advantages:

As stated above many features and services of Cloud Computing have made it one of the powerful technologies. If properly used, then Cloud Computing can provide vast benefits to all types of Businesses. Some of advantages of the Cloud Computing can be stated as:

1. Cost Effective: It is probably one the most cost efficient method which can be easily used, maintained and upgraded. Simple desktop software costs businesses a lot of expenses. In addition to it there are licensing fees for multiple users which proves to be very expensive. On Other hand Cloud provides all the services at much cheaper rates. This can significantly lower the businesses IT expenses. Besides all this there are many options such as one-time payment, pay as we use and other scalable options available.
2. Unlimited Storage Space: Cloud provides us with the facility of unlimited storage space so there nothing to worried about the storage space or increasing the business current space available.
3. Backup and Recovery: As all the Data is stored in Cloud, backing up data and recovering the data on Cloud is quite easier than on physical machines.
4. Automatic Software Integration: Only those software applications that we require would be available to us. In Cloud, Software Integration occurs automatically. No special efforts are required to customize and integrate our applications.
5. Easy Access to Information: Once we are register within the Cloud, we can access the information from anywhere at whatever time, with just an internet connection. Also there is no boundary of time and location for accessing the information.

Disadvantages:

1. Technical Issues: It is true that information and data on the Cloud can be accessed anytime and from anywhere at all, but there may times when this system can have some serious issues. At that time we might have some problems. Even the best Cloud Service providers have problems in spite of keeping up high standards of maintenance. Also we need a good internet connection for logging on the server at all times. If there are any network or connectivity problems then we would stuck at that point.
2. Security in the Cloud: The other major issue in the Cloud is Security. We should be aware that we will be surrendering all our organization's sensitive information to a third party Cloud Service provider. It could be put organization at great risk. Thus before adopting this technology, we need to make absolutely sure that we choose the most reliable service provider, who will keep our information totally secure.
3. Prone to Attack: Now as we are storing all the information of organization in Cloud, it is vulnerable to external hack attacks and threats. As we know that nothing on the internet is completely secure and hence, there is always a possibility of stealth of sensitive data.

CONCLUSIONS

Cloud Computing can solve many problems related of educational institutions. It would be booming technology in the nearby future. It would be helpful not only to the students but also to teachers, administrators and staff working in educational institutions.

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