

Cloud Computing Applications in Higher Education

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Abstract - Cloud computing is an Internet-based computing service provided by the third party allowing share of resources and data among devices. It is widely used in many institutions and organizations. Now a days and becoming more popular because it changes the way of how the Information Technology of an organization is organized and managed. It provides lots of benefits such as simplicity and lower costs, almost unlimited storage, least maintenance, easy utilization, backup and recovery, continuous availability, quality of service, automated software integration, scalability, flexibility and reliability, easy access to information, elasticity, quick deployment and lower barrier to entry. This paper begins with defining cloud computing, its key characteristics, deployment and service models, relationship between them. Then paper describes the role of cloud computing in higher education.

Keywords - Cloud computing, Characteristics of Cloud computing, Models of Cloud computing, Higher education.

1. Introduction

In the existing system internet allow the user to access contents in the form of video, audios, email and information from the web pages. Today's the internet with cloud computing provides virtual data center through this we would able to rent from a virtual storefront to build a data center like cpu, storage, memory and also add web application servers, databases, enterprise server bus, platform..etc. Higher education is one of the pillars of society development. Through the partnerships between universities, government and industry, researchers and students have proven their contribution to the transformation of society and the entire world economy^[2]. In the field of education, cloud computing is very practical for a variety of reasons. Indeed, cloud computing will enable a certain educational institution to actually make use of the global internet resources for data analysis and data storage. The cloud is a valuable tool that can be used to improve accessible to quality education and to boost achievement Students can actually log onto a space online and attend classes outside of the classroom environment. As such, the lecturers do not have to deal with overflowing classes and students packed like sardines; instead, they can focus their attention on creating content students will understand, developing their students' skills and helping students pass their exams. Cloud allows students to share their ideas, education infrastructure and tools which results drastic reduction in educational institution's overhead expenditures on quality learning materials like books and software and equal access to these scarce resources which helps the students' academic performance should increase along with the quality of education.

2. Cloud Computing

Cloud Computing architecture comprises of many cloud components, which are loosely coupled. 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, and four deployment models."

Characteristics

There are five characteristics that define cloud computing

On demand self service

The users need any information immediately then user can easily log into the account of the service provider and extract the desired information without any difficulty.

Network Access

The users can access their information from anywhere in the world. if need log into their account using an internet connection in order to extract the important information from the service provider website.

Resource pooling

Cloud computing permit several clients to knock into a single pool of a server or disk storage or some other types of specific storage. By the use of resource pooling user can save money.

Elasticity

The user sometimes require additional resources in a small period of time in this case cloud computing provides additional resources. for example the company get new clients and need 2 extra servers to meet the customers'

business requirements, the service provider could permit the company to support two different servers at a time.

Usage fee

Once the user use it specific period of time, he has to pay for that amount of time. Don't need to pay in advance therefore more companies are choosing it for the purpose of storage. This concept is like water or electricity

Three main service models of cloud computing are

1) Infrastructure as a Service, or IaaS,

It based on physical asset, we can see and touch: servers, storage and networking switches. In this case cloud computing service provider provides computing and storage capability. it allow the users to customize their own server environment which means binding certain server configuration and operating system and software together. IaaS platform will add new servers or storage spaces of user automatically according to the cpu utilization of the server.

2) Platform as a service or PaaS

At the PaaS level, what the service providers offer some logical resources, such as databases, file systems, and application operating environment. cloud computing services that supply an on-demand environment for developing, testing, delivering and managing software applications. PaaS is designed to make it easier for developers to quickly create web or mobile apps, without worrying about setting up or managing the underlying infrastructure of servers, storage, network and databases needed for development.

3) Software as a Service (SaaS).

At the SaaS level, service providers offer consumer or industrial applications directly to individual users and enterprise users. SaaS method for delivering software applications over the Internet, on demand and typically on a subscription basis. With SaaS, cloud providers host and manage the software application and underlying infrastructure and handle any maintenance, like software upgrades and security patching. Users connect to the application over the Internet, usually with a web browser on their phone, tablet or PC.

2.1 Applications of Cloud computing

a. Clients would be able to access their applications and data from anywhere at any time. They could access the cloud computing system using any computer linked to the internet

b. Corporations that rely on computers have to make sure they have the right software in place to achieve goals. Cloud computing systems give these organizations company-wide access to computer applications. The companies don't have to buy a set of software or software licenses for every employee. Instead, the company could pay a metered fee to a cloud computing company.

c. Servers and digital storage devices take up space. Some companies rent physical space to store servers and databases because they don't have it available on site.

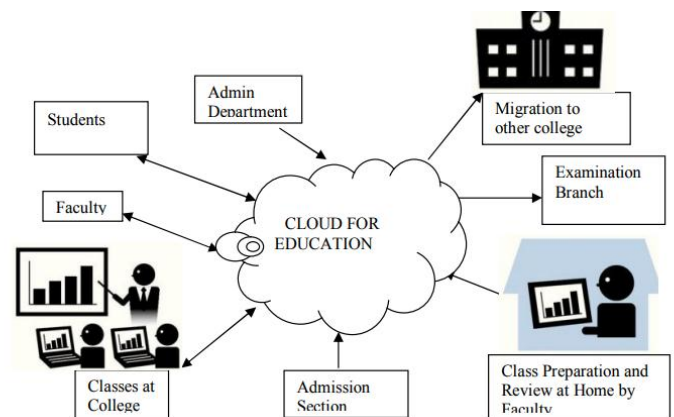
Cloud computing gives these companies the option of storing data on someone else's hardware, removing the need for physical space on the front end.

d. Cloud computing systems would reduce the need for advanced hardware on the client side.

2.2 Cloud computing in higher education

In a country like India with a population of over a billion, one of the biggest challenges that the government faces in providing education is the provisioning and maintenance of infrastructure. The infrastructural issue can be viewed from two dimensions: on one hand, the lack of investments and on the other hand, the difficulties in maintaining such infrastructures. This article focuses on the lack of investment and suggests the use of cloud computing as a form of possible remedy.

The key benefit of Cloud computing in education is financial: Just like in other industries, learning institutions will be able to reduce costs when it comes to maintaining the IT infrastructure including licensing, energy consumption, technical labor, as well as hardware due to virtualization that comes with cloud computing. The user experience is highly enhance with the adoption of cloud computing. In this case the users will include teachers and students. Learning content can be retrieved from a central point and can be accessed from anywhere anytime instead of being relayed from local servers only, hence administration and management gets streamlined. Centralized learning content ensures that the staffs focus is on providing high quality learning experience rather than struggling with a system that is inefficient.



Services attached to education cloud

The learning needs of students in the current generation are quite different from those of the past generations. As a result of the changing times, students in the current generation prefer the use of technology and its various applications. Cloud computing provides students with fast access to core course materials and connects them with one another.

2.3 Benefits of Adopting Cloud Computing by Education Institution

The following is a comprehensive list of advantages that come with the use of cloud computing within the education sector-

- i) Institutions of higher learning can allow their technological infrastructure to be used by other firms as a way of enhancing research
 - ii) The efficiency associated with cloud computing may aid learning institutions to keep pace with the growing need for energy cost and resources.
 - iii) Cloud computing has an extended reach which enables universities to teach students in different and new ways, as well as ensure they can manage massive workloads and projects better.
 - iv) It helps students appreciate new technology better when they join the global workforce.
 - v) Cloud computing exempts learning institutions from data management, and reduces costs and requirements that come with data security.
 - vi) It provides services and online tools that ensure collaboration capabilities and secure communication.
 - vii) It allows students and teachers to access, publish and share class calendars, documents, as well as web pages
 - viii) Problems including insufficient infrastructure, lack of teachers, low rates of graduation, as well as tiny classrooms can be addressed by use of cloud computing.
 - ix) Geographical distances will be bridged as people can study from anywhere
 - x) Institutions that lack adequate infrastructure can also provide education of high quality because they ought not to purchase software licenses, hardware, or incur implementation services costs.
- Upgrades and maintenance to be easier.
- xi) Service is available anytime any day as required by the user.
 - xii) Good accessibility because service and data are available to the public.

3. Challenges

There are a number of challenges in cloud computing

1. Cloud computing did not originate in the college environment, there are few colleges that are taking cloud computing seriously enough to be developing or teaching courses in this subject like MIT.

2. Cloud computing is truly multi-disciplined, in that the average system admin needs to understand a bit about networking, virtualization, routing, data movement, data use, process management, and security to be helpful to an organization using cloud computing.

3. Educators are not prepared to teach cloud computing – in general with a broad paint brush, many computer science

educators at all but the most prestigious colleges are simply not able to teach this not so new but still cutting edge technology.

4. Cuts in funding – everyone everywhere has had their budgets slashed while we wait for consumers to come back and start spending again. This includes colleges because many colleges' budgets are tied to the states budgets that are tied directly or indirectly to sales tax, use tax, B&O tax, or the many other ways that government taxes both businesses and consumers to accomplish tasks.

3. Conclusion

Cloud computing evolves models offering significant advantages, yet potential mistakes as well. Cloud computing seems to be worth exploring from small businesses and major enterprises to top universities and online colleges. The cloud is composed to develop the educational sector, and schools and learning institutions. Basically, cloud computing will enable learners to formally undergo education even without going to the four-walled classrooms. In fact cloud can also help those families who travel a lot, cloud computing will allow their children to travel while continually learning lessons, submitting assignment, and getting grades.

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