

Cloud Computing in Education

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Abstract

Education plays an important role in maintaining the economic growth of a country. Now a days the Classroom teaching is changing and students are becoming more technology oriented, innovative and therefore in this changing environment it's important that we think about the latest technologies to incorporate in the teaching and learning process. One of the latest technologies prevailing now days is Cloud Computing. By sharing IT services in the cloud, educational institution can outsource noncore services and better concentrate on offering all the concerned, the essential tools to help them succeed. This paper focuses on the impact of cloud computing on the education system and how we can provide the quality education by using the above technology.

Index Terms: Cloud computing, higher education, SaaS, PaaS, IaaS

Introduction

“Education is not the filling a bucket but the lighting of a fire” - William Butler Yeats (1865–1939) Irish poet, dramatist.

Teaching now a day's does not mean a teacher in the front and writing on board and the students sitting in rows. It can take place outside the classroom also may be under a tree or in a park if you have an internet connection. Educational institutes adopting cloud technology can easily provide the students different course materials all free of charge. The assessment and instructional support to students can also be easily implemented. Resources delivered by cloud are cost effective, consistent, and is easy to distribute and update. For the people those who have non traditional learning needs this technology can be a boon. Students who are not able to complete their education due to a strict traditional system can complete their studies; individuals with certain disabilities can also be benefited [1]. It can also serve the needs of students who are in need of new job skills and older students like the drop outs. So, Cloud computing can help in providing these solutions. It's a network of computing resources—located just about anywhere—that can be shared. Thus, by implementing cloud computing technology we can overcome all short comings of traditional teaching approach. They not only check the needs of the institutions but also ensure that quality education is provide to every student and also his attendance, class performances etc can be effectively maintained without worrying for the infrastructure issue. The cloud helps ensure that students, teachers, faculty, parents, and staff have on-demand access to critical information using any device from anywhere. Both public and private institutions can use the cloud to deliver better services, even as they work with fewer resources.

What is cloud computing?

The National Institute of Standards and Technology (NIST) defines cloud computing as a model that helps enable ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (ex, networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models.

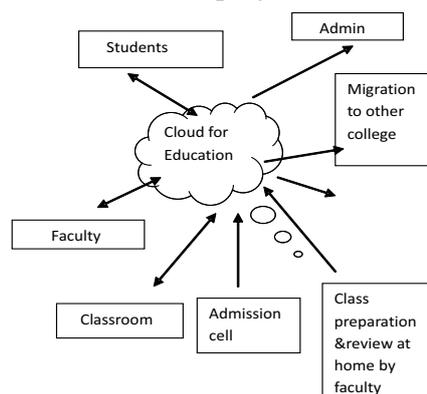


Figure 1: Implementation of Cloud In Education System

IT in present education system

IT in present educational system is restricted to certain implemented softwares like library automation, attendance feeding software, feedback systems etc. In classrooms it is restricted to power point slides and videos and any file opened and displayed on the projector. Still in teaching many things are done manually and we can say that there is minimum amount of interactive teaching restricted to institutions having a good infrastructure. We can use this cloud technology definitely for interactive learning using web based technology solutions in place of classroom teaching

Cloud characteristics:

On-demand self-service:

A consumer can unilaterally obtain computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.

Broad network access:

Cloud capabilities are available over a network and can be accessed through standard mechanisms that promote use by (multiple) client platforms (e.g., mobile phones, laptops, and personal digital assistants (PDAs)).

Resource pooling

One of the great strengths of cloud computing is that the provider is able to pool computing resources, such as storage, processing, memory, network bandwidth, and virtual machines, to

serve multiple consumers with different physical and virtual resources dynamically assigned and reassigned according to the consumer demand. The subscriber generally has no control over or knowledge of the exact location of the provided resources.

Rapid elasticity

IT capabilities can be rapidly and elastically provisioned, in some cases automatically, according to the scale required. To the consumer, the capabilities available often appear to be unlimited and can be purchased in any quantity at any time.

Measured service

Cloud systems automatically control and optimize resource use by filtering service appropriately by its type. Resource use is monitored, controlled, and reported, providing transparency for both the provider and consumer of the service.

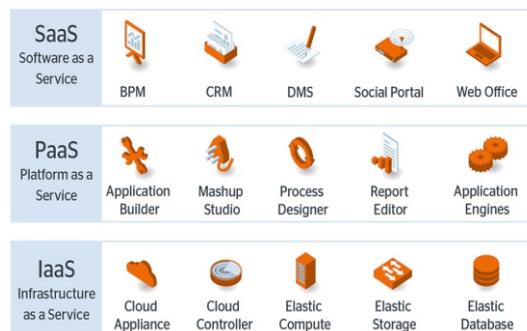
Choosing an infrastructure

Private cloud: Operated solely for an organization, a private cloud may be managed by the organization or a third party and may exist on or off the premises.

Public cloud: The infrastructure is made available to the general public or a large industry group and owned by an organization selling cloud services.

Community cloud: A community cloud is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be managed by the organizations or a third party and may exist on or off premises. For example, a state government may set-up a community cloud infrastructure for all its separate organizations to pool resources.

Hybrid cloud: This infrastructure combines 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 (ex, cloud bursting, or a dynamic redistribution of resources between clouds to handle the demand surge and balance loads).



Benefits

Some of the major advantages of implementing cloud computing in education sector are listed below:

Personalized Learning

Cloud computing offer unlimited choice in learning for students. Students are exposed to a wide variety of resources and software tools, providing a flexible and an enriched environment.

Economies

Continuous upgrades of software and hardware are putting an inevitable pressure on the budgets of educational institutions. In such a situation, cloud computing comes to rescue. Cloud computing provides hardware and software computing and other resources on pay per use basis which enables educational institutions to accelerate the use of new technologies and focus on imparting quality education.

Elasticity and Scalability

The major benefit of cloud computing is that consumers are not confined to a particular set of resources. Educational Institutions can begin with small scale services and then gradually build them up without bearing any significant rise in investment cost. Institutions can scale up to more resources or storage when user load increases or scale down when the need shifts.

Accessibility

Users can access resources 24/7/365 from anywhere. This is possible due to quality service provided by superior resources and skills.

Lesser Carbon Imprint

Cloud computing enable educational institutions to reduce power consumed by them. This in turn leads to lesser carbon emissions. Moreover, cloud providers are making sincere efforts to create eco-friendly data centers which will further reduce carbon emissions.

Standardization

Cloud computing provides software standardization for use by educational institution individually or district wide. For example an institution can develop its own set of applications/solutions and reuse them several times. This will result in lowering of cost and increase in reliability and reduction in implementation time [1].

Areas where cloud computing can have an impact

Cloud computing has been credited with increasing competitiveness through cost reduction, greater flexibility, elasticity and optimal resource utilization. Here are a few situations where cloud computing is used to enhance the ability to achieve business goals.

1. [Infrastructure as a service \(IaaS\)](#) and [platform as a service \(PaaS\)](#)

When it comes to IaaS, using an existing infrastructure on a pay-per-use scheme seems to be an obvious choice for companies saving on the cost of investing to acquire, manage and maintain an IT infrastructure. There are also instances where organizations turn to PaaS for the same reasons

while also seeking to increase the speed of development on a ready-to-use platform to deploy applications.

2. Private cloud and hybrid cloud

Among the many incentives for using cloud, there are two situations where organizations are looking into ways to assess some of the applications they intend to deploy into their environment through the use of a cloud (specifically a public cloud). While in the case of test and development it may be limited in time, adopting a hybrid cloud approach allows for testing application workloads, therefore providing the comfort of an environment without the initial investment that might have been rendered useless should the workload testing fail.

Another use of hybrid cloud is also the ability to expand during periods of limited peak usage, which is often preferable to hosting a large infrastructure that might seldom be of use. An organization would seek to have the additional capacity and availability of an environment when needed on a pay-as you-go basis.

3. Test and development

Probably the best scenario for the use of a cloud is a test and development environment. This entails securing a budget, setting up your environment through physical assets, significant manpower and time. Then comes the installation and configuration of your platform. All this can often extend the time it takes for a project to be completed and stretch your milestones. With cloud computing, there are now readily available environments tailored for your needs at your fingertips. This often combines, but is not limited to, automated provisioning of physical and virtualized resources.

4. Big data analytics

One of the aspects offered by leveraging cloud computing is the ability to tap into vast quantities of both structured and unstructured data to harness the benefit of extracting business value. Retailers and suppliers are now extracting information derived from consumers' buying patterns to target their advertising and marketing campaigns to a particular segment of the population. Social networking platforms are now providing the basis for analytics on behavioral patterns that organizations are using to derive meaningful information.

5. File storage

Cloud can offer you the possibility of storing your files and accessing, storing and retrieving them from any web-enabled interface. The web services interfaces are usually simple. At any time and place you have high availability, speed, scalability and security for your environment. In this scenario, organizations are only paying for the amount of storage they are actually consuming, and do so without the worries of overseeing the daily maintenance of the storage infrastructure. There is also the possibility to store the data either on or off premises depending on the regulatory compliance requirements. Data is stored in virtualized pools of storage hosted by a third party based on the customer specification requirements.

6. Disaster recovery

This is yet another benefit derived from using cloud based on the cost effectiveness of a disaster recovery (DR) solution that provides for a faster recovery from a mesh of different physical locations at a much lower cost than the traditional DR site with fixed assets, rigid procedures and a much higher cost.

7. Backup

Backing up data has always been a complex and time-consuming operation. This included maintaining a set of tapes or drives, manually collecting them and dispatching them to a backup facility with all the inherent problems that might happen in between the originating and the backup site. This way of ensuring a backup is performed is not immune to problems such as running out of backup media, and there is also time to load the backup devices for a restore operation, which takes time and is prone to malfunctions and human errors [3]. Cloud-based backup, while not being the panacea, is certainly a far cry from what it used to be. You can now automatically dispatch data to any location across the wire with the assurance that neither security, availability nor capacity is an issue. While the list of the above uses of cloud computing is not exhaustive, it certainly gives an incentive to use the cloud when comparing to more traditional alternatives to increase IT infrastructure flexibility, as well as leverage on big data analytics and mobile computing.

Challenges

There is no doubt that cloud computing opens up a world of opportunities for educational institutions. But nonetheless, there are concerns which cannot be ignored. Like all the new technologies, cloud computing also faces certain challenges which need to be overcome in order to fully exploit its benefits.

Security

The major concern for any educational institution is the security of data. In cloud computing, important and crucial data is stored in one place and hence prone to hacking. A survey of chief Information Officers and IT executives by IDC (International Data Corporation) rated security as their main cloud computing concern. Cloud computing seems risky because its perimeter cannot be secured. Institutions consider data to be more secured if it is hosted within the institution instead of any remote data center, not under their control and whose location is unknown. Cloud services by educational institutions will have to wait until the legal issues related to security of data are fully addressed [1].

Compliance Issue

Several cloud providers have set up their data centers across the world, which expose the data to several risks legally and practically. In a shared services environment, institutions do not know or control as to where their important data is stored and accessed by whom. In such a situation, data residing in foreign countries may be more readily subject to seizure and disclosure. UK's Data

Protection Act (DPA) 1998 prohibits the transfer of data outside the European countries. Hence, the cloud providers are left with no choice other than setting up a data center within the country to comply with the regulations. This may pose as a big challenge for the cloud providers.

Lock

In currently most of the cloud providers offer their services through proprietary APIs (Application Programming Interface) [2]. These results in lack of interoperability as a universal set of standards and interfaces have not yet been defined. Institutions are at a risk of vendor lock-in wherein they get associated with the products of a particular vendor. If some other cloud provider comes up with a better product, it would be quite difficult for the institution to migrate from its current widely used system to a totally new system. This would also impose significant financial burden on the institution.

Reliability

Since the cloud providers use their resources to the maximum advantage, this sometimes results in unexpected failure of the system. Amazon's S3 (Simple Storage Service) and EC2 (Elastic Compute Cloud) suffered a 3 hour outage in February 2008. Later in July, the same year, S3 again suffered an 8 hour outage. In early 2009, Google's Gmail went down for 3 hours, thus preventing its 113 million users from accessing their emails or the documents which they store online as "Google Docs" [2].

Conclusion

This paper focuses on the promising features of education cloud which best suits the current needs of educational IT departments. The advantages that come with cloud computing can help to resolve some of the common challenges faced by the educational institutions [1]. Cloud computing works one layer above the virtualization and enables a user to be platform independent. Initially the private education providers are taking interest in education cloud but later the governments also seek to understand why and how to deploy cloud platforms efficiently and securely. In other words, cloud computing can democratize education and this new system will spread quality education to each and every part of the world.

References

- [1] Cloud Computing Technology in Education System by Prof. Pragti Goel, NBR E-JOURNAL, Volume 1, Issue 1 (Jan-Dec 2015), ISSN 2455-0264
- [2] ISSN: 2349-7688, Vol. 2, Issue 2, June 2015, pp. 150-152
- [3] Role of Cloud Computing in Education by Kiran Yadav Vol. 2, Issue 2, February 2014, ISSN(Online): 2320-9801,ISSN (Print): 2320-9798
- [4] Scope of Cloud Computing in Education Sector: A Review by Harsimran Singh Anand¹, Kamayani²,