
Cloud Computing Technology in Education System

Prof. Pragati Goel

Associate Professor, NCRD's Sterling Institute of Management Studies, Nerul, Navi Mumbai

ABSTRACT

Technology changes so fast now a days that whatever we have implemented as a smart solution yesterday is a history today. Cloud computing is opening new horizons for various sectors of business as well as education sector also. Cloud computing is changing the ways of the individual's personal learning and interactive learning. Also the primary, secondary and higher education spheres of an individual in terms of many to many to learning are being changed by the use of cloud computing. Cloud computing regardless of the geographic location allows the students to interact and collaborate with an ever expanding circle of their peers. Education sector particularly in India has still not accepted these new technologies completely. Many institutions are still not ready to accept these changes either due to security reasons or any other biased grounds. Many surveys conducted have proved that the current education system is not worth and has many loop holes. The knowledge of Cloud has been built by many years of study in distributed systems, grid computing, parallel processing etc. and can bring a drastic positive change in the present education system. This paper will discuss the various pros and cons of cloud computing in education and also the various features of this technology related to the education sector.

KEYWORDS: Clouds, Transition, Service, Security

INTRODUCTION

Teaching now a day's does not mean a teacher in the front 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. It can also serve the needs of students who are in need of new job skills and older students like the drop outs.

Virtual classrooms can overcome the difficulty of small classrooms with students attending the classes at their place on their computers (as computers are getting cheaper day by day) even if the teacher is not in front of them but hundred miles away. This can also help in addressing the issue of inadequate number of teachers. With cloud based education tools students can learn from the best of the faculty with a multi screen and multi device live learning sessions for classroom like environment or experience.

CLOUD COMPUTING

To educational IT departments of an institute cloud computing gives better choice and flexibility. The platform and applications provided by the cloud service provider can be used on-premises, off-premises, or a combination of both, depending on the academic organization's needs. An educational institute does not need to deploy the computer resources and hardware for storage and also does not need to separately install or pay for the software applications as all these will be given by the service provider. Similarly cloud computing makes it possible to deliver course content and other student services over mobiles, ipads, tablets and other devices. So cloud computing has a big role and impact on the usage of projectors or tablets by both students and staff. Also digital tools provide media rich information that encourages interactive learning, online forums allowing collaborative learning with improved student workflows for assignments submission, feedback etc. Due to the availability of cloud services Virtual universities are becoming a reality across the world.

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.

TYPES OF CLOUD MODELS

Public cloud: also known as external cloud. In public cloud, a service provider makes resources such as applications and storage to the general public over the Internet. Public cloud services may be free or offered on a pay-per-usage (paying only for the services used by the client) model. It is easily scalable to meet customer requirements and is shared and accessible by all. Examples of public clouds include

Amazon Elastic Compute Cloud (EC2), IBM's Blue Cloud, Sun Cloud, Google App Engine and Windows Azure services platform.

Private cloud: This cloud infrastructure operates specially for a single organization. It provides hosted services available exclusively to a limited number of people who are approved users affiliated with the organization behind a firewall. These services are hosted either internally or externally and are managed internally or by a third party and are delivered using a private network.

Community cloud: Here the infrastructure is shared among several organisations from a specific community with common concerns (like security, compliance, jurisdiction etc.) It is multitenant, managed internally or by a third party and hosted internally or externally on a private cloud.

Hybrid cloud: A hybrid cloud is a composition of two or more clouds such as public, private or community cloud. It offers advantages of multiple deployment models. In this cloud computing environment, an organization provides and manages some resources in house and has others provided externally.

CHOICES IN THE CLOUD

When we want to adopt this technology we have to choose whether we want to deploy it on our own premises or we have a software which can be deployed as a service or a combination of both can also be deployed. This deployment model has a freedom of change as the service demand changes.

Infrastructure as a service (IaaS): Here the services provided to the clients are hardware belongings (like storage) and computing pre-eminence.

Software as a service (SaaS): Here the client does not need to buy the software packages instead of this the software applications as services are presented on the internet to the client for usage.

Platform as a service (PaaS): To sustain the whole significant growth lifecycle including drawing, debugging, testing, operation and support of the rich web based applications and services on the internet PaaS provides all the amenities.

STRATEGY FOR IMPLEMENTATION OF CLOUD SYSTEM

With a clearly defined wish list, institutions must then approach the cloud transition in the following four phases:

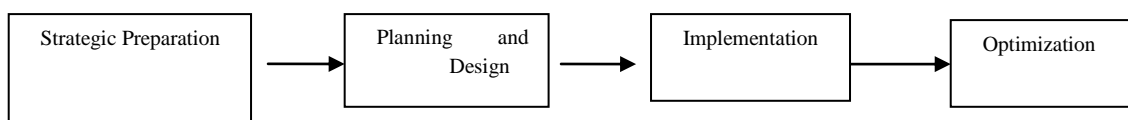


Fig 1: Four phases of cloud implementation

Strategic Preparation : In this initial phase, appropriate cloud computing strategy, architecture and security, as well as objectives will be determined by the IT decision makers. Institutions should work with experts having experience in multiple technology areas, such as virtualization, service orchestration, automated provisioning, and the security that underpins network architectures. To migrate to a cloud computing model the costs, benefits, and operational changes should be evaluated, including both the current and desired services management approach. The results of this phase will be subsequent cloud architectural development, tools, process integration, and implementation. Strategic preparation should also target security focusing on protecting access and providing on-demand security options within a services catalog for their users. In addition, cloud-computing evolution and post-deployment activities in every stage should also be taken into account.

Planning and Design : This phase requires expert coordination among the team members, partners, and other vendors. Detailed architecture design, data-centre specific expertise, and security designed from end to end is also taken into account. The results of this phase are an end-to-end architecture blueprint, a migration roadmap, a common control framework, and a security technology framework consisting of physical safety and security and these lay the foundation for subsequent implementation and integration.

Implementation : this phase consists of implementing the security technology architecture. In order to reduce risk during a transition to cloud computing, institutes need to have someone with an experience in providing a virtualized architecture, as well as integrated tools. Tested methodologies, good practices, and through knowledge of the core systems within the cloud environment can facilitate a smooth migration from the existing environment to a cloud utility computing architecture, while ensuring adherence to plans and enabling on-time delivery of a fully implemented cloud-computing model. During this implementation stage, for the in house experts live and parallel sessions of knowledge transfer should be arranged to give operational confidence to the in-house experts.

Optimization : Optimization of the cloud model, which can accelerate adoption, is the point where we can maximize the true benefits of cloud computing: lower operating and capital expenses, increased business agility and responsiveness, and scalability.

This is done through activities such as:

- Architectural reviews
- Security audits
- Cost-reduction exercises
- Process improvements
- Tool customization
- Post-deployment

BENEFITS OF EDUCATION CLOUD

- i. The problems like low graduation rates, insufficient infrastructure, tiny classrooms, lack of teachers can be solved using Cloud computing solutions.
- ii. Geographical distances will not be any hindrances in the education system.
- iii. Institutions not having ample infrastructure will also be able to provide quality education as there is no need to purchase hardware, software licenses, or implementation services.
- iv. Education can be easily democratize as organization can deploy cloud computing rapidly.
- v. Maintenance and upgrades will be lot more easier. The cloud model provides the ability to rapidly acquire, provision, and deploy new IT platforms, services, applications, and test environments. With cloud capabilities, months-long IT hardware procurement processes can be eliminated, reducing time spent on such tasks to a matter of hours or even minutes.
- vi. Cost is reduced as institutions reduce or eliminate IT capital expenditures and decrease ongoing operating expenses by paying only for the services they use (pay-as-you go plan or a subscription) and potentially by reducing or redeploying IT staff.
- vii. Availability of the services is 24/7 as desired by the user using a education cloud.
- viii. Accessibility is good as data and services are publicly available.
- ix. Education cloud will surely decrease the carbon footprint and we can move towards Going Green project.
- x. Education cloud is user friendly and can effectively manage large amounts of data.

PROBLEMS WITH EDUCATION CLOUD

- i. One problem associated with this cloud is of connectivity which is also becoming better and better day by day and also 4G is almost here.
- ii. Interoperability is again a barrier in adoption as a set of standards acclaimed universally and/or interfaces have not yet been defined, resulting in a significant risk of vendor lock-in.
- iii. Another issue is of security of our data as the educational institutes no longer have as much control over personal data. The cloud computing provider should have the appropriate practices and policies to ensure that data is properly maintained, handled, used, or disclosed as the institutes are totally relaying on the provider. With this education cloud it is easy for the hackers to get data. So to reduce this risk of security educational institutes should take care that the cloud computing provider is adequately protecting the data.

CLOUD SECURITY CHECKLIST

For many educational IT institutes security and data privacy implications are the foremost concern. In the last few years, security has taken on an added dimension of complexity and institutes require at least some level of on-campus protection. Here is a checklist of security issues and capabilities to consider when it comes to optimizing the security of cloud implementation

S.	Features	Check/ Uncheck
1.	Data safety	✓
2.	Data confidentiality	✓
3.	Data privacy	✓
4.	XML signature	✓
5.	Browser security	✓
6.	Cloud integrity and binding	✓
7.	Network security	✓
8.	Flooding and denial-of-service attacks	✓
9.	Data centre location	✓
10.	Dedicated security team to ease transition	✓
11.	Regulatory compliance	✓

Table 1 : Checklist

CONCLUSION

This paper focuses on the promising features of education cloud which best suites 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. 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.

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