

# Use of Cloud computing in Education Field A Review

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## **Abstraction**

*In the present scenario, many education institutions are facing the problems with the growing need of IT and infrastructure. Cloud computing which is an emerging technology and which relies on existing technology such as Internet, virtualization, grid computing etc. can be a solution to such problems by providing required infrastructure, software and storage. Resource sharing in a pure plug and play model that dramatically simplifies infrastructure planning is the promise of "cloud computing". The two key advantages of this model are ease-of-use and cost-effectiveness.*

*In this paper a basic research has been carried out to show cloud computing can be introduced in the education field to improve teaching – learning process effectively. The requirement of current demand of infrastructure as well as softwares which is fulfilled by cloud computing and bring a revolution in the field of education.*

**Keywords:** Cloud Computing, e Learning, Saas, IaaS, PaaS

## **Introduction**

Cloud computing is a complete new technology. It is the development of parallel computing, distributed computing, grid computing, and is the combination and evolution of Virtualization, Utility computing, Software-as-a-Service(SaaS), Infrastructure-as-a-Service (IaaS) and Platform-as-a-Service (PaaS). cloud computing provides shared resources,

software and information through Internet as a PAYGO (Pay-as-you-go) basis. Cloud computing can be a welcomed option in the universities and educational institutes for higher studies. It gives a better choice and flexibility to the IT departments by building multipurpose computational infrastructure once and then uses it for several purposes for several times. Evolution of cloud computing number of services have migrated from traditional system to the online form. At present many institutes are updating their IT infrastructure and data and facing some challenges which can be solved by cloud computing.

## **Cloud computing characteristics and benefits**

Cloud computing boasts several attractive benefits for organizations i.e. business as well as educational and end users. Main benefits of cloud computing are:

- **Self-service provisioning:** End users can spin up compute resources for almost any type of workload on demand. This eliminates the traditional need for IT administrators to provision and manage compute resources.
- **Elasticity:** Companies can scale up as computing needs increase and scale down again as demands decrease. This eliminates the need for massive investments in local infrastructure, which may or may not remain active.
- **Pay per use:** Compute resources are measured at a granular level, enabling users to pay only for the resources and workloads they use.
- **Workload resilience:** Cloud service providers often implement redundant resources to ensure resilient storage and to keep users' important workloads running -- often across multiple global regions.
- **Migration flexibility:** Organizations can move

certain workloads to or from the cloud -- or to different cloud platforms as desired or automatically for better cost savings or to use new services as they emerge.

## Types of cloud computing services

Cloud Providers offer services that can be grouped into three categories.

### 1. Software as a Service (SaaS):

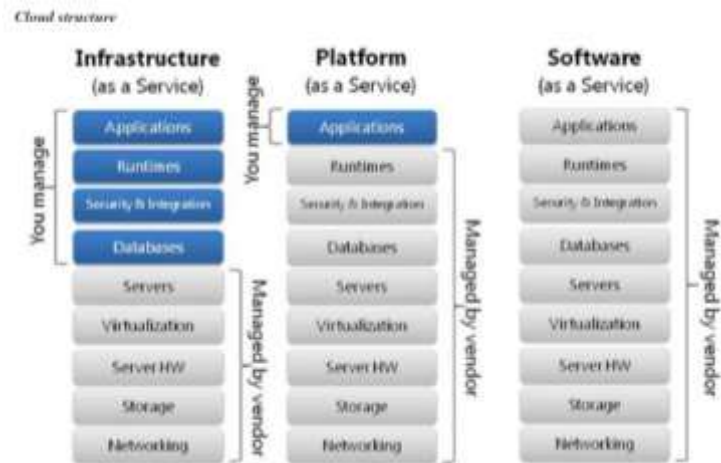
In this model, a complete application is offered to the customer, as a service on demand. A single instance of the service runs on the cloud & multiple end users are serviced. On the customer's side, there is no need for upfront investment in servers or software licenses, while for the provider, the costs are lowered, since only a single application needs to be hosted & maintained. By using SaaS, big vendors like Microsoft, IBM, Oracle and Salesforce.com offers various educational software and applications in less cost.[3]

### 2. Platform as a Service (PaaS):

Here, a layer of software, or development environment is encapsulated & offered as a service, upon which other higher levels of service can be built. The customer has the freedom to build his own applications, which run on the provider's infrastructure. PaaS enables the customer to hire virtual servers, as well as other services required to operate the applications that exist. Further, it ensures that the client design, develop, test, deploy and host applications[2]. PaaS providers offer a predefined combination of OS and application servers, such as LAMP platform (Linux, Apache, MySQL and PHP), restricted J2EE, Ruby etc. Google's App Engine, Force.com, etc are some of the popular PaaS examples.

**3. Infrastructure as a Service (IaaS):** IaaS provides basic storage and computing capabilities as standardized services over the network. Servers, storage systems, networking equipment, data centre space etc. are pooled and made available to handle workloads. The

customer would typically deploy his own software on the infrastructure. Some common examples are Amazon, GoGrid, 3Tera, etc. [1]



## Cloud Deployment Models

The hosting models for cloud represent the different types of cloud environments which are characterized by different sized, access and proprietorship. There are four deployment models as follows:

**Public Cloud:** In this type of cloud hosting, the cloud services are provided through a network that is accessible by the public.

**Private Cloud:**

This is also regarded as an internal cloud. The environment on which the cloud computing platform lies is protected by a firewall that is monitored by the information technology department which belongs to the particular organization and can only be used by the authorized clients only.

**Community Cloud:**

This denotes a cloud hosting that is mutual and is shared among many organizations with similar interest and requirement of a specific community including trading firms, banks, or gas stations among others. The group of users must have computing apprehensions that are similar.

**Hybrid Cloud:**

This is an integrated model of cloud computing environment. It may consist of two cloud servers or more, which may either be public, communal or private.

## Applications of Cloud in Education

Educational cloud computing services represent a growing variety of useful services available on the internet, and the most innovative and rapidly developing element of technology and education. It also promises to provide multiple services that will be very useful to the students, faculty and staff. Furthermore, these applications are heavily investing in cloud computing as being the future of the academic cloud computing [4] [5]. Some of these applications are Microsoft, Google, IBM, HP, Amazon, Sales force, Amanda and Zamanda.

A. Amazon Cloud Services in Education- Amazon Web:

Amazon offers many cloud services, including: Amazon Elastic Compute Cloud (AmazonEC2): A web service that offers virtual machine and extra CPU cycles for the institutional organization. Amazon Simple Storage Service (Amazon S3): Allows the students, faculty and researchers to store items with alimited size in Amazon's Virtual storage\_ Amazon Simple Queue Service (SQS), Amazon Virtual Computing Laboratory (Amazon VCL): [6].

B. Microsoft Education Cloud Computing: The Microsoft software and services strategy are about the power of choice a hybrid model of resources that enables the students and researcher to transfer to the cloud. The Azure Services Platform (ASP), includes services that allow the faculty, students and researchers to establish user identities, manage work flows, execute other functions such as Microsoft's online computing platform [7]

C. Google Applications for Educational Cloud Computing Google App Education (GAE) as a new generation of cloud computing-based Web application development platform, enables its users such as the faculty, researchers and students and so on, GAE is available at no cost to institutions, universities and education community [8]. Google Apps

Education Web-based messaging tools such as Google Mail, Google Talk, Google Sites, Google Video and Google Calendar to the faculty, students and staff for free in addition to productivity and collaboration tools such as Google Docs Package [9][14]

D. IBM Cloud Services to Education: By using the IBM SmartCloud for Education services, schools and higher education institutions can address the significant challenges they face: student achievement, graduation rates, scholarship funding, and demands for IT resources for research.[10].

E. Salesforce.com Cloud Computing In Education: Salesforce is a trusted leader in cloud computing and customer relationship management, as well as a respected pioneer in the educational institutes. As part of these philanthropic efforts, the Salesforce.com Foundation makes its products available at the educational institutes at a big discount.[11]

F. HP Cloud Computing In Education: HP Cloud computing in education is a way to build, operate, and consume IT that makes educational resources such as the student records, knowledge management, faculty collaboration and etc. available on demand. [12].

G. AMANDA And ZMANDA Cloud Computing For Education: For backup and added Functionality that support fast installation, simplified management, enterprise-class functionality, and low-cost subscription fees.[13].

## Impacts of cloud computing on education

Three fundamentally new impacts that must be factored into the educational system:

A. *Low – Cost and Free Technology*: There has been a huge growth in low – cost and free technology for social interaction, publishing, collaborating, editing, content creation, computing etc., All that needed is a cheap

access device and a web browser, broadband perhaps wireless hotspots.

*B. Content Growth :* The amount of content is growing at an exponential rate, available to a broad audience and anyone can contribute. Content has traditionally come from limited, relatively “known” channels like textbooks, encyclopedias, newspapers and television. Most content now comes from relatively “unknown” sources through the web. Content can be true, partially true, or false. There is more of all of the above available to us instantaneously.

*C. Collaboration :* Technology is rapidly improving the ability to communicate and collaborate with others. It is becoming easier to find and cannot with any one in any new and expanding ways; mobile phones, email, instant messaging, social and collaborative software and blogs. Collaboration has been a one – time, relatively static and sequential process.

### **Benefits Of Cloud Computing For Institutions And Students**

There are numerous benefits in the field of education for institutions and students when the e-learning is implemented with the cloud computing technology [19].

1. *Personalized Learning:* Cloud computing affords opportunities for greater student choice in learning.
2. *Reduced Costs:* Students can use office applications for free without having to purchase, install and keep these applications up to date on their computers. It also provides the facility of Pay per use for some applications.
3. *Accessibility:* Availability of the services is the most important and desired by the user using the education cloud. 24 X7 is the availability that is needed by this system without failure and anywhere.
4. *No Extra Infrastructure:* The applications can run from cloud through their PC, mobile phones, tablet PC having

minimum configuration with internet connectivity

5. *Go Green:* Education cloud will surely reduce the carbon footprint.

6. *User Friendly:* This new facility is user friendly and no need to worry about the complexity. It is easy to understand and easy to operate.

7 *Improved performance:*

Since the cloud based e-learning applications have most of the applications and processes in cloud, client machines do not create problems on performance when they are working.

8 *Instant software updates:*

Since the cloud based application, the software's are automatically updated in cloud source. So, always e-learners get updates instantly.

9 *Benefits for students:*

Students can take online courses, attend the online exams, get feedback about the courses from instructors, and send their projects and assignments through online to their teachers. [16]

10 *Benefits for teachers:*

Instructors have the capacity to get ready online tests for understudies, arrangement and make better substance assets for under studies through substance administration, evaluate the tests, homework, tasks taken by understudies, send the input and correspond with understudies through online discussions. [17][15]

Teachers or lecturers can upload their class Tutorials, assignments, and tests on the cloud server which students will be able to access all the teaching material provided by the teachers via Internet using computers and other electronic devices both at home and college. [20]

### **Some Challenges**

There are several obstacles computing faces before adopted.

1. *Security:* There are several concerns surrounding the implementation of security in cloud computing and one of them is data privacy. The users do not

have control or know where their data is being stored.

2. **Performance and Availability:** Experiments that are research endeavors computing power. Some of the concerns include how to guarantee such performance from an outside vendor. Availability of services is another related concern in terms of the possibility of massive vendor outages. This is especially true since it may impact student learning or the timely delivery of the research results, which are typically tied to strict timelines.

3. **Integration with in house IT and customizability:** University IT administrators typically use their own in – house applications with a considerable portion that is customized to their own lab structure. The concern is the transition of such in – house applications to the cloud environment and how much of the customizability will be lost in that process.

4. **Cost** is another factor that may be introduced by additional vendor relationship management or possibly additional measures that are unique to cloud computing.

5. **Interoperability:** A universal set of standards and interfaces have not yet been defined, resulting in a significant risk of vendor lock – in.

6. **Control:** The amount of control that the user has over the cloud environment varies.

7. **Latency:** All access to be cloud is done via the internet, introducing latency into every communication between the user and the environment.

8. **Reliability:** Many existing cloud infrastructures leverage commodity hardware that is known to fail unexpectedly.

### **Risks of Cloud Computing in Education**

The universities and schools should consider the challenges and risks prior to transferring to the cloud[18][19] . Examples of these risks are:

*Cloud Service Failure:* Insufficiency of financing and immature markets could guide some cloud providers out of business and any loss or deterioration of service delivery performance, as well as a loss of investment, make the universities and schools to the risk of having to perform their own duties and obligations, thus being exposed to contractual or legal liability to their employees, third parties, the students or even the public.

*Compliance Regulations:* Due to the increasing number of regulations and need for operational

transparency, the educational institutions are increasingly adopting consolidated and consistent

sets of compliance controls

*Data Privacy:* The multi-tenancy, reuse of hardware and software profiles, and resiliency due to

the redundant nature of cloud means a greater risk of incomplete or unlock deletion or denial of service attacks on institutions' confidential data.

*Assurance to Service Provider:* This proposes a dependency on a particular cloud service provider for service preparation, especially when data portability is not supported.

### **Conclusion**

The present motto of our country is making india, digital india and equal and quality education to all, the problem of reaching the technology to remote schools and educational institutes therewhere cloud computing plays immense role to improving quality and enormous education for students.

The cloud allows us to access its services for our work anywhere, anytime and share it with anyone with machine independent. In this paper present this cloud computing in the field of education is very beneficial not only to educational institutes but also for students and faculty members for improving the quality of education.

There are some challenges with cloud computing and its use in education but with the time these will be resolved.

As we know that every technology update time to time so in future more secure and some complex softwares would be available. Also for making strong cloud computing Basic cloud computing courses should be arrange as well as teachers and students should be willingly and motivate to use services of cloud computing. It is proposed that universities and other institutions will provide cloud based virtual laboratories for all disciplines.

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