

# **Role of Cloud Computing on Education System**

**Prof. Nivedita Singh**

*1- Dept. Of Computer Science & Engineering*

*niveditasingh7653@gmail.com*

## **ABSTRACT**

Education plays a important role in constructing a student with robust knowledge and information that gradually grows over time which turn in maintaining the social, economic growth. Cloud computing is regarded as massively scalable, an on-demand configurable resources computing model and is one of the latest topics in the information sector. It offers the cloud infrastructure in a distributed rather than dedicated infrastructure where clients can have full access to the scalable, reliable resources with high performance, everything is provided to the clients as a utility service over the internet.

*Cloud Computing* in recent years has attracted substantial interest from various institutions, especially higher education institutions, which wish to consider the advantages of its features. Many universities have migrated from traditional forms of teaching to electronic learning services, and they rely upon information and communication technology services. The usage of Cloud Computing in educational environments provides many benefits, such as low-cost services for academics and students. The expanded use of Cloud Computing comes with significant adoption challenges. Understanding the position of higher education institutions with respect to Cloud Computing adoption is an essential research area. The smart classroom, labs are introduced with automation in maintenance and management of all academic activities. 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[1].

**KEYWORD:** Education Sector, Cloud Computing, E-Learning, SaaS, PaaS, IaaS .

## **INTRODUCTION**

Education plays a prime role in society's life. The academic research is dynamic in nature, so the conceptual terms, frameworks and definitions are not finite, different authors put forward different opinions on cloud computing terminologies Cloud refers to a network in which resources are stored and accessed as per use. Computing of these resources for higher level services with easy management often over the internet is called as cloud computing. Cloud computing helps user to access, configure and use services offered by the cloud at anytime and anywhere. The National Institute of Standards and Technology characterizes cloud computing using these five essential characteristic as on-demand self-service, broader network access, resource pooling, rapid elasticity and measured service[2][3]. The education system currently being used now is based on the traditional infrastructure. It consists of physical resources such as various personal computers which are connected to each other by a network using remote servers. The expenditure on the traditional infrastructure consists of buying physical pieces of hardware, setup and upgrading the hardware to meet the technological advancements happened over time. Efforts are made for crash recovery as hardware can cease to work due to any uncontrolled actions. In cloud computing, access methods and the cost changes as we introduce cloud in the infrastructure. Cloud computing can be considered as a virtual hosting platform. Instead of expending capital on physical resources, all the servers, software or networks can be hosted on cloud to make the infrastructure less tedious.

Today's students access the Internet constantly, and they explore the world through the Internet. By accessing different programs, such as Twitter, Gmail and other social media applications these students already are consumers of Cloud Computing technologies. Accordingly, It has been demonstrated that Cloud Computing solutions have become very attractive in supporting collaborative learning and have been incorporated in social theories of education. As a result, Educational sector administrators, either globally or locally asking IT staff to implement Cloud Computing technologies. Some benefits of Cloud Computing for Education system over traditional technologies are mobility, efficiency, enhanced availability increased productivity, scalability, and penetration of knowledge all over the world.

Cloud architecture consists of two components that are -

+ Front End

+ Back End

In which front end and back end are connected to each other using Communication medium such as internet. Front end component deals with the client infrastructure which using interfaces or applications to enable the user to access cloud computing services, such as web browser. The back end is the cloud itself consisting of all the resources as storage, virtual machines, servers, deployment models, cloud services etc.

Learning in EDUCATION SYSTEM can be defined as all forms of electronically supported learning and teaching, which are procedural in character and aim to affect the construction of knowledge with reference to individual experience, practice, and knowledge of the learner. Information and communication systems, whether networked or not, serve as specific media (specific in the sense elaborated previously) to implement the learning process[1][4][11].

## **CLOUD COMPUTING**

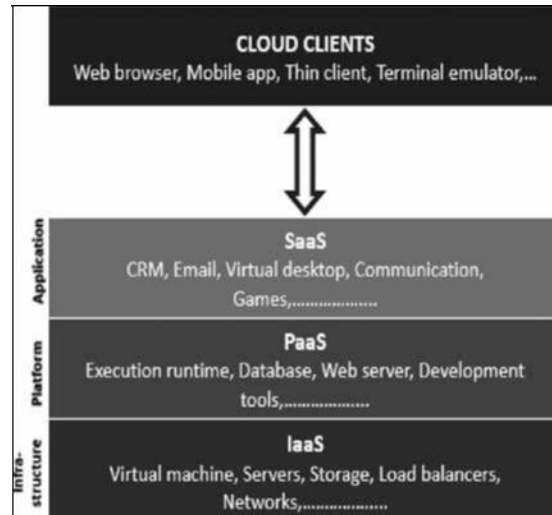
Cloud Computing has rapidly emerged as new computing technology, which evolved as a result of the advances in Information and Communication Technology. The term "cloud" was inspired from the "cloud" symbol that is typically used to symbolize the Internet in computer network. As per the definition provided by the National Institute for Standards and Technology (NIST) "*cloud computing is a model for enabling 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*". It is also known as the process of running an application or the program over several computers that are connected by the network. The cloud is comprised of four deployment models and three service models [1][2][4].

## **CLOUD SERVICE MODELS**

+ **Software-as-a-Service (SaaS):** It is a software distribution model where a third-party provider hosts applications and makes them available to customers over the high-speed internet connection.

+ **Platform-as-a-Service (PaaS):** It is a middle layer which gives the organizations, institutions or companies a freedom and framework for developers to develop their own applications and deploy them and make customers within their company to access the resources.

+ **Infrastructure-as-a-Service (IaaS):** Infrastructure is most vital among the three service models because it is the basic need to launch the organization's services over the internet in a cloud platform, to make their services available to clients and applications to run them smoothly.



**Cloud computing service models arranged as layers in a stack**

**CLOUD COMPUTING DEPLOYMENT MODELS**

+ **Public Cloud:** The cloud services are easier to install and less expensive or even charge free, the applications, hardware and bandwidth are provided by the service provider, and are scalable, the user avail can only those services that they are interested.

+ **Private Cloud:** As the name suggests, its services, infrastructure is solely operated and maintained by an organization. The services are made available on proper authentication, priority is being given towards the client’s data security.

+ **Community Cloud:** Here the cloud resources are shared by an organization which is of common interest for every participant which is being part of a community, whose needs are similar.

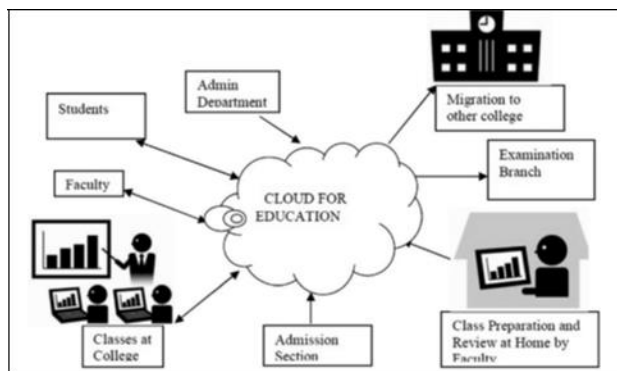
+ **Hybrid Cloud:** It is a combination of two or more cloud deployment models like (public, private, community) it enables cloud application portability, multi-tenant, resource sharing[1][3][4].

**CLOUD COMPUTING IN EDUCATION SECTOR**

In traditional education system some problems exists like lack of teachers, lab facility, latest books, infrastructure etc. Most of the private educational institutions have become highly dependent on information technology to service their requirements. These services are increasingly provided using Internet technologies to faculty and students and accessed from web browsers. The services are offered cheaply or freely to education, often with much higher availability than can be provided by the educational institution.

Cloud computing technology can provide solutions for the above mentioned problems in education system. Cloud Computing enables users to control and access data by the Internet. The main users of a typical higher education cloud include students, Faculty, Administrative department, Examination department and Admission as shown in Figure 1.





**Fig 1: IMPLEMENTATION OF CLOUD TECHNOLOGY IN EDUCATION**

All the main users of the institution are connected to the cloud. Each and everyone users have a separate login is provided for all the users for their respective work. Faculties can upload their class Tutorials, Assignments, Tests, Notes and other their Video lecture's on the cloud server which students will be able to access all the teaching material provided by the faculties member through Internet using any electronic devices we can access anywhere and any-time. The education system will make it possible for faculties to identify problem areas in which students to make mistakes, by analyzing students study records. So, faculties can improve teaching materials and methods.

This will not only make it possible for students to use online teaching materials during class but they will also be able to access these materials at home, using them to prepare for and review lessons. Utilization of cloud computing systems will reduce the cost of operation because servers and learning materials are shared with other institute[5][6][12].

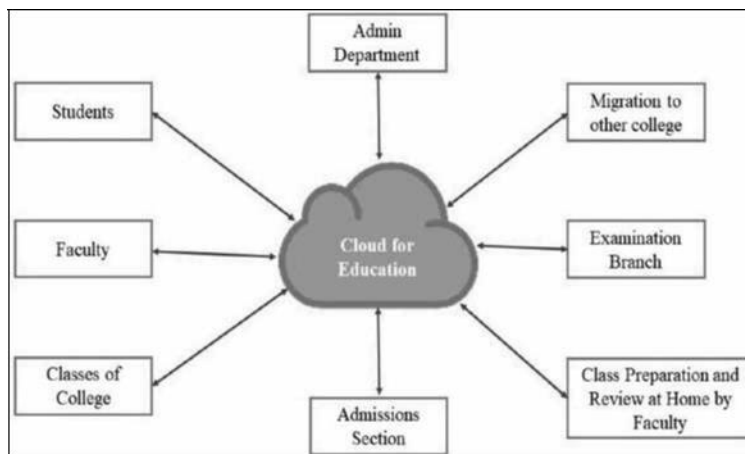
## **Cloud Computing Useful In Education Field**

### **Student Activities**

1. View mark sheet and download mark sheet
2. View attendance status
3. E-learning
  - +È Notes
  - +È Projects
  - +È Circulars
  - +È Online videos
  - +È Interaction with domain experts and other college students-By forum
  - +È Knowledge sharing

### **Faculty Activities**

1. Online attendance (No manual) and marks
2. Online/offline academic resources
3. Domain expert interaction
4. View status like experience, feedback, college
5. Research
  - +È Sharing of knowledge between research scholars
  - +È Resource sharing like papers, results etc



**Education System Cloud**

**Parents Activities**

1. View the status their son/daughter
2. Interaction with college and university

**College Management Activities**

1. use for accrediting process
2. Lesser cost of maintenance
3. Availability of all information

**University**

1. Maintain overall communication
2. Timely update all documents
3. Adopt high security

**LITERATURE REVIEW**

Lots of research has been done about advantages, challenges and applications of Cloud Computing.

1. Delic and Riley assess the current state of enterprise knowledge management, describe architectural views of cloud and discuss briefly the underlying technologies.
2. Hussein and Khalid also made a survey on cloud computing security challenges and solutions and proposed a model for cloud computing security[13].
3. Piyare and Lee discussed about integrating wireless sensor network to the cloud services for data collection and sharing.
4. Ragib Hasan has done a research on it and won the NSF CAREER Award.
5. Banerjee provided overview of researches performed at HP Labs in the article “An Intelligent IT Infrastructure for the Future”.
6. Tuncay Ercan reviewed what the cloud infrastructure will provide to education sector and how the teachers and students can be benefited.
7. Anjali Jain and U.S Pandey discussed about the role of cloud computing in higher education.
8. Microsoft provided an overview about the cloud services that can be used in education, pointed out the benefits, briefly described security issues, tips about planning and the services they are

providing under Microsoft Live@edu[5][6][11].

### **BENEFITS ON EDUCATION SYSTEM**

1. **Personalized Learning** - Cloud computing affords opportunities for student choice in learning.
2. **Backup and Storage** - Students ,teachers can easily store their data and Cloud automatically saves content or data and therefore it is not possible to lose content.
3. **Resource Availability** - The biggest advantage of cloud computing in education is that the provider is able to pool the resources, which includes storage, bandwidth , memory, network, to serve multiple consumers with different virtual resources and dynamically assigning them the services according to the university or collages demand and needs.
4. **User-Friendly** - Education cloud is user friendly and can effectively manage large amounts of data.
5. **Accessibility & Availability** - Accessibility is good as data and services are publicly available also 24\*7 hours services available for students and teachers or institute.
6. **Up-gradation Services**-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.
7. **Cost** -Cost is reduced as institutions reduce or eliminate IT capital expenditures and decrease ongoing operating expenses by paying only for the services and potentially by reducing or redeploying IT staff[5][6][7][9][11].

### **PROBLEM STATEMENT ON EDUCATION SYSTEM**

1. **Technical Issue's** - Lack of technical support, sometimes if cloud provider's server is unavailable, it can damage ones work progress.
2. **Reliability** - Slowness, unreliable Internet connection is not sufficient to access the cloud services in education sector.
3. **Security Issue's** - Students and Faculties portal accounts hacking is one of the worst scenarios of cloud computing in education sector.
4. **Protection Issue's** - Malware violations are undetectable as the malicious software as a valid SaaS, once run these software harm and damage the cloud students vital data[5][6][7].

### **CONCLUSION**

The cloud allows us to access our work anywhere, anytime and share it with anyone. The users of the education system can get lot of benefits. This results in enhancement of quality education. It frees us from particular machine to access a file or an application like a word processor or spreadsheet program. In the present paper a Cloud education system is introduced and how it is beneficial for students, faculty and the educational institutes for providing quality education. On integration, it gets maximum utilization these technologies[1][2][4].

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