

Cloud Computing and Education- A Technical Review

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ABSTRACT: The objective of present paper is reviewed the technical Aspect of Cloud Computing on the Education System. The Class room teaching is a changing and Students are becoming more technology oriented and Therefore in his 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 students, teachers, faculty, and staff the essential tools to help them succeed. Nutshell Cloud computing has the potential for improving the efficiency, cost and convenience for the universities and educational sectors.

KEYWORDS: Cloud Computing, Education, Saas, Paas, Iaas.

INTRODUCTION:

Indian Government has taken the initiatives of Policies for the upleptment of Education with Advance Technology .In the area of School/Primary and Secondary Educational Policies “Rashtriya Madhyamik Shiksha Abhiyan” Which has Come Force from 1 April, 2010. Efforts are being made to create a Robust and vast system of Higher and Technical Education .In the area of College and University / Higher Educational policies “Rashtriya Uccharat Shiksha Abhiyan (RUSA)”Which has come Force from 2013.The Indian Government Aims to Provide Quality Education to Students through Advance Technology Infrastructure.

These various Schemes make students reaches to the School and College, But Lack of Facilities (smart Class Room, Wi-Fi and other ICT Facilities).Seriously affect their Results and thus courage the Students to Continue their Education .One of Biggest challenges that government faces in providing Education is the lack of Infrastructure and if available then Maintenance of that Infrastructure and Maintaining a Wide Range of Hardware and Software Equipments.

Cloud computing can help provide those 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 these shortcomes and maintain a centralized system where all the authorities can check the education system from each and every aspects and continue monitor and guide the system. 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.

Cloud computing may be defined as a set of hardware and network resources that combine the power of multiple servers to deliver different kinds of services via the web. NIST (US National Institute of Standards and Technology) defines cloud computing as:

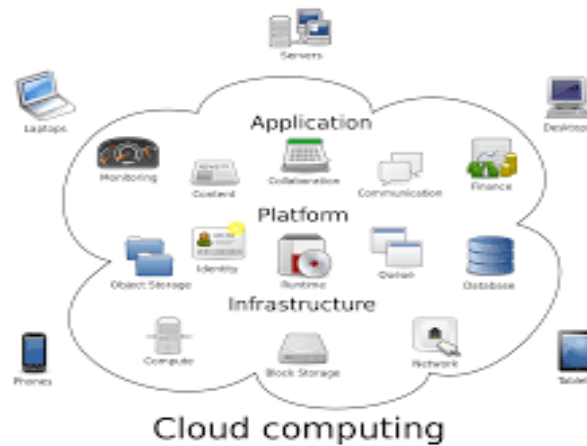


Fig: 1

“ 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 ”

Cloud computing is Internet-based computing in which shared resources, software and information are delivered as a service that computers or mobile devices can access on demand. The Internet makes this process easily achievable even for the general user. Advantages of the cloud computing technology include cost savings, high availability and easy scalability. Examples of cloud-based services include Google Apps, YouTube, Twitter and Drop box etc.

The various types of services provides by the cloud are:

Services Models of Cloud Computing:[1]

1.) **Software as a Service (SaaS):** SaaS refers to any type of software program that is managed remotely and delivered via the web. This is currently of most interest in education. Not only is the data stored in the cloud but the application too, with the user requiring only a web browser. The best known examples are Google Apps for Education and MicrosoftLive@edu which provide communication and office applications such as spreadsheets and email.

2.) **Platform as a Service (PaaS):** The operating environment in which applications run. With PaaS, one can develop new applications or services in the cloud that do not depend on a specific platform to run, and can make them widely available to users through the Internet. PaaS delivers cloud-based application development tools in addition to services for testing,

Deploying, collaborating on, hosting, and maintaining applications. Examples of PaaS include Microsoft's Azure Services Platform (Microsoft, 2012), Sales force's Force.com development platform, Google Apps Engine

3.) **Infrastructure as a Service (IaaS):** The on-demand data centers. Here customers can rent basic computing resources such as processors and storage, and use them to run their own operating systems and applications. You pay for only what you use, and the service provides all the capacity you need, but you're responsible for monitoring, managing, and patching your on-demand infrastructure. One big advantage of IaaS is that it offers a cloud-based data center without requiring you to install new equipment or to wait for the hardware procurement process. This means one can get IT resources at his school, college, or university that otherwise might not be available. For example Amazon's Elastic Compute Cloud; organizations can use this infrastructure to run Linux servers on virtual machines and scale up usage as required.

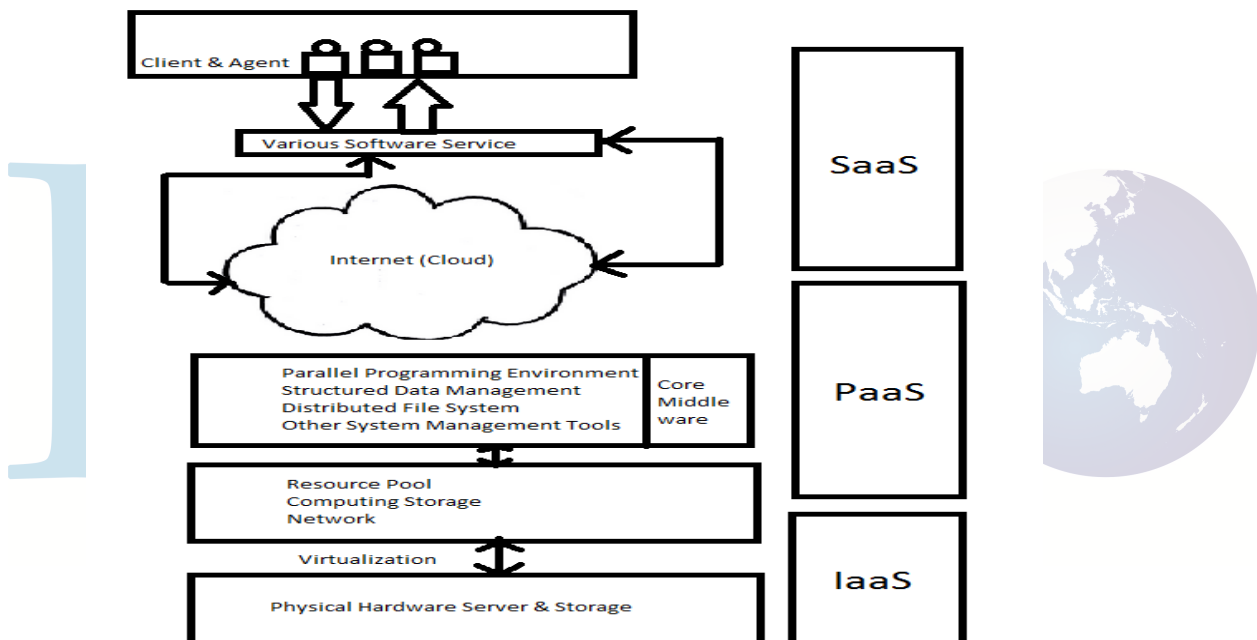


Fig: 2 Service Model

2.) Deployment Model of Cloud Computing

The deployment models defined by the cloud community are Public Cloud, Private Cloud, Hybrid Cloud and Community Cloud.

Public Cloud: One of the leading forms of the current computing deployment model. Mainly used by the general public cloud consumer and the policy, value and costing are defined by the service provider. The popular public cloud services are Amazon EC2, S3, Google App Engine, and Force.com.

Private Cloud: This is a cloud model for a single organization and managed by organization or a third party. The infrastructure can be located on premise or off premise. Primary reason for implementing private cloud is to maximize and utilize existing in-house resources. Secondary reasons include the data privacy and trust for security. Finally, data transfer cost

and to have full control over mission-critical activities behind the firewalls. Academic institutions build private cloud for research and teaching purpose.

Hybrid Cloud: It is a combination of two or more clouds viz., private, community or public. In order to optimize the resource and to utilize core competency of the public cloud organizations use the hybrid cloud. Virtual Private Cloud (VPC) is a deployment model of Amazon Web Services (AWS). Using VPC it is possible to have a secure and seamless bridge between IT infrastructure of an organization and Amazon public cloud. Hybrid cloud is the combination of public and private cloud.

Community Cloud: Several organization of same group shares their cloud resources and jointly constructs the policies and requirements. The infrastructure of the cloud can be hosted by a third-party vendor or within one of the organizations in the community.

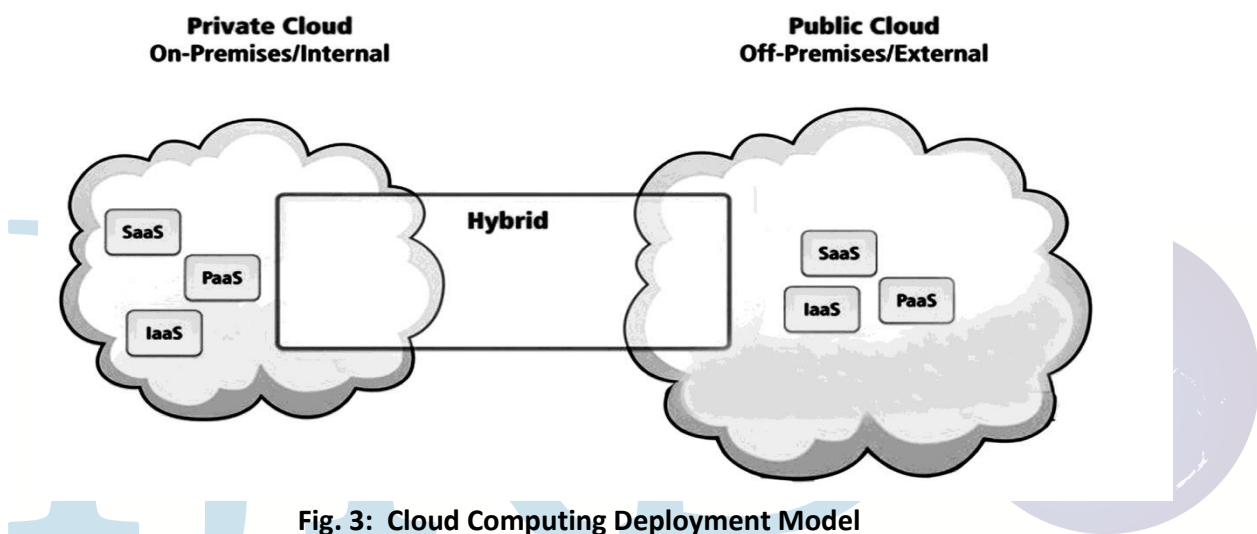


Fig. 3: Cloud Computing Deployment Model

CLOUD ARCHITECTURE FOR EDUCATION

Due to the higher accessibility, availability and efficiency of cloud services many universities, businesses are trying to make use of these services. Today's cloud computing Providers are offering higher education, the opportunity to substitute their data and information in the 'cloud' for universities with existing data centers, servers and application replacing these traditional campus machines. Developing a cloud architecture for education can be distinct according to the purpose and infrastructure of the institution and can be challenged. The universities has to follow all the rules and regulation of the state and country for developing a cloud for education as many countries are very strict in cross broader transfer of information. Once the university establishes where their data will reside and gives the measure of data security an agreement called SLA(Service Level Agreement) can be made with the cloud service provider. The SLA is a document which can ensure educational cloud users regarding the services provided by the cloud. It tries to identify the users need and simplifies complex issues and creates a relationship between the user and the service provider. It helps to specify the privacy, consistency and integrity. [2]

What is differences between Private and Educational Cloud

In Fig 4 (a) (b) shows the private and educational cloud architecture for education. [3][4][5] Institutes can develop their own cloud called as 'private cloud' by making use of their

existing resources or multiple universities can come together and can develop a hybrid cloud called as ‘educational cloud’, in which they can share all the resources from the various universities. Private cloud makes use of the local network whereas the educational cloud makes use of public network to access the services provided by the cloud. Both private and educational cloud which is developed for education has to specify the services provided by them. [12]

Table 1: Differences between Private Cloud and Education Cloud. [6]

Cloud Feature	Private Cloud	Education Cloud
Owned and managed by	Single University	Service Provider (Many University)
Access	Limited to Employees and Students of Single University	By Subscription
Control and Customization	Yes (By University)	None

Table: 1

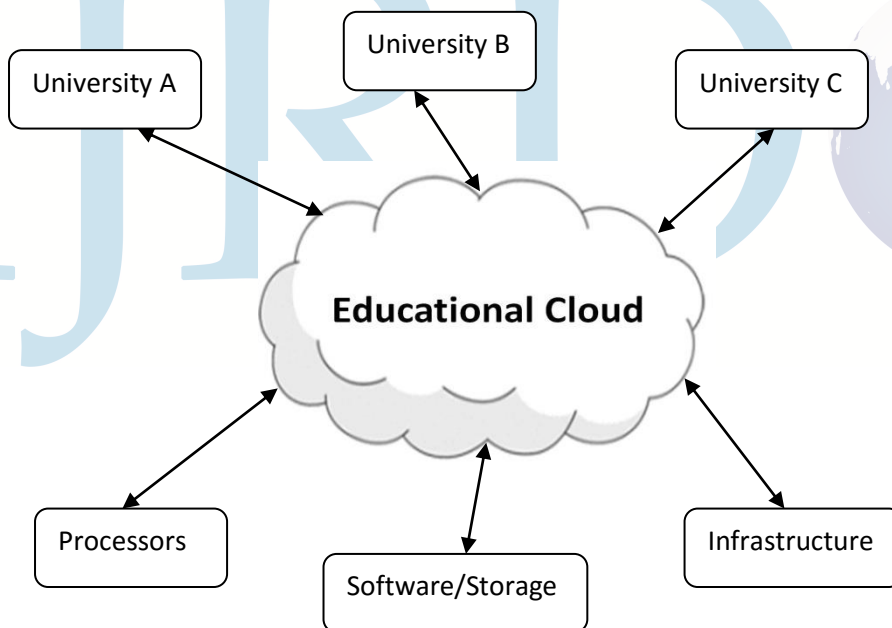


Fig: 4 (a)

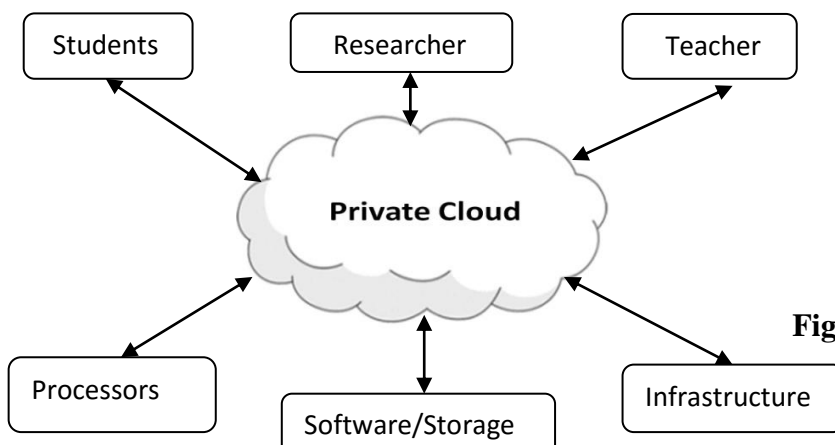


Fig: 4(b)

Some Services Available to Educational Institutions

Microsoft for Education: Microsoft is one of the companies whose services have been reforming education for more than two decades. The Microsoft's cloud is currently available to the educational institutions in the following forms: Office 365 for Education (formerly Microsoft live@edu), Business Productivity Online Suite (BPOS), Exchange Hosted Services, Microsoft Dynamics CRM Online and Office Web Apps.

Google Apps for Education: Google Apps for Education is a widely used platform for outsourcing free web-based email, calendar and documents for collaborative study. Google has initiated two important campaigns for introducing improvements in the education sector. 72 of the top 100 U.S. Universities used Google Apps for Education in 2012, while Chromebooks entered 2000 schools in 2013.

AWS in Education: Amazon's AWS cloud is an education-friendly set of services that provides cost-efficient solutions to universities, community colleges, vocational schools and K-12 schools and districts. AWS users have at their disposal computing and storage resources that contribute to a creation of flexible IT infrastructure in these institutions. The global community of AWS education services has reached the number of 2,400 schools in 2013.

LITERATURE REVIEW

Hong-link Truong et.al (2012) concluded in his paper that developing Cloud computing are Effective Solution for teacher and research Activities. Cloud computing is definitely one of the major innovations that entered worldwide classrooms in recent years. Kiran Yadav (2014) show that the cloud allows us to access our work anywhere, anytime and share it with anyone. It frees us from needing a particular Machine to access a file or an application like a word processor or spreadsheet program. Saju Mathew (2012) has been carried result cloud computing is an emerging computing paradigm and next generation platform that can provide tremendous value of information of any size. The shift towards cloud computing would enable the universities and educational institutions to save money and take benefit of the developing technology. Both private and educational cloud can provide the necessary computational facility on demand of the user without any expense and can create a common platform for sharing the various resources from the various institutions.

BENEFITS OF CLOUD COMPUTING FOR EDUCATION

There are many benefits of cloud technology in education sector.[7][8][9][10] Every organization has different point of views. Mostly they implemented because of Learning management system and student information system.

1.) 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. Students can use office applications for free without having to purchase, install on their computers.

2.) **No Extra Infrastructure:** Colleges and governments are now free to focus on their goals that is making more research facilities available to the students and making the environment global in spite wasting time on worrying about the buildings, labs, teachers etc.

3.) **Personalized Learning:** Cloud computing affords opportunities for greater student choice in learning. Using an Internet-connected device, students can access a wide array of resources and software tools that suit their learning styles and interests.

4.) **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.

5.) **Accessibility:** Availability of the services is the most important and desired by the user using the education cloud. 24 Hours is the availability that is needed by this system without failure. From anywhere one can login and access the information.

6.) **Go green:** It is protection of the environment by using green technologies. Education cloud will surely reduce the carbon footprint.

7.) **Openness:** It increased the openness of students to new Technologies.

8.) It increasing functional capabilities.

9.) Offline Usage with Further Synchronization Opportunities.

LIMITATIONS OF CLOUD COMPUTING

Cloud computing has the potential for improving the efficiency, cost and convenience for the universities and educational sectors, but it has few limitations such as; [11]

- 1) Not all application runs on cloud
- 2) Risk related to data protection and security and its integrity
- 3) Organizational support
- 4) Dissemination politics, intellectual property
- 5) Security and protection of sensitive data
- 6) Maturity of solutions
- 7) Lack of confidence
- 8) Standard adherence
- 9) Speed and lack of Internet can affect work methods

CONCLUSION

In this Paper the technical Analyses of Cloud Computing has been focused on the Education System. The services and deployment of Cloud Computing has been also depicted to Education institution of Cloud Computing on the Education .The Limitation can be eliminates through further researcher.

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