IMPORTANCE OF CLOUD COMPUTING IN INDIAN EDUCATION SECTOR

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Abstract: *- Educational Institutions are under huge pressure for extending to deliver more and need to find choice to provide rich, inexpensive services and tools. Cloud computing has its ability to provide computation and storage peripherals as services. Public as well as private institutions can use cloud computing to supply good services with a restricted quantity of resources. Around 45 million mankind will be in the age group of 18 to 20 years by 2020 in India. It will become more difficult in future to make available satisfactory schooling for them. This paper is an analytical finding about on the role of cloud computing in education.*

Keywords:**Software as a Service (SaaS), Virtual Computing Lab (VCL), Cloud Computing and Learning as a Service (LaaS)**

1. Introduction

The ICT has a huge importance in the field of education. The concept of Life Long Learning and Anybody, Anytime, Anywhere is now become possible through ICT. The education field is the second largest field around the world, and Indian school system is the largest system in the world having more than 1.12 million schools. In the current financial crisis, educational institution is facing huge problems to provide necessary IT supports to educational, research and extension activities. [1].

With the inclusion of cloud computing concept as an integral part of IT policy, the colleges and schools can extend their capability without investing on security or going for millions of rupees investments in IT. Using the features of Cloud Computing, educational institutions can put their entire focus on teaching and research activities. There is no need to worry about IT infrastructure as well as software systems. Numerous e-Universities like IBA e-University, Asia e-University, UK e-University and various different e-Universities are using multimedia E-learning materials. These materials are already available for E-learning through cloud computing. The under-developed countries like India can increase the level of education; literacy and economic development because the technical education is such countries are expensive, have fewer opportunities and economic unevenness.

Table 1- Expected Investments in Cloud Computing Education

Cloud Type	Figures in US $ in Billions	
	Year 2014	Year 2020
Public Cloud	25.5	169.3
Virtual Private Cloud	7.5	76.4
Private Cloud	7.8	25.9
Total	40.8	261.6

Many universities around the world, amongst which the University of California, Washington State University's School of Electrical Engineering and Computer Science, higher schooling institutions from the UK, Africa [2], U.S and others has already benefited with better prospect and usefulness using cloud based E-Learning.

A study done by Forrester Consulting in 2018, said that businesses shift from physical market and done collaborated to Google Apps saved around 45% to 65% and at the same time they got return on investment (ROI) of over 300%. The table given above shows the cloud computing market predicted by different findings up to 2020.

This paper is an analytic study on role and importance of cloud computing in education sector. This paper is partitioned into 5 Sections. Section-2 contains the discussion about the role of cloud computing in education sector. Section-3 is about the benefits of cloud computing over on-premises IT infrastructure. Section-4 contains the current cloud computing based education scenario in India. Last, section-5 is our conclusion.

2. Cloud Computing In Education

Cloud computing is a wireless network of computer peripherals located around the globe which shares to carry to education with modern techniques now not found in conventional IT infrastructure. It also provides solutions to many challenges faced by the education institute. With the combination of software and infrastructure of an organization with software and services offered by cloud provides an organization the new options for managing system management. Also, it reduces the cost and provides safety at the same time which helps to extend the quality of services.Cloud based teaching resource library has following features:

- Substantial with an incredible, helpful, fast searching and problem solving capacities.
- Standardization, grouping, determinations, customer alter, and customer control. Favorable for shape the manageability of the archive
- Organization never worries about information and taking backup frequently because information is stored in the cloud with high level security.
- In the cloud, various varieties of users can easily find what they need and at the same time entire operations are centrally controlled by cloud service providers.

A. Benefits of SaaS in School Education

Educational institute taking benefits of cloud computing services need not to pay money to purchase software license. Also there is no upgradation and maintenance cost to pay. Google's cloud computing services Google Apps delivers free of cost softwares like word processing, spreadsheets, presentation, website development, E-Mail and various applications for personal use. Google Apps saves by removing traditional IT cost which include hardware, server maintenance and upgradation.

Several educational institutes like Pike Country School saves the cost by replacing 1,400 clients by deploying a virtual desktop solution on the IBM cloud [3]. They are benefited by more than 60% of investment cost with increasing security and overall maintenance costs [11].

B. SaaS Benefits in Higher Education: Microsoft Live@edu

Microsoft Live@edu [4] is a cloud based application which has tremendous benefits for students, staff, faculty and alumni, E-Mail address. It also provides other applications that can be use to collaborate and communicate online without any cost to educational institutions. This application also helps students to prepare them for job after education.
There is several Microsoft's new clients including Portland Public Schools, Oregon; University at Albany, Fashion Institute of Technology, Vanderbilt University, city of Alexandria, VA [5].

- After pilot test of Live@edu, the University at Albany has chosen Live@edu for it's more than 23,500 of students, teachers and staff.

- Fashion Institute of Technology (FIT) is a topmost design, fashion, business management and technology school. FIT has 12,000 students in all campuses around the world. FIT is now implementing Live@edu using cloud environment for students in classroom teaching.
- In Tennessee, Vanderbilt University is using Live@edu for its 12,000 students. By doing agreement, Vanderbilt is hiking the entire Microsoft communications and cooperation, on-premises and in the cloud, including Windows Live SkyDrive and Windows LiveMesh2011 [6] which helps to reduce file servers, disaster recovery and easy access of data and information any in their university affiliated campuses. This technology and services can be used anywhere, on any device for the Vanderbilt's students and staff.

C. Role of Cloud Computing in Distance Education

- *Sharing of Resources*- We can use cloud resources by using internet on any personal devices without upgrading the software. We can avoid reinstallation as well as upgradation by using cloud services to store the resources either software or hardware [7]. This prompts the acknowledgment of resource sharing and no need to update the software as well as hardware. By consolidating the resources of different school into a cloud will put down the cost of resources for a single school [8].
- *Security*- Every single education institute has confidential information and private data which they want to keep secure. For such institutions, security plays and vital role in distance education [9]. Staff and faculty in distance education can use this data by accessing it through internet but at the same time it can be hacked or attacked by virus. In such pessimistic scenario, the whole system framework can be paralysis. The cloud computing mechanism can secure and keep monitoring on data by implementing high level security to resources. The cloud service managers can unified data management, resource allocated, load balance, software installation and security control which reduce the investment cost of resources.

  At the same time high level security is provide to sensitive and highly confidential data like research results, students records and employee's payroll etc. [10].
- *Support Services in Distance Education*- The services currently offering by distance education to the learners are not possible for anyone, anytime and anyplace [11]. Most of the distance education organizations provide only information level data but the learners require knowledge level data. Now a day, cloud computing services remove this shortfall. By using high speed internet, learners are now able to fulfill their demands and various kinds of study materials which they want after their logging.
- *Collusion Learning in Distance Education*- Collusion learning assumes a significant job in distance education by making a network in which learners can communicate with others and helps to solve their problem. In collusion learning, the most significant thing is to imbibe trust among students [12]; else, they will feel isolate and powerless in the study. With the use of cloud computing services, the teachers and students, students and students can use collusion learning for online study material exchange, online document editing, for example Google cooperation platform[13].

3. Advantages of Cloud Computing Over On-Premises IT Infrastructure

When user utilizes on-premises computing mechanisms, it is the responsibility of only user to maintain computing environment whereas in cloud computing services, it is just pay and use model. In cloud computing environment, user can utilizes entire resources without any fear.

The table given below shows the details of the resources. The users have to manage it in on-premises, Hosted and Cloud condition:

Table 2- Details of Resources in On-premise, Hosted and Cloud

On-Premise	Hosted	Cloud Computing
Application Runtimes SOA/Integration Databases Server Software Virtualization Server Hardware Storage Networking	Application Runtimes SOA Applications Databases	Applications

4. Educational Cloud Computing Scenario In India

As up to 8th December 2019, there are 49 Central Universities, 367 State Universities, 123 Deemed Universities, and 282 Private Universities [14] in India. The difficulties presented by the educational organizations for education necessities are enormous. In India, there will be about 48 million of people belongs to the age group of 18 to 20 years by 2020 [13]. To provide skilled education to these people there will be an requirement of more than 20 million teachers but at present more than 1.3 million teaching posts of teachers are vacant. As per current government policy, we will create only 55,000 teachers up to 2020 and it will lead to large teaching appointment which will remain vacant.

In India, cloud computing has exceptional role in education because it enables to share resources at different locations in an economic and convenient way.

Several kinds of applications of cloud computing in education sector will be the future of IT framework for education, and includes educational information require for the development of hardware and software for the resources. [15]

IIT Kanpur is utilizing IBM lab. Indian Institute of Hardware Technology Limited (IIHT) is as of now in discussion with different colleges and schools to incorporate their coursework with the e-Learning program. IT Industry has been profited by the IIHT's cloud computing applications because it is probably fulfilling the increasing demand of cloud computing certified trainers and experts. IIHT is planning to train and certify 100,000 certified trainers in India and around the world in coming days. IIHT has already started IIHT certification program to become experts which will help several IT experts to acquire the skills to develop themselves into cloud professional for expertise in virtualization. IIHT has collaboration with Sikkim Manipal University in India, China University and Drexter University for offering Learning-as-a-Service (LaaS) which will make IT education easier.

India's Telecom Commission is planning to create US $4.3 billion National Optical Fiber Network and it has been endorsed by the Department of Telecom (DoT) which will help to broaden the nation's current fiber optic network [11] from the town level to the village level, giving the nation of 1.3 billion population a plenty of administrative services at their doors which will diminish relocation of rural population to urban areas [16].

A high-speed multi-gigabit National Knowledge Network (NKN) is use to provide unified high speed network for all information related institutions in the India. The aim of NKN is to cater the nation’s mission for making quality institutions with research facilities and creating highly trained experts. More than 350 educational institutes have

been connected with NKN to communicate more than 1500 institutions belongs to different categories across the India.

The Indian customers like middle market sellers, universities, institutions, communication companies as well as government bodies are prepared to get resources they require to cloud framework and application to their clients. Numerous Indian Industries including Infosys, IBM India, Accenture, and so on have shown there interest to promote research in cloud computing.

5. CONCLUSION

Cloud computing will bring a change in perspective in the teaching learning process by offering better prospect to concentrate more around education and research areas as opposed to on sophisticated IT usage. The cloud computing has great future in satisfying the objective of distance education for Anybody, Anytime, Anyplace and Anything. Learning as a Service is probably going to be the new opportunity of cloud computing administrations in education.

By implementing cloud benefits in the education institutions can essentially save the cost of software license and also cut the institutional IT staff. The institution does not required highly configure educational software can use it from its nearby institution which will not only tends to best utilization of resources but at the same time it will save huge investments as well as human resources. The technical institutes can go for proper utilization of their resources like Routers, Switches, Network security gadgets, Network Management software, and so on. The institutions can updates their at present computer centers to cloud computing centers. Using these services commercial organization can also generate some income too.

Assimilation of resources by using cloud computing will fulfill the demand fast handling of information to facilitate the current "data blast". It will also help to get the educational growth of the fast changes in IT sector. At the same time, it will heighten the types of educational resources utilization, save cost, moving towards demand for green energy and also heighten the security features.

As per the Open Doors[17] yearly review by the US's Institute of International Education (lIE), it is found that, for the first time the percentage of US students in India has been increased by 44% and Indian students in US is decrease by 1 %1. So to grasp the rapid changing trends in education system, it is the time to use the Indian education sector with advanced technology. At present, in India, there is no records of the handicapped passed out students of various Universities of educational institutions for verifications in case of forgery. If such kind data is switched to cloud, then it can be very smoothly accessed through NKN. India is still growing country even though it has lot of potential, and research in cloud computing.

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