Role of Cloud Computing in Modern Education System

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Abstract – *Computer education has a major role in motivating the people and the society in giving new ideas which strikes in the mind of literate people. The role of study in many academic institutes is exploring new technologies for effective education system especially economically developing countries. Now days, students are using latest technologies in learning as well as teaching for the development and growth of the country. Cloud computing is being adopted by various organizations through internet because of its scalability. It can be very useful in teaching as well as learning process. It has its importance in the learning of quality education which provides a number of services including hardware and software. Efforts have been made in this paper to browse the cloud computing with a view to make it understandable about the role of cloud computing for the betterment of the education system.*

Keywords- *Cloud computing, teaching methodology, PAYGO, Education sector, Information, Infrastructure, Services.*

I. INTRODUCTION TO CLOUD COMPUTING

The cloud computing has changed the traditional computer system which is used to store the data on hard disk of the computer. It has brought a wonderful change in today's computer system. It has developed several new applications which help us in teaching the students over the internet. IT technology is changing day by day which puts more financial burden on institutes. Cloud computing provides the option of PAYGO (Pay-as-you-go) basis with a view to share the burden according to the requirement of the user while they use the cloud computing in the campus or off the campus [1]. They can utilizes these model from anywhere at any time by sharing computing sources rather than having personal devices or local servers to handle different applications. Cloud computing provides minimal management effort as well as service provider interaction [1-2]. Cloud computing means when applications and services are moved into the internet that is called cloud. It is an Internet based computing in which computers or mobile devices can access on demand. Free or low-cost cloud-based services are used by learners and educators to support learning, social interaction, content creation, publishing and collaboration. Many companies such as IBM, Dell, HP, Intel, Google are delivering services from the cloud have their own cloud base solutions to their users, including email access, document applications, text translations, maps etc [2-3],[5].

II. SERVICE MODELS

Service models of cloud computing is as follows and shown in fig. 1:

(a) Software as a Service (SaaS): This model helps the students or staffs for using various types of applications from all the feasible location through various devices available like laptops, mobiles and tablets to meet their requirements. Most of the institutes are using this service to facilitate the students, staff and academics.

(b) Platform as a Service (PaaS): This model is used for coding and implementing the applications in a simple and an efficient way. This model is cost effective and simple. In this model, PaaS is attached with dedicated APIs for monitoring and controlling all the activities of main server. The user send the request to the server and server takes action on all requests and process it gently after executing the server to give the output to the user [3].

(c) Infrastructure as a Service (IaaS): It is a self service model which provides various services to users for controlling and managing data center infrastructure. It is called resource clouds which provide different types of resources according to the user requirement.

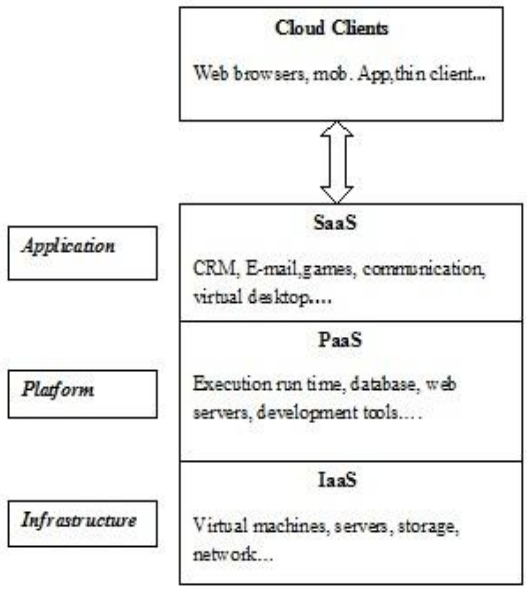

Fig.1. Cloud Computing Service

III. PREVALING SYSTEM OF EDUCATION

Cloud computing is being used in various educational institutes in different ways. Documents are created and stored in the computer. The documents are accessible by the user not only on his/her network but can be accessed by computers outside the network. Therefore, it is very much clear that one can accesses the information uploaded in the cloud computing by the others people through the internet. Cloud computing provides resources and capabilities of information technology, for example, a user can communicate variety of applications such as collaboration, storage, communication etc. through cloud computing [1],[4]. This is an advantage of modern computer technology which imports education located in remote areas through cloud computing. Students can study the subjects of their choices which are not available in educational institutes where they belong. For the specialization of certain educational fields, the students can use cloud computing through internet [4].

In the modern times, the use of information and technology has brought a drastic change in our day to day activities because of the latest applications of computer software. This has put more financial burden on institutes but cloud computing provide the option of PAYGO (Pay-as-you-go) basis with a view to share the burden according to the requirement of the user while they use the cloud computing in the campus or off the campus [5].

IV. EVALUATION OF CLOUD COMPUTING IN EDUCATION SYSTEM

(a) In many institutes there are deficiency of infrastructure, platform, and software's due to many barriers. So, in such a situation, cloud plays a important role where students who are not connected with the modern facilities can get quality education through their virtual machines. Fig.2 clearly indicates that the institutions are using various services for importing education to students through cloud computing which has better quality than before [6].

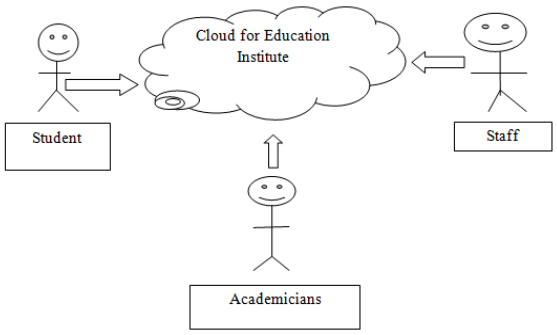

Fig.2. Use of cloud computing by different users [5]

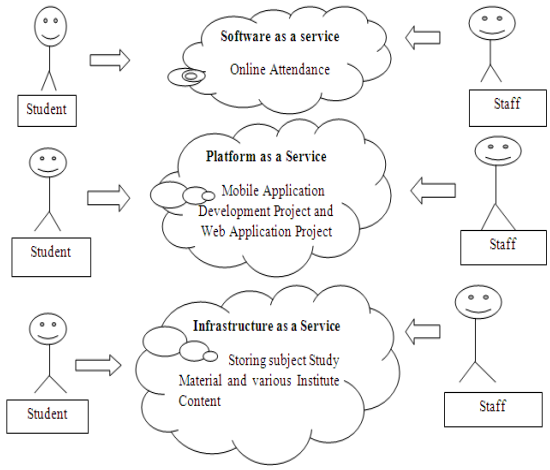

Fig.3 Use of various services of Education Cloud [5]

(b) Though the cloud computing is very useful for the educational purposes but the other administrative organizations are also using it because of its low maintenance cost and easy communications with staff located at different

places (as shown in fig. 3). To meet the needs of education cloud PaaS performs a major role in organizing the practical session such as developing web applications and mobile applications etc. Cloud computing enables users to control and access data through the networking. The cloud computing has its utmost utility specially for higher education students are shown in fig.4

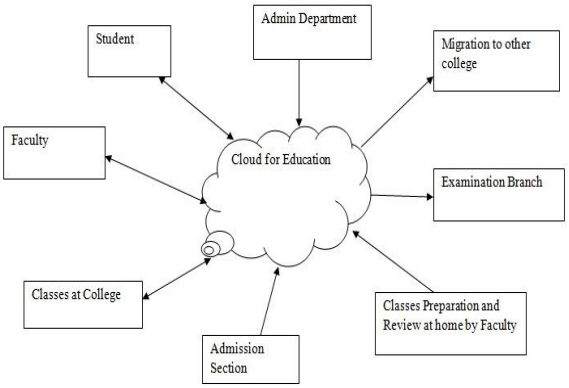

Fig.4. Services attached to Education Cloud

All the main users of the institution are using cloud computing. Separate login is provided for all the users for their respective work. Teachers are using cloud computing for class Tutorials, assignments, and tests by uploading their projects for their students. With the use of this technology, the students are capable to find out the materials uploaded by their teachers at any place and at their suitable time. The education system will make it easy for teachers to identify problem areas in which students tend to make mistakes, by analyzing students' study records. In doing so, it will also allow teachers in improving the materials and methods. This will allow students to access the material not only in the campus but make it possible to utilize such materials by accessing through cloud computing anywhere. [6]

(c) The mobile connectivity is an essential tool for communications between teachers and the students always and everywhere for the cloud based education .This system is not bound for any specific device or connectivity because user can use any device such as laptops, mobiles etc. Various students have learnt different foreign languages and customs by sitting in different countries through internet [7].

(d) The real power of education clouds becomes evident when viewed from a user's perspective. A set of users (including students, teachers, parents and others) can access a variety of education cloud services, using whatever device or devices they have access to (laptops, desktops, PDAs, etc. Through cloud platforms, teachers have better communication with parents and students regarding assignments, tests and projects. Parents are in a position to keep an eye over the activities related to the studies of their kids through phone networks. Teachers can post important messages and keep an archive of completed work in one spot [6-7].

(e) The use of white boards and markers have been made a chapter of old histories by the smart boards. These smart boards have brought a drastic change in the educational system by abolishing the traditional use of white boards. The credit goes to the latest technologies which are being used by the cloud computing through internet. The students can participate in discussing their subjects with their teachers with these modified classrooms containing sound effects. With this latest technology the students are not bound to attend the lectures in the classrooms rather they can participate in the classroom discussions from their homes or otherwise. It has also made convenient for teachers to understand the views of their pupils and can guide them about their mistakes [8].

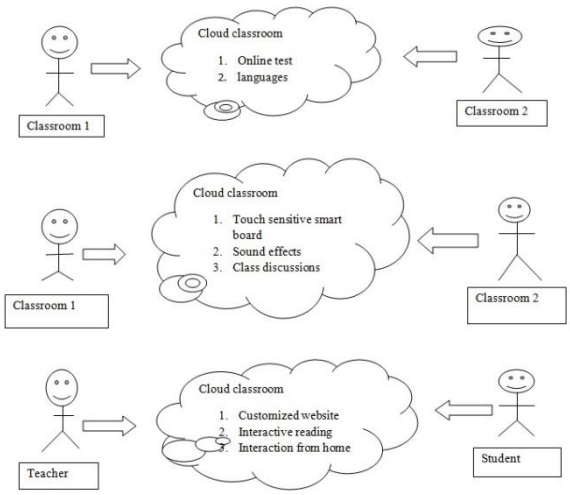

Fig.5. Interaction between Teacher and Student [8]

V. EFFECT OF CLOUD COMPUTING IN EDUCATION ([7], [9-12] ,[15])

1. **Remote and Easy Accessibility:** Using cloud computing, user may access various services useful for education system with devices like mobile phones, laptops at any location where internet is easily available.
2. **Reduced Cost:** Cloud computing is inexpensive as many applications are freely available and pre-installed which reduce the cost of educational institute.
3. **Homogeneity:** There is no restriction on the user to use a particular cloud provider or architecture rather user can access the open cloud in accordance to the requirement of the user working with other institutes.
4. **Efficient System:** Cloud computing delivers as well as retrieves the data and applications with less time and hence, it is an efficient system

VI. SHORTCOMINGS OF CLOUD COMPUTING ([9], [11-16])

1. **Compliance Regulations:** It requires a set of regulations which is essential for transparency while using cloud computing in the educational institutes because the number of users is increasing day by day.
2. **Data Privacy:** Using cloud computing, there is a big thought in user's mind that the information can be accessed by the unauthorized users. To prevent the data from unauthorized users the developers of cloud computing has introduced a foolproof method by providing passwords which have proved very useful to protect the information from the hackers/unauthorized users.
3. **Networking Problem:** Due to presence of different types of clouds, networking becomes complex.
4. **Infrastructure Dependency:** The hybrid cloud model is dependent on internal IT infrastructure, therefore it is necessary to ensure redundancy across data centers.

VII. CONCLUSION

The modern institutes and academies are in great need of such technologies which may be useful for the betterment of teaching system and the cloud computing fulfils their requirements. By introducing cloud computing in, educational sector the teaching as well as learning methodology will become more effective with better quality. The use of this technology will reduce the expenditure of institutes in maintaining the infrastructure of institutes.

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