

A Next Generation Technological Learning with Special Reference to Learning with Cloud Computing

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Abstract—*In Today's world is filled with technology. Every development in the technology and computing are influencing all the areas of our life. One of the important area is learning. With the growing technology of Internet plays a major role in learning process and enhancement of learning over Internet has become one of the major topic for the researchers. As technological development increases in today's world, as a result in the expenses of the infrastructure is to meet the demands of the clients or customers. Thee solution for all such problem is Cloud Computing.*

Keywords: *Cloud computing, Technology, E- learning, Internet, Researcher.*

1. INTRODUCTION

In the recent times rapid growth of technology has made most of the individual & organization technology dependent. One of the such development is growth of Internet, which has totally change the pace and the life style of the individuals. At present growth of Internet has developed tremendous impact on the education. Nowadays most of the learners & the educational institutions are dependent on the Internet resources but several factors are affect the educational institutes in the usage of internet such as infrastructure, increase in bandwidth, download capacity, performance, data storage issues and the most important is the cost. To overcome all issues at many educational institutes are now adopting a new growing technology called "cloud computing".

Cloud computing is a computing which is scalable, dynamic and often virtualized resources is provided as a service over the network. NIST defines the cloud computing as one of most convenient, on demand network access to shared pools of configurable computing resources, which can be rapidly provisioned and released with minimal cloud service provider intervention and interaction or management effort. Due to dynamic features in nature, cloud computing can be used as one of the adoptable technology for many universities or educational institutes. Now a day, level of education has increased and at the same time all the educational institutes have also grown in terms of the data storage, infrastructure

and resources. The educational institutions are opting for new mode and procedure for the teaching purpose which has given a new opportunity to many new computing devices. Today's learner has come out of traditional learning method "classroom teaching" to the web based learning mode. Many educational institutes have constructed their own personalized web based system which is maintained by the institutes itself. Most of the educational institutes/ colleges have very limited learning resources or study materials which need to be updated time to time. As a result educational institutes need to spend huge amount to update the resources regularly & need to invest huge amount for their system maintenance which causes extra burden in some educational institutes. The growing level of education and increasing knowledge of the learner is forcing him to come out of the educational institutes in search of new resources and learning materials as the learner may not get from their respective institutes. It gives an opportunity to the learners to explore new technologies and adapt to new learning system called as 'E-Learning'.

2. CLOUD COMPUTING

In the present days cloud computing has become one of important areas of research in IT sector. Due to its good characteristic many organization & educational institutes are trying to adopt this emerging technology. Since the cloud computing is an Internet based computing, the only requirement is to have a continuous connection of Internet. The main idea of the cloud computing is to have all the resources at one end for which we required software, information and all the other resources can be shared with different users on demand. Cloud computing also allows its subscribers to use the required application without the need to purchase and physically install in to client computers or laptops which enable them to access their information, files and folder from any part of the world 24X7 by using any Internet enabled devices such as smart-phones, I-pad, laptop, etc.

Following figure shows devices can access data from cloud computing

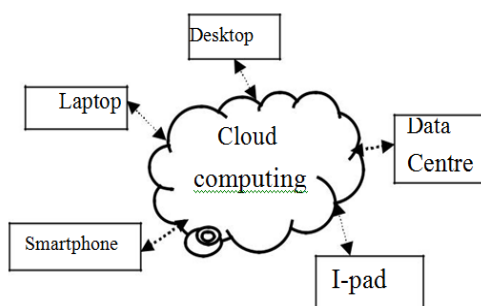


Fig. 1: Cloud Computing

As the Cloud computing uses PAYGO payment mode, the users has to pay according to the usage of the service offered by the Cloud Service Provider (CSP). Some good features of the cloud computing are virtualization technology, disk storage, fast Internet access, inexpensive servers etc. But the most important and popular feature is scalability.

Advancement of the cloud computing has put a great impact on service delivery, infrastructure thereby allowing more efficient and fast computing process by centralizing storage memory processing and bandwidth without investing in new infrastructure, new personnel training, purchase software or new licensing software. The development of technology is bringing all the resources together under one pool to offering new opportunities in teaching and learning process.

Some important characteristic of cloud computing is as follows:-

1. On demand access: - The learner or consumers can demand and access any required resource at any point of time without any interaction of the cloud service provider.
2. Flexibility of the service: - As per requirement and demand of the consumer all the services can be flexibly allocated and released.
3. Broad network access: - Continuous connection of Internet is one of the important requirements of cloud computing. As shown in figure 1 all computing devices can be connected to the network.
4. Pool of resources:- In cloud computing all the resource from multi-tenants can be brought together under one pool. Hence the required resource can be allotted to the learners easily.
5. PAYGO (Pay as you Go):- All the required and demanded resource by the consumer are charged according to their usage, hence no resource are misused by the consumers.

With the increasing level of education and resources required, it is very difficult for the educational institutes to cope with the rising infrastructure, types of application and software installation which in turn increases the overhead for the

educational institutes. To solve such type of problem and control the rising expense educational institutes can use the required resources from cloud on demand and in PAYGO basis. In cloud computing the resources can be either private or public. The private cloud is built for the individual organization where the users can make use of the facility without any change and store their sensitive data, whereas the public cloud offers access to the external users who are billed according to the usage of the resources.

Following diagram shows private and public cloud.

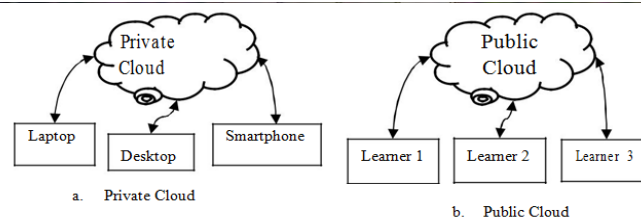


Fig. 2: Private and Public cloud

With the variety of cloud users has to full flexibility to choose from the variety of service offered by the cloud. User priorities and security requirements determine the level of cloud capabilities to explore. The main and common services of cloud computing includes the following:-

- a. *IaaS (Infrastructure as a Service) – IaaS provides all the virtualized resources, networks which is very beneficial to the organizations and has the ability to replace the entire data centre when necessary.*
- b. *PaaS (Platform as a Service) – PaaS gives the customer a platform where the customer can run their existing application without worrying about the maintenance and updating of the operating system.*
- c. *SaaS (Software as a Service) – SaaS is one of the most popular service opted by the customer as it provides all types of complex applications over Internet and provides a reliable storage for the applications.*

3. CLOUD COMPUTING AND E-LEARNING

Learning is a continuous process and today's learners have come out of the traditional classroom lectures. The learner tries to explore the variety of information from the computers and web based training (WBT). E-learning has evolved since computers were first introduced in education. As a result the recent trend is to have a blended service, where computer based activities are integrated with practical or class room activities. When a learner tries to access the service for learning and educational purpose, then this type of special service is termed as "Educational and Learning as a Service (ELaaS)". It is very much similar to the computer based learning (CBT) in which the user decides his learning activities which is accessible and done through computer. It's a linear learning fashion in which the user can refer to use the

online books, journal, publications etc., leaving the traditional classroom based learning. Using ELaaS is one good solution to continue education over Internet through cloud without worrying about the strength of the class, reading materials, the knowledge and skills obtain in traditional methods. The students can have access to a variety of studying materials or can have audio video learning using animations.

Following diagram shows the different blocks used in E-Learning and traditional learning using cloud computing

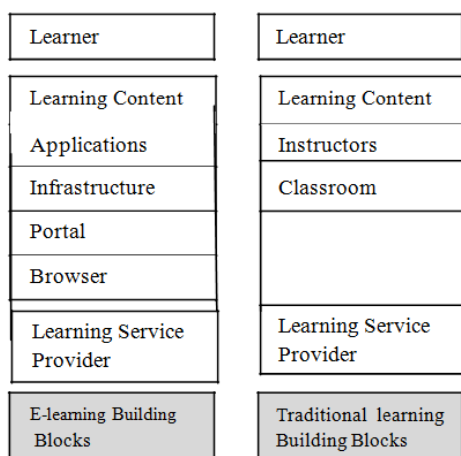


Fig. 3: Building blocks of E-Learning and Traditional

To support the student community who want to continue their higher studies many universities have come forward and now they are offering online education through cloud.

A. HOW CLOUD COMPUTING HELPS IN E-LEARNING AND IN HIGHER EDUCATION?

In higher education the learner cannot only depend on the traditional class room teaching as he has to refer many learning materials. Due to the limited resources, the learner finds all the required learning resources from Internet, hence termed as E-learning. E-learning is an Internet based learning process which uses the Internet technology to spread knowledge to all learners in the various parts of the world. It is a fast, easy and makes use of all the modern educational technology provided with a new mechanism of communication and resources rich environment to achieve a new way of learning. As a result the learner can plan, design, select, manage and implement his own learning materials and skills which can be very advantageous to learner thereby improving the efficiency of education.

The major benefit of using E-learning is that it can be used in all sectors of education such as academic course, training courses, company training, continuous education etc. and the two major components that contribute to E-learning process are the a) learner himself and b) the trainer. Using E-learning the learner can –

- Take all the courses online irrespective of the location
- Take online exams from any location
- Send feedbacks to the trainer
- Send homework and projects to the trainer from any part of the world.

While the trainer can –

- Deal with the course and content management referring to the other materials also
- Can prepare and put tests for the learner from any location at any time
- Can mark the homework, projects at any time from any location
- Communicate and send feedback to the learner

Generally, E-learning system is considered as a distributed system, which includes client side applications, an application server, a good database consisting with all necessary learning materials and the required hardware components and all connected with good network.

Following diagram shows E-Learning system

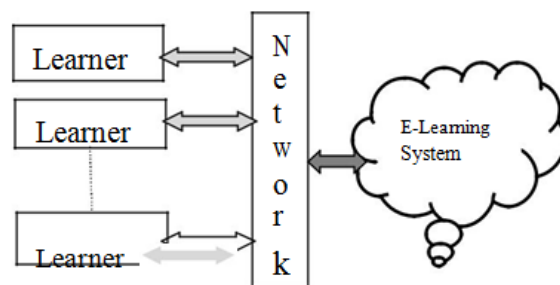


Fig. 4:- E-Learning System

As E-learning is very important in higher education, in the same way cloud computing plays a major role in learning by making use of its computing tools effectively thereby enhancing the level of education. Since cloud computing is known for its dynamic scalability and availability of virtual resources many educational universities and institutes can adopt their technology for learning process. By using cloud computing universities and institutes can focus more on research based teaching rather than wasting time in complexity of traditional system. Cloud computing can be one good solution when cooperative learning can be achieved by collaborating all the technologies.

Since cloud computing provides variety of services it can be a good solution for E-learning. For providing E-learning the universities can directly contact the cloud service provider. By making an agreement with the cloud service provider the universities can access all the virtualized resources, can have centralized storage system and make routine monitoring. By using the services and the virtualized resources from cloud computing the universities can collaborate with different universities, libraries of various universities can be merged,

thereby creating a virtual environment for learning by reducing the expenditure, manpower and time required to make a good computer lab. Due to the wide availability of resources, data centres, services cloud computing is one of the developing technology that put a good effective impact on E-learning and teaching environment.

4. CLOUD ARCHITECTURE FOR E-LEARNING

The version of this template is V2. Most of the formatting instructions in this document have been compiled by Due to the rapid development and growth in IT many educational institutes are facing a high level of challenges in their learning and teaching environment. The major worries are about the infrastructure and the expenditure to remain competitive. Once again cloud computing can be a solution due to its variety of features. In any cloud environment it has 3 main components;

- a. *Service consumer - is a client who needs to access the resources and services 24/7 that are easy to use from any location.*
- b. *Service creator – needs different tools and capabilities to offer varieties of service to their consumer on demand and ensure that the service consumer uses the service.*
- c. *Service provider – are responsible for implementing the service that the consumer requested for.*

Keeping all the benefits and features of cloud computing in mind author tries to construct a new architectural model for cloud computing so that it can be introduced in E-learning system thereby increasing the scalability, flexibility, usability and its availability.#

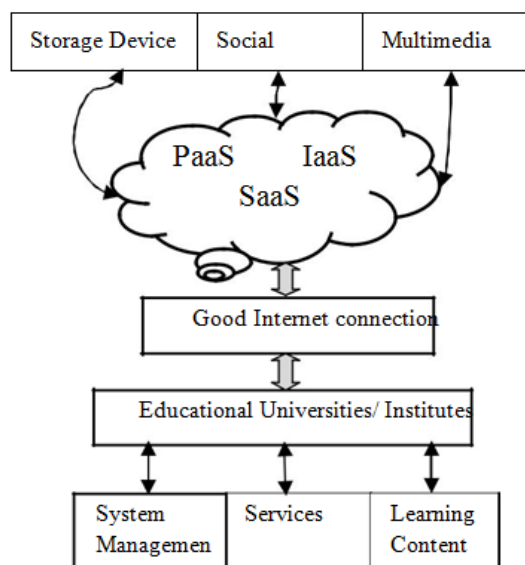


Fig. 5: E-Learning architecture using cloud computing

5. ADVANTAGES AND DISADVANTAGES OF USING CLOUD COMPUTING IN HIGHER EDUCATION

A. ADVANTAGES

1. *Data and the applications can be accessed from any location*
2. *All the resources used for teaching and learning can be monitored and metered properly*
3. *Cost of the resources are not fixed they are charged as per the learners usage*
4. *Infrastructure and resources can be accessed 24/7*
5. *Due to the wide varieties and availability of resources learners have developed the interest for research and have given the new opportunities for the learner to access new technology.*
6. *Since everything is online green environment is created.*

B. DISADVANTAGES

- a. *Though all the resources are available in cloud, it is very necessary to get the organizational support for adopting cloud computing technology.*
- b. *Due to lack of customization many applications don't run in cloud*
- c. *Since data is the most valuable resource, customers are worried about the security and protection of their sensitive data.*
- d. *Though cloud computing lacks proper security consumers have lack of confidence in subscribing the services*
- e. *Since one of the requirement of cloud computing is continuous connection of Internet at a high speed, which is always not possible and hence it can affect the learning.*
- f. *Cloud computing should follow the standards.*

6. CONCLUSION

When traditional learning is getting bored nowadays learning through technologies has created some of sort of interest in education and adapt to E-learning. Introducing the pool of technology and resource which the user can access on demand has made E-learning and education easy for the learner. Introduction of cloud computing in E-learning has opened new doors for the learner, educational institutes and universities for further enhancements. Due to many advance features and characteristic of cloud computing with respect to learning has given a new dimension to the educational sector to transform the level and type of learning. As a result the learner can access the information 24/7 from any location, while the educational institutes have reduced the burden of expenses spend on the infrastructure and other aspects with respect to learning

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