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APPLICATIONS OF CLOUD COMPUTING IN THE FIELD OF EDUCATION

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ABSTRACT

Education is one of the elementary things required to bring about a positive change in a person's life. A human cannot attain full heights until and unless he is fully educated. But quality education is still a dream for many because everyone don't have access to it. Moreover education system has faced numerous challenges due to scarcity of budget and resources since ages. The challenges to education system include the need of tools that offer more versatility and can adapt to new developments, andmobility, which is both a growing reality and a requirement for teachers and students.Cloud computing, though a relatively nascent technology, has proved to be revolutionary in past few years. It is a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications. The term "cloud" in "cloud computing" is used as a metaphor for "internet". Its principle is to provide IT resources in the form of services that users can call on and consume "on-demand" via some network and only pay for their actual consumption. Cloud computing is currently being used in various fields and education is one of them.It has offered a gamut of benefits ranging from lowering the costs by sharing equipment and solutions to flexibility in implementing teaching content. Cloud computing allows sharing of education resources in such a way that it promotes dynamic exchanges and participation between teachers, students, their social network and parents.

KEYWORDS: Cloud computing, education, resources, internet, challenges to education system, benefits, on-demand.

INTRODUCTION

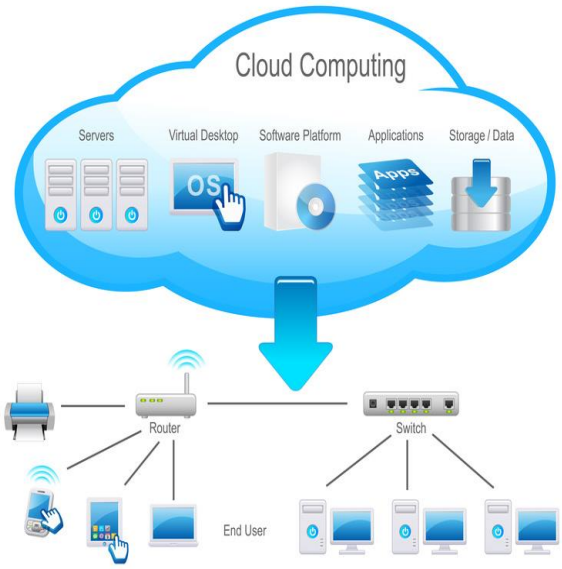
There have been a lot of developments going in the field of information technology. Cloud computing is one such development. It has taken the field of information technology by storm. Cloud computing is becoming an attractive technology due to its dynamic scalability and effective usage of the resources; it can be utilized under circumstances where the availability of resources is limited. [1] In this paper we study what actually cloud computing is and how it has found application in various fields. In this paper we also study about how cloud computing has found application in the field of education. The traditional computing methods used in institution possessed a lot of problems. This paper throws a light on those problems and also analyses how cloud computing has solved those problems.

CLOUD COMPUTING

In today's world of technology, cloud computing is creating a lot of buzz. Though a nascent technology, it is taking huge strides towards popularity. It has been the next natural step in the evolution of on-demand information technology services and products. Cloud computing have been around for some time now but the term became "popular" in October 2007 when IBM and Google announced a collaboration in this field [2]. The increase in popularity of cloud can be seen from the fact that IDC have predicted a 130% increase in cloud computing by 2016, meaning an increase to $43 billion [3]. Cloud computing can be defined as the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer. It is a technology based on the internet system that provides remote data centres to manage information services and applications. Cloud computing allows basic internet users and companies to manage files, information and applications without installing any software on their computers. Its only requirement is having an Internet connection [4].

It ensures that users can simply use the computing resources on demand and pay money according to their usage by a metering pattern similar to water and electricity consumption. Therefore, it brings a new business model, where the services it provides are becoming computing resources. In cloud computing, the term "cloud" is used as a metaphor

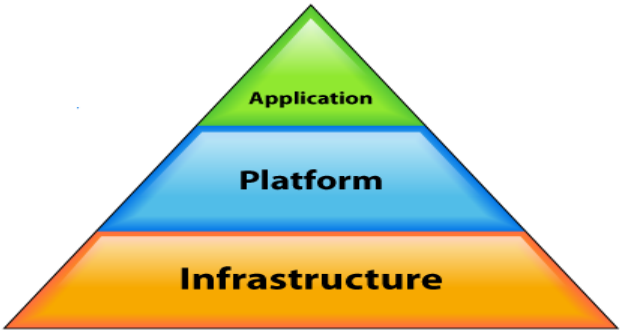
for internet. The cloud is a host to various services. The user accesses the cloud through internet and uses the various services on demand and pays only for what it has consumed.



As seen in the figure given above, the cloud is host to a very large range of services ranging from applications to storage of data, servers to virtual desktops and platforms to run software. The end users in a cloud computing environment don't need the infrastructure to access and use a particular service which is present in the cloud. The infrastructure required is provided by the third party who is offering the cloud services. The end users only need an internet connection to access those services. In this way the cost paid by an end user reduces drastically as the end user doesn't need to have any kind of infrastructure on his or her side. In a cloud computing system, there's a significant workload shift. Local computers no longer have to do all the heavy lifting when it comes to running applications. The network of computers that make up the cloud handles them instead. Hardware and software demands on the user's side decrease. The only thing the user's computer needs to be able to run is the cloud computing system's interface software, which can be as simple as a Web browser, and the cloud's network takes care of the rest [5].

There are three service models for cloud computing:

- Infrastructure as a Service (IaaS)
- Platform as a Service (PaaS)
- Software as a Service (SaaS)

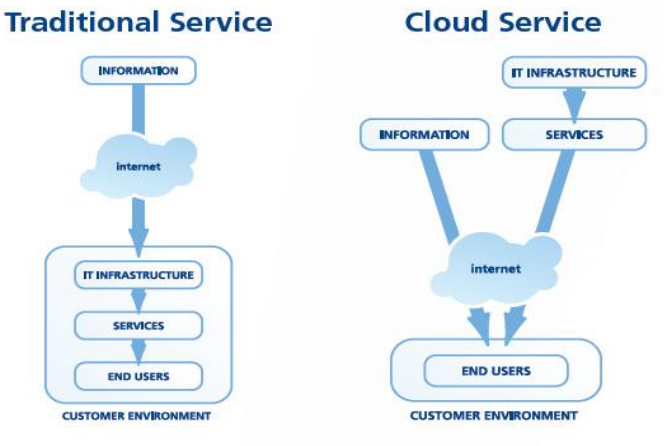


Infrastructure as a Service (IaaS): In this service model, set of physical resources such as servers, network devices and storage disks are offered to the users. This service model offer services that support the infrastructure application and a much more significant amount of consumers. Among the examples of infrastructure services are Amazon EC2 or Microsoft Azure Platform [6].

Platform as a Service (PaaS): In this service model the cloud provides the software platform for systems to run software. Its example includes the Google App Engine.

Software as a Service (SaaS): in this service model, applications are hosted and delivered online via a web browser offering traditional desktop functionality. Its examples include Google Docs, Gmail, MySAP and various other applications [7].

TRADITIONAL VERSUS CLOUD COMPUTING



A traditional computing or it can be termed as on-premise computing is what most organizations are used to. The servers are located in the organization itself, it purchases hardware and software and they are the property of the organization. On-premise creates disadvantages for businesses because they have to incur high upfront costs for hardware and software and most organizations use less than a quarter of their server resources. For these reasons, cloud computing or a hosted model has become an attractive alternative [8]. In cloud computing, a major chunk of cost incurred by hardware and software is bore by the third party who is offering the cloud services as the hardware required to access various services offered by the cloud is also provided by the cloud.

THE GOOD AND BAD OF CLOUD

Pros:

- Lower Total Cost of Ownership
- Scalable to fit the organizational needs
- Reduce upfront costs on hardware and software
- More secure data backup and recovery. If one server fails, it is automatically picked up on another server.
- Utility based. Most organizations only use 5-10% of their server resources; with a hosted solution it will only pay for the amount of server resource your business needs and pay for them on a monthly basis, like electricity.

Cons:

- Bandwidth costs could outweigh economical advantages of moving to a hosted solution.
- Not all software programs can be moved into the cloud.
- Depending on the size of the organization, it may not be a great price difference. The bigger the organization, the less cost advantage.
- Security can be a concern.
- Downtime. In cloud computing users are completely dependent on the Internet. If the Internet is down then no user will be able to access the cloud and use its services.
- Rural Location. If the organization is located in an area that has limited Internet access, it will not be able to use a hosted model [9].

APPLICATIONS IN THE FIELD OF EDUCATION

Now the question arises, why cloud computing can be needed in the field of education. Suppose there is a very large education institution. In this age of e-learning, a computer is must for every student and teacher. But buying computers for everyone isn't enough; one has to buy a complete range of licensed software to make the systems to perform adequately. Buying a separate license for each computer would incur a hefty cost. Cloud computing provides an alternative to it. Instead of installing a suite of software for each computer, only one application has to be loaded. That application would allow students and teachers to log into a Web-based service which hosts all the programs the user would need for his or her job. Remote machines owned by another company would run everything from e-mail to word processing to complex data analysis programs. This would reduce the money spent by institution to a large extent [10].

CHALLENGES FACED BY EDUCATION SECTOR

- The field of education has always faced scarcity of budget and resources. Despite this scarcity, this field finds itself confronted with various challenges and changing dynamics of the society. Some of the challenges faced by education sector are:
- The increasing speed of innovation in information technologies that no longer allows teaching establishments to keep up with the speed of innovation and stay in line with day-to-day technological reality, even though it is vital that pupils and students are prepared for IT in the best possible way.
- The "consumerization" of IT, which places new tools in the hands of students. These tools change students' relationship with knowledge and thus need to be incorporated into the education process [11].
- The emergence of generation of "digital natives" who have a perception of life and relationships that is influenced a lot by the digital tools.
- The growing need of tools by students and teachers that are more versatile and can adapt to new developments [12].
- Mobility has become more of a necessity in today's education process. Both teachers and students rely more and more on IT tools to prepare or review classes and access resources and knowledge in locations other than the classroom.
- The pace of learning has shaken off the shackles of the "8am to 4pm" school-day cycle. Increasingly, school pupils and students have come to expect an educational environment that allows them to learn at their own pace [13].

WHAT CLOUD COMPUTING OFFERS FOR EDUCATION?

Though education sector is facing a lot of challenges, cloud computing has offered some benefits for it. Some of them are:

Saving:

- Cloud computing offers efficient use of IT resources. It allows reduction in costs through:
- A reduction in costs through sharing IT equipment, centralized on a cloud platform with the virtualization of machines reducing the number of systems required.
- It reduces the need for costly local infrastructures that are under or over-sized, or not used to their maximum potential (typically, 50-90% of server capacity is unused). [IBM]
- A reduction in the money spent on procuring licenses for various applications.
- A reduction in the size and complexity of the number of machines and programs to be installed at each site, and hence the cost of licenses and maintenance is less.
- The billing of services is based on the actual use of resources (pay-per-use) and this leads to a great reduction in costs [14].

Flexibility:

One of the major benefits of cloud computing is that it offers a lot of flexibility in following ways:

- Speed of adjusting to change: Centralizing and standardizing the available resources enables faster upgrades in line with technological progress and/or changes to demand and requirements.
- flexibility in implementing teaching content – including, for personalized learning, a customized teaching process that meets the needs and specific difficulties of each student; students are then able to draw from the

whole of the content available, as well as find the information and tools they are looking for that are appropriate to their stage of education [15].

- flexibility of learning, giving easy access to courses and content at any time, any place; options to learn outside the school itself, as well as outside of the school calendar

Collaboration:
Because the Cloud allows multiple users to worn on and edit documents at the same time, it enables effortless sharing and transmission of ideas. With this feature, group projects and or collaborative lesson plans can be optimized for both teachers and students [16].

Sharing: Skills, good practices, applications, teaching content and infrastructures can be pooled and shared to avoid each establishment duplicating resources that exist elsewhere.

Sharing equipment also has the effect of harmonizing resources, making it easier to support them, and avoiding the problems of incompatibility or difficult integration between various tools and systems (including within the same establishment) [18].

CONCLUSION

Cloud computing has emerged as the next big thing in the field of computing. It has found application in lots of field. Various institutions and organizations have turned to cloud computing in search of an efficient computing. Wherever it has been used, it has offered efficient, cheap and improved type of computing. The field of education suffered from the lack of resources and budgets. Despite of this it had to compete with the new innovations in information technology that kept popping up every day. Cloud Computing provided educational institutions a way to tackle these challenges without increasing the required budget and resources.

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