

A Study of Implementation of E- Learning with Cloud Computing

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Abstract

Cloud computing is growing rapidly, with applications in almost any area, including education. E-learning systems usually require many hardware and software resources. There are many educational institutions that cannot afford such investments, and cloud computing is the best solution. This paper presents the positive impact of using cloud computing architectures upon e-learning solutions development. It focuses on the benefits of cloud computing for e-learning solutions and the e-learning project management challenges when this architecture is used. Education is a necessary human virtue and essential for society because it reflects the personality of the human being in our society. The effective way of teaching gives the quality of education and advance learning such as e-learning to the learners and also a high quality of teaching to the tutors. Information Technology (IT) plays a significant role in field of education. Now days, E-learning and M-learning have become very popular trends of the education technology riot. E-Learning is the new tool related to the virtualized distance learning by means of electronic communication mechanisms, specifically the Internet to enhance the traditional learning system. An E-learning system generally needs a lot of software and hardware resources. Today, many educational institutions cannot afford such investments and environments therefore cloud computing is the finest solution. The Cloud Computing environment rises swiftly as a natural platform to provide support to e-Learning systems. Hence, this paper presents the impact on using cloud computing for e-learning which contains an innovative environment resulting from both virtual and personal learning environments. This paper introduces concepts of e-learning and cloud computing infrastructure with their key benefits.

Keywords: - Cloud computing, E-learning, Mobile learning, Project management

1. INTRODUCTION

During the last years, the nature of the Internet was constantly changing from a place used to read web pages to an environment that allows end-users to run software applications. Interactivity and collaboration have become the keywords of the new web content. There is no doubt the future belongs to the Web 3.0 (also called the intelligent Web) [1]. This new environment supports the creation of a new generation of applications that are able to run on a wide range of hardware devices, like mobile phones or PDAs, while storing their data inside the cloud. The need for education is increasing constantly and the development and the improvement of the e-learning solutions is necessary. Also, the e-learning systems need to keep the pace with the technology, so the new direction is to use cloud computing. There are several cloud computing services providers that offer support for educational systems. Among them are Amazon, Google, Yahoo, Microsoft etc. In [2] are presented the main advantages of using cloud computing in schools. The following sections focus on cloud computing concepts and the benefits of cloud computing for elearning solutions. Also, the impact on e-learning solutions based on cloud computing project management is analyzed. This is very important for the development of e-learning solutions based on cloud computing.

2. E-LEARNING

E-Learning is electronic learning, think instead of a big “E” for “exciting, energetic, engaging, extended” learning [2]. E-learning is a new education concept by using the Internet technology, it deliveries the digital content, provides a learner-orient environment for the tutors and learners. The e-learning supports the construction of life-long virtual learning environments. In e-learning the learners uses a computer to learn a task, skill, or process. It is also referred

to as computer based training, internet-based learning, web-based training, and online learning. Today, e-learning is extensively used on different educational levels such as academic courses, continuous education, company trainings, etc. A subset of e-learning is M-learning, M-learning is mobile learning, which means learning using portable devices that allow the learner to learn in different environments and whilst on the move instead of being restricted to a classroom setting or tied to a desk. The term has grown enormously in popularity in the past few years, with the advent of handheld wireless devices such as i-Pads and tablets and increasingly sophisticated mobile phones. The essential requirements for C-learning (classroom learning) are the building, teaching faculties, time duration for learning, hardware and software resources. Now a day's sometimes the teaching institute does not have enough classrooms, faculties/tutors, hardware and software. To make teaching and learning process time and cost effective the concept of e-learning is very useful. Thus, E-learning can be more effective than C-learning.



Figure 1. E-learning

3. CATEGORIES OF E-LEARNING

E-learning has two main categories. The categories are:

Asynchronous E-learning

In asynchronous e-learning, the communication between participants does not occur at the same time and learner can learn at any time. The learning content is available at a Web server which is on cloud for learners all the time and on demand of the learner's workstation that will delivered from cloud. Due to its lower cost of development, reusable components and ease to the learner, now days it becomes more popular. This type of e-learning usually takes place via CD-ROM based, Network-based, Intranet-based or Internet-based. It may include access to tutors through online bulletin boards, online discussion groups or e-mail.

Synchronous E-learning:

Synchronous training is that classes are conducted over the Internet with a live tutor. All tutors and learners are logs in at the same time and can communicate directly and virtually with each other, which allow people to interact with peers and experts. Learner can raise his/her cyber hand and even view the cyber whiteboard. This type of e-learning usually takes place via virtual classroom, audio or video conferencing, internet telephony, shared whiteboard, application sharing, live web casts, chat rooms or even two way live broadcasts to learners in a classroom.

4. CLOUD COMPUTING

The cloud computing term was derived from the way the Internet is often represented in network diagrams. Due to the fact it involves the existence of data centers that are able to provide services, the cloud can be seen as a unique access point for all the requests coming from the world wide spread clients (see figure 1).

Cloud computing comprises of three layers [5]:

Infrastructure as a service (IaaS)

Platform as a service (PaaS)

Software as a service (SaaS)

Depending on the requirements, the customers can choose one or more services provided.

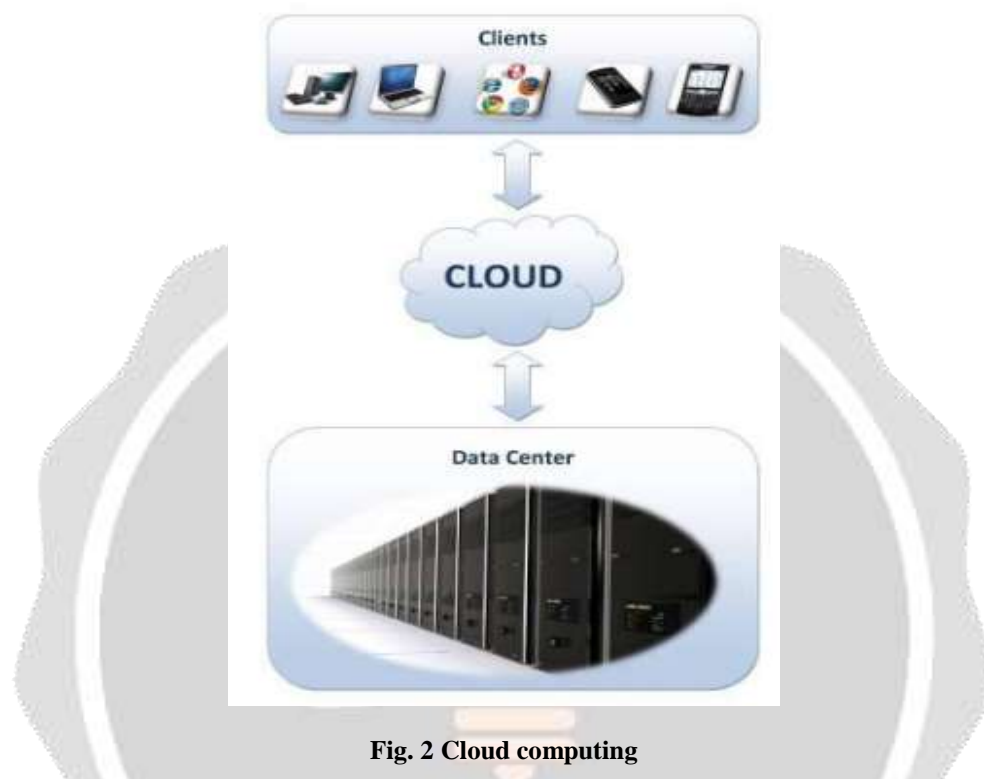


Fig. 2 Cloud computing

Hardware devices (such as regular PCs, notebooks, mobile phones, PDAs or any other similar equipment's) or software applications (like web browsers, for example Google Chrome) can successfully play the role of a cloud client (see figure 3). The customers are renting or simply accessing the needed processing capacity from the data center using the above mentioned client applications. The quality of the service becomes a crucial factor of the cloud computing success.

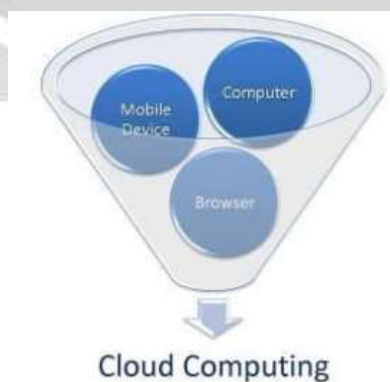


Fig. 3 Cloud computing clients

Cloud computing is by no means different from grid computing. The later tries to create a virtual processor by joining together a cluster of computers. The aim of a grid computing architecture is to solve large tasks by using the

advantage of concurrency and parallelism, while the cloud is focused on collaboration. Cloud computing becomes very popular because it moves the processing efforts from the local devices to the data center facilities. Therefore, any device, like an Internet connected phone, could be able to solve complex equations by simply passing the specific arguments to a service running at the data center level that will be capable to give back the results in a very short time. In these conditions, the security of data and applications becomes a very major issue. Cloud computing is widely accepted today due to its key advantages:

The cost is low or even free in some cases. Also, there are no costs (or very small ones) for hardware upgrades; for some applications (like spreadsheets) it can be used even in the offline mode, so when the client goes back online a synchronization process is refreshing the data; the strong connection that exists today between the users and their personal computers can be completely broken because a customer can reach the same result by using any Internet connected device having minimum software requirements; devices with minimal hardware requirements (mobile phones, for example) could be successfully used as cloud clients in order to become part of the cloud, there is no need to download or install a specific software, only the Internet connection is required; the cost of licensing different software packages is moved to the data center level, so there is no need to upgrade the local system when new service packs or patches are released; crash recovery is nearly unneeded. If the client computer crashes, there are almost no data lost because everything is stored into the cloud.

Some of the main cloud computing disadvantages are the following:

The Internet connection speed may affect the overall performances; on a long term basis, the data center subscription fee may be more expensive than buying the hardware; the service quality is crucial and the need of the backups is critical when speaking about data security.

The major players in the field of cloud computing are Google, Microsoft, Amazon, Yahoo and some legacy hardware vendors like IBM and Intel. Cloud Computing applications are mainly intended to help companies and individuals to stretch resources and work smarter by moving everything to the cloud. One of the biggest promoters of the cloud computing is Google that already owns a massive computer infrastructure (the cloud) where millions of people are connecting to. Today, the Google cloud can be accessed by Google Apps [6] intended to be software as a service suite dedicated to information sharing and security. Google Apps covers the following three main areas: messaging (Gmail, Calendar and Google Talk), collaboration (Google Docs, Video and Sites) and security (email security, encryption and archiving). Microsoft is developing a new Windows platform, called Windows Azure, which will be able to run cloud based applications [7]. In 2006, Amazon extended its AWS (Amazon Web Services) suite with a new component called Amazon Elastic Compute Cloud (or EC2), that allows to the users to rent from Amazon processing power to be used to run their own applications [8]. The EC2 users rent out from Amazon virtual machines that can be accessed remotely. The cloud is an elastic one just because the user can start, stop and create the virtual machines through the web service. There are three predefined sizes for the virtual machines that can be rented: small, medium and large, depending on the physical hardware performances.

5. KEY BENEFITS OF USING CLOUD COMPUTING FOR E-LEARNING

The various advantages are

Benefits of cloud computing for e-Learning to the Learner, Tutor and Institute

- Easy and Quick accessibility Available to anyone 24/7.
- Reduce time and cost.
- Modular.
- Wide participation.
- Accommodating different learning styles and levels.
- A positive impact on learners, tutors, as well as the educational system as a whole.

- Effective technologies use many evidence-based strategies (e.g., immediate feedback, online content management, frequent testing and assignments, etc.).
- Proof of completion and certification, essential elements of training initiatives, can be automated.

Benefits of cloud computing for e-Learning to the Learner

- Learning 24/7, anywhere with access to a computer and Internet connection; it reduces the cost and time of travelling.
- Self-paced, means learn with their own speed, so it improves the satisfaction and reduce the level of stress.
- Student motivation and Confidence that refresher or quick reference materials are available reduces burden of responsibility of mastery.
- More opportunities for distance extended learning
- Easy-to-access course materials, which is provided by tutor.
- Students may have the option to select learning materials that meets their level of knowledge and interest.

Benefits of cloud computing for e-Learning to the Tutor

- Reduced overall cost by reduction of time spent in travelling, lodging and food.
- Teaching times reduced as an average of 40 to 60 percent.
- Allow to complete the course as per tutor choice.
- Self paced, means teach with their own speed and also as per tutors' interest.
- Easy to distribute the course materials.
- Re-useable learning materials
- Online learning materials are Updateable, so easy to edit, to update and to review.
- Online tests, quiz, homework, projects and assignments distribution and evaluation is possible at any time.

Benefits of cloud computing for e-Learning to the Institute

- No cost of institute building's rent because learning is online.
- Easy to track and prove progress for your tutors and learners.
- The institute is free from the management of different time schedule
- Reduces overall costs of education institutes, which includes the cost of travel, lodging, meals, tutors salaries, the waste of employee work time, rent of room/building, production and distribution of the course materials.
- Centralized data storage – losing a cloud client is no longer a major incident while the main part of the applications and data is stored into the cloud so a new client can be connected very fast.

6. CONCLUSIONS

The development of e-learning solution cannot ignore the cloud computing trends. There are many benefits from using the cloud computing for e-learning systems. Also, there are some disadvantages that have to be taken into account. Using cloud computing for e-learning solutions influences the way the e-learning software projects are

managed. There are specific tasks that deal with finding providers for cloud computing, depending on the requirements (infrastructure, platform or services). Also, the cost and risk management influences the way the e learning solutions based on cloud computing are managed. A metrics system needs to be developed in order to measure the efficiency of cloud computing based e learning solutions. The Academy of Economic Studies from Bucharest uses a e-learning solution based on Moodle and it has its own datacenter that can be in the future a platform for cloud computing. This paper presents some results of the research project IDEI 2673: Project management methodologies for the development of mobile applications in the educational system, financed within the framework of IDEI research program. Currently the research society has suspected that an e-learning is the next generation of Education Learning Mechanisms. In this paper we tried to prove that cloud computing changed E-Learning future systems. A wide world of knowledge and tools now is available to tutors and learners through cloud based services all the time and accessed from anywhere, from any device. The study summarized the main advantages, which include flexibility, convenience, easy accessibility, consistency and its repeatability.

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