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E-Learning via Cloud Computing

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Abstract

Cloud computing brings the computational distances, innovations and shifts of the Information Technology paradigms. Cloud computing will have a significant impact on the area of education and learning, empowering its users (i.e., students, lecturers and administrators) to perform their tasks effectively at low cost through available cloud services provided by cloud service providers. This paper discusses the use of cloud computing in educational and learning frameworks, called "Education and Learning as a Service" (ELaaS), emphasizing its potential benefits. This paper will investigate whether the promise of cloud computing can be used to improve or reduce the challenges faced by learning implementation i.e. we focus on the benefits of cloud computing for e-learning solutions.

Keywords: Cloud Computing, Information Technology, E-learning

1. Introduction

In recent years e-learning has become a widely accepted form of learning, and the use of the global network is inevitable throughout the education process. Ubiquitous learning combines wireless, mobile, and content-based awareness technology to find students' status and provides more flexible support beyond the formal learning process (Shih, Chu, Hwang, & Kinshuk, 2011; Hwang, Chih-Hsiang, Tseng, & Huang, 2011 , El-Bakry & Mastorakis, 2009; Yang, 2006). In order to support modern learning methods, as well as many heterogenic learning resources within courses, virtual learning environments need to be supported on strong IT infrastructure. At the same time, to be effective, critical learning environments need to be based on learning management systems (LMS) and integrated into the existing learning environment of educational-institutions.

LMSs are powerful integrated processes that support many of the activities that teachers and students have created during the e-learning process (Hauger& Kock, 2007; Kahiigi, Ekenberg, Hansson, Tusubira, and Danielson, 2007). Most of the time, LMS users are large groups with different characteristics, sometimes bad. The adaptation of e-education programs to an individual or group based on their circumstances, expectations, knowledge, and interests is now unavoidable (Paramythis & Loidl-Reisinger, 2004). As e-learning transition systems become more and more complex, educational institutions need innovative solutions to incorporate risky and reliable e-learning environments. (Aroyo, Dolog, Houben, Kravcik, Naeve 2006).

2. Related work

Cloud computing (CC) is an unusual, intelligent and controlled computer infrastructure that runs applications for end users. Cloud Computing is a computer platform that focuses on providing consumers with valuable IT skills as a service through the Internet (Sultan, 2010). Services and data integration in a set of shared resources (Srinivasa, Nageswara, and Kumari, 2009). Virtualization is one of the requirements for Cloud Computing access

(Dong, Zheng, Yang, Li, &Qiao, 2009). It allows efficient use of resources, since several virtual machines (bottom: VM) can operate on a single physical machine (Jin, Liao, Wu, Shao, & Luo, 2008). Cloud Computing is an infrastructure that can bring new value to the e-learning system, as educational services can be delivered in a reliable and efficient way. It also provides an ideal environment for biquitous learning activities. As a result, efforts to introduce Computer Computing in the area of e-learning have been initiated over the last few years and are ongoing worldwide. However, moving from traditional IT infrastructure to cloud-based infrastructure is a difficult task for an educational institution (Reich, Hubner, & Kuijs,2012)

3. Integration Model

Developments for the standard e-learning program include: use of LMS, integration of Internet services into educational institutions network and business information system. Integration of program components is achieved using multiple layers:

- Collaboration of staff - students, teachers and others involved in the learning process can access the program and be able to communicate from any location.
- Integration of information - the system allows for the collection of highly sophisticated, informal data, and users can access structured data.
- Process integration - Integrated e-learning processes are integrated using web services.
- App integration - integration is evident at the application level in cloud infrastructure.

An approach for integrating e-learning services with cloud infrastructure is shown in figure

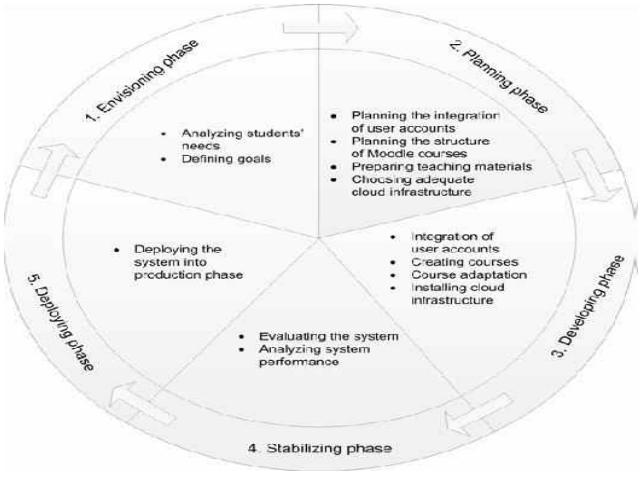

Figure 1. A method for integration of e-learning services with cloud computing

There are five stages in the proposed model. In the first phase, user accounts are created. User accounts are stored on the LDAP server. The LDAP server is integrated with the user directory of the educational institution where student accounts are located. In the second phase, the studies were performed on the Moodle LMS. Instructional materials are prepared, activities and assignments are described. Appropriate software tools for teaching instructional process are selected. The study sync process was performed. In the third phase, VMs have operating systems and software configured. Each VM adapts to the learning styles of students and the requirements of a particular course. After that, the configured VMs are stored in the CC infrastructure. In the fourth phase, students use the ELAB Cloud VM reservation system and its deployment. The app allows students to set up any of the provided VMs in the Moodle process they are enrolled in. Students can make reservations using the web application. In the fifth and final stages, teachers and program managers can review and analyze student outcomes and program performance.

4. Cloud Based Education Systems

As the adoption of cloud computing increases, many educational institutions are introducing cloud computing technology into their educational programs, promising and delivering risky and reliable education services. Many universities have acknowledged the potential benefits of cross-cloudcomputer for economic reasons, as well as for advanced teaching and data sharing. Much research has been done to investigate the benefits of using cloud computing for e-learning applications and to propose solutions for e-learning cloud computing systems. Pocatilu et al., presented the benefits of cloud computing for e-learning as low cost with high data security, visualization, centralized data storage, and the opportunity to test data access. They also highlighted the benefits of cloud computing for e-learning based on the characteristics of three cloud service models: infrastructure (e-learning systems that can be run on provider infrastructure), platform (e-learning systems can be implemented based on the provider interface for development), and and service

(e-learning programs can use providers' own solutions). Bora and Ahmed explored the benefits of adopting e-learning cloud computing and found it to be cost effective, offering improved performance, providing faster software updates and improvements in text formatting and data security. In addition, it provides many benefits for students and teachers, such as online courses, exams, assignments, projects, feedback, forums, and e-learning content and resource-management.

The University of California (UC) Berkeley is working on its studies in a cloud-supported Amazon Web Services, based on the SaaS service model. The University of Washington is adopting cloud computing to provide productivity and collaboration tools for staff and students, supported by Microsoft (Windows Live including Email and Calendar, Messenger, SkyDrive, Spaces, and Photos) and Google (Google Apps including Google email , Calendar, Docs, Sites, and Talk). The University of Texas at Austin and North Carolina State University have experienced a significant reduction in IT related costs. Universities have access to cloud computing for economic reasons and for advanced teaching, teaching and data sharing.

Many companies including accelerate the delivery of cloud-based education programs to educational institutions as a way of doing business for the future, and many learning management systems now support cloud-based education resources . Although much work has been done to date on cloud adoption of educational processes, some studies need to be done to create different types of cloud-based education programs, in new and more effective ways. In the meantime, most of the current cloud-based programs are focused on delivering and sharing learning materials and instructional works, instead of building and supporting a fully integrated cloud-based platform.

5. Benefits of Cloud Computing

In General, the benefits of cloud computing in e-learning are divided into four different groups:

- reduce utility costs
- flexibility in infrastructure operations
- increased availability
- the end user is the client

Since Electronic Learning, better known as E-Learning, is defined as Internet-enabled learning. The e-Learning components can include content in multiple formats, learning management, and online community of students, content developers and experts. The research summarized the key benefits, including flexibility, simplicity, ease of accessibility, consistency and frequency. With Information Technologies (IT), there is a growing trend towards research and exploitation of these types of Learning platforms. There are a few steps at different levels of teaching, from which some of the examples are Khan Academy1, the Virtual Learning Center of Granada University (CEVUG-UGR), the Open University of Catalonia, MIT Open Course Ware, or Strandford University's "Free Online Course." Studies supported by the e-Learning approach tend to achieve a higher impact in the teaching framework than that of the attendees. For example, in the first edition of Stanford's "Machine Learning" courses for over 160,000 students worldwide were enrolled. This size affects a variety of issues; on the other hand, the infrastructure provision is required to provide the same service for that number of students in addition to the standard web server capability. In addition, the demand for teaching resources often varies in a fast and fast way, and produces high-quality startups.

To attend applications during these timescales without access to other program services, it will be necessary to prepare the infrastructure much higher than that required for the regular operation of the learning center. Another option would be to provide those services according to need and to pay for the resources that are actually being used. The answer to these needs is the Cloud Computing environment. Cloud Computing is an integration paradigm where IT system resources are provided as services, which are available to users through a network connection, often the Internet. It is a model for the provision of IT services offered in the catalog that responds to the user's needs in a flexible and consistent way, the actual usage charges being made.

Thus, the two distinguishing features of this paradigm are, on the one hand, the use of the desired resources and on the other, the obvious resilience of the way financial resources are allocated in a robust and accurate way when

absolutely necessary, without the need for a detailed understanding of the infrastructure from the perspective of the user. With these features, Cloud platforms emerge as a viable alternative to traditional computing centers. They suggest an alternative to anti-discovery and maintenance of computer facilities.

In addition, the e-learning platforms of the major dimensions we mentioned above produce large registers of interaction among student-platform educators. These data bases contain precise information that is not defined in a precise manner. Mining Dining techniques must be used to extract this information. So "Educational Data Mining" is coming, this is the desired behavior for the development of new methods for assessing data from academic work (especially technology-based) and the use of those methods to achieve a better understanding of students' behavior, and how to create processes and materials that support the learning process.

6. Cloud Computing for E-Learning Tasks

As greater growth in the number of students, content of education, services not offered and resources available, the size of the e-Learning program grows at an exponential rate. Challenges related to this topic in terms of integrating resources, storage and communication requirements, and dealing with changing concrete applications illustrate the need for a platform that meets risk requirements and cost control. This site is Cloud Computing. The major benefits and drawbacks to be addressed with e-Learning programs are (Section 6.1). Subsequently, the importance of choosing Cloud Computing for this type of tool will be discussed (Paragraph 6.2).

6.1 Current Challenges of E-Learning Systems

Among the learning technologies, web-based learning offers many benefits with regular classroom-based learning. Its major advantages are the reduced cost as the physical space is no longer needed and can therefore be used at any time and place the learner will be able to use. In addition, the learning material is easy to maintain and the teacher can incorporate multimedia content to provide a more robust framework and simplify concepts. Finally, it can be viewed as a student-based approach that can bridge the differences between teachers, so that all can assess the validity of their content to analyze and reuse common areas of knowledge.

However, there are some objections that must be addressed before the full integration of e-Learning into curriculum. At present, e-Learning systems are still weak in scalability at the infrastructure level. A few resources can be distributed and allocated to specific tasks so when they receive higher responsibilities, the system needs to install and configure new resources at the same type, making costs and management resources more expensive than before.

This key issue has to do with the proper use of these resources. For example, in a typical university setting, PCs and servers are used less during the night and during semester breaks. In addition, these services are highly sought after especially at the end of the semester, following a compelling application law. Virtual machines are stuck or inactive, consuming their full potential. Finally, we should understand that there are costs associated with computer repair (and construction), but that the educational institution has to pay for local licensing, installation and technical support for each softwarepackage.

6.2 On the Suitability of Cloud Computing for E-Learning

E-Cloud learning can be viewed as a Software Software-as-a-Service. Its deployment can be done very quickly because the hardware requirements of the user are very low. In addition, as we mentioned earlier, we reduce the burden of retaining and sponsoring an educational institution at a retailer, allowing them to focus on their core businesses, and receiving the latest system updates free of charge and sharing essentials using Web 2.0 technology.

In the following, we summarize the consequences and implications regarding the development of e-Learning services within the Cloud Computing environment, as highlighted by Masud and Huang at:

- Web Access: It means easy access to anywhere, at any time and anyone can access the application, a great need for Web Development skills.
- No client software required: Therefore, reduce the cost of registration, since no installation, software

installation, deployment and server management costs, as well as low cost of ownership, reduce time-in-importance, fewer IT staff are required per center.

- Pay for usage-based subscriptions: It's ideal for the Software Model Education market, and can access complex applications very easily.
- SaaS server can support many educational institutions: Since the application runs on a server farm, the system-related vulnerabilities. As student use grows, software performance will not decrease.
- All registrant information hosted on a SaaS server: The highest level of security is required by a SaaS provider to gain subscribers' trust and to build massively customized software solutions. Subscriber information is distributed among multiple providers and should be integrated to achieve business overview, high demand for the system and data integration.
- Finally, some potential values of Cloud Computing education as emphasized by Ouf et are following:
- There is no need to restore everything to a six-drive and transfer it from device to device. It also meansthat students can build a reservoir of knowledge that stays with them and continues to grow as long as they want.
- Replacement of cracks is almost unwanted. When a computer client crashes, almost no data is lost because everything is stored in the cloud.
- Allow students to work from multiple locations (home, work, library ... etc), find their files and organize them through the cloud and browser-supported applications can also be accessed by various devices (mobile computers, laptops and desktop, access to Internet offers available).
- Flexibility: Infrastructure with increasing levels of investments.

Cloud computing allows user to grow dynamically as demands changes .

- Undeveloped development: it is almost impossible for any interested person (thief) to find out where a particular data source is located (tests, test questions, results) or find out which part of the body he needs to steal. acquiring digital assets.
- Virtualization: enables the rapid replacement of a compromised server without significant cost or damage. It is very easy to create a virtual machine clone and therefore the expected cloud downtime is greatly reduced.
- Medium data storage: loss of client cloud is no longer major events while the main part of applications and data is stored in the cloud so that new client can be contacted faster. Imagine what would happen today if a laptop that stores test questions was stolen.
- Monitoring data access becomes easier when it is considered that only one location should be monitored, not thousands of computers scattered across a wide area, for example. Also, security changes can be easily monitored and implemented as the cloud represents a unique access point for all clients.

7. Conclusion

We have discussed the essential elements of e-Learning, focusing on the flexibility, convenience, easy of access, consistency and repetition of these types of programs. In this way, the E-learning system is facing the challenges of optimizing the management of capital resources and provision, subject to greater growth of users, services, educational content and media resources. Cloud Computing platform features are ideal for this learning migration, so that we can take full advantage of the opportunities provided by the creation of an efficient learning environment that offers personalized content adaptation to the current educational model.

Specifically, the benefits that address e-Learning integration in the cloud can be highlighted as good flexibility and robustness of resources, including storage, computer requirements and network access; and lower costs by looking at the payment format used on paper and saving it on new hardware and equipment and software licenses for educational programs. A number of approaches have already been proposed to address e-Learning in Cloud Computing, which describe these models and how they use this environment to enhance features of the education system. However, we should emphasize that these are the first steps to the open line of research and exploitation of e-learning and cloud platforms.

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