

# Cloud Computing Utilization For E-Learning Pharmaceutical System

Dr. Mohammed F. Al Ajmi, Shakir Khan, Irfan Khan

**Abstract:** Cloud computing is rising speedily with applications in approximately any area, together with pharmaceutical education. E-learning systems generally need several hardware and software resources. There are a lot of educational institutions that cannot have the funds for such investments and cloud computing is the most excellent answer for this. This paper provides the optimistic impact of using cloud computing architectures based on e-learning system development. It spotlights on the payback of cloud computing for e-learning solutions and the e-learning development organization confronts when this architecture is utilized.

**Index Terms:** Cloud computing, E-learning, Mobile learning, Project management, Project supervision

## 1 INTRODUCTION

In the previous years, the environment of the Internet was continuously changing from a position used to understand web pages to an environment that permits end-users to run software applications. Interactivity and teamwork have grown to be the keywords of the innovative web content. There is no doubt the expectations belong to the Web 3.0 (also called the smart Web) [1]. This novel environment supports the formation of a new invention of applications that are capable to run on a broad choice of hardware devices, like mobile phones or PDAs, while accumulating their data within the cloud. Platform layer correspond to PaaS (Platform as a service) that made a higher level of abstraction on the base of IaaS layer. The call for learning is growing constantly and the development and the improvement of the e-learning solutions is needed. Also, the e-learning systems require remaining the speed with the technology, so the innovative direction is to use cloud computing for e-learning. To provide a development environment, test environment, server platforms and other services, users can develop applications based on Internet and other server's service provider's infrastructure, and then share it to other users. When combined with the traditional e-learning systems, cloud computing platforms arise as a cost effective and efficient e-learning solution. There is several cloud computing service providers like Amazon, Google, Yahoo, Microsoft etc. that offer support for educational systems. Integration of e-learning with cloud computing, not only helps distributing information and aids learning and teaching registry, but can also resolve the high cost of development, increase performance of management and monitor security [5].

At present, most of the conventional education forms are becoming not being suitable for requirements of social progress and educational development and not being able to catch up with the changes of learning demand in time, thus computer networks have brought opportunities for it. In [2] are offered the major advantages of using cloud computing in schools. The subsequent sections target on cloud computing thoughts and the profit of cloud computing for e-learning solutions. The impact on e-learning solutions based on cloud computing project managing is also examined. This is extremely significant for the development of e-learning solutions based on cloud computing.

## 2 CLOUD COMPUTING ELEMENTS

It is a new paradigm that provides efficient network login to an appropriate pool of computing resources which can be provided and released with just nominal assiduity and service provider's reciprocity. However, in traditional web-based e-learning mode, system construction and maintenance are located in interior of educational institutions or enterprises, which results in a lot of problems existed, such as a lot of investment needed, but without capital gains to return, without development potential and staying power. The need for e-learning is increasing constantly and the development and the improvement of the e-learning solutions is necessary, money according to the usage [3]. The two distinctive features of cloud computing are, on the one hand, the use of resources under demand and on the other hand, the transparent scalability [4], hosting e-educational system into the cloud. The temperament of the Internet was relentlessly changing from a place which 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. The call for learning is growing constantly and the development and the improvement of the e-learning solutions is needed. The cloud computing term was derived from the way the Internet is often represented in network diagrams. Cloud computing is a subscription-based service where you can obtain networked storage space and computer resources. Cloud computing is a computing model based on networks, especially the Internet, whose task is to ensure that the users can simply use the computing resources on demand and pay. SaaS (Software as a service) is a software distribution model, designed for web delivery, user can deploy and access through the Internet hosting. SaaS providers need to build information for all network infrastructure, software, hardware, operating

- 
- *Shakir Khan is working in King Saud University as Researcher, Riyadh(KSA)*
  - *Dr Ajmi is faculty member in pharmacy college of King Saud University*
  - *Irfan Khan is faculty member in PY College of King Saud University and heading in conducting online examination deployed by MKCL.*

platform, and is responsible for the implementation of all post-maintenance and other services. The need for education is increasing constantly and the development and the improvement of the e-learning solutions is necessary.



**Fig. 1** Cloud computing

Hardware devices (such as mobile phones, regular PCs, notebooks, PDAs or any further similar equipment) or software applications (like web browsers, for example I.E, Google Chrome and firefox) can effectively play the responsibility of a cloud client (see figure 2). The consumers are renting or basically accessing the required processing power from the data center via the above pointing out client applications. The excellence of the service becomes a central factor of the cloud computing achievement. Cloud computing is by no means unlike from grid computing. The grid computing tries to generate a virtual processor by combining together a bunch of computers. The objective of a grid computing architecture is to resolve big tasks by utilizing the benefit of concurrency and parallelism, while the cloud is focused on group effort. Cloud computing grows to be very accepted because it progresses the processing hard work from the local devices to the data center services. Therefore, any machine, like an Internet associated phone, could be able to resolve multifaceted equations by just passing the particular arguments to a service operating at the data center stage that will be competent to give back the consequences in a very short instant. In these situations, the defense of data and applications befalls a most important matter. Cloud computing is broadly accepted today due to its many

advantages: the price is low or even free in several cases. Also, there are no expenses (or very small ones) for hardware advancements; for several applications (like spreadsheets) it can be utilized even in the offline approach, so when the consumer goes back online, a synchronization method is refreshing the data; the strong connection that exists these days between the users and their individual computers can be totally broken because a consumer can attain the similar result by utilizing any Internet linked device having least software requirements; devices with least hardware necessities (mobile phones, for example) could be effectively used as cloud clients; in order to suit part of the cloud, there is no requirement to download or install a exact software, only the Internet connection is needed; the price of licensing dissimilar software packages is motivated to the data center level, so there is no call for, to upgrade the local system when innovative service bunches or patches are released; collide recovery is almost unneeded. If the consumer computer crashes, no data is lost because the whole data is stored into the cloud. A few of the main cloud computing drawbacks are the following: the Internet connection speed may influence the whole performances; on a long term basis, the data center subscription fee may be more expensive than buying the hardware; the service excellence is important and the need of the backups is serious when talking about data security. The main players in the meadow of cloud computing are Microsoft, Amazon, Google, Yahoo and some heritage hardware vendors like IBM and Intel. Cloud Computing applications are mostly proposed to assist companies and individuals to extend resources and work smarter by moving all to the cloud. One of the largest supporters of the cloud computing is Google that previously owns a huge computer infrastructure (the cloud) where millions of public are connecting to. These days, the Google cloud can be accessed by Google Apps [6] proposed to be software as a service group devoted to information sharing and security. Google Apps plasters the following three major areas: messaging (Gmail, Calendar and Google Talk), teamwork (Google Docs, Video and Sites) and safety (email security, encryption and archiving). Microsoft is raising a novel Windows platform, called Windows Azure, which will be capable to execute cloud based applications [7]. In 2006, Amazon increased its AWS (Amazon Web Services) group with a new module called Amazon Elastic Compute Cloud (or EC2), that permits to the users to lease from Amazon handing out power to be used to execute their individual applications [8]. The EC2 clients lend out from Amazon virtual machines that can be contacted remotely. The cloud is a flexible one just because the client can begin, end and generate the virtual machines via the web service. There are three predefined sizes for the virtual machines that can be leased: small, medium and large, depending on the physical hardware concerts.

### 3 CLOUD COMPUTING ADVANTAGES FOR E-LEARNING SOLUTIONS

Several education institutions do not include the resources and infrastructure required to run top e-learning solution. This is the reason that Blackboard and Moodle,[20] the largest players in the ground of e-learning software, have now accounts of the foundation applications that are cloud oriented. E-learning is broadly used today on unlike educational levels: constant education, company trainings, educational courses, etc. There are different e-learning

solutions from open source to business. There are as a minimum two entities mixed up in an e-learning system: the students and the trainers.

#### The students:

- 3.1. Acquire online course
- 3.2. Acquire exams
- 3.3. Propel feedback
- 3.4. Propel homework, projects

#### The trainers:

- 3.1. Agreement with content management and arrangement for tests
- 3.2. Review tests, training, projects taken by students
- 3.3. Propel feedback
- 3.4. Speak with students (forums)

Generally, e-learning systems are urbanized as scattered applications but this is not needed so. The architecture of a scattered e-learning system consists of software components similar to the client application, an application server and a database server shown in figure 3 and the required hardware apparatus (client computer, communication infrastructure and servers).

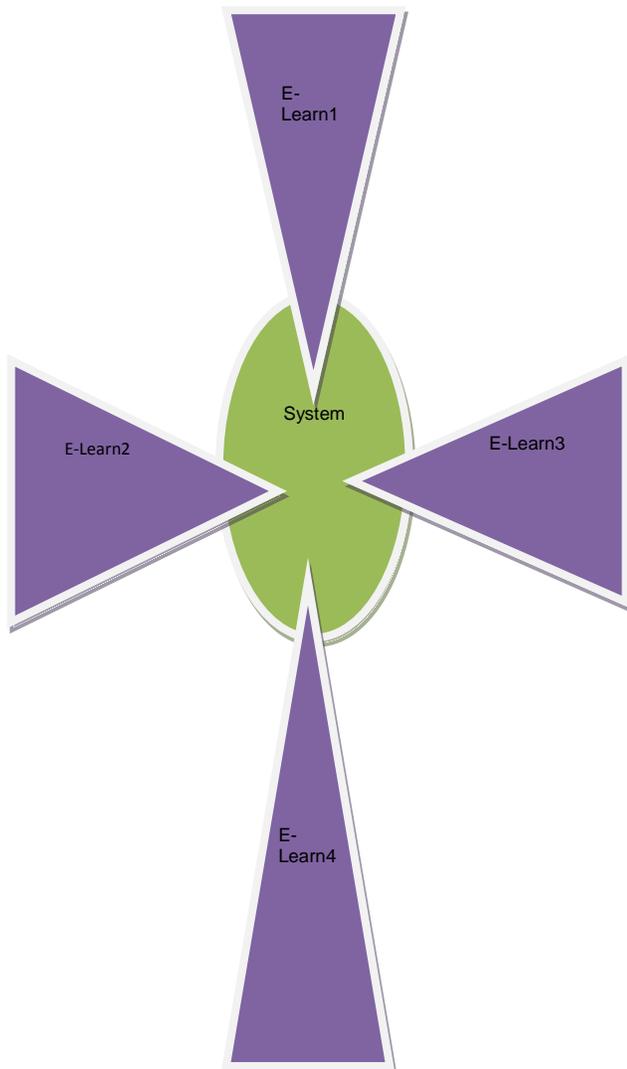


Fig. 3 E-learning system

The client hardware could be a mobile tool or a desktop computer. The client application can be an easy web browser or a devoted application. Even with the existing hardware and software restrictions, mobile devices are sustaining multimedia based applications. In comparison with desktop applications, these days mobile applications, particularly multimedia-based applications, have severe restrictions due to the processing power and memory limitations. Due to the actuality that the information processing is on the server side, the utilization of mobile devices for education is rising speedy. Still, the mobile applications require to be optimized for the use of e-learning. In [3] and [17] the m-learning applications individuality were analyzed. The e-learning server will utilize cloud computing, so all the necessary resources will be accustomed as required. E-learning systems can benefit from cloud computing via:

**Infrastructure:** utilize an e-learning solution on the provider's infrastructure

**Platform:** utilize and expand an e-learning solution based on the provider's development interface

**Services:** utilize the e-learning solution known by the provider.

An extremely big anxiety is interrelated to the data security because both the software and the data are kept on remote servers that can collapse or vanish without any further warnings. Even if it appears not very realistic, the cloud computing gives some most important security advantages for individuals and companies that are utilizing/increasing e-learning solutions like the following:

**Improved impossibility** – it is almost unfeasible for any involved person (thief) to find out the location of the machine that stores some required data (tests, exam questions, results) or to observe which is the physical component, he wants to take in order to obtain a digital asset;

**Virtualization** – makes feasible the fast replacement of a negotiated cloud located server without main costs or compensation. It is very simple to generate a clone of a virtual machine so the cloud downtime is likely to be reduced significantly;

**Centralized data storage** – losing a cloud consumer is no longer a main occurrence while the main division of the applications and data is kept into the cloud so a novel consumer can be connected quickly. Imagine what is happening today, if a laptop that keeps the examination questions is stolen; Monitoring of data access becomes simple in view of the truth that only one position should be controlled, not thousands of computers belonging to a university, for example. Also, the security amended can be simply tested and applied since the cloud corresponds to a unique entry point for all the consumers. Another significant advantage is related to expenses. If the e-learning services are utilized for a relative short time (several weeks, a quarter, a semester), the savings are very significant.

#### 4 DISCUSSION

Finally, we may find some cloud-related works for performing a comparison on the efficiency of online models versus traditional models [7]. The most representative, the potential benefits of cloud based e-learning include: Mobile, decentralized and just in time learning. This system is intended for subscribing the selected learning resources as well as creating a personalized virtual classroom, and allows the learning content providers to registry their applications in the server and the learners integrate other internet learning resources to their learning application pools. Other proposals for personal and virtual learning interact with services that rely on the cloud, such as YouTube or GoogleDocs [19]. As opposed to the standalone laptops which would suffer the brunt of being carried daily in terms of wear and tear and loss. This framework has secure infrastructure and only can be accessed from cheap terminals. It is intended that Green IT be embraced by the use of solar powered VDIs and the content hosted in green datacenters. Researchers would collaborate more effectively by having in place a common portal connected to on line libraries. At the present, the combination of cloud technologies and e-learning has been scarcely explored. Some relevant efforts to use IaaS cloud technologies in education, another example of application that can be found in the specialized literature is BlueSky [18-19], whose architecture has several components aimed at the efficient provision and management of the e-Learning services, being able to pre-schedule resources for the hot contents and applications before they are actually needed, to safeguard the performance in concurrent access, although no details have been found with regard to how this is achieved. On the other hand, CloudIA [17] is a framework. It is therefore an internal responsibility to manage this risk. Therefore until more is done on the public cloud infrastructures, the private cloud still remains the most secure. Well developed content can only be coordinated by government and provision of the same to the stakeholders is the way to go. A more flexible learning mechanism is provided that aligns itself more closely to the learner's day to day activities. In taking content outside the learning structures, cloud computing allows for the delivery of learning anytime and anywhere. ? This framework hopes to be integrated to the e-government system which would impressively put the country forward in terms of research and service delivery. Tomcat, PHP, and Apache web server, with this approach, students can focus more on developing, deploying and testing their applications in a servlet container.

#### 4 CONCLUSION AND FUTURE WORK

The development of e-learning solution cannot overlook the cloud computing tendency. There are several advantages for utilizing the cloud computing for e-learning systems. Also, there are several disadvantages that have to be taken into account. Using cloud computing for e-learning solutions controls the way; the e-learning software projects are supervised. There are precise tasks that deal with finding providers for cloud computing, depending on the necessities (infrastructure, platform or services). Also, the price and threat supervision influences the way the e-learning solutions based on cloud computing are supervised. A metrics system needs to be developed in order to determine the competence of cloud computing based e-learning solutions. The Academy of Economic Studies from Bucharest utilizes an e-learning

solution based on Moodle and it has its own datacenter that can be in the future a platform for cloud computing.

#### ACKNOWLEDGMENT

The authors acknowledge the support from the Research Center, College of Pharmacy, King Saud University, Riyadh (KSA).

#### REFERENCES

- [1] B., DeCoulfe The impact of cloud computing in schools, *The Datacenter Journal*, <http://datacenterjournal.com/content/view/3032/40/>, July 2009
- [2] F. Cena., R. Farzan, P. Lops, Web 3.0: Merging Semantic Web with Social Web, *Proceedings of the 20th ACM conference on Hypertext and hypermedia*, HT'09, June 29–July 1, 2009, page 385
- [3] C. Boja, L. Batagan, Software Characteristics of M-Learning Applications, *Proc. of. 10th WSEAS International Conference on Mathematics and Computers in Business and Economics (MCBE'09)*, Prague, Czech Republic, March 23-25, 2009, ISSN: 1790-5109, ISBN: 978-960-474-063-5, pp. 88-93;
- [4] Amazon Elastic Compute Cloud (Amazon EC2), <http://aws.amazon.com/ec2/>, retrieved on August 2009
- [5] M. Creeger, CTO Roundtable: Cloud Computing *Communications of the ACM*, vol. 52, no. 8, august 2009, pp. 50-56
- [6] Google Apps - [www.google.com/a](http://www.google.com/a), retrieved on August 2009
- [7] Windows Azure Services Platform - [www.microsoft.com/azure](http://www.microsoft.com/azure), retrieved on August 2009
- [8] Amazon Web Services - [aws.amazon.com](http://aws.amazon.com), retrieved on August 2009
- [9] P. Pocatilu, C. Boja, Quality Characteristics and Metrics related to M-Learning Process, *Amfiteatru Economic*, Year XI, June 2009, No. 26, pp. 346-354
- [10] Project Management Institute, *a Guide to Project Management Body of Knowledge (PMBok Guide), Third Edition*, Project Management Institute, 2004
- [11] Vetrici M., Reducing Software Projects Duration using C#, *Informatica Economica Journal*, Vol. VII/No. 1, 2007, pg. 91-95.
- [12] M. Vetrici, Software Project Duration Estimation Using Metrix Model, *Informatica Economica Journal*, Vol. XII, no. 47/2008, pp. 87-91.
- [13] V. Temnenco, Software Estimation, Enterprise-Wide, *IBM The Rational Edge*, Vol. June 2007, <http://www.ibm.com/developerworks/rational/library/jun07/temnenco/index.html>.

- [14] Billing and Budgeting Resources – Google App Engine – Google Code  
<http://code.google.com/intl/ro/appengine/docs/billing.html>
- [15] J. Brodtkin, Gartner: Seven cloud-computing security risks, *Infoworld*, July 2008, <http://www.infoworld.com/d/security-central/gartner-seven-cloud-computing-security-risks-853>, retrieved on August 2009
- [16] M. Vetrici., *Improving software project quality using criticality analysis*, Proceedings of The Ninth International Conference on Informatics in Economy IE 2009, Bucharest, Romania.
- [17] Sulistio, A., Reich, C., Doelitzscher, F.: Cloud Infrastructure & Applications – CloudIA.In: Jaatun, M.G., Zhao, G., Rong, C. (eds.) Cloud Computing. LNCS, vol. 5931, pp.583–588. Springer, Heidelberg (2009)
- [18] Dr. AlAjmi, Dr. A. Sharma, Shakir Khan: Growing Cloud Computing Efficiency-(IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 3, No. 5, 2012, pp.172-176.
- [19] Sosinsky, B.: Cloud Computing Bible. John Wiley and Sons (2011)
- [20] Shakir Khan et al./ International Journal of Computer Science & Engineering Technology (IJCSET):Moodle Based LMS and Open Source Software (OSS) Efficiency in e-Learning, pp: 50-60

