C-Learning: Innovative Solution for Cloud Teaching

Pasquina Campanella
Department of Computer Science
University of Bari "Aldo Moro"
via Orabona, 4 - 70126 Bari - Italy
pasqua13.cp@libero.it

ABSTRACT

Current trend in digital age lead us to argue that access tools will become more and more contextual in near future. New frontiers in knowledge society for new forms of shared knowledge that lead to a *social* and *cooperative learning* environment to guarantee extensibility and flexibility. It is clear that the era of rigid platforms is closing, we tend to learn from the network, enhance existing knowledge, experiment with innovative models, explore new contexts. We tend towards web solutions that lead to the so-called "cognitive intelligence", in the perspective of "*collaboration*" between users becoming real prosumer. In light of this, the informal approach increasingly supports the formal approach, focusing on the learner. In this scenario cloud learning is born, "formation in cloud", which combines the possibility to draw resources distributed with contextual information. But the needs that arise in the era of distributed computing to manage the various heterogeneous activities are that there is the absolute certainty that the machines of network, scattered all over the world, are always available (latency times, unpredictable crashes) therefore continuous monitoring is essential. In this context, the docebo cloud e-learning platform was analyzed to analyze the different trend.

KEYWORDS

docebo, cloud computing, services, architecture, monitoring.

1 INTRODUCTION

Since the '90 with Grid Computing and today with technological evolution and methods of use by users we are witnessing the proliferation of an interaction between different systems for the purpose of a computational cooperation, which shifts the classic vision of ICT towards large datacenter [3], [6], [9], [22]. Hence the rise of web 2.0 and the services of sharing and publishing content has generated the possibility of having services without having to incur classic problems of management of local resources [4], [16], [20], [25]. These advances have led to a huge increase in the reach of IT environments, and consequently, the need arose to manage them in a single "cloud" [6], [26], [30]. The need for such environments is felt for the growth of networked equipment and data streaming processes in real time and also for the dissemination of architectures and applications oriented to service, collaboration and sarin [3], [19]. Cloud architecture has been for many IT giants the best candidate for solving some problems generated by large-scale data processing [27], [29]. With this in mind, a new hybrid model of resource utilization has been defined, which has taken the name of Cloud Computing [20], [28], [29]. Cloud computing represents, therefore, a new approach for the supply of ICT resources in continuous progress that allows to obtain an easy access to the on-demand network to a group of configurable computational resources [1], [7], [17], [19]. Although the cloud landscape is still extremely young, in recent years it has become increasingly important in Information and Communication Technology (ICT) and is the new technology that will allow the entire educational system to be changed in the near future, allowing it to be delivered on an ongoing basis high-tech e-learning services leading to significant savings [10], [18], [19]. The perspective leads to the development of *CLearning* (*Cloud-learning*) and *CMobile-Learning* (*CloudMobile-Learning*) where the user will have access to data that will be shared in cloud according to his request. The term "*cloud learning*" can be translated as "*formation in cloud*", indicating a virtual space where you can store, share and consult training data on a remote server [6], [23]. Currently there

are several suppliers on the market that have enhanced their data centers for hosting applications in the cloud: from giants like amazon, ibm, google, microsoft, sun microsystems up to cloud reality offered by smaller companies like goGrid [24]. It is possible to access applications via a browser with any device that accesses the network (PC, notebook, tablet, mobile phones) (Fig.1). In a cloud computing environment there are three distinct actors [2], [5], [12], [15], [17]:

➢ **Infrastructure Provider** (service provider): manages the platforms by providing services (storage, applications, computing capacity), generally following the pay-per-use model;

➢ **Service Provider / Cloud User** (user administrator): chooses and configures the services offered by the provider. Implements a service that uses the resources provided by Infrastructure Provider and offers them to the end user.

➢ **Final Client**: use the services configured by Service Provider. In some cases, the administrator and the end customer can coincide.

Figure 1. Representation of Cloud connections

Cloud computing, therefore, is a new way of conceiving the use of IT services that makes use of the convergence of three key elements [8], [15], [17], [27]:

✓ utility computing;
✓ virtualization of computing resources;
✓ software as a Service.

Cloud computing defines different models of service delivery, among which the main ones are [6], [12], [17]:

➢ **Software as a Service (SaaS)** – provider applications are accessed by the consumer from various client devices through a *thin client* interface;

➢ **Platform as a Service (PaaS)** – the consumer has control over distributed applications and configurations of hosting environment;

➢ **Infrastructure as a Service (IaaS)** – the consumer, according to his needs, can provision processing, storage, use of network for obtaining resources.

This article analyzes docebo cloud platform in the first section, then the experimental results conducted in various learning times and finally conclusions and future developments.

2 DOCEBO CLOUD PLATFORM

The spread of virtualization and cloud computing technologies, together with the growing need to reduce the costs of managing applications and systems in the IT world, has led to the diffusion of delivery policies in on-demand mode, to allow the diffusion of new models relating to access to software applications [11], [14], [21], [27]. Here, then, that we talk about platforms or infrastructures that are made available as services. These services can be considered as the basic components for development of cloud computing [6], [24], [29]. On this basis, the docebo cloud platform, an e-learning as a service platform designed to allow the creation and management of on-line courses with ample interaction possibilities, is considered. Docebo was born as an evolution of Spaghettilearning, an LMS, developed in 2003 by the same team of developers [7], [13]. Today it has a widespread use and in this the foundation that introduced it has migrated to develop its platform in Cloud / As a Service direction and has resulted in the release of docebo 7.0, directly accessible online "as a service", without no installation required. Docebo provides the creators of e-learning courses with a series of tools, such as forum and chat, user and group management, tests and surveys, document archives and the possibility to connect to some videoconferencing services, such as Teleskill [14], [29].

3 EXPERIMENTAL RESULTS

Many online teaching problems depend on a structure incapable of managing organizational complexity deriving from the introduction of new technological solutions [14], [16]. In light of this, several tests were conducted on docebo cloud platform, migrated to cloud solutions to allow online courses to be managed with ample opportunity for interaction. The tests were conducted in the community with 200 participants aged between 23 and 40, willing to evaluate new cloud impact. The docebo cloud platform can be accessed by connecting with an account as shown in Fig. 2 and exploring features ranging from distance learning, videoconferencing lessons, archiving and making available educational files, monographic courses, evaluation tests, publications of alerts, discussion forum.
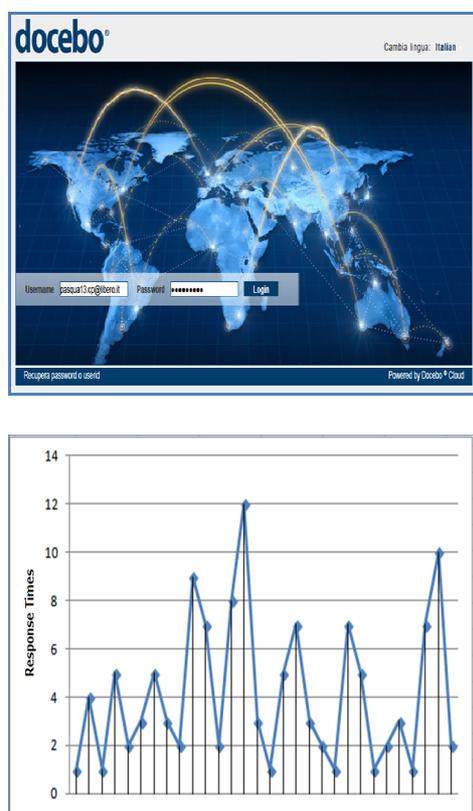
Figure 2. Docebo Cloud platform access and monitoring

Docebo Cloud considering the monitoring related to the organizational complexity of teaching, placed in the era of distributed computing in order to manage different activities to an unknown number of machines, scattered around the world, or that there is the absolute certainty that they are always available (latency times, unpredictable network crashes) provided variable cloud response times in the management

of various tasks as shown in Fig.2, a reduction occurred with a number of users of less than 100, very dependent also on the skills of the interlocutors.

4 CONCLUSIONS and FUTURE DEVELOPMENTS

Concluding C-Learning as *last form of globalization* stands as innovation of web 2.0 and migration to new areas, where needs of user demand a strong demand for services, which needs connectivity and transmission band and that must be promptly adapt to the requests of users resulting in a number of advantages, especially for resources that can be requested and obtained on-demand. It is emerging as a model that changes the way resources are provisioned, because they are decoupled by technology and "encapsulated" in IT services. These services are dynamic and flexible and can be used individually or in larger business contexts, allowing optimal use of resources shared between different users (multitenant model). The article analyzed didactic-organizational complexity of docebo cloud e-learning platform and provided variable response times in management of various tasks with a slightly uneven trend. The experimentation carried out within the community between a different number of students willing to explore the new platform for provision of content has resulted in an optimal result with a number of users of less than 100, very dependent on the skills of the interlocutors.

REFERENCES

1. Alabbadi M.M., Cloud computing for education and learning: Education and learning as a service (eLaaS), Proc. of the 14th International Conference on Interactive Collaborative Learning (ICL2011), pp. 589-594, IEEE.
2. Al-Zoube M., E-learning on the Cloud, International Arab Journal of e-Technology, vol.1, n. 2, pp. 58-64, (2009).
3. Armbrust M., Fox A., Griffith R., Joseph A.D., Katz R., Konwinski A., Lee G., Patterson D., Rabkin A., Stoica I., Zaharia M., A View of Cloud Computing, Commun. Acm, vol. 53, n. 4, , pp. 50-58, (2010).
4. Bein D., Bein W., Madiraju P., The Impact of Cloud Computing on Web 2.0, eij, vol. 9, n. 1, pp. 5-12, USA, (2009).
5. Campanella P., Cloud Computing: un nuovo paradigma, Atti VIII convegno nazionale Sie-l,

connesi! Scenari di innovazione nella formazione e nella comunicazione, 14-15-16/09/2011, Ledizioni, Reggio Emilia, Italy.

6. Campanella P., Cloud E-learning: un nuovo binomio, Atti Didamatica 2016 – Innovazione: sfida comune di scuola, università, ricerca e impresa, 30° edizione Aica, 19-20-21/04/2016, pp. 128-137, Udine, Italy.

7. Campanella P., Method of experimental evaluation of ICT in teaching, Atti del convegno Elearn 2011, world conference on e-learning in corporate governement, healthcare e higher education organized by AACE, Honolulu, Hawaii, USA, 17-18-19-20-21/10/2011.

8. Chandran D., Kempegowda S., Hybrid E-learning Platform based on Cloud Architecture Model: a proposal, Proc. International conference on signal and image processing (ICSIP), pp. 534-537, IEEE, (2010).

9. Cappos J., Beschastnikh I., Krishnamurthy A., Anderson T., Seattle: a platform for educational cloud computing, Acm sigcse bulletin, vol. 41, n. 1, pp. 111-115, March 3-7, New York, USA, (2009).

10. Ercan T., Effective use of cloud computing in educational institutions, Procedia-Social and Behavioral Sciences, vol. 2, pp. 938-942, 05/01/2010.

11. Katz R., Goldstein P., Yanosky R., Cloud computing in higher education, Educause, (2010).

12. Khajeh-Hosseini A., Greenwood D., and Sommerville I., Cloud Migration: A Case Study of Migrating an Enterprise IT system to IaaS, 3rd International Conference on Cloud Computing, pp. 450-457, IEEE, (2010).

13. Impedovo S., Campanella P., Facchini G., Pirlo G., Modugno R., Sarcinella L., Learning Management Systems: un'analisi comparativa delle piattaforme open-source e proprietarie, Atti Didamatica 2011 - Informatica per la didattica, Torino 04-05-06/05/2011.

14. Impedovo S., IAPR FELLOW, IEEE S. M., Campanella P., Docebo Cloud: apprendimento e nuove tecnologie, Atti Didamatica 2012 - Informatica per la didattica, Aica, Taranto 14-15-16/05/2012.

15. Lin G., Fu D., Zhu J., Cloud computing: IT as a Service, vol. 11, n.2, pp. 10-13, ACM, (2009).

16. Lin G., Dasmalchi G., Zhu J., Cloud computing and IT as a Service: Opportunities and Challenges, Proc. of the IEEE International Conference on Web Services, (2008).

17. Manzalini A., Moiso C., Morandin E., Cloud computing: stato dell'arte e opportunità, Notiziario Tecnico Telecom Italia, n. 2, (2009).

18. Miller M., Cloud Computing: Web-Based Applications that Change the Way you Work and Collaborate Online, (2008).

19. Martins Morgado E., An exploratory essay on Cloud Computing and its Impact on the use of Information and Communication Technologies in Education, in education in a technological world: communicating current and emerging research and technological efforts, ed. Mendez-vilas, formatex, (2011).

20. Ouf S., Nasr M., Helmy Y., An enhanced e-learning eco system based on an integration between cloud computing and Web 2.0, Proc. of the 10th IEEE International Symposium on Signal Processing and Information Technology (ISSPIT), pp. 48-55, 15-18/12/2010.

21. Pocatilu P., Alecu F., Vetrici M., Using Cloud Computing for Elearning Systems, Proc. 8th Wseas international conference on data networks, communications, computers, (dncoco'09), Baltimore USA, pp. 54-59, (2009).

22. Qian L., Luo Z., Du Y., Guo L., Cloud computing: an overview, pp. 626-631, springer, (2009).

23. Rao N. M., Sasidhar C., Kumar V. S., Cloud computing Through Mobile Learning, (ijacsa), International journal of Advanced computer science and applications, vol 1, n. 6, pp. 42-46, (2010).

24. Sultan N., Cloud computing for education: a new dawn ?, International journal of Information Management, elsevier, issue 2, vol. 30, pp. 109-116, (2010).

25. Dimiter G. Velev, Challenges and Opportunities of Cloud-based Mobile Learning, ijiet, iacsit, vol. 4, n. 1, pp. 49-53, (2014).

26. Vouk M. A., Cloud computing: issues, research and implementations, Department of computer science, North Carolina State University, Raleigh, North Carolina, USA, Journal of computing and information technology, vol. 4, pp. 235–246, (2008).

27. Wang B., Xing H.Y., The application of cloud computing in education informatization, in International Conference on computer science and service system, IEEE, pp. 2673-2676, 27-29/06/2011.

28. Yanfei S., Cloud Computing applications in the network learning, in China outside school basic education edition, (2010).

29. Zhang Q., Cheng I., Boutaba R., Cloud Computing: state-of-the-art and research challenges, Journal of internet services and applications, vol.1, n.1, pp. 7-18, springer, (2010).

30. Wang L., von Laszewski G., Younge A., He X., Cloud Computing: a perspective study, vol. 28, n. 2, pp. 137-146, springer, (2010).