Generic E-Assessment Process Development based on Reverse Engineering

Fahima Hajjej, Laboratory LaTice, Tunis, Tunisia
Yousra Bendaly Hlaoui, Laboratory LaTice, Tunis, Tunisia
Leila Jemni Ben Ayed, Laboratory LaTice, Tunis, Tunisia

ABSTRACT

The e-assessment, as an important part of any e-learning system, faces the same challenges and problems such as problems related to portability, reusability, adaptability, integration and interoperability. Therefore, we need an approach aiming to generate a general process of the e-assessment. The present study consists of the development of a generic e-assessment process which should be adapted to any learner profile. This e-assessment process is implemented as a composite cloud service which could be invoked by any existing LMS regardless of its environment. The authors are brought the abstraction defined by a workflow about proposing a development approach based on the Reverse Engineering and the cloud environment. To attempt these goals, they have studied the e-assessment politics of different existing LMSs to generate their e-assessment activities. These activities composing the generic e-assessment process using the Reverse Engineering and based on a set of mapping rules. Then, the authors have proposed a pedagogical scenario linking the generated, e-activities in an abstract manner using the concept of workflow. To specify this e-assessment workflow process, they use UML activity diagram language. Finally, to implement their approach, the authors have used the technology of cloud computing services

KEYWORDS

Cloud Computing, E-Assessment, Learning Management System, Scenario, Workflow

1. INTRODUCTION

1.1. Motivation

Recently, the e-learning has gained popularity among educational institutions as well as enterprises. Therefore, many commercial or open-source Learning Management Systems (LMS) have been developed. Open source is available in an efficient way promoting learning as anyone can easily access to it with free redistribution privileges (Ajlan, 2012; Cavus et al, 2014). With the increasing number of LMSs, it becomes hard to know which one to use. Researchers have developed various methods to determine which LMS is the best to use and how to define challenges features of LMSs (LMS, 2015). While the use of these systems has gained recognition and acceptance amongst institutions, a new category of problems has arisen and need to be solved: the numerous varieties of platforms and...
approaches which are used in different system implementations increase the difficulty to exchange pieces of information amongst different LMS systems. Therefore, some of them have become obsolete and dedicated for specific institutions (Al-Samadi et al, 2009).

The e-assessment, as an important part of any e-learning system, faces the same challenges and problems such as problems related to portability, reusability, adaptability, integration and interoperability. For instance, we suppose that you are a learner in a university using a well specified LMS and you moved to work to other university using a different LMS. If the first LMS of your x-university is not well designed to share your assessment materials, you will not be able to use the same materials in the new LMS.

Another example, you are a teacher and you are using, separately, a LMS to achieve your e-learning tasks and a stand-alone e-assessment system to achieve your assessment activities. Both of these systems are not interoperable. Therefore, you have to register the student twice: in the LMS and in the e-assessment system, duplicating, by this, data about him/her. Consequently, you are not able to use the assessment results in the process of learning content adaptation and redesign. Despite the use of some standards of interchangeable methods by some LMSs, like SCORM, the need of personalized e-assessment standard is still not satisfied, as these standards are used to interchange the learning contents and not the e-assessment ones.

Eventually, the fairness in the e-assessment process is arising as another problem of the e-assessment. In fact, existing LMSs do not offer the same method of assessment. Moreover, in the same LMS, we need an assessment process based on well-established pedagogical scenarios. This unfairness makes evaluation of different students in the same and different establishment more difficult. Therefore, to fulfill these limits, we need an approach allowing a rigorous solution which presents a generic e-assessment process that could be used by any existing LMS.

1.2. State of the Art

Authors in (Bizonova et al, 2007) have used the Reverse engineering paradigm to develop generic e-learning functionalities. They have compared platform specific models of different LMSs and have created a platform independent model that covers common functionalities of these LMSs. They have created or enhanced the generalized model by continual integration of the functionalities as provided by the LMS candidates (Moodle (Moodle, 2013), OLAT (OLAT, 2015) and Claroline (Claroline, 2015)). The disadvantage of this approach is that the elaborated Platform Independent Model (PIM) is dedicated only to represent features and functionalities of two specific open-source frameworks and not to cover all functionalities of the other existing LMSs.

Authors in (Dehbi et al, 2013) have presented a LMSGENERATOR, a multi-target Learning Management System Generator with an approach based on the MDA (OMG, 2015) and the component approach. Based on generative programming, from user specifications (abstract models) and the desired technologies, software bricks will be generated and assembled to produce a complete solution adapted to the area and the user’s needs. The accumulation of strategies and procedures used in this approach makes it more complex to be developed.

Authors in (Moreno et al, 2005) have proposed a framework model called e-MDA which is ideal for the “4+1” view model, and equivalent to the calculation of independent models (CIM) in the MDA. In e-MDA, each view has five levels, and it proposed that the platform independent model (PIM) should be established in accordance with five levels. However, the method that has proposed does not follow the MDA principles as transformations between different models (PIM and PSM (Platform Specific Model)). The authors have only focused on the development of a domain model. We do not see the advantages of the use of the MDA.

Authors in (Cong, 2010) have presented a model-driven development approach for the e-learning platforms. They have developed the domain model (CIM) through the analysis of business logic of the e-learning and then they have stratified the PIM under the J2EE framework, and they have proposed the transformations from PIM to PSM layer by layer.
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