A Private Cloud-Based Smart Learning Environment Using Moodle for Universities

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EXECUTIVE SUMMARY

Moodle is an open source learning management system that helps universities host the courses online through standalone or a in a private cloud environment that helps the educational institutions grow exponentially with all the facilities Moodle can offer. This chapter identifies the feasibility of a university to host their courses in Moodle which runs under a private cloud environment. This chapter explains various difficulties incurred by the public cloud and other standalone servers. This chapter also analyzes various metrics towards smarter learning methodologies and observes that the learning curve of the users is considerably increasing, and hence, such models are suitable for universities with several thousands of users. This chapter proposes a method to deploy Moodle for a smarter learning environment in universities of huge strength.

INTRODUCTION

Moodle Modular Object - Oriented Dynamic Learning Environment (Moodle) is a learning management system (LMS) that can cater to more than 50,000 users of any university (LMS, 2018). It is robust, secure and can handle a large user base. Moodle is preferred by many educational institutions ranging from primary school, secondary school, K12 education schools, as well as engineering and technology colleges and universities. A recent initiative enables Moodle to support any device mode, whereby it can be used on any device, anywhere, and with any type of network. The future of Moodle is so promising and powerful that it is supported by a strong online community where any updates or bugs can be handled and managed.

Over the years, Moodle has been used for various metrics like course modeling, objective mapping, outcome analysis, course evaluation, virtual learning environments, and models on 2D and 3D, teacher -

centric methods and learner-centered approaches (Lamia, T., Ashouri, H., & Sarra, T., 2017). Also, Moodle is particularly able to provide a strong support for content - based delivery. Here it plays an invaluable role as content drives learning and is often regarded as the king of learning. For example, Moodle has been tapped for work involving projects undertaken by undergraduate and postgraduate students done in the previous semester to predict the students' behavior (Nozal, C. L., Pastor, J. F. D., Raedo, J. M., & Sánchez, R. M., 2013). (Esteban-Escaño, J., Esteban-Sánchez, A. L., & Sein-Echaluce, M. L., 2017) propose that both teachers and the learners are given different scenarios for handling projects that are carried out during the last year of the under graduate courses. They use Moodle to for reviewing, evaluation and handling of the projects in an adaptive way.

Another area where Moodle has been used is in the teaching of blended courses in liberal arts in universities to conduct predictive analytics to see the performance of learners (Conijn, R., Snijders, C., Kleingeld, A., & Matzat, U., 2017). For example, from a single institution, data is collected from almost 5000 students to predict the performance of the blended courses in the liberal arts, which in turn is used to outperform the learning curve of the wider student population of that university. There are also instances where, Moodle has been used to deal with the teaching of physics using virtual and remote laboratory measurement system with the aid of chats, forums and video conferences (de la Torre, L., Guinaldo, M., Heradio, R., & Dormido, S., 2015) Such Moodle-supported initiatives prove the robust and fuzzy behaviour of the integral and derivative control system. Moodle has also been integrated with other learning tools. Wikipedia, for example, is considered to be one of the powerful tools for promoting a collaborative way of writing and providing suitable content for readers as stated by (Sonego, A. H. S., do Amaral, É. M. H., Nunes, F. B., & Voss, G. B., 2014). There are efforts that use Wikipedia as a learning model to deal with collaborative learning among students of a university. This method of learning provides better interaction between the student and the teachers. A tool called Trivial CV has been developed to handle competitive activities within the classroom environment, where the competitiveness between the students is assessed by the teacher or the instructor (Moreno-Ger, P., Martínez-Ortiz, I., Gilmartin, V. F., & Ballesteros, R. H., 2013). This tool has been integrated into Moodle for better usage and for creating a larger user base.

Yet another area where Moodle can assist in a powerful way is in the management of assessments in courses. In distance learning programs in particular, the main challenge is the administration of tests and online assessments for students. In some cases, the genuineness of the users cannot be verified and hence biometric may be one of the options to enable more rigorous testing in the learning environment (Gil, R., Orueta, G. D., Tawfik, M., Garcia-Loro, F., Martin, A. P., Sancristobal, E. & Castro, M.,2013) propose this type of work that enables the inclusion of users' fingerprints when they appear for the examination, along with the usual user name and password authentication. However, running a script and validating it with a learning management system (LMS) can be a challenge, as noted by (Trenas, M. A., Ramos, J., Gutierrez, E. D., Romero, S., & Corbera, F., 2011). In this regard, a tool has been developed that can verify and validate the Very High Speed Integrated Circuit Hardware Description Language VHDL scripts that can be uploaded to Moodle so that users can verify their results through automatic processing or compilation of their source codes. Various source codes can be compiled online through the help of Moodle.

(Garcia-Robles, R., Diaz-del-Rio, F., Vicente-Diaz, S., & Linares-Barranco, A., 2009) propose problem-based learning (PBL) as one of the popular methods for blended learning in a university in Spain for a course in computer engineering. PBL is an uncommon pedagogical method in computer

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