Moodle Cloud Computing Evolved Paradigm for E-Learning

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***Abstract:*—Moodle is a free, open-source Learning Management System distributed under General Public License. Moodle has been an excellent and low-cost technology for educational Institutions that can be used by the educators to extend e-learning content to the learners. Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources. Moodle Cloud is a fully hosted moodle site where one can create effective online teaching and learning environment in a collaborative, private environment. One can create courses, provide activities and resources for learning and assessment, allow learners to complete quizzes or submit files, grade assignments and communicate with your learners. Technical education in India contributes a major share to the overall education system and plays a vital role in the social and economical development of this nation. Education sector boasts of 42 Central universities, 243 State universities, 53 State Private universities, 130 Deemed universities, 33 Institutions of National Importance (established under Acts of Parliament) and five Institutions (established under various State legislations) totaling 504 in 2009. This paper proposes a moodle cloud framework in order to provide a new era in e-learning.**

Keywords— Cloud, Moodle, ERP, SaaS, Paas, Iaas, LBS, OPAC ERMS, OCLC and Digital India

I. INTRODUCTION

Martin Dougiamas is the founder of the open-source Moodle project which provides a free learning platform now used in every country around the world and in every education sector. Moodle is the open source platform that lets to build the perfect education solution. In some countries Moodle is the standard learning platform for around 90% of all schools and Universities. Moodle is used by Open University, Cisco, Mazda, Monash University, GAC Academy, Australian National University, Cambridge University, BP, Shell, Flinders University, Allianz, Novell, Microsoft and Louisiana State University, World Vision.

Government of India is having the ambitious plan to raise the present 16 million enrolments in higher education to 42 million by 2020 as well as interconnect electronically India's 572 universities, 25,000 colleges and at least 2,0 00 polytechnics for enabling e-Learning and content sharing across country.

Library Management System is one of the systems to automate the library in standalone Environment. The LMS solution is integrated with Barcode for easy access and retrieval of any item from the Library. An On-line public access catalog (OPAC) facility is also provided for speedy retrieval of any kind of document. An OPAC is an online bibliography of a library collection. It is developed as stand-alone online catalogs with networked of computers. Now OPAC has been made accessible from a server to users all over the world linking with the INTERNET. ERMS. ERMS (Electronic Resource Management Systems) is a process of choosing electronic resources for library's collections and service offerings. E-Resources such as e-journals, e-books, databases, and web-resources are ever-increasing array of databases

Cloud computing is a one of the technology model for IT services. It allows businesses organizations not to install locally multiple servers and equipment and avoid dealing with hardware failure, software installs, upgrades and compatibility issues.

Higher Education sector has witnessed a tremendous increase in its institutional capacity since Independence. The Government of India is keen to use the technological resources in helping its mission to make Higher Education accessible to all deserving students. In this direction, it has launched its National Mission on Education through Information and Communication Technology (NMEICT). Another significant step in this direction is the National Video Server of the National Programme on Technology Enhanced Learning (NPTEL), which was launched at IIT Madras in February 2011. The video server is connected to 1 Gbps link of the National Knowledge Network (NKN) and also to 155 Mbps link to the Colleges' Virtual Private Network (VPN). Both the networks come under the National Mission on Education through Information & Communication Technology (NMEICT) and the video server would make the entire NPTEL, Sakshat, IITB Spoken Tutorial, FOSS content available to students across Universities and Colleges online as well as free and Open Software. All India Council for Technical Education (AICTE) with Microsoft Corporation tied up to deploy Microsoft Live@edu, a cloud-based solution to serve more than 10,000 technical colleges and institutes throughout India for the purpose of high-quality technical education and collaboration.

This Paper proposes moodle cloud framework to enhance the quality of education, deliver better services even with fewer hardware and software resources limiting to browser only substituting for the educational Institutions from the burden of handling the complex IT Infrastructure management

as well as maintenance activities that leads to huge cost savings.

II. BACKGROUND

A Cloud computing has evolved from a no. of phases, earlier it was stand alone and autonomous computer then mainframe and client server model evolved. Mainframe and Super computer are powerful computers used mainly by large organizations for bulk data processing such as census, industry and consumer statistics.

The acronym Moodle stands for modular object-oriented dynamic learning environment Martin Dougiamas, who has graduate degrees in computer science and education. Moodle has continued to evolve since 1999. It has been translated into over 100 different languages and is accessible in many countries worldwide. Institutions can add as many Moodle servers as needed without having to pay license fees. The Open University of the UK currently uses a Moodle installation for their 200,000 users while the UK government uses a Moodle installation for their Civil Service Learning platform serving half a million employees.

Table 1 : Moodle Version and release date

Ver	Version release date
1.09	30 May 2003
3.0.7	14 November 2016
3.1.4	9 January 2016
3.2.1	9 January 2017

Anthony Sulistio et al of Hochschule Furtwangen University, Germany establishes CloudIA (Cloud Infrastructure and Application) framework to build private cloud for the purpose of running e-Science and e-Learning applications in university. Abishek Gupta et al of Indian Institute of Technology, Delhi designed and implemented the workflow of an academic cloud. Bo Dong et al has presented an e-Learning framework called Blue-sky cloud framework in which physical machines have been virtualized and allocated on demand for e-Learning systems. It also solves the challenges faced by eLearning systems. It also consists of three layers such as the virtual infrastructure, capability and data caching layer. It improves the availability, performance and scalability of eLearning systems.

III. SERVICE & METHODS

Users can download and install Moodle on a Web server, such as Apache HTTP Server and a number of database management systems. The MoodleCloud service provides free hosting for an up-to-date Moodle site on https://yourname.moodlecloud.com. The site will always be running the very latest release of Moodle and no technical know-how required. MoodleCloud makes e-learning easier by hosting online. With MoodleCloud, there is no installing software on servers or performing maintenance and upgrades. It is created by the people who run Moodle.

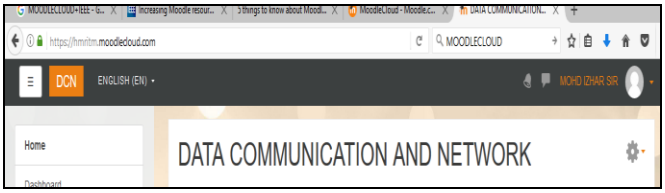

Figure 1: Moodle Cloud Framework

MoodleCloud is designed for smaller users. Such as a teacher, a trainer , administrator wanting to see how Moodle works installed without having to set up an environment themselves and an instructional designer wanting to practice building a course in the Moodle site. It is free to use but the user numbers are limited to 50. The space allotment is 200 mb However Moodle integrates with YouTube, Dropbox, Flickr, and many other content sites.

Figure 2 : Moolde Cloud Structure

Plugin BigBlueButton, an excellent open source video conferencing tool, can be used with 6 people in a session for a small discussion.

Distributed Computing - is Computing performed in a Distributed System. Distributed System-a distributed system is a collection of independent computers, interconnected via a network. These computers and Network are capable of collaborating (work together) for a task and appears to be a single coherent system. In other words. A distributed system is a collection of autonomous hosts (Computers) that are connected through a computer network and coordinate with each other in such a way that users perceive the system as a single and integrated computing facility. Cloud Computing - now Cloud computing is an evolving paradigm. Cloud computing is intended to serve as a means of connecting users worldwide without having any installation of application and maintaining of files. Cloud services include deployment of applications and maintaining database at remote servers.

Figure 3 : Cloud Computing

Cloud computing can transform the way systems are built and services delivered, providing libraries with an opportunity to extend their impact. Cloud Computing provides different

service model in order to use in different domains such as SaaS, Paas and Iaas,

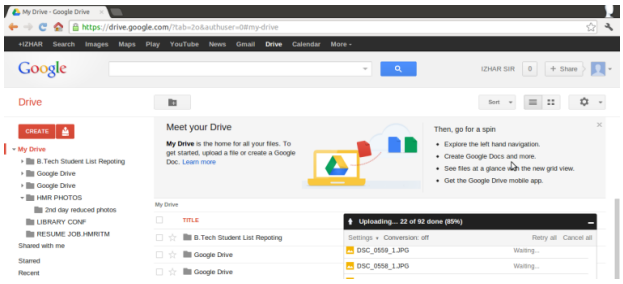

Figure 4 : Google Drive as an Example of SaaS Cloud Computing

Figure 5 : Facebook is example Paas and IaaS Cloud Computing

Library Management System is mostly on LAN technologies that means limited to some geographical areas and need to be open to everywhere. Such library type of stand-alone technologies contains resources which are replicated in nature and is costly to its local users. OPAC and ERMS tries to make its distribution worldwide but even it is costly to its global user as distribution technology owned is old in nature and it is added to it and surely, it need to be changed onto cloud computing. Many library systems uses only some percentage of their capacity.

SECURITIES AND ISSUES

Security issues depend on types of service and Deployment Models. So, for IaaS, vendor responsibility is around physical, environmental, and virtualization security. Every other aspect of security in applications, operating system, etc. still needs to be handled by the customer. On the other hand if you are using a SaaS offering, the vendor is responsible for all elements of security. Key issues are :

Physical Security – It is checked with the cloud provides. Policies, layout and authentication type security is required.

Administrator/Management checks : It is a seen that who is to make system secure, they break the security by passing the confidential information. Background checks of their administrative employee need to be checked and a vigilance on them required.

Data Encryption – Data Encryption is altogether necessary. It is an extremely element of data protection.

Network Security – Various methods of network security is required as in the same case of distributed network.

Virtualization Security – Almost all Cloud providers use virtualization to provide economies of scale and optimal distributed architecture. Virtualization has its own set of security issues.

Process Security – the Process running on the Cloud server need to be secured with Anti-virus as most of the attacks are on the application running at Server Side.

Transparency is the main issue in cloud computing where it is required to hide differences in data representation and how a resource is accessed, no matter where a resource is located or moved even while in use. The same resources are shared by several users at a same time. It hides the failure and recovery of a resource.

IV. RESULTS AND DISCUSSIONS

Moodle Framework provides a lot of activities and resoures in order for e-learning. The assignment activity module enables a teacher to communicate tasks, collect work and provide grades and feedback. BigBlueButtonBN lets you create from within Moodle links to real-time on-line classrooms using BigBlueButton, an open source web conferencing system for distance education.

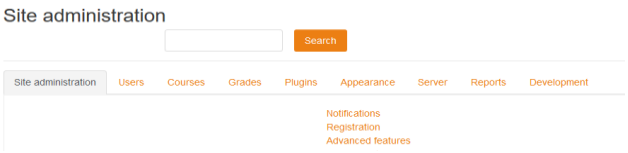

Figure 6 : Moodle Cloud Site Administration

The chat activity module enables participants to have text-based, real-time synchronous discussions. The feedback activity module enables a teacher to create a custom survey for collecting feedback from participants using a variety of question types including multiple choice, yes/no or text input. The quiz activity enables a teacher to create quizzes comprising questions of various types, including multiple choice, matching, short-answer and numerical.

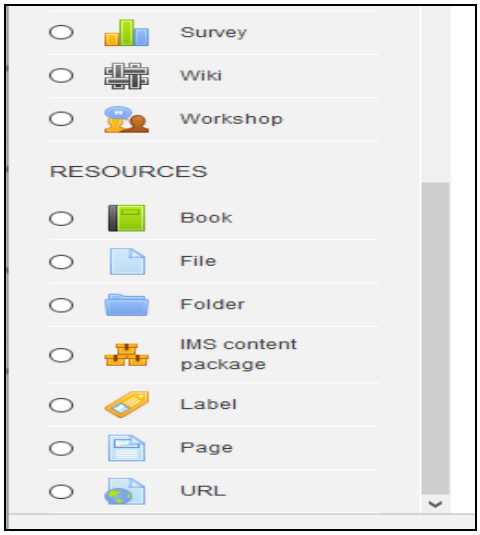

Figure 7 : Moodle Cloud resources

A SCORM package is a collection of files which are packaged according to an agreed standard for learning objects. The SCORM activity module enables SCORM or AICC packages to be uploaded as a zip file and added to a course.

Content is usually displayed over several pages, with navigation between the pages. There are various options for displaying content in a pop-up window, with a table of contents, with navigation buttons etc. SCORM activities generally include questions, with grades being recorded in the gradebook.

The workshop activity module enables the collection, review and peer assessment of students' work.

The file module enables a teacher to provide a file as a course resource. Where possible, the file will be displayed within the course interface; otherwise students will be prompted to download it. The file may include supporting files, for example an HTML page may have embedded images or Flash objects.

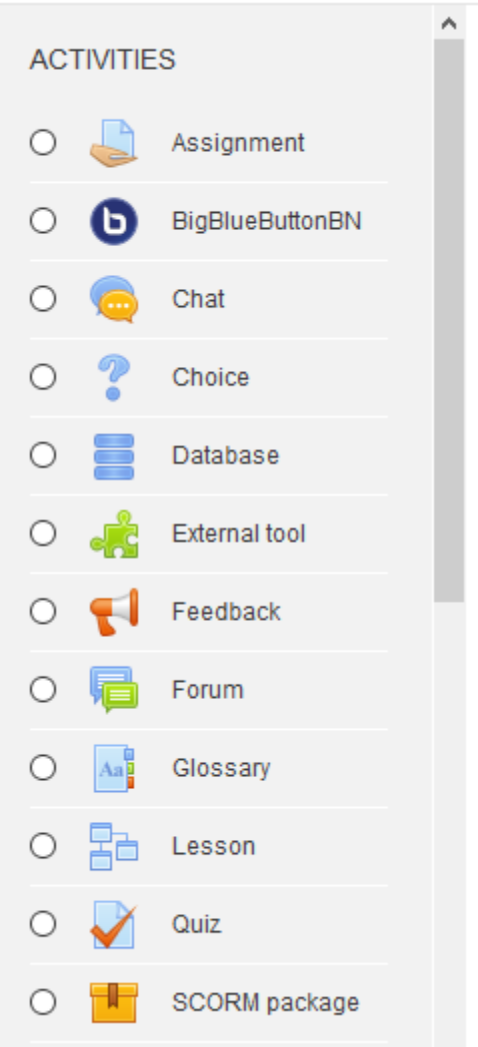

Figure 8 : Moodle Cloud Acitivities

Various Educational systems to cover all aspects of management use web enabled\based Management Information System (MIS) to efficiently institutionalize, consolidate and Control the system. It has become a strong trend in the socialize and Institutionalize development because of the several benefits it offers. Such system is accessible instantly and input\output is possible anytime and any part of the world. Each level in the hierarchy can login and enter and\or see the data that is relevant to them. Different levels of permission can be assigned to different users ensuring that they can only access parts of the system those are relevant to them.

Figure 7 : Web Based MIS

The Director of Education, Delhi for example started using web based MIS in the year 2002 for managing around 1000 schools with 40,000 staff to cater to about 9.5 lakh children with the sole aim to provide quality education in the government schools. Web based systems includes Online Student Management System including Online Admission, Online Student Feedback, Online office Management, Budget Module, File Track Module, A web based internet mailing system officers and to Mister, Online LMS and also online school information module for parents and researchers.

AICTE under the e-governance implementation project has also put in place a web portal to help students and to manage its approved institution spread all over India. L&T InfoTech implements Siebel CRM (Customer Relationship Management) modules for AICTE for strong nationwide network for upward and downward communication.

Figure 8 : AICTE WEB Portal

However one can use the Cloud Computing Technology in any of university or any education system having its affiliated schools and colleges. Cloud computing can provide not only the entire web enabled MIS and ERP services and Solution to its user, the students and teacher on one hand can be able to use it for their labs experiment and education but on the other hand, management of the colleges needs not to buy these costly software tools and material. Even the more costly

research software can be purchased by the university and some minimal cost can be charged by different affiliated colleges and the same can be put on line on the cloud to its users. Beside Live@edu project of AICTE is cloud suite for education with more than 22 million people using the service worldwide. Live@edu offers education institutions free, hosted, co-branded communication and collaboration services for students, educators, and staff. By signing up for Live@edu, schools gain access to a comprehensive suite of services which include Outlook Live for e-mail, Office Web Apps, Windows Live Messenger for instant messaging and Windows Live SkyDrive for 25 GB of online data storage space; preparing the students for the future.

V. CONCLUSION AND FUTURE WORK

Moodle Cloud is a technological framework it can be used for the benefit of every students, faculties, administrators and research scholars in an academic environment such as college or university. Moodle Cloud framework addresses the services and deployment of cloud in a new dimension and each activity and resources specifies the essential components needed to construct an academic cloud in a university.

Once each University in India starts deploying Cloud Technology, as the Government of India is keen to use the technological resources in helping its mission to make Higher Education accessible to all students, all University can be taken in one umbrella for effective administration as well best education system by way of making available of all resources to everyone and at every corner of India, that means achieving the same purpose of the project, National Mission on Education through Information and Communication Technology (NMEICT) initiated by Ministry of HRD, Govt. of India.

To Conclude, we need evolved paradigm of cloud computing and Moodle Cloud framework in order to balance the usage of the resources and for e-learning as most of the universities infrastructures are underutilized and in some cases over utilization of resources occurs.

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