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Role of Learning Management Systems in Education

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Abstract*—Learning management systems are simple web based applications that are being used today by various educational bodies and numerous industries. These systems are designed by many industries, educational bodies, etc. according to their needs and requirements. In this paper, some of the characteristics of open sources learning management systems were analyzed to identify the basic characteristics for designing a learning management system. The LMS is designed for various educational bodies and the modules for future are also proposed in this paper.

Keywords— Learning Management Systems (LMS), Architectural design, LCMS

I. INTRODUCTION

A learning management system is a server-based or cloud based software program. It contains information about users, courses and content. A learning management system provides a place to learn and teach without depending on the time and space boundaries. Learning management systems are also known as Course Management Systems (CMS), Personal learning Environment (PLE), e-learning courseware and Virtual learning Environments (VLE).

A learning Management System may be defined as:
"A Learning Management System (LMS) is a software application for the administration, documentation, tracking, reporting and delivery of e-learning education courses or training programs". [1]

A. learning management system

A learning management system is used within educational organizations as well as with various industries.
An educational LMS is designed to deliver instructor led courses which includes two way interactions between learners and instructors and also between learners and other learners. The LMS is used by the industry as well which have distinct functions and features from the educational LMS. A learning management system for educational background should be able to do the following [1]:

- centralized and automate administration
- use self-service and self-guided services
- assemble and deliver learning content rapidly
- consolidate training initiatives on a scalable web-based platform
- support portability and standards
- personalize content and enable knowledge reuse

The instructor lead courses allow managing the courses and exchanging information with students as per the requirement need.

B.LMS Design Pattern

These days Learning Management Systems is being adopted by many institutions to fulfill the needs and requirement. The users of LMS can be categorized into following:

- ***The learners:*** They use the system for the educational process. The learners are the basic or the main users of LMS.
- ***The instructors***: The instructors are the teachers and the assistants who use the LMS to supervise, assist and evaluate the learners.
- ***The administrators***: The administrator can take the support of all the users of the system to keep a check on the proper operating status.

C. Advantages and disadvantages of learning management system

a. Advantages

- Using the correct learning strategies, LMS can increase motivation of learners, promote learning, encourage interaction, provide feedback and support can be provided during the learning process.
- A LMS supports content in various formats, e.g. multimedia, video, and text.

- Access to course material is at anytime. Course material is updated and students can see the changes made in the particular field. Teachers can modify information according to the need of the student.
- Improvement in teaching methodology and the outcomes of the learning are not guaranteed through learning management system.
- Various activities are offered to the learners to make choices out of it.
- Re-use of the learning activities can be done. By re-using content, time and effort can be saved and the cost of improving online content is also reduced.

b. Disadvantages

- Conventionally, LMSs tend to be course centered rather than student centered. At this time, a LMS does not accommodate a complete range of teaching styles.
- Some trainers have weak computer and information literacy skills and lack the information management skills needed to successfully use a LMS to support their teaching. Teaching staff in this situation must not only learn how to operate within these environments but also develop a critical perspective of their use of the LMS in teaching in a variety of modes (Samsonov & Beard, 2005).
- Many teachers are challenged to design and organize a mixture of learning activities which are appropriate to the needs of the student, teaching skills and teaching styles. (Dwyer & Dwyer, 2003).
- It is very easy to convert existing poor teaching practices to a LMS.
- Some current research suggests that online teaching leads to an increase in teacher workload (Dralle, A. 2007).

II. Design Of Learning Management System

A. LMS can have the following features

- Registration and Enrollment options to teachers and students.
- Adding/Deleting Courses by the University/Educational Bodies.
- Set the different User Roles and user account.
- Setting the course calendar.
- Upload and Retrieve Assignment and Resources
- Forum module.

B. Use Case Diagram

A use case diagram is a simple representation of a user's interaction with the system and depicting the specifications of a use case. A use case diagram can portray the different types of users of a system and the various ways that they interact with the system. The below represented use case diagram shows the interaction of the system with various users in a learning management system.

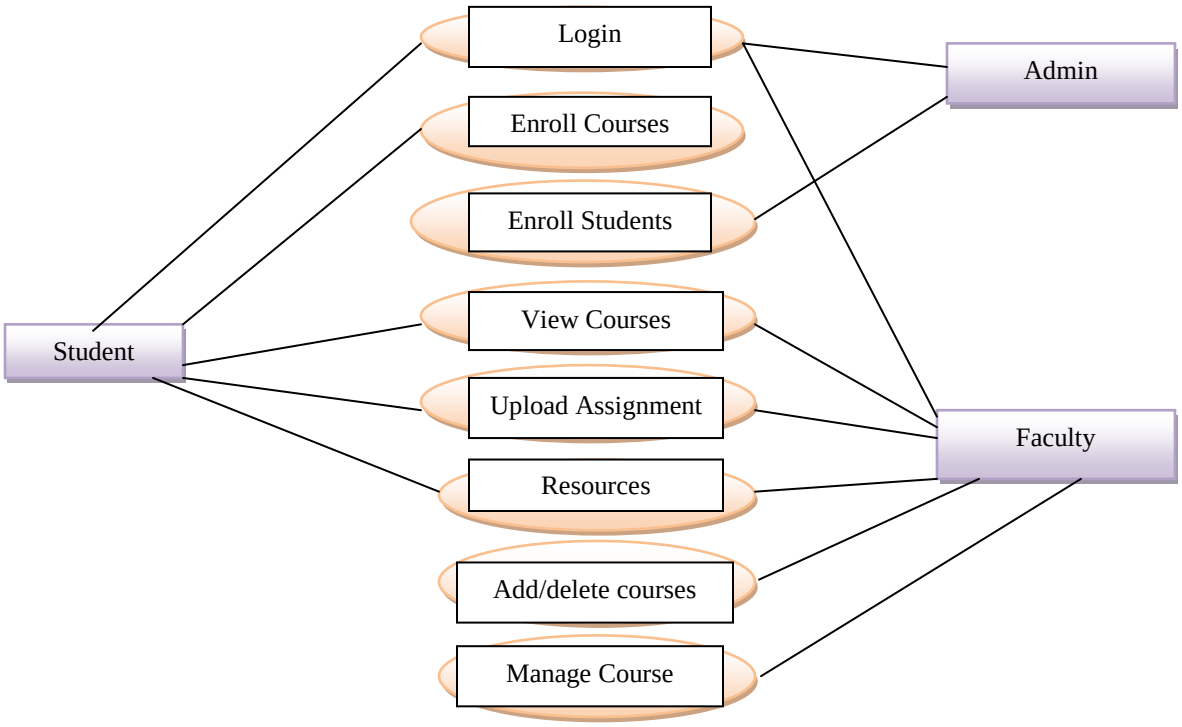

Fig 1: Use case diagram for LMS

C. Activity Diagram

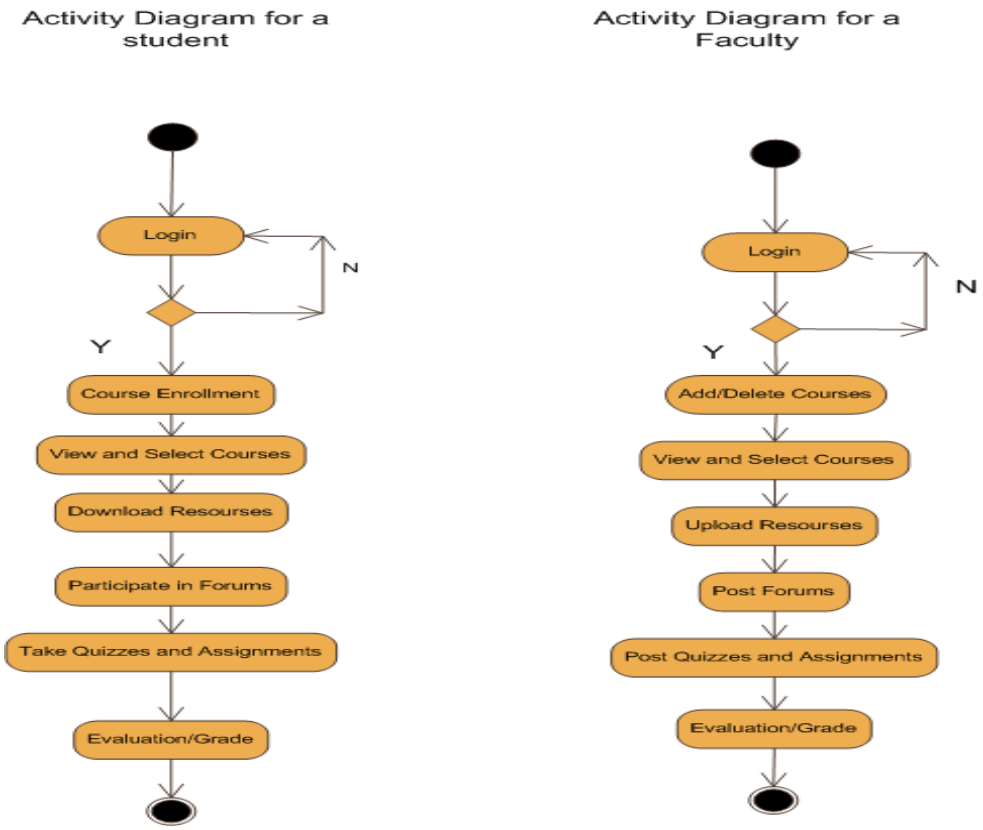

Fig 2: The Activity Diagram Of Learning Management System

III. Requirements For Lms Systems In An Academic Environment

a. Course content management

- The storage of personal files to be uploaded by the users should be supported by the system.
- Course objects sharing and reusability between users should be supported by the system.
- A digital library should be supported for the sharing of information between all the users.

b. Evaluation

- After the completion of the course the students should be able to evaluate the courses.
- The result page answers should be viewable by the user responsible for the course.
- The answers should be analysed by the user responsible for the course.

c. Communication

Text based chat, forums, wikis, internal messages system should be supported by the system.

d. Progress monitoring

- The students overall progress should be tracked by the system.
- A grade book should be maintained and access should be granted to both students as well as teachers to access the result of the students.

e. Administration

- The eligibility of the student should be checked for admission to a course.
- Different accounts such as student account, teacher's account and admin account should be maintained for different roles.
- The access of material should be the responsibility of the person who maintains the course.

f. Third party integration and standards support

- The system's compatibility with the third party should be maintained for simplified integration.
- The common standards and frameworks such as AICC, IMS, and SCORM should be supported by the system.
- The system should be able to run on multiple hardware and software platforms.

g. Third party content support

- The system should be able to handle existing content (flash, MP3, video formats etc.) as well as the new content created by the third party.

h. Usability

- The system should be easy to use and learn by the users.
- Full accessibility of the system should be provided with a web browser.

i. Configuration and modification

- The systems source should be modifiable by the administrators to access the source code or have access to an API/SDK.

j. Technical requirements

- The system must be able to work under heavy load.
- The system must be able to handle growth in the number of users or information.

k. Learning and pedagogical requirements

- The system should support interactive course content object.

IV. Framework Of The Proposed Lms

The framework designed is an effort to have all the features needed in an ordinary learning management system. The following are the modules needed for the framework to be designed:

- Learning Content Manager
- Course Manager
- Content Assembly Tools
- Catalog Manager
- Learning Planner
- User Profile Manager
- Collaborative Environment
- University Consortium Manager

The framework of Learning Management System is divided into Learning Content management System (LCMS) and Learning Management system (LMS). In LCMS portion, educational bodies can create, store, reuse, manage and deliver learning content. LMS portion will manage users, administration etc.

a. Different phases for the proposed framework

The learning management system is divided into three phases: Layout, database, and web services. Each phase describes specific actions taken in several locations. Following is the brief description of each phase:

- ***Layout Phase***: This phase has the main concepts of the web application design facilities in the system. PHP is used for the designing of the whole system. Here PHP is chosen as the scripting language because:
  - ✓ PHP is an open source server side programming language available at free of cost.
  - ✓ Its coding style is quiet easy to understandable and it is very efficient on multi-platforms.
  - ✓ It is very flexible but powerful language, most suitable for developing dynamic web pages.
  - ✓ It does not put strain on servers. It uses its own inbuilt memory space that decreases the workload from the servers and the processing speed automatically enhances.
- ***Database Phase:*** This phase is connected with all other modules. MySQL is used as the database for the project. MySQL pronounced either "My S-Q-L" or "My Sequel," is an open source relational database management system. It is based on the structure query language (SQL), which is used for adding, removing, and modifying information in the database. Standard SQL commands, such as ADD, DROP, INSERT, and UPDATE can be used with MySQL.
- ***Web Services Phase:*** In this phase we have to use web services as references in most database actions. For example, the data manipulation is done through web services. All web services are web methods of functions that perform specific actions. Web Services allow the system greater flexibility over the Internet by allowing it to work with other systems through the Internet as if it was a standard LAN network. It uses XML to transmit the data to and from different sources. Web Services can also be considered as a connectivity tool—objects, data sets, and even cached objects can be passed to and from other servers. [2]

b. What LMS is supposed to do?

Learning Management System is a software application for the administration, documentation, tracking and reporting of training programs, classroom and online events, e-learning programs, and training content. This LMS is supposed to have the following features:

- Registration and Enrollment options to teachers and students.
- Adding/Deleting Courses by the University/Educational Bodies.
- Set the different User Roles and user account.
- Setting the course calendar.
- Upload and Retrieve Assignment and Resources
- Forum module.

LMS is used by audiences like students, teachers and administrators. Also LMS can be used by anyone who is interested in conducting the online classes and who wants to store and retrieve the student's documents.

There are four critical issues that govern the success or failure of LMS. They are Scalability, Compatibility, Reusability, and High Availability. Other characteristics that define an LMS are:

a) Data Management: Data including text, animations, videos, static pictures, etc. is managed in a great amount.

b) Processing Load: A significant proportion of processing load needs to be distributed from the Web server to the Web client.

c) Personalization: Different users should not have access to the same data. The data view should be customized for various users.

d) Intelligent Agents: These incorporate intelligent web agents that tailor information customized for individual users.

e) Meaningful and Unlimited Tags: HTML has a limited set of pre-defined tags and all these tags cannot define the content in a human readable form.

f) Sharable Courseware Object Reference Model (SCORM) Compliancy: An LMS has to be developed in compliance with SCORM which requires that the content developed be reusable and easily shared between different LMS.

V. Conclusion

With the improvement of Computer Assisted Learning, Learning Management Systems are gaining popularity as a convenient medium for delivering and managing teaching and/or training to the distant learners. It is noticed that Current LMSs are lacking in some functionalities for which they can be used by educational bodies. This work tries to bring out those functionalities which can be incorporated in a standalone LMS to upgrade it into various educational bodies supporting LMS. Objectives of this work were, to study about LMSs and different modules of an already existing LMS, to explore extra functionalities to transform a generic LMS into an LMS that supports various educational bodies, and to propose a Framework for an LMS that can act as a learning management system for various educational bodies. The work is not complete in true sense because some of the functionalities like receiving feedback from the participating educational bodies, processing of accounting information and calculating credit transferable to the individual educational bodies are yet to complete. Moreover, more flexibility in program flow is required. In the proposed framework all the fundamental modules needed to facilitate actions for a consortium are identified. However, there could be more investigations needed in different aspects of versatile operation of such a consortium LMS like, extra modules for identifying the best content among the similar subjects, broadcasting any information from the participating universities, checking quality of the content etc, to incorporate quality of the services of the consortium. The future work will concentrate on these needs and extend the proposed framework to incorporate those modules. Moreover we have tried to implement some of the proposed modules and functionalities. But functionalities like receiving feedback from the participating universities, processing of accounting information and calculating credit transferable to the individual Universities are yet to implement. These can be taken as future work.

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