

# **Learning Management System**

Project Report submitted in partial fulfillment of the requirement for the degree  
of

Bachelor of Technology.

In

**Computer Science & Engineering**

Under the Supervision of

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## Certificate

This is to certify that project report entitled “Learning Management System”, submitted by Ankita Verma in partial fulfillment for the award of degree of Bachelor of Technology in Computer Science & Engineering to Jaypee University of Information Technology, Wanknaghat, Solan has been carried out under my supervision.

This work has not been submitted partially or fully to any other University or Institute for the award of this or any other degree or diploma.

**Date:** 07-05-2015

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## **Acknowledgement**

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Date: 07-05-2015

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## **ABSTRACT**

The Learning Management System (LMS) has been established in a number of universities worldwide to help connect students and lecturers without the confines of the traditional classroom. It is an environment with digital software which is designed to manage user learning interventions as well as deliver learning content and resources to students. Since the LMS system has already been implemented and it has also been made compulsory for the lecturers to apply in their daily lectures, it is vital to identify feedback of students as users of LMS. Previous studies have shown various findings in relation to the impact of using LMS in the higher learning environment in various universities worldwide. For many institutions, the Learning Management System, or LMS, is the most significant enterprise system for teaching and learning. The LMS is the means by which course information is distributed to students.

LMS allows us to create and support an unlimited number of online learning courses that can be accessed by students from all over the world. Learning Management System (LMS) provides an integrated platform for content, delivery and management of learning as well as accessibility by a range of users that may include learners, content creators and administrators. Open University Malaysia, the seventh private university in Malaysia that fully operated as an Open and Distance Learning environment had successfully implemented the LMS to ease the learning process of their students as well as their administrators

Today's learners, especially younger ones, expect to use computers in their learning, while adults have also begun to heavily use the Internet in their learning. And the same way letter writing has been replaced by electronic mailing is the same way the board, the chalk and the duster are going to be replaced by electronic learning.

The aim of the project LMS is to manage online content and administer distance learning processes and to increase learning during classroom time, to enhance student motivation, to encourage students to prepare for class, and to allow the instructor to fine tune the classroom activities to best meet students' needs. Hence, there is a vast chance for new researchers to confront more challenges and to develop an LMS.

# **1. INTRODUCTION**

The Learning Management System or popularly known as LMS in the community of higher institutions is an online portal that connects lecturers and students. It provides an avenue for classroom materials or activities to be shared easily. It is also a portal that enables lecturers and students to interact out of the classroom, having discussions through forums that could otherwise take up too much of the time supposed to be spent learning in the classroom. In this era of information technology, the internet is easily available and accessible by urban areas, which is where most universities are situated. The internet is defined as a vast computer network linking smaller computer networks worldwide, and it includes commercial, educational, governmental, and other networks, all of which use the same set of communications protocols. In the era of networked information, Internet, the largest worldwide network of networks, has emerged as the most powerful tool for an instant access to information. Information is now just a 'finger touch' distance away from the user and it would not be inappropriate to say that the Internet has become the biggest global digital information library which provides the fastest access to the right kind of information in nano-seconds of time to end-user at any time and at any place in the world. The Internet has become the most extensively used information source that empowers the average person to get in roaming with the latest information. Today's users can no longer depend on conventional information sources to cope with the latest developments in their respective fields.

The Internet has emerged as a powerful educational tool. With the increasing impact of information and communication technologies on higher education, all those concerned with higher education are attempting to grasp how ICT could help in modernizing the process of teaching, learning and research. Most university students nowadays also have access to the internet as their university provides internet access, and usually there are internet cafes within a walking distance from the university's campus, catering to students. Some also have internet access within their own home as they subscribe to an internet service provider. University students are mostly independent in their learning as lecturers usually give out lecture notes, and further information are left for the students to discover on their own, as it is not a one-way learning process which is practiced in the primary and secondary school system. The learning process at the university level is a two-way process, lecturers share their knowledge and students give their opinions or thoughts in return a topic in a class discussion. Therefore, university students need to constantly broaden their knowledge by searching for information.

So, in this era, teachers and students can carry forward their work on the Internet in ways that are similar to and tightly intertwined with the traditional ways that they learn, teach and study in libraries, classrooms, laboratories, seminars, conferences, etc. The Internet can provide access to essentially unlimited resources of information not conventionally obtainable through other means.

## **2. INTERNET USAGE BY ACADEMICIANS AROUND THE WORLD**

### **A. Overview**

Several studies had been conducted by researchers, and although the aim of their research on the use of the Internet may vary, their research shows that Internet is being used by academics around the world. From a local perspective, a study revealed that students at universities in Malaysia had used the Internet for course-related activities. Students with better basic skills in the Internet perceived the Internet to be supportive of learning environment by using the Internet for their learning tasks and also generally had better attitudes toward using the Internet to improve their studies.

### **B. Internet Usage by Academicians World-Wide.**

For the academicians in the University of Delhi, India, the usefulness of the Internet is shown through the frequency of its use. Most of the respondents used the Internet more frequently, with 70 percent of them indicated using it daily, 16 per cent of them more than two or three times in a week, 12 per cent of them once a week and 2 per cent of them occasionally. Internet presence helps to improve the educational process and address problems related to weak collaborative partnerships, declining educational standards, rising costs, increasing student numbers and to meet the general increased demand for higher education. A well-managed information flow in an academic institution can lead to the improvement of academic standards and can ensure greater equality. With the introduction of the Internet, information-seeking activities and information access have become much easier, faster, and more cost-effective for the intellectual community, as showed in the research done at the Rajshashi University in Bangladesh. In addition, internet access in the University of Ibadan, Nigeria, is primarily expected to help students and staff to access literature and to engage in academic communication. A study in 2003 evaluated the level of utilization of the Internet for academic research at the Obafemi Awolowo University, Ile-Ife, Nigeria. The results from the analysis of the responses showed that the respondents ranked the use of research materials on the Internet fourth (17 per cent). However, respondents who used the internet ranked research materials second (53 per cent) to e-mail (70 per cent). The study concluded that the use of the Internet for academic research would significantly improve through the provision Learning Management System (LMS) among University Students. The Internet made it possible for users to have access to large volumes of information on many disciplines, irrespective of the users geographic allocation. In general, we can deduce that academicians use the Internet as a tool to search for more information for academic purposes.



### **3. THE LEARNING MANAGEMENT SYSTEM (LMS)**

#### **A. How Does LMS Work?**

In line with the ever-changing modern times where students rely on the internet for most of their daily activities, it is appropriate for an online system or student portal to be set up to cater to their academic needs. The online portal has to be a place where students can confidently search and obtain information regarding their courses, and also to ensure the accuracy and reliability of the information. The Learning Management System (LMS) is one such system which is used by various universities all over the globe. There are basically four types of e-learning systems: the Learning Management System (LMS), Learning Content Management System(LCMS), Learning Design System (LDS), and Learning Support System (LSS). We will mainly focus on Learning Management system which is an e-learning system used by various universities all over the globe. LMS is a useful content distribution system, where instructors can distribute course materials and interact with students at a distance (as cited in Almarashdeh, Noraidah, Nor Azan and Alsmadi) The LMS can also be described as a high level web based technology solution for planning, conveying and managing a myriad of learning events within an organization such as online, virtual classroom and instructor-led courses that can assess a specific learning process.LMS is also one of the solutions which are useful for both students and instructor in online learning environment.

LMS are tools for student communication and interaction among students and lecturers. LMS will help the lecturers to provide their learning materials and also interactivity features such as thread discussions, shared files and forums. As mentioned, LMS also support management task such as delivery and tracking, examination, planning, virtual live classes and several statistical analyses. This may save lecturers a lot of time and effort without making any substantial change in teaching process.

A typical LMS provides an instructor or moderator to prepare and deliver content, monitor participation by students, as well as assess student's performance online. The LMS provides interactive features to the students. As such, threaded discussions, video conferencing, and forums for discussion are the main features of an LMS. The goal of an LMS is to keep track of students' progress and performance.

## **B. The Issues of LMS among University Students**

With the introduction of a new system, there will be problems that ensue among the users. Ramayah's study found that many colleges are using LMS for e-learning courses and instruction, but many instructors restrict themselves to uploading course materials to the course web site and never use the interactive features such as chat, discussion forum, email, messages). Some instructors may use the discussion board to generate class discussion among students and themselves but the lack of immediate feedback with the discussion board in LMS has discouraged users to utilize them. Although many interactive features are available in the LMS, its capacity for use may still be limited because of its demand on the commitments from both instructor and students during a specific time frame (as cited in Almarashdeh, Noraidah, Nor Azan and Alsmadi). Wahlstedt and Honkaranta also stated that there also seems to be a gap between the reality and the many advanced teaching tools that are provided in LMS, such as multimedia materials, which were considered as possible means for enhancing teaching, but are not utilized.

To bridge this gap, the LMS system should be build to be more adaptive and customizable. This is also to support teachers or instructors with different computer level skills (as cited in Almarashdeh, Noraidah, Nor Azan and Alsmadi). However, another study found that there are numerous barriers to the integration of instructional technology into higher education, such as technology infrastructure, faculty effort, technology satisfaction, and graduates competency. Many higher online educational institutions have failed due to the high cost of technology, poor decisions, competition, and the absence of a business strategy. These universities that provide e-learning face enormous difficulty in achieving successful strategies, including the delivery, effectiveness, and acceptance of the courses.

Besides that, knowing students' intentions and understanding the factors that influence students' beliefs about e-learning can help academic administrators and managers to create mechanisms for attracting more students to adopt this learning environment. Therefore, it is necessary to conduct research that deals more intensively with learners' perception of, attitude towards, and intention to use e-learning. However, little research has been done in Malaysia to empirically determine the relationship of university students' e-learning use with personal factors such as perceived usefulness, easiness, attitude, intention to use, and self-efficacy, with social factors such as subjective norm and organizational factors such as system accessibility.

## C. Acceptance of LMS among University Students

Researches on LMS use has focused primarily on students with mixed results. Studies have confirmed that, on average, there is no extensive variations between the amount students learned with and without the aid of online systems, but that there is a considerable variation in student outcomes depending on how instructors use technology in their classes. In order to better identify what advantages have been obtained from the investments in ICT, universities are turning their focus toward academic users of LMS.

A study in 2011 confirmed that Perceived Ease of Use (PEU) has a significant impact on Perceived Usefulness (PU), as suggested by Technology Acceptance Model (TAM) Theory. Both PU and PEU also have positive effect on Behavioral Intention to Use. This indicates that the ability of a LMS to allow student and instructors to accomplish his learning task, enhance effectiveness in learning and increase learning productivity is more important than the easy to use, easy to access information and clear interaction of the LMS. Furthermore, the usefulness of the LMS led to high intention to use more than ease of use of LMS among learners. On the other hand, an ease of use of LMS led to high intention to use more than the usefulness of the LMS among instructors. In other words, the usefulness of LMS influence the learners intention to use more than an ease of use of LMS, while an ease of use LMS influence the instructor intention to use of the LMS more than usefulness of LMS. The findings indicate that generally distance learners and instructors using the LMS on their learning and teaching activities and the high acceptance level of LMS implies a desire on having learning management system in Malaysian universities. The study shows that the acceptance of the learning management system is vital in deciding whether the system is usable and utilized by students and instructors in Malaysian universities.

In Korea, people are encouraged to use IT in every field to be updated with the social change caused by IT. University students may want to adopt e-learning because they think e-learning experience will be beneficial for future job preparation. A study in 2009 found that neither perceived usefulness nor perceived ease of use had a significant direct effect on behavioral intention to use e-learning. In Konkuk University for instance, e-learning introduction, e-learning manuals, and an e-learning strategy were developed by the Center for Teaching and Learning

## **4. Available Open Source Learning Management Systems**

Before reading these brief reviews, it is useful to set expectations at a realistic level. Like so much of the open source applications that are available, the tools listed here have been conceptualized and created to fill a need in the university setting. Keep in mind the different priorities that exist in that environment. Corporate universities are focused on business outcomes in the form of competencies and expense control. Learning management systems in the university setting are focused on online collaboration, often as a supplement to classroom education. None of these tools have all the robust functionalities of a mature commercial LMS that result from many years of effort to build a tool that suits specific corporate needs. Instead, look for the potential that these LMSs have and how you can realize that potential. The proverbial glass is half full – not half empty. One of these applications may just be very close to filling your needs. Remember, developing features and functionalities in the PHP language is comparatively easy and inexpensive. More about what it would take to make one of these systems work for you in the concluding section.

## A. Claroline

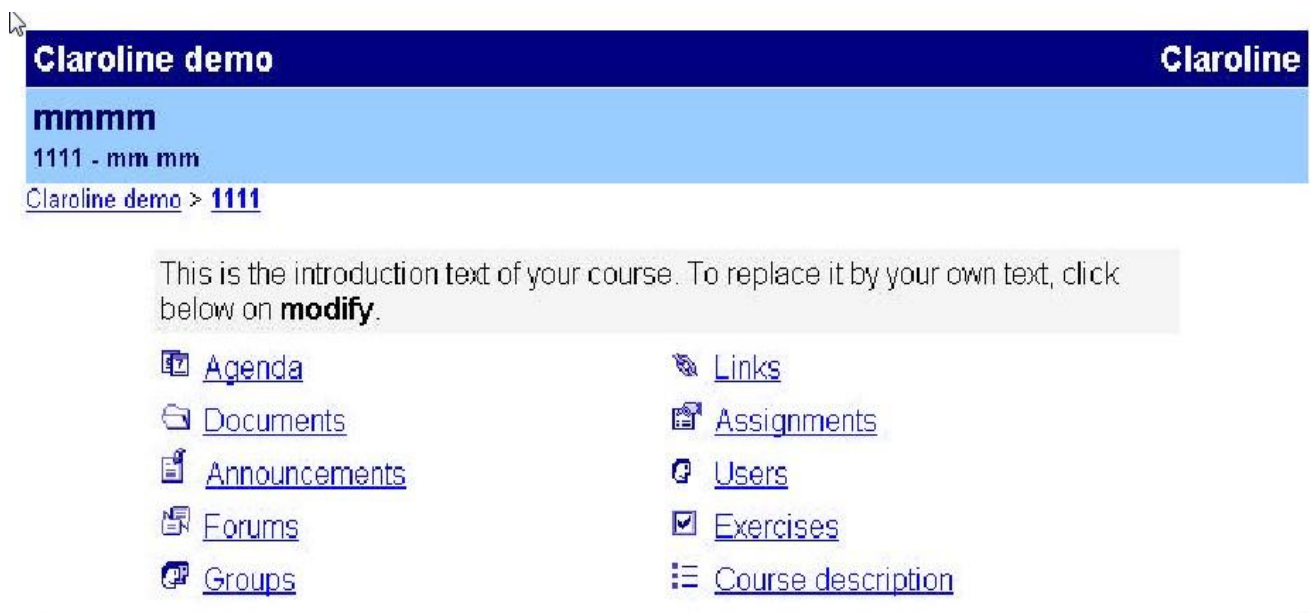


Fig. 1

### URL

<http://www.claroline.net/>

### Origin

Claroline was created to provide instructors at the Université Catholique de Louvain, Belgium, with an e-learning platform that is easy to use. The maturity of Claroline can be attributed to having a large user base that has contributed to its development.

### Features

- Course description
- File Manager
- Agenda
- Announcements
- Links
- Exercises
- Forums
- Users management
- Groups
- Assignments
- Statistics

## **Strengths**

Claroline's main strength is ease of use. The interface is very intuitive. It is very simple for instructors and course developers to upload documents, type in text, manage groups and send out announcements. There is no need to learn HTML or any other formatting language. Claroline lends itself extremely well to asynchronous e-learning. Announcements, message boards and contact lists encourage collaboration. Claroline's documentation is excellent and provides good insights into what the system can and cannot do.

## **Weaknesses**

Claroline is weak in defining competencies and tracking them. This could be remedied by adding additional dimensions to the user group administration area. What is termed "exercises" in the interface is really a quizzing and testing tool. It does not track individual scores, however, only group scores. The reason for this is that the system is not sufficiently secure. There are really only two user levels – student and instructor. An instructor can assign a student as a tutor. This does not provide additional administrative rights, only the right to belong to several groups at the same time. The assumption is that the instructor will give an assignment and that the student will upload a paper to complete the assignment. It has no shopping cart as part of the system. Also lacking are the business rules that are part of most proprietary LMSs, where pre-registration, waitlists, reminders, and so on make training administration a lot easier. Announcements are manually driven.

## **Current User Community**

Claroline has been adopted mostly by universities around the world. The interface and support text has been translated to 15 languages, which should tell us something about how broad the user community is. A list of users can be found on Claroline's website

## B. Ganesha

The screenshot shows the Ganesha LMS interface. At the top, there is a navigation bar with links for 'Accueil', 'Exemple', 'Manuel', and 'Doc. technique'. The header features the 'e-Formation Ganesha' logo and the website URL 'www.anemalab.org'. On the right side, there are links for 'Remerciements' and 'Aide en ligne'. Below the navigation bar, the text 'Exemples de connexion sous différents profils' is displayed. Two tables provide user profiles for 'Un stagiaire' and 'Un tuteur'. The 'Un stagiaire' table lists five 'Guest' users. The 'Un tuteur' table lists two 'Tuteur' users. To the right, a login form titled 'Accès à l'exemple' includes fields for 'Identifiant' and 'Mot de passe', a 'Rappel login/password' link, and a 'Les visiteurs 2.0' link. At the bottom right, there is a link for 'Un Administrateur'.

Un stagiaire	
Pour accéder dans la plate-forme en tant que stagiaire, voici quelques exemples de comptes déjà disponibles en démonstration :	
Groupe A	
Identifiant	Mot de passe
Guest1	Guest1
Guest2	Guest2
Guest3	Guest3
Guest4	Guest4
Guest5	Guest5

Un tuteur	
Pour accéder dans la plate-forme en tant que tuteur, voici quelques exemples de comptes déjà disponibles en démonstration :	
Groupe A	
Identifiant	Mot de passe
Tuteur1	Tuteur1
Tuteur2	Tuteur2

Fig. 2

### URL

<http://www.anemalab.org/commun/english.html>

### Origin

This LMS was almost left off this list because the site is entirely in French. Wisely, the creators put a link to the Google site translation tool, allowing the site to be read in bumpy, yet understandable English. It was developed by Anemalab Formation, a company specializing in consulting, training trainers in e-learning and the design of webbased courses. Their effort grew out of a frustration with the complexity and cost of proprietary platforms. Note that this is a private company that develops open source software and gives it away for free. More about this in the concluding section under the sub-head “Approach.”

### Features

This system is full-featured and well-designed. The creators have taken a flexible approach that often yields wonderful results in open source software development. This involves integrating existing components developed by other groups. For example, instead of building a quizzing and testing tool from scratch, they have integrated Hot Potatoes, a popular existing quiz tool.

### Strengths

Ganesha tracks student attendance. This is an important feature that is missing in some of the other systems.

### **Weaknesses**

The fact that most of the documentation is in French will present a challenge for many readers of this report.

An English language version is allegedly under developme

### **Current User Community**

With 4,000 installations and over 1,000 messages posted on the message board, this is one of the more mature open source LMSs. This includes several universities in France. A list is available on the web site.



## C. Ilias

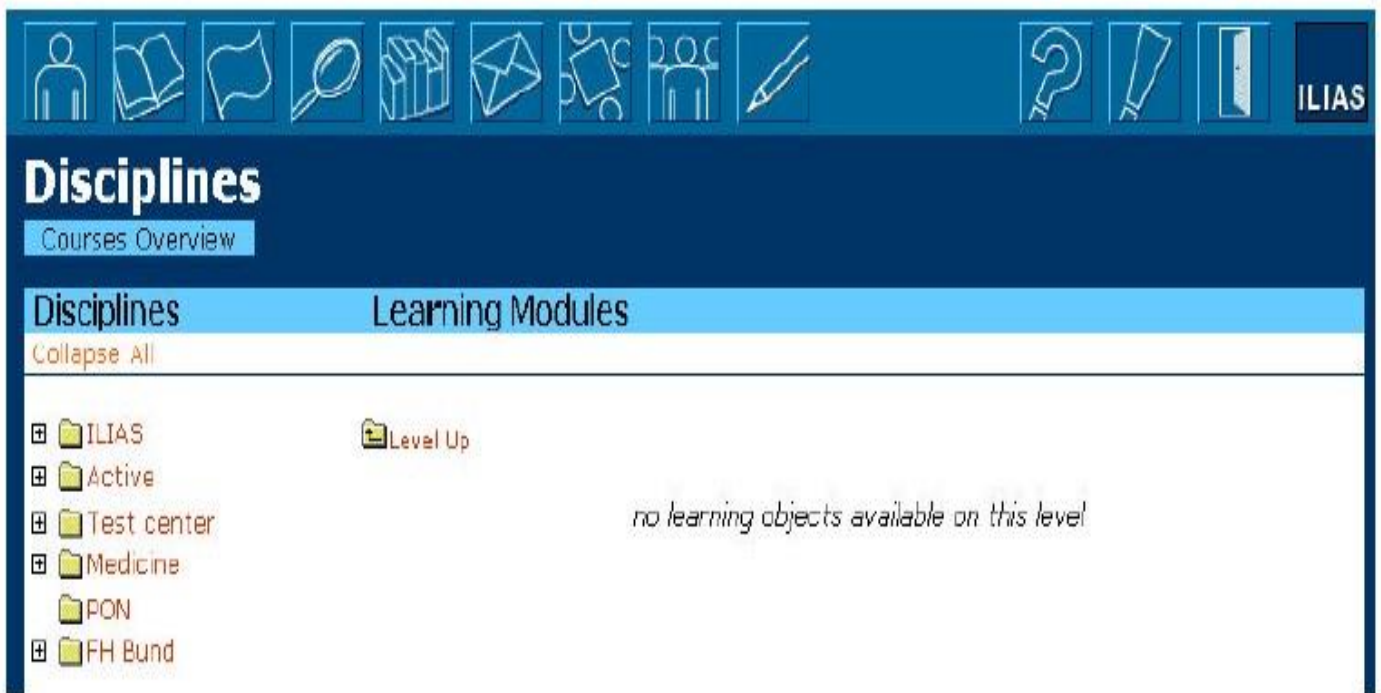


fig. 3

### URL

<http://www.ilias.uni-koeln.de/ios/index-e.html>

### Origin

Ilias open source is a joint project of the University of Cologne, the Faculty of Economics, Business Administration and Social Sciences at the University of Cologne, the Sal. Oppenheim Foundation and the Department of Education, Science and Research of the State of Northrhine-Westphalia, Germany. Its purpose is to supplement classroom training by creating areas for what are called self-regulated learning and collaborative learning.

### Features

- Personal desktop for each user with information about last visited courses, new mails or posts
- Learning environment with personal annotations, test, glossary, print function, search engine, offline-version
- Course management system
- Communication features such as news system, discussion forums and chat
- Group system for collaborative work and organizing members and resources
- Integrated authoring environment (Editor) to create courses without HTML
- Support of metadata for all levels of learning objects
- Context-sensitive help system for learners and authors

- User and system administration interface
- System languages: English, German, French, Spanish, Norwegian, Swedish, Danish, Polish

## **Strengths**

Ilias has several strong features that one might find in a mature LMS: User self-service pre-registration, multiple active content formats including (flash, various movie formats, VRML and an image mapping tool), XML meta tag tools for all contents types, excellent online help documentation, discussion boards, group management and group communication tools. Unlike Claroline, tests in Ilias are tied to the individual user. Tests can be skills checks by module, exercises or formal end-of class tests. It has very powerful content creation tools with a nicely structured modular system for assembling courseware.

## **Weaknesses**

There is no module for competency assessment. The system is set up with no clear links to reports in the administrative view. This does not mean that reports cannot be pulled from the database. In a corporate setting, that is something that should be created as a separate module. Flexibility in setting up user roles may be a limitation with currently defined users limited to administrator, author, learner and guest.

## **Current User Community**

Ilias's user base is mostly made up of universities in Germany. A list of them is provided on their web site. Judging from the discussion boards, there is a lot of interest in future improvements to the application – not just in Germany as the English language board is active as well.

# D. Moodle

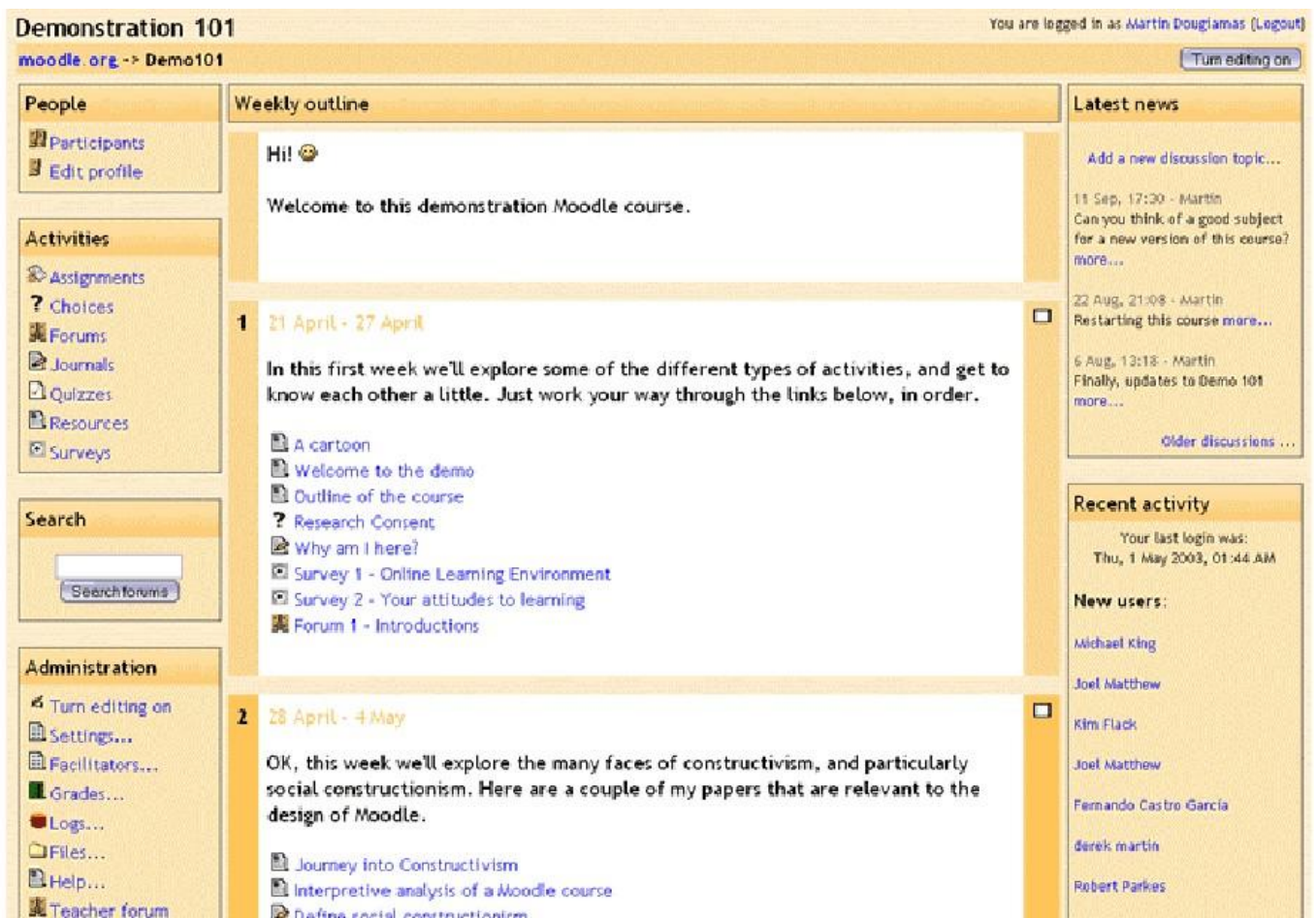


Fig. 4

## Url

<http://www.moodle.com>

## Origin

Moodle is in many ways a one-man campaign by Martin Dougiamas. As this Australian native puts it himself: "Moodle is my perpetual work in progress." Having been a systems administrator on a WebCT installation, combined with advanced degrees in education and computer science, Mr. Dougiamas clearly has deep knowledge of what a mature LMS looks like. He, himself, admits that Moodle falls short in some areas compared to the big proprietary systems, especially in the area of scalability.

## Features

- Suitable for 100% online classes as well as supplementing face-to-face learning
- Emphasis on strong security throughout. Forms are all checked, data validated, cookies encrypted etc
- Every user can specify their own time zone, and every date in Moodle is translated to that time zone

- Multi-language interface
- Choice of course formats such as by week or by topic
- Flexible array of course activities - Forums, Journals, Quizzes, Resources, Choices, Surveys, Assignments-
- Full user logging and tracking - activity reports for each student are available with graphs and details about each module (last access, number of times read) as well as a detailed "story" of each students involvement
- Mail integration - copies of forum posts and teacher feedback can be mailed - Assignment Module with due date and grade requirements
- Students can upload their assignments (any file format) to the server - they are date-stamped. Late assignments are allowed, but the amount of lateness is shown clearly to the teacher
- For each particular assignment, the whole class can be assessed (grade and comment) on one page in one form
- Advanced Quiz Module with multiple answer formats and report options
- Built-in surveys (COLLES, ATTLS) have been proven as instruments for analyzing online classes.

### **Strengths**

Features is the main strength. The features listed above are only a sample. For full list of features, please go to the Moodle website. Language support is another strength. Currently, it is translated to 27 languages with more in development. Conceptually, Moodle is also very mature. Further, Moodle is the only open source LMS to truly address the issue of human resource information systems (HRIS) integration. The newest release has a GUI tool to hook into various external database formats.

### **Weaknesses**

Calendar features are absent, although there are plans underway to integrate a calendar feature. XML tagging and multimedia content support is not as strong as in other systems.

### **Current User Community**

Moodle has been installed at universities and institutions all over the world. There are also some commercial users of Moodle. At a minimum, there are 500 organizations that are depending on it for learning management, meaning organizations that have installed Moodle and are actively participating in making improvements to it. Though it is difficult to know the exact number of users, it is likely much higher than 500 considering the application is downloaded at a rate of 50 to 100 times per day.

## E. The Manhattan Virtual Classroom

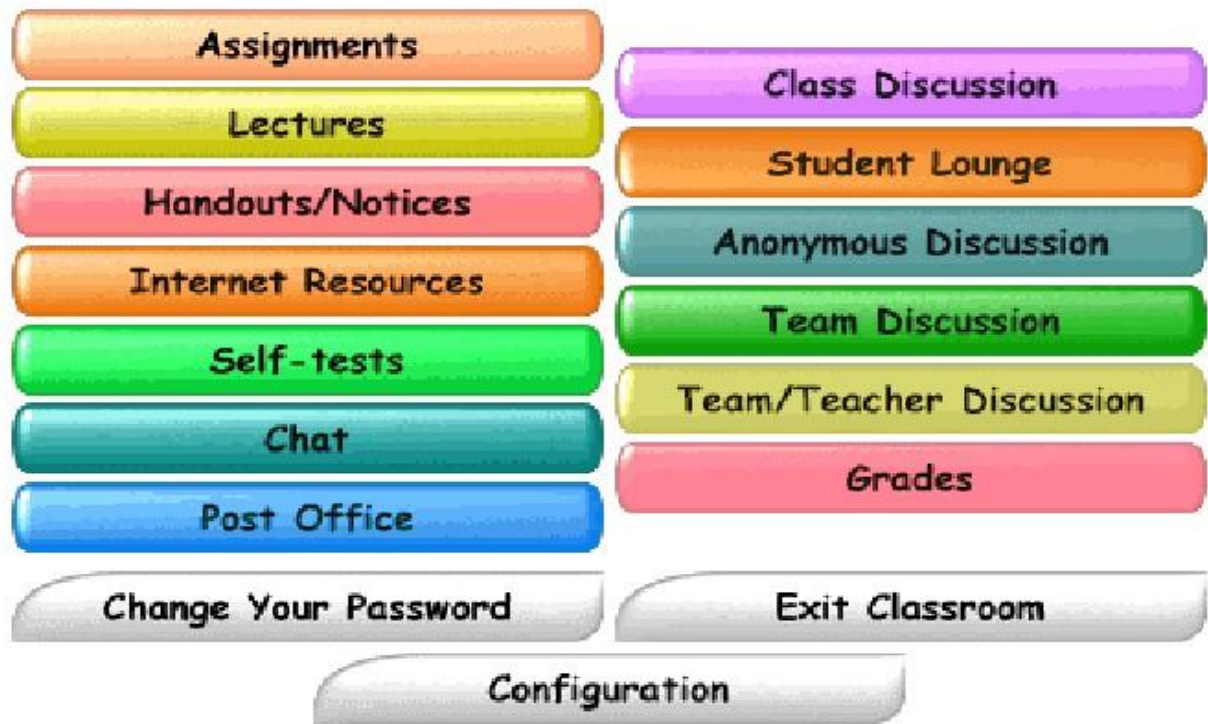


Fig. 5

### URL

<http://manhattan.sourceforge.net/>

### Origin

Manhattan was developed by Steven Narmontas and was first used at Western New England College in Springfield, Massachusetts in 1997. In October of 2000, the software was released in its entirety on the Internet for free. It is written in the 'C' programming language and only works on a Unix platform.

### Features

- E-mail system designed specifically for 'virtual classroom' use
- Virtual syllabi, lectures notes and other handouts available to your students
- Quizzes for student self-assessment only
- Electronic discussion groups
- Live chat sessions for your class
- Post assignments, receive work from students, and provide feedback
- Provide a private list of World Wide Web links for your class
- Easily distribute grades to your students, while protecting their privacy

- Add interest to your classroom with multimedia
- Decide which modules to use and when

### **Strengths**

Comparatively speaking, there are not that many strengths. The ability to grade students and submit those grades to individual student is not an attractive feature in the corporate setting.

### **Weaknesses**

Using Manhattan is not completely intuitive, as evidenced by the 100-page teacher manual.

### **Current User Community**

Some small colleges use this system, though the user community is much smaller compared to the other systems in this report.

## **5. Supplement Technologies**

Having an operating system is a start, but to have an LMS, we need more. Considering that the history of Linux is synonymous with the history of the Internet, it should come as no surprise that all of the learning management systems in this report are web based. The beauty of web-based systems is that they are so accessible across distance and across computing platforms. This is easy to see from the user's perspective. Behind the scenes, on the server side, things are more complicated. It helps to understand the concept of multi-tiered computing. Most web-based applications have at least three tiers: The browser, the server and a database. The browser/user sends a request to the server. The server takes the request and fetches data from the database, formats it in some way, and sends the data back to the browser. In addition, an applications layer, or a middleware, is needed. This is key as this middle layer is where the actual business rules reside. In the Microsoft world this would be some thing like Active Server Pages. Cold Fusion is another popular middleware. There are many proprietary learning management systems available that use ASP or CFM pages. If you decide to buy one of those systems, you are paying for the expensive server software, the database and the application software that make up the LMS. That is where the story started. Now, let's take a look the equivalent technologies that are available for free.

## A. Apache

The **Apache HTTP Server** is the world's most widely used web server software. Originally based on the NCSA HTTPd server, development of Apache began in early 1995 after work on the NCSA code stalled. Apache played a key role in the initial growth of the World Wide Web quickly overtaking NCSA HTTPd as the dominant HTTP server, and has remained the most popular HTTP server since April 1996. In 2009, it became the first web server software to serve more than 100 million websites.

Apache is developed and maintained by an open community of developers under the auspices of the Apache Software Foundation. Most commonly used on a Unix-like system (usually Linux), the software is available for a wide variety of operating systems including Windows, Linux, Unix Including Windows, Linux, Unix, FreeBSD, Solaris, NetWare, OS/2, TPF, OpenVMS and eComStation. Released under the Apache License, Apache is free and open-source software. It handles the IP numbers where websites reside and the scripts that service those websites use, and so on. According to Netcrafts Web Server Survey of October 2002, Apache holds over 60 percent of the server market CUE White Paper Open Source Learning Management Systems worldwide. Compare that to Microsoft's 25 percent. Interestingly, Microsoft uses several Apache servers itself as part of its web services. Apache evolved much in the same way that Linux did. The name itself explains it. Several developers were working on different pieces of the project until one day one of them said: "Boy, this is a patchy software." Apache. How does one get Apache? Download it for free. Nice!

### Features

Apache supports a variety of features, many implemented as compiled modules which extend the core functionality. These can range from server-side programming language support to authentication schemes. Some common language interfaces support Perl, Python, Tcl, and PHP. Popular authentication modules include mod\_access, mod\_auth, mod\_digest, and mod\_auth\_digest, the successor to mod\_digest. A sample of other features include Secure Sockets Layer and Transport Layer Security support (mod\_ssl), a proxy module (mod\_proxy), a URL rewriter (mod\_rewrite), custom log files (mod\_log\_config), and filtering support (mod\_include and mod\_ext\_filter).

Popular compression methods on Apache include the external extension module, mod\_gzip, implemented to help with reduction of the size (weight) of Web pages served over HTTP. ModSecurity is an open source intrusion detection and prevention engine for Web applications. Apache logs can be analyzed through a Web browser using free scripts, such as AWStats/W3Perl or Visitors.

Virtual hosting allows one Apache installation to serve many different Web sites. For example, one machine with one Apache installation could simultaneously serve www.example.com, www.example.org, test47.test-server.example.edu, etc.



Apache features configurable error messages, DBMS-based authentication databases, and content negotiation. It is also supported by several graphical user interfaces (GUIs).

It supports password authentication and digital certificate authentication. Because the source code is freely available, anyone can adapt the server for specific needs, and there is a large public library of Apache add-ons.

## Performance

Instead of implementing a single architecture, Apache provides a variety of MultiProcessing Modules (MPMs), which allow Apache to run in a process-based, hybrid (process and thread) or event-hybrid mode, to better match the demands of each particular infrastructure. This implies that the choice of correct MPM and the correct configuration is important. Where compromises in performance need to be made, the design of Apache is to reduce latency and increase throughput, relative to simply handling more requests, thus ensuring consistent and reliable processing of requests within reasonable time-frames.

For delivery of static pages, Apache 2.2 series was considered significantly slower than nginx. To address this issue, the Apache version considered by the Apache Foundation as providing high-performance is the multi-threaded version, which mixes the use of several processes and several threads per process. This architecture, and the way it was implemented in the Apache 2.4 series, provides for performance equivalent or slightly better than event-based web servers, as is claimed by the president of the Apache Foundation, Jim Jagielski. However, some independent benchmarks show that it still is half as fast as nginx.

## Development

The Apache HTTP Server Project is a collaborative software development effort aimed at creating a robust, commercial-grade, feature-rich and freely available source code implementation of an HTTP (Web) server. The project is jointly managed by a group of volunteers located around the world, using the Internet and the Web to communicate, plan, and develop the server and its related documentation. This project is part of the Apache Software Foundation. In addition, hundreds of users have contributed ideas, code, and documentation to the project.

## B. PHP

**PHP** is a server-side scripting language designed for web development but also used as a general-purpose programming language. As of January 2013, PHP was installed on more than 240 million websites (39% of those sampled) and 2.1 million web servers. Originally created by Rasmus Lerdorf in 1994, the reference implementation of PHP (powered by the Zend Engine) is now produced by The PHP Group. While PHP originally stood for Personal Home Page,<sup>1</sup> it now stands for PHP: Hypertext Preprocessor, which is a recursive backronym.

PHP code can be simply mixed with HTML code, or it can be used in combination with various templating engines and web frameworks. PHP code is usually processed by a PHP interpreter, which is usually implemented as a web server's native module or a Common Gateway Interface (CGI) executable. After the PHP code is interpreted and executed, the web server sends resulting output to its client, usually in form of a part of the generated web page; for example, PHP code can generate a web page's HTML code, an image, or some other data. PHP has also evolved to include a command-line interface (CLI) capability and can be used instandalone graphical applications.

The canonical PHP interpreter, powered by the Zend Engine, is free software released under the PHP License. PHP has been widely ported and can be deployed on most web servers on almost every operating system and platform, free of charge

PHP is the middleware of choice for the Apache server. It is an open source language of tags that the Apache server reads to perform functions. This usually involves fetching data from a database, but it could be many, many other things such as executing forms, performing calculations or writing data to a database.

PHP stands for Hypertext PreProcessor. It is hard to say exactly how popular PHP is. Easily, there are millions of websites that use PHP for functionality. All of the learning management systems that we shall look at in more detail below use PHP for their application logic. PHP is free, of course, and is usually provided as a free service by web hosting companies.

### Implementations

The original, only complete and most widely used PHP implementation is powered by the Zend Engine and known simply as PHP. To disambiguate it from other implementations, it is sometimes unofficially referred to as "Zend PHP". The Zend Engine compiles PHP source code on-the-fly into an internal format that it can execute, thus it works as an interpreter. It is also the "reference implementation" of PHP, as PHP has no formal specification, and so the semantics of Zend PHP define the semantics of PHP itself. Due to the complex and nuanced semantics of PHP, defined by how Zend works, it is difficult for competing implementations to offer complete compatibility.

PHP's single-request-per-script-execution model, and the fact the Zend Engine is an interpreter, lead to inefficiency. As a result, various products have been developed to help improve PHP performance. In order to speed up execution time and not have to compile the PHP source code every time the web page is accessed, PHP scripts can also be deployed in the PHP engine's internal format by using an opcode cache, which works by caching the compiled form of a PHP script (opcodes) in shared memory to avoid the overhead of parsing and compiling the code every time the script runs. An opcode cache, Zend OpCache, is built into PHP since version 5.5. Another example of a widely used opcode cache is the Alternative PHP Cache (APC), which is available as a PECL extension.

While Zend PHP is still the most popular implementation, several other implementations have been developed. Some of these are compilers or support JIT compilation, and hence offer performance benefits over Zend PHP at the expense of lacking full PHP compatibility. Alternative implementations include the following:

- HipHop Virtual Machine (HHVM) – developed at Facebook and available as open source, it converts PHP code into a high-level bytecode (commonly known as an intermediate language), which is then translated into x86-64 machine code dynamically at runtime by a just-in-time (JIT) compiler, resulting in up to 6× performance improvements.
- Parrot – a virtual machine designed to run dynamic languages efficiently; Pipp transforms the PHP source code into the Parrot intermediate representation, which is then translated into the Parrot's bytecode and executed by the virtual machine.
- Phalanger – compiles PHP into Common Intermediate Language (CIL) bytecode
- HipHop – developed at Facebook and available as open source, it transforms the PHP scripts into C++ code and then compiles the resulting code, reducing the server load up to 50%. In early 2013, Facebook deprecated it in favor of HHVM due to multiple reasons, including deployment difficulties and lack of support for the whole PHP language, including the `create_function()` and `eval()` constructs.

## USES

PHP is a general-purpose scripting language that is especially suited to server-side web development, in which case PHP generally runs on a web server. Any PHP code in a requested file is executed by the PHP runtime, usually to create dynamic web page content or dynamic images used on websites or elsewhere. It can also be used for command-line scripting and client-side graphical user interface (GUI) applications. PHP can be deployed on most web servers, many operating systems and platforms, and can be used with many relational database management systems (RDBMS). Most web hosting providers support PHP for use by their clients. It is available free of charge, and the PHP Group provides the complete source code for users to build, customize and extend for their own use.

PHP acts primarily as a filter, taking input from a file or stream containing text and/or PHP instructions and outputting another stream of data. Most commonly the output will be HTML, although it could be JSON, XML or binary data such as image or audio formats. Since PHP 4, the PHP parser compiles input to produce byte code for processing by the Zend Engine, giving improved performance over its interpreter predecessor.

Originally designed to create dynamic web pages, PHP now focuses mainly on server-side scripting, and it is similar to other server-side scripting languages that provide dynamic content from a web server to a client, such as Microsoft's ASP.NET, Sun Microsystems' JavaServer Pages, and mod\_perl. PHP has also attracted the development of many software frameworks that provide building blocks and a design structure.

The LAMP architecture has become popular in the web industry as a way of deploying web applications. PHP is commonly used as the P in this bundle alongside Linux, Apache and MySQL, although the P may also refer to Python, Perl, or some mix of the three. Similar packages, WAMP and MAMP, are also available for Windows and OS X, with the first letter standing for the respective operating system. Although both PHP and Apache are provided as part of the Mac OS X base install, users of these packages seek a simpler installation mechanism that can be more easily kept up to date.

For specific and more advanced usage scenarios, PHP offers a well defined and documented way for writing custom extensions in C or C++. Besides extending the language itself in form of additional libraries, extensions are providing a way for improving execution speed where it is critical and there is room for improvements by using a true compiled language. PHP also offers well defined ways for embedding itself into other software projects. That way PHP can be easily used as an internal scripting language for another project, also providing tight interfacing with the project's specific internal data structures.

PHP received mixed reviews due to lacking support for multithreading at the core language level, though using threads is made possible by the "pthreads" PECL extension.

## C. MySQL

This is the last, but not the least, piece of the technology puzzle. This is the database. By any measure, MySQL is a robust and popular database. It should be said that it does not have the industrial strength of Oracle, for example. However, in the web applications food chain, the LMS is not the most complex and difficult application to build. Perhaps that is why there are so many LMSs. It is certainly not as complex as supply-chain management or online stock trading, for example.

Developers tend to like the combination of Linux, Apache, MySQL and PHP (LAMP for short) for these reasons: It is free, it is easy to develop in and, most importantly, it just plain works. This becomes obvious when one takes a look at the available applications that use this potent combination. Take a look at this list:

- Content management systems
- Secure, database-driven shopping carts
- Web auction systems
- Online photo albums
- Project management suits
- Intricate personal planners with calendars and contact database
- Chat and message boards
- And so on...
- All free

### Interfaces

MySQL is a relational database management system (RDBMS), and ships with no GUI tools to administer MySQL databases or manage data contained within the databases. Users may use the included command line tools, or use MySQL "front-ends", desktop software and web applications that create and manage MySQL databases, build database structures, back up data, inspect status, and work with data records. The official set of MySQL front-end tools, MySQL Workbench is actively developed by Oracle, and is freely available for use.

### Command line

MySQL ships with many command line tools, from which the main interface is 'mysql' client.<sup>[21][22]</sup> Third parties have also developed tools to manage MySQL servers.

- MySQL Utilities – a set of utilities designed to perform common maintenance and administrative tasks. Originally included as part of the MySQL Workbench, the utilities are now a stand-alone download available from Oracle.

- Percona Toolkit – a cross-platform toolkit for MySQL, developed in Perl.<sup>[31]</sup> Percona Toolkit can be used to prove replication is working correctly, fix corrupted data, automate repetitive tasks, and speed up servers. Percona Toolkit is included with several Linux distributions such as CentOS and Debian, and packages are available for Fedora and Ubuntu as well. Percona Toolkit was originally developed as Maatkit, but as of late 2011, Maatkit is no longer developed.

## Programming

MySQL is written in C and C++. Its SQL parser is written in yacc, but it uses a home-brewed lexical analyzer.<sup>[33]</sup> Many programming languages with language-specific APIs include libraries for accessing MySQL databases. These include MySQL Connector/Net for integration with Microsoft's Visual Studio (languages such as C# and VB are most commonly used) and the JDBC driver for Java. In addition, an ODBC interface called MyODBC allows additional programming languages that support the ODBC interface to communicate with a MySQL database, such as ASP or ColdFusion. The HTSQL – URL-based query method also ships with a MySQL adapter, allowing direct interaction between a MySQL database and any web client via structured URLs.

## Limitations

Like other SQL databases, MySQL does not currently comply with the full SQL standard for some of the implemented functionality, including foreign key references when using some storage engines other than the default of InnoDB, and check constraints.

Up until MySQL 5.7, triggers are limited to one per action / timing, meaning that at most one trigger can be defined to be executed after an INSERT operation, and one before INSERT on the same table. No triggers can be defined on views.

MySQL, like most other transactional relational databases, is strongly limited by hard disk performance. This is especially true in terms of write latency. Given the recent appearance as of 2012 of very affordable consumer grade SATA interface solid-state drives that offer zero mechanical latency, a fivefold speedup over even an eight drive RAID array can be had for a smaller investment

## High availability

Ensuring high availability requires a certain amount of redundancy in the system. For database systems, the redundancy traditionally takes the form of having a primary server acting as a master, and using replication to keep secondaries available to take over in case the primary fails. This means that the "server" that the application connects to is in reality a collection of servers, not a single server. In a similar manner, if the application is using a sharded database, it is in reality working with a collection of servers, not a single server. In this case, a collection of servers is usually referred to as a farm.

One of the projects aiming to provide high availability for MySQL is MySQL Fabric, an integrated system for managing a collection of MySQL servers, and a framework on top of which high availability and database sharding is built. MySQL Fabric is open-source and is intended to be extensible, easy to use, and to support procedure execution even in the presence of failure, providing an execution model usually called resilient execution. MySQL client libraries are extended so they are hiding the complexities of handling failover in the event of a server failure, as well as correctly dispatching transactions to the shards. As of September 2013, there is currently support for Fabric-aware versions of Connector/J, Connector/PHP, Connector/Python, as well as some rudimentary support for Hibernate and Doctrine. As of May 2014, MySQL Fabric is in the general availability stage of development.

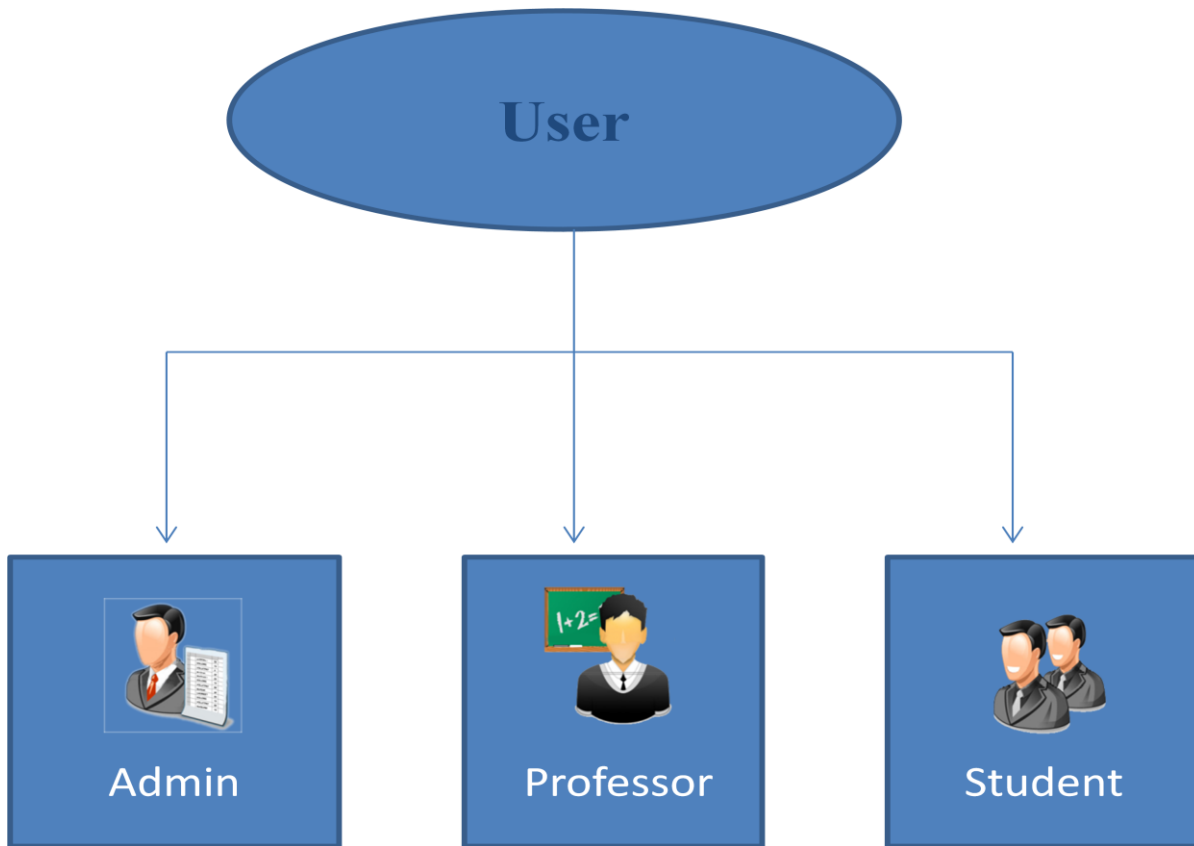
## Deployment

MySQL can be built and installed manually from source code, but this can be tedious so it is more commonly installed from a binary package unless special customizations are required. On most Linux distributions the package management system can download and install MySQL with minimal effort, though further configuration is often required to adjust security and optimization settings.

Though MySQL began as a low-end alternative to more powerful proprietary databases, it has gradually evolved to support higher-scale needs as well. It is still most commonly used in small to medium scale single-server deployments, either as a component in a LAMP-based web application or as a standalone database server. Much of MySQL's appeal originates in its relative simplicity and ease of use, which is enabled by an ecosystem of open source tools such as phpMyAdmin. In the medium range, MySQL can be scaled by deploying it on more powerful hardware, such as a multi-processor server with gigabytes of memory.

## 6. How the KNOWLEDGE MANAGEMENT SYSTEM will work?

### A. User role and interface:



**Fig. 6**

#### 1) Admin:

a person responsible for general system ,teacher Administration and course settings.

#### 2) Professor:

a person responsible for creating and administering Topics and Lectures for Courses, managing the whole learning process.

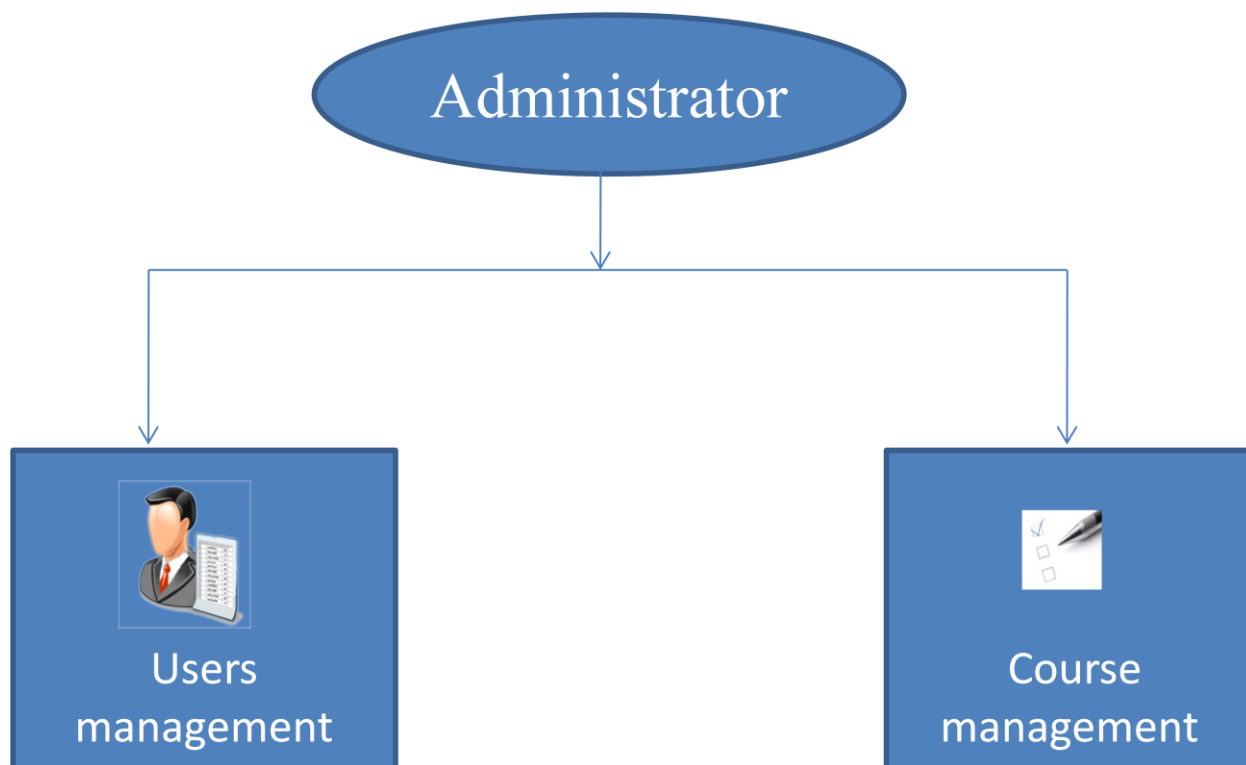
#### 3) Student:

a learner enrolled into one or several courses.



## B. Admin Interface:

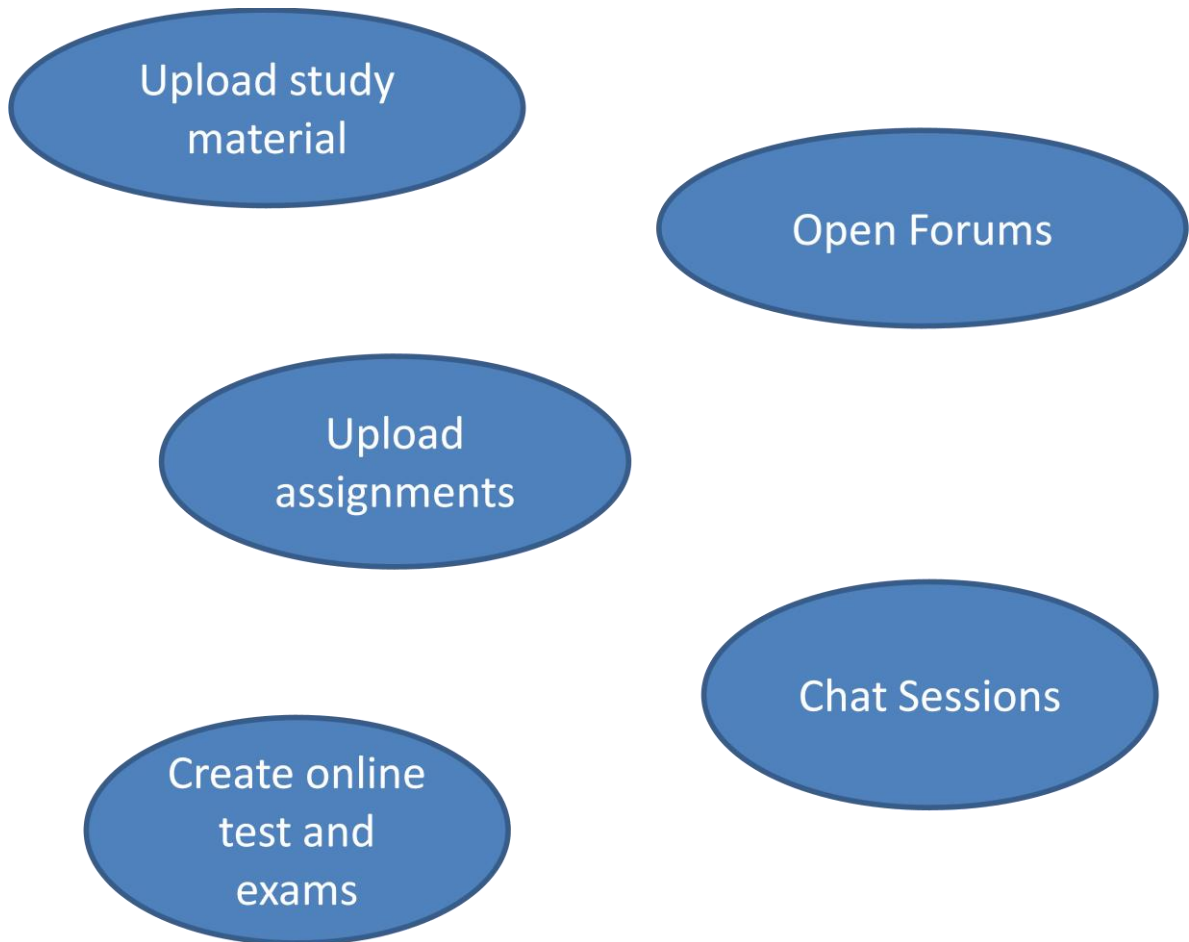
The Administrator of the System can perform operations on :



**Fig. 7**

## C. Teacher Interface:

What the teacher can do in LMS




## D. Student Interface:

What students can do in LMS



Download  
lecture notes



Upload their  
assignments



Chat Sessions



Take Part in  
forums

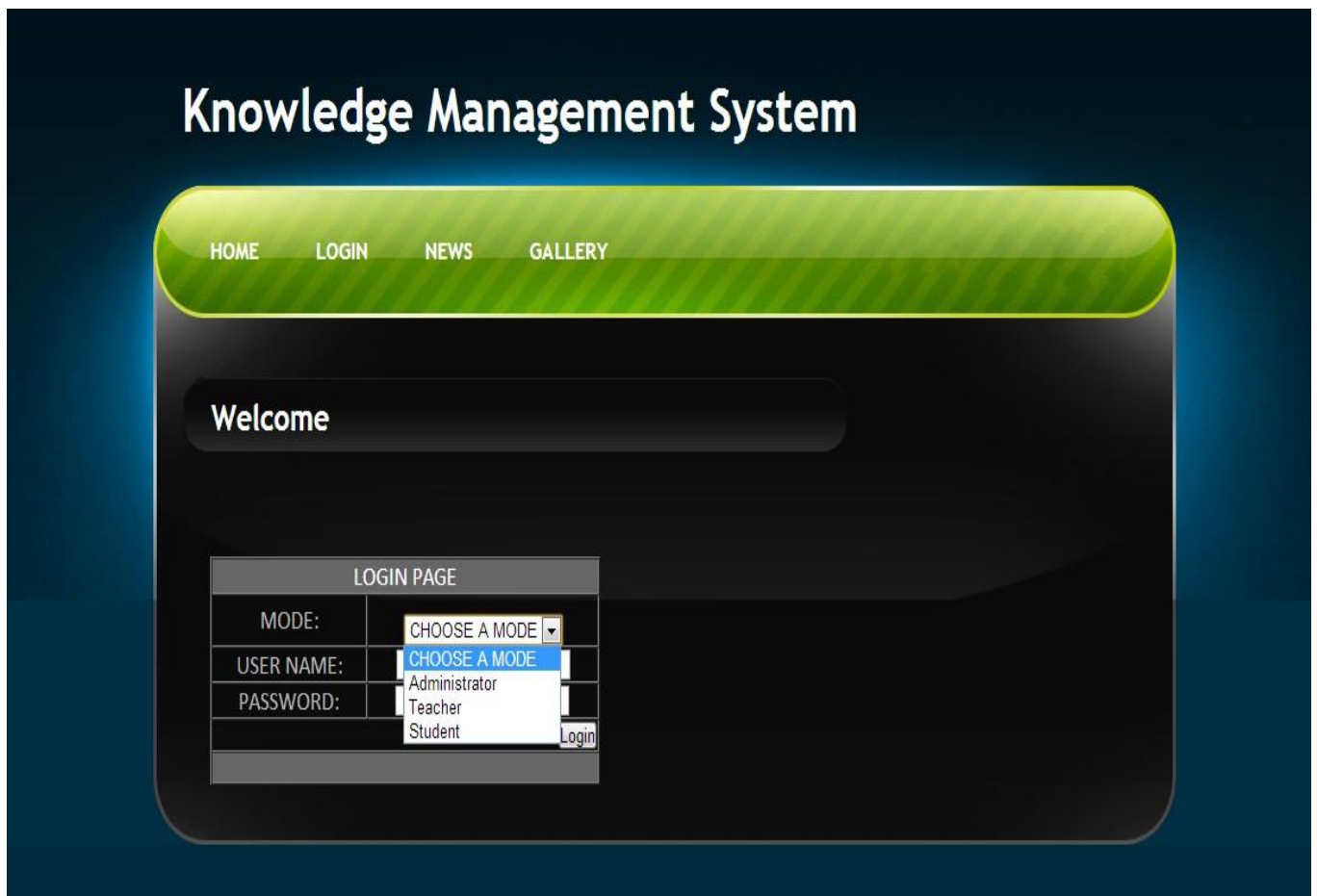
## 7. IMPLEMENTATION:

### Home page:



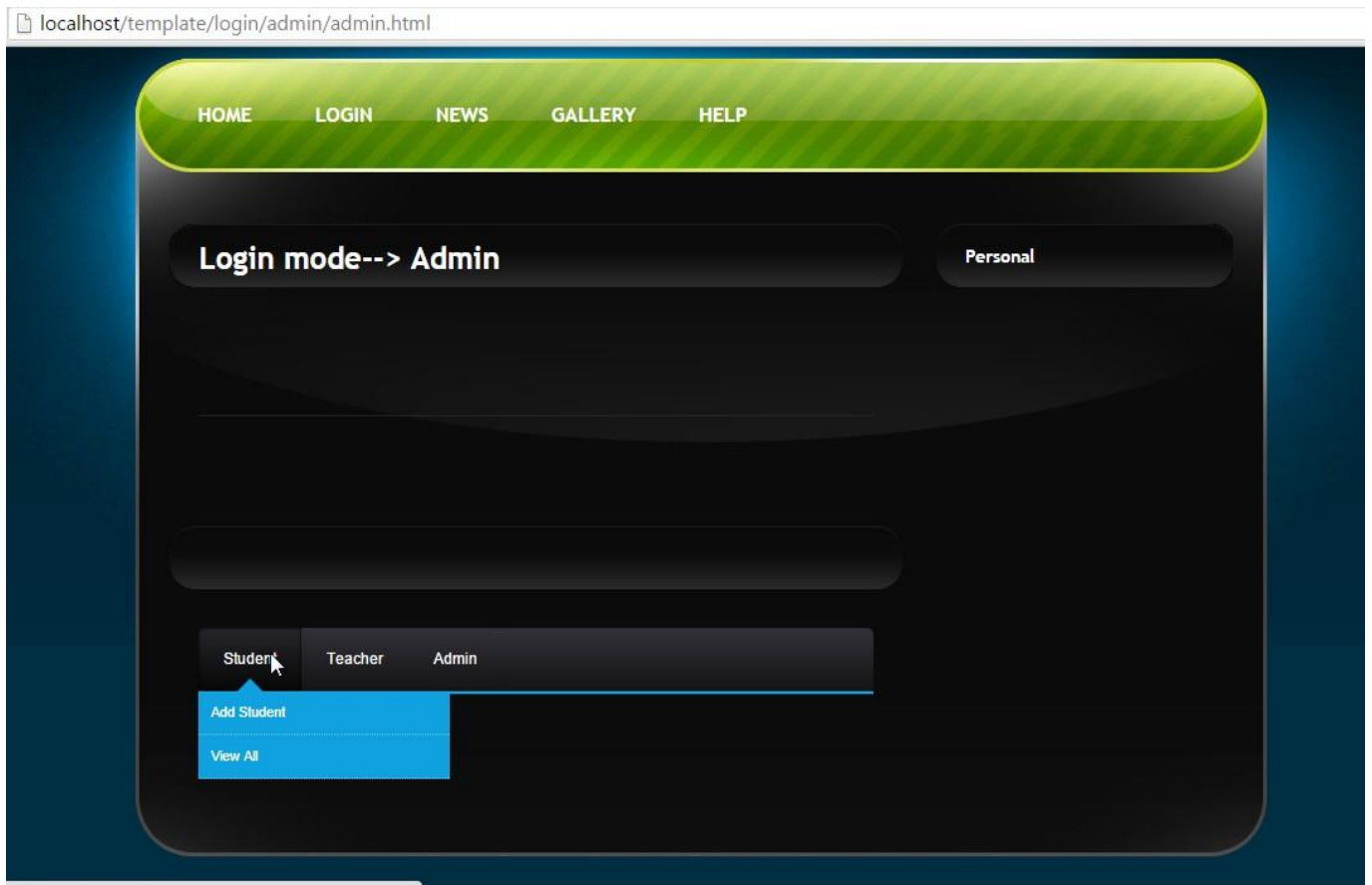
The homepage has been designed with a dark blue background and green colour has been used for the menu bar. The menu bar contains four options i.e. home, login, news, gallery. The main frame has been designed in black colour and a flip feature has been used to flip the picture in the main frame. For the text white colour has been used.

## Login page:



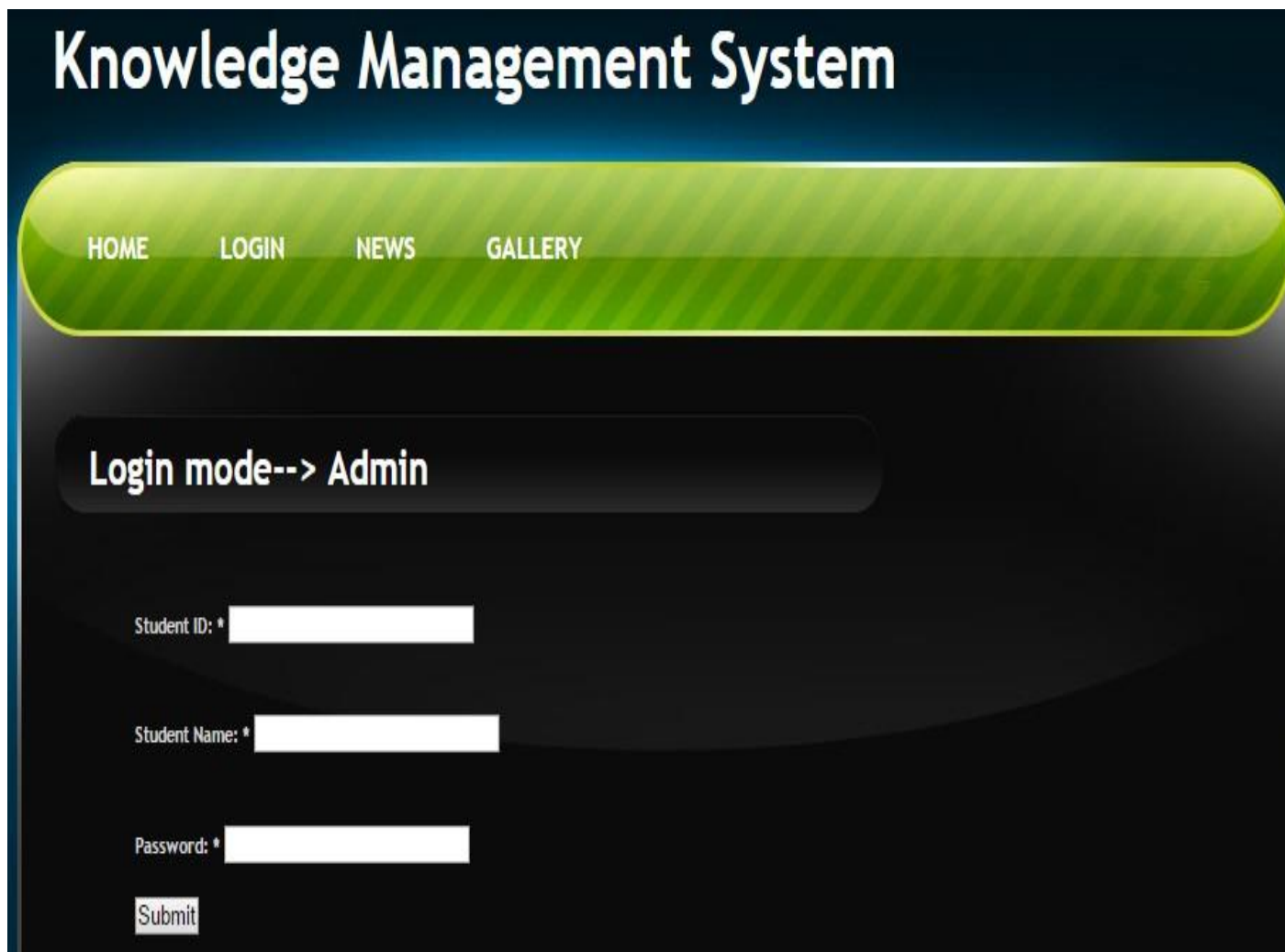
If you are already a user then just login as follows and Choose a mode. As other typical login pages, this login page also contains a textbox for username and password. A dropdown menu has been used for the selecting a mode. The dropdown menu contains three modes – administrator, teacher and student. If the user chooses the mode ‘admin’, then he has to write the username and password in the textbox and click the button ‘login’. Then a new window will appear.

## Admin :



Let us assume that the user logs in as admin. The user will be given the rights to add and view information about the teacher, student and admin. As the user clicks on 'student', there will be an option to add student's details and to view all the students in the database. Likewise if the user clicks on 'teacher', then again there will be an option to add teacher's details in the database and an option to view all the teachers registered in the database. And the same goes for 'admin'.

If the user clicks on “Add Student” then the following window will open:



The screenshot shows a web interface for a Knowledge Management System. At the top, the title "Knowledge Management System" is displayed in large white font. Below the title is a green navigation bar with buttons for "HOME", "LOGIN", "NEWS", and "GALLERY". The main content area is dark grey and features a "Login mode--> Admin" label. Below this, there are three input fields: "Student ID: \*", "Student Name: \*", and "Password: \*", each followed by a white text box. A "Submit" button is located at the bottom left of the form area.

This window contains three textboxes- student id, student name and password and a submit button. Now the admin can fill up all the details of a student and submit the form. Once the form is submitted, the details of the students will be registered in the database.

Once the details are filled and form is submitted the a new window will open :

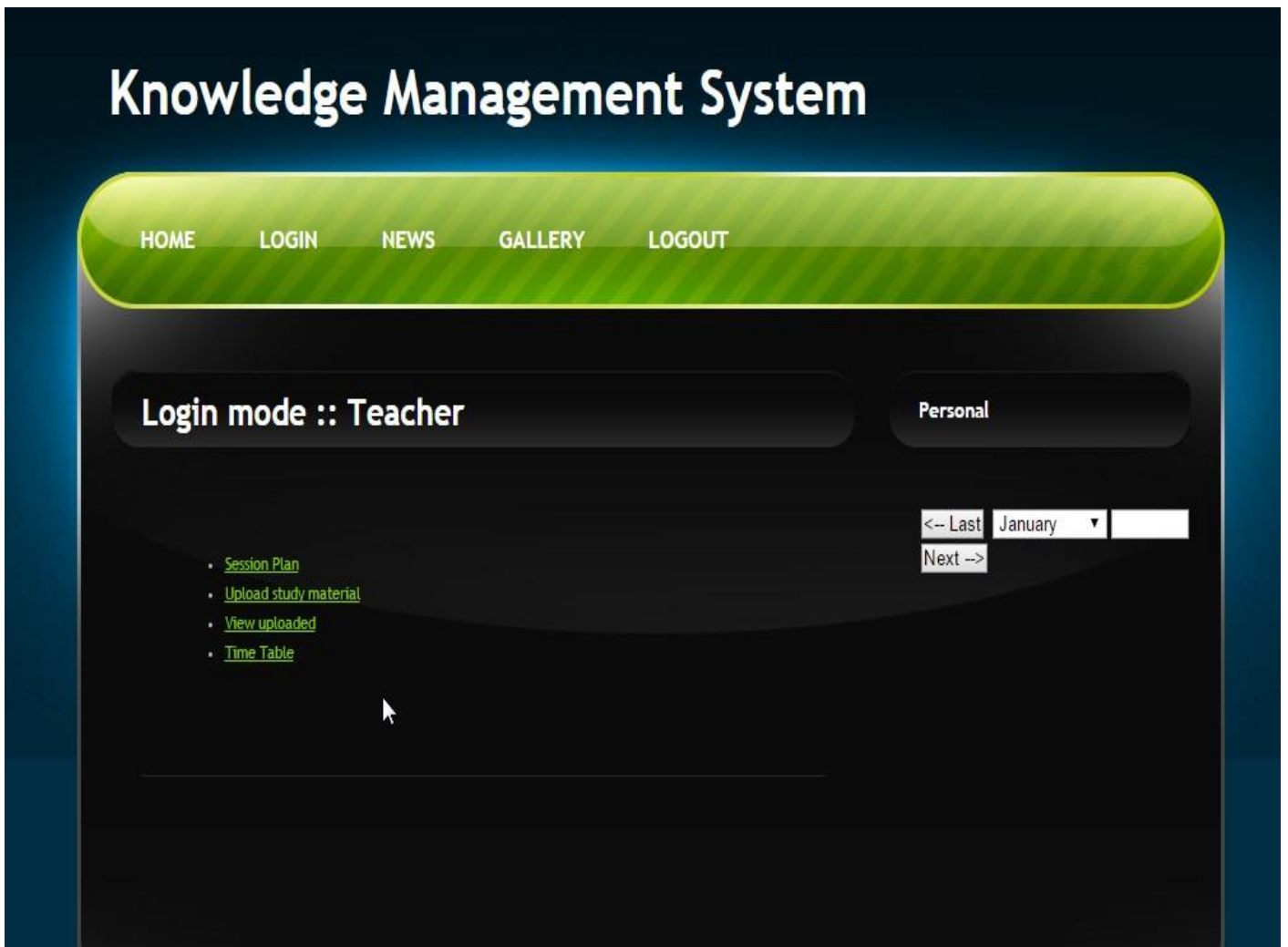


This table contains all the information of a student. The admin can then edit or delete the records or can add a new record also.

**NOTE:** Same will be the case for the teacher and admin.



## Teacher:



If the user is a teacher then the above window will open. The teacher can view his/her session plan. He/she can upload the study material of the required subject. Then the teacher can view the uploaded study material. There is an additional feature 'calendar' also so that the teacher can make an idea of the future works.

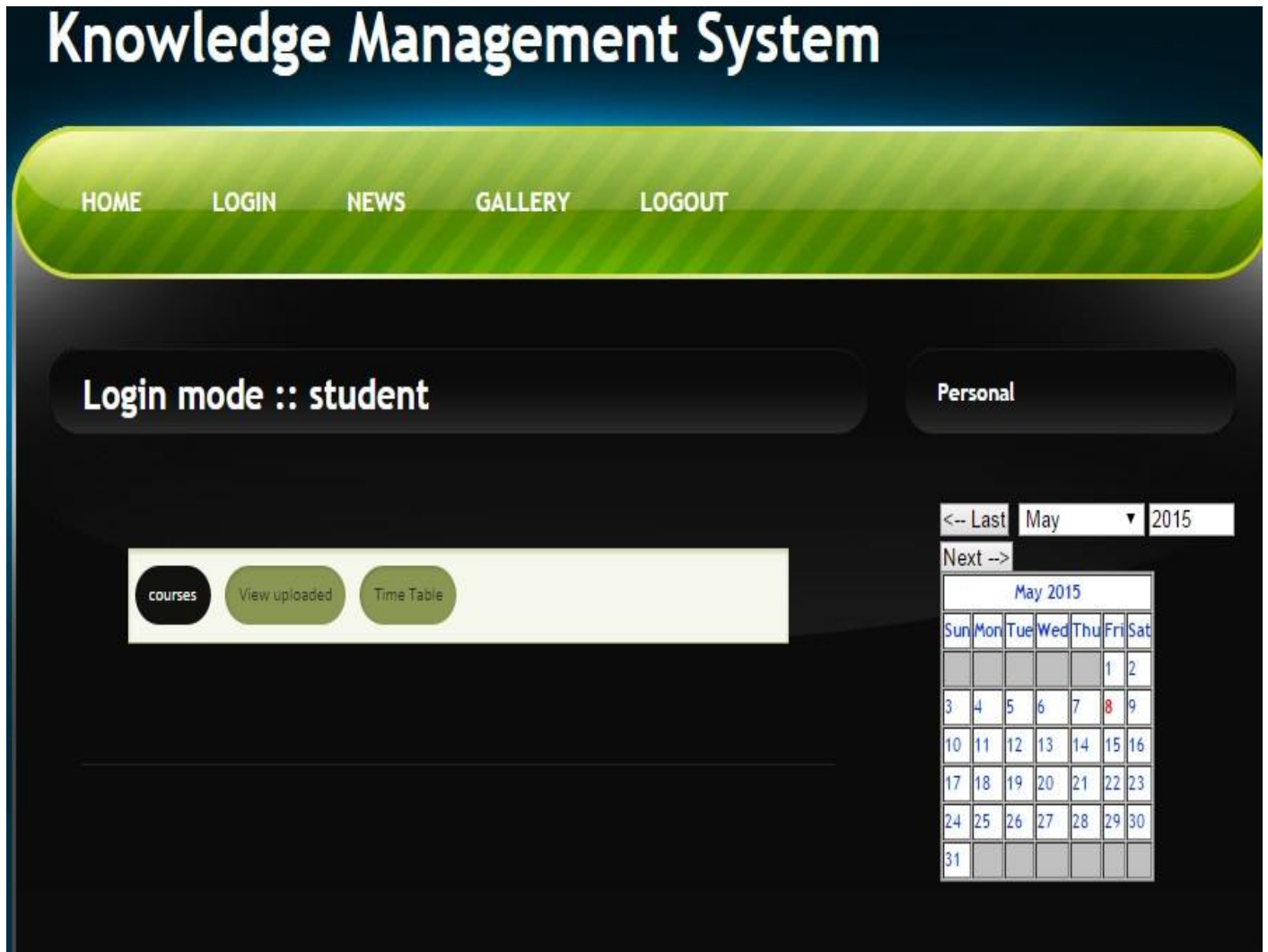
## Uploading feature:



How the upload feature works?

There are two buttons – choose file and upload file. The choose file will browse all the files in the system to be uploaded. Once the file is chosen, the upload file button will upload the file.

If the user is a student then the following window will open:



There are three main buttons – courses, view uploaded and time table. And an additional feature of ‘calendar’ is also there. On clicking the ‘courses’, a list of all the courses will be displayed which is discussed later in detail. On clicking the ‘view uploaded’, the study material which has been uploaded by the teacher can be seen. It is also discussed later in detail.

If the student clicks on 'courses':

The screenshot displays a web interface for a Knowledge Management System. At the top, there is a navigation bar with buttons for HOME, LOGIN, NEWS, GALLERY, and LOGOUT. Below this is a section titled "Select a course" which contains a table of course information.

S.No	Course Code	Subject Name	Type
1. Compulsary	BTC 221	<a href="#">Opreating System</a>	
2. Compulsary	BTC 222	<a href="#">Data Base</a>	
3. Compulsary	BTC 223	<a href="#">C plus plus</a>	
4. Compulsary	BTC 224	<a href="#">Matematics (iii)</a>	
5. Compulsary	BTC 225	<a href="#">Analog Electronics</a>	

If the student clicks on courses then this window will open. All the courses are listed here which are compulsory. The courses are listed with their course code in order to avoid any confusion.

If the student clicks on any of the subjects then the window with the description of the respective subject will open:

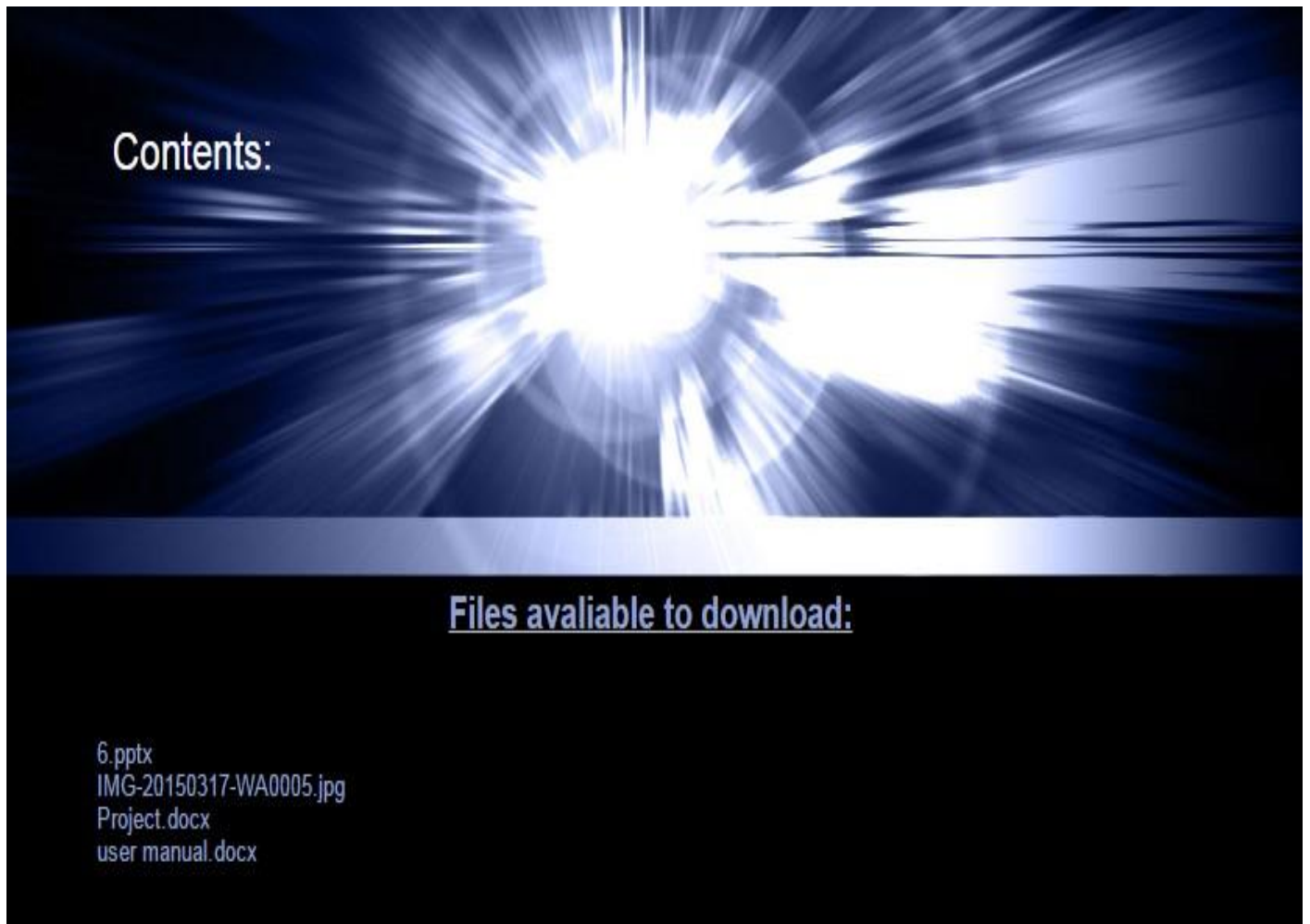
The screenshot shows a web application with a green header bar containing navigation links: HOME, LOGIN, NEWS, Gallery, and help. Below the header, a dark grey rounded rectangle displays the course title: **Course : Database and Management System**. Underneath the title is a table with three columns: S.No, Module, and Description. The table lists 17 modules with their respective descriptions.

S.No	Module	Description
1.	Introduction	Concept and goals of DBMS
2.	Introduction	Database Languages, Database Users, Database Abstraction
3.	Introduction	Basic Concepts of ER Model, Relationship sets
4.	Hierarchical model & Network Mode	Keys, Mapping, Design of ER Model
5.	Hierarchical model & Network Mode	Concepts, Data definition
6.	Hierarchical model & Network Mode	Data manipulation and implementation
7.	Hierarchical model & Network Mode	Network Data Model
8.	Hierarchical model & Network Mode	DBTG Set Constructs and Implementation
9.	Relational Model	Relational database
10.	Relational Model	Relational Algebra
11.	Relational Model	Relational Algebra
12.	Relational Database Design and Query Language	SQL
13.	Relational Database Design and Query Language	Functional Dependency
14.	Relational Database Design and Query Language	Normalization using Functional Dependency
15.	Relational Database Design and Query Language	Multivalued dependency and Join dependency
16.	Relational Database Design and Query Language	Lock Based Protocols; Time Stamped Based Protocols
17.	Relational Database Design and Query Language	Deadlock Handling, Crash Recovery

For example, the student clicked on the subject database and management systems then a new window will open with the detailed description of the course. The description contains all the modules related to the course that have to be completed in the respective semester.

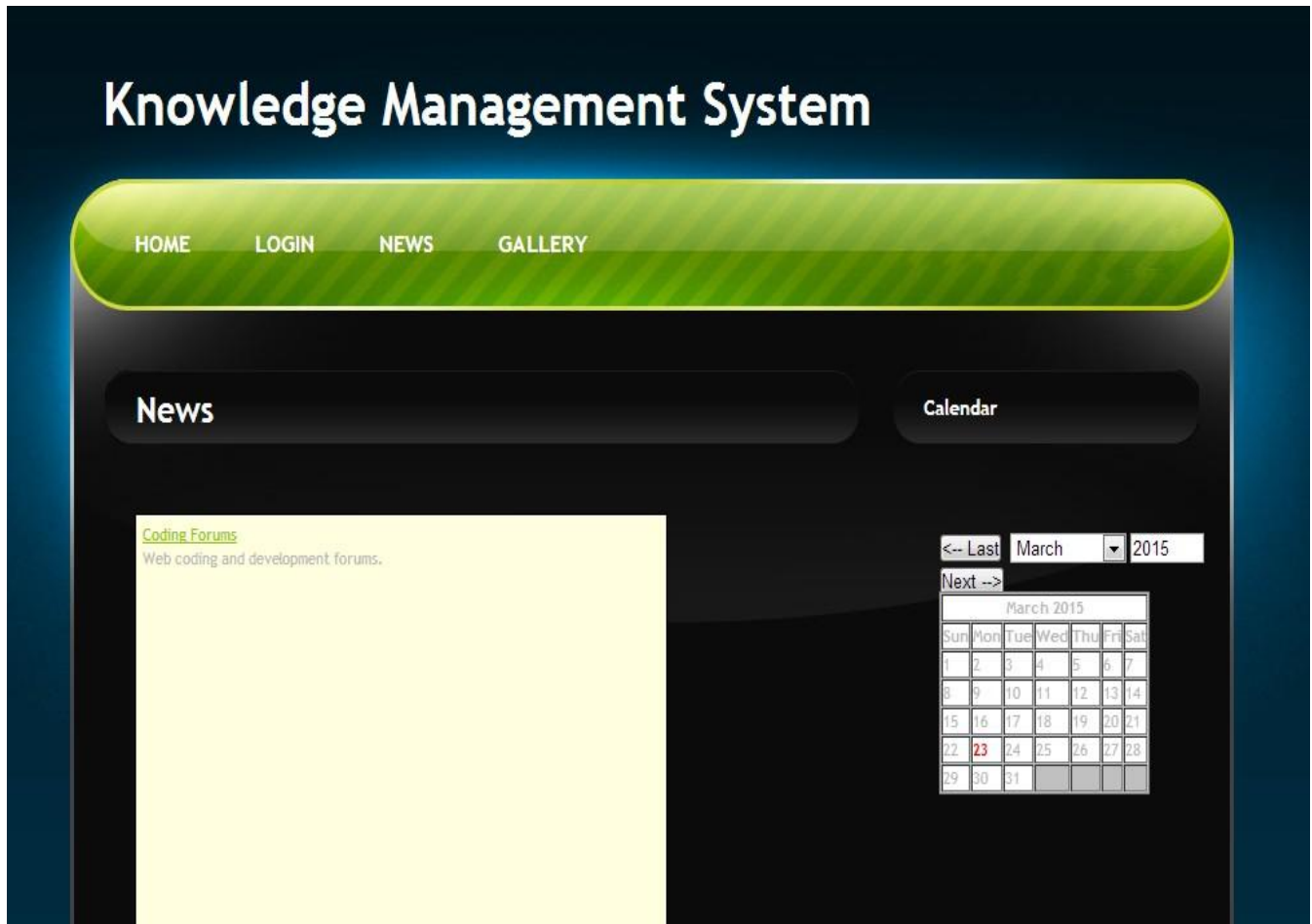
**NOTE:** Same goes for the other subjects as well

If the student clicks on 'view uploaded' :



In this window there will be a link which will enable the students to download the files or study material which has been uploaded by the teacher. The uploaded files can be easily downloaded.

## News:



The feature 'news' has been added just to flash some important dates and news on the homepage. As the notice board is used to put all the important news of an institution likewise in an e-learning system, the feature news has been added.

## Gallery:



As the name itself says, gallery feature has been used to put some of the pictures of the students, colleges etc. the slideshow feature has been used in the making of 'gallery' page.

This is all about the 'knowledge management system'.



## **8. CONCLUSION**

In this modern world where information is disseminated quickly via the internet, the LMS is an essential tool for university students as not they can keep updated with their coursework, but get instant notifications pertaining to their daily assignments. In turn, lecturers have an easier time reaching out to their students out of class hours and can instantly update them over the LMS about issues regarding their coursework. Although those using the LMS might encounter some problems, it's all part and parcel of learning and using a whole new system altogether. Universities should provide proper training and guidance for students and lecturers using the LMS, as well as have a team which is on-call at all times to solve any problems that may arise. Nevertheless, most university students have access to their university's LMS or similar systems that help to enhance their learning process. Many have also expressed positive views about LMS, therefore proving that LMS is a necessary implementation in all universities worldwide.

The purpose of this document is to provide a detailed description of the functionalities of the Learning management system software. This document has covered each of the system's intended features, as well as offered a preliminary glimpse of the software application's User Interface (UI).

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