

KLASIBER: A FLOSS IMPLEMENTATION TO BUILD E-LEARNING SYSTEM OF FACULTY OF INDUSTRIAL TECHNOLOGY, ISLAMIC UNIVERSITY OF INDONESIA; AN ADMINISTRATOR PERSPECTIVE

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ABSTRACT

Open Source (OS) community offers numerous e-learning platforms called: Learning Management Systems (LMS). These applications deliver what teacher and students need in the learning processes. The accessibility of e-learning provides additional challenges that may not be faced when providing access to other Web resources. This paper provides a set of guidelines and experiences for building an online course based on the e-learning standards using free/libre/open source software (FLOSS) applications with Moodle which has been implemented in Faculty of Industrial Technology and can be accessed through the website at <http://klasiber.informatika.web.id>. The experience of the LMS will facilitate in deepen the dissemination of the knowledge through online course materials, forum and discussion, assignment, and collaborative work.

Keywords: *LMS, Moodle, e-learning*

1. INTRODUCTION

People in all walks of life are using information and communication technology (ICT) to help them do things more efficiently and effectively, and education in university is one of users who need to implement the ICT application. Since the Web is widely used as a delivery channel for e-learning resources and the need of the system is very important, the Faculty of Industrial Technology has been implementing the online Learning Management System called Klasiber, a free form translated language in Bahasa Indonesia from the word of Cyber Class in English.

Learning management system (LMS) itself is a software system used to deliver on-line education. Alternate terms often used are managed learning environment, virtual learning environment, course management system or learning support system. Today, most LMSes make extensive use of the Web and include features such as discussion forums, chats, journals, online assessment with grading tools and student tracking [1] [2]. LMSes also are used to supplement regular face-to-face courses. They are used in universities, schools and by businesses to deliver corporate training.

The implementation of the LMS in our Faculty involves the movement of educational digital content and the knowledge of pedagogical communities into an online space. Students (and also Teachers) are enforced to move toward from offline learning method (in class only) to online learning. The online learning method doesn't mean to replace the offline method, but mixed to achieve higher result. With the LMS, students and teachers

can extend their class in different way, without need to make a meet. Discussions, chats, collaborative work is done with Klasiber. Hence, the dissemination and the understanding of knowledge will make it way to higher achievement.

Cost is our mainly reason why we use FLOSS application such Moodle than proprietary software solutions such as Blackboard and WebCT. But cost is not the only reason for us to look beyond available proprietary LMS solutions. The ability to modify software is an important consideration for the member of the Faculty to meet the need, because each organization has it own rules and regulations and also specific learning requirements. We also need to integrate the LMS with existing systems.

2. WHAT IS FREE/LIBRE AND OPEN SOURCE SOFTWARE (FLOSS)?

Shaw et al. describe open source software (OSS) "developed and disseminated in an open forum. As such, it revolutionizes the way in which software has historically been developed and distributed." [5] Free/Libre/Open-Source Software, or FLOSS, is an alternative term for free software. It is used by those who wish to be inclusive or who do not want to take a side on whether "free software" or "open-source software" is a better term [7].

In constructing the FLOSS phrase, the French/Spanish word libre was included to emphasize the "freedom from entanglements" meaning of the English word free, as opposed to the unintended (but frequently assumed) "pay no money" meaning [7].

With FLOSS and Linux, the system will have quality and security advances, with numerous examples of migrations to Linux make these applications is widely used and also with its capability being more secured than one based on proprietary software.

2.1 LAMP

The acronym LAMP (or L.A.M.P.) refers to a set of free software programs commonly used together to run dynamic Web sites or servers: Linux, as the operating system (in our environment we use Ubuntu Linux Server); Apache, as the Web server (in our environment we use Apache2); MySQL, as the database management system (or database server), we use MySQL version 4; and Perl, PHP, Python, and/or Primate (mod mono), as scripting/programming languages [8]. The LAMP environment is needed to build the Klasiber. These software are the implementation of using FLOSS in developing the e-learning environment.

2.1.1 Web server

Much of the infrastructure of the Internet is based on open source, and the most popular web server has always been FLOSS. Apache is the number one web server, with over 64% market share in May 2006, almost more than three times the market share of its nearest competitor. This is illustrated in Figure 1 by the UK based Internet services company Netcraft [6].

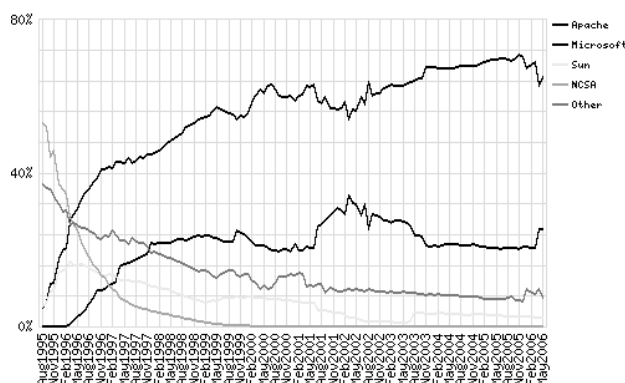


Figure 1. Number of Web Server in the Internet

2.1.2 Server-side applications

In order to enhance the capability of web server, it should be powered with the server side applications. Server-side applications are applications that installed and configured on Internet servers to work with the web server, and then accessed through any computer on the Internet with web clients in browsers. The applications referred in this paper are mainly programmed in the programming language PHP (<http://www.php.net>), and use the MySQL database (<http://www.mysql.org>). When installed on an Apache server, as stated before in LAMP definition,

these three applications constitute a very strong platform for a broad variety of open source web-based applications based on a dynamic, fully searchable relational database structure.

MySQL is a multithreaded, multi-user, structured query language (SQL) relational database server, using the general public license (GNU). The PHP—MySQL combination is also cross-platform, i.e. will run on Windows as well as Linux servers.

2.1.3 Moodle as part of open-source application

The open source approach is also gaining widespread consideration within the tertiary education sector. The development of open courseware, for example using the model being pioneered by MIT in the USA (<http://web.mit.edu/ocw>), and the availability of open source virtual learning environment software (e.g. Fle3, <http://fle3.uiah.fi>) all have implications that educators will need to take into account [3].

A very strong e-learning application is Moodle (<http://www.moodle.org/>). Moodle is a complete e-learning software suite or course management system, with a modular software package designed to help educators create quality, multimedia-based online courses.

Moodle is a software package for producing internet-based courses and web sites. It's an ongoing development project designed to support a social constructionist framework of education.

Moodle is provided freely as Open Source software (under the GNU Public License). Basically this means Moodle is copyrighted, but that we have additional freedoms. We are allowed to copy, use and modify Moodle provided that we agree to: provide the source to others; not modify or remove the original license and copyrights, and apply this same license to any derivative work.

The word Moodle was originally an acronym for Modular Object-Oriented Dynamic Learning Environment, which is mostly useful to programmers and education theorists. It's also a verb that describes the process of lazily meandering through something, doing things as it occurs to you to do them, an enjoyable tinkering that often leads to insight and creativity. As such it applies both to the way Moodle was developed, and to the way a student or teacher might approach studying or teaching an online course. Anyone who uses Moodle is a Moodler [4].

A single Moodle Web site can host a large number of courses. Each course is managed by one or more teachers. Courses can contain activities such as discussion forums, student journals, quizzes, surveys, assignments, chats and workshops. Moodle includes support for grading, file uploads, user logging and tracking, multimedia, e-mail integration and many other features, all comparable to those available in proprietary LMSes [1].

Most LMSes are instructor-oriented and largely concerned with how course content is delivered. Moodle is based on a learner-oriented philosophy called social constructionist pedagogy, in which students are involved in constructing their own knowledge. The concepts behind this philosophy of learning are that learners actively construct new knowledge by tinkering, and they learn more by explaining what they have learned to others and by adopting a more subjective stance to the knowledge being created. These ideas run parallel to the way open-source development works, in which the developers also often are users, everyone is free to tinker with the software and code is constructed, peer-reviewed and refined by the means of an open discussion.

The social construction pedagogy is reflected in the design and choice of Moodle features. For example, one of Moodle's features is every course can have a glossary of terms. The glossary can be set up to allow course participants to add their own terms and definitions. Taking it a step further, Moodle allows comments to be attached to each term, enabling participants to refine and clarify these definitions.

3. KLASIBER IMPLEMENTATION

3.1 Installation

Installing Moodle in providing Klasiber on a LAMP system is straightforward and well-documented. After unpacking the downloaded package (usually packaged with tarball and gzip or in zip file), we need to place all files and folders into our Web server's directory.

Before running the configuration file (config.php), we need to create a MySQL database and have a sufficient privilege account. Moodle needs a separate data directory to store some files, such as user-uploaded images. This directory usually and should not be accessible directly over the Web. We can protect it either by using an .htaccess file or by placing the directory outside the Web server's documents directory as in Klasiber which put the data directory into a directory which is inaccessible by Web server' document directory.

In our server environment, we put the moodledata into a separate directory which is (and it should be) impossible for the user to access it from browsers.



```
root@cisco.ft.uil.ac.id: /var/www/moodle
File Edit View Terminal Tabs Help
root@cisco:/var/www# unzip moodle.zip
root@cisco:/var/www# chown www-data:www-data -R moodle
root@cisco:/var/www# mysql
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 12 to server version: 4.0.24-Debian-10ubuntu2-log

Type 'help;' or '\h' for help. Type '\c' to clear the buffer.

mysql> create database mdl;
Query OK, 1 row affected (0.00 sec)

mysql> quit
Bye
root@cisco:/var/www# cd moodle
root@cisco:/var/www/moodle# cp config-dist.php config.php
root@cisco:/var/www/moodle#
```

Figure 2. Installing moodle in Linux (Ubuntu Server) environment

The default Apache and PHP settings on most Web servers should be adequate. PHP sessions support (usually enabled by default) for authentication purposes and file uploading to upload files to the server need to be enabled and to be set to the maximum size of the files which are going to be uploaded by the system. Also, PHP safe mode needs to be disabled. Some Web hosting providers do not allow disabling PHP safe mode while others do, so check in advance. It is also recommended in order to maximize the Klasiber system that we should install some modules in apache like GD Modules, PHP-Pear, and Perl Library. It is also recommended to let the Register Global is off to make the system more secure.

A single file, config.php, stores the basic configuration settings, such as database information, Web site URL, directory paths and permissions. In the unpackaged distribution, Moodle comes with config-dist.php which will be copied by the installer into config.php in order to make the LMS work. The config.php contains detailed instructions and examples.

The next step is visiting the main page of Klasiber Web site with a Web browser. From this point on, Moodle handles its own installation over the Web, setting up the database and creating tables with install.php. Finally, we are asked to create an administrator user account. Successful creation of the user account completes the Moodle installation, and redirects us to the home page of our new Klasiber site.

Once the system is installed, almost all regular administrative activities can be carried out by using a Web browser. When logged in as the administrator, a block containing administration links appears in the left column of the main page after installation. The Configuration link in this block opens up a control panel that allows the administrator to control all aspects of the Klasiber site using a Web browser such as configure variables that affect general operation of the site, site settings that define how the front page of the site looks, themes to make how the site looks (colors, fonts etc), language for checking and editing

the current language pack, modules to manage installed modules and their settings, blocks to manage installed blocks and their settings, filters to choose text filters and related settings, backup to configure automated backups and their schedule, and calendar to configure various calendar and date/time-related aspects of Moodle.

In configuration, we can set what will the Klasiber looks like with themes, the user behaviors, logs, maximum size of the file going to be uploaded, ban user, set the modules and plug in, and so on. It is recommended that after installing the web site, we should register our LMS with Moodle's site (<http://www.moodle.org>) from the configuration page, so that our web site is listed in the Moodle's web site.

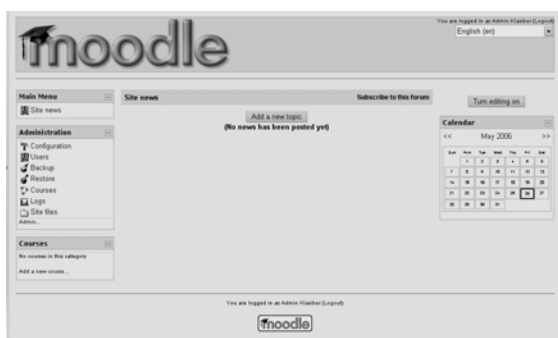


Figure 3. Home page after Moodle installation

3.2 Customization

Moodle comes with lot of themes, and we can switch themes directly from the Configuration panel. It's easy to create new themes, too like what we have done with Klasiber. Each theme is contained in a subdirectory of the main theme directory. To create our customize theme, we copy one of the existing theme folders and give it a new name.

The folder for each theme contains certain standard files, such as config.php and styles.php. The easiest way to change the look of the theme is to tweak the file styles.php, which modifies the Cascading Style Sheet (CSS) used for the theme.



Figure 4. Moodle after customization

4. FORGOTTEN STEPS

Though Moodle has a fully automated function, there are some activities which need to be aware. Base on our experiences, these are the steps which have been happened and has resolved.

First, many activities in Moodle make an intensive interaction between teachers or administrator or the system itself with students, such uploading assessment, send email if students make a subscription on forum, etc. These activities are unable to run immediately from the system. Fortunately, the Moodle's developer has created a file called cron.php under admin folder which unfortunately doesn't run automatically with the system. In order to make the script run in a periodic time, we must access the file with cron function in *nix environment. In our environment we put this line:

```
*/5 * * * * wget -q -O /dev/null \
http://our_web_domain/admin/cron.php
```

Forget to put these line will make the system getting slower, create long queue on email system, and sometimes can create an inconsistency on tables and database.

Second, administrators or teachers should backup the site regularly, there is no 100% secured environment. Anything could happen; hence we should regularly backup our own data.

5. SYSTEM REQUIREMENT

After running, access to Klasiber is very high, with unique visitor each day in amount of 405 in average, and page load (the home page) 1,011 hit in average each day, without counting the page load of each courses, then the demand of Klasiber is in a very high rate.

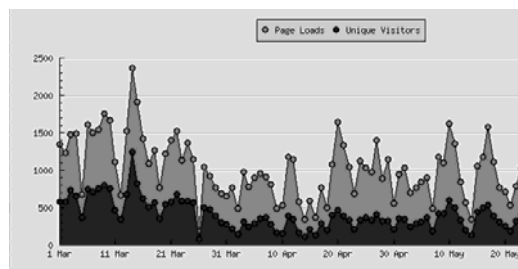


Figure 5. Page Loads and Unique Visitor Statistics (March – May 2006)

To fulfill the demand, we run a Dual Processor Xeon 3.0 GHz, with 1,5 GB DDR RAM, and 72 GB for the data and 36 GB for the system with SCSI Hard drives, and with a FastEthernet card. Though we have these qualifications, the system resources still can take up to 80% of the total resources.

6. WEB ANALYSIS

To get the statistics of the websites, administrator set an awstats application to monitor who, what, when, where, and how the Klasiber accessed by users.

Klasiber has a high rate of visitor with a very high rate of data transfer with 283.24 MB in average each day or about 9GB transfer rate per month. Most users access Klasiber in the business hour and at night as seen in the graph below.

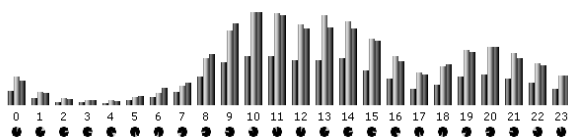


Figure 6. Visitor per Hour (Pages – Hits – Bandwidth)

Most visitor visit Klasiber with Windows as his/her operating system, mostly with Windows XP. Table below shows visitor's operating system in May 2006.

Table 1. Visitors' Operating System

Operating Systems	Hits	Percent
Windows	491353	94.3 %
Unknown	23969	4.6 %
Linux	2581	0.4 %
BSD	2291	0.4 %
Macintosh	217	0 %
Sun Solaris	73	0 %
Symbian OS	33	0 %
Unknown Unix system	6	0%

Firefox and Internet Explorer share the same percentage as browser which accesses the Klasiber. But sometimes table below not show exactly the true score, because often Opera identify itself as Internet Explorer.

Table 2. Visitors' Browser

Browsers	Hits	Percent
MS Internet Explorer	219580	42.1 %
Firefox	219406	42.1 %
Opera	52560	10 %
Unknown	22116	4.2 %
Mozilla	5457	1 %
Wget	793	0.1 %
Netscape	227	0 %
Konqueror	193	0 %
Nokia Browser (PDA/Phone browser)	95	0 %
Lynx	57	0 %
Others	39	0 %

7. FUTURE PLANS

Although Klasiber has been helping the learning process and the dissemination of knowledge and information, we still have problems to resolve. The Islamic University of Indonesia itself has developed an Integrated Information System for the Students and Teachers but doesn't have an e-learning system. In future, we plan to mix the Information System Klasiber. Hence, students and teachers only need an account to access their data and courses.

8. ACKNOWLEDGEMENTS

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REFERENCES

- [1] Abhijeet Chavan, Open-Source Learning Management with Moodle, *Linux Journal*, at <http://www.linuxjournal.com/article/7478> (accessed May 2006)
- [2] Heinz Lothar Grob, Frank Bensberg, Blasius Lofi Dewanto, Model Driven Architecture (MDA): Integration and Model Reuse for Open Source eLearning Platforms, *e-learning and education (eleed) Journal*, at <http://eleed.campussource.de/archive/1/81/> (accessed May 2006)
- [3] Karl Øyria, , Peter J. Murrayc, osni.info -Using free/libre/open source software to build a virtual international community for open source nursing informatics, *International Journal of Medical Informatics* (2005) 74, 937 – 945
- [4] Moodle, *About Moodle*, Moodle Documentation, at http://docs.moodle.org/en/About_Moodle (accessed May 2006)
- [5] N. Shaw, D. Pepper, T. Cook, P. Houwink, N. Ain, M. Bainbridge, *Open source and international health informatics: placebo or panacea?* *Inform. Primary Care* 10 (1) (2002) 39 – 44.
- [6] Netcraft, *May 2006 Web Server Survey*. *Netcraft Archive Survey*, at http://news.netcraft.com/archives/web_server_survey.html (accessed May 2006)
- [7] Wikipedia, *Free/Libre/Open-Source Software*, at http://en.wikipedia.org/wiki/Free/Libre/Open-Source_Software (accessed May 2006)
- [8] Wikipedia, *LAMP (software bundle)*, at [http://en.wikipedia.org/wiki/LAMP_\(software_bundle\)](http://en.wikipedia.org/wiki/LAMP_(software_bundle)) (accessed May 2006)

