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Technical Evaluation Report

24. OS Software: an alternative to costly Learning Management Systems

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Abstract

This is the first in a series of two reports discussing the use of open source software (OSS) and free software (FS) in online education as an alternative to expensive proprietary software. It details the steps taken in a Canadian community college to download and install the *Linux* Operating System in order to support an OSS/ FS learning management system (LMS).

Background

The Woodstock College campus of the New Brunswick Community College system is small, with only an on-site seat capacity of 300 students. The College has approximately 250 computers (staff and student labs), connected to two servers (administration and student) operating in a *Windows* environment. Technical support is provided by two individuals who are responsible for all aspects of the Information Technology (IT) infrastructure, including software management. IT staff are called upon to provide technical support for specialized software used by instructors for industry-specific applications. The College's operating budget supports the overall IT infrastructure, including the resources and professional development required by instructors in the use of new learning technologies. As with many educational institutions, this budget is being increasingly stretched by the costs of proprietary software required to develop and support an online learning environment (Reynolds, 2003). Nonetheless, the strategic plan of the College network identifies e-Learning as a priority issue.

Sister campuses of the College use the *WebCT* learning management system (LMS) to support their e-Learning initiatives. Other campuses are being encouraged to use this system to promote collaboration among the campuses in the development and delivery of e-Learning courses. The author's campus does not does not offer a sufficient number of online courses, however, to justify the software's annual cost (approx. CDN $10,000). In this situation, an increasingly viable alternative to expensive proprietary options is the use of free or low-cost open source software (OSS). New OSS products are enabling teachers to develop e-Learning material in a structured and flexible environment without the disadvantages of proprietary software. They represent a significant new stage in the development of online learning methods, not only in terns of cost, but also in relation to reliability, scalability, and performance (Wheeler, 2003).

This report describes the installation and use of OS software as a means to providing an LMS at minimal cost. A follow-up report (click here to see Technical Note XIV in the series) will compare some of LMS software programs currently available using the OS approach.

Open Source Software and Free Software (OSS/ FS)

For the purpose of this report, the acronym OSS/ FS is used (Wheeler, 2003), combining both open source software (OSS) and free software (FS). The distinction between OSS and FS, and a detailed description of each, can be found at the GNU Project's website (*www.gnu.org*). In summary, OSS refers to the availability of the software's source code to the general public, usually with a licensing agreement stating the code's functions. According to the GNU Project, the term "free software" (FS) is ambiguous: 1) a superficial meaning, "software you can get for zero price;" and 2) the more significant "software which gives the user certain freedoms" with regard to its use and distribution. The importance of the FS concept, asserts the GNU Project, is the issue of liberty rather than price, as in "free speech" as opposed to "free beer." [N.B. The term GNU is something of a "hacker in-joke," a "recursive acronym" for "GNU's Not Unix".]

The GNU Project defines four types of freedom associated with the FS concept:

- **Freedom 0:** To run the software for any purpose

- **Freedom 1:** To study how the program works, and to adapt it to one's needs

- **Freedom 2:** To redistribute copies in order to help one's neighbor

- **Freedom 3:** To improve the program, and release improvements to the public, so that the whole community benefits

A precondition for Freedoms 1 and 3 is access to the source code. Many OSS/ FS software programs are available free of charge, but many are also commercial programs. Wheeler (2003) states that OSS/ FS is not the equivalent of "non-commercial" software, nor is it necessarily in the "public domain." Many, but not all, OSS/ FS are released under the GNU General Public License (GPL), which is intended to guarantee the freedoms mentioned previously.

Selection of an Open Source Software / Free Software (OSS/ FS) Conferencing System

The Woodstock College campus has limited experience offering DE courses, and does not have extensive human or technical resources to facilitate the creation of e-Learning materials. As a teacher at the College, the author needs to provide his on-campus students with readily accessible materials and resources (e.g., lecture notes, assignments, and Web hyperlinks). Initially, to set up his courses, the author used the *BlackBoard* system's free website for its many common LMS features and the advantage of the public Web-server. However, students have often been frustrated with the slow connection and download times involved in this method, even though accessing the site using a T1 line.

The author's next step was to program his own website, though this did not provide all the desired options (e.g., calendar, discussion forum, assignment drop-box, etc). The author could have also installed separate software to provide these functions, but preferred a method that would be easier to use and maintain than a collection of disparate items. The author also wanted a tool that could be used by other instructors; and this required the selection of a complete and

fairly straightforward no-cost product. Current OS options include the *Bazaar* and *Moodle* LMS systems, both released free of charge under the General Public License (GPU). Such systems are not yet immediately accessible to the novice user, for they involve a complex sequence of installation procedures and access to, for example, a *Linux, Unix, Windows, Mac OS X*, or Netware system with PHP support. Customising the software can require, for example, *Perl* programing skills, and access to a database such as *MySQL*. The current report gives step-by-step instructions in the relatively complex installation process.

Installation of Mandrake *9.1*

1. Initially, the author attempted to install the *Bazaar* software using *Mandrake Linux* 8.0 (a *Linux* OS system), but was unsuccessful. The problem appeared to be with the version of *Mandrake* the author was using, so instead he downloaded and installed the latest version (9.1), which includes *Apache* and *MySQL*. To do this, go to: *http://www.mandrakelinux.com/en/*, and click on the download link.

2. Scroll down the download page until you arrive at the section asking if you wish to become a member of the *Mandrake Linux* Users' Club.

3. Next, click on the *Mandrake* 9.1/i586 ISO Image. The following is a description of a *Linux* ISO Image, taken from the LinuxISO site (LinuxISO.org, 2003):

   A *Linux iso* is a file containing a CD Rom disk image of a *Linux* distribution. This CD Rom disk image is an exact copy of a *Linux* distribution on a CD Rom. Think of it as the equivalent of a screen capture, but instead of capturing the information on a screen, this image captures all of the information on a particular *Linux* distribution's CD Rom. When burned as a disk image, the .iso file is turned into a duplicate CD of the original CD. If burned as a file, instead of a disk image, the CD becomes a copy of the downloaded .iso file, and not a bootable CD with accessible files and directories.

   This website also explains important aspects of downloading and burning a CD copy of the *Linux* OS.

4. The previous step leads to a screen containing a selection of download sites. Select one. If you are prompted for a user name and password, the site may have run out of anonymous user slots (see the FAQ mentioned in the previous step). Go back and select another site.

5. At this point a file-transfer screen should appear. Download the files and burn them to a CD as instructed in the "readme" file.

6. Read the "Quick Start" documentation before installing the software. Install the *Mandrake Linux* OS on your server. [**N.B.** The author's server uses a *Dell OptiPlex* desktop, with a *Celeron* 564MHz processor, 128MB of RAM, and a 6GB hard drive.]

7. When the installation is complete, set the network connections. Open the "Control Center" by clicking on the appropriate button. You will be prompted to log-on to the Control Center as the super (root) user.

8. Click on the "Network and Internet" button. The *DrakeConnect* assists with the set-up of this of this button.

9. Click on the "Wizard" button. At this stage of the installation, you will need to obtain information from your IT department (static IP address, gateway, etc.).

10. Although *Mandrake* 9.1 comes with *MySQL*, it may not be installed. Click the "Software Management" button. The *RpmDrake* will help you to install the software packages. A "Software Packages Installation" screen will be displayed. Sort the packages alphabetically and install the following: *MySQL*-4.011a-5mdk

    MySQL-client-4.0.11a-5mdk

    MySQL-common-4.011a-5mdk

    Libmysql10-3.23.44-1mdk

11. Once *MySQL* is installed, you will need to start it. While you are in the "Control Center" panel, click the "System" button, and then click the "Open a Console" button.

12. Go to the root directory by typing the following at the prompt (#):

    cd..

    cd..

    This should lead to the following prompt: **[root@localhost/]#**

13. Start *MySQL* by using the following command at the command prompt: (**N.B.** spaces are represented by the "?" symbol:

    ?/etc/rc.d/init.d/MYSQL?start

    Press the "enter" key. Your command line should look like:

    [root@localhost/]#?/etc/rc.d/init.d/MYSQL?start)

14. When installing the LMS software (e.g., *Bazaar* or *Moodle*), you will be asked for the root password for *MySQL*. To be prepared for this, set your password by entering the following command (where xxxxxx is your password):

    Mysqladmin?-u?root?password?xxxxxx

    [**N.B.**Make a note of this password, because you will require it later.]

    Steps 15 and 16 below are unique to the installation of a package (e.g., *Bazaar*) that requires *Perl* programming support.

15. Install the *Perl* CPAN module. The Comprehensive *Perl* Archive Network is a large collection of *Perl* software and documentation. *Bazaar* requires *Perl* modules that may not have been installed with *Mandrake*. To be sure, install them now. To install the *Perl* module, type the following command at the root prompt:

    [root@localhost/]#:?perl?-MCPAN?-e?shell

[**N.B.** During the installation of the CPAN module, the option of manual configuration and auto-configuration is given. Unless you are familiar with *Linux* and *Perl*, it is strongly recommended that you type "no" at this prompt, to trigger an auto-configuration.]

16. The **cpan>** prompt should now be displayed. This is the prompt that you will use to install the other modules. Install the CPAN modules you need by typing the following commands:

    cpan>?install?term::ReadKey

    cpan>?install?MD5

    cpan>?install?Lingua::Ispell

    cpan>?install?Mail::Mailer

    These commands are always typed at the **cpan>** prompt. Wait for the installation of one before you proceed to the next.

All being well, you are now ready to install an LMS system (click here to see Technical Report XXV).

Conclusion

As this report has demonstrated, the installation of OSS/ FS software can involve a steep technical learning curve, and may require expert IT support. But it is apparent that the emerging OSS/ FS options represent a vital and viable alternative to the costly, proprietary LMS software programs previously available. The second part of this report (click here for Technical Note XXV) will compare specific LMS packages that use the OSS/ FS principle.

References

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The next report in the series compares specific open source software programs for online course management.

N.B. Owing to the speed with which Web addresses are changed, the online references cited in this report may be outdated. They can be checked at the Athabasca University software evaluation site: http://cde.athabascau.ca/softeval/. Italicised product names in this report are assumed to be registered trademarks.

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