Design and Implementation of an extensible, modular, web-based class-room supplement 2008-2009

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Abstract

Blackboard, Fairfax County's current Academic Suite and one of the most commonly used Class-room supplements in education, is disliked by many students and teachers as well as containing many security vulnerabilities. The Goal of this project is to develop an extensible, modular, web-based replacement for Blackboard which will incorporate Blackboard's functionality as well as additional features. By building an extensible and modular replacement what will run on a standard LAMP (Linux, Apache, MySQL, and PHP) Server, this project will hopefully be much easier to maintain, secure, and add additional functions to.

Keywords: software design, software engineering, application, web-based

1 Introduction

For many people today, the Internet is the first place they go for information and many school systems are trying to make as much information available online as possible. However many of the commericial course management systems available today suffer from lack of standardization and extensibility. An ideal course management system would be easy and intuitive to use,

extensible, and secure, the last becoming more important every day. In this paper, I will describe the design of an alternative, web-based, extensible course management system running on a standard LAMP (Linux, Apache, MySQL, PHP) server.

There are many choices that can be made in web applications including language (PHP, ASP, Ruby, Python) and data storage system (LDAP, Oracle, MySQL, Postgre SQL). All have their advantages and disadvantages. PHP is the current standard for web pages although Ruby and Python are growing. ASP is a proprietary Microsoft language which makes it less than ideal for web site development. The current database standard is MySQL, though the others are popular for various purposes. PHP and MySQL are available for both Windows and UNIX operating systems which means that applications developed using them are relatively easy to transport between environments.

2   Background

Today, many schools use some form of a course management system (CMS) to allow teachers to post files, announcements, and assignments for their students. However, few of these schools have gotten feedback from the users and tried to improve the CMS experience. In many cases, the course management system annoys both students and teachers who find bugs unfixed and problematic to deal with. Many users also find desired features missing or poorly implemented as a result of this lack of feedback. Another growing problem with some course management systems is that they were designed using outdated languages or coding practices and thus are difficult to maintain and extend. In addition, some of them have not been upgraded to fix recently discovered security holes in the languages that they use. In Today's Internet-based world, it is critical that schools have a secure and easy way to share information between students and teachers that is based on standard coding practices that will make it easy to fix any bugs and add new features to the system0.

3 Preliminary Testing and Analysis

Currently I have Apache2 with mod_ssl and mod_rewrite, PHP5, and MySQL5 running on a Debian Linux server in the lab. This is all that my project requires to run. The currently working version of my code presents a login page and denies access to the site without a valid login. Once a user logs in, their IP and browser agent are recorded for security, and they are given a PHP session which is used throughout the site. Before allowing them to access each page, the kernel module checks that their IP and browser agent are the same (to protect against session hijacking) and that they have not been idle for a long time (to protect users who forget to logout). All of these features work with multiple accounts and the main page currently uses information from the database to display the user's name and "rank" (teacher, student, or administrator).