From Microsoft to Open Systems: Converting a Third Year Web Application Development Course to an Open Systems Platform

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ABSTRACT

This paper outlines the development cycle followed when industry demand indicated a requirement for graduates with expertise in using open systems tools in the Web application development area.

The third year Web Application Development degree course was originally offered using a Microsoft platform consisting of VBScript, Access and Active Server Pages. Graduates from the course had little difficulty finding employment, but once employed, most graduates were asked by their employers to undertake Web development work using open systems tools. As a result employers were canvassed as to the preferred development environment and a decision was made to change to a JavaScript, MySQL and PHP environment.

Hardware and software platforms were evaluated and a development environment was installed and tested. Teaching materials in terms of notes, exercises, and assessments were developed and evaluated in consultation with industry representatives and past graduates. The course was delivered to a class of 48 students and the results of their evaluations were used to enhance the course.

The paper offers advice to lecturers who may be interested in offering a similar course and includes references to useful resources, including applications, notes, and exercises.

1. INTRODUCTION

In 1998 the Eastern Institute of Technology (EIT) Hawke's Bay decided to adopt the UNITEC Bachelor of Computer Systems (BCS) degree and offer it under a franchise arrangement. The BCS was chosen in preference to other similar degrees because it offered Certificate and Diploma exit points at the end of year 1 and year 2, and it enabled Certificate of Business Computing (CBC) graduates to enter the second year with reasonable credit provisions. The BCS subject range while being similar to that offered within the National Diploma in Business Computing, was missing courses in the Multi-media, Internet and Web development areas. To fill the gap, EIT staff developed several new papers and in consultation with UNITEC staff had the papers included within the degree. One of the new papers was a third year paper originally called Web Client Server, which was later renamed Web Application Development.

The Web Application Development paper, aims at providing students knowledge and skills for developing Web based client-server applications, and was taught for two years using a Microsoft development

environment utilising VB-Script, ASP and Access. The course was very popular and graduating students who had successfully completed the course found little difficulty in gaining employment in the Web development area.

Contact with past graduates in the workplace suggested that while VBScript and ASP provided valuable skills in Web Development they were not the preferred Web development environments in the work place. Further research among local developers supported the view that an open system environment was preferred and as a result a decision was made to change the development environment.

2. THE DEMANDS FOR OPEN SYSTEMS

The arguments for and against open system platforms have been around for some time. The case for open systems can be summed up by the following quote from Yarger, *et al.* (1999, page ix).

"In the world of computing, the 1990s may rightly be called the decade of Open Source software. From Linux to Perl, from palmtop to mainframe, the Open Source movement has left its mark in practically every niche of technology. This impact is especially strong in the commercially neglected world of mid-range server applications commonly needed by non-profit organizations and small businesses."

Until recently the preferred open system Web development environment utilised Perl scripts which used the Common Gateway Interface (CGI). When compared to Active Server Pages (ASP) running under Microsoft's Internet Information Server (IIS), the Perl and CGI combination was difficult to program and did not provide seamless integration with Microsoft Access databases. When comparing the programming expertise needed for Perl with the programming expertise required for ASP, the choice of which environment to adopt came out heavily in favour of ASP.

The argument for using ASP in preference to an open source product changed somewhat when PHP (recursive acronym for PHP: Hypertext Preprocessor) was introduced in 1998 as a scripting language especially suited for Web development that can be embedded into HTML. Since its release PHP has gained rapid popularity, and is now used in Web-related applications by some of the most prominent organizations such as Mitsubishi, Redhat, Der Spiegel, MP3-Lycos, Ericsson and NASA (php.net, 2002) .

In New Zealand, PHP has grown in popularity and apart from some Government organisations who have adopted a licensing arrangement with Microsoft which sees them using ASP integrated with MSSQL, it is becoming the development platform of choice. The reasons for the popularity of PHP include the speed at which it is able to access databases, its superior memory management and its cross platform migration strategy. PHP is also tightly integrated with mySQL (an open source DBMS) and programming in PHP is similar to programming in C++ (Lim, J. 2000).

The popularity of PHP was confirmed by an informal survey of Napier and Wellington businesses conducted by the writer in October 2001. Of the twelve businesses surveyed, eight stated that they would prefer their Web development to take place in an open source environment using PHP and a further two indicated that they would be adopting PHP in preference to ASP in the future.

As a result of past student feedback and the findings of the informal business survey, a decision was made to drop the well-developed teaching environment, which used VBScript, ASP and Access and replace it with an open systems environment using JavaScript, PHP and mySQL.

3. THE ADOPTION PROCESS

Having created a set of paper based and Web based teaching materials using the Microsoft Web programming environment, it was with some reluctance that the decision to move to the open source environment of JavaScript, PHP and mySQL was adopted. Once the decision was made the first step was to visit the Web and find out what resources were available.

It was a pleasant surprise to find that the open source world provided a rich environment with free software, excellent documentation and numerous supporting documents. Unlike the Microsoft environment where cost is an issue, the open source environment provides a rich software environment for both Unix/Linux and Windows, and people who are happy to share their expertise and experiences at no cost.

The first stop was php.net, the one stop shop for PHP resources, a couple of clicks and a Windows

version of PHP was installed on the writer's laptop running under IIS. Having installed PHP it was time to learn some coding, again no problem, full documentation for PHP in both HTML and CHM format can be found php.net. A quick search using Google.com revealed a large number of on-line PHP tutorials and within hours the writer was happily coding in PHP using the trusty free Web programming editor, FirstPage2000 (available from http://www.evrsoft.com).

Having mastered the basics of PHP, it was time to investigate if the claims of seamless integration between PHP and mySQL were true. For mySQL resources the best site proved to be mysql.com. Once again a couple of clicks and mySQL for the Windows environment was downloaded and installed. A further search for tutorials revealed plenty of free advice on the creation of databases using mySQL, and before long SQL statements were being used to create, modify and delete databases, tables and records.

Having been comfortable with Access and its use with ASP on an IIS server, it was a little unsettling attempting to discover how databases and users on a mySQL server were managed. Again the problem was short lived, mysql.com have a product called mySQLAdmin, which runs under PHP and can be used to manage databases. A little more searching and an application called dbTools was downloaded from http://www.dbtools.com.br/, this proved to be a well designed database and user management tool with an easy to use graphical user interface. This product while not open source is freeware and can be used without cost. Further investigation revealed another excellent mySQL management tool, with an even friendlier interface. The mySQLFront application can be downloaded from http://www.anse.de/mysqlfront/.

Using PHP to access records on a mySQL server again proved to be no barrier. Compared to ASP and its methods of retrieving records, PHP was easy to understand and program, and once again and there were numerous tutorials to help the learning process.

Having successfully implemented the PHP and mySQL environment on the laptop in a stand-alone environment, it was time to migrate the software to the software laboratory and its client-server environment. Again, the whole process was relatively straight forward, and before long PHP was being used to access mySQL tables from multiple workstations concurrently.

Having proven that the PHP and mySQL combination would work, it was time to develop suitable teaching resources. This was done over the summer vacation and by February, a resource book including lessons and exercises in JavaScript, mySQL and PHP was ready to be printed.

Writing the resource book proved much easier than designing suitable assessments. When working with Web based products like JavaScript, mySQL and PHP it is very difficult to come up with programming task for which solutions are not readily available on the Internet. The solution to the JavaScript exercise was to get students to produce an on-line form that required validation and produced an invoice on the screen and in text format. The PHP task was to reproduce the Teletext pages using a mySQL database and Web based interface.

Next year the move to open systems will be completed with the Microsoft server running IIS being replaced with a Linux server running Apache. The writer has already tested the replacement operating systems environment, using a Linux partition on a laptop. As with previous open systems trials, the exercise proved to be a relatively simple one.

4. DELIVERY AND REACTION

Delivery of the course using the open source environment proved to be a rewarding experience for both lecturer and students. Apart from a few grumbles from students who had taught themselves VBScript and ASP over the vacation period and who were unaware that the delivery platform had been changed everybody accepted the migration without complaint. Since most of the forty-eight students had previously programmed in C++ and had used SQL for Oracle in earlier classes, the learning curve for the new environment was relatively painless.

One issue that did arise was created as a result of students wishing to practice at home. Many did not have copies of IIS and found that some early versions of Windows would not allow Personal Web server to run. The solution was found on-line at www.apache.org, and a copy of Apache server for Windows was downloaded and made available. Some students had difficulty getting Apache, mySQL and PHP to work and kept seeking assistance during class time. This time the solution came from a student who discovered that an all in one solution called PHPTRIAD which can be downloaded from

www.phpgeek.com. Further investigation revealed that a similar and easier to use solution could be downloaded from http://www.easyphp.org/.

Evaluations from students on completion of the course were on the whole very positive, most commented favourably about the use of the open systems environment and all students expressed support for the move away from VBScript and ASP.

The only consistent complaint was that the workload for the course was too high and that more time should have been allocated for classes. Students expressed the belief that perhaps the course could be divided into two or three papers, a Javascript and HTML coding course, a mySQL course and a PHP course. It was interesting to note that most of the students who complained about workload were those who were the weaker programmers. Other complaints related to the lack of exercises in the workbook and the need for more theory notes on the basics of both JavaScript and PHP.

The majority of students expressed support for the course and the way that it was delivered. Several students stated that they enjoyed the real world nature of the course, and the challenges that the assessments provided. Other positive comments were made about the programming environment and the ability to practice the required skills at both home and at the polytechnic.

4. CONCLUSION

Support for open systems environments has increased over the last decade and since its release in 1999, PHP has proven to be one of the most popular and easiest to use open source Web development tools. The integration of PHP and mySQL offers an attractive teaching platform, which can be adopted without financial burden and without the need for in-depth technical expertise.

The change from a Microsoft platform based on VBScript, ASP and Access to an open source platform using JavScript, PHP and mySQL proved to be relatively straight forward and was accepted by both students and tutorial staff.

The amount of work involved in covering both a client side programming language and a server side language that integrates with a DBMS in a single course does place pressure on students, particularly those who struggle with programming. The writer suggests only students who have proven programming skills be allowed to participate in such a course.

The writer strongly recommends the combination of PHP and mySQL in preference to ASP and Access as a delivery platform for delivering Web development courses. The change in platform at EIT proved to be an enjoyable experience for all concerned and provided students with skills that should prove useful when they move into the workplace.

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RESOURCES

PHP http://www.php.net
MySQL http://www.mysql.com
DbTools http://www.dbtools.com.br/
SQLFront http://www.anse.de/mysqlfront
PHPTriad http://www.phpgeek.com
EasyPHP http://www.easyphp.org/
Apache http://www.apache.org
FirstPage 2000 http://www.evrsoft.com
Teaching Materials http://corich1.tripod.com