Open Source and Open Standards in Higher Education

Anand Kumar Chauhan[*]

Abstract

The newest trend in software development is open source, which has become almost a revolution over the last decade. Led by the finest software minds on the planet, open source is not only a social and collaborative way to develop software, but in most cases is immune to the profit motive common in the close source software company culture. Open source software gave rise to open standards of data exchange, control procedures, and interaction among open source software components. This paper will analyze contributions made by open source software to education in general with special reference to higher education. The paper ends with a description and comparison of key features of some open source/open standard resources for e-learning. These demonstrate the flexibility and consequent cost reduction for online education systems.

Introduction

For fifty years, software development has been in the hands of commercial companies. During the 1990s, however, this has changed. The Open Source Initiative (OSI[1]) defines the standards which must be followed for any software to be designated open source.   OSI definitions have led to four aspects of open source software which render it well suited to educational purposes. These will be discussed in the following section.

Superiority

Open source software is based on free distribution of the source codes which form the core of any software system. Since these codes can be freely downloaded and modified, the skills of thousands of individual human intellects can be focused on a given software project. Thus, the length of the software development cycle is much reduced. In addition, software products are more thoroughly tested because users all over the world are available to test the results. In closed source software, only a handful of engineers (rather than end use consumers) do the testing and bugs creep in. This can easily be seen by comparing the two most common PC operating systems in use today: Linux, representing open source and Windows, a close source commercial product.

Also, open source software develops in a natural way since decisions about software design and coding are made by the entire open course community rather than by only a few project leaders or lead programmers. In open source development, only the best and most powerful solutions and methodologies survive the test of time and the scrutiny of the whole community. Thus, the process of development ensures that the best approach and the best pieces of software code become part of the final product.

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[*] Anand Kumar Chauhan, Instructor of Computer Science, Lamar State College, Port Arthur, Texas.
 Email is Andy.Chauhan@lamarpa.edu

Open Source as an Ideal Choice

In college level computer science courses like Operating Systems or Computer Networks, class concepts are always supplemented by laboratory assignments or projects. In such a scenario, open course is the ideal choice because the students can modify and experiment with the source codes. The students also have the opportunity to inspect the inner workings of a real time software product. This is not possible in the case of commercial software. It is not surprising, therefore, that Linux is the most popular operating system for academic and research purposes, and real time deployment at universities world wide.

Open Standards[2]

A software product usually consists of various modules, each having a different function. The collective behavior of these components defines the overall functionality of the product itself since each component depends on and exchanges data with the others. Open source software development is done all over the world and each part of the community develops individual modules. Thus, it became necessary to establish standards and common definitions for open source software. These standards are defined as the description of data exchange and functional protocol to define interaction between modules to insure interoperability of software. Software components which follow specific open standards can be replaced with other standard-compliant products. Thus, the user is given more freedom to choose the component best suited to his needs and is not bound to a particular product, as with commercial software.

IEEE LTSC[3] (Learning Technology Standards Committee) is working to define a range of standards for online education. JA-SIG [4](Java Architectures Special Interest Group) has already established uPortal as one standard for online content management. This is the fastest emerging standard and has even been implemented by commercial close source vendors such as WebCT and SCT Web. MIT's OKI[5] (Open Knowledge Initiative) is collaboration between universities and standardization organizations to support learning in higher education. OKI provides an extensible architecture which defines the interaction between different components of educational software. WebCT and Blackboard are two of the close source commercial products which are OKI compliant. IMS[6] Global Learning Consortium is a world wide group of educational, commercial, and governmental organizations which collaborate to develop e-learning standards.

Open Source Software

There is a great deal of freely-downloadable open source software. In some cases, the entire system can be built cost free using an open source operating system, web server, and database. It should be noted, however, that some open source software requires prerequisites which are not free or open source. Some of the major features of open source educational content management software which can be used to make an online educational system are compared in the table[7] below.

Product	OS	Technology	Web server	Database	Compliance
ATutor 1.3	Unix/Win	PHP	IIS/Apache	MySQL	IMS
Bazaar 7.04	Unix	CGI Perl	Apache	MySQL	IMS, IEEE
Bodington 2.1.0	Unix/Win	Java	Tomcat / iPlanet	MySQL/ Oracle/ PostgreSQL	IMS
CHEF 1.0.7	Unix/Win	Java	Tomcat		
Caroline 1.4	Unix/Win	PHP	Apache	MySQL	
Courseware 2.5	Unix/Win	Java	Tomcat	Oracle/ PostgreSQL	OKI
Eledge 3.1	Unix/Win	Java	Apache/ Tomcat	MySQL	
FILE3 1.4.2	Unix/Win	Python	ZOPE		
Jones e-education V2003	Unix	Java	Apache/ Tomcat	MySQL	IMS
KEWL 1.2	Win	ASP	IIS	SQL Server	
LON-CAPA 1.0	Unix			MySQL	
Manhattan Virtual Classroom 2.1	Unix	CGI C	Apache		
Mimerdesk 1.5.3.1	Unix	CGI Perl	Apache	MySQL/ PostgreSQL	
moodle 1.1.1	Unix/Win	PHP	Apache/IIS	MySQL/ PostgreSQL	
Whiteboard 1.0.2	Unix	PHP		MySQL	

Conclusion

Open source software is clearly an important component of modern higher education and will show a promising growth rate in higher education for the next decade. However, it will take some period of time for this new field to reach its full potential, in part because it appears that few standards have been widely adopted in the production of educational software. Educational institutes and policy makers must take the responsibility for implementing free standards and encouraging the development of open source software. Also, in my view, truly open source software should not require the use of any commercial components. Open source software should be truly "open." And on a personal note, my favorite software in the list above is Moodle which I have been modifying and testing for real time deployment.

[1] http://www.opensource.org/
[2] http://www.openstandards.org/
[3] http://ltsc.ieee.org/
[4] http://www.ja-sig.org/
[5] http://web.mit.edu/oki/
[6] http://www.imsglobal.org/
[7] http://www.edutools.info/