

Using FOSS for Developing E-Learning Portals

Mihaela Brut,
Faculty of Computer Science, University "Al. I. Cuza" Iași, Romania
mihaela@infoiasi.ro

Abstract

In this paper, we expose the opportunities of using free open-source software (FOSS) in developing an e-learning portal, which could function as well as an e-learning institution, or as a training section inside the intranet of a company. The portal technologies constitute the actual trend in the e-learning platforms development. The FOSS solutions provide support for the personalization of learning modalities, for appliance of new teaching/learning methods, and for using the latest hour technologies in the learning management process. We shall focus on the Java portal technology, and the correspondent solutions for e-learning.

Introduction

The open-source software development took great amplitude, the education and domain being very well represented by this trend [4]. There exist small applications destined to be integrated in the own systems, or to produce various materials, but also there are available complete infrastructures for e-learning platforms and portals.

The prerogative of open-source usability in general, and for the e-learning field in special, is conferred by some main advantages: low costs, long term development capacity, open philosophy, software piracy alternative, possibilities for regional adapting, and for learning from the open-source code. The reticence due to intellectual copyright, to the Internet driving guidance, or to the software's easy-to-use attribute is in a continually decrease [2].

There exist some projects having the goal to provide information about the open-source solutions in the e-learning domain:

- *OSS Watch* (<http://www.oss-watch.ac.uk/>) provides the higher education community with neutral and authoritative guidance about free and open source software, and about related open standards.
- *IOSN* (*International Open Source Network* - <http://www.iosn.net/education>) provides debates, information, case studies on the use of open-source in education in the Asia-Pacific Region.
- *JOIN!* (<http://www.ossite.org>): it provide consultancy and support for organizations/institutions that want to employ open source Learning Management Systems in all relevant topics ranging from the choice of a platforms, didactics and organizational issues.

- *SIGOSSEE* - proposes to form and develop a Special Interest Group to investigate the major issues appertaining to the use of OSS for education

We shall focus on the open-source solution for developing an e-learning portal, especially using Java technology.

Portal Overview

The portal product market appeared in the 1990s, and, since then, portal products involved many complementary technologies. However, counter to expectations, a commonly understood definition for what constitutes a “portal”, and how it varies from other technologies, has not been established yet [3]. Thus, the term “portal” is used for many different things, sometimes distinguished by their complexity level:

- A portal of “thin” layer aggregates, integrates, personalizes and presents information, transactions and applications to the user according to their role and preferences. Such example is British Academy PORTAL, representing a locally held directory of online resources.
- A “thick” portal search across distributed databases of information, not all of it web-based, such example being HEIRPORT, the Historic Environment Information Resources PORTal [10].

The portals of first category are also named *institutional portals* [6], being associated in general with an institution (constituting, therefore, the category of interest for us because could correspond to an e-learning institution), and having as main advantages: knowledge *of* users, familiarity *to* users, ability to surface relevant content and services.

Technically, a *portal* is a network service that brings together content from diverse distributed resources using technologies such as cross searching, harvesting, and alerting, and collate this into an amalgamated form for presentation to the user. This presentation is usually via a web browser, though other means are also possible. For users, a portal is a, possibly personalised, common point of access where searching can be carried out across one or more than one resource and the amalgamated results viewed. Information may also be presented via other means, for example, alerting services and conference listings or links to e-prints and learning materials [10].

The top ten features of an educational portal are considered: Search favourite resources, Library administration, Access or update teaching materials, Personal information, Library and quality Internet resources alerts, Access your institutional email, Handbook, Deadline alerts, Access or update reading lists, Campus news [1].

The evolution of an educational portal implies the following phases [5, 7]:

- Table of contents: the portal provide information about the institution, various content elements, intern search facilities, and links to relevant resources;
- Content aggregation and organization: advanced search features, subject categories organization, personalization facilities;

- Data integration, dynamic applications: support for didactic / administrative staff, for students, for collaboration between the study groups, for data integration at the institution level, etc.;
- Global integration, dynamic documents: on-line management of the courses, students, assessments, implementation of various e-learning mechanisms, or external data integration

The FOSS Portals Offer

The strong development of the FOSS for education conducted to various popularization actions, such the constitution of a first inventory of this type of software [4], or the establishment of some evaluation and rating criteria [6].

We list below only some FOSS high-rated portals infrastructure, developed by using distinct technologies:

- *CompreHensive collaborativE Framework (CHEF* - <http://chefproject.org/portal/>) provide a flexible environment for supporting distributed learning and collaborative work, integrating some open-source products based on Java technology (JetSpeed, Velocity, Turbine), as well as on RFF W3C standard. This platform could be used and adapted for educational purposes, constituting an institutional portal.
- *Modular Object-Oriented Dynamic Learning Environment (Moodle* - <http://www.moodle.org>) is a software package for producing internet-based courses and web sites, offering a support for security and administration, and having an ample community of users and developers. The source code written in PHP by using MySQL and PostgreSQL databases is a good trump for adopting this platform, because of the popularity of these technologies, but also because of the possibility to run the platform without any changes on a variety of operating systems.
- *The Learning Online Network with Capa (LON-CAPA: <http://www.lon-capa.org/>)* is an open source freeware distributed learning content management and assessment system, implemented in Perl. It provides content sharing and content reusability facilities, promoting the collaboration between academic institutions, as well as the creation and grading of on-line exams capabilities.
- *FREEDOM (Free Software Renaissance of gnu/linux in European Education Development On line Method - <http://www.linuxdidattica.org/docs/freedom/>)* - aims at producing tested and documented open-source software concerning all teaching subject. It aims to be a portal for Linux eLearning systems.

We shall focus below on the particularities of portals based on Java technology.

The Java Portal Paradigm

The specification which standardizes the Java technologies used in portal design, named JSR 168, was introduced by the specialists from the Sun Microsystems and

IBM, according to the suggestions from the computer science community. In order to enable interoperability between *portlets* and *portals*, this specification define a set of APIs for portal computing addressing the areas of aggregation, personalization, presentation and security [8, 9].

According to the JSR 168 specification, a *portal* represent a web based application that provides facilities for personalization, authorized access, content aggregation from different sources and hosts, the presentation layer of Information Systems. The pages of a portal include a set of portlets which dynamic generate content for the various users, according to their preferences. A portlet is "a Java technology based web component, managed by a portlet container that processes requests and generates dynamic content. This content is named „fragment”, literally representing annotated text fragments, for example in HTML, XHTML or WML. Portlets are used by portals as pluggable user interface components that provide a presentation layer to Information Systems. Thus, a portal may be thought as a complex Web site that assemblies various contents generated and presented to the final users by the portlets.

The portlets can be executed on the local machine, or could be invoke at distance by a portal, via a web service, through the agency of a request/answer paradigm implemented by the portal. For this last aspect, there exists another specification, provided by the Oasis organization (<http://www.oasis-open.org>), named Web Services for Remote Portals (WSRP). The development of JSR 168 specification took into account the WSRP specification. Generally, the portal server includes the portlets container, but also is possible to store at distance the portlets.

So, a portal window is divided in many sub-windows, in every representing a content generated by a portlet. A portlet window includes, nearby the properly content, a personal title, and some control buttons for maximization, minimization, closing, content visualization or editing. The changes made by a user inside his own portal window shall be visible only to him, being kept from a session to another.

The first important portal technology was developed by the research team of IBM. The actual WebSphere application integrates a portal server compatible with JSR 168, but is very expensive. There exist also many free portal servers, accommodated with the JSR 168 specification. We give below a general overview of some such portal servers, successfully used in education:

- *Grid Sphere* (<http://www.gridsphere.org/>): is a portlet API implementation nearly fully compatible with IBM's Web Sphere 4.2. Includes a higher-level model for building complex portlets using visual beans and the Grid Sphere User Interface (UI) tag library. Flexible XML based portal presentation description can be easily modified to create customized portal layouts. Has built-in support for Role Based Access Control (RBAC) separating users into guests, users, admins and super users, and integrated Junit/Cactus unit tests for complete server side testing of portlet services including the generation of

test reports. Grid Sphere core portlets offer base functionality including login, logout, user and access control management.

- *Pluto* (<http://jakarta.apache.org/pluto/>): the Reference Implementation of the Java Portlet Specification. The current version of this specification is JSR 168.
- *Jetspeed* (<http://jakarta.apache.org/jetspeed/site/index.html>): is an open-source implementation of the Enterprise Information Portal, using Java and XML languages, and being part of the Jakarta Apache project (<http://jakarta.apache.org/>). It provides abstract specifications for portlets, that could be instantiated and personalized.
- *JA-SIG uPortal* (<http://mis105.mis.udel.edu/ja-sig/uportal/download.html>): is Java Open Source platform (JA-SIG) for developing educational portals, respecting WSRP standard (not JSR 168). Provide abstract specifications for community tools, such as chat, forums, survey, and so on, build relationships among campus constituencies, providing the opportunity of their instantiating and personalizing. So, uPortal is an open-standard effort using Java, XML, JSP and J2EE.
- *Oracle iPortal* make use of many open standards: HTTP, XML, SOAP, Java, J2EE, Web services, WebDAV, wireless communication protocols. It has an open architecture, integrating, for exempla, various applications such Exchange, Lotus Notes, etc. For accessing local and distributed databases, it makes use of PL/SQL. It has implementations for Windows, UNIX, and Linux platforms. It integrates a portlets container, containing the pages with effective information. Includes application of “wizard” type for design and content development assistance for the Web pages inside the portal. It possess a system for user authorization and for access controls management, by using the SSL protocol.
- *UCISA-JISC Portals Forum*: integrates many administration systems (SQL Server, W2K), providing the management of some multiple on-line courses, and even of some Virtual Learning Environments (VLE): 4.000 modules, out of which 400 Blackboard, 200 WebCT, used in 200 schools or educational sites. Also, provide support for the usage of library catalogues (Aleph, Metalib).
- *Jahia* (<http://www.jahia.org/jahia/Jahia>): an integrated web content management and corporate portal server, 100% Java based, available under a collaborative source license (contribute or pay paradigm). It is very easy to install, to use and to administer. It possesses built-in Portlet-based interface, built-in support for standardized java web applications and web services (default servlets supported as portlets). Is integrated with the Apache Lucene Search Engine. Provides JSP and JSTL support for easy templates development. Includes, also, a dynamic XML export module.

- *Liferay* (<http://www.liferay.com/>): is designed to deploy portlets that adhere to the Portlet API (JSR 168). Many useful portlets are bundled with the portal (Mail, Document Library, Calendar, Message Boards, to name a few) and can be used as examples for adding the own custom portlets.
- *Exo* (<http://www.exoportal.org/>): is a powerful Open Source - JSR 168 compliant - enterprise portal built from several modules. Based on the most innovative tools, API and frameworks such as Java Server Faces, Pico Container, JbossMX and AspectJ.

Conclusions

The free portal infrastructure offer is very generous, making use of various and complex technologies. When an institution opts for an open-source e-learning system, it must take into account some specific technical problems (the development resources that are available, functionality needs to be supported, the further developing perspectives), as well as some evaluation criteria for such a system: *scalability, openness, administration, implementation, functionality, effectiveness* [7]. For the interoperability and scalability purposes, it is recommended to be adopted a solution that follow a standard specification, such the JSR 168 for the Java portal technology.

References

1. Ian Dolphin, *Presenting natiOnal Resources to Audiences Locally (PORTAL): integration of national resources with institutional information and services*, UCISA-JISC Portals Forum, UK, 2003
2. Dai Griffiths, *Three metaphors inhibiting progress in Free / Open Source Educational Software (FOSS)*, SIGOSSEE Seminar Limerick 2nd June 2004;
3. Jono Smith, *HE Portals: Key Issues for 2003 and Beyond*, UCISA-JISC Portals Forum, UK, 2003
4. Mike Malloch, *First Inventory on eLearning and Open Source Software (OSS) Projects in Europe*, SIGOSSEE project, 2004: <http://www.ossite.org/activities/firstinventory/view>
5. Liz Pearce, Leona Carpenter, Ruth Martin, *Stakeholder Requirements for Institutional Portals*, FAIR Programme of the JISC, UK, 2003;
6. Rob Reynolds, *Open Source Courseware – Evaluation and Rating*, EdTechPost, 2003: <http://www.edtechpost.ca/mt/archive/000049.html>
7. Tan Wooi Tong, *Free/Open Source Software in Education*, UNDP-APDIP 2004
8. * * *, Java Community Process, Java Specification Requests, JSR 168: Portlet Specification <http://www.jcp.org/en/jsr/detail?id=168>
9. * * *, JSR 168 Portlet API Specification 1.0 Released for Public Review: <http://xml.coverpages.org/ni2003-07-18-a.html>
10. * * *, Joint Information Systems Committee (JISC): <http://www.jisc.ac.uk/>