

DEVELOPMENT OF A LIGHTWEIGHT LEARNING MANAGEMENT SYSTEM USING OPEN SOURCE SOFTWARE DRUPAL

B. Maruthu Pandiyan

Deputy Manager – Knowledge Services, Advinus Therapeutics Ltd, Bangalore

Madhuresh Singhal

Senior Manager – Knowledge Services, Advinus Therapeutics Ltd, Bangalore

Introduction

The evolution of software and access to various resources over the Internet has changed the landscapes on Learning. The internet has become one of the basic tools in teaching and learning. E-Learning is becoming part of our life and numerous E-Learning software is available commercially as well as open source. This article demonstrates a lightweight and less resource intensive, simple to handle Learning Management System, developed using the very popular web content management system Drupal. This also gives a justification for why someone should use Drupal as Learning Management System as well as modules required for this purpose.

E-Learning

In simple terms, e-Learning is electronic learning, in which the learner uses a computer to learn a task, skill, or process. It is also referred to as computer-based training (CBT), web-based training (WBT), and online learning. According to JISC, e-Learning can be defined as 'learning facilitated and supported through the use of information and communications technology'.

Learning Management System (LMS)

An LMS is a software application for the administration, documentation, tracking, reporting, and delivery of education courses or training programs.

Most LMSs are web-based to facilitate access to learning content and administration. They are used by educational institutions to enhance and support classroom teaching and offering online courses to a larger group of learners. LMSs are used by industries and other organizations to support continuous learning initiatives and in house training programs.

Ideal Learning Management System

An ideal LMS should have the following characteristics:

- Web-based or blended E-Learning course deployment.
- Delivering learning resources and content at the right time.
- Course announcements and calendar administration tool.
- Manage users, roles, courses, instructors, and facilities and generate reports.
- Provide self-service learning for students and employees.
- Course calendar, learner messaging and notifications.
- Assessment/testing capable of handling learner pre/post assessment.
- Display scores, transcripts and grading of course work.
- Web-based file management and group work areas for collaborative web publishing Course content annotation facility and bookmarks.
- Web-based email and discussion groups.

Abstract

The use of ICT during the past decade has fundamentally changed the way we learn. E-Learning has enhanced the experience of learning through text, audio, images, animation and streaming videos, which made classroom learning less relevant. There are several open source and commercial tools and software available to provide E-Learning programs with just a click away. This article shares the experience in implementing a custom built lightweight Learning Management System based on Drupal, one of the most advanced web content management systems. It discusses about various modules available in Drupal, which can be used to make it a full-featured Learning Management System.

Keyword:

Learning Management System, Open Source Software, Drupal, E-Learning, Moodle

- Real-time chat rooms and white boards.
- Compliance with various E-Learning Standards like SCORM.

Examples of Learning Management Systems

There are a huge number of LMSs available to choose from, some are proprietary off-the-shelf, some are open source, and some completely custom-built. Some of the most popular LMS are,

Blackboard: The proprietary commercial and very prominent LMS available today, Blackboard has fallen out of favor with the emergence of the other modern and open source solutions. It is regarded as a very rigid LMS.

Moodle: Moodle is a fully featured and powerful open source LMS, has a dynamic open source community of developers and continues to remain flavor of the most academic community.

Sakai: Sakai is a full featured LMS built by Stanford, which has been adopted by MIT, Berkeley, and others. It is not completely open source, but operated on a community backed license.

Canvas: Most robust and full featured LMS offers currently available, Canvas is used in both the higher ed and K-12 segments. It is an open source and open API product, and is one of the few LMSs that has a free mobile app to go along with it.

What is Drupal?

Drupal is free and open source web content management software that allows one to easily organize, manage and publish the content, with an endless variety of customization. With Drupal, one can create, design & display, administer, collaborate, connect, extend, share, organize & find a variety of content.

Advantages of Drupal

- The Drupal is open source software with a strong community of over 648,000 users and over 10,000 developers
- Drupal supports 55 languages and English (the default), including support for all the major Indian Languages
- Regular Drupal Meetups occur across the world
- The Drupal website lists over 15,000 free modules and themes to extend the functionality
- Hundreds of colleges and universities around the globe are currently operating a scalable website based on Drupal.

- Some of the world's powerful websites are built on this flexible, powerful and scalable technology.

Why to Use Drupal as LMS?

There are many specialized LMSs already available as open source and ready to deploy like Moodle, Sakai, etc. Then why to use Drupal as LMS? The reasons are-

Generally, specialized LMSs are resource intensive, needs separate infrastructure to deploy and manage. They occupy huge server space and very complicated to implement. Sometimes there is a need to hire specialized people to deploy and manage.

Thousands of Universities, Institutes of Higher Learning and companies already use Drupal for their Websites, Intranets and other Initiatives. They need not create a new infrastructure to deploy the LMS, instead they can opt for Drupal to build the LMS and manage without any additional resources and expertise. Drupal offers an easy learning curve in comparison to any LMS as it is comparatively easy to install and implement.

Drupal is a very light weight and doesn't occupy huge server resources. The Drupal's nature of modularity helps in achieving what we want rather than what is available. Here are the reasons usually people prefer to use Drupal in comparison to off-the-shelf LMS.

- Off-the-shelf LMSs are just LMS
- Drupal can be anything

Drupal can be anything like website, intranet, community based web 2.0 sites, mailing list or discussion forum, weblog platform, content management system, workflow system, etc. Drupal's community is huge, wide variety of Drupal themes, have many modules that already support E-Learning like activities.

SCORM compliance and implementation of Learning Tools Interoperability (LTI) has made Drupal more attractive for LMS.

Sharable Content Object Reference Model (SCORM) is a collection of standards and specifications for E-Learning. SCORM compliance allows rendering and reusing of educational learning objects between Drupal and other Learning Management Systems.

Learning Tools Interoperability (LTI) is an initiative by IMS Global Learning Consortium to provide seamless access to learner profiles between different Learning systems. In simple terms, it provides a secure way to access different learning courses with one single user profile.

Modules available in Drupal to build an LMS

Drupal is one of the few CMS that has a huge number of modules (approx. 15,000) and growing. These modules extend the functionality of Drupal manifold. The following modules helped us in extending Drupal capabilities to develop it as a full-fledged Learning Management System.

Book Module

(<https://drupal.org/documentation/modules/book>)

A book is a set of pages tied together in a hierarchical sequence, with chapters, sections, subsections, and so on. This module is available by default in Drupal installation. This can be used as books, manuals, site resource guides, Frequently Asked Questions (FAQs), for the online courses. Book module has a cluster of modules to add more functions like translation, role based access etc. There is an outline designer module to design the book pages more intuitive.

H5P (HTML 5) (<https://drupal.org/project/h5p>)

H5P is a very powerful content authoring tool with rich internet content. Flash is fading off and HTML 5 is becoming the default standard for content creation. This module will help in creating question sets, drag and drop tasks, multiple choice tasks, board game, presentation, flashcards and more using Drupal.

All the content in HTML5 will work great on mobile phones, tablets and other mobile devices. With H5P one can create and edit HTML5 content in the web browser just like editing any other Drupal content. Being an authoring tool for rich content H5P also enables site to receive and export H5P files. They work much the same way as flash files works.

Content Construction Kit (CCK)

(<https://drupal.org/project/cck>)

CCK is a set of modules that helps in integrating different types of content such as Audio, Video, Animation ,etc in to any content type with custom fields. This module will be very much helpful in creating course content.

Course (<http://drupal.org/project/course>)

This module allows any content-type to be used as an e-learning course, containing any number of graded or ungraded course objects. It has APIs to control enrolling, taking, and restricting access to courses, configurable outline access control based on time, conditions (object start, completion, grades), Framework for external learning application integration (such as Moodle). Enrollments and attendance sub-module can be used for registration and attendance management system. Attendance can be a requirement for completion of a course.

Exercise Planner

(<http://drupal.org/project/exercise>)

Exercise Planner allows teachers to create exercises, and students to combine exercises into exercise plans. Calendar helps in creating long term plans, periodic plans and workout for each user.

Instant messenger

(<http://drupal.org/project/im>)

This module allows registered users to chat/communicate via instant messaging in real-time. The IM module uses jQuery and Ajax, and hence not requiring any external instant messaging protocols and/or servers.

Forum

Forum is a core module in Drupal that enables threaded discussions about each course and enables learners and instructor to discuss various topics.

Event (<http://drupal.org/project/event>)

This is a simple module to keep track of events and show them to users in various calendar displays. It also provides an event API to allow other modules to store and work with date data.

Course Credit

(http://drupal.org/project/course_credit)

Course credit allows an administrator to assign and map credit types to learner profiles and courses. Learners will receive a certain number of credits on completion of an activity. Credits can be configured based on the activities and type of learner.

Quiz (<https://drupal.org/project/quiz>)

The Quiz module provides tools for authoring and administering quizzes through Drupal. A quiz is given as a series of questions and scores are then stored in the database. This module provides tools for online courses (Audio and Video enabled), Self-learning programs, Training programs, Supplementary classroom activities.

Quiz Assignment

(http://drupal.org/project/quiz_assignment)

It allows creators of quiz to add a quiz assignment question type. This is very useful if uploading of a file is part of a quiz/test. When added to a quiz, the user will be given a file input field to use to upload locally stored files to the server. The quiz instructor can then download this file and score it.

Question Types can be Multiple Choice, Drag and drop (with lines), Scale, True or False, Matching, Short Answers and Long Answers.

Certify (<http://drupal.org/project/certify>)

A module for issuing PDF certificates to users upon completion of a set of conditions (courses). It allows certificate creators to create their own PDF templates for the certificates.

Views (<https://drupal.org/project/views>)

Views are a group of modules, provides extensive customization in terms of reports and analytics. The default views ,of course contents and users can be modified. Views support graphs and diagrammatic representation of values. This helps in analytics such as the number of student’s enrolled, active participation and completion etc.

SCORM Cloud (https://drupal.org/project/scorm_cloud)

SCORM Cloud can be integrated with Drupal. This module provides an API to allow SCORM courses to be uploaded through Drupal site for hosting, delivery, and tracking through the SCORM Cloud. The module allows Drupal users to register for and take the uploaded courses. In depth reporting is available per course and per user. This transforms a Drupal website into a powerful Learning Management System (LMS).

LTI Tool Provider

(https://drupal.org/project/li_tool_provider)

This module allows a Drupal site to serve as a Learning Tools Interoperability (LTI) in any Learning Management System (LMS) supporting the LTI standard. Example, LTI compliant LMSs are Angel, Blackboard Learn, Moodle and Sakai.

Drupal Distributions

One of the unique features of Drupal is “Drupal Distributions” or “Installation Profiles”. Distributions provide features and functions to build a specific type of site, as a single download containing Drupal core, contributed modules, themes, and pre-defined configuration.

Drupal already has several Distributions dedicated to LMS, such as ELMS, ADRENNNA etc.

This makes it possible to quickly set up a complex, user-specific site rather than go through all the hassles in identifying, installing and configuring modules individually.

Conclusion

E-Learning and Learning Management System landscapes are ever changing and new technologies are becoming part of the Learning Initiatives. Many institutions have already implemented Drupal as a platform for their intranet and internal communication. In this article, we have seen the advantages of using Drupal over off-the-shelf LMS. This article covers the basic requirements to convert the existing Drupal system into a full-featured LMS. Drupal can act as a Content Management System (CMS), Intranet and LMS, all-in-one, for the organization. This article will be handy for the people who don’t want to introduce new software and can implement the E-Learning capabilities with existing infrastructure.

References

1. What is E-Learning (2010). Retrieved from <http://www.digital-harbor.net/>
2. Introduction to E-Learning (2010). Retrieved from <http://www.jiscdigital media.ac.uk/guide/introduction -to-E-Learning>
3. Learning Management System. (2014). Retrieved from http://en.wikipedia.org/wiki/Learning_management_system
4. LMSs and More: Drupal in Education. (2013) Retrieved from <http://fourkitchens.com/blog/2013/02/14/lms-and-more-drupal-education>
5. Drupal - Open Source CMS. (n.d.). Retrieved from <http://www.drupal.org>
6. Moodle – Open Source Learning Platform. (n.d.). Retrieved from <http://www.moodle.org>
7. E-Learning – Wikipedia. (2014). Retrieved from <http://en.wikipedia.org/wiki/E-learning>
8. Anderson, T. (2006b). Teaching a Distance education course using educational social software. Retrieved from <http://terrya.edublogs.org/2006/01/02/teaching-a-distance-education-course-using-educational-social-software/>
9. Chatti, M. A., Jarke, M., & Frosch-wilke, D. (2007). The future of e-learning: a shift to knowledge networking and social software. *International Journal of Knowledge and Learning*. doi:10.1504/IJKL.2007.016702

References

10. Ollendyke, Bryan. (2011). *Rumblings of the Drupal LMS*. Retrieved from <http://btopro.wordpress.com/2011/06/15/rumblings-of-the-drupal-lms/>
11. Ollendyke, Bryan. (2013 November 01). *Learning Tools Interoperability in Drupal! (and why you should care)*. Retrieved from http://courses.semo.edu/library/infolit/apastyle_web.htm
12. Price, heather. (2013 July 25). *E-Learning Frameworks and Tools Programme*. Retrieved from <http://www.jisc.ac.uk/whatwedo/programmes/elearningframework.aspx>
13. Robertson, J. G., & Fitzgerald, B. (2013). *Drupal for education and e-learning: Create web-based, content-rich tools for teaching and learning*. Birmingham: Packt Pub

