

## HOW TO BUILD, DEVELOP AND MAINTAIN AN EDUCATIONAL WEBSITE USING AN OPEN SOURCE FRAMEWORK

**Adrian Runceanu**, *University Constantin Brancusi of Targu-Jiu, ROMANIA*

**Marian Popescu**, *University Constantin Brancusi of Targu-Jiu, ROMANIA*

**Ilie Borcoși**, *University Constantin Brancusi of Targu-Jiu, ROMANIA*

**ABSTRACT.** In this paper we present how to design and implement an educational website, with the Drupal framework. We describe the tools used to create an interactive site and we present a case study of a website with educational content.

**Keywords:** framework, databases, content management system, wikis, educational technology

### INTRODUCTION

#### 1.1 Introduction

Not every programmer knows how to program the web using HTML, PHP, Javascript and MySQL to update information on the web. Today in the industry, advertising products desired by improving communication, e-commerce, without hindering this work. Importantly, organizations will publish and update information on the website without knowing anything about a software application to be used in a web browser. Also, people want to share ideas, to retain references lists sites, details about specific technological configurations, lists of upcoming events and encounters, and all they want without being limited by technical details.[12] The best solution for the needs of these organizations and individuals is to use a content management system. In his work [4] describes the use CMS to create portals and e-commerce sites, to blogs and wikis.

"A content management system (CMS) can be defined as a database of information and a way to modify and display information without losing time with the technical

details of presentation". [12] A CMS provides anyone who doesn't know HTML, PHP, Javascript and MySQL, ability to manage, update, upload and delete content from a website without the advice of a competent web programmer. [10] If you want to use a CMS, it is not necessary to write HTML code, and then it reduces the time to develop a web project. CMS also allows the development and organization of web content in a flow manner, which ensures that their web projects reach their goal of economic activity.

With a content management system, a website developed by a web developer can be updated by any member of an organization or to any individual. And this without aggravate shrink the company's activity and effectiveness of a company.

Content management systems classifies tasks as:

- Web pages
  - Presentation: designing templates for content; layouts and appearances
  - Content: according content life cycle, these tasks are authoring, reviewing and publishing content, update or removing expired content, etc.

➤ System management: manage users,

roles, system configuration, etc.

## 1.2 CMS. Definition

A content management system is software that enhances initiation or training, handling and elimination of information in the form of images, documents, scripts, and plain text [8].

"CMS increases overall operational efficiency by automating processing of personalized content management interface rules and workflow extension". [7]

"Content Management System is a standardized process and organized supply, creation, processing, management, presentation, processing, publishing and content reuse". [11]

A content management system (CMS) is a computer application used to create, edit, manage and publish content in a consistent organized manner. CMS are frequently used for storing, controlling, and publishing industry-specific documentation such as news articles, operations manuals, technical manuals, sales guides, and marketing brochures. The content managed may include computer files, image media, audio files, video files, electronic documents and web content. [9]

A general definition of a content management system is that, a CMS is a facility that is used to manipulate content on a website.

## 2 Drupal

### 2.1 Introduction

Drupal is one of the 12 most popular sites OSCMS. [15] It started as open-source software in 2001, when the source code was released by Dries Buytaert, Drupal founder

and project manager. Drupal.org is the official website of Drupal CMS.

This site provides a structured and consistent content about Drupal, and contains a community of developers and users who contribute effectively to the development and improvement of the software daily.

Drupal is used in order to build various web applications, based on portal sites, site of the business community, and reaching news publications, websites of companies, electronic content site [6]

Drupal is easy to use and contains many modules and libraries. Drupal web applications developed are reliable, robust, efficient, extensible and flexible.

Drupal is operating system open source (OSCMS), comes under the General Public Licence GPL restrictions. This license gives freedom to share and change any part of the Drupal source code. It is not possible to make the software type using Drupal site owner. That restrictive occurs if you change any part of the Drupal source code and build it software in order to make money, then you must provide the source code of software for anyone who asks for it and distribute software under GPL. [8]

Drupal is written in at least six (6) Programming Languages: PHP, SQL, HTML, CSS, XML, and JavaScript. [2]

Drupal also uses database open source: MySQL and PostgreSQL for storing contents and settings. It is multiplatform software and runs on various platforms such as Windows, Mac OS X and Linux.

At present the current versions of Drupal 7.xx which are characterized by better administrative interface, but with some

problems with some modules on the support.

The above design features match the essential features for a Web 2.0 site as listed below, which is why the author selected Drupal to construct it, as Drupal is a virtual construction kit for Web 2.0 applications:

- Users as first class entities in the system, with prominent profile pages, including such features as: age, sex, location, testimonials, or comments about the user by other users.
- The ability to form connections between users, via links to other users who are “friends,” membership in “groups” of various kinds, and subscriptions or RSS feeds of “updates” from other users.
- The ability to post content in many forms: photos, videos, blogs, comments and ratings on other users’ content, tagging of own or

others’ content, and some ability to control privacy and sharing.

- Other more technical features, including a public API to allow third-party enhancements and “mash-ups,” and embedding of various rich content types (e.g., Flash videos), and communication with other users through internal e-mail or IM systems.[3]

## 2.2 How to use Drupal

It is very important to know what technologies are used in Drupal, because this allows us to know what are the things needed to develop a Drupal site. Since Drupal is multiplatform software, we do not care to take into account the operating system when you start to build a website with Drupal. The technologies have to take into account when you start working with Drupal are: web server, database and language interpreter.

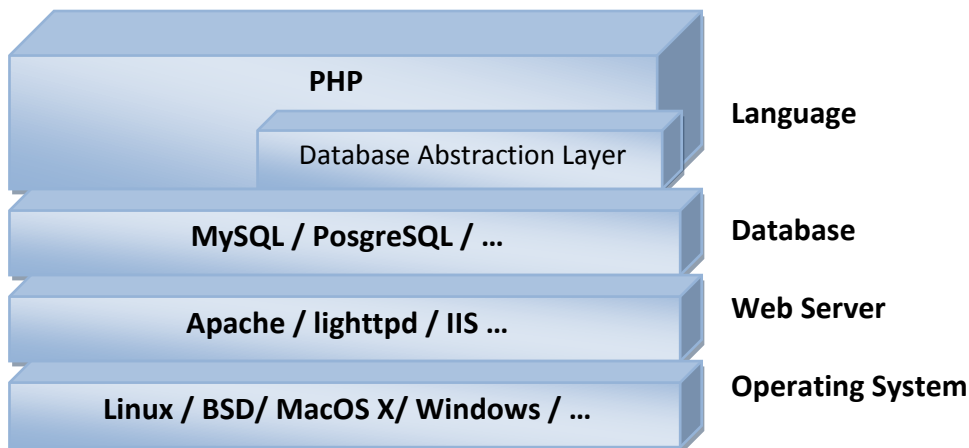


Figure 1. Drupal’s technologies requirements

## 2.3 Structure of Drupal

Drupal structure could be said to contain many different parts, the exact structure depends on the richness of the site.

Although, all Drupal sites contain 2 basic structures: The Drupal core and The Theme engine.

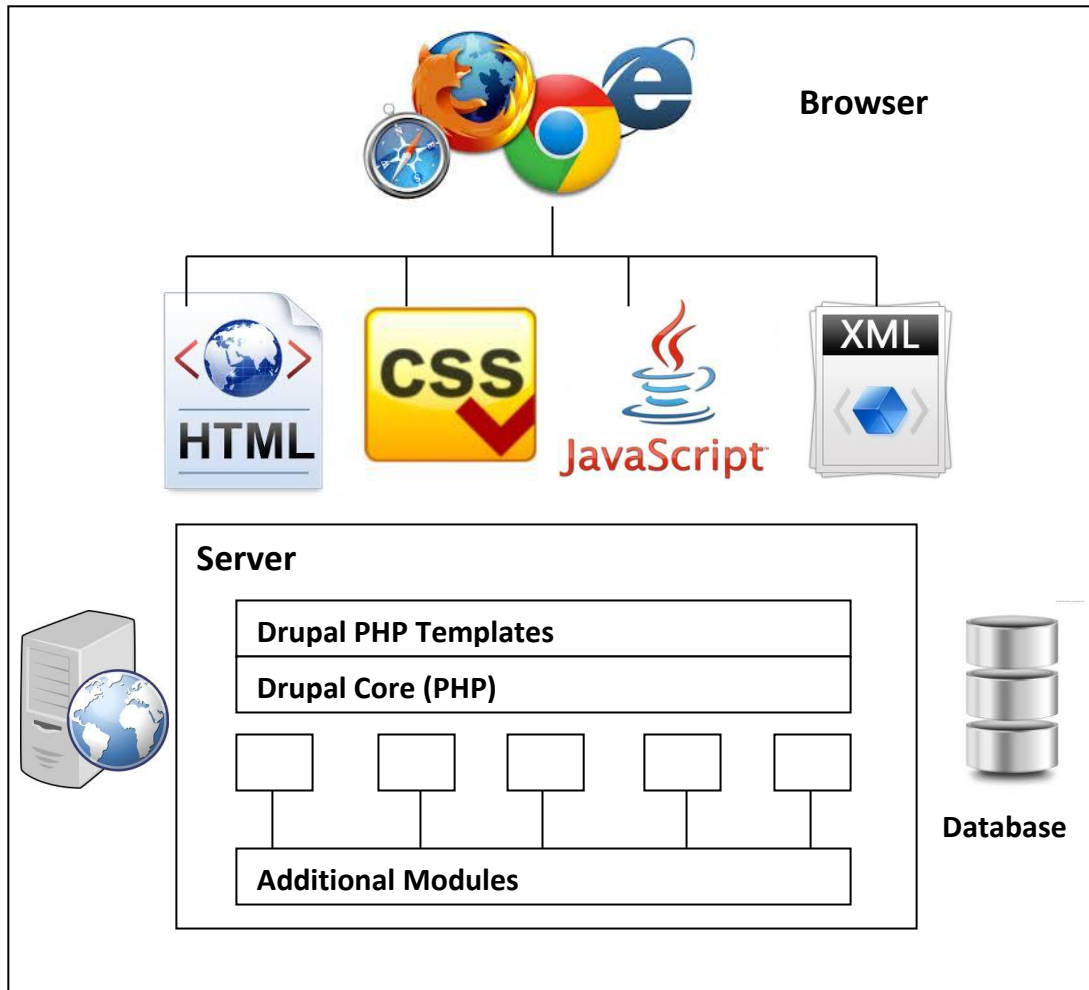


Figure 2. Drupal's structure

The Drupal core is the Drupal folder that is downloaded from the drupal.org, and it is the heart of Drupal. The Drupal core provides main functionality to be used by other parts of Drupal system. It contains: codes that assist the Drupal system to respond when it takes a request, libraries for running Drupal, and Core modules-modules that provides basic functionalities for Drupal system. Drupal core takes data from contributed modules, custom modules, core modules, and database and hand them over to the theme engine.

The Theme engine is responsible for receiving the data from the Drupal core and rendered them for display in the web browser. That is, Drupal uses PHPTemplate - a theme engine, for formatting and to layout HTML, CSS, and XML for display

in the browser. There are many theme engines such as Smarty, XTemplate, PHPTemplate, and PHPTal. Drupal makes use of PHPTemplate as its theme engine [13]

The Contributed modules and themes are the modules and themes developed or put up and maintained by the Drupal community. Any individuals with Drupal development interest can be part of the Drupal community.

The Custom modules and themes are implemented or developed, and customized by individual Drupal site developer. This is usually done when a drupal site developer couldn't find a suitable module or theme for his/her site need.

### 3. Wiki

As general content management system, Wiki makes users create and edit web content in simple ways, and embed hyperlinks in content for cross references. Contrast with blog, wiki emphasizes collaboratively authoring web content and democratically using web content. Users could author content in uniformed styles and formats by following guidelines. Even more, many wiki websites allow end-users edit content without login to encourage sharing knowledge. Compared with other types of content management system, wiki strengthens version control of content and weakens management of content. Based on open editing and believing in democratic use of content, it is supposed that all authors are well-meaning and devote correct knowledge. It is unnecessary to manage content. Nevertheless, it is hard to promise there are no mistakes in content. In addition, users might abuse this feature to ruin constructed and correct content. Wiki is often applied as online encyclopaedia because of collaboratively authoring. One famous example is Wikipedia [14]. It is also used by groups to collect all works together, like translating articles, developing software, sharing notes among students, and so forth. In briefly, wiki is suitable for sharing knowledge by group work.

We present an on-going implementation of a portal for students at academic specialization Automation and Applied Informatics. Through a wiki type environment - namely DokuWiki, we implemented a collaborative site through which encourage, on the one hand, the active participation of students in solving practical laboratory activities, and on the other hand, to increase students' curiosity read educational materials before their presentation and laboratory course. In future implementations we will try to include a compiler for developing applications in C/C++, PHP and Java.

### **3.1. Using wikis for teaching a computer programming course**

Computer programming is an introductory course in the study of computer programming, presenting concepts and concepts, and develops practical skills related to writing programs using the programming language C/C++. Until now necessary bibliographic materials uptake of such course consisted of books published in the past years [1] [16] and the lecture notes PDF of the slides presented in class. It was a challenge for students to master course content based only on the notes they took of the course, the source code shown in laboratory activities and slides provided on the course website.

To improve teaching strategy used in teaching this course, I started to put all teaching material on the wiki (Figure 3). We know that a course website posted a syllabus, outline, hand-outs, files, and assignment instructions.

This wiki contains detailed explanations of the material presented in the course, with special emphasis on explaining the source code examples. In addition contains proposed for solving problems and suggestions for the study of individual students by sending links to more complex materials. Editing the wiki is relatively simple and transparent, leading to understanding the overall idea of the material presented, but the blocking study in unnecessary details. It also encourages students to break the material into simple segments and then linking them dependency for understanding more advanced concepts. Possibility of including programming code proved to be very useful for most theoretical part of the course. We used and inserting graphics where the process is more effective to explain some concepts.



Figure 3 Syllabus for Programming course

Wiki of Computer Programming course started from February 2013 and now contains about 15% of the course material. Explanations appear both teachers and assistants and the students as semester progresses. The material will completely cover sheet discipline and goals to be achieved by presenting these notions of programming. Of course, any implementation of wikis, we don't have a deadline, but a reasonable stage of implementation.

### 3.2. Wiki-Based Instruction

This approach is not a substitute for learning by completing information from books, but is meant to be a teaching tool which is based on participative learning of students in the teaching process. Since the wiki is a collaborative tool, allowing teachers and assistants to involve students in the creation phase and especially to improve the contents. This course encourages students to come up with solutions and explanations presented well

than new beginning. Of course those who are involved in this process are rewarded with points of evaluation laboratory work. We want the students to write their wiki as part of work activities at home. This way motivate and transform students into active participants in the educational process. And it is also a way of research to suggest ways to better understand the concepts as they are put in a position to explain to others. It is known that humans are far better concepts you need to explain to others. This small experiment which we performed is well received by students and we want to continue and improve it further.

Wiki type software that we use (DokuWiki platform) provides simple ways for the administrator to view recent changes to the article and especially the opportunity to return to a previous version if changes made introduces concepts and examples without prior documentation. It is quite easy to monitor new articles added. Because there is a connection, it is easy to see which student has made some changes and here to reward good work, to warn the

good little editing, or to note that some students were not involved in editing and participation in collaborative learning activities. Each access journals retain wiki page, not just editing. In this way, the teacher (or assistant) to ensure that the student has read the material presented in lecture / laboratory so that teaching will become more interactive and efficient. Thus we can deactivate that account type can

allow anyone access to view the contents of the wiki without connection.

In addition to the course page C++ code presented as examples of programming concepts, we have included links to two online compiler source C++: <http://codepad.org/> (Figure 4) and <http://ideone.com/> (Figure 5). Thus students can try their online codes created and send links to solutions obtained.

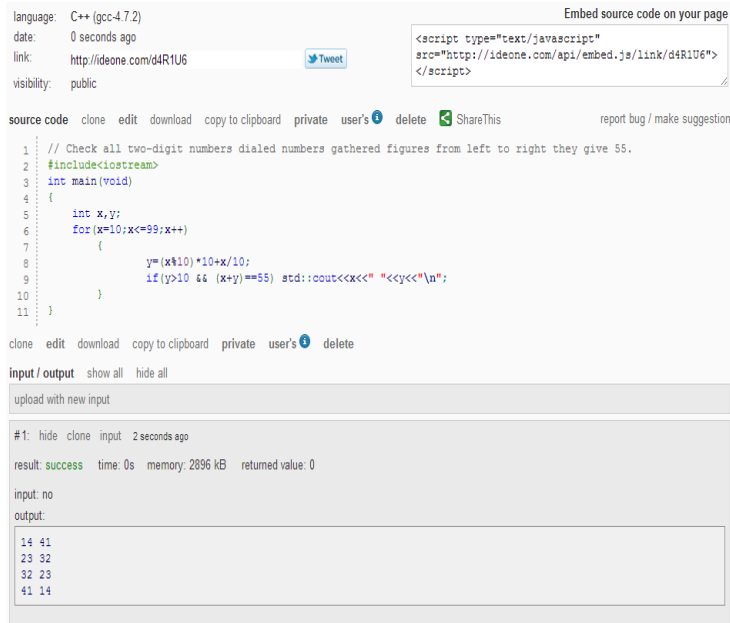


Figure 4 Example of online compilation of a C++ source code in ideone.com



Figure 5 Example of online compilation of a C++ source code in codepad.org

## CONCLUSION

I think this wiki page that I implement for teaching computing programming is just a start for an educational portal for my students at Automation and Applied Informatics. I will try to develop an online compiler for some programming languages, for use in educational process. The goal of this article is to present how to develop different web applications with desired functionalities using content management systems - Drupal. We present how to design and implement an educational website, with the Drupal framework. Our university website will be reconstructed with Drupal. Now we develop some faculty sites using Drupal with some educational modules like Wiki.

## REFERENCES

- [1] Adrian Runceanu, Programming methods and techniques. C + + - laboratory guide, Academic Publishing Brancusi, Targu-Jiu, 2003
- [2] Butcher, M., 2009. Drupal 6 JavaScript and jQuery. Packt Publishing Ltd. Olton Bir-Minghua, UK.
- [3] Cormode, G., & Krishnamurthy, B. (2008). Key differences between Web 1.0 and Web 2.0. First Monday, 13(6). Quoted February 23, 2013 from <http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/2125/1972>
- [4] Delgado, B, Daniel. 2007. Inspiring teamwork & Communication with a content management system. ACM Digital Library URL: <http://dl.acm.org/citation.cfm?id=1294060> Quoted April 16 2013
- [5] Douglas L. Holton. Blended Learning with Drupal, MERLOT Journal of Online Learning and Teaching Vol. 5, No. 2, pg. 348-355, June 2009.
- [6] Drupal, 2002. URL: <http://drupal.org/> Quoted April 29, 2013
- [7] Ericsson highlights watchpoint CMS, 2010. Raheem, M. 2010. Investigation, installation and implementation of an open source content management system. Theseus: electronic library of the University of applied sciences.
- [8] Mercer, D, 2010. Drupal 7 Create and operated any type of website Quickly and Efficiently. Second Edition, Packt Publishing Ltd. Olton Birmingham UK.
- [9] OSCI. The Open Source Collective, Inc. 2002. "OpenSourceCMS", <http://php.opensourcecms.com/scripts/show.php?catid=1&category=CMS%20/%20Portals> Quoted 10.04.2013
- [10] Robertson, 2003. Chocha, Z. 2010. Joomla website project for norsad agency. Theseus: electronic library of the university of applied sciences.
- [11] Rothfuss, 2001. Ivanova, V. 2009. Content Management System Implementation Efficiency and Value. Theseus: electronic library of the university of applied sciences.
- [12] Simpson, L. Doug, 2005. Content for one: developing a personal content management system. ACM Digital Library URL: <http://dl.acm.org/citation.cfm?id=1099512> Quoted April 14 2013
- [13] VanDyk, J, 2008. Pro Drupal Development. Second edition, Apress Media LLC. New York City, USA.
- [14] <http://www.wikipedia.org/>. Wikipedia. Wiki. Retrieved April 29, 2013 from the World Wide Web: <http://en.wikipedia.org/wiki/Wiki>.
- [15] <http://spyrestudios.com/free-content-management-systems/> - Top 12 Free Content Management Systems (CMS), April 29, 2013
- [16] Adrian Runceanu, Mihaela Runceanu, Getting programming in C + +, Academic Publishing Brancusi, Targu-Jiu, 2012